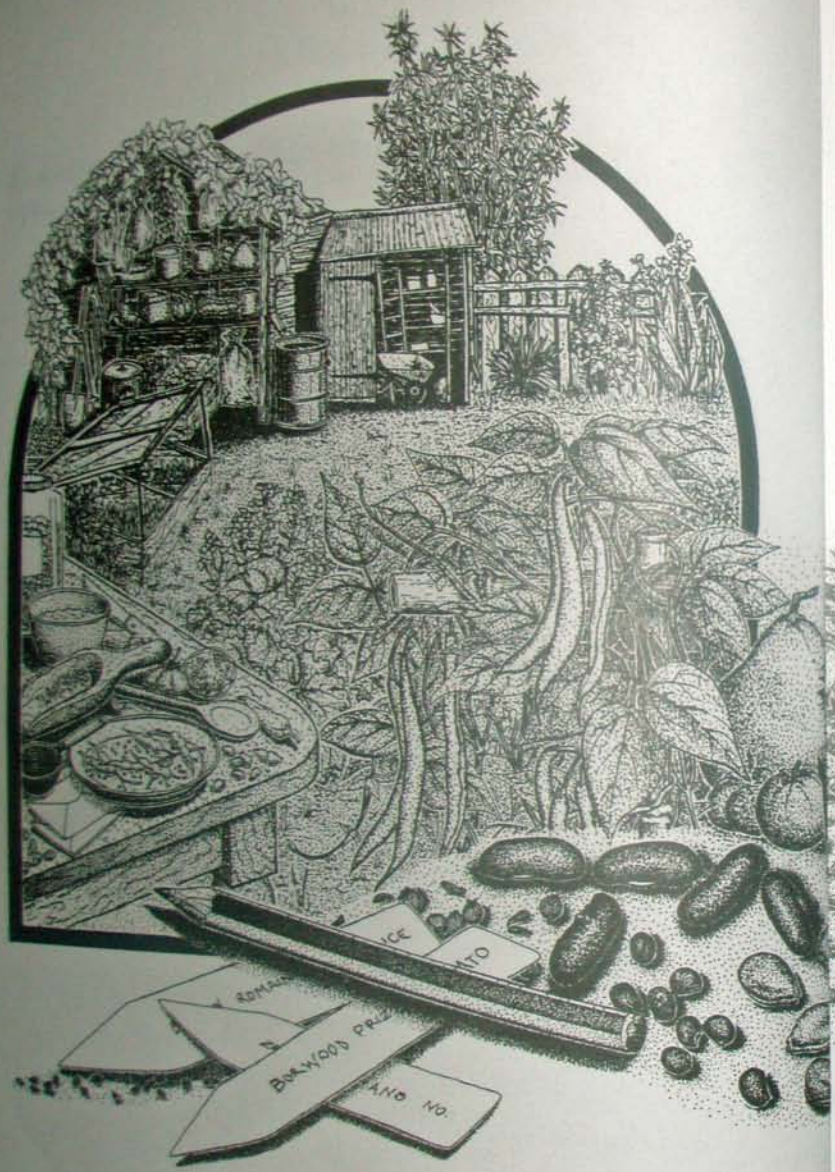
the Seed Savers' Handbook

Michel & Jude Fanton

illustrated by Alfredo Bonanno



The Seed Savers' Handbook

by Michel & Jude Fanton

The founders of Australia's Seed Savers' Network show how gardeners can protect our global food heritage — and eat it too. The seeds and growth cycles of 117 vegetables, culinary herbs and edible flowers described in detail.

Illustrated by Alfredo Bonanno

A Seed Savers Book

Ce livre est dédié
à la mémoire bienveillante de nos parents,
et à la gloire de nos enfants

5000 printed in 1995
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A Seed Savers Book

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Disclaimer: Whilst we have attempted to identify the common uses for some of the types of plants described in this book, we make no claim whatsoever as to the medicinal uses of the plants. We have attempted only to provide readers with general information in this regard. For specific complaints, see your health professional.

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Preface

Without Seed Savers' Networks, Seed Exchanges and local Seed Banks, we gardeners would have lost most of the seeds developed by our ancestors – mainly by women and elderly gardeners. Many of us remember our grandmother's seed jar and the paper bags of seed pods drying in kitchens.

It is a public scandal that these seeds have now been patented or subjected to legal controls – by politicians and lawyers who have no real interest in seeds. It is also scandalous that large multinational corporations have gained control over our main food plants via seed patenting. Without dedicated home gardeners, the seeds of our staple foods could not exist. Such seed resources are only safe in the hands of people who save and grow them and eat their bounty; they are lost in "collections" or storage, or in hybrids wholly owned by multinationals.

Jude and Michel Fanton are old friends who have devoted their time and work to locating and exchanging Australian heritage seeds, that is seeds which can be kept true to type in local conditions, and above all open-pollinated seeds which maintain vitality of production year after year, without expensive biocides or heavy artificial fertilizers.

Today, urea or nitrogenous fertilisers prevent essential amino acids forming in grains, hence lowering protein production levels by between 20 and 60 percent. While superphosphate adds cadmium to soils and crops and reduces the essential zinc levels in food from 20 to 50 percent of our needs, traditional and conservative gardeners are producing food that is truly fit to eat!

This book will be of immense use to all of us who grow or want to grow good food in our gardens and on our farms. We may yet produce healthier children with discriminating tastes, and raised on home-grown food, like us older people.

I believe this book to be essential for all caring gardeners, farmers, cooks and parents and I trust that it will speed our return to good nutrition and a healthy society. My warmest wishes go with it. Everybody needs a "life membership" of a Seed Saving Exchange. Bon appetit!

Bill Mollison
(The Permaculture Institute)

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Last, our children, Julien, Aimée and Zephyr for looking after us in the long course of this book's production.

The Illustrator...

Alfredo Bonanno was born in Italy, and grew up in the city of Torino. He studied photography and graphic design and came to Australia in 1981 and settled later in northern NSW.

Illustrating this book has opened new dimensions for him.

I have taken to my heart the joy of gardening, the pleasure of eating and testing vegetables previously unknown to me and of rediscovering the real flavour of the more traditional ones.

The illustrations were a challenge because I wanted to portray the different stages of growth of the plants, emphasising the aspects of propagation. A lot of plants do not have their edible parts, their flowers and their seeds appearing at the same time, so I have used a little artistic licence.

Whenever possible I have drawn from live specimens collected in our home garden or from friends. This has sometimes been difficult, as for example when Jude cut her finger badly while trimming some peruvian parsnip roots for me to take home to draw. At other times, the experience was hilarious, as when I got the same massive specimen home and had to keep all 12 kilograms of roots, soil and earthworms still on my small table while I was drawing them.

I wish to thank Jenny, my companion, for her patience with my long night sessions at the drawing table; Darel, my five year old son, for being a fast learner about where all those seeds should be planted in the garden; and a special *"grazie"* to Jude and Michel for encouraging me to grow all those delicacies.

Introduction

Gardening is one of Australia's most popular pastimes, as well as being a healthy and practical pursuit. However too few of today's gardeners do what came so naturally to their ancestors – save the seeds of their crops.

Until recent times all gardeners and farmers were the stewards of the plant heritage that sustained us. Over the centuries it was seed saving that enabled people to domesticate wild plants, and this allowed communities to settle.

Through years of consciously selecting their fruit, vegetables, grains and flowers, yesterday's gardeners produced the diversity of crops that we have come to enjoy.

The diversity of life (bio-diversity), that is essential to our survival, is quietly eroding. Far fewer locally adapted strains are available today: the strains that have the particular characteristics of taste, and of pest and disease-resistance, that are so useful to the no-spray gardener.

Why is this happening, when the skills that a gardener requires to help maintain our plant heritage are so few and so simple? Why have half a dozen strains of red shiny cricket balls replaced juicy, delicious tomatoes whose gene pool features hundreds of different strains?

To save good seeds you need only follow what the plant do naturally. But you do have to start with an original and viable seed stock.

The way food is mass-produced and distributed today dictates plant breeding and seed production worldwide. It stands to reason that, when plants are engineered for specific commercial features, other valuable characteristics are inevitably lost. Tomatoes harvested by machine, dumped onto conveyor belts and hauled long distances by truck need to be very tough indeed, but not necessarily tasty or nutritious!

Citing this "tasteless but tough" commercial tomato as a "prime example" of the problem, the eminent Australian seed physiologist Dr. David Murray notes that, "Flavour and aroma constituents are major determinants of ... quality in fruits, vegetables and grain crops, but this aspect ... has often been ignored in past breeding programmes". (Murray, ed., *Advanced Methods in Plant Breeding and Biotechnology*, 1991)

Most commercial enterprises concentrate on breeding hybrids, not open-pollinated varieties. But hybrids are not suitable for seed saving because they revert to their highly inbred parents, or are simply as sterile as a mule.

The end result of these trends is that gardeners are left with a dependency on corporate-controlled hybrid vegetable and flower seeds that require purchasing each year – at further cost to the gardeners. Of course, this is a positive attribute for agrichemical corporations!

Furthermore, hybrid plants are genetically uniform. Hybrid seeds will produce practically identical plants, which will succumb all at once when there is a disease or pest problem. In a small garden, differences among plants allow different reactions to pests. Uniformity is quite contrary to the requirements of the home gardener.

Hybrid vegetables are designed to mature all at the same time. Farmers under contract to a cannery need their beans, or tomatoes, to ripen simultaneously in order to minimize their harvesting costs, but home gardeners need their crop to ripen progressively so that there will be enough fresh produce for many meals.

Commercial growers need a vegetable that has been bred to cope with travelling to distant markets. The home gardener's crop needs to travel only as far as the kitchen. Home-grown beans can be as tender as possible and tomatoes as juicy as peaches – unlike the tasteless, market-bound varieties.

The Seed Savers' Trust invites you to help preserve the rich diversity of food crops before it

disappears, both for our own future and the future of our descendants.

Seed saving can be as simple or as involved as you wish. It can be about acquiring and maintaining old varieties and passing on the seeds to neighbours or friends. Or it can be detailed and scientific, relating to breeding for specific conditions, such as saline soils. It's up to you.

Whichever type of seed saver you choose to be, or might be already, there is a dynamic to it. It has to do with self-reliance.

We can help ourselves to become independent again by saving seeds and passing on knowledge about propagation and plant usage. By regaining control of our food, we strengthen our own security, the genetic integrity of our traditional crops and the potential to develop useful varieties that are adapted to the climate, the soil of the region and local pests.

Already some native Australian food crops, like the quandong, finger lime and macadamia, have been improved by selecting plants that are more palatable under cultivation. There is enormous scope for more bush tucker on the table.

Seed saving is an enjoyable activity that everybody can undertake. It is fascinating to watch plants flower and go to seed, to see all the different forms of the young seedlings, to witness how they change over the years, and to become familiar with them. It satisfies our curiosity about the cycles of living things.

Wise gardeners in Australia and New Zealand have saved the seeds of vegetables, flowers and herbs that have been cultivated by their families for as long as 150 years. In the first six years of The Seed Savers' Network we uncovered in excess of 1200 home-saved varieties, only a few of them available through commercial channels.

Our aim is to maintain these varieties in as many gardens as possible, rather than in a seed bank. We hope that this book will provide home gardeners with the necessary knowledge to become effective seed savers and to protect plant diversity.

The techniques are mostly easy to master and you will notice that we have developed a Simplicity Rating system for the plants described in our Handbook (Part Three, page 51). You can see at a glance whether the plant you have selected for seed saving matches your experience.

For instance beginners can start with tomatoes, lettuce and beans because they do not cross-pollinate easily. This optimizes the chances of future seed purity.

You may choose to caretake only one variety at first, having obtained your stock from a gardening friend, a family-owned seed company, The Seed Savers' Network, your local gardening club or Permaculture group. Soon you'll have an abundance of seeds, and enough experience to go on to greater things.

Good luck, and pass it on!

Michel Jude

MICHEL AND JUDE FANTON

PART ONE

The Issues

1. The Seed Savers' Network

Why Collect?

The living resources described in this book – the traditional garden and farm crop varieties we have in Australia and New Zealand – have never been the object of systematic collection. They have not been described fully and they are rarely discussed in horticultural or agricultural books. The seeds of these plants are not sold in stores, but are passed on from one gardening friend to another. Aware of this official neglect of a part of our cultural heritage, thousands of active gardeners have joined The Seed Savers' Network to evaluate and caretake this rich heritage. More will take up seed saving as an integral part of gardening.

Worldwide, there has been a growing concern over the last decade about the loss of genetic diversity in our gardens and on our farms. In September 1991, the Agriculture Committee of the European Parliament established a scheme to conserve plant genetic resources, recommending that European genebank programmes and non-government organisations (NGOs) establish crop networks. Although the 1992 budget for this important work was a mere US $2.5 million, according to *Geneflow* (1992), the recommendation was significant (*Geneflow* is the publication of the International Board for Plant Genetic Resources funded by donor governments of the industrialized nations):

> The importance of conservation carried out by the "informal" sector (NGOs) was revealed at the hearing and it was emphasized that people's initiatives to maintain and use genetic diversity in sustainable farming systems should be encouraged and supported; both formal and informal initiatives are urgently required to stem the tide of genetic erosion and make the best use of conserved germplasm.

Here at The Seed Savers' Network, we are seeking contact with individuals and organizations with similar aims.

Beginnings

An increasingly interested media asks what prompted us to start The Seed Savers' Network in Australia. Michel's favourite response is:

> It was all Jude's fault, because she demanded *only* authentic French cooking. To win her and show off, I had to not only cook the "fair dinkum" dishes but also to *grow* the essential ingredients.
>
> I already had a good kitchen garden with tomatoes, capsicums, dandelion and chicory. But no! to make an authentic dish, I had to have the *right* variety. So to make *her* a summer *Ratatouille Nicoise* (*see* the recipe in Part Three under Eggplant), I went on a search for a special meaty tomato that cooks well – unlike the salad tomato – a capsicum that is both red and green, round and flavoursome *courgettes de Nice* and a strong purple garlic.
>
> It was pure love that made me do that! Many of those seeds were not for sale anywhere and I had to place some ads in *Grass Roots* and *Earth Garden* magazines. The response was overwhelming – an embarrassment of seeds came my way. I had to share them with other gardeners.

Another of our responses is that in 1985 we made contact with David Cavagnaro, an American naturalist and photographer bent on preserving the diversity of edible plants. He was extremely keen for us to start a Seed Savers in Australia. He introduced us to an organization in the USA, the Seed Savers' Exchange founded by Kent Whealy, who was the first Westerner to start a systematic public collection of home-bred garden varieties. His work inspired us and provided a model from which to work. In Austria, Switzerland, Germany and France there were similar NGOs run with public support.

Sometimes we say that The Seed Savers' Network resulted from our habit of collecting unusual and locally-adapted varieties and want-

ing to share them, as well as our passion for growing them.

We had been given some local strains of vegetables that were not available in shops by an old local farmer retiring to the NSW North Coast. We wanted to pass them on to other gardeners to make sure that these special seeds would not be lost if the mice ate them one year (which happened), or if the bees crossed varieties such as the rare, dry and tasty pumpkin he gave us. We also felt that we had to pass on our knowledge about how to save these seeds.

If questioned by a more politically-oriented interviewer, we might talk about the take-over by large international corporations of independent family-owned companies such as Yates. These small companies may still be allowed to trade under their own names, but their output has been "rationalized" in such a way by their corporate owners that the wide range of varieties they used to offer have been cut to just a few, and the seeds of many useful and top-quality vegetables are rapidly disappearing from the public domain.

As a response to this situation The Seed Savers' Network was formed as a rescue service, as were similar organizations in other countries at around the same time. We all thought that the life's work of so many gardeners and seed-people must be preserved.

Bill Mollison, the father of Permaculture, gave us great encouragement to get started. He strongly supported the work of the Seed Savers' Exchange in the USA and was delighted that we were thinking of setting up a similar organization in Australia.

So you can see there were many reasons why Seed Savers came about. We feel that the conservation and education trust that we started in 1986 was only just a beginning.

Seeds, especially of food and other useful plants, should be taken care of *by the people*. They are too precious for all of them to be placed under the exclusive control of the few. The more hands that hold them, the safer they will be.

Seed Savers at Work

What makes The Seed Savers' Network distinctive is that it is doing work of public importance without government funding. It does not sell its seeds, but disseminates varieties that have been overlooked by plant breeding institutions and plant scientists. Even if our agricultural bureaucrats *did* decide to give priority to the collection and maintenance of useful varieties, and to storing them under controlled temperature and humidity for short and long-term use, it would be difficult for home gardeners and farmers to have access to this plant heritage. The institutions are simply not set up to deal with individual members of the public.

At Seed Savers, we promote *in situ* conservation, which means we all look after our plant heritage in our own areas, in our own gardens. This does not have to be a burden. Some Seed Savers have taken responsibility for just one variety and grow it every year. The Seed Savers' Network includes an increasing number of curators who take care of a particular species, for example, one person to conserve capsicums and another onions. For larger plant groups, like beans, main curators have sub-curators to back them up.

We encourage the establishment of heritage gardens in town parks for the conservation of useful plants. As part of their work, such gardens should display the ecosystems in which the plants that have been collected are grown with their natural companions, so that the centres of diversity are represented – a South American garden, an Ethiopian garden, a Chinese garden, and so on.

Plants will go to seed as part of the display. Older gardeners will demonstrate gardening techniques that include seed saving. The stock used will be non-hybrid.

Such heritage botanic gardens would be excellent sites for educational activities. We take heart that gardening is one of the most popular outdoor activities in Australia (*Report of the Committee of Inquiry into Folklife in Australia*, 1987, page 54).

Heirloom seeds that have been passed on carefully from one generation to the next are part of the cornucopia of non-hybrid seeds that is taken care of by active subscribers. Anyone is welcome to play a part in this rescue service. By being part of The Seed Savers' Network you join with others who are actively conserving our heritage open pollinated seeds.

Whether you come as a novice or experienced seed saver, or are willing to organise a local seed saving group, your contribution is greatly valued. You may choose just to contribute financially, send a seed sample to the bank, or offer seed through the exchange in the Spring Newsletter to other Network supporters. You may decide to be more actively involved by trialling varieties, multiplying up small seed samples or becoming a custodian. If you send in a good quantity of seed, or offer seed in the newsletter, you enjoy a reduced subscription for that year.

As a subscriber you will receive newsletters twice a year with seed news, seed-saving tips and a seed exchange through which fellow subscribers offer a multitude of seeds, tubers and other planting material rarely available commercially. Through the newsletter, you may request seeds that you are looking for, or offer your excess seeds. In addition to being able to order seeds from the lists in the newsletters, you can also obtain varieties of seeds during the year by writing directly to the seed bank.

The Network's seed bank is a dynamic collection. Primarily it functions as a point of reception and dissemination and has little focus on long term storage. Very importantly, we maintain records of all the seeds which pass through the Network and tag varieties through generations and different growers with an accession number. The seed centre was established on the outskirts of Byron Bay, NSW, early in 1998 to trial out varieties and as a demonstration and education facility housing the seed bank and offices of The Seed Savers' Network.

The role of The Seed Savers' Network is to ensure that planting material, as seeds or otherwise, is made available to those who want to grow it. There are thousands of useful plants out there awaiting our selection. We encourage you to start a local seed saving group and can support your efforts.

The Seed Aid Trust—the charity arm of Seed Savers—aims to help farmers and displaced people in troubled lands. The Trust also supplies seeds to people who cannot afford them. We have sent parcels of garden and field seeds to development aid workers in villages and towns in Botswana, the Deccan Plateau in southern India, Papua New Guinea, Ecuador and Sarawak. Your community group may like to grow seeds for a specific project overseas.

In 1995 Seed Savers began an energetic programme of advice and training towards the establishment of seed networks in other countries, including The Solomon Islands, Tonga Cuba, Cambodia, Malaysia and in southern Africa. We have participated in meetings in Fiji, India, Zimbabwe, Nepal and the US about the monopolisation of ownership of seeds, genetic engineering, plant patenting and, of course, providing alternatives such as community seed banking.

Seed Savers offers training for these overseas projects at the seed centre. Advanced courses and internships are available to people who are already trainers in their own countries and for people who want to work in sustainable agriculture programmes. See the brown form inside the back cover if you want more information or would like to apply.

Now let's look at seed issues in a global perspective.

2. Background to Biodiversity

When greed was all my love, my strength was none
There is no seed, for those who plant a stone.
Bill Mollison

Seed Homelands

Early this century the Russian botanist Nicholai Vavilov identified places in the world that were the genetic homelands of crops. He called them "centres of diversity" and stressed the importance of preserving them because they were the original habitats of domestic plants and their wild relatives.

Many of these centres were isolated by mountains, rivers and lakes. Because of this, agriculture had remained constant in them over the centuries. They were the cradles of agriculture, where specific plants were first domesticated.

Over time, through human and natural selection, these crops have evolved into new forms with different characteristics, termed "landraces". These landraces contain many genetic variations which give each crop the chance to survive all kinds of environmental changes. Because of this genetic diversity, forward thinking scientists and plant breeders recognize their importance in a world with rapidly changing climates.

Vavilov spent his life collecting plants, travelling to such diverse places as Ethiopia, South America and Japan, as well as throughout Europe and North America. The Vavilov Institute in Leningrad was the first, largest and best seed bank in the world, with 250 000 live seed samples in its safekeeping and farms to grow them out. The dedication of its workers still serves as an inspiration to all.

By the end of the 900 days' siege of Leningrad, when 600 000 people starved in the streets, twenty of the Vavilov Institute's seed bankers had also died of hunger. Those who survived ate sawdust and rats – anything they could find. The director in charge of the rice collection at the agricultural research center died in the gene bank with bags of rice seed surrounding him. They were people who really believed the saying that has become popular now: "these genetic resources are borrowed from our children". (Fowler & Mooney, 1990)

Vavilov also identified secondary centres of diversity to which crops were transported many centuries, even millennia, ago and in which they had become widely and successfully cultivated. For example, Ethiopia – a primary centre of diversity for coffee, millet and sorghum – is recognized as a secondary centre for wheat, which originated in central Asia around the trans-Caucasus, the Volga, Afghanistan and India.

As modern varieties were gradually introduced into ancestral centres of diversity, thus displacing traditional crops, some scientists became concerned about the depletion of the reservoir of these genetic resources. Governments and large companies sent teams of plant scientists to roam the world in search of primitive relatives of the food, medicinal, fibre and oil plants we consume today.

The United Nations, too, through its Food and Agricultural Organization (FAO), helps research bodies, such as the International Rice Research Institute in the Philippines. For many years, the FAO supported and accommodated the International Board for Plant Genetic Resources (IBPGR) which was formed to collect, conserve and evaluate germplasm. This Board now is financially supported by several Western governments, including Australia, and by the World Bank.

Unfortunately, each time scientists return to the centres of diversity, they find that many

varieties are no longer there. The erosion of the genetic diversity of the traditional varieties can be attributed to several factors:

- world wide sale of only a few uniform varieties,
- changes in agricultural practices from small to large acreages,
- disruption as a result of wars and drought (e.g. Afghanistan, Ethiopia, Yugoslavia) preventing seed crops from being grown and harvested.

Reversing the ravages of genetic erosion will help preserve the diversity of our future food supplies.

Life in a Freezer

Officials responsible for genetic resources are saying the situation is under control and that the diversity of our crop plants is not being lost. The US Rockefeller Foundation claims that ninety five percent of the genetic diversity of wheat, barley and corn has been collected and locked away safely in frozen gene banks.

However, the situation is not as rosy as officials paint it. Erna Bennett, first staff member of the Crop Ecology and Genetic Resources Unit of the FAO, notes that the pattern of collection of primitive wheat in Turkey matched perfectly the path of the sealed highway. The scientists never ventured more than a few hundred metres away from their four wheel drive vehicles, the "safe ground" of their civilisation. (*Harvest Edition*, Seed Savers' Exchange, 1987). How many out-of-the-way villages with unique agricultural eco-systems have been missed?

Collections are also not representative because endangered crops of regional importance, and crops with limited commercial value, tend to be ignored by collectors even though they are invaluable as food for the poor.

A great proportion of the seed samples that are collected and stored in gene banks is reported to be so lacking in documentation as to be useless to plant breeders.

Added to these woes, it is now recognised that there is more genetic erosion inside a gene bank than outside it (*Geneflow* 1991). Seed banks vary in efficiency from one country to the next. Mechanical and electrical failures are common in developing countries and this endangers the viability of seeds kept in seed banks. For example the world's largest sorghum collection is kept in India, and a huge wheat collection in Mexico, both countries with unreliable electricity supplies.

Another threat is political instability. In May 1991, the Nazret Agricultural Research Centre in Addis Ababa, Ethiopia was vandalized by the armed forces. The facility housed a large collection of sorghum, all of which was destroyed, along with the laboratories.

More important, the aim of keeping seed in gene banks is to preserve the diversity within strains, rather than to preserve the actual seeds as such. The seeds are usually tested for viability every five years and when their viability is too low they are regrown in the gene bank's fields to multiply the samples. The resulting seeds are harvested and then stored for another stretch of time.

But many gene banks regrow a sample that is small and not representative of the population collected originally. This is especially true when the sample comes from primitive strains with a lot of variability. Financial constraints force gene banks to grow much smaller seed samples than would be required to maintain a full genetic picture. In Kyoto, Japan, only five rice plants per sample are grown for regeneration, whereas a whole field of each should be grown (Fowler & Mooney, 1990, page 171).

After several growouts, institutionalized seeds begin to adapt, not only to the local climate, but also to their frozen storage environment. Only seeds that survive prolonged low temperature will germinate.

In one controlled experiment a population of mixed coloured beans started losing colours. After ten growouts there was only one colour left (Fowler & Mooney, 1990, page 168). Genes are often linked up in chains and a colour characteristic may be linked to a resistance to disease or drought. Some traits are becoming extinct simply because of insufficient effort to preserve that diversity.

Too often, a plant grown traditionally in mountainous terrain without irrigation is grown out on a river bank at a lower altitude, in a different soil, with different pest problems, under irrigation and with chemicals, so that after several growouts a loss of essential characteristics occurs.

Australian seed physiologist, Dr. David Murray points out a further concern – the reduction of funding for these collections:

> At present there is a growing financial pressure on both national and international agencies to cut back on the numbers of genotypes actively maintained. Such streamlining is premature. It is not yet possible to judge which minority genotypes are superfluous to future breeding requirements, and which not (1991, page 2).

Clearly, the safest place to keep these original seeds is with farmers in the primary and secondary centres of genetic diversity. A grass roots system, where farmers are paid to grow and save seeds from their traditional crops and to keep their traditional domesticated animals, is in operation in Hungary, and in a much more developed form, in Ethiopia. However, Third World farmers, who have been keeping crops and animals since Neolithic times, are now growing more of the new Green Revolution seeds and letting their traditional crops become extinct.

Green Non-Revolution

Norman Borlaug started the so-called Green Revolution with his "miracle" seeds, claiming that it would transform the begging bowl of the world into a bread and rice basket. He worked at the Dupont De Nemours biochemical laboratories and later at the Rockefeller Foundation's institute of maize and wheat breeding in Mexico, and won the Nobel Peace Prize for 1970.

The short-stemmed, high-yielding varieties of wheat and rice developed by Borlaug did change the face of Third World fields. Alas, as we shall see, it was often for the worse.

The FAO itself helped to introduce to Third World farmers a Green Revolution package that consisted of seeds, agro-chemicals and mammoth irrigation projects.

Now, twenty years on, many of the places where high yielding varieties were planted have a legacy of poisoned soils, pest epidemics, foreign debts and social inequalities that are exacerbated by the concentration of land ownership.

The new varieties that would save the world were supposed to be pest and disease-resistant, but, compared to the traditional varieties, they are more susceptible to local pests and diseases – a common problem being black smut in rice, which causes malformed seeds.

The new varieties may have yielded more than the old varieties, but at a high price. The Australian branch of Rural Advancement Foundation International (RAFI) says that while rice production tripled in South Asia over a twenty year period, this is only because synthetic fertilizers were used to force production. This practice is highly unsustainable at both the village and national levels.

Without the necessary aids and schemes, the new varieties are often less productive than the old ones. Appropriately, they have now been termed "high-response varieties" instead of "high-yielding" ones. Bred for translating nutrient into more grain, the high-response seeds also require the use of weedicides because large amounts of fertilizers promote rapid weed growth.

The shorter-stemmed rice plants of the Green Revolution stand up in the wind but they do not give enough straw for feeding cattle, thatching roofs, making paper and so on.

The chemicals that have to be used with them certainly kill the weeds and insects in the rice paddies, but they also exterminate the small fish, frogs and paddy crabs that are essential as a protein supplement in the diet of the rice workers.

Frogs and surface fish also control mosquito larvae and some aquatic weeds. Their droppings make instant fertilizer. In traditional systems, when the paddies dry out, the fish that have not been caught add to the richness of the soil.

Plants with edible yields, such as taro, water spinach and water chestnuts, thrived along the edges of the paddies. These plants lost their niches with the application of weedicides.

A wonderful ecosystem, the multi-yield of a centuries-old indigenous farming system, was sacrificed for one single purpose – maximum grain production.

It is like swapping a small, tasty, wholesome meal for a large bowl of white rice.

Furthermore, irrigation and nitrogenous fertilizers promote the growth of leaves, which accelerates insect development. The use of insecticides stimulates the surviving insects to breed faster, thus increasing the chance of stronger mutations. New insecticides are constantly necessary and so the vicious circle grows larger.

Azolla, a fern-like algae that floats on the surface of the paddies, was traditionally grown in many Asian countries in association with rice. It transformed nitrogen from the air into a plant nutrient, suppressed weeds and gave up to three tonnes of green manure to the acre when the paddies were drained. Green Revolution use of chemicals has eliminated this plant in the paddies.

Many of the new strains of rice are hybrids and cannot be relied upon to produce seed stock for the next year's crop. Even when they are not, farmers must replace their stocks every few years because fast-breeding diseases break down the resistance of the uniform varieties.

Plant breeders need constantly to produce new "improved strains" that can resist the ever-evolving diseases – at least until the next strain is developed. The growing of larger fields of rice or wheat and the creation of monocultures turns minor diseases into major epidemics.

The crucial factor of land ownership was almost totally ignored when the Green Revolution was being hatched. Those farmers wealthy enough to afford the necessary fertilisers and pesticides have increased their wealth and bought out the poorer farmers who cannot keep up.

The result of this massive assault upon traditional Third World agriculture is a far cry from the original promise of plenty for all. According to the Pesticide Trust in London, three million cases of acute poisoning are recorded each year in the Third World (*The New Internationalist*, 1990 edition). High levels of illiteracy, poor rural medical services and the unavailability of protective clothing all contribute to the heavy toll.

In their essay "Feeding the World in the Nineties", Brown and Young said there was "little to celebrate on the food front" because of the poor's lack of land and power. "The landless of the Earth are expected to rise to nearly 220 million households by the end of this decade" (*State of the World*, 1990).

It is hardly necessary to add that the problems of these people, and many others just up the ladder, will not be solved by the breeding seeds which can only be grown in tandem with high-cost chemical inputs.

Self-reproducing traditional seeds have been cared for by farmers for centuries without the need for a panoply of pesticides. But these seeds are now in the hands of corporations and agricultural research institutes. Millions of seed savers are replaced by a handful of scientists.

It is estimated that over 100,000 local strains were grown in Asia in 1960. Hybrid varieties bred by the International Rice Research Institute (IRRI) in the Philippines largely replaced them. For example the semi-dwarf IR36 "became the world's most widely cultivated rice within just a few years" such that by 1981, 70 percent of the rice-growing area of the Philippines was planted to this one variety (Plucknett, 1987, pages 171-182).

Anyone for Hybrids?

Crossing two genetically different varieties requires a considerable amount of hand labour. This explains why a lot of the production for the colourful seed packets and the bulk seed in produce stores occurs where there are few limits on workers' minimum wages, in places such as Chile, Taiwan, Kenya and Indonesia. Yet some types of hybrid tomato seeds can cost an incredible $12 000 per kilogram in Australia.

Technically, hybridization means the crossing of two widely different varieties. The result is a hybrid variety that has traits derived from both parents that may be of advantage to the new, hybrid variety. The hybrid plant will often exhibit what is known as "hybrid vigour" – a mixture of qualities that will enable it to grow more successfully than either of its parents. However this hybrid vigour is reduced in subsequent generations.

Hybridization occurs naturally and rather haphazardly in the wild, but, in the context of the seed trade, the process involves a deliberate narrowing of the genetic makeup of each of two varieties until particular characteristics are isolated in each. These, when combined in a hybrid, suit the breeding programmes and commercial plans of the trade.

The deliberately inbred breeding lines used for hybrids generally originate from a single individual chosen for its specific characteristics

and not allowed to naturally exchange pollen with other individuals of the same variety.

This reduces the amount of variability at each generation as off-types are rogued, or culled, mercilessly. In this way, uniformity is obtained.

Sometimes, each variety that has been selected for a desirable trait, is bred on itself for ten generations, a procedure called "selfing". The two distinct inbred varieties are then married. The progeny plants with a combination of desired characteristics are called F1 (first filial).

A typical procedure would be to select one plant having greater productivity than normal, and the other the quality of maturing early. The F1 hybrid that results can then be highly productive and early maturing.

Unfortunately, the next generation of seeds after the F1 – the F2 generation – does not necessarily have the selected characteristics, and usually produces a very mixed bag of descendants, that is, throwbacks to weedy ancestors, including inbred characteristics. In some cases, the seed of the F2 generation will not germinate at all.

F1 hybrids do not necessarily perform in the best interests of gardeners and farmers. According to Seed Savers' subscribers and in our own experience, traditional open-pollinated varieties are perfectly adapted to the home garden and small farm. They deliver the flavour and nutrition that gardener/cooks relish.

It is the vigour and uniformity that makes F1 hybrids understandably attractive to the farmer under contract to sell a crop. It is in time for harvest deadlines (the farmer needs to be punctual for delivery to supermarkets), grows in an orderly fashion to the same size (which is convenient for packaging and permits non-selective, once-over mechanical harvesting) and is productive. Unfortunately, these hybrids usually demand high inputs of fertilizer and pesticides.

In 1960, 99 percent of all corn planted in USA, 95 percent of sugar beet, 95 percent of sorghum, 80 percent of spinach, 80 percent of sunflowers, 62 percent of broccoli and 60 percent of onions were hybrid (USDA, *Seeds: The Yearbook of Agriculture*, 1961).

We would expect such figures to be even higher these days. And this is a worldwide phenomenon. American Pioneer Hi Bred, one of the biggest of the seed giants, has fifteen foreign hybrid corn research facilities and does business in ninety countries.

It should be noted that some vegetables are easier to hybridize than others. For example, beans and peas are never commercially hybridized because they are automatic pollinators. The tedious hand-pollination of each flower would result in only a few seeds and the price would be prohibitive.

The F1's strengths are also its weaknesses. These highly manipulated plants may respond extremely well under favourable conditions, but can fail catastrophically under adverse conditions, when planted in extensive monocultures. This makes them quite unsuitable for Third World subsistence farmers who starve when crops fail.

The variability of open-pollinated varieties gives the crop a better chance of success. Jackie French, the well-known Australian writer on organic gardening writes, "when some of my hybrid zucchinis get powdery mildew, they all get it and die within a few days of each other. On the other hand my open-pollinated plants are more variable, some succumb early, some later and some seem untouched." (French, 1991, page 31).

Much of the food on the supermarket shelves, including fresh produce, is grown from hybrid seed. Even many cereals, fruits and vegetables sold in health food stores and organic shops are the products of hybrids which are often low in nutritional value.

These concerns are of little relevance to home gardeners because most of the hybrid crops have no advantage for them. Regionally adapted open-pollinated varieties are often better in flavour, tenderness and texture than varieties that can be transported long distances in cold storage.

We would definitely advise home gardeners to garden full cycle and to produce their own seeds for the next season, rather than indulging in hybrids.

Designer Genes

With new techniques of bioengineering, plant breeders can extract a single useful gene, or a cluster of them, from one plant, or even from an animal, and incorporate it into another plant.

Experiments have transferred the cold-hardiness of a flounder fish into the soya bean and the gene responsible for the flashing light of a firefly into tobacco.

Every plant cell contains a central core which controls all activity occurring in the cell. Within this nucleus is found DNA (deoxyribo-nucleic acid), which has a very large molecule made of thousands of atoms, the arrangement of which can vary.

The number of these long, chain-like molecules of DNA varies with plant species. The specific arrangement of the atoms on the chains determines the genetic code, and a change in the code leads to new characteristics in the plant.

Such gene manipulation is ideal for corporate plant breeders. Instead of years of selective breeding, gene shearing can achieve almost instant results.

An example is a tomato, developed for the canned tomato soup and paste trade, which contains 2 percent more soluble solids than previous strains. The genes for this strain came from a tomato found in the Peruvian Andes and huge profits have been made from it. (Hugh Iltis in *Biodiversity*, edited by E.O. Wilson, 1988).

In the early 1980s, biotechnology was sold to the world as a new hope for agriculture without chemicals. Agri-genetics promised biological pest controls and hardier plant varieties. In reality, however, it has proved vastly different, as the current emphasis on herbicides for weed control has shown.

Herbicide-resistant genes found in one exotic plant can be transferred to other crops. According to *Development Dialogue – A Journal of International Development Cooperation* (1988, page 157), Pioneer Hi-Bred, advised that screening for genetic resistance to herbicides is becoming as important as screening the same cultivar for resistance to prevalent diseases and insect pests.

Herbicide tolerance strategies make it possible for manufacturers to employ more toxic products because the crop itself may not be harmed. A prime example are the soya beans that can withstand the Monsanto company's glyphosate product Roundup™. It illustrates one of the most disturbing aspects of biotechnology, which is a tendency to try to adjust the environment and people to the needs of the industry, rather than vice versa. In another example, industry-associated scientists express hopes of manipulating the genes of threatened European trees so that they can tolerate acid rains!

A parallel could be drawn with using medications for coping with the symptoms only of stress and monotony, rather than seeking to address the root causes.

It is a scandal that, at a time when our world needs residue-free, nutritious food plants, bio-engineers are creating plants that are designed to accept a lot more chemical fertilizers, herbicides, insecticides and fungicides without suffering side effects. All this is at the expense of people's health, the survival of wildlife and the cleanliness of air and waterways.

Another worrying aspect of bioengineering – accidental gene transfer – occurs when pollen from a field crop carrying a bio-engineered herbicide resistance, contaminates a nearby related weed, giving to the latter an inbuilt herbicide resistance.

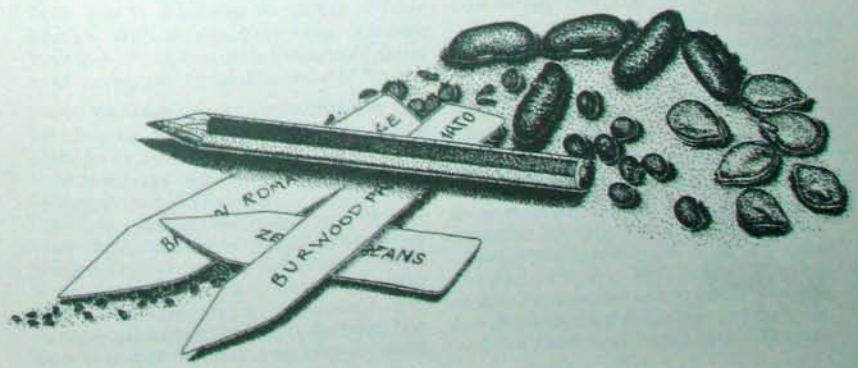
In one example, the genes of herbicide resistance in bioengineered lettuce have been accidentally passed on to wild prickly lettuce, *Lactuca serriola*, a highly undesirable weed in fields of lettuce growing for seed.

The consequence of this is an even greater use of herbicides. More than a hundred bioengineering groups worldwide are engaged in herbicide tolerance programmes.

As the Canadian geneticist and commentator on science and the environment, David Suzuki, points out, the timespan between a discovery and its application has become dangerously short (Suzuki, 1990). There is no leeway for the philosopher, spiritual leader, pragmatist, parent or grandparent to understand and consider the consequences of a scientific discovery. With no notice, policy makers cannot predict the many short-term and long-term term effects for life on Earth, and corporations can operate with diminishing accountability in what seems to be no more than the pursuit of profit.

PART TWO

The Practicalities



3. What Seeds to Save

A Variety of Sources

As you would expect, the seeds that are maintained by Seed Savers come from diverse sources, often having arrived in Australia through tortuous and unlikely channels.

Heirloom: These are seeds that are handed down from one generation to the next.

A good example is the Barwick Watermelon: Mrs Barwick from Armidale sent Seed Savers the white seeds of a watermelon that had arrived in Australia from England in the luggage of her husband's great grandparents in 1855. The seeds had been saved from the sweetest, most flavoursome fruit of the best bushes from that time to the present. Many Seed Savers and their friends are now able to enjoy eating the Barwick Watermelon, too.

Incidentally, watermelon is one of the crops recorded as being grown by settlers in the early days of New South Wales. Since the time of the very first harvest on the new continent, the seeds have been saved carefully for the next year's planting right up to today – and so on into the 21st century, we hope!

The climbing Muffet Bean from Penrith, NSW and the Gibson Snake Bean from Toowoomba, Queensland are also in this category. It is relatively easy to determine the origins of these because they are still in the families' collective memories. If you have an heirloom seed please send a sample to the Seed Savers' seed bank.

Local Varieties: These are the varieties that have been grown in the one region for as long as the locals can remember.

Often it is very difficult to find out who first brought them into an area.

Around Taree, on the central coast of New South Wales, no one we talked to could say where the region's popular Rice Marrow – a kind of pimply squash, with a very hard skin, sweet flavour and rough texture – originated. Rice Marrows are sold on the side of the road. The seeds cannot be found in shops or in any seed catalogue. Everyone growing them knows that if you do not save the seeds of the best squash, you then will have to rely on a friend for new seeds.

The Rice Marrows are not uniform like the vegetables you buy in a store, yet no-one shopping at a roadside vegetable stall worries if they do not look alike. Each farmer grows a slightly different form. Some are rather longer than others, whilst others might have stripes of green.

That lack of sameness would no doubt be a problem if the product were sold on contract to a supermarket chain. Would they fit neatly in a box like the uniform hybrids?

Varieties no longer available commercially: These varieties have been dropped by seed companies but are maintained by home gardeners.

The Zebra Climbing Bean, which gives fair crops even in poor soils and has brown striped seeds, is an example. It changes name at the convenience of the caretaker and is also known as Greek Winter Bean, Count Zeppelin Bean or Mollie's Bean, named after the mother of Permaculture's Bill Mollison who grew the beans in Tasmania and saved the seeds for decades. There may even be a Zebra Bean in your family.

Many people have sent us seeds that they call Seven Year Beans. This name has been applied to Scarlet Runner Beans, Lima Beans and Hyacinth Bean. With others, like the Burwood Prize Tomato, Webb's Wonderful Lettuce and Indian Cobra Melon, the original commercial names have stuck.

Varieties that have arrived in Australia with more recent migrants: These form part of an immigrant cultural and culinary heritage.

Hungarians have brought their thick-walled Paprika, Greeks their Red Okras, Italians their cooking tomatoes for tomato paste, Lebanese their delicious, crisp cucumbers and marrows. Southeast Asians have brought vegetables that

particularly suit the northern half of Australia, and their shops abound in the inner city suburbs. There are always interesting seed packets and propagating material to be found there.

Historical seeds: These are seeds with some historical significance.

An example of these is a variety of cotton that arrived in Australia with Captain Flinders late last century. A farmer from Bethania in Queensland grew it for years and sent it to Seed Savers after he retired. It is a short fibre strain called the Silky Cotton, and was cultivated extensively in the region of Brisbane and Ipswich by islander and convict labour. It is hardy and no pests are known to attack it. The fine fibres are of great softness – hence its name.

Another example is a Victorian open-hearted lettuce that is drought and frost-hardy, and came from China into the Ballarat area at the time of the gold rushes. It has been disseminated through The Seed Savers' Network as the Gold Rush Lettuce and is now commercially available.

These varieties should be preserved, along with other crops once grown locally, as a public resource and as an educational tool.

Plants Move

Some varieties that seem to originate from one area or family frequently come from a different region. Gardeners move with their seeds.

A seed saver in Morayfield, Queensland, wrote:

> My father has been growing Snake Beans for at least forty years. He was a school teacher and subject to transfer. This bean variety has been tested in a wide range of climates and soil types, each time with a great success: Mount Tamborine south west of Brisbane – in light, sandy soil; Kumbia near Kingaroy – where the soil is volcanic red; Townsville – light loam; Caboolture just north of Brisbane – also light loam. The beauty of these beans is their hardiness in many circumstances, immunity to most pests and even to bean flies.

Seeds and planting material are also exchanged and sold in local markets. For example, Red French Eschallots have been sighted in North Queensland corner shops. Vietnamese and Chinese shops often sell vegetables that can become good stocks of warm-climate plants, such as taros, red sugarcane, yams, various chillies, lemongrass cuttings, watercress and water spinach with roots on them.

Seeds move when gardeners travel. Many good garden varieties arrived in Australia during World War Two with American soldiers.

The Great American Cucumber came to Casino, northern NSW, when a soldier shouted from the railway carriage, "Is anyone a farmer here?" and handed down seeds of what became the crispest and most flavoursome cucumber that anyone in the area had ever grown. The Connolly family grew it for years and passed it on to many other gardeners and farmers. This is another side-of-the-road or local shop "specialty" known as the Richmond River or Easter Cucumber.

An American soldier on R&R leave in Proserpine, North Queensland in 1945 gave the seeds of the Brown Romaine Lettuce to the late Mr. Pat McPaul who propagated them and later sent seed to Seed Savers with another packet labelled "Seeds of Knowledge." Inside, there were wise words about the need to look after our seeds. Pat was ninety two at the time, showing that it is never too late to share.

We have sent out hundreds of Brown Romaine Lettuce seed packets. Judging by the amount of seeds sent back to the seed bank, this drought-hardy and productive lettuce is fast becoming popular.

Plants Adapt

When a population of plants is brought to a new locality and grown there for a number of generations, there will be changes in its genetic makeup and behaviour. Individual plants may even start to look different.

With beans, the ratio of dark-coloured seeds may increase; more lettuces may be able to withstand hotter weather than before; a proportion of okra might show an ability to resist autumn cold weather and still produce fruit; every year a larger number of tomatoes may produce more and have less infestation of eel worms in their roots.

As a result of natural selection, those types that are best adapted to the new environmental conditions will dominate more and more with each generation, until, after a number of years, an equilibrium is reached.

In cross-pollinating species, such as carrots or spinach, seeds are developed after natural outcrossing between two plants, with each new plant representing a new gene combination. However, they will vary only within certain limits. Once stabilized, the general behaviour of the variety will remain constant, as long as the growing conditions remain unchanged.

When non-chemical gardeners start to grow and save seeds of a strain in their home gardens, they will only select seeds from plants that show no insect damage and that resist disease. In this way, they will slowly but surely encourage a variety suitable to no-spray gardens and farms.

In the same way in areas of frost, only plants that manage to bear viable seeds before the autumn frosts will survive to be selected. After several generations, this will tend to produce a variety that bears earlier and has a marked tolerance to cold.

Generally, when putting a new variety in your garden, any individual that shows a natural ease of growth should be selected. In this way a new range of characteristics will develop and become features of the plant over the years. After a decade of observation and selection you will have your own strain of seeds to offer, suited to your own region.

Only Connect...

"The best and healthiest food is prepared, in the main, from ingredients that are grown close to you, in your own soil, if possible, and harvested and enjoyed in the correct season.

Food plants, grown organically, that have adapted themselves to your garden over generations of seed saving, will perform noticeably better in your kitchen than generalized hybrid plants, grown (and possibly contaminated) by chemical methods far away from your region, and subject to transportation and storage.

Good gardening produces good plants and good plants provide wholesome food.

Any thinking cook will pick the vital connection between soil, seed, plant and self. It is the strength of regionalism and regional cooking." Michael Boddy, 1992.

4. Purity and Production

Pollination

Pollination occurs in plants when pollen from the male parts of the flower is deposited on the female parts.

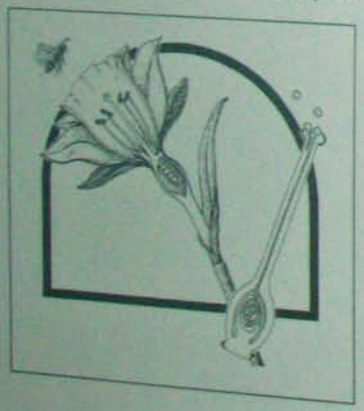
In most of our vegetables, herbs and flowers, the male and female parts are in the same flower. These are called *complete flowers.*

Exceptions to this are the Cucurbit family (pumpkins, melons, cucumbers, etc.), corn, where the male and female parts are on the same plant but in different flowers (*monoecious*), and asparagus, where the male parts are on one plant and the female on another (*dioecious*).

Self-pollination: In some complete flowers, self-pollination occurs. Lettuce, tomato, and okra have the female part so close to the male that the slightest wind movement, even from a passing bird, causes the pollen to drop onto the receptive stigma (female).

In peas and beans, self-pollination occurs before the flower even opens. This is called automatic self-pollination.

Cross-pollination: Other types of complete flowers require cross-pollination. They are adapted to the extent where an external agent such as an insect of the wind is necessary to create fertile seeds. With onions, pollination occurs between the little flowers (florets) of the same flower ball, and between florets from one plant to another.



With carrots, parsley, celery and their kin, wasps and flies carry pollen from one umbel to another, or from one plant to another.

Some plants, such as those in the cabbage group (Brassicas), have a chemical barrier that prohibits self-pollination within the flower. They require bees or other insects to bring pollen from another plant and carry out effective cross-pollination. One plant on its own produces hardly any seed.

In fact plants in the cabbage group, *Brassica oleracea*, accept pollen from any member of this group and form fertile crossed seeds. This means that cabbages and cauliflowers that are going to seed at the same time need to be isolated, or you may end up with a cabbage-cauliflower cross.

In practical terms, a single plant of cabbage, broccoli, kohlrabi, cauliflower, etc. will produce only a very small amount of seed if grown alone. The same plant will produce several hundred grams of true seed if other plants of the same variety are going to seed nearby. That same plant will produce a cross (or hybrid) if another Brassica of the same species flowers in close proximity to it.

Roguing before flowering is especially important with cross-pollinators as the pollen from off-types will contaminate the true types.

Natural cross-pollination: Plants such as lettuces, tomatoes, peas and beans are self-pollinated. They do not rely on insects and pollen from other individual plants to produce fertile seeds. They are natural "inbreeders".

However, in a garden situation, a certain amount of natural cross-pollination happens because of curious and hungry insects. Pollen often sticks to the body and legs of insects, or is collected for food and transmitted in minute quantities to the next flower visited. Keep in mind that self-pollination is never one hundred percent and varies between species according to location, insect activity and the length of the style, or female receptor in the flower.

Another factor that needs to be taken into account is that the pollen of some varieties is dominant over the pollen of others. For instance, chilli pollen is often dominant over the pollen of capsicums of the same species.

The occurrence of natural cross-pollination when two varieties of some vegetables are grown side by side is as follows:

- Two different kinds of lettuce will typically cross from one to five percent.
- A tomato will cross with another tomato from two to five percent.
- A capsicum will cross with another capsicum from nine to thirty eight percent depending on the variety.
- Hot chillies normally cross up to four times more than sweet capsicum.
- Okra, according to the University of Missouri Department of Horticulture, crosses from four to eighteen percent, and four to forty two percent according to the American Department of Agriculture.

Therefore, even self-pollinators should be isolated one from the other as much as possible. To determine how a particular plant is pollinated, refer to Part Three, where plants are listed in alphabetical order.

Keeping Them Pure

If you want to save seeds from both a cabbage and a cauliflower at the same time, or from more than one variety of either cabbage or cauliflower, in the same growing season, you will have a problem if they flower at the same time, because they are cross-pollinators.

Any insect-pollinated plant will need to be isolated from other varieties. Even if plants are self-fertile and/or self-pollinating, like capsicum, insects will still transfer pollen from one variety to the next.

What to do? Here are five techniques:

Grow them apart: Pure seeds can be produced by leaving enough distance in between two or more varieties to prevent contamination from insect or wind-blown pollen. How far apart differs for each plant, and we refer you to the seed saving sections in Part Three "The Plants".

You may find some of the suggested distances excessive because they are based on the distances that insects can fly under good conditions. For instance, bees can forage within a four kilometre radius of their hive.

Use any isolation distances as general guidelines for open terrain only. Obstacles that break insect flight patterns or deflect airborne pollen, such as hedges, buildings, barriers, or ridges can greatly reduce crossing. Also, when there is an absence of insects, there is less chance of crossing.

We encourage the home gardener and the farmer to experiment, in order to discover *minimum* distances for maintaining seed purity in their own garden or fields. Experiment only with varieties that are not rare, and for which you have plenty of seeds.

Isolate them in time: This is suitable for crops where all the plants flower simultaneously and for a short time – for example corn and sunflower. You may not have a large enough garden or enough land to isolate corn by half a kilometre, but you can grow one early, one mid-season and one late variety. Each will shed pollen at a different time.

Provided you have a long enough growing season, you can save all three kinds of corn.

Bag them: When only a small amount of seed, and absolute purity, is needed, covering the blossoms of such fruit as tomatoes and capsicums with a paper bag or panty hose is adequate. This is for self-pollinated crops only.

Plastic bags are not suitable because they prevent air flow. The bags exclude insects and any pollen that is flying about at the time of flowering, and can be removed once the fruit is set.

Cage them: For total exclusion of insects, cage those species which flower over a long time and whose pollen is transported by insects, like chillies and eggplants.

Make low cost cages from old flyscreen doors or windows. You can also use short steel rods stuck in the ground with polypipe attached to create a dome shape and cover that with shadecloth or nylon mesh. A row of plants can be

caged by having an arched tunnel made in a similar way.

The idea is to exclude all insects, and to hand-pollinate them. On a commercial scale, seed producers introduce bees and other insect pollinators into the cages.

Cage them on alternate days: This is for when you have two varieties flowering at the same time and both require pollination by insects for seed formation. It is done with long portable insect-excluding cages.

Cage the first variety while insects work the second. Then swap the cages to allow the insects to work the first variety. Once both varieties have been individually pollinated, they should both be caged until flowering stops.

For example, if you have cabbage and cauliflower flowering at the same time, you would allow the bees to work on one at a time – provided that no neighbours have *Brassica oleracea* (including broccoli, Brussels sprouts and kohlrabi) flowering at the time.

Allow the bees to do their work on the flower heads of the cabbages, and then the cauliflowers on alternate days, and leave cages on both varieties until the flowering has stopped.

Annual, Biennial, Perennial

Annuals: Annuals are plants that typically start from seed and produce their crop of blooms and seeds within one season of growth. On average this growth season lasts six months, so annuals spend one half of the year in the ground and the other half as seeds in storage, before being replanted.

Usually, annuals are planted in spring, come to seed in late summer and die in autumn. However, in tropical or sub-tropical Australia and the warmer parts of New Zealand, annuals such as spinach, broad beans and some winter lettuces, which cannot stand hot summers, are planted in autumn, grow through the mild winter and bolt to seed in spring.

Some plants that are annuals in cold climates, such as tomatoes, become perennials in warmer regions.

Biennials: Biennials are plants that produce vegetative growth during the first growing season, slow down through a period of cold weather, go to seed in the second growing season, and then die.

This is a feature of cold or temperate zone vegetables such as those in the cabbage group, celery and most root crops.

The name "biennial" originates in the northern hemisphere where the production of seeds occurs in the second calendar year, after overwintering. The time that seed heads emerge is related to factors such as latitude, which affects day-length, as well as the periodic changes in temperature and soil moisture.

No hard rules can be assumed, as you will learn when the plant is permitted to go through its full cycle. A forgotten carrot may shoot up of its own accord in the second spring, after lying dormant over winter.

Generally, the production of seeds takes eighteen months. This is termed *seed-to-seed* production. The other method for perennials is called *root-to-seed* in which the crop is pulled out of the ground in late autumn, selected for true-to-typeness, stored, and then replanted in spring.

Onion, carrots, celeriac seeds, etc. can even be produced by the root-to-seed method by acquiring the actual vegetable and planting it for producing seed. This way it only takes half the time normally needed to obtain seeds.

If you are in an area where winters are particularly severe, protect biennial crops with straw in the garden, or dig them up in autumn, store carefully, select the best, and replant these in spring.

To produce seeds of consistent quality year after year, the biennial plant has to have a cool season of two months or more, with night temperatures between minus 10°C and plus 4°C.

In Australasia, where there is a lack of this period of low temperatures, a lot of biennial plants behave as annuals, especially in the tropical and sub-tropical garden. Biennials, such as carrots, beetroots, celery, turnips, parsnips, cabbage, and its relatives, produce seeds in nine months in northern Australia.

It is all right to collect these seeds for one or two years, but, generally, seed from what is naturally a biennial should be produced in the cooler districts, in order to maintain vigour.

Perennials: Perennial plants are perhaps the most useful in the edible garden. They are the ones that will survive neglect. They are the faithful producers. That is why they feature in all

traditional gardens and have been adopted with enthusiasm in Permaculture.

If vegetables are divided into root, leaf and fruit types, you can see how perennials line up:

- Root: sweet potato, taro, Peruvian parsnip, Queensland arrowroot, cassava, water chestnut, yam, ginger and tumeric.
  The last five of these will die back in cold seasons, then shoot again with the spring rains and warmth. They should be harvested and divided during their dormant stage.
- Leaf: hibiscus spinach, New Zealand spinach, sorrel, kale (in particular the walking stick cabbage) and water spinach.
  Cassava, sweet potato, and some taros are grown principally for their edible roots but their leaves also provide delicate flavoured potherbs – or spinach, in the vernacular – during their phase of most vigorous growth.
  Most herbs are perennial, and generally speaking they are good companions for vegetables.
- Fruit: The legumes hyacinth bean, scarlet runner bean, yam bean and lima bean all share the common name "Seven Year Bean", which indicates their generous nature. According to the severity of your winters, their leaves will die back to a degree and regrow in spring.
  Some fruiting plants are annual in temperate climates, but behave like perennials in tropical, and sometimes sub-tropical, climates. Examples of these are capsicum, eggplant, and even tomato.

Plants that can be divided by crowns, such as rhubarb, artichoke and asparagus, are perennial. Perennial members of the onion family include some leeks, garlic chives and tree onion.

Besides giving food for several years, perennials give planting material each year for you to replant and share around. They must be carefully placed, for example in the orchard or as borders, where they can be a permanent fixture.

Now that we have ensured that the seeds we produce are as pure as possible, let's look at which plants to select for seed collecting.

5. Selecting and Collecting

Criteria for Selection

You will have to decide which are the most suitable plants to bear seeds from amongst the many individuals in the garden. Selection is not just a matter of choosing the best seeds out of the best fruit, the best seed head or the best pod. It also involves culling unwanted stock.

Roguing, as it is called, is done by taking out any plants with undesirable characteristics before flowering time. This ensures that the pollen of any unwanted off-types – or plants that are not true-to-type – does not fertilize the flowers of the plants you have chosen for seed. In this way, particularly with cross-pollinators, you can make sure that only the best plants go to seed.

If you are just starting to save the seeds of plants you do not know well, sow more seeds than the number of plants you need for food. In this way you will be able to discover all the variations of the plant, observe their characteristics and select the most desirable traits.

If, on the other hand, you have been growing a certain variety for many years, you will know what qualities to expect.

But, in both cases, you must consider the whole plant. Rather than just selecting a particularly large fruit or thick pod on a diseased plant, look out for exceptional individual plants that survive an extended period of bad weather, or that are free of insect attacks when other plants are obviously suffering from them.

In all cases, only disease-free strong plants should be candidates for seed saving. Don't even contemplate using poor performers, unless they are all you have.

To prevent household members harvesting plants you wish to keep for seed, mark the best plants by tying a bright ribbon to them so that everyone knows they are special.

In this respect sweetcorn in particular is a hard one to manage diplomatically. How do you explain to children that the earliest cobs to mature contain the genes that in future generations will contribute to more early cobs for all?

With crops that send up a seed stalk at the end of their edible stage, such as lettuce, cabbage and root crops, it is important to choose plants that are slow to bolt. With lettuce, pick out and mark individual plants with a prolonged leaf stage, rather than plants that send up a seed stalk early in the season.

It is tempting to save the seeds of the first lettuce plant that produces them. But this would result in increasing the ratio of early seeders in future generations when what you need is a strain of lettuce that can actually resist going to head for as long as possible, in order to provide lettuce leaf over a extended period.

With crops that give a number of successive pickings, such as green beans, it is not a good idea to keep harvesting for the table until there are only a few pods left on the bush, and then save the seeds of the remaining few. It makes more sense to leave the very best bushes alone until it is time to harvest their dry pods, and eat from all the other bushes.

With root crops, choose the largest, smoothest, healthiest and most representative specimens when you lift the crop for storage over winter (*see* Biennials, in Section Four).

With tomatoes, texture of the fruit and its earliness, along with the health and vigour of the whole plant, are of prime importance. Consider also the overall leaf density, which gives essential shade to the fruit in hot summer.

With rockmelon, size is not the most important factor. Freedom from fungal diseases – and flavour – should be major factors of selection.

You may choose to select fruit from a vine that gives smaller but more numerous fruit than a vine that gives fewer but larger fruit, if that is your desire.

Over time, and with care, home gardeners can fashion their plants to their own needs. But major changes will not appear all of a sudden – a tomato that has been surviving for just a few years in an arid climate without much irrigation cannot automatically be called a drought-resistant variety. It will take up to ten years to stabilize the new characteristics.

How Many to Select

Gardeners and farmers who are in love with a particular variety and who intend to save seeds regularly should decide how many plants to mark, and declare them out-of-bounds to eager pickers. No matter how few seeds are needed for next year's sowing, the decision on how many plants to reserve has to be made with more than one factor in mind.

Although the largest and best looking plant or fruit is naturally considered for collection, it is just as important to save seeds from other interesting plants in the variety.

The aim is to maintain a fair degree of variation. This is what open-pollination is all about, as opposed to the production of uniform hybrids, where all plants are identical.

Optimum variability is essential for the crop to adapt to changes, whether these be in soil, cultivation methods, latitude, planting time, or climate. Plants are constantly reshuffling their genes.

Technically, for plants that self-pollinate, such as tomato, lettuce, bean or pea, only one to six plants need to be reserved. They are natural inbreeders. Beans have survived thousands of years without the help of insects to carry pollen. The gene pool is automatically kept wide by the nature of the bean's genetic makeup. For this reason, it is possible to save seeds from only one self-pollinating plant quite successfully for one year. But, if you save seeds in this manner year after year from too few individual plants, you will create weaknesses in the variety – "inbreeding depression" or "bottle neck" in the jargon – and eventually cause the strain to run out.

For Cucurbits, such as pumpkins, melons and cucumbers, we recommend a minimum of half-a-dozen fruits be kept each season for seed saving. It is an advantage to keep pumpkin seeds from the fruit of different vines, instead of picking from only one vine. This should not preclude anyone from keeping the seeds of only one pumpkin, if it is the only way possible.

For corn, sunflowers and the onions, it is imperative to save seeds from a large number of individuals to maintain variability. If too few individual plants are selected, there will be an irreversible loss of characteristics.

For example, multicoloured corn may lose some colours and some of its insect resistance. Another corn variety may lose its earliness, and yet another its productivity.

Depending on variety, cobs from 50 to 100 plants need to be put aside for corn, and seed heads from at least twenty onions and leeks.

However, if these large amounts are impractical in your situation, save whatever you are able to – it will still be good seed saving practice. As a matter of interest, it is worth experimenting with multicoloured corn. Keep only one cob each season. Repeat for the next five years and observe the loss of diversity reflected in the loss of colours.

Some crops are self-incompatible and require more than one individual plant for adequate fertilization purposes. The female parts of broccoli, kale, mustard, and turnip flowers have a chemical barrier to pollen that comes from the male part of the same plant. In this way the plant makes sure that true cross-pollination occurs and characteristics from other individuals are brought in. Your crop will have a greater chance of surviving in an everchanging environment.

If you save with variability in mind, you will end up with an excess of seeds. For example, three cabbages can give up to 1.5kg of seeds and a lettuce up to 60 000 seeds per plant. You will be able to keep your neighbours and friends in supply, and advance the purposes of The Seed Savers' Trust.

When to Collect

The best time of day for seed collection is about 10 a.m., when the dew has evaporated.

The home gardener accustomed to picking crops at the best possible time for the table will soon learn to determine when the plants are ready for seed picking.

Here are some general guidelines:

- Fruits that have seeds in their pulp, such as tomatoes and eggplant, are best picked when the fruit is rather ripe, turning soft, a little after the table stage.

- Those fruits that are eaten mature, such as pumpkins and red capsicum, are picked as for the table and the seeds scooped out of the cavity. The best stage for collecting is a couple of weeks after fruit maturity when the seeds have had time to plump up.
- Those fruits picked very immature for the table, such as cucumber, zucchini, okra and sweetcorn, will have to stay on the bush for quite a while longer for seed purposes. They will need to reach full size and then be left for approximately another three weeks to allow the seeds to mature.
  Leaving the fruits to mature on the bush will inevitably slow down the production of vegetables for the table, because a lot of the plant's resources will now go to the production of seeds.
- Where the seeds provide the edible part of the plant, as with maize, broad beans, dry beans and sunflowers, they can be left on the plant until they are completely dry, providing that wet weather does not set in, and that predators like field mice and parrots do not help themselves to the standing seed crop.
- With plants that tend to shatter – that is, let their seed fall on the ground when they are ripe (such as lettuces, carrots, parsnips and onions) – it is a matter of harvesting them progressively as they become ripe.
  This particularly applies in wet and windy weather.
  The plants will need to be checked daily and covered with a paper bag if the weather becomes windy. A canvas or a sheet under the plants also works well. The whole bush can be pulled out before all the seeds are ripe and left to ripen further in the shade on top of a sheet of canvas, or in a bag, making sure that the roots are free of soil.

Once we have gathered our seeds, we must prepare them for storing until the next planting season.

6. After the Seed Harvest

This section looks at the overall principles of processing and storing your seeds. What to do with specific seeds is dealt with in Part Three of this handbook.

Cleaning

Chaff and stems can harbour insects that may attack your stored seed. Just a little attention to removing them with ordinary kitchen utensils will pay off.

You can clean seeds either by a wet or dry method, depending on how they are found on the plant.

Wet Cleaning is used for those plants that carry their seeds in moist flesh, such as tomatoes, rockmelons, cucumbers and pumpkins.

Scoop the seeds out of the flesh into a large container of water and rub them vigorously. Collect seeds with a sieve, and run water over them to remove all the little bits of flesh. The clean seeds need only to be dried on a plate or greaseproof paper for ten days or so and labelled.

Dry Cleaning is used for seeds maturing in a dry receptacle – capsule, pod, husk or case – as with beans, peas, sweetcorn, popcorn, maize, radish, lettuce, carrot, onion, beet, okra and most garden flowers.

Let the plant produce dry seeds on the bush. Should rainy weather set in, the whole plant can be pulled out when all the pods are brown, and hung in a shed or under the verandah.

Dry pods also can be harvested individually as soon as they are ready on the bush. They are then gently rolled or crushed, and winnowed.

Winnowing has an ancient, biblical feel to it, as John Budd pointed out in a "Country Wide" documentary programme about The Seed Savers' Network. It is a magical thing for children to do.

Slowly, the seeds and the chaff are tossed into the air and the chaff wafted away with a gentle breeze. The chaff consists of the calyxes, stems, old petals, husks and dead reproductive organs of the flowers and fruits. No great loss.

The secret of success lies in the shape of the vessel used for winnowing. An elongated flat basket of the kind found in Chinese stores has been the most successful for us.

Another method is to put the seeds into a bowl and shake them until the debris floats to the top. A gentle consistent blow, or a little fan, will lift the chaff away.

Large quantities of podded seeds (such as beans, peas and okra) can be placed in a hessian sack and the seeds separated out by stomping on the sacks. The dried pods can be discarded by hand, or winnowed by machine.

However, if you really find winnowing time consuming, and that you keep on losing most of your seed, do not despair. You can store and plant seed and chaff with impunity. In fact some old farmers store their corn seed on the cob.

Screening is a another way of cleaning seed. Seed Savers has a set of five differently gauged stainless steel sieves that are mounted on wooden frames.

First we use a sieve with a gauge large enough to let the seeds go through. The large debris is excluded and can be thrown on the garden. The seeds, and the chaff smaller than the seeds, are all that is left, and these can be separated with a small gauge sieve. Kitchen colanders and sieves work really well.

Drying

Strict attention needs to be paid to drying seeds. They are easily ruined if they are too moist when stored.

Some seeds may need to go through two drying processes – first, after harvest, inside their capsule, or pod, to ensure that all the seeds are mature, and second, after winnowing.

Generally, large seeds need a much longer drying time than small ones. A simple test to see whether large seeds are ready is to try to bite one of the seeds. If no impression is made with a reasonable amount of jaw pressure, then the seed is ready. Dry for longer if you have injured the poor thing!

Some ways to go about drying are:

- Keep small quantities of seed in a bowl on the window-sill out of the sun and turn them occasionally.
- Spread seeds out evenly on newspaper in a spot where they will not be blown away or spilled. Some people do this with wet seeds because they prefer to have them sticking to the paper for planting out later.
- Hang small quantities in paper bags in a breezy spot.
- Lay larger quantities out on screens and turn them occasionally.
- Hang up large quantities of big seeds, such as beans, in thin hessian sacks to finish off drying.
- In very wet weather, set seed screens high up on racks in a warm room such as the kitchen, or above a water heater. Do not let the temperature reach more than forty five degrees Celsius.

Diseases

Diseases that are spread in, or on, seeds need to be avoided, particularly if you are passing on seeds to others.

The odd-coloured coatings on bought seeds are usually a mixture of fungicides and insecticides – the iridescent purple sweetcorn kernels and bright pink cabbage seeds that you can buy are loaded with chemicals.

Once the chemical processing starts, it escalates. "Insecticides also increase the need for fungicide treatment, since they tend to predispose seeds and young seedlings to attack from soil fungi. Compatible fungicides and insecticides such as Captan-dieldrin™ and Thiram-dieldrin™ are available." (USDA, 1961, page 274)

There are however a couple of simple, non-toxic methods of preventing disease in seeds, suited to the home and market gardener and farmer:

Hot Water Treatment: This is a safe method of treating seeds for diseases such as black rot, black leaf spot and black leg in cabbage, which spread and develop only in humid weather, as well as bacterial canker in tomato and downy mildew in spinach.

- Soak the seeds in water held at a constant temperature of 50°C for about twenty five minutes. Make sure that the temperature does not rise too high. This can be done with a thermometer checking a saucepan full of water inside another saucepan, or, better still, in an electric frypan.
- After the water treatment, dry the seeds in a sieve. It is important that they are well dried again before storing.

Fermentation: The seeds of tomato and cucumber are fermented to rid the seeds of unwanted seed-borne diseases, by the action of bacteria and yeasts.

- Cut the fruits in two. Remove the seeds and pulp with a large spoon or cupped hands and put with a little water into a container. Leave this to sit at warm room temperature.
- After a few days, a foam or crust will form on the surface, indicating that the fermentation has occurred and the surrounding gelatinous pulp has dissolved.
- To obtain clean seeds, rinse with plentiful quantities of water. The debris and empty seeds float, and are slowly poured out. The rest can be washed under a tap in a strainer. You will then obtain perfectly clean seeds.
- Spread out the wet mass of seeds very thinly and evenly on a non-stick paper to dry.

Storing

Second to breeding, the most important factor in determining the vigour of a seed is the way it is stored. It is always a wonderful experience to have the seeds that you have planted germinate fast and at first go.

The most wearying feeling, especially for an inexperienced gardener, is waiting for a sprout to come up – and nothing happens. Seasoned gardeners will know that it is the seed that is at fault, but beginners always have doubts.

"Did I plant too deep? Did I water too much? ...or too little?"

Most vegetable and flower seeds have a life span of three to five years under normal cool and dry conditions.

Parsnip seeds will not last much more than from one season to the next. The whole Umbelliferae family and Allium genus have rather short-lived and sensitive seeds.

It has been found that the germination rate of onion seeds is reduced by more than half if they are kept in a warm place, such as a west facing room in summer.

Generally, seeds last longer when the seed coat is thick, such as with most bean seeds. It seems that larger seeds last longer than small.

Seeds in storage are dormant but alive. They breathe very slowly. The trick is to create a constant temperature and humidity in storage that will keep this life process (with a minimum exchange of gases) at the lowest rate. At the best of times this life process is happening at a very slow pace which prolongs the seed's lifespan.

In open-air conditions the seeds will absorb moisture and the nutriment stored inside the seeds will start to react with the oxygen. With a little temperature rise the seeds will release carbon dioxide and generate more heat. Soon their respiration rate will rise to an unacceptable level for safe storage.

With this in mind, let us look at the most important points about storage:

Darkness: Storage on an open shelf and in a clear jar decreases the life of seeds. Preferably, put them in paper bags, in dark coloured jars and in a cupboard.

Moisture: Excessive moisture in a sealed container will make the seeds burn their store of nutriments and even generate their own heat like a compost. Because different seeds have different seed coat thicknesses, they will absorb moisture at different rates.

Most vegetable seeds should be stored at below ten percent humidity (five percent is optimum), while peanuts and soybeans are better stored at fifteen percent humidity because of their oil content.

At low moisture levels, seeds can handle fluctuations of temperature better. We cannot emphasize too much that vegetable seeds should be dried well before storing. If your seeds are not particularly well dried, it is better to leave them in a paper bag at room temperature rather than risk making compost inside a jar!

Silica gel crystals, available from the chemist, can absorb moisture from seeds in a sealed container. Place a layer about a centimetre thick at the bottom of the storage jar and separate it from the seeds by a layer of cotton wool.

The colour of the crystals indicates how much moisture has been absorbed – blue for dry, and pink for moist. You can dry pink crystals in the oven until they turn back to blue, and use them again.

If you cannot obtain silica gel crystals, you will find that powdered milk or bone-dry grain can

be placed at the bottom of seed storage jars for the same effect. It is also good idea to pack seeds away in jars only on dry days. A tape around the jar lid helps to keep out moisture.

Most sub-tropical and tropical fruit trees have seeds that cannot be dried without damaging their embryo. They need to be germinated soon after the fruit has been eaten. The small seedlings that result will lie dormant in shady moist conditions for years until they have more light, just as would happen on the forest floor.

Citrus seeds should not be dried, but can last four years when stored under refrigeration in high humidity. Moist sand is good for this.

Rainforest seeds are picked and cool-stored moist in a plastic bag until planted.

Temperature: For most vegetable seeds, 5°C is the ideal temperature. For long-term storage, a fridge is the obvious choice.

For short-term storage, put the containers of well-dried seeds in a south facing room. A place under the house would offer a more even temperature than under the kitchen ceiling.

Insect damage: Before storing any seeds, it is worth making sure that weevils are not already in residence. The eggs of weevils and other insects hide under the seed coat of beans and corn and emerge when the temperature is right.

Two days of freezing inside a sealed container kills most weevils and eggs – although some species of weevils would need much longer at lower temperatures. After freezing, wait until the container is back to room temperature before opening it, or moisture from the surrounding air will condense on its inside. But, be careful, if the seeds are not dry enough beforehand, they will be damaged at low temperatures.

African farmers thinly coat beans and other large seeds with edible oil, renewing the oil if weevils are seen.

Container type: Film canisters and screw-top jars make suitable seed containers, but avoid coffee jars, because they rely on cardboard and foil for their seal. Glass jars can be fitted with a good home-made gasket. A tyre's inner tube works well when cut exactly to fit under the lid.

Place the dried seeds in a paper or plastic zip bag, or an envelope, marked with name, date, and any other information pertinent to the seed, before packing into the jar. This way, several types of seed can be stored in one jar, which can then be placed in a fridge, cupboard or cellar. Plastic bags on their own are not moisture proof.

Germination Tests

By storing your seeds correctly, you will double or triple their life span. But you still need to monitor their viability if you are handling a collection. Gardening clubs with seed collections should carry out germination tests every second year, and rotate the stock.

Use from ten to one hundred seeds – depending on the degree of accuracy that you want. Place them on several layers of moist paper towel and store them in a plastic bag for up to one week at 20 to 25°C. In the kitchen, the best position would be on a window sill, or high up.

After a few days, unroll the paper and check the seeds for germination. If a seed has sprouted, it can be counted as viable.

After a week, all seeds can be counted and the rate of germination is evident. Forty five seeds out of fifty represents ninety percent fertility. A rate of less than sixty percent, indicates poor fertility and that batch should be quickly distributed to group members for propagation.

On the home level, it is useful to know the germination rate, so you can decide how thickly to plant your seeds.

A seed vitality test can also be done in the soil. This gives more valuable information, because many seeds may have the vigour to sprout on a wet and warm paper towel but would not have enough stamina to push a sprout through a layer of soil.

A vitality test is usually done in a warm and constant temperature, with a sheet of glass covering the box of soil containing the seed.

Finally, remember that seed germination is not always a black and white matter. Seeds that are at the end of their germination potency are often weaker and produce plants and seeds that have some genetic defects, or show a lack of vigour when the plant is up.

A seed is only a temporary promise. Obviously not all seed will germinate. Martin from Rockhampton has this to say:

> I did manage to get some original seeds of Ox-heart tomatoes, found dried on a piece of newspaper in the back of a 300 year-old Bible. The date on the paper was 1923. However they were only six seeds and none of them grew.

The oldest seeds found that have germinated are sacred lotuses carbon-dated as 460 years old and discovered in a Manchurian lake in an oxygen-poor peat moss deposit.

Lotus seeds have an extremely hard and impervious coat. They are suitable to long natural storage. In contrast to this, beans have a coat nowhere near as thick. Few varieties of bean seed will last more than ten years. Out of a hundred beans stored at room temperature in temperate climates, fifty would remain viable after five years.

Dr. Gary Nabhan, author of *Enduring Seeds* (1989), contests the popular belief that wheat seeds stored for centuries in Pharaohs' tombs, or beans found in Aztec caves, could have germinated: "It seems that people want to believe that the very crops so dependent upon man for survival from year to year can somehow last millennia without human intervention." (page xxi)

Dr. David Murray disputes seed scientists' predictions that tropical cowpea *(Vigna unguiculata)* seeds can be stored for 400 years without damage. He writes:

> I expressed my scepticism at such optimistic estimates, but since I am only a specialist in seed biology, my comments could of course go safely unheeded. Now the cat is well and truly out of the bag. In an article by Deborah Mackenzie published in *New Scientist* May 11th 1991, it has finally been admitted that "not all seeds survive in the cold." Jaap Hardon, head of the Netherlands' seedbank, concedes that "there is more genetic erosion *in* the banks than *outside* them."
>
> Where does that leave The Seed Savers' Network and groups like it in other parts of the world? As guardians of genetic diversity, it leaves us way out in front.
>
> Of course it takes more time and trouble to grow plants to maturity and harvest and store fresh seed (at room temperatures). But with more and more people prepared to make the effort, preservation of distinct cultivars is more certain. A "diffuse" seed bank with many custodians is more likely to survive the occasional mishap than a concentrated seed bank storing seeds the lazy way. (*The Seed Savers' Network Newsletter* No. 10)

There is only one conclusion to draw from this: the best place for seeds is *in the ground* as soon as is practicable. And, because garden seeds do not last more than a few years in storage, we need as a matter of urgency Seed Savers groups or committees in gardening clubs to make sure that seed stocks are built up by their members.

7. Planting and Planning

"The seed starter works ... at the edge of a mystery. Though we may take it for granted, we are part of that mystery, along with the fragility, the resilience, the dependability of the green world."

Nancy Bubel, The New Seed Starter's Handbook

Seed Starting

If you have decided to give up buying punnets of seedlings grown from seeds of unknown origin in suspect raising mixture, then you will need to know how to raise your own seedlings.

First, make sure that the time is right for planting and the seed that you are about to use is viable. A seed is viable if it is fresh and plump, without insect interference.

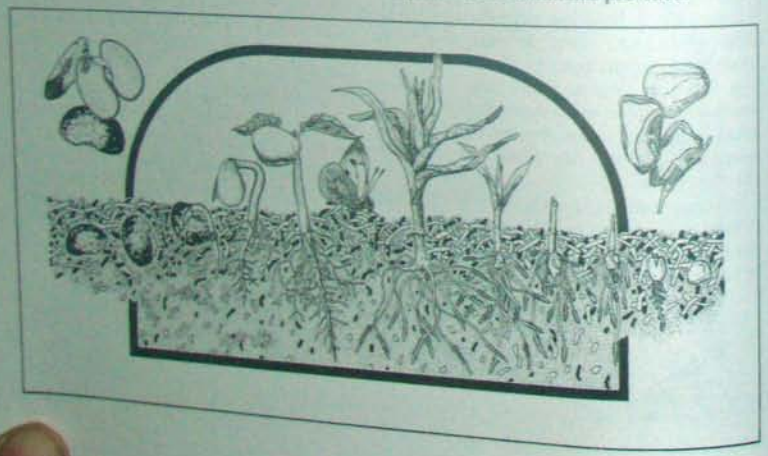
Some seeds such as winged beans have a very hard seed coat. These may need individual scarifying – by rubbing on concrete, or a grindstone or nicking with a knife. Other seeds, such as carrot seeds, will not germinate if they are too warm. Vernalization – placing the packets of seeds in the fridge for a few days before planting – will simulate a cold winter.

Moisture will break down chemical barriers to germination, though some wetland species require a special range of temperatures and light before they will germinate.

In this book, the plants that we deal with are all cultivated plants. They are used to having humans as caretakers.

The stages of a germinating seed are:

- Imbibing water.
- Digestion and translocation – there is less water intake at this stage. The growth hormones giberillin and cytokinin and the gas ethylene help to promote the conversion of the fats and oils in the seed to fatty acids, then sugars and starch (sprouted seeds are sweet).
- Cell division – renewed water uptake, more respiration and great increase in size.
- First shoots – the radicle (first root) and plumule (first leaves) appear, and the plant starts to depend on the nutriments provided.



Rules of Thumb for Planting

Thoroughly prepare the soil: Especially in the case of fine seeds, soil needs to be sieved. Mixtures for seedling trays are made with various ingredients but should contain some good soil, some lightening component such as peat moss, well rotted leaf humus or mushroom compost, and some sharp river sand. The fertility does not have to be high. The compost and manure must be well matured.

Soil temperature is more important than the actual air temperature: This feature was as important in Europe in the Middle Ages as it is today. Then, it was common practice to bare one's bottom and sit on the garden soil in order to test its warmth. If it wasn't comfortable enough, the planting of seeds was postponed until it felt really good!

Large seeds should be planted directly into the ground and small ones into seedling trays.

Beans, corn, and Cucurbits (*see* Section Eight) do better if they are sown directly into the ground, while lettuces, onions and tomatoes are better off in seedling trays. Exceptions to this are:

- When you live in a cool climate and want to start your seedlings early – Cucurbits, for instance – then plant them indoors.
- When you have arrived at a very fine tilth in the garden and can sow fine seeds – as long as you intend to water regularly.

A seed should be planted to the depth of two to three times its diameter; however –

- It is better to sow too shallow than too deep. The reason for this is that the germ cannot make its way through too thick a layer of soil. It will die from exhaustion, lack of air, or too much moisture.
- Plant more deeply in sandy soils, in dry weather and in hot weather. The Hopi Indians plant their corn seeds up to sixty centimetres deep (yes, two feet!) in the burning sands of the Arizona desert.
- For shallow planting, the surface of the soil should be made as fine as possible, the seed sown evenly over it, then the surface slightly beaten with the back of a spade. Frequent watering may be necessary, if it doesn't rain.
- A way to deal with very fine seeds is to mix them into a small amount of sand and run the mixture into a shallow furrow.

Water with a mist twice a day for the first few days and then once a day for a few more: Too much, and too little, water is a problem. Seeds are often washed away, or tumbled to destruction by too powerful a jet of water, or heavy rainfall.

Dehydration is also a killer, particularly if the seed has already started to germinate and then the water supply is terminated.

Transplant seedlings after the second set of adult leaves emerges and protect them: Note that a lot of seedlings have juvenile leaves that are of a different shape to the adult leaves. After transplanting, protect them from strong sun for a day or two.

Large vegetable seeds often have longer viability than small seeds: For the conservation of a plant with small seeds, a planting may have to be done every year.

Self seeding will occur in the garden provided that –

- plants are left to go to seed;
- seeds fall on fertile ground that will not be cultivated nor mulched too often – otherwise the young volunteers may be killed off in their infancy;
- you know which emerging seedlings are the vegetable seedlings you want and which are not, so that you can treat them accordingly.

Planning a Seed Garden

Leave space for plants to go to seed: When laying out a garden, allow room for plants to go to seed. They will stay in the ground for longer than if grown for the table. You can rarely plan ahead the location of these plants, because you will be selecting the best plants based on factors other than convenience of placement.

This is not easy for gardeners who customarily start off each new crop in completely clear beds. If you have this neat approach, consider the aesthetics of plants going to seed: the different shapes and colours add form and beauty to the garden scene.

Pay attention to labelling: If you are just starting seed saving, you will need to adopt methodical habits. In particular, attention should be given to labelling. Variety names need to be recorded on labels that will last in the garden for many months.

We have found the best labels available commercially are the matt white ones that can be written on with a pencil. Old venetian blinds last well; pen impressions on thin aluminium afford the best permanent label.

It is also a good idea, as mentioned earlier, to mark conspicuously plants, fruits and seed-heads as being reserved for propagation. Use bright cloth, silver paper, ribbon, string or tape.

Keep a plan of plantings in your garden that is updated regularly.

Avoid crossing of varieties: Reference should be made to the table in Appendix A. The following is a list of suggestions for the most common vegetables:

- Several kinds of lettuces can be allowed to go to seed at once, but they should be separated by a tall crop.
- There will be nearly one hundred percent purity between rows of tomatoes separated by rows of climbing beans on trellises. You can have several sequences if you like. Alternate a white bean and a coloured bean to avoid the entangling of similar looking bean varieties.
- Beetroot and silver beet are different forms of the one species and will cross pollinate. You can grow as many varieties of these as you like but you must ensure that they do not pollinate one another.

The best method is to nip out the flower stalk from any variety whose seeds you do not want as soon as you see it forming. Keep a strict watch to make sure that no unwanted flowers form.

- In the field, grow only one watermelon, one rockmelon, one cucumber, one squash, one gramma and one pumpkin each year.
- Corn can be staggered when your growing season is long. Plant one variety in early September, another one in early November and another one in early January. All of them can be saved for seeds, because they will not flower simultaneously.

  Maize will not pollinate and spoil sweetcorn if the maize is castrated, or detasselled, before it flowers. The pollen of the sweetcorn will fertilize the maize, of course, and fill the maize kernels with mixed genetic characteristics, but these can be kept for maize meal, polenta or tacos.
- The farmer with, say, a river flat and a kitchen garden that are separated by about 1.6 km can grow a variety of corn in each, a watermelon in each, a marrow in each, and so on, and save the seeds.

Permaculture

We have already described the activities of The Seed Savers' Network as Permaculture in action. Now is the time to introduce Permaculture and its founder Bill Mollison.

When Bill heard that we were starting a network of seed savers based mostly on endangered vegetable varieties, he visited our terraced gardens in the hills of Nimbin and gave assistance in the establishment of The Seed Savers' Network. He became our first foundation member.

After moving to our district from Tasmania, Bill spent many exciting days and long nights with us. We are keen Permaculturalists and he was very interested to see new sub-tropical applications, mistakes and all.

We were eager to introduce him to the rare spices and specimen trees that we had been collecting for a decade. There were extremely fast growing nitrogen-fixing legume trees with light fern-like foliage, such as *Enterolobium timbouva* (Elephant's Ear tree) and *Tipuana tipu* (Pride of Bolivia), covered with food producing

vines like passionfruit, yams and gourds, with a grove of Rio Nunes coffee and ginger family members growing underneath.

Bill loved seeing all of that in action. Everything planted was of some use. There were fibre plants, rare timbers, dye plants, all kinds of fruit and berry trees, and beverages such as maté tea *(Ilex paraguensis)*, Chinese tea, Abyssinian tea *(Catha edulis)* and various types of coffee.

In a Permaculture setting each plant has to have more than one job or function.

Trees in a windbreak should not only slow down the wind but could also provide fodder for animals in times of need, be a defensive hedge to replace barbed wire one day, be leguminous to enrich the soil with nitrogen, and provide reasonable bee fodder. Some trees can do all of these jobs. Sometimes a range of trees is needed.

In his preface to the *Introduction to Permaculture* (1991), Mollison wrote:

> I grew up in a small fishing village in Tasmania. Everything that we needed we made. We made our own boots, our own metal works; we caught fish, grew food, made bread. I didn't know anybody who had only one job, even anything that you could define as a job. Everybody worked at several things.

We keep this in mind when designing a food growing system.

Principles of Practical Permaculture

You can find solutions to environmental problems, and establish practical gardens, if you follow these simple suggestions:

- **Grow food where people live and use minimum space for it:** Establish plant and animal systems close to where you live in extremely productive front and back yards – wall, fence and roof included.
- **Have lots of diversity in the system or garden:** Selection of plants should include early, mid and late season varieties for continuous production, plants that store easily, plants that are perennials, and plants that self-seed.
- **Choose plants according to products and services:** When choosing plants, their total yield should be considered.

  A good example is the bitter orange (*Citrus bigaradier* or *aurantium*), which is very thorny and is used in north Africa to form impenetrable hedges. Its flowers give bergamot essence, the base of Earl Grey Tea, and an essential oil that has medicinal applications. Its fruits are sought for marmalade, and their peel yields the base of Curacao, Cointreau and various bitters. The tree itself is lopped to promote coppicing which results in valuable canes.
- **Stack species:** If you start in a bare paddock, ground covers, bushes and small pioneer

trees are considered the first canopies. These would consist of fast-growing species that may not necessarily last very long, such as acacias.

These trees offer protection from sun and wind to more valuable trees that are planted next, such as fruit and nut trees, timber trees, etc.

The system can then be enriched with understorey plants, ground covers and vines. An example for dry climates is, starting at the top canopy, to have date palm trees with passionfruit vines growing up them, then pomegranates and, at ground level, chickpeas (or broad beans).

Another example for such a climate would be to grow *Sesbania cannabina* (native to Western Australia), shading young avocado and feijoa trees, with a cash crop of sorghum that has rows of flax and chickpeas interplanted. In the annual garden, the tall perennial capsicum can shade your lettuce in summer, with a carpet of herbs beneath that.

- **Create productivity and privacy with a living fence:** By building high trellises and planting fast-growing vines around the whole perimeter of your block, you may be able to add productivity to privacy.

  Climbing beans such as the Zebra bean, or the Scarlet Runner in colder climates, will cover the fence in only six weeks if you are in a great rush to obtain cover.

  To improve the cover you can add other species. A climbing Madagascar (Lima) bean, with a Cucurbit such as luffas, *Lagenaria* gourds, or chokoes, will quickly cover the fence and bring an abundance of flowers and fruit.

  A more permanent approach is to plant a fast growing annual bean for immediate effect, a perennial bean to add nitrogen to the soil and passionfruit, kiwi fruit vines or grapes, which take longer to grow but last for years.

  Trellises can be installed in any urban dwelling against western facing walls to stop heat – on carports, shadehouses, dunnies, chookpens, toolsheds, and over the sandpit.

- **Serve each job or function with more than one component:** For example, cows should have perennial and annual pastures, other fodder trees for their leaves, and legume trees for their pods. Your water for the garden should come from several sources, such as a well, roof water, swales or contour ditches – even condensation from growing trees with large leaf surfaces.

  Minimal food should come from the shops and as much as possible from a multitude of local sources, like your garden, orchard, your local market garden, your pond which will contain crayfish, fish, and frogs (that also act as pest controllers by eating mosquito larvae). Harvest also the woods, creeks, side of the road and common land where wild food often grows.

- **Have each component serve more than one purpose:** For example, the Queensland arrowroot is a perennial. It is a good starch plant and also serves as a weed barrier right around the garden. The tubers grow so thickly that they cover the ground and let no running grasses, such as kikuyu, through. So it has at least two functions.

  Add a row of lemongrass, which is also useful for Asian cooking, and another of comfrey, and you have an impenetrable weed barrier. Create a small wind-protected niche for plants that may need the extra protection, as lettuce does in summer.

- **Remember that the problem is the solution:** The Bill Mollison maxim says it all: "You have a duck deficiency, not a snail problem." When you have observed ducks feasting on snails, you will begin to see snails as only protein for ducks. A seemingly useless boggy paddock can produce some beautiful well chosen bamboo or reeds for crafts.

- **Remember that pollutants are only an unemployed output:** Eliminate pollutants by recycling.

  To stop weed invasion from next door, lay thick wads of newspapers along the fenceline, overlapping each other. Place organic waste, such as sawdust or straw, on top to create humus.

  When you have poultry, you can make use of every aspect of the chickens' output. We all know that chicken manure is useful, but so are the birds' scratching habits.

  Chickens can be used to clear new ground of persistent weeds. A judicious fencing system in the orchard can be made to assign them to their duties – they become a "chicken-tractor" that is far more fuel efficient than the mechanized version.

  The chickens' need for protein is satisfied by the fallen fruit and maggots (this halts the fruit fly cycle), and their natural behaviour makes them safer and more efficient weed controllers than any herbicide.

  To minimize the smell and noise, the chicken pen does not have to be close to the house. It can be situated in the small fruits and berries orchard and be made portable. Because the orchard and the chicken are placed together, the yields are increased.

  The undesirable alternative is for the chickens to end up in a corner of the yard without any greens to eat and without shade, while the orchard fills with weeds and is littered with maggotty fallen fruit.

  Permaculture offers a "win-win" situation where everyone and everything is better off. It is a planned, but natural symbiosis.

- **Rationalize placement in zones:** Whether you have a quarter acre block or larger property, zoning helps to divide the landscape into units of usage.

  The zones are initially planned in concentric circles starting with Zone I at the centre and ending with Zone V, the wilderness, on the periphery. But corridors and islands of any of the zones can be planned within other zones. For example, a corridor of Zone V plants can lead right up to the house area for you to enjoy the wilderness at the doorstep.

  How often you visit each zone, or how much intensive care the components need, will determine how close the zones should be to the main dwelling.

  The prickly-leafed Bunya nut tree, which takes ten years to bear, is hardy and dangerous to live below. It goes as far away as practicable – to Zone IV for instance.

  The herb garden that you are likely to use regularly is at the kitchen door, balcony or window sill. This belongs in Zone I.

  Besides placing elements in relation to each other, as in companion planting, you must site the elements in relation to yourself as well. If you have fresh vegetables every meal, your kitchen garden will have to be close to you – otherwise you will miss out when it is dark or raining.

  In the garden bed itself, plucking-greens such as bok choy, the spinaches, sorrel, celery and looseleaf lettuces have to be near the path so that there is no effort in reaching them.

  Plants such as potatoes, cotton and pumpkins can be further away because you go to them for harvesting just once. They belong in Zone II and they can be planted in block shapes without any access path, within a large bed.

  Berry trees, the favourites of children, should be sited along pathways. Fruit trees that bear for a few weeks or months per year are placed further out and nut trees that can be harvested one day a year are planted even further away in Zone III.

  Fuel, timber and pole trees are placed in the next Zone (IV) away from the dwelling. Forests for wildlife and the occasional visit are positioned the furthest away, in Zone V.

The garden is planned and ready for planting.

8. A Special Family – Cucurbits

Characteristics

The family known as Cucurbitacae is characterized by vining plants (although some bushy types exist) and includes pumpkins, squashes, cucumbers, watermelons, rockmelons, gourds, chokos and many lesser-known vines. They are termed the Squash as well as the Cucurbit family. Most of them are annual and have separate male and female flowers on the one plant (monoecious).

We have singled this family out for special attention because there are misconceptions about crossing within it. Moreover, there are various techniques that apply to a wide range of vegetables, and these can be described here for the whole family rather than repetitively in the alphabetical section of this book.

Crossing will occur only within each species. For example, cucumber accepts pollen only from another cucumber. It will not cross with a rockmelon or a watermelon. A green cucumber may cross with a white cucumber, if they are grown in proximity. In this case, the seeds of both will give fruit with mixed characteristics, such as white cucumbers displaying green streaks, and vice versa.

All Cucurbits have flowers that are male, and flowers that are female. Male flowers are borne on a long stem and appear long before the females, so that there is more chance of different pollens reaching each female, and therefore more genetic diversity conserved.

The female flowers are borne on a short stem and have a small swelling at the base of the flower that becomes a fruit. Fertilization is dependent on insects, mostly bees, which are attracted in the early morning by the profuse pollen and bright colours. Pollen sticks to the bees as they go from flower to flower and from vine to vine.

Flowers live for one or two days; they open at dawn and wilt slowly over the next day or two.

Unusually high temperatures cause a predominance of male flowers. During wet seasons, the plant tends to concentrate on giving more vegetation and hardly any fruit set. Pollinated females even abort due to stress, such as excessive heat.

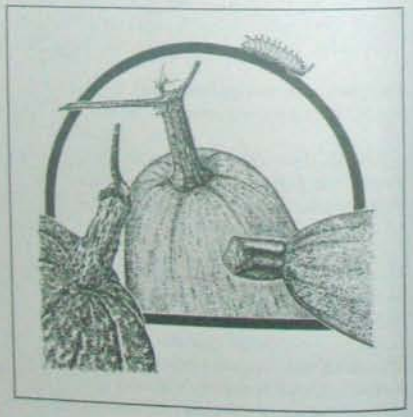
Pumpkins and Squashes

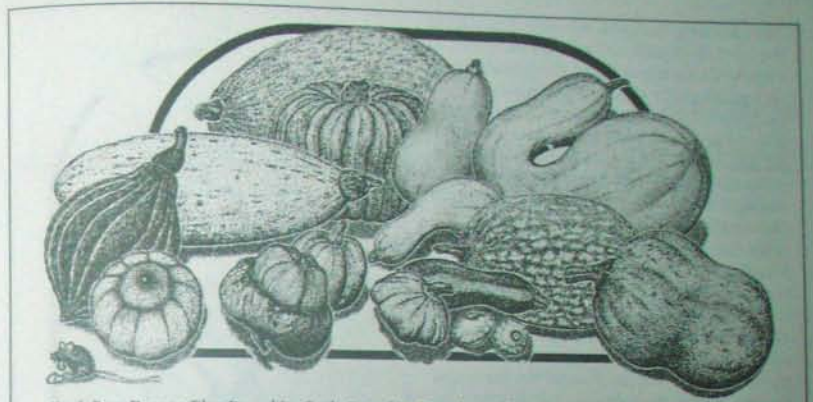
The common names of the pumpkins and squashes vary greatly between countries, with many regional differences. What is called a "Hubbard Squash" by one family may be called "Joe's (or whoever's) Pumpkin" by neighbours.

As well, there are four main species of this group that can be grown for seed, providing you know which is which. They are distinguished from one another by their growth habits, their leaves, seeds and fruit stalks:

Cucurbita maxima (e.g., Queensland Blue) – very long vines, large rounded hairy leaves, wide, round, corky stems on the fruits. Swollen yellow seeds which have a parchment, or cellophane coating (*see* Pumpkin in Part Three).

Cucurbita moschata (e.g., gramma and trombone) – very long vines, large, hairy spotted indented leaves, narrow five-sided stems that





Back Row: Banana Blue Pumpkin, Cattle Pumpkin, Beaudesert Blue, Butternut, Crookneck, Trombone. *Front Row:* Hubbard Squash, two Turk's Caps, Golden Nugget Squash, Scallop Squash, Zucchino, two Patty Pans, Chilacayote, Gramma.

are flanged where they join the fruit. Flat, gritty seeds with a groove around the edge and no cellophane coating (*see* Gramma in Part Three).

Cucurbita pepo (e.g., zucchini) – often bushes, prickly stems and leaves, narrow five-sided stems. Small flat white seeds with a groove around the edge and no cellophane coating (*see* Squash in Part Three).

Cucurbita mixta (e.g., Japanese pumpkin) – very long vines, large hairy leaves, stems like *C. moschata*. Flat long seeds that are heavily grooved around the edges. (*see* Gramma).

In practice, you can grow one of each of these species, but a Cow Pumpkin and a Triamble will cross as they are both *Cucurbita maxima*.

A quick inspection of the seeds will reveal their similarity. If you find, when you go to plant two types of squash, that their seeds resemble one another, they will cross with one another.

We know of some old farmers who manage to grow all sorts of pumpkins of the same species in the same field and save some of the seeds. They have been with the same strains for many years and know their characteristics well enough to realize that some pumpkins have a dominant pollen over others.

If contamination occurs, they can actually recognize the off-types the next year and rogue them out.

This is not recommended for the great majority of us. It is wise to grow only one of each group at a time, or isolate varieties by at least 400 metres. If neighbours have planted something that could cross with yours, hand pollination ensures true-to-type seeds.

Hand Pollination

The aim of hand pollination is to control the exchange of pollen, and thus control the parentage. It is done by protecting the flowers from insects or wind while the female part is receptive.

Here is a step-by-step way to hand pollinate Cucurbits:

- Choose male and female flowers the evening before they are due to open. They will be rigid, have some yellow colour on the seams of the closed bud and some yellow tinges at the tip.

  Close each flower with a twist wire, a rubber band or a little masking tape around the top of the flower, or wrap pantyhose around the whole flower and tie it up on the stem so that no insect can creep in.

  Your early intervention will mean that at first light the bees will not be able to get at the flower.

- Next morning start with the male. Cut it off at the base of its stalk and take off the petals to expose the male part. Open the female flower and rub the male part into the female part.
  Because hand-pollination restricts the free flow of pollen from numerous males to the female, mimic nature and choose and use some males from different vines of the same variety to hand pollinate the female flower, so that a wide genetic base is maintained.
- After the pollen is well deposited on the female part, shut or cover the female again until the flower withers. Mark the fruit with the varietal name on a tag around the stem, or at a later stage when half-grown, using a waterproof pen.
  Make sure that the tie around the stem can expand as the stem grows and thickens, or leave it loose enough to accommodate the large diameter.

When the vines are very vigorous, it may be useful to mark the position of the fruit with a stake as well.

The whole process takes only a few minutes and is quite fascinating. We find we have more success with hand pollination early in the season. The first four fruits on a vine are more likely to "take".

If the vine has already set some fruits that were not hand pollinated you may have to remove them (and eat them as zucchini) in order for the plant to produce more flowers.

Make sure the seeds are plumped right up before picking the fruits. It is best to wait until they are three weeks beyond the fully mature stage. Cucumbers and zucchini can grow to be sixty cm long. Store the fruits for one to three weeks before opening for seeds.

Planting the Seeds

Cucurbits are generally planted in a warm soil. Some gardeners pre-soak their Cucurbit seeds and then get them to sprout in a warm and light soil straight out in the garden. The darker the colour of the soil the better.

For early sowing in cooler districts, plant in a pot and keep warm – on top of the fridge, for example. This will get plants up quickly at a time

when seeds planted directly in the ground may rot, or be killed by a late frost.

The pots with the germinated seeds will need to be moved into a sunny position until the plants are large enough to move into the garden.

If the seeds are planted directly, the soil can be warmed by placing a layer of fresh manure to ferment below a hill that has been thoroughly prepared with well rotted manure and a top layer of good compost. Always plant the seeds more thickly than will be needed and thin out the weakest seedlings as they begin to crowd out the stronger ones.

The Squash family has long shallow roots. It is better to water these, rather than the leaves, to avoid fungal diseases.

Cucumbers are among the many Cucurbits traditionally said to grow in accordance with the virility of the planter! Marrow seeds in England used to be placed in the inner pocket of a waistcoat before planting, presumably to warm them up, though it may have been to absorb some of the planter's virility.

Many older pumpkin growers in Australia agree that a three year-old seed gives more female flowers than a fresh seed.

PART THREE

The Plants

117 listings of vegetables, culinary herbs, and edible flowers in alphabetical order. If you cannot find the plant that you want, it may be listed under another name – plants have many names! To find it, refer to the Index of Alternative Names in Appendix C.

SIMPLICITY RATING

Some seeds are simple to save at home, some more difficult. To help you in your choice of what seeds to save, we have rated the plants on our list. The scores are somewhat arbitrary because there are different difficulties in different climates. Our criteria include the extent of crossing, whether there is a need for a large number of plants for seed saving, the ease of collecting the seeds, the durability of the seeds, and to a certain extent, their availability.

For the beginner	•• For the accomplished seed saver
• For the gardener with experience	••• For the expert seed saver

• Amaranth	Eschallot	• Peruvian Parsnip
• Artichoke	Fennel	• Poppy
• Asparagus	•• Garland Chrysanthemum	• Potato
• Basella	Garlic	• Pumpkin
Basil	Garlic Chives	• Queensland Arrowroot
Bean	• Ginger	•• Radish
•• Beetroot	• Gourd	• Rhubarb
• Bitter Gourd	• Gramma	• Rocket
• Borage	•• Guada Bean	•• Rockmelon
Broad Bean	• Hibiscus Spinach	• Rosella
• Broccoli	• Hyacinth Bean	• Rosemary
••• Brussels Sprouts	• Jerusalem Artichoke	• Runner Bean
•• Cabbage	•• Kale	Sage
• Calendula	•• Kohlrabi	Salad Burnet
• Cape Gooseberry	• Korila	• Salsify
• Capsicum & Chilli	• Leek	•• Silver Beet
•• Cardoon	Lemongrass	Snake Bean
• Carrot	Lettuce	• Sorrel
•• Cassava	Lima Bean	• Soya Bean
•• Cauliflower	• Luffa	•• Spinach
•• Celeriac	Marigold	• Spring Onion
• Celery	• Marjoram	• Squash
• Celtuce	• Mint	• Sunflower
• Chervil	• Mitsuba	Sweet Potato
• Chicory	• Mizuna	• Taro
Chilacayote	•• Mustard	•• Tarragon
• Chinese Cabbage	•• Mustard Greens	• Thyme
• Chives	Nasturtium	Tomato
Choko	• New Zealand Spinach	• Tree Onion
•• Collard	•• Oca	• Tumeric
Coriander	• Okra	••• Turnip
••• Corn	•• Onion	•• Water Chestnut
•• Corn Salad	•• Orach	•• Water Spinach
• Cowpea	• Oriental Cooking Melon	Watercress
•• Cucumber	• Pansy & Violet	• Watermelon
• Dandelion	• Parsley	• Wax Gourd
Dill	•• Parsnip	• Winged Bean
•• Eggplant	Pea	Yam
•• Endive	• Peanut	• Yam Bean

A Note on Botanical Names

Under each common name entry the botanical family name is listed, then the genus and species. The full botanical name, which, for some people, is pedantic and awkward, helps us to be specific, and universally accurate. We have tried to demystify botanical language as much as possible by giving the meaning of the original words, which were usually Greek or Latin, and often practically descriptive.

The abbreviations used are:

- spp. – a number of species within the genus, e.g. *Amaranthus* spp. means that there are several *Amaranthus* species to which we refer.
- ssp. – subspecies, e.g. *Beta vulgaris* ssp. *cicla*.
- var. – variety, e.g. *(Brassica oleracea* var. *capitata)* distinguishes the cabbage from other close relatives, like broccoli *(B. oleracea* var. *italica)*.
- Following the conventions of the botanical classification system, once a botanical name has been mentioned, the genus name is abbreviated to a single letter in further references to it, as in the *Brassica* example above.

There are changes made to botanical names from time to time, for instance the family Compositae has been changed to Asteraceae, and Cruciferae to Brassicaceae. There have been other family name changes mooted, but we have chosen to keep the more conventional ones.

When a botanical name has been changed by the botanical community, the old name is in square brackets, e.g. Okra *Abelmoschus esculentus [Hibiscus esculentus]*.

Before you choose what seeds to save, see Simplicity Rating page 51.

AMARANTH

AMARANTHACEAE

Amaranthus spp. – Literally non-fading in Greek. The ancients noted the long-lasting qualities of the flowers and esteemed them as a symbol of immortality.

Origins: The highlands of South America. The white-seeded amaranth was once a staple grain of pre-Columbian civilizations which included the Incas, but the Spanish conquistadors forbade its cultivation on the grounds that it was used in sacrificial ceremonies.

Description: Amaranth is a tall annual with drooping seed heads. The foliage and large flower heads can be very showy being bright red, gold and purple. Grain amaranth often has white seeds that vary in size and take between four and six months to give a crop; leaf amaranth usually bears small, black, shiny seeds.

In Australia and New Zealand, amaranth is known mainly as a flower and is called Love-Lies-Bleeding and Joseph's Coat. The wild relative "pigweed" *(A. powellii* & *A. retroflexus)* can be recognised by its erect spikes on the stems and smaller leaves. In New Zealand a cultivated form of leaf amaranth is called Tampala.

Cultivation: Amaranth needs a warm growing season. It can be sown by broadcasting. A few species self-seed and should be introduced with care into new areas. However, leaves of all *Amaranthus* are edible and are eaten as bush foods.

Saving the Seed: There are a multitude of varieties which cross with one another very easily. Even some species have been found to cross with one another e.g. *A. caudatus* and *A. hypochondriacus*.

For most types, flowering occurs as the days become shorter.

Being wind-pollinated, they will cross with one another if less than 400 metres apart at flowering time. The seed heads mature gradually from bottom to top. Careful selection is needed every time a plant is chosen for seed. Inferior individuals should be rogued, or pulled out, before they can flower and pollinate better plants.

To maximise your seed harvest, shake the near-mature seed heads into a paper bag or onto a canvas while you do the rounds of the garden. If you are growing a fair-sized patch, it is faster

to cut the heads all at once when most of the seeds are ripe. The fully ripened heads tend to drop their seeds.
Dry for a week and thresh the heads with gloved hands, or feet, on canvas as the chaff is somewhat prickly. The seeds may be lost when winnowing because the chaff and seeds are of similar size and the seeds are of a light weight. If you heap uncleaned seeds in a bowl and toss them, the light debris will concentrate on the top and can be blown away. Repeat this until only seeds remain.

Storage: Amaranth seed is generally recognized as long-lived, up to five years in the open. Seed size varies considerably, averaging 800 seeds to the gram.

Usage: Amaranth is drought, pest and heat resistant and adapts easily to new environments. This makes it an excellent crop for non-irrigated croplands in developing countries. It is popular as a grain with subsistence-level peasants because it is very productive, grows in poor soil and only a small proportion of the harvest needs to be put aside for the next year's crop.
Amaranth is high in nutritional value. *A. tricolor* seeds are rich in calcium, iron, carotenoid pigments and lysine which compares favourably with milk in food value. When blended with grains that lack lysine, amaranth is ideal for lactating mothers, infants and children. The National Academy of Science in the USA sees amaranth as an important source of protein, vitamins, and minerals, particularly in tropical and sub-tropical highlands (National Research Council, 1989).
In China and Vietnam, the young seedlings are uprooted, washed, chopped and briefly steamed. In Singapore, a tall variety is relished for its stems, which are peeled and eaten as asparagus. In the southern states of the USA, the tiny black seeds are broadcast over a well-prepared garden bed and the thinnings are eaten along with collard and other greens.
The Greeks pluck amaranth leaves, boil them, then discard the water containing the oxalic acid which is toxic if taken in great excess.
The dried leaves are added to "mealie meal" (maize porridge), giving it a green colour, in Namibia and South Africa. Amaranth is avoided by Zulu warriors as they believe that it weakens them in battle.

In northern India, seeds of *A. cruentus* are popped and sold as a sweet or a cereal that is light, crunchy and tastes like a nutty popcorn. Popped amaranth is available as a breakfast health food in the USA.

Its astringent leaves are sometimes eaten for excessive menstruation, and to relieve sore mouths and throats.

On the Lookout: There is a wonderful leaf amaranth that grows wherever Greeks have settled. The plant yields masses of leaves that are used as a spinach. When heading, it bears drooping red flowers. A Greek gardener in the Brisbane suburb of West End says that one of her wedding presents was a packet of family heirloom amaranth seeds. She uses it in the traditional Greek dishes calling for spinach.
Marie Lee from Pine Creek in the Northern Territory sent us some amaranth seed and said:

> In 1933, when I was one year old, an old Chinese lady pulled up some red spinach plants and said "soup for baby" to Mum. She wouldn't hand over the seeds at all, so Mum cut off the tops, planted the bottoms, and off the plant went.
> It grows in rich, warm, damp soil. When sixty cm (two feet) high, we eat the leaves which have red markings and thick juicy stems. The ball-like seeds grow on the lower stems, whereas they usually appear on the tops.

Chinese cooks on cattle stations in the northern part of Australia left behind interesting strains of vegetables, often including amaranth, and these can still be found today, especially where fresh food is a scarce commodity.

ARTICHOKE

ASTERACEAE

Cynara scolymus – cynara is the Latin name for the wild cardoon, and scolymus, from the Greek scolops, means "pointed".

Origins: The globe artichoke is considered native to the Mediterranean seashore and the Canary Islands. The ancient Romans relished a primitive form of artichoke. The Italians have made selections of purple and green artichokes since the 15th century.

Description: Artichokes are attractive plants that can be long-lived when grown in the right area. They flower from early spring through to autumn, according to climate and variety. The artichoke produces a stalk that grows up to two metres high with numerous branches. Eventually these will be topped by the delicious buds, which will turn into a spectacular purple flowers. The leaves are large and look like a Scotch thistle's – grey above, whitish and furry underneath. They are also called globe artichokes, to distinguish them from Jerusalem artichokes, a different plant (*see* separate entry).

Cultivation: Artichokes thrive in deep, rich soils in maritime climates. Although unusual in New Zealand, they do well at sea level as far south as Christchurch in the South Island. They will rot if the soil is cold and waterlogged in winter.
After they have borne a crop, cut the stems thirty cm (a foot) above the ground and mulch them well to protect their delicate roots from winter temperatures.

In the tropics and sub-tropics, the wet weather and hot summer sun are a problem. If you love them, give them a little shade. A slight application of salt is beneficial.

In Permaculture, as in any good management system, the garden space around the plant can be filled in with lettuces or other shallow-rooted crops.

Artichokes can escape cultivation and have become rampant around Melbourne and Adelaide, and naturalized in temperate areas of NSW.

Propagation: The preferred way is to propagate from the suckers (sometimes called side shoots, or slips) from plants that produce a good-sized terminal bud. Plants started from seeds will not produce many buds, if any, in the first year.
During spring a good plant will produce up to fifteen suckers, of which only half a dozen of the largest should be left on the plant to grow into large shoots for propagation. When these selected suckers start growing leaves thirty cm long, cut them neatly from the base of the plant with as many small roots as possible intact and replant in a permanent place. This is the way to ensure an artichoke variety will reproduce true-to-type.

Saving the Seed: To obtain a new variety, start with seeds and select repeatedly from the offspring. A high proportion of the seedlings may revert to the spiky type and should be rogued out.
Large purple flowers will form on top of the thick stems. Only the best fruit, with an outstandingly large base, should be left to go to seed. Let them pass the edible stage – their scales will get hard, and purple florets will cover the head.
Suppress the little side buds on the same stem to give more strength to the heads reserved for seed. In Brittany, western France, farmers bend the stalks down to protect the seed heads from the rain.
The seeds are found in the seed case after the white thistle down has blown away. It is a prickly affair to retrieve the seeds because the calyx is spiny.

Storage: The seeds will last for five years if kept cool and dry. They are grey, angular, oblong and flattened. There are thirty seeds to the gram.

ASPARAGUS

LILIACEAE

Asparagus officinalis – in Greek, asparagus means "first sprout" and in Latin officinalis, "the apothecary shop".

Origins: Asparagus is a native of coastal areas and river banks of Europe and southern Russia. It has been taken from its natural habitat to the garden and slowly improved by selection. Seed savers have been at work!
The Romans cultivated it and so did the Gauls, who used it as a medicinal plant. It has now reverted to its wild form in many wasteland areas to become bush tucker.

Description: Asparagus is a perennial and a Permaculture plant par excellence. It has both male plants and female plants (i.e. it is dioecious). The flowers on the male plants look like yellowish green bells and the female's flowers are smaller and quite inconspicuous. Asparagus plants are ferny and grow to one and a half metres.

Usage: *Kitchen Talk Newsletter* No. 12 featured the history and usage of the globe artichoke. One story noted that it is the only vegetable that appears to leave more on your plate, after you have eaten it, than when you started: "A large part of the pleasure derived from a globe artichoke lies in the knowledgeable and slow unwrapping of the mystery – separating, classifying, selecting and nibbling as you go on – until the prize, the delicious and nutty bottom of the bud, is finally revealed," writes Michael Boddy.
Here is a classic recipe: Pick the flower buds when young (before the tips of the scales become hard and dark); steam the whole artichoke and eat the base of each scale dipped in a dressing made of good wine or cider vinegar, mustard and olive oil. The central leaf stalk is eaten blanched just as cardoons are. The dried flowers fetch a good price at the florist if picked in their prime.

Artichokes tend to lower the urea level of the blood and combat excess acidity, rheumatism, liver malfunction and bad breath! They are recommended for nursing mothers trying to wean babies, as they slow down lactation.
Cynarin, a constituent of artichoke, is a sweet-tasting chemical that is soluble in water and saliva, and is the basis of the Italian aperitif Cynara. Cynarin will sweeten the taste of anything you eat afterwards. It is also known as a liver protector in animals, and has been formulated into a drug for lowering cholesterol *(KTN, as above)*.

On the Lookout: If you have early frosts it may be worthwhile to propagate the green globe type, which is ready up to twenty days earlier than the purple. But the purple strains are reputedly better eating.
The seeds of only two strains are available commercially in Australia, but there are many more varieties in the Italian community, such as the dwarf perpetual artichoke which produces buds for most of the year, providing it is frequently watered. This particular variety is very tender and mostly eaten raw. There is a Purple of Tuscany and a Green of Florence, both of which have the distinction of being eaten whole when very young.

Before you choose what seeds to save, see Simplicity Rating page 51.

Cultivation: Thorough preparation of the soil is needed, including a large proportion of sand, along with high fertility. Asparagus is highly salt resistant and a light application of salt – up to thirty grams, or an ounce, per plant – is even recommended.
The male plants produce more spears earlier in the growing season than the female plants which have rather thicker and more tender spears. For good production, give the best conditions from the start and keep feeding and mulching deeply every winter. Care should be taken not to harvest in the first two or three years while the plant is gathering strength.

Propagation: Asparagus is generally propagated by dividing the crowns of plants that are at least three years old. This is done in winter when there is no visible growth. Lift the tangles of roots and crowns, which will look like bunches of stiff seagrass, and tease them out into separate crowns. Trim the roots back to fifteen cm (six inches).
Plant in furrows about forty cm deep, placing the crowns onto a small mound in the centre of the furrow. Fill up the furrow with good rich compost.

Saving the Seed: Asparagus can also be propagated by seed, but this takes longer than from crowns because the plants need an extra year before they are ready for harvesting. To obtain seeds, leave the most vigorous female plants, with at least one male nearby. Following cross-pollination by insects, scarlet berries will form on the female plants in autumn. The ripe fleshy berries containing half a dozen black seeds are picked, crushed, washed and dried in the shade.
If you are an asparagus collector who wants to propagate from seeds and have more than one variety, be aware that bees will cross-pollinate them. Plant the seeds in spring in fine rich soil and transplant the seedlings the following year, choosing only the strongest. Select for the desired characteristics in the subsequent years.

Storage: Seeds will last between three and five years. There are fifty seeds to the gram.

Usage: When young shoots are eaten raw, they give maximum nutritional value. Otherwise they are boiled upright in bunches from three to ten minutes according to age and size. The reliable old "billy" (no aluminium please!) is a good vessel for this.
Serve with butter or lemon, or as the French do – while still hot, douse with vinaigrette dressing, allow to cool and serve as an entree.
Some gardeners prefer their asparagus green, while others produce fat white spears by heaping soil, leaves, straw or seaweed over the whole bed and cutting the spears off deep under this mulch.
The Chinese use several species of asparagus, both medicinally and as a food.

Medicinally, asparagus is used to stimulate lazy intestines, because its high fibre content helps bowel movements. It is not indicated for people with rheumatoid arthritis. It increases the flow of urine and perspiration, along with cell production in the kidneys, but should not be eaten when the kidneys are inflamed. It is believed to increase the libido.

On the Lookout: In Geelong, Victoria a certain Monsieur Tournouer grew asparagus plants that he brought from France in 1866. Other French settlers introduced their plants to different parts of Australia, both before and after that time. Some of the original strains may well have survived and would be worth tracking down and tasting.
Ask around for Grosse Blanche, Asperge Verte, Asperge d'Argenteuil, which bears even-sized spears until the season finishes, and Asperge de Vineuil which is suitable to cool, foggy areas.
Supermale produces only males which means there is no competition for the established plants from volunteer seedlings.
English-named varieties include Early Giant and Violet of Holland (the ancestor of many of today's varieties), which have pink or purple tips; Connover's Colossal, which has very thick spears, may not be as appetizing.
California 500, which is an improvement on Mary Washington, is popular in New Zealand.

BASELLA

BASELLACEAE

Basella alba and ***B. alba*** var. ***rubra*** – Basella is this plant's name on the Malabar Coast in south western India; alba means "white" and rubra "red" in Latin, referring to the colours of the stems.

Origins: South Asia.

Description: The plants are twiners, and can climb two metres up a trellis or bush; otherwise they will sprawl over the ground and twist themselves gently. The flowers are small, green and are produced at the leaf axils. Also known as Ceylon, Malabar and Indian Running Spinach.

Cultivation: Although basella grows well in a climate with a wet summer, it will grow almost anywhere. The hotter and wetter, the better. Basella is very easily grown organically because it is rarely attacked by insects. The seeds germinate readily and can be planted directly in the garden, or in seedling punnets or trays.

Propagation: Take cuttings from well-established basella plants and bury them at least half way up the stem in good soil. They will quickly send down their own roots in warm and wet weather.

Saving the Seed: Basella goes to seed as the weather cools down. Pick the berries when they are dark purple. They have only one seed in each of them. Rub them clean with gloves and wash them under a tap until the water runs clear. Alternatively, leave the skin and flesh on them. Dry on a wire screen before storage.

Storage: The seeds look like peppercorns and store for five years in a cool, dark and dry place. There are fifty seeds to the gram.

Usage: The mucilaginous leaves and tender stalks are used as a spinach, or in soups and stir fries. Their oxalic acid content is low and they are very rich in minerals and vitamins. Cooking should be brief to retain these nutrients – more than a minute creates a sloppy mess. Our children write on their bodies with the inky berries. G.A.C. Herklots, whose knowledge of Asian vegetables was already profound by the time he was interned in Hong Kong during World War Two, records that, in China, basella was grown for its seeds, the flesh of which were used as a dye in rouge and sealing wax (Herklots, 1972). This dye is also a safe, natural colouring for jellies, pastries and sweets.

When eaten regularly as a spinach, basella is a mild laxative.

On the Lookout: Bunches of basella shoots are often for sale in summer in the Chinese and Vietnamese communities of Australian cities and can be used for propagation. There is a small-leafed variety which is tastier than the large, thick-leaved strain.
There is also a Chinese species, *B. corifolia*, with a heart-shaped leaf. This particular basella does not run to seed as early as the other species and reputedly has a superior taste. Eclipse is not as rampant as other varieties and is ideally suited to greenhouse culture.

BASIL

LABIATAE

Ocimum basilicum, ***O. gratissimum***, ***O. sanctum*** and ***O. canum*** – from the Greek ocimon for basil and the Latin basilicum for "royal", gratissimum for "very agreeable", sanctum for "holy" and canum for "hoary".

Origins: There are several species of basil, all of them native to either Africa or Asia.

Description: There are both perennial and annual basils, and their shape and size range from almost prostrate, to mighty bushes two metres high.

Cultivation: Basil is predominantly a warm season plant. In cool climates, plant for summer cropping. Perennial basils thrive after a winter pruning.

Propagation: Both perennial and annual basils can be propagated by cuttings. This way, there is no need to be concerned with isolation distances. Just pop the bottom ends of the stalks in a glass of water until white roots start appearing, then replant. Annual basils however are usually propagated by seed.

Saving the Seed: Basil flowers are coloured white through to purple. They have an abundant and pungent nectar, and rely on insect pollination; so one basil will cross with others. You will need to separate different varieties by as much garden space as possible – preferably fifty metres.
The seeds mature from the bottom to the top of the flower, and capsules generally contain four seeds. Either cut the stalks or rub your hand up them when the top seed capsules turn brown and brittle.
Dry on a sheet of paper or in a paper bag. Rub well when the seed capsules are crisp and dry, either in between the hands or on a small gauged wire mesh to dislodge the four seeds contained in each capsule.
Place the crushed mixture in a large bowl and carefully whirl the lot until the seeds gather at the bottom of the bowl and the chaff on top. Pick out the bulky chaff with your fingers; the rest can be gently blown over. A very small gauged sieve will let the dust fall through and retain the seed.

Storage: The seeds will last up to five years sealed away in a dark, dry, cool place. They are small and spherical, and there are 600 to the gram.

Usage: Pesto has become a popular sauce to serve with pasta. It is a heady mix of sweet annual basil, garlic, Parmesan cheese, olive oil and pine nuts (macadamias can be substituted here) ground up together.

Basil is recommended as a tea for some forms of headache. A fine powder made of the dried basil leaves was used in the olden days as a snuff, to clear blocked noses.

On the Lookout: Every Greek and Vietnamese front yard seems to have basil plants. Basil releases its aroma on touch. Some Greek families use them as a border plant along a footpath that is near the front door so they have advance notice of visitors – a kind of olfactory bell.
O. basilicum is the sweet annual basil of European cultivation; ask your Russian friends for the famous Malarossy Bazilike. Ask your Spanish friends for Albaca Menuda (Fine Basil) and Albaca de Hojas de Ortiga, or Nettle-leafed Basil which is called Basilico Arricciato by the Italians. Try your luck with your Italian friends for Basilico Maggiore Nero (Large Purple). The most authentic basil for use in pesto is Picollo which is a dwarf variety that is often seen on the window sill in Italy, where it can be harvested as often as needed without having to walk into the garden. This is good planning!
The largest lettuce-leafed type is Mammoth which has leaves as big as saucers, and is ideal for drying.
Then there is Holy Basil, "Ram Tulsi" in India, *O. sanctum*, sacred plant of the gods Krishna and Vishnu. It is bushy and has purple calyces.
O. gratissimum is cultivated in Thailand and Malaysia as "Selaseh Besar", coming in several exotic scents. It has quite small leaves.
Asian shops often have very unusual basils, such as lemongrass, anise and cinnamon-scented ones, which can all be grown from cuttings. Scented basils are an essential ingredient in Thai cooking.
O. canum is the Hoary Basil or "Kemangi" in Java and Malaysia. It is an annual with a lot of branches up to one metre tall. The aromatic leaves are used in Laksa, a Malay-Chinese rice noodle soup dish. The leaves are eaten as a spinach and the seeds are used to make a jelly.

BEAN

LEGUMINOSAE

Phaseolus vulgaris – phaselos is Greek for bean, and vulgaris "common" in Latin. (*see separate entries for* Broad Bean, Guada Bean, Lima Bean, Runner Bean, Snake Bean, Soya Bean, Winged Bean *and* Yam Bean).

Origins: Although there are records of bean cultivation in Mexico in 4000 BC, the plants seem to have originated from the temperate regions of South America.
Ethno-botanists focus on the Incas of Peru as the domesticators of beans and surmise that they were transported in successive waves northwards through Central and North America. The invention of pottery 6000 years ago in South America is thought to have enabled the boiling of dried beans. Prior to that, green beans were eaten raw.

Description: Some beans are grown to be eaten green when the pods are tender (that's the French bean sold by greengrocers), and others are eaten dried (that's the Kidney, Navy bean, etc., sold by grocers). The first have either no parchment (inner skin) in their pods, or a very thin one, and the second usually have a thick

parchment. Apart from the green beans being left to mature and dry on the bush, the seed-saving techniques for both green and dried beans are very similar, so we will deal with both together. Some of the many other species known as "beans" are covered elsewhere in this book.

Both French and Kidney beans have two growing habits: dwarf (bush) and climbing (pole).

In the 16th century, Pope Clement the Seventh seemed to have had vision with beans – he distributed, in ceremonies of great pomp, bags of beautiful-looking beans to the populace. When the Pope's niece married the French King Francois I, he gave her large quantities of multi-coloured beans to replant in France, saying that she should be more proud of her wedding present than "all the jewels of the crown".

Beans spread so fast from the Americas to Asia that for a long time they were considered in Europe to be of Chinese origin.

Cultivation: Plant the seeds directly in the position they are to grow because they do not survive transplanting very well. Dwarf (bush) beans need a less rich soil than climbers because they have lower yields and are in the ground for a shorter period. A climbing bean can yield up to three times more than a dwarf bean.

In warmer Australia and New Zealand, beans fit in well after a crop of potatoes. A good hilling helps to protect them from wind damage. Care should be taken not to bruise plants while cultivating in wet weather lest they become more prone to disease, such as anthrachnose.

Saving the Seed: Accidental hybridization (crossing) rarely occurs because pollination happens mostly before the bean flower opens (i.e. automatic pollination). This explains why so many gardeners have been able to keep their favourite strains pure for decades.

Despite this, different climbing varieties are best planted two metres apart to ensure a hundred percent purity. It is also a good practice to avoid planting two different varieties of climbing beans with the same coloured seed side by side because they will be hard to sort at harvest.

Beans grown for seeds are grown the same as dry beans for home consumption, except that at an early stage those with leaf discolouration, bacterial blight or any other sign of disease should be rogued out. Select the finest individual plants and identify with a ribbon.

Traditional gardeners say that cutting off the tops of the climbing varieties causes the lower bean cluster to grow larger. Some gardeners believe that seeds selected from the top of the bush will grow into plants with a predisposition to flower poorly at lower and mid-level.

If the weather is wet at harvest, the beans may be picked and dried progressively as they come to the yellow pod stage. With dwarf varieties, when the pods turn yellow brown, the whole bush can be uprooted and hung in a dry, airy space. Leave all the pods on the bush to dry completely. Pod out the beans from their shells. If you have large quantities, hang them in hessian bags and beat them with a stick.

Assessment of the dryness of the seed needs to be made during the next stage. Test the beans by biting with a gentle pressure. No impression should be made. Discard blemished and shrivelled seeds. Usually you will need to dry them for a further one or two weeks.

Store them in airtight containers on a dry day. Weevils lay their eggs under bean seed coats and the seeds will be eaten when they hatch. Freeze the dried beans in a jar for forty eight hours to kill weevils and their eggs. Coating with edible oil prevents weevil infestation.

Storage: Bean seeds will last three years. Some will germinate if kept for several years, but not as vigorously. Bean seeds range from five to ten per gram.

Usage: Dried beans are the "meat" for 300 million people in the world today (*Geneflow* journal, 1992). Combined with a cereal and a small amount of seed oil, they make a complete meal.

Green bean juice is a diuretic: one glass before breakfast is recommended. The cooking water from dry and green-shelled beans revives the colour in printed cotton fabrics when added to the wash.

On the Lookout: The beauty of beans is so marked that ethno-botanists are of the opinion that there was religious significance in their colour patterning and forms. Active subscribers of Seed Savers are maintaining hundreds of varieties of beans.

Wally Bergman, a coalminer from Mackay, Queensland, has collected and maintained more than one hundred sorts of beans over the years. He even buys stocks from seed companies that are about to discontinue lines. He has rescued some beautiful strains from Goodwins, a small Tasmanian family seed company. Bill Hankin, in the Snowy Mountains, is another enthusiastic bean collector. Beans seem to enthuse gardeners more than any other vegetable.

We will look at green, then dried bean varieties.

Before you choose what seeds to save, see Simplicity Rating page 51.

Green Beans – French Beans, Snap Beans, String Beans – to be eaten fresh.

Dwarf: Bush beans include New Discovery, Feltham Prolific, Emperor William, Perfect Bush, Tweed Wonder, Canadian Wonder and Magnum Bonum. In Queensland, Redlands Beauty and Redlands Greenleaf were bred by the Department of Primary Industries for their resistance to the fungal diseases that are common in that State's wet and hot weather.

All the beans whose names start with "College" were bred by the NSW Department of Agriculture and have been popular with market gardeners and canneries.

Climbing: For climbing beans, a trellis, fence, or tripod will need to be provided. Many beans that arrived in Australia in the early years were quite large and suited the big families of the day. General Mackay has pods thirty cm (a foot) long and quite wide.

The Muffet Bean, which arrived from England to be cultivated in the Goulburn, NSW, area in 1827, is a large variety that would have helped to feed the fourteen registered children of Ken Muffet's great grandfather. It contains up to twelve beans in one pod and is possibly a Caseknife. This name indicates their large size. Ken and his relatives still grow this old-fashioned bean and it means a lot to them.

The Lohrey's Special Bean, with a natural salty flavour, and a butter bean, named the Magpie because of its black and white seed, were saved for fifty years by the one family at Rocky Cape in Tasmania.

We have been sent dozens of types of Zebra beans with names such as Count Zeppelin, Scotia, Mollie's, Greek and Mrs O'Brien's Zebra Beans. They come from various states of Australia, some having arrived with German settlers. Doreen Bollen from Toronto near Newcastle, NSW, who has saved and grown a Zebra bean for forty years, says "My father-in-law got them in Bellingen (NSW) from a lady who had them from an old man who had brought them himself from Germany years ago!"

The Nardi Bean is one that performs well even in poor soils. It first arrived in Australia from the New Hebrides (now Vanuatu) in the late 1800's with the Nardi family who settled in New Italy, a hamlet near Lismore, NSW.

You may wonder why Seed Savers would want to collect so many Zebras that apparently looked the same. Isn't one enough? Because they emanated from different regions, they were adapted to different climatic conditions and soils. These unique genes had earned them the right to be grown and protected.

Yellow-podded varieties, both dwarf and climbing (such as Bountiful Delicacy, Mammoth Golden Cluster and Kentucky Wonder Wax) are known for their fine flavour. Butter beans such as Cherokee Wax were at one time popular in New Zealand.

Dried Beans – Pinto Beans, Navy Beans, Soup Beans, Kidney Beans – to be dried and stored for soups and flour.

Many varieties of Barlotti (or Borlotti) beans, both dwarf and climbing, exist amongst the Italo-Australian community. They are characterized by speckled brown and red pods with very fat seeds. The Atherton Tablelands in northern Queensland, the Riverina area of southern NSW, and Shepparton and Mildura in Victoria are all strong Italian farming communities. A climbing variety resistant to rust – the Mangere bean, with waxy pods – has been developed in New Zealand.

Barlotti beans are also used green-shelled. The very tender Green Flageolet Bean used for making cassoulet is grown and distributed by Michel Porcher at Gisborne, Victoria.

BEETROOT

CHENOPODIACEAE

Beta vulgaris – beta is the name that the ancient Romans gave to the beet, vulgaris stands for "common". Silver beet (chard), sugar beet, mangels and fodder beet are also classified as *B. vulgaris* (see Silver Beet). The other three are grown as animal food and are not dealt with in this handbook.

Origins: Wild beets are native to northern Africa and the coast of Spain and Portugal. They were introduced to northern Europe by the Romans who fed them to both their troops and horses. Beets adapted very well to cold northern winters and from them, sugar beet and the round red beet were developed. Collections of the wild relatives of beetroot are being made in Sicily and Calabria for large scale gene banks.

Description: The many forms of beet share the common characteristics of having a swollen root and spear shaped leaves.

Cultivation: Beetroot is a biennial. It is not very hardy in prolonged harsh winters but will take some below zero temperatures. It is sown in winter in warm climates and late summer in cool climates.

It is salt tolerant by nature. For seed production, an application of common salt at thirty grams to the square metre (an ounce to the square yard) or boron in the form of borax at one tenth of that rate is beneficial.

Saving the Seed: The roots attain full size during their first year of growth and in the second year send up an angular stalk. The plant then dies off. This is typical of a biennial. However, in places where the difference of day-length between seasons is not marked, such as far northern Australia, beetroot may not go to seed at all.

In cold climates the roots are lifted for evaluation at the beginning of winter, stored in moist sand, then re-selected for replanting in spring according to their true-to-typeness, appropriate size and uniform colour. They will go to seed in the summer. To preserve the diversity of the strain, a good dozen (at the very least six) plants should flower together, especially if the variety is rustic and shows a lot of character.

To encourage larger seed balls on the lower parts of the branches, the top and side branches should be tipped. Seeds can be picked individually as they ripen, or the whole stalk cut down and hung to dry further. Strip the branches by hand into a bin or an equally wide container. Each seed ball contains from two to six individual seeds. As they are hard to separate, you will end up with small groups of seedlings wherever you plant a seedball. Plant breeders have developed a strain of sugar beet with a single seed ball, so that there is no need to thin the seedlings.

Beetroot is pollinated by both insects and wind. The pollen is very fine and can fly long distances. Depending on wind direction and ferocity, commercial seed growers isolate beetroot from silver beet, sugar beet and fodder beets, that are flowering at the same time, by 250 to 500 metres. Few gardeners actually allow their beets to get to the flowering stage, so there is little chance of crossing.

Storage: Seeds keep for four to six years. This is uncommon longevity for a vegetable seed and there is usually less than fifty percent germination at that stage. There are fifty seeds to the gram.

Usage: Beetroot is grated raw and dressed, or steamed, sliced and covered in vinegar and a touch of sugar – the old Aussie way. The leaves are edible and make a nutritious spinach.

The root is not recommended for diabetics because of its high sugar content.

On the Lookout: The Italians introduced red beetroot to the rest of Europe, and French gardeners made numerous selections. Ask Middle Eastern folks for red ones and look for yellow ones in old German settlements, such as the Barossa Valley, the Murray flats, and York Peninsula in South Australia, and Tarrington, the Mallee and Geelong in western Victoria. In New South Wales, German settlers also established themselves on the edges of cities, often as market gardeners.

Bull's Blood, an ancient variety, is also grown for its reddish, purple leaf. Early Wonder is an old flat type that is suitable to early planting and has been replaced by both Early Market and the Dutch bred Boltardy. Detroit Dark Red is often used as a main crop for the mid-season. In New Zealand, Crimson Globe, Rapid Red, Dewar's Dwarf and Early Flat Egyptian, which Yates distributed from early this century until the mid-thirties, may still be grown in some North Island gardens.

The long and half-long types are often of good quality but their hairy appearance and lack of uniformity made them less popular in the past, so many tasty strains have disappeared. Century, Obelisk, and Winter Keeper are in this long-rooted group.

BITTER GOURD

CUCURBITACEAE

Momordica charantia – from mordes, "to bite", because the seeds have the appearance of being bitten.

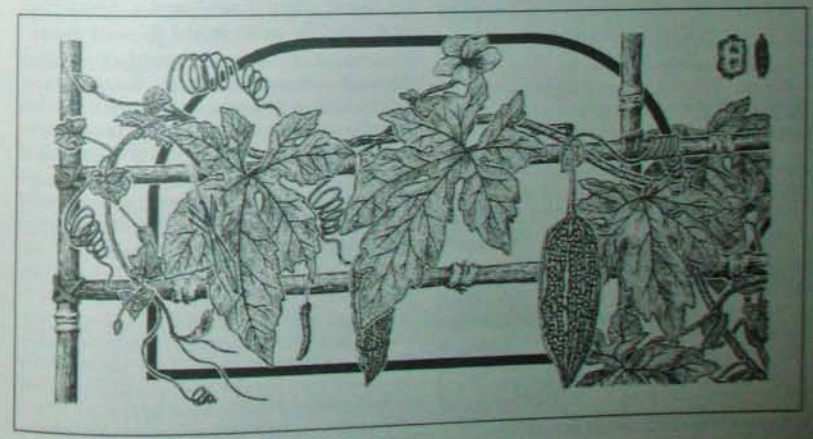
Origins: Tropics of Africa and Asia.

Description: A slender annual, climbing to two metres. The fruit looks like a light jade-coloured stalactite and is picked for the kitchen while still immature, hard and green.

Also called Bitter Cucumber and Basalm Pear, or Peria in Malaysia, Kiuri in Japan, Karawila in Ceylon. The Chinese say "Fu Kwa."

Cultivation: Sow your seeds next to a trellis in spring.

Saving the Seed: Bitter gourds do not cross with other Cucurbits. Allow the fruits to ripen until they become yellow-orange and soft. Even if they are purchased at a store the fruits may mature if left in a paper bag in a warm spot for a few days. They will split open, dramatically displaying rows of shiny blood-red seeds. These should be scooped out and soaked for a day to get rid of the red flesh.



Underneath, the seeds are beige and hard shelled, and need to be dried before storing. Bitter gourds self-seed, and are often seen on fences long after the original propagators have left.

Storage: The seeds will last five years in good conditions and there are twelve seeds to the gram.

Usage: High prices are paid for bitter gourds in Asian and inner city grocery stores. In India they are used a great deal in pickles and curries. The bitter taste becomes somewhat addictive in the same way as that of olives, but it can be leached out with water. The Chinese cut the fruit in half and briefly steam or parboil it. They then cover it in soya sauce and serve it as a condiment. The leaves are used in Indian curries.

Bitter gourds are used in Oriental medicine for the quinine content which gives the bitter taste. The fruit is considered beneficial for diabetics. The seeds are a powerful laxative, not to be treated lightly! In China, crushed seeds are applied to carbuncles.

On the Lookout: There are many varieties of bitter gourds, including white ones, such as Moonshine which has ivory skin and is specially adapted to a greenhouse environment. Bengal Pride has smooth, dark green fruit and is the most productive of all varieties. In capital cities, look in Chinese and Vietnamese groceries for imported seed packets. Virtually every region of Asia has its own strain of bitter gourd, some of which may be growing on your street.

BORAGE

BORAGINACEAE

Borago officinalis – from the Latin burra meaning "rough", referring to the hair on the stem and leaves. officinalis is Latin for "the apothecary shop".

Origins: A native of the eastern Mediterranean region from where it was taken by the Crusaders to western Europe. Favoured by the ancient Greeks who fed their warriors the flowers to give them courage before battle. In the Middle Ages, borage tea was taken by participants before jousts and tournaments. The Welsh named it "Llanwenlys" – the herb of courage.

Description: Borage is an annual with rough wide leaves and clusters of star-shaped blue blossoms hanging from hairy stems.

Cultivation: Borage is most profuse and naturalizes even in poor soils. When planted on top of a hill it will self-seed its way down the hill.

Saving the Seed: To obtain a heavy flowering do not overfeed, or the plant will produce mostly leaves. The luminous blue flowers are almost constantly in bloom and attract bees. The seed capsule, containing one or two rounded seeds, with an apex, should be picked one by one when dry. They need only a little more drying to be stored.

Borage seeds throw true-to-type. Strict selection is not needed to maintain the quality of seed in a strain.

Storage: The seeds will last over five years and there are sixty five seeds to the gram.

Usage: The flowers and the young tips are used in salad. The leaves are used in soup by eastern Europeans, who also eat the young leaves as a spinach. The bluish-green foliage has sharp little hairs that may irritate fingers.
Its ever-falling leaves turn into a rich, black and spongy compost, making it the ultimate mulch producer. Borage is a companion to strawberries, though when grown amongst them it must be trimmed for mulch several times a season.

A poultice of steamed leaves is applied to reduce inflamed swellings. Its high potassium content makes borage a natural strengthener for the nervous system. It is said to increase milk flow in lactating mothers. People with high blood pressure, diabetes or liver problems require additional potassium and borage is a very rich source of this mineral. The dried flowers are a colourful ingredient in potpourri.

Before you choose what seeds to save, see Simplicity Rating page 51.

BROAD BEAN

LEGUMINOSAE

Vicia fava – vicia was the name for vetch in Latin and fava for the broad bean itself.

Origins: Broad beans have been cultivated since prehistoric times in Europe. They were unearthed in the ancient city of Troy and found in Egyptian tombs and with Bronze Age artefacts in Switzerland. Their exact origin has therefore been hard to determine. It is recorded that the Romans used them as voting tokens and that they reached China by the first century AD.
Before the explorers brought the common bean back from the Americas, the only bean that Europeans and Middle Easterners knew was the broad bean. Folk (or primitive) varieties grow in the Sahel, the southern part of the Sahara Desert, in poor agricultural lands.

Description: Broad beans are a hardy bush. They are also called Horse Beans, and in northern Africa, where a smaller version is common, Tick Beans.

Cultivation: Broad beans respond well to the addition of compost and moderate soil moisture. May to July is the best time for planting in most areas. Prune the tops when the bushes are half-grown to encourage branching and try these as a salad green or spinach.
The beans are best planted in double rows or blocks because they support each other. In New Zealand, many experienced gardeners surround their double rows of long-pod types with stakes, fix a rigid rail on top and tie strings around the plants. It makes harvesting easier, considering each plant might have five stalks which often fall over each other. Broad beans can be cut back to the ground after a sub-tropical winter and be expected to shoot again.

Saving the Seed: Broad beans are partly self-pollinated and partly cross-pollinated. Several hundred metres is a fair isolation distance to ensure purity if you happen to be growing more than one variety.
The first pods to form are best for seeds. They are to be found at the base and are larger than subsequent pods. Allow the pods to dry on the bush and choose those from the most vigorous individual plants. Such refined steps cannot be taken on a large scale where a whole field is combine-harvested and threshed.
Shell out the beans and dry on a rack until a bite on the seed will produce only a little mark. Thresh and store in a loose knit bag. The bean seeds will not need any winnowing.

Storage: Seed can last for up to ten years but only if kept in conditions with low humidity and constant temperature. Properly dried beans stored in an airtight jar and put away in a cool spot for four years have a ninety percent rate of germination. But only half of them would germinate if kept at room temperature. There are 1000 seeds to the kilogram.

Usage: Broad beans are not always seen for sale as a fresh vegetable, so growing them at home is the way to ensure you have this taste sensation. They can be picked at different stages of growth to give different dishes.
The dry beans ferment vigorously to a very palatable wine. A paste of one or two powdered dry beans and water left to ferment for a day or two is a traditional starter for sourdough bread.

A tea made with the dried flowers will work for some types of migraines. In France, two powdered dried beans are taken with wine on an empty stomach to dissolve stones in the urinary tract. A small percentage of people with Mediterranean ancestry have a genetic inability to digest fava beans and become ill by eating them.

On the Lookout: For colder areas, there are the long-podded types with up to eight beans in a pod. They are hardy and are ready for planting from early to late autumn. Examples are Early Long Pod, Polar, Acquadulce and Longfellow which produce up to ten beans in a pod.
Red Epicure is grown for its chestnut flavour and colour and is hardy and heavy cropping. The Windsor or Broad-Pod beans will not survive winter in frosty areas but will die back and shoot from the roots in spring. Their pods have up to five beans in them and they have a pronounced flavour. The dry seeds of Green Windsor are pale green and hold their colour when cooked.

Scarlet Cambridge has a deep burgundy-coloured bean. The Sutton is a bush with many branches and white-seeded pods that mature early. Dwarf broad beans are useful for windy areas: Cole's Early Dwarf is one of the many good English types and bears all its pods just above ground level.

The *Genetflow* journal (1989) mentions that cultivars collected in Sicily, Portugal, and Cyprus show a great diversity of type and landrace. Wide variation was evident in respect of the size and shape of the seeds as well as the earliness of the crop.

BROCCOLI

BRASSICACEAE

Brassica oleracea var. ***italica*** – brassica is simply the name used by the Romans from a Celtic word for cabbage, and oleracea for "vegetable-like".

Origins: A descendant of kale which is native to the western coast of Europe.

Description: Broccoli was developed for market gardening in Italy in the last 150 years. Prior to the turn of this century, purple broccoli was more common than green and the name "broccoli" referred to the tender shoots produced by some types of overwintered cabbages.

There are two types of broccoli: heading and sprouting. Heading types have virtually disappeared in Australasia. They take a long time to mature and are suitable for areas which are too cold for cauliflowers.

The broccoli that is now produced so widely is green sprouting broccoli. It has two growth habits – one with a central head, and one that produces numerous small flower heads along the stalk (e.g. the sprouting Calabrese). It grows well in summer in cool southern Australia and in winter in warmer Australia.

Cultivation: Do not overmanure or you will get lots of leaves and small heads but, by splitting the fertilizing between planting time and mid-season, a large seed crop is ensured. You have to keep harvesting sprouting broccoli for eating because it keeps on sending up side shoots whose flowers quickly open. For seed production, let all the shoots go to seed. It is a spectacle.

Saving the Seed: Broccoli is a biennial, but if planted in warmer climates it will produce seeds in only one growing season. Broccoli is cross-pollinated and individual plants of broccoli are normally self-sterile, so leave at least two adjacent plants flowering, or a few side shoots of one which has been cut for the table, next to the one you want to save. This is to ensure seed formation and to conserve as many characteristics (i.e. diversity) as possible.

If we are talking about the long term maintenance of a variety, then half-a-dozen broccoli plants should be allowed to go to seed together. To have stronger seeds, it is better not to harvest the heads for the table.

The buds will turn into a tall thick mass of yellow flowers. Broccoli will cross with cabbage, cauliflower, kale, kohlrabi and Brussels sprouts. Two kilometres separation between them is required for absolute purity. As soon as a stalk grows up it will need support. Pods will form and gradually turn yellow then brown, but not all simultaneously.

When most pods (or rather siliques) are dried and the seeds rattle within, cut off the whole bush and hang in a dry place for two weeks, with a large sheet of paper or canvas underneath. Thresh out the seed and then dry it for a further fortnight, or until completely dry. Use a screen or sieve to separate chaff and seed.

Storage: The seeds will last up to five years. They are smaller than cabbage seeds, with 300 seeds to a gram.

Usage: Broccoli has been readily adopted by the Chinese as it is excellent when cooked to be a bit chewy (*al dente*, as Italians say). It can be doused with dressing when still hot and eaten later as a cold entree. The flowers are edible in salads and as garnishes.

Regular consumption tends to lower blood pressure and is helpful in reducing obesity. Also broccoli is said to have anti-carcinogenic properties.

On the Lookout: Italians used to have some good seed stock including the San Martinari broccoli (from San Marino), Nataleschi (for Christmas), and some named after the month in the northern winter when they are harvested: Gennajuoli, Febbrajuoli, Marzaoli, etc.

There are several types of asparagus broccoli (a kind of sprouting broccoli) available in Asian shops. The Nine-Star Perennial bears pure white shoots like tiny cauliflowers in early summer for up to five years if kept well mulched during winter in cold places.

In England at the end of the last century there were more than forty varieties of coloured heading broccoli on the market including Siberian, Danish Purple and Cockscomb. If you want quick production, Spartan Early and De Cico reach maturity within a month of transplanting while Calabrese takes three weeks longer for the first shoots to appear.

BRUSSELS SPROUTS

BRASSICACEAE

Brassica oleracea var. ***gemmifera*** – brassica is Latin for cabbage, oleracea for "vegetable-like" and gemmifera means "bearing buds".

Origins: Developed from kale, the ancestor of the cabbage in western Europe.

Description: This crop is relatively new, having been developed over only the last 200 years in Belgium. The general appearance of the plant is not unlike the ancient borecole.

Cultivation: Best grown in a cool temperate climate where frost makes the little heads tight. In the tropics it would also require high altitudes to produce seeds. It grows best in compacted heavy soils, but can't tolerate wet feet. Without overfertilizing, add a little poultry manure when the little heads are forming to encourage seed production.

Saving the Seed: Brussels sprouts will cross with any of the *B. oleracea* (*see* Appendix B) flowering nearby. They are biennial and insect-pollinated. As they are self-incompatible you will need to leave more than one plant for seed. They flower in their second year. For the kitchen, take only the bottom sprouts at the beginning of the season and the top ones at the end. This leaves the middle ones standing, the best for seed.

The top leaves of the plant are generally cut off to force the side sprouts to develop branches of flowers. The pods containing the small spherical seeds will form, and the seed stalk should be cut when the older pods turn yellow, but before they are dry. Leave to dry out on a canvas, then winnow and dry the seeds further before storage.

Storage: There are 270 seeds to the gram and they will last for four to five years.

Usage: Brussels sprouts are a good winter source of vitamin C. The smaller the sprout, the greater the tenderness. Steamed and served with butter, pepper and salt, and lemon juice is an old recipe (Acton, in Ray, 1974), or as Michael Boddy serves it, with cold pressed walnut oil.

On the Lookout: It is difficult to find tasty old local varieties because a lot of them have been diluted through unplanned crosses. Rather than grow those large almost cabbage-like Brussels sprouts, lacking fine flavour, aim at those with hard, nut-like small sprouts with a crisp texture. Look for Darlington, Dwarf and Tall King of the Market, Dwarf Gem, Laxton, Rear Guard (late variety) and Yates Champion. Rubine Red, which has red foliage and sprouts, is available in Canada at the moment but from only one seed company (Whealy, *The Garden Seed Inventory*, 1987).

Long Island is an American-bred variety suitable for the south of New Zealand and the cooler parts of Victoria and Tasmania, where it is planted in January. Fillbasket does not take warm weather and is suitable only for cold districts, where it is planted in early March.

CABBAGE

BRASSICACEAE

Brassica oleracea var. ***capitata*** – brassica is Latin for cabbage, oleracea for "vegetable-like", capitata is Latin for "having a head".

Origins: The coastal chalk rocks of south eastern Europe and the Channel Islands are the original home of the cabbage. It was cultivated there 2500 years ago by the Celts who domesticated it from wild kale. The Romans later selected and cultivated several sorts of head cabbage.

Cabbage is an anglicized version of the Old French word "caboche" meaning head. The fact that cabbage has similar names in different languages shows its long and wide use: "Kopi" in Hindi, "Kale" in Scottish, "Kaal" in Norwegian, "Kohl" in Swedish and "Col" in Spanish.

Jacques Cartier, the French explorer, introduced cabbage to the Americas via Canada around the 1600's. In Australia, cabbage was popular with the early settlers because it could be eaten both fresh and pickled.

Description: Heading cabbages include the Savoy with crinkly green leaves, the Sugarloaf for spring eating and the large flat white Drum Head, which is grown for winter cutting.
In this handbook, the open-leafed cabbages are under Kale and Collard, and the Asian cabbages under Chinese cabbage, Mizuna and Mustard Greens.

Cultivation: If the heads are harvested by cutting off the stalk rather than uprooting the whole plants, this will enable the roots to produce a succession of small heads sprouting at the point where the first crop has been cut off.

Saving the Seed: Biennial and cross-pollinated by insects, cabbages will cross with all the other *B. oleracea* (cauliflower, Brussels sprouts, broccoli, kale and kohlrabi), but not with the Chinese cabbages. The flowering heads of any of these other plants within a few hundred metres will have to be cut off before their flowers open. If both are grown for seed, use the caging technique described in Section Four.
Since cabbage is self-incompatible, more than one plant is needed for cross-fertilization. One plant on its own would set a small amount of seeds, if any. It is therefore best to allow half-a-dozen plants go to seed. This may seem excessive but will ensure that most of the variety's character is preserved.
Mark the best plants and leave in the field to flower in the second growing season. In very cold areas, cabbage should be covered with straw over winter. Commercially, in areas where it is not cool enough for cabbages to go to seed, gibberellic acid (a hormone widely used in the flower trade) is sprayed on the heads. In Indonesia, the seed of cabbage is grown from local seed stock at high altitudes where temperatures are cooler.
Sometimes a deeply-cut cross may need to be made on the head to allow the seed stalk to emerge. All the side shoots which may appear at the base of the stalks should be cut off to encourage the main stalk.
Cabbage seeds of poorer quality can be produced from plants whose heads have been harvested – this is called "stump seeding". Leave two to three leaves on top of the stump to prevent the sun from scorching it. In the second year, the stalk will produce pods. It is easiest if the seed pods are harvested all at once on the branches. Hang for further drying, for a week or so, over a canvas or similar. On a dry day, thresh, winnow and store.

Storage: The seeds are round, reddish-brown to blackish-brown and they will last four years in temperate regions, and six to nine months in the tropics. There are 250 seeds to the gram.

Usage: Sauerkraut is a healthy, fermented food, rich in lactic acid and made from white cabbage, such as Dutch or Drumhead. Here is one method: in a fermentation container with an air lock like a beer or wine barrel, alternate layers of thinly-sliced cabbage and rock salt (eight to ten percent by volume) until full. Amongst the layers distribute some juniper berries and halved cooking apples, add a few cups of good whey from milk that is going off, and cover with water. Press down and place a weighted dish on top. Put the barrel in the sun and rotate daily for three days, and then in the kitchen for three days. The result will last for months at cellar temperatures (12°C).
Coleslaw is best made with open-hearted cabbages such as collard and kale. It means "salad of cabbage" in Dutch. Red cabbage is traditionally pickled. Savoy and other green cabbages are best lightly steamed and eaten plain.

The juice of the leaves is used to expel worms in children. Opera singers used to drink unsalted cabbage broth mixed with a beaten raw egg before performing. Cabbage is still used nowadays in Europe to dissipate the effects of alcohol. The ancient Greeks believed cabbage prevented drunkenness, while modern researchers have said it helps to ward off cancer.

Before you choose what seeds to save, see Simplicity Rating page 51.

For people with arthritic pains, here is a recipe that is often used in Italy: wash a leaf of cabbage and roll with a rolling pin until it reduces to a mash. Then make a ball out of it, add a teaspoon of borax and a little water and apply with a bandage to the painful area.

On the Lookout: There is a tremendous range of cabbages, with many quite good hybrids from which reliable seeds cannot be saved. The types chosen are dictated by the time of the year for planting, and usage.
The conical spring cabbages are good for early spring and late summer transplanting, as they can take much more cold weather than the drumhead types. Early spring types include Enfield Market and Yates First Early Improved, Early Marvel and Yates Earlyball. St John's Day and Henderson Succession, which has bluish leaves, were bred in Australia by the Henderson family seed company. Yates also had their own lines such as Yates Vanguard, Christmas and All Head. Other strains were usually of English origin.

CALENDULA

ASTERACEAE

Calendula officinalis – from the Latin calende meaning "first day of the month", referring to the almost continuous habit of flowering, and officinalis meaning "apothecary shop".

Origins: A native annual of the Canary Islands, South Central Europe and North Africa.

Description: Bright yellow and orange daisy like flowers on a low bushy plant.

Cultivation: Calendulas can be planted in autumn as they are tolerant to cold, even to snow. In colder climates they are planted in spring. They prefer a sunny position but can take some shading.

Saving the Seed: Because calendulas are pollinated by insects, only one variety should be grown at once if you want to maintain the colours or characteristics of that particular strain. Double calendulas will not necessarily come true next season, because they may revert to the old single type. Flower heads can be cut when the stem is still green but the petals dry. A little crushing between the hands will reveal the seeds that are unusual in shape, ranging from crescent to nearly straight. Selection from the best plants is a key factor in producing any flower seeds but it need not be as rigorous for calendulas as for modern showy lupins and petunias.

Storage: The seeds will last only one year if kept in the open and two seasons if kept dry and dark. There are 100 seeds to the gram.

Usage: The petals are the part that is used for food and medicine. They are a substitute for true saffron (*Crocus* spp.), and a safe yellow food colouring in, for instance, egg dishes.
Scatter the fresh petals onto salads and soups. To dry for later use, place the petals in a sieve and dip them, for a moment, into boiling very salty water and then spread them out on white paper in a shady spot. The dry petals should be stored in an air tight jar as they discolour and lose their scent in the open. As a second best, the chaff left over from seed cleaning can be dried and stored, for later medicinal infusions.

An infusion of fresh or dried calendula petals, or chaff, is a powerful antiseptic for bathing wounds and scratches. Soak dried calendula petals in oil for a week and apply to cracked lips and sunburn. The fresh flowers rubbed on a bee sting, bull ant or green ant bite relieve the sharp pain.

On the Lookout: There are many forms of calendula, from the most simple single to the sophisticated modern doubles. Colours range from light yellow to deep orange, the latter being most suitable for herbal remedies. Barry Waters from Tamborine Mountain Garden Club in South East Queensland is very fond of his home bred calendula variety that he has been growing for twenty years. The spreading bush tends to give masses of flowers, smaller, but more prolific, than the commercial varieties.

CAPE GOOSEBERRY

SOLANACEAE

Physalis peruviana – from the Greek physalis for "bladder", referring to the shape of the fruit.

Origins: The Andes in South America.

Description: A straggling bush up to one metre tall that bears yellow fruits inside a crisp envelope, which is the calyx. It is perennial and can

tolerate some frost. In India it is called Jam Fruit. It is certainly a children's favourite. Cape gooseberry is also called Chinese lantern. It obtained its common name because it was introduced to Australia from the Cape of Good Hope, South Africa. There are several relatives such as tomatillo, ground cherry and husk tomato, all in the genus *Physalis*.

Cultivation: Cape Gooseberry grows in full sun as well as partial shade and does well even in poor soils. It likes warmth and naturalizes easily in the right climates.

Saving the Seed: Flowers are perfect and self-pollinating. Cut open fruit that you have collected from as many bushes as possible and scoop out the abundant seeds. Add a little water and allow to ferment for a few days. Evidence of this is a white foam on top. Rinse, then drain the seeds in a fine strainer. Dry for a few days. The seeds are small, hard, yellow and lens shaped.

Storage: The seeds will last three years under dry conditions. There are 400 seeds to the gram.

Usage: Cape gooseberry is an excellent source of vitamin C and vitamin A precursor, and a good source of vitamin B-complex. The protein content is very high for a fruit, being just a little less than dates. Cape gooseberries can be eaten sun-dried. They also make a most unusual flavouring for icecream.

In India the leaves are eaten medicinally as a bitter spinach, the calyx and stalks are used in an infusion for light intermittent fevers and the plant is even used as a quinine substitute.

On the Lookout: Italians have bred a particularly large variety called Giallo Grosso whose fruit can attain five cm across. Another large one, Goldenberry, resists light frost.

CAPSICUM & CHILLI

SOLANACEAE

Capsicum: ***Capsicum annuum*** – from the Greek kapto, "to bite," an allusion to the pungent properties of the fruit; annuum is Latin for "annual".
Chilli: ***C. frutescens***, ***C. pubescens***, ***C. baccatum*** & ***C. annuum*** – fructa means "fruit-bearing", pubescens "hairy" and baccatum "with berries" in Latin.

Origins: There is some controversy about the origin of chillies and capsicums. There is even discrepancy about the botanical classification. Although some experts believe that various species came from Mexico, it is generally accepted that the ancestors of chillies originated in an area of Bolivia and spread through Central and South America in early history.
Columbus was looking for a route to the spice-growing East Indies when he was presented with chillies on arrival in the West Indies. Thinking that he had completed his mission, he named the inhabitants "Indians" and the chillies, "peppers". Both names persist today.
Chillies are recorded as reaching the Philippines with the Portuguese in the 1500's and having

spread to Hunan and Szechuan – China's centre of spicy food – soon afterwards. There, it is called "foreign pepper".

Description: *C. annuum* varieties have white flowers and only one fruit emerging from each growing point. These are good for temperate regions.
C. frutescens is the most common type of chilli and includes the potent Birdseye types, one form of which puts the bite into Tabasco sauce. Two or three fruits grow at each node. Others are the Squash chilli (formerly *C. chinense)*, also called Scotch Bonnet or Rocotillo in Jamaica, which has been growing well in our gardens for years. It will cross with *C. annuum*.
C. pubescens has black wrinkled seeds, purple flowers and its leaves are covered with a light fuzz, as its name indicates.
C. baccatum has large flowers and leaves, and its fruit is extremely hot.

Cultivation: 15°C is the minimum temperature for successful germination of the seeds. Seeds can be started indoors in winter and the seedlings planted out in spring when the danger of frost has passed. It is wise to stake them if strong winds are common.
Both chillies and capsicums behave as perennials in the sub-tropics and tropics, and as annuals in temperate zones. Hot chillies are tolerant of cool weather but are frost sensitive. In temperate areas they are grown in pots and moved indoors in winter. A subscriber to Seed Savers grows 150 varieties, belonging to four species of chillies, in Merbein, Victoria. It is the diversity of flavours, growth habits, fruit shapes and colours that attract chilli collectors.

Saving the Seed: The flowers of capsicums and chillies are perfect. They are technically self-pollinating, but crossing by insects does occur. Chilli pollen is dominant over capsicum pollen, leading to hot surprises in the next generation. Caging individual bushes with a shade cloth, or for better results with spun polyester, is a solution if you want to grow several types and save their seeds.
A tunnel where insects will be excluded is also good for growing out a collection of chillies and capsicums all at once. However isolation of 200 metres from other varieties ensures total purity. Fifty metres is the smallest distance for avoiding most crossing. In the small garden, a branch can

be bagged, or individual plants can be isolated a garden length with a tall crop in between, to break the bees' flight path.
When the strongest, disease-free bushes carry particularly well-formed fruit, select the best of them. They are ready soon after the final colour for that variety has been reached. Cut the fruit open, scrape out the seeds, and dry them on paper in the shade for a few days.
Seeds do not have to be washed. Large amounts of chilli seeds are most easily extracted by putting the ripe chillies with water in a blender on slow speed. Flesh and pulp will rise to the top and can be poured off. Seeds will settle to the bottom.
Do this in a well-ventilated room because of the strong fumes and always wear rubber gloves when working with hot chillies. Make sure that all utensils are washed thoroughly afterwards.

Storage: The seeds are cream, yellow or black, flattened and nearly round. When kept in cold, dark and dry storage conditions they will remain viable for five years. There are 150 seeds to the gram.

Usage: Algerian salad: barbecue some capsicums, chillies and tomatoes until the skin is charred; peel, slice and dress with vinegar, oil

and garlic. Chillies have a nutritional content high in protein (three percent) and very high in vitamins C and K.
Hundreds of millions of poor live on rice and/or cassava with chilli. It is probably the most popular vegetable (NB: not a spice) in the tropical world. Recent Western research has shown that its active ingredient, known as capsaicin, helps the metabolism and prevents obesity, so chillies are recommended to weight watchers!

Powdered cayenne (from the town of the same name in French Guiana) is made into liniment to increase the blood flow in areas affected by rheumatism. Be careful of overdoing it and causing blisters!

On the Lookout: When chillies and capsicums ripen they display many beautiful colours: red, black, orange, yellow, brown and even purple. Italians, Asians and East Europeans, especially Hungarians and Roumanians, have interesting mild to hot varieties.
Manzano, which are in the purple flowering group (*C. pubescens*), grow well in Australia. They were highly regarded by the Incas and can grow for ten years, being the most cold-tolerant of all the cultivated chillies. They do not cross (hybridize) with the other species.
The fruit of *C. baccatum* contains unique aromas and flavours that may be overpowering to the uninitiated. This species includes the Central American Escabeche which is used in Mexican cooking and the Andean Aji which has been in cultivation for 4000 years.

CARDOON

ASTERACEAE

Cynara cardunculus – cynara is the Latin for wild cardoon and carduus for thistle.

Origins: Native to the western Mediterranean, cardoon was cultivated in Egypt 2500 years ago. At the turn of this century it became a fashionable vegetable in Europe.

Description: Cardoon is a perennial thistle with grey, velvet-like leaves that grows to 1.5 metres. It has more profuse vegetation than the globe artichoke, which it resembles, and it is the leaf stems that are cooked and eaten. A very showy plant at all stages. An edible ornamental!

Cultivation: Cardoon is raised from seed. It is planted in autumn in all but the very coldest climates. It definitely needs a fertile soil. In poor, dry soils, cardoon will produce only small and hollow stalks, and a poor seed crop. The leaf stems can be blanched, mulched and tied up.

Saving the Seed: Although individual cardoon flowers are self-sterile, flowers on the same plant will nevertheless produce fertile seeds. The flowers, which are similar to, but smaller than, the artichoke's, are made up of many small blue florets contained by scales. The two will cross.
The most vigorous plants are left unblanched and unpicked, for seed. Prune back each plant to three or four flowers only, and when they start to show some white fluff, the flowers can be cut and hung to dry in paper bags in a shed out of the sun.
The seeds are not easy to extract. You will have to bash the seed head to get anything out. Only spikeless varieties should be selected for propagation.

Storage: The seeds are oblong, somewhat flattened and grey with brown streaks. They are rather long lived for a vegetable seed – approximately four years out in the open – and will keep even longer in a jar in a dark, cool spot with little temperature fluctuation. A gram contains twenty to twenty five seeds.

Usage: Historians tell us that ancient Romans ate young leafs and stalks as a salad. Today Italians dunk raw strips of the stems into virgin olive oil or into a hot anchovy and garlic paste called bagna cauda. The cardoon can be more simply eaten battered, fried, in soups and stews and even pickled.
The succulent leaf stems, sometimes called chards, are sauteed and served with white sauce, etc.
In Spain and Portugal cardoon flowers are used to make milk curdle.
The root also is tender and flavoursome.

On the Lookout: Champion has tender, large stalks, while Tenderheart has multiple side branches.

Before you choose what seeds to save, see Simplicity Rating page 51.

CARROT

UMBELLIFERAE

Daucus carota var. ***sativus*** – daucus is Latin for carrots and karoton the Greek for wild carrots.

Origins: Native to many regions, including parts of Europe, northern Africa, Afghanistan and central Asia. Carrots were first used as medicine. They come in many colours. Purple carrots arrived in Western Europe from the Middle East in the Middle Ages. After considerable selection, these evolved into yellow ones. Not until much later, did a Dutch gardener obtain a mutation which had the orange pigment familiar today. By the Middle Ages the Japanese had developed unusually long carrots adapted to their cuisine.

Cultivation: Carrots need a deep soil free of coarse material. Sow thinly, possibly along with radish seeds for natural spacing as row markers. The more primitive a carrot strain is, the easier it will be to grow. This is also true of other cultivated plants. Carrot seeds germinate at a better rate with sunlight and therefore should not be planted too deeply, but must be kept moist.
Some growers alternate rows of carrots with rows of shallots or onions because the strong odours of onion mask the smell of carrot, to which the carrot fly is madly attracted.

Saving the Seed: Carrots are insect-pollinated and different varieties can easily cross. As they are biennials, they usually take two growing seasons to flower. In their second spring, a seed stalk starts to emerge from the centre of the leaves and soon the first umbel unfolds.
In the sub-tropics and tropics, carrots may go to seed at the end of their first growing season, as most biennials do. If you are in a cold climate where the ground soil freezes deeply, lift your crop in autumn and store in the cellar. Select the finest carrots – smooth, well-coloured, and with a flat top. Cut off most of the green tops and store in sand. Replant after all danger of frost has passed. Otherwise leave the best plants in the ground over winter, protected with a thick mulch.
The flowers are white and surprisingly beautiful. They are borne at the end of several stalks with numerous branches and successively appear in flat clusters which are about ten cm wide.

If left for too long in the garden, the seeds may fall off as the umbels begin to dry. A wide range of insects carry the heavy and sticky pollen to other umbels.

Professionals put a 500 metre distance between varieties. But it is a rare situation to have more than one variety of carrots flowering concurrently. The weed, and garden flower, Queen Ann's Lace *(D. carota)* will contaminate good stock if allowed to grow nearby.

In wet weather at harvest time, cut the branches, and dry indoors. The primary and secondary umbels give the best seeds and if you have enough plants, save the seeds from only these ones.

A retired farmer, whom we met at an East Gippsland Organic Growers' Conference, and who had grown carrot seed for Anderson's Seed Co. in Victoria, told us he reserved the queen (top) umbel for foundation seeds (the seeds supplied to other seed growers) and the rest were allocated to the general public. This is not to suggest that commercial seeds are sub-standard, but to pass on a tip from an old timer.

In a good year, one plant can yield 120 grams (four ounces) of seeds, and as little as fifteen grams in a bad year. When the seed heads are completely dry, rub them between your hands or over an appropriate screen mesh. Then use a smaller screen to remove the fine chaff. Winnow with care as the seeds are light and could blow away.

Home-saved carrot seeds have a beard on their seed coat, unlike commercial seeds which have been mechanically rubbed. This beard is reputed to enable carrot seeds to work their way into the ground.

Storage: Carrot seeds can last up to three years in a cool, dark and dry environment. Market gardeners who save their seeds consider that two year old seed is ideal for planting. There are nearly a thousand seeds to the gram.

Usage: Carrots are easy to digest and are said to be beneficial for worried people. When carrots are peeled, cut into small pieces and boiled, much of the vitamin content is oxidized on contact with the air, while the mineral salts are dissolved in the cooking water.

Carrot juice is said to help clear the lungs and throat of mucus. It also prevents colitis, relieves peptic ulcer, stomach acidity and heartburn.

Carrot soup is an excellent staple in times of stomach and digestive problems. A strong tea made of carrot seeds may be taken for flatulence.

On the Lookout: Finding home-bred varieties is a real challenge – not many gardeners have kept carrot strains alive. The shorter the carrot, the faster it is to mature, so shorter varieties are chosen for earliest eating. Oxheart is a short carrot developed for shallow soils. It can be pulled out of the ground easily and is a good, old-style carrot for the organic market.

The long, heavy ones are planted in autumn in the Auckland, NZ, area. Early Shorthorn, Saint Valery, Long Scarlet Altringham, Flanders Large Pale, Short White, Long Lemon are some of the varieties found in old catalogues.

There is a primitive yellow fodder carrot in eastern France that is excellent in stews. All the types bred in the French town of Nantes are coreless and extremely tender, but have weak tops which make them hard to pull out.

CASSAVA

EUPHORBIACEAE

Manihot utilissima [M. esculenta] – man-ihot is the Brazilian name given to this genus of plants; utilissima means "very useful" and esculenta means "edible" in Latin.

Origins: Brazil, the Guianas and tropical Mexico.

Description: Cassava grows from the equator to warm temperate areas. It is a perennial, open-branched shrub, with hand-shaped leaves, growing to four metres. Its dahlia-like roots swell and provide an abundant amount of a starchy food that is a staple in many tropical countries.

There are two main types available, the sweet and the bitter. Cassava is also called Manioc and Tapioca, and the product tapioca is made from cassava.

Cultivation: This hardy plant is a must in the tropical and sub-tropical garden. It will grow in very dry conditions but is frost tender. Cassava is better grown in friable soils for ease of root harvest. Individual roots can be excavated without pulling out the whole plant. This is convenient because the roots must be consumed soon after detaching from the plant.

Where shifting cultivation is practised, cassava is the last food plant to be grown before the ground is abandoned to regenerate. As it is a heavy feeder, production will be considerably higher on fertile sites.

Propagation: In good soils and in the tropics, cassava roots reach a size that is ready for harvest within a year. When the leaves die off in winter, prune back the mature branches and cut them into sticks that are about thirty cm (one foot) long for replanting. These can be kept in a shady spot for a few weeks before planting out. Bury about one third of each stick in the ground and it will send out new shoots at each leaf node in spring.

Usage: In the wet season the growing tips, consisting of four or five almost full-sized reddish-brown leaves, are very tender and, when cooked, become a delightful spinach tasting somewhat like exotic mushrooms.

While not optimal as regards food value, cassava roots are a reliable, easy-to-grow source of starch. Consume them within twenty four hours of harvest, before purple streaks containing hydrocyanic acid appear. You will find that they are a delight to peel and chop, this being done with only a wooden knife in the Pacific. Cassava is at its best roasted in chunks, or sliced and fried. It can also be sliced thinly and dried for storage. A flour made by pounding these slices can be used in cake making.

Cassava is used as a living fence in Bali, where the sticks are planted closely crosswise. Urban Melanesians in New Caledonia grow a row of cassava near the house, keeping it trimmed low at all times, and harvest its leaves only.

Highly-bred strains of tall cassava are grown as an export root crop in the tropics to fatten lot-fed pigs in Western countries. These modern strains are highly productive, high in starch (up to thirty percent) but poor in nutrients and they are being rejected by women farmers in western Africa because their leaves are not as palatable, nor as easily harvested as the traditional varieties.

On the Lookout: The variegated cassava has yellow and green striped leaves. The red-stemmed one is more suited to cooler climates than the green-stemmed. It is worthwhile looking in gardens and asking for a cutting.

CAULIFLOWER

BRASSICACEAE

Brassica oleracea var. ***botrytis*** – brassica is Latin for cabbage, and oleracea for "vegetable-like"; botrytis means "grape-like" in Greek.

Origins: This is another vegetable which does not exist in the wild because it derives from the kale, itself of ancient cultivation. It was popular in ancient Rome but originated in Syria where it was supposedly grown for over a millennium beforehand. Also called cole-flower in Tudor times, when the heads were no larger than tennis balls, cauliflowers have been selected for a dramatic increase in size over the last few hundred years.

Description: The cauliflower is grown for its curd which nestles inside its large leaves.

Cultivation: Cauliflower is sensitive to overly acid soils and prefers a pH of 5.5 to 6.5 for a healthy seed crop. The soil should be well supplied with organic matter (composts, green manure) and be well drained. In Australia it grows best where the weather is cool and humid at budding time. Iced water poured on the head at maturity stops premature ripening. It is much less tolerant than cabbage to extremes in temperatures. Quick crops such as lettuces and radishes can be grown amongst cauliflowers.

Saving the Seed: Select and mark plants when the heads are in their prime. Those that form curds quickly, but are slow to bolt to flower, are the best to save for seed. Being biennial, cauliflowers take two growing seasons to produce seed. In cold climates they go to seed early in their second summer. The head matures quickly, separates into branches and soon starts to produce masses of stems and flowers. Pinch out the top flowers to strengthen the lower parts that produce the larger seeds.

Cauliflowers for seeds must be isolated from other *B. oleracea* (e.g. cabbage, Brussels sprouts), that are flowering, by long distances – 360 metres is recommended in Sweden, to 900 metres in the USA for certified seeds (FAO *Agricultural and Horticultural Seeds*, 1961). Harvest and process the same as for broccoli and cabbage.

Storage: The seeds are spherical and similar to cabbage seeds, except smaller and often not as

well formed. They will last up to four years in temperate regions if well stored. There are 500 seeds to the gram.

Usage: Grate cauliflower raw and dress with a mixture of lemon juice, mustard, and oil dressing. A Greek recipe, that cosmopolitan Aunt Gill taught us, is to melt anchovies in olive oil with garlic and black olives, add a head of cauliflower that has been cut into two inch pieces and partially cooked by steaming, and add cream at the last moment. This sauce is gently folded into a big bowl of short-cut pasta and eaten immediately with friends.

On the Lookout: Paleface which is planted in June in the cooler parts of Victoria, is suited to many climates. It was developed in Western Australia. Metropole, Late Italian Giant, and Black Sicilian are rather rare nowadays but well remembered.
Green Glaze is another old Australian standard, said to be resistant to aphids, and suitable for warm inland conditions. However in his book *Better Vegetable Growing* (1973) Norman de Vaus regrets that it is now very hard to locate. It is probably because cauliflowers are naturally hybridized easily that this wonderful variety has disappeared from the home garden.
Vilmorin, a French seed company, offered forty six varieties in their seed catalogue in 1946. In New Zealand, varieties like Snowball Early can be planted with success. As with Brussels sprouts, cauliflower is losing a tremendous amount of diversity not because of any corporate conspiracy, but simply as a result of changing tastes and accidental cross-pollination.

CELERIAC

UMBELLIFERAE

Apium graveolens var. ***rapaceum*** – apium means celery and graveolens "strong-smelling" in Latin.

Origins: Celeriac was selected from celery 400 years ago in Europe, for its root rather than its stems.

Description: Celeriac has smaller leaves than celery, thinner stalks and a large, half-buried, round root. It is more cold-resistant than celery and therefore an ideal substitute if you live in southern lands.

Cultivation: Cultivate as for celery, but the soil should not be dug close to the roots and there is no need to hill for blanching.

Saving the Seed: Celeriac is a biennial. Celery and celeriac grown for seed in the same garden will cross-pollinate when visited by insects. When regrown, these hybridized seeds will produce plants displaying various characteristics of both celery and celeriac.
As the root is half buried, it is worthwhile to see what is underground when you intend to save seeds from celeriac. In order to select the best true-to-type roots, dig the whole plant up after the first growing season, that is when it is dormant. The roots should be smooth and well formed and there should be only a small tuft of leaves.
Replant them in the garden after examination and selection. However if the ground in your area freezes below the surface, they must be stored in the cellar over winter. In spring, they will go to seed.

Before you choose what seeds to save, see Simplicity Rating page 51.

The primary (top) umbels mature first and should be harvested before secondary umbels. The seed is easily separated from the umbels with a little rubbing between your hands. Pass through one or two sieves and store after a few days of drying.

Storage: Seeds will retain a fifty percent germination rate for at least five years in cool, dry and dark conditions. There are 2000 seeds to the gram.

Usage: In France, celeriac is grated and dressed with mayonnaise and the salad is called Remoulade. However this is not recommended for people with digestion problems. Celeriac can be sliced, dried and used as a flavouring for soups and stews.

Chilblains are relieved when they are bathed with an infusion of celery or celeriac leaves.

On the Lookout: If you cannot obtain seeds of celeriac, replant a bought root and wait for the seeds. The best varieties have a minimum of rootlets and are fine textured.

CELERY

UMBELLIFERAE

Apium graveolens var. ***dulce*** – apium means celery, graveolens "strong-smelling", and dulce "sweet" in Latin.

Origins: From Sweden to northern Africa and eastern Asia, celery grows wild in salty soils and marshes. There are records of its cultivation in France before the 16th century, and in Italy before the 18th century.

Description: Celery is grown in Australia primarily for its stems which can be blanched by excluding light. However there are many smaller forms that have more flavour than these broad-stemmed ones.

Cultivation: Celery will grow poorly in extremes of temperature. It grows best between 12 and 24°C and does very well with a thick mulch around the plants (sea grasses are fantastic for this) as its fibrous matted roots do not extend very far. Commercial growers water up to three times a day in hot and dry weather and blanch the plants with boards. On the home level milk cartons can be used for blanching.

All flowering Umbelliferae are valuable hosts for predator wasps that sting those nibbling nuisances, caterpillars. Celery should be grown in the garden, along with dill and fennel, as a habitat for these predators.

Saving the Seed: Celery will cross-pollinate with other celeries and with celeriac. Choosing the very best individual to go to seed amongst what is grown for the table is a seed saver's routine.
In warm climates, where celery is grown over winter, it goes to seed within a year. In cold areas it is a biennial and will have to be protected with clean straw over winter, or lifted and stored upright in moist sand until replanting time in spring. In the spring a many-branched huge stalk will develop from the centre of the plant.
The off-white flowers are produced in umbels at the ends of the branches. When the seeds ripen they can be harvested successively to minimise seed loss, or the whole stalk cut when it is finally brown. Thresh and dry the seeds for a further two weeks in the shade. Several plants will give you enough seeds to pass on to a thousand gardening friends.

Storage: The seeds are tiny, light brown in colour and aromatic. They will last for five years or more if stored in ideal conditions. There are 2000 seeds to the gram.

Usage: Home-grown celery has so much more tangible flavour and goodness than shop-bought. Blanching, by hilling while growing, is not essential if celery is to be used as a flavouring in cooking. It is deliciously crunchy when added to a Chinese stir fry late in the piece. The leaves can be dried and kept for use in soups and stews.

A decoction of the seeds helps in cases of rheumatism and bronchitis.

On the Lookout: The Americans developed good strains like Dearborn, Fern Leaf, and Golden Plume. Look for Seymour's Superb White, Cole's Dwarf Solid Red and Crystal Pink. South Australian Giant White is planted from early January until late March.
Look for varieties that have a tendency to clump. We grow an excellent Chinese sort with hollow stalks that is used only for its light green leaves. A bush tucker relative is found in northern NSW – *Aptum prostratum* of which there are two types, the first a prostrate form that grows on coastal headlands and sand-dunes. The other type is more upright, has a finer leaf and grows in the mangroves. It has been observed growing alongside naturalized *A. graveolens* by Peter Hardwick, bush tucker specialist.
Cutting celery, strictly a herb, has smaller stalks and is mainly used as a flavouring.

CELTUCE
ASTERACEAE

Lactuca sativa [L. sativa var. ***augustana]*** – from the Latin lac for "milk", referring to the white sap, and sativa for "cultivated".

Origins: A type of lettuce which originated in China where it is called Woo Chu.

Description: The edible part is the thick tender stem which grows to one metre or more. Its leaves are like a Romaine lettuce. It is also called Asparagus Lettuce, indicating its growth habits as well as its taste.

Cultivation: Like most Asian green vegetables, celtuce is more tender and juicy if grown fast.

Saving the Seed: Seeds form fairly quickly and are easy to save. Follow the same procedure as for lettuce. When the plant is sending up a long stalk it may be worthwhile giving it some support, especially if the garden is in a windy spot. We saved celtuce seeds from plants that flowered just metres away from a Brown Romaine lettuce without any obvious crosses in the next generation.

Storage: Celtuce seeds will remain viable for up to five years. There will be about 1000 seeds to the gram.

Usage: In salads or cooked, the leaves and stem are both excellent. The flavour is like a blend of celery, lettuce, asparagus and artichoke.

On the Lookout: Varietal differences are marked by the width of the leaves. There is even a red celtuce.

CHERVIL
UMBELLIFERAE

Anthriscus cerefolium – the derivation of anthriscus is uncertain, it is said to have been given by Pliny, the Elder; cerifolium means "waxed leaves" in Latin.

Origins: Southern Europe and south eastern Russia.

Description: A sparse, low plant, with very finely cut leaves that are quite decorative in the garden.

Cultivation: A winter plant in warm Australia, chervil does well in rich soil. Traditionally it is planted amongst cabbages, an early pointer to the now-popular principles of companion planting. The seeds need light for germinating so they should not be covered with soil, but sprinkled on top of the ground and watered often. Chervil has to be grown in the shade in summer months. Plant weekly for continuous harvest.

Saving the Seed: Mark the most vigorous plants. They will develop an umbel with small white flowers. The problem for food production is to prevent the plant from going to seed too early. One month after flowering, the seeds are ready for harvest. The little seeds shatter very easily and need daily harvesting to obtain a good quantity.

Storage: The seeds last one to two years. There are 450 seeds to the gram.

Usage: The ancient Greeks and Romans used the leaves as a spinach and cooked the roots as a starch. Chervil is an essential ingredient of French omelette "fines herbes" along with chives and plain leaf parsley. It is traditionally eaten with peas.

A face bath of chervil tea is a popular French treatment for wrinkles. An unsweetened infusion of its leaves tends to lower blood pressure when taken once a day for two weeks only.

On the Lookout: Curly, plain and dwarf varieties exist. Brussels Winter is one of the slowest to run to seed, has a pleasant anise flavour, and is very resistant to both heat and cold. An Italian variety, Vertissimo, suits fresh herb producers because it recovers rapidly from heavy harvesting.
There is also a large-rooted kind of chervil called "Kjorvelroe" in Danish, and "Kervel Kloubnievidnyi" in Russian – the Turnip-rooted chervil of the English. One variety is Chervil of Prescott which is recorded as coming from Siberia and having a parsnip-tasting root.

CHICORY
ASTERACEAE

Cichorium intybus – cichorium is derived from an Arabic name for chicory and intybus from the Egyptian tybi for January, the month when it is eaten there.

Origins: The Mediterranean basin. Edible varieties of the wild chicory were first developed in Syria. In the 19th century the large-rooted varieties were in vogue as a coffee substitute, being known as Magdeburg. In 1850, as the successful result of an experiment in Belgium to grow white-leaved winter vegetables on a bed of mushroom compost in the dark, the witloof, meaning "white leaf" in Flemish, was born.

Description: There are two cultivated species of this genus: *C. intybus*, which produces the witloof, with leaves like Cos lettuce. It is eaten as a spring salad and the roots are used as a coffee substitute and *C. endivia* (*see* Endive) which has frilly salad leaves.

Cultivation: Witloof does particularly well in Tasmania and the south island of New Zealand. Plant seeds in late spring in the open air. If planted too early in spring they are liable to go to seed in hot and dry weather.
By mid-autumn the foliage will have dried out and can be uprooted. The largest roots, sometimes as thick as a wrist, are selected for witloof production. Place the trimmed roots in a dark cellar, or cool dark place like a cupboard, or even under a flower pot, in mushroom compost. The tender shoots, called "chicons", will soon appear on the root crown and can be eaten throughout winter. Chicory can be more easily grown just for its leaves by sowing in autumn or spring. It has the reputation of breaking up compacted soil.

Saving the Seed: Chicory, a biennial with perfect flowers, is self-incompatible and will cross-pollinate with other chicories, including the roadside chicory, and with endive. Insects

do the job. If you are collecting seeds from more than one variety of chicory, a garden length isolation will not do. 400 metres is recommended to commercial growers.
The plant shoots a stout stem with several branches up to two metres tall. The luminous blue flowers are borne along the stalks – a stunning sight in the garden. The seeds are tubular, beige and do not drop easily off the stalk. When the branches feel dry, crumple the whole stalk into a paper bag and hang in a shady place. Rub hard between the hands and separate the seeds from the chaff by winnowing. It is a hard plant from which to extract seed but persistence will pay off. Winnow carefully.

Storage: The seeds are long-lived, lasting up to eight years. There are 600 seeds to the gram.

Usage: The leaves are enjoyed in salad for their fine bitterness and crispness. The young roots of the Magdeburg type can be lifted in autumn and dried, chopped, roasted and ground into a coffee substitute. The witloof is absolutely delectable and is eaten raw, or steamed and served with a rich sauce.

Chicory increases production of bile and helps to counteract the bad effects that coffee and heavy foods have on the liver. A tea made of the whole plant in flower is reputed to dissolve gallstones.

On the Lookout: There are many shapes and colours including red ones such as Primu Rossa, Sotto Marina and Variegata di Castelfranco. Italians name the red ones Radicchio. A good many of these varieties are available in packets from Italian grocery shops.
Barbe de Capucin, or Monk's Beard, is a fine-leaved salad variety that can also be grown in a cellar or in a box and eaten blanched as witloof.
Alba, Spectra and Robin (the first pink-tinged variety) are good for witloof.
Brunswick is a recommended variety for making coffee.

CHILACAYOTE

CUCURBITACEAE

Cucurbita ficifolia – cucurbita means gourd in Latin and ficifolia "fig-like leaf".

Origins: Chilacayote is a native of the highlands of Mexico but is even more popular in the South American Altiplano.

Description: Long trailing vines with deeply indented leaves, and fruits that are the size of small watermelons, green with many small white splotches. Also called Zambo, Alacayote, Chilicayote, Malabar Gourd and Fig-leafed Gourd. It is the only perennial squash in the world, and the only one with black seeds too.

Cultivation: Chilacayote grows more easily than pumpkins. Fruits have set from mid winter through to late summer in the sub-tropics of Australia. It can take cool weather and altitude but is frost sensitive. It climbs up a trellis or spreads out to considerable distances but it is not as invasive as pumpkin as it does not shade the ground as much. The vines may die back in winter, but shoot again in spring.

Saving the Seed: It does not cross with any other squash or pumpkin. Fruits become rather hard when ripe for seed. Store for at least three weeks after picking for the seeds to mature. Scoop out the wide, flat, black seeds and separate from the flesh. Their mucilaginous coating needs to be removed by soaking for a day and then rinsing under water. This is the wet processing method described in Section Six. Quite a bit of drying is needed after this – up to two weeks in a shady warm spot.

Storage: Seeds last up to five years if kept in a cool dark environment. There are between five and eight seeds to the gram.

Usage: First-rate as an immature round squash – very tender, firm and almost sweet. Pick when about the size of an apple and eat lightly cooked or raw like a cucumber.
The large mature fruits are used to make a delicious and nutritious pudding by simmering the flesh with milk and cinnamon. In South America a jam is made of the white spaghetti-like flesh, which is called "angel's hair". No water is needed: cut up the flesh of a chilacayote and any citrus, cover with sugar and leave overnight. Boil and towards the end, add walnuts. Like a jam melon, chilacayote contains pectin.
A candy is made with the crisp white flesh in Chile and Mexico. We have found that the flesh can be used in porridge as is done in Botswana with watermelons. The insides of the seeds themselves are edible and are eaten roasted, although they are also quite pleasant eaten raw.

On the Lookout: Hugh and Lilian Osborne of Henry Doubleday Research Association sent to the seed bank Alacayote, a strain of chilacayote, collected from South American members.

Before you choose what seeds to save, see Simplicity Rating page 51.

CHINESE CABBAGE

BRASSICACEAE

Brassica rapa – brassica is Latin for cabbage, and rapa means "turnip-like".

Origins: China. Cultivated since 2000 BC. The Chinese took it to the rest of the world with their migrations from the 14th century.

Description: There is a huge diversity of plants called Chinese cabbage. The subspecies *pekinensis* includes heading types like pe-tsai, celery cabbage and Chinese cabbage.
The *chinensis* subspecies contains the more open types such as Chinese mustard, celery mustard, bok choy and pak-tsoy.
Spinach mustard and Japanese mustard are classified as *B. juncea* and can be found under Mustard Greens.
Mizuna *(B. juncea* var. *japonica)* is Japanese cabbage and has its own entry.

Cultivation: In Australia they are all annuals, meaning that they will produce seed in one warm growing season. They should be encouraged to grow rapidly with applications of ample fertilizer and water. The plants mature in less than three months, which is considerably less time than the European cabbage takes.

Saving the Seed: They are cross-pollinating (and self-incompatible), so it is best to keep two or more bushes of a variety in order to let them pollinate one another. They will cross with turnips and all other varieties of Chinese cabbage. A small garden is not suited for producing more than one variety for seed, as varieties need to be a minimum of 400 metres apart.
It is worth saving seed from the very best plants rather than from those that happen to form seeds too easily. Careful roguing is advisable to select for desirable characteristics. The yellow flowers will turn into pods. When these become brown and the seeds can be heard rattling, pick the whole stalk and lay it on a sheet. Leave to dry further and thresh and winnow. Label carefully, because all Brassica seeds look similar.

Storage: The seeds last three to five years. There are 350 seeds to the gram.

Usage: The fleshy stems of Chinese cabbage bring juice to stir fries. Each variety or type has a different use in Chinese cooking, either as steamed or fresh greens, or pickled. When cooking, start with the stalks and later add the green leaves. Don't overcook!

On the Lookout: Just the names attract attention: Shantung, Wong Bok, Pe Tsai, Bok (or Paak) Choy, Flat Cabbage, White Flowering and Soup Spoon Paak.
Vietnamese and Chinese shops will often have a great variety of the seeds of these cabbages for sale, as well as the vegetables themselves.

CHIVES

AMARYLLIDACEAE

Allium schoenoprasum – allium was the Roman name for garlic, schoenoprasum comes from the Greek schoinos for a "rush-like" and prason for a leek.

Origins: Chives are endemic to many parts of Europe, as far east as the Kamchatka Peninsula in the Bering Sea, and over into North America.

Description: Chives have thin tubular leaves and grow in clumps.

Cultivation: Chives make good border plants. The more fertility in the soil, along with regular watering, the more leaf growth there is. The clumps will last several years before being divided if the soil around their roots is replaced each year by a rich compost.
Harvest the leaves continuously for best production. If they are not picked for a while, chive plants become leggy.

Propagation: Generally, chives are propagated by clump division. Older varieties of chives may bear no fertile seeds at all. The root bulbs develop in clusters which should be dug up in spring every second or third year. Trim the roots and the leaves of the divided clump for replanting.

Saving the Seed: The other way to propagate is by seed, bearing in mind that not all flowers will be fertile. A few clumps should be left unpicked to produce a quantity of good seeds. The exquisite globular purple flowers will yield black seeds. Chives will not cross with any type of onion.

Storage: The seeds last a maximum of two seasons, but only one if the climate is humid and hot. There are 600 seeds to the gram.

Usage: A natural companion to tomatoes in salad and good as an insect repellent in hedgerows in the vegetable garden. A useful pesticide can be prepared by steeping a good handful of chives in boiling water. Let them stand until the water is cool. The mixture can be sprayed on Cucurbits for many fungal problems.
At the table, chives promote digestion and stimulate appetite. The flowers are ornamental and the unopened buds a perfectly edible garnish. Chives can be planted in a container with parsley, garlic chives, chervil and basil on the window sill and used on a daily basis.

Chives are known to contain small amounts of iron and are therefore beneficial to anaemics.

On the Lookout: There are varieties that are suitable for small gardens and pots, such as Grolau which was bred in Switzerland for intensive indoor cultivation.
Flower colours range through dark red, pink, mauve, purple and blue.

CHOKO

CUCURBITACEAE

Sechium edule – edule meaning "edible" in Latin.

Origins: Mexico. Chokoes were widely used by the Aztecs before the Spanish arrived and are now distributed all over the world. They are found in every region of Australia. Also called Chayote in Mexico and Christophine in the West Indies.

Description: Choko is a perennial in the tropics and sub-tropics, but an annual in cooler climates. A good Permaculture plant, it can be used as an insulator for sheds and a disguise for old fences. It is also a productive, low maintenance food crop, and is very palatable when harvested young and prepared with love and understanding.
There are many types of choko: smooth and prickly, light green and the more tropical white. In Mexico, a small choko is grown especially for its large nut-flavoured seed.

Cultivation: Provided they have good soil, chokoes can be grown anywhere. They will take off in spring. The fruit, which is one large edible seed, is planted at a tilt with the larger end down and the small end exposed, or lightly mulched. In warmer zones, vigour can be encouraged by cutting back the vines to ground level and laying

mulch on top. When the mild winter has passed, the plants will re-shoot.

Propagation: Chokoes are monoecious, having both male and female flowers on the same vine. A new vine is obtained by planting the whole choko which, when it has gone beyond the edible stage, sends out a shoot, even while on the vine.
In cooler areas, store mature fruits over winter in a dark, cool, airy place and plant out when the shoots start to appear after the danger of frost has passed.

Usage: The plant has delicious edible shoots and tendrils. A few chokoes half buried in a box of compost will provide a good supply of tender greens for stir fries. The fruits can be eaten raw when very young, at about half their mature size. Michael Boddy (*Good Food Book*, 1984) finds chokoes, picked immature, have a delicate flavour when gently steamed. He also cooks the large chokoes for dessert, like pears, and reports that the vines can be used in hat-making, instead of raffia.
On the opposite side of the Pacific, Mexicans use the stems to make baskets and eat the roots, which resemble sweet potato in flavour and texture. In Indonesia the tuberous roots of two to three year old plants are considered the most tasty (Ochse, 1931).

On the Lookout: The choko is something of a character. Market gardeners and backyard gardeners are keeping some unusual sorts, such as the enormous green one that is halved and fed to pigs, cattle and poultry.
A stallholder at the Byron Bay market in northern NSW sells six different types of choko, amongst them a fine-flavoured yellow one with little spines, and a smooth medium-sized white one with a floury potato-like texture.

COLLARD

BRASSICACEAE

Brassica oleracea var. ***acephala*** – brassica is Latin for cabbage, and oleracea for "vegetable-like"; acephala is Greek for "without a head".

Origins: This favourite of the Scots and English is a short-stemmed, leafy variety of cabbage, whose origins it shares.

Description: Very ancient in cultivation, collard is an extremely rustic plant which can withstand a wide range of temperatures. It bears a confusing range of names such as cole, borecole, colewort and even kale in England. It is the cabbage most resistant to heat, and it also resists cold. It has rounded flat leaves and is open-hearted.

Cultivation: Collard is easy to grow as long as it is well-manured and watered in the early stages.

Saving the Seed: The flowers are perfect but self-infertile, as are many flowers of *Brassica oleracea*. For better seed production a few plants need to be left to go to seed in order to pollinate one another. Collards will cross with cabbage, cauliflower, broccoli, Brussels sprouts, kale and other varieties of collards that are flowering at the same time. Seed harvest and cleaning is the same as for all the Brassicas (*see* Cabbage, or Kale).

Storage: The seeds are round, and reddish to blackish-brown. They will last four years in temperate regions and a year in the tropics. There are 200 seeds to the gram.

Usage: Collard can be harvested leaf by leaf at any stage. In cool weather it increases in size rapidly. Its quality improves after a light frost. Very good for people without much time for cooking or gardening. Collard is not as fibrous as kale, and can recover after heavy pickings.
Collard was the "soul food" of the black slaves in the southern states of the USA. It was eaten with green-shelled cowpeas, rice and a little pork fat – a quick, convenient and nutritious meal for hard-working families. It is said that slave children were given the cooking water from collard greens, called "likka", to keep them healthy.

On the Lookout: Georgia Southern is one of the few collards available; it will tolerate poor soil and heat and it grows up to one metre tall. In Seed Savers there is a collard that in the sub-tropics produced leaves from early spring through to the following winter.

CORIANDER

UMBELLIFERAE

Coriandrum sativum – the name comes from koris, Greek for "bug", referring to the smell of its unripe seeds; sativum means "cultivated" in Latin.

Origins: Coriander originated in southern Europe and parts of Eurasia. 3000 year old seeds were found in Egyptian tombs.

Description: Coriander is a small annual herb that is usually grown for its leaves in Australia. It is also called Cilantro and Chinese Parsley.

Cultivation: Plant coriander at a time of year that you know you can keep the water up to it. Seedlings do not transplant well, so plant seeds directly in place. If it dries out, the plant will quickly go to seed. We plant ours in the autumn, the wettest season, though local herb producer, Jules, plants coriander throughout the year and markets bunches of young whole plants in the dry spring/summer months. Some restaurants and gourmets must have this herb all year round. Try growing it in the shade of larger vegetables.

Saving the Seed: Flowers are perfect, self-fertile and visited by many insects. If you have different sorts of coriander, they will cross. The white lacy flowers are produced on top of the branches in spreading umbels.

The plant goes through an unpleasant odour stage when the seeds are green, so that for a certain time it is barely edible. The seeds then turn light brown and hard and are harvested for replanting and for use as a spice. The seeds do not all ripen at once. Because the smallest disturbance makes the seeds fall when ripe, successive harvests are necessary. The seeds need a thorough drying before storing.

Storage: Well-stored seeds last for three years and there are ninety to the gram.

Usage: The seed has a warm, aromatic taste and is used as a condiment throughout Asia, Latin and South America. The leaves are used in soups, meat dishes and especially with fish. The crushed thin roots are an essential ingredient in Thai cuisine.
In Chile the leaves are even used in fruit salad. The ground seeds are an essential ingredient in many Asian dishes.

Chewing the ripe seeds stimulates secretion of gastric juices.

On the Lookout: There are two types of coriander for two different purposes. One gives large seeds which, when ground, are an important ingredient in curry powder. The other gives small seeds and provides the better tasting and more abundant leaves. Oval and round seeds are available in Indian food shops.

CORN

GRAMINEAE

Zea mays – zea comes from the Latin zao "to live" and was given by Linnaeus; mays is the Mexican name for maize.

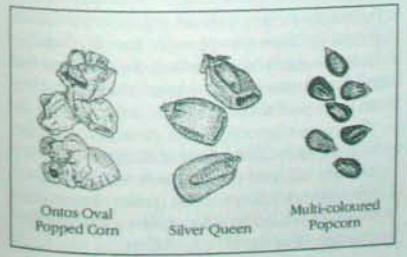
Origins: The Andes. All corns have a common ancestor, teosinte, a tall grass with narrow ears. A perennial teosinte was recorded in Mexico in 1977 by a team of scientists. Trading amongst Indian tribes slowly spread corn from the Andes to North America and records show its use for thousands of years by the Incas, Aztecs and American Indians.

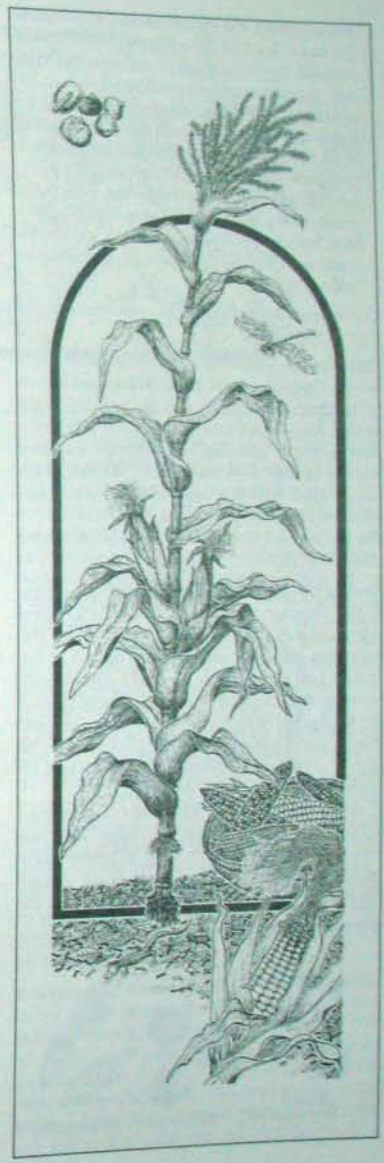
Before you choose what seeds to save, see Simplicity Rating page 51.

When the French explorer Jacques Cartier arrived in Canada's Hudson Bay in 1540, maize was already there and beans were climbing amongst it. In many American Indian tongues, maize and life have the same word. Some of their legends maintain that we were transformed from animals into humans by cultivating maize. Most groups had traditional varieties which they considered gifts from the Gods.
Columbus introduced corn to Europe and by 1600 it was well accepted, unlike the potato and the tomato. Less than a century after the re-discovery of America, corn was reported to be available on all markets in Lombardy and Venice.
Maize was introduced to Africa before Columbus' time (Jeffreys in *Annual of the New York Academy of Sciences*, 1965) either by Arabs or the Africans themselves.

Description: Corns have adapted to a whole range of conditions. More than 300 varieties of corn were grown in America before the arrival of white settlers.
The five different types of corn are:

- Dent – has a small depression on top of the kernel caused by the core (endosperm) shrinking; long and hard kernels are used for cracking and grinding into live stock meal;
- Flint – is the hardest of all corn as its endosperm is all callous; the hard round kernels are used for rolling into cornflakes and grinding into corn meal such as polenta;
- Flour – has an endosperm made up entirely of soft opaque starch; the thin skinned kernels are easy to mill into flour;
- Pop – is the most primitive with up to six side shoots (tillers) and can produce up to sixteen small cobs; the plump, hard, small kernels have air bubbles trapped inside which pop





when heated; the immature cobs of miniature forms are used as baby corn by the Chinese;

- Sweetcorn – was known amongst the Mandan, Iroquois and other Indian tribes, but has achieved widespread usage only recently. All types of corn can be eaten when young, that is, at the milky stage, although sweetcorn is preferred for this by most people. Only in the last hundred and fifty years has sweetness, tenderness and a high water content been bred into sweetcorn. When dried, sweetcorn seeds are very shrivelled in comparison to the other types.

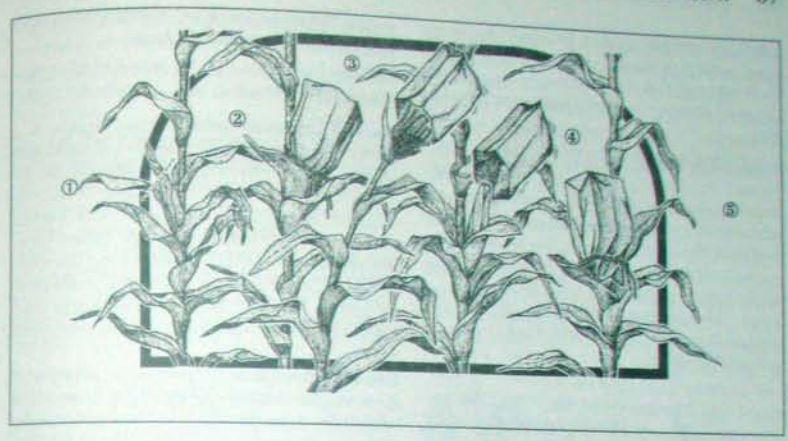
Commercial hybridization of corn began in the USA in the 1940's.

Cultivation: Different cultures have different ways of growing corn. Hopi Indians plant corn a foot deep in hot sands and dance to the cloud spirits. Broadscale farmers plant an inch deep and pay the chemical bills. Some varieties mature in sixty days and others take twice that long. Local varieties, and local advice about planting times are always the best.
For greater production, fertilize corn before it is flowering because it is a gross feeder.

Saving the Seed: The male tassel forms on top of the plant and produces pollen, which is shed when the anthers hang down like little bells. The cob with silks protruding from its top is the female part of the plant. Each silk corresponds to one kernel on the cob, and must be pollinated for the kernel to form. Generally, the tassel will start to shed pollen before the silks emerge. To ensure maximum pollination, corn should be grown in blocks, not in single file.
It is a challenge for the beginner to save corn seeds successfully for several years. First, we will look at isolation to keep a variety pure; second, at how to maintain enough genetic diversity for long term maintenance of the variety; third, at how to select for strong features; and last, how to process the harvested seeds.

Isolation between Varieties: Corn is wind-pollinated but bees are attracted by the abundance of pollen shed. To keep a variety safe from crossing (or hybridization), cobs that are to be collected for seed must be isolated. Remember that sweetcorn will cross with the other types of corns mentioned above. There are three ways to isolate your cobs from the light drifting pollen:

- By distance – The distance downwind from the nearest crop of a different variety is most important. A minimum of 500 metres is recommended for purity. However, the size of the next patch, wind direction and velocity are the real determining factors.
  Take two instances:
  First: A suburban situation where a few neighbouring gardeners would have only a small number of corn plants, not necessarily shedding pollen at the same time, and where there are tall buildings and trees as barriers. It is likely that corn would be safe with as little as one hundred metres' isolation.
  Second: A garden crop at the edge of a town surrounded by large corn fields which, when blooming, saturate the air with their pollen. Even at two km there could be no guarantee of the purity of the smaller crop.
- By time – The important thing is that two or more different varieties should not be shedding pollen at the same time in the vicinity. In the warmer regions, where there is a long growing season, plant different varieties a month or more apart and the pollen will not mix.
- By isolating the developing cobs, using hand pollination which is done as follows:
  Place a brown paper bag over the male tassels before they open (*see* Saving Precious Genes below for how many), and close the bag.
  Before the silk emerges from the cobs, cut one cm (half an inch) off each cob without cutting off the tip of the cob *(as in number 1 in the illustration opposite)*. This gives an even edge to all the silks. Cut off the leaf that is at the axil of each cob and put a brown paper bag over the cob and down next to the stalk *(as in number 2)*. The silks will have emerged enough after three or four days.



Collect pollen about midday from several males by tapping on their bags *(as in number 3 above)* and mixing it all into one bag. Pollen of corn is not viable for more than a day in warm weather.
Blow or pour *(as in number 4)* the fine gold powder onto the emerging silks and cover the cobs again when finished *(as in number 5)*. Remember that each silk corresponds to a kernel so this process may have to be repeated two or three times to achieve complete pollination. Cover ears and tassels again.
Leave the cobs covered until the silks turn brown. They stay "green" (receptive) for weeks.

Saving Precious Genes: How many cobs to save? Because corn is a crop that is dependent on cross-pollination for survival, it is of utmost importance to save as many cobs as possible, so that the seeds have all the genetic characteristics of the variety that are necessary for the survival of the strain. Saving seeds from only a few cobs for several years in a row will increase inbreeding and tends to push the variety to ripen later and later until eventually the frosts may kill the lot. It is also likely to become disease-prone and die out in this way.
The number of cobs to save will depend on the uniformity of the variety and its rusticity. Farmers who keep a variety like the Tableland Red select a couple of hundred cobs from the thousands in the field, and from the centre rather than from the edges of the field. They keep only the best central rows of kernels on each cob.
For the home gardener, five to fifteen cobs will suffice in the short term, but new blood from the same variety will have to be re-acquired a year or two down the line. They should be planted with your seeds to rejuvenate the variety. From time to time, Mexican farmers allow teosinte to grow and cross with corn as they have found that this invigorates the corn. For gardeners with the space and inclination, seed saving from fifty to a hundred cobs – and the more the better – is recommended for maintenance of the variety.
It is better if a cob from which seeds will be saved is not pollinated by the male flowers of the same plant. To avoid a corn plant pollinating itself, detassel it, that is, cut off the male flowers well before the anthers hang down and start shedding pollen. In a field situation, the plants in the centre are earmarked for seed, detasselled, and the outer surrounding ones are left to produce pollen. To some extent this also provides a barrier against foreign pollen landing on those central plants kept for seed.

Selection of Strong Seeds: The whole plant, as for many other vegetables, has to be considered. Do not, for instance, choose a big cob on a late, small plant. With sweetcorn, refrain from eating the earliest and best cobs and mark them with a bright cloth. This lets everyone else know to leave them alone. If you save fifty cobs you will end up with around 4000 seeds. Too

much for a home garden, but great for swapping, selling or giving away. When selecting, look for specifics that suit your area, such as drought, fungus or insect resistance, or earliness.

Processing Seeds: The cobs should stay on the plants for about a month longer than the sweetcorn stage, preferably until the husks are dry and white. They may have to be protected from birds and field mice. After harvest, the husks can be peeled and tied back and the whole cob hung up for further drying for a week or two.
Some older farmers recommend leaving the seed on the cob as they believe it lasts longer in storage. However, if space is limited, the cobs can be shucked (a wonderful southern USA term) by rubbing one against the other. Gather all but the small kernels on the ends – these can be cracked and used to make porridge, or polenta. When the kernels are absolutely dry, freeze them in an airtight container for two days to kill weevils and their eggs, which may be hidden under the seed coats.


Tenasee

Storage: Sweetcorn seeds will not last as long as other corns – usually two years, though longer is possible if they are kept very dry and at a constant low temperature (5°C is best). Flint, dent, and popcorn seeds can remain viable in a dry environment from three to ten years, depending on variety and storage. Store in labelled airtight jars.

Usage: Alkali processing by using limestone in the cooking water is a very old tradition. The Aztecs threw the shells of barbequed snails into the cooking pot to alkalinize the water and soften the kernel skins. The kernels were then ground wet on a soft volcanic stone called a "metate" and made into tortillas.
To cook sweetcorn, boil the water (not the corn), put the cobs in, turn off the heat and allow to sit for ten minutes before draining. In New Zealand, Maoris ferment shelled white corn by letting it soak in a running creek for several weeks before eating it as "Kangaa Wai". That way more nutrients are available.

In French Guiana an infusion of the silks of the cobs is used to combat urinary tract problems.

On the Lookout: Golden Cross Bantam is a sweetcorn that tends to send out several side shoots. It was a very popular variety suitable for early, mid-season and late planting. It matures in ninety days. Country Gentleman is a white sweetcorn, quite late, with deep, narrow non-aligned rows of kernels. Hickory King is a white dent corn, also used as a sweetcorn when picked young. The Red Mandan matures in sixty days and suits areas with a short growing season.
Ontos Popcorn is in the same category and is grown in the southern Snowy Mountains. It is a white corn from the USA. It pops well and like all popcorn is great as a chook food. Julie Firth has successfully grown mini red popcorn in Waggrakine, WA. She harvested up to fifteen immature baby corn cobs on the one plant as there are several stems.

Quarantine: Regulations apply within Australia for moving corn seed, the major reason being to prevent the spread of boil smut. Information on areas of quarantine is available from your Department of Agriculture.

CORN SALAD

VALERIANACEAE

Valerianella locusta – valerianella is the diminutive of the Latin valere "to be in good health".

Origins: Corn salad derives the name from its natural occurrence in fields of wheat, once called "corn" in England. It grows wild over southern Europe and western Asia.

Description: Corn salad looks like a small, loose-leaf lettuce. It was often harvested in the French vineyards before herbicides started to poison its habitat. It is desired for its utter tenderness. Italian corn salad *V. eriocarpa* is rarer, has hairy leaves, is suitable for warmer climates and needs to be planted every week or so for continuous yield. Corn salad is also called Lamb's Lettuce, and Mache and Doucette in French.

Before you choose what seeds to save, see Simplicity Rating page 51.

Cultivation: Corn salad is traditionally broadcast and grown in patches. It matures in less than two months. It is an autumn plant in cold temperate climates and a winter plant in the sub-tropics.

Saving the Seed: Corn salad is insect-pollinated. In order to conserve the growing energy for making seed, the leaves of plants kept for seed should not be picked. As soon as the weather warms up, the plant flowers.
Check the seeding plant often to ensure that seed is not dropping to the ground. Carefully cut the seed stalks and hang with the head in a paper bag for further drying. Beat, winnow and continue drying.

Storage: The seed is small and yellow-brown with a groove in the middle. After four years of proper storage the seeds will only be fifty percent viable. There are between 700 and 1000 seeds to the gram.

Usage: Corn salad is delicious with a lemon juice dressing in a green tossed salad. It is rich in vitamins A and C.

On the Lookout: Etampes Round, Lettuce Leaf, Variegated, Spoon-leafed and Golden Cabbaging are varieties mentioned in old catalogues.

COWPEA

LEGUMINOSAE

Vigna unguiculata – Doctor Vigna was a professor of botany at Pisa, Italy, and unguiculata means "finger-nailed".

Origins: The cowpea is thought to have originated in western Asia and reached Africa in prehistoric times. It arrived in Jamaica and southern USA with the slave trade.

Description: It is an annual semi-climber and is often grown interplanted with maize in southern Africa, (where it is called the Kaffir Bean), and with finger millet or ragi *(Eleusine coracana)* in India.
It is known in warmer Australia as a fodder and green manure plant, but some large garden varieties exist. Cowpeas vary greatly in shape and size.

Cultivation: This is a warm weather plant sensitive to frost. It grows best in temperatures above 20°C.

Saving the Seed: Cowpeas are self-pollinating. When all the pods are dry on the bush, pull the whole plant. Careful, the pods may shatter. Give the pods a few more days to dry in the shade, and then shell them by beating on a tarpaulin. They can then be winnowed, dried further and stored.

Storage: Cowpea seeds last five years, if stored in cool, dry conditions. There are fifty seeds to the gram.

Usage: In the "deep south" of the USA, cowpeas are eaten fresh, shelled. In Africa, cowpeas are a very important food at the village level. They are eaten with vegetables and spices as a thick soup. Also the shelled bean is ground into flour which is formed into a ball with spices and deep fried. Dried cowpeas need boiling for only thirty minutes. Soaking removes some of the oligosaccharides that cause flatulence.

In Malawi, the leaves are left to wilt briefly in the sun, then packed in an earthenware jar with a little water and brought to the boil. They are spread in the sun for a further two days and stored to be eaten crisp or in "mealie meal" porridge.

On the Lookout: A Queensland subscriber writes:

> I have a large-seeded cowpea (forty cm high but not climbing or running) which was grown in the Darling Downs of south-east Queensland in the late forties. It was a number one vegetable; the matured seeds were shelled like dried peas and were light brown in colour and eaten like baked beans. My mother planted a crop each year in September-October to keep a supply of dried cowpeas for the kitchen and we always saved our own seed.

There is a mottled black-and-white cowpea, which is tasty as well as attractive, in The Seed Savers' Network. Other cowpea varieties have been sent in, largely of American origin, from northern Australia. In south-east Queensland there is one called Black-Eyed Pea.

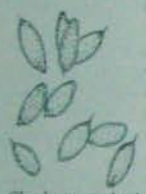
CUCUMBER

CUCURBITACEAE

Cucumis sativus – cucumis was the name used by the Romans for cucumber and sativus meant "cultivated".

Origins: From northern India, its centre of diversity, the cucumber was transported to China in the 2nd century BC, and also to the Middle East at an early stage. The bible records that the Israelites complained to Moses in the wilderness about the lack of cucumbers; they had become accustomed to them during their stay in Egypt.

The Roman Emperor Tiberius was said to have taken pride in his out-of-season hothouse cucumbers. The Romans were well aware that a rich soil, warmth and moisture are essential to their growth. It was a common practice to grow them in large baskets filled with horse manure and rich soil. Thin sheets of *lapius specularis* (mica) were placed over the baskets and admitted light nearly as freely as glass would have done. The ancient writer Pliny informs us that cucumbers were grown in mobile boxes that were moved indoors at night in order to keep them warm.



Charlemagne had them in his gardens in the 9th century, but it is said that the British had to wait until the 14th century to have a first taste of them! As a fitting exchange for the botanic wealth of the Americas, it was Columbus who introduced the cucumber to that continent.

Description: Cucumber plants are vines that fruit during the warm time of the year. The little pickling gherkin is more suited to cooler climates than most other cucumbers.

Cultivation: To have an early and large crop, organic market gardeners fill the bottom of large holes with straw and manure then plant the seeds in a layer of topsoil with compost on top. When watering the young plants, avoid wetting the leaves so as not to encourage fungus.

For easy harvest, train the vine to climb a trellis. Cutting off the growing tips encourages branching and a better production.

Saving the Seed: A cucumber will not cross with anything else but another cucumber. Half a kilometre separation is needed between different varieties that are flowering at the same time. If you grow more than one, you will have to hand pollinate each variety (*see* Section Eight).

Leave a fruit to fully ripen on the vine. White spine varieties turn pale yellow, green ones turn golden to brown. The size can be astounding: we have had cucumbers kept for seed grow to seventy centimetres long and of considerable weight. Ken Hanna a foundation member from Middle Pocket near Mullumbimby, NSW arrived at Seed Savers with half a ute load of Richmond River cucumbers harvested for seed, some of them whoppers weighing four kilograms.

Gherkins enlarge and become a whitish-green colour. The colouring at maturity is an indicator of trueness-to-type. Hence off-colour individual cucumbers can be rogued out at this stage. The mature cucumber can be stored for a while before extracting the seeds. Scoop the pulp and seeds out into a bowl and leave to ferment for a few days so that the jelly around the seeds dissolves. This procedure will also kill off any seed-borne diseases.

Wash well in a sieve under running water. Spread seeds out thinly on wax paper or a sieve to dry for a week to ten days. They will need to be moved about the first day or so, so that they do not stick together when drying.

Storage: The seeds will last four years in the open air if you are in a dry climate and up to ten years in ideal closed storage conditions. There are forty seeds to the gram.

Usage: The home gardener knows the superior crisp texture and taste of fresh young cucumbers from the garden. Milk products like cream and yoghurt complement cucumber and are used in dressing for Indian raita (cucumber and yoghurt salad).

Old cucumbers can be cooked up in a quick curry or stir fry, although it would be hard to endorse the recommendation made by Eliza Acton in her 19th century cookbook. Typifying the less appealing side of English cuisine, she advised boiling cucumbers at length!

Excellent natural diuretic, promoting and regulating the flow of urine. Good for the kidneys. Milk which has had cucumber soaked in it is used to fade freckles! A well-ripened cucumber can be rubbed on burns and inflammations to relieve them. Spanish Gypsies use a slice of cucumber on bruises. A cooled slice placed over each eye relieves strain and fatigue.

On the Lookout: The favourites are Apple and Lebanese. Early Fortune is an old variety used mostly for slicing as the fruit remains firm after it is ripe.

In the Northern Rivers of New South Wales, local farmers and market gardeners are growing a cucumber that has several names, including Richmond River, Easter and Great American cucumber. It is a whitish-yellow cucumber that grows to thirty centimetres (one foot) in length and remains very crisp and does not get bitter. At this stage it divides itself into five long sections with a cavity in its centre. It is not to be confused with the soft white cucumber sometimes sold in the supermarket. Joe Connolly a Casino, NSW, farmer, Joe Connolly, was given the seeds at Casino railway station by an American soldier in 1945. He grew it and passed it on to many friends in the region. It is now seen on numerous market gardens stalls and in local greengrocers. The particular value of this cucumber is its ability to produce through the wet season at the end of summer.

In New Zealand, Straight Eight is well remembered for its earliness – fifty five days, from seeds to picking – and may still be available. Telegraph is an old and good glasshouse variety suitable for the South Island.

Christa Sullivan from Watervale, SA grows a German pickling cucumber which she obtained from an old gardener who said that it had been grown by his father and grandfather, and was brought in by German settlers in the Barossa Valley. It is accession number one in the Seed Savers records. These cucumbers tend to be late maturers but are most suitable for pickling.

Cucumis metuliferus is known as the African Horned Cucumber in Australia but called the Bitter or Jelly Cucumber in Africa. It is called Kiwano in New Zealand, and is often kept until fully ripe, when it is eaten as a fruit. A native of southern Africa, where it is mostly bitter and even toxic in its wild form, the Australian version has a sweet taste. When the Seed Aid Trust sent seeds to Botswana, it was widely accepted by the local people who recognized it as an improvement over their local bitter ones. It has the unusual characteristics of having sharp spikes – don't go harvesting in bare feet – it also has irritating, prickly leaves. Not a "user friendly" plant until you taste its flesh!

DANDELION

ASTERACEAE

Taraxacum officinale – from the Arabic tarasacon for "bitter herb" and officinale, Latin for "the apothecary's shop".

Origins: Native of Europe and Asia. It is a perennial and called the "pissenlit" (wee-in-bed) in France, because of its diuretic effect. The English name derives from the French "dent de lion", or lion's tooth, referring to its leaf shape.

Description: Dandelion needs no introduction to most gardeners and wins little praise from growers of lawns, although children love its dry, white seed heads. There are cultivated varieties with quite large, as well as small frizzy leaves.

It may be worth noting that the flower stalks are single and hollow, because it can be confused with a look-alike weed cat's ear *(Hypochoeris radiata)* whose slightly furry leaves are less sharply serrated and whose taste is less appealing.

Cultivation: Dandelion should be grown as fast as possible to avoid bitterness. It is usually sown in winter for a spring crop. A good garden soil makes any wild dandelion more abundant, and less bitter.

Saving the Seed: Dandelion is fast to go to seed and has the familiar yellow flowers. If you are growing an improved type, select from only the very best specimens or they will revert to the wild types readily. The wind takes the seeds if they are not harvested quickly.

Storage: The seeds will last for two years before viability starts to run out. There are 1000 seeds to the gram.

Usage: Choose the medium-sized leaves for salads and leave the young ones to grow. Dressing with vinegar and oil is essential. The combination of the bitter leaves, acidity and oiliness acts as an internal broom. The flowers are also edible. The wild ones found in temperate climates can be eaten if they are harvested in the early days of spring, and dressed.

A blood cleanser after over-eating in winter, dandelion promotes the secretion of bile and removes excess water from the body. The sap is useful against warts. As with chicory, a coffee can be made from the roasted roots and this gives lazy livers a boost. The whole plant, or just the leaves, can be juiced and consumed straight away or tea made of the dried or fresh leaves.

On the Lookout: Mauser's Trieb was bred to be blanched indoors in the way that witloof is made from chicory. Cabbaging, Full Heart, Giant Erect and Moss, (which has delicate teeth that resemble the finest curled endive), are all to be found in old catalogues, but few are still on sale. If no cultivated varieties are available, choose a good-looking wild one and improve it with selection over the years.

DILL

UMBELLIFERAE

Anethum graveolens var. ***esculentum*** – anethon is the Greek word for dill; graveolens is "strong-smelling" and esculentum, "edible" in Latin.

Origins: Dill is an annual whose distribution is widespread in Central Asia and elsewhere because of its medicinal popularity. Being native to such diverse climates as Iran, Iraq, Azerbajan, Armenia, parts of Turkey, northern Tibet, Afghanistan, Mongolia, northern India and Pakistan is an indication of its hardiness.
Dill also grows wild as a natural companion to field crops in southern Europe.

Description: At first, the plant resembles fennel, but it has a more lacy foliage and is more fragile in appearance. The plant develops many branches along a main stem which eventually peaks as a cluster of umbels with yellow flowers. As with many other vegetables, their seedheads form a beautiful pattern.

Cultivation: Plant in early spring, when danger of frost is over. Dill self-seeds quite easily because the seeds fall off if the bush is rattled.

Saving the Seed: Although pollinated by insects, dill will not cross with any other herb and the seeds will be pure. It is an easy one to save for the kitchen and for garden seed. When the seeds are light brown, cut the umbels with care and dry them on canvas or paper, in the shade. With a little beating the seed will fall, giving you clean seeds.

Storage: The seeds will last three years in dry, cool and dark conditions. There are 900 seeds to the gram.

Usage: Dill seeds go, along with cucumbers, into the pickle jar and the leaves are used in fine sauces in northern European dishes. Dill is the perfect herb to grow in between broccoli and cabbages as it repels the cabbage moth.

Dill tea, made from the seeds, is a traditional gripe water for babies.

On the Lookout: There are varieties that are grown primarily for their leaf, and others that are grown for their seeds. Leafy varieties, such as the German Vierling, have abundant fragrant foliage and are slow to bolt.
Long Island Mammoth and Bouquet are early to go to seed, produce extra large flowers and the maximum of seeds.

EGGPLANT

SOLANACEAE

Solanum melongena, ***S. macrocarpon*** & ***S. aethiopicum*** – solanum is Latin for "nightshade", macrocarpon is large fruit, melongena is Greek for "sprung from a fruit tree", aethiopicum means Ethiopia. The first of these is the large eggplant, the second is the African, which is small and the third is the Asian one that is bright orange or red, and is often called tomato-fruited.

Origins: The purple eggplant, now so common, was domesticated in India and Burma; it arrived in China by the 4th century. The Arabs introduced Europeans to the delights of eggplant in the 7th century.

Description: There is great variation in eggplant fruits, from the common large purple to the pea-sized yellow ones of Thailand. The first eggplants grown in England were small and egg-shaped, hence their English name. They are called Aubergine in France and Brinjal in India.

Before you choose what seeds to save, see Simplicity Rating page 51.

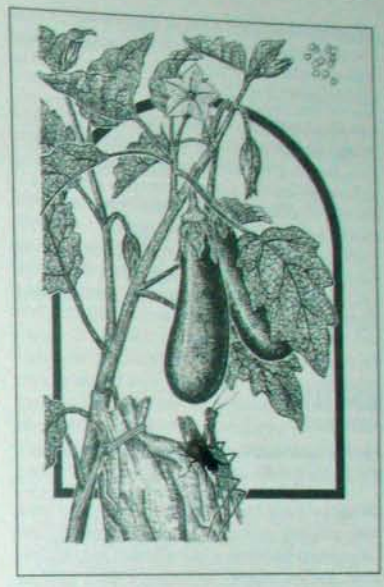
Cultivation: Eggplants need warmth and a long summer to be mature enough for seed saving. If you have short summers then you may need to start plants off indoors to produce any fruit at all. They are best transplanted, very carefully, when the day temperatures rise to around 20°C. Rooted cuttings can also be started indoors. Eggplant bushes do not tolerate frost.

Saving the Seed: Eggplant is a perennial which behaves and is treated as an annual in cold climates, so that young plants are started fresh from seed every spring. It is self-pollinating, but a small amount of crossing between varieties is likely to occur with insect activity. To avoid this, isolate each variety by a garden length or cage each clump of eggplant as described in Section Four. Another way to handle saving seeds of several eggplants growing near each other is to bag a few flowers of each plant to exclude insects. Tie the paper bags onto the flowers before they open and remove as soon as the little fruit is set.
There are no hard and fast rules about safe isolation distances. For example, in the USA, 400 metres (a quarter of a mile), reducing to forty five metres if there is a tall, dense planting between varieties, is the recommended isolation distance for certified seeds. Please do not let these apparently outrageous long isolation distances rob you of the experience of growing as many sorts of eggplants as you would like to eat.

For pure seeds, these distances can be lessened considerably in the home garden. You can easily grow and save pure seeds of at least four varieties, conveniently separated by ten metres (about thirty feet). You can also grow side by side different species e.g. a large purple variety, an African one and Thai green eggplant.

Choose the first fruits of the most vigorous and healthy plants and leave until they are about to fall off the plant. Several fruits of the same variety, but from separate bushes, should be kept for the long-term maintenance of a variety. Pick and hang the mature fruits in a shed until their colour dulls.

Suzanne Ashworth, who is the author of *Seed to Seed* and the curator of eggplants for The Seed Savers' Exchange in the USA, recommends getting to the seeds by cutting off the top and grating, or blending, the bottom which contains



the greater density of seeds. If you use a blender, cut the eggplant into cubes and whizz them up with water at a slow speed. Pour out the mass and collect the seeds from the bottom.
Wash and spread the seeds thinly on a sieve, leaving them to dry for a day or so. Place in a paper bag and hang for a further couple of weeks, before storing.

Storage: The seeds are viable five years later. Seeds can be frozen for longer storage. There are 200 seeds to the gram.

Usage: Eggplant is sometimes sliced and sun-dried for winter usage in arid zones. In Italy, very thin slices are dried and preserved in herbs and oil. The flesh has the texture and taste of mushrooms.
Cooking eggplants to perfection requires effort, and this may not suit faster life styles. A common way in France and Italy is to cut them into centimetre (half inch) thick slices, salt them and leave them to sweat for thirty minutes and then pat them dry to get them ready for frying. Ratatouille Nicoise is a stew of eggplant, onion, capsicum, zucchini and tomato in olive oil, heavily laced with Mediterranean herbs.

Eggplant leaves are used as a poultice to soften the scar tissue left after burns and haemorrhoids! In India whole charred eggplants are crushed to a powder and used as a tooth cleaner.

On the Lookout: Round and long, purple and white varieties are grown by Middle Eastern peoples. A great diversity of green, white and yellow varieties, ranging from tiny ones like a bunch of grapes to enormous fruits, are to be found in Asian-Australian gardens.
For short-summer areas, Early Long Purple is the best. Black Beauty and New York Spineless (probably not "the" original strain) are standard varieties.

ENDIVE

ASTERACEAE

Cichorium endivia – cichorium is derived from the Arabic for chicory.

Origins: Endive seems to have developed from wild chicory around the Mediterranean, the Caucasus mountains and Turkestan, but its common ancient name, in tongues from Europe right through to Siberia, suggests that it was domesticated simultaneously in many cultures in Central Asia.

Description: Endive has two basic forms: frilly, which has white, yellow and green leaves, and scarole which has puckered leaves like Mignonette lettuce. Endive can be confused with chicory *(Cichorium intybus)*.

Cultivation: This hardy annual is planted in early winter in a warm part of the garden where the seeds can germinate fast. Not enough moisture causes them to bolt and the taste becomes very bitter. Deep mulching around the plants is ideal. One week before harvesting – but only when the weather is dry – blanch by tying the leaves in a pony tail.

Saving the Seed: Endive is a self-pollinated biennial. Choose the best plant and refrain from picking its leaves. When seeding, it sends up stems about a metre high which may need tying together and staking to save garden space. Pinch the tops when they start heading to obtain larger seeds.
The masses of blue flowers mark the difference between endive and lettuce, with the latter having yellow, fluffy flowers that yield small, flattened, elongated black or white seeds. Endive has beige seeds. It does not cross with chicory. Cut the plant when the flowers and stalk are dry and the seed capsules are brown. Hang under shelter. Older gardeners say that seeds which take a long time to germinate will produce plants that bolt early.

Storage: If stored dry and in a dark cool place, the seeds will remain viable for more than five years. There are 900 seeds to the gram.

Usage: The French prepare a dressing for endive salad by thoroughly mixing mild prepared mustard with a good vinegar, then beating olive oil in gradually, and finishing off with a little added cream. The leaves are dried, after washing, by whizzing them around in a basket or teatowel, and the salad is tossed carefully so that the dressing can coat all surfaces. Other flavours such as garlic or herbs can be added, and chunks of lightly fried speck ham sprinkled over the dressed endive before serving.

On the Lookout: Golden Heart, Large Pancarlier, Staghorn, White Moss, Batavia, Hooded Winter, Italian. For summer and autumn choose the Green Curly endive. Most of these varieties have very decorative leaves. Bianca Riccia da Taglio is specially suited as a plucking green, reputedly lasting all year round.

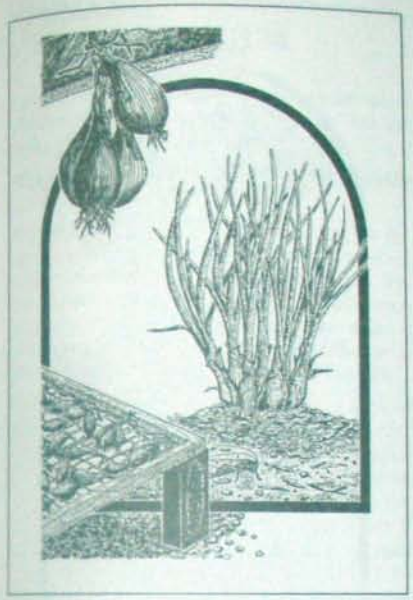
ESCHALLOT

AMARYLLIDACEAE

Allium cepa var. ***aggregatum*** – allium is Latin for garlic, ke-pa for onion and aggregatum refers to their habit of clumping. The eschallot used to be classified *Allium ascalonicum* which is believed to derive from Ascalon, a town in Syria.

Origins: Eschallot is another crop which originated in the rich fertile crescent where agriculture took off 9000 years ago – mainly in the foothills of Syria, Iraq, Palestine and Jordan.

Description: This multiplier onion is the true "eschalote" of the French. It comes in a wide range of flavours as well as skin colours such as red, grey, brown and yellow. The base of the eschallot is composed of about twelve onions lightly attached to one another, and its leaves are tubular like an onion's, but shorter and thinner.



Eschallots should not be confused with spring onions which some people call shallots.
Early settlers called eschallots potato onions. Nowadays they are also called French shallots.

Cultivation: Eschallots grow on top of the ground rather than underground. To be productive, they need a rich compost and a soft loam which has been well-fertilized the year before. In Britanny, eschallots are grown in rich, sandy, loamy soil and fertilized with kelp. They are planted in late spring in cooler areas and harvested when the tops die down in autumn. They will easily freeze and deteriorate if left in the ground in cold winters. If the clump is left in the ground for too long, it will start a new cycle and the bulbs will start emptying.

Propagation: On extremely rare occasions some eschallot varieties will bear viable seeds. Normally they are propagated with the best side bulbs. Eschallots are harvested when the leaves are withered and then are spread on a wire screen in a cool, well-ventilated shelter.
Because they rot easily when injured, they should be cured in the shade before the clumped side bulbs are separated off. This will prevent any breaking of tissue. Individual bulbs are planted out.

Usage: English drawn-butter sauce, French *beurre blanc* and *sauce bearnaise* are made with eschallots rather than with the overpowering onion. Their tender leaves can also be eaten, as in Java, Indonesia.

On the Lookout: Well-known to early Australian settlers, eschallots are worth collecting from older folks before the traditional strains completely disappear. They may be called all sorts of misleading names but "Bulb Shallots" and "Potato Onions" are the most recognized names in Australia. There is great diversity to be found here. Commercial crops of a small red variety are grown on Queensland's Atherton Tablelands in the cooler seasons. The Golden Jersey Shallot is grown in summer in Victoria. They are now sold in many Asian shops. Michael and Janet Boddy's *Kitchen Talk Newsletter* (No. 6) had much to say about them:

> Traditionally, planting of the French shallots is done on the shortest day of the year and lifting on the longest day of the year when the leaves are decaying. In northern France, where many different type of shallots are grown, each region uses its own and treats with humorous contempt the shallots of another region. Normandy shallots for instance, mild and piquant, are very like the ones we can buy here. Burgundy shallots, aromatic and pungent, are elongated in shape, and grey.
> The dishes that each region produces, such as *moules marinieres* (mussels in white wine) in Normandy or *coq au Chambertin* in Burgundy are, obviously enough, best served by the type of shallot that grows in that region.

FENNEL

UMBELLIFERAE

Foeniculum vulgare – foeniculum is Latin for "little hay", referring to the shape of fennel's leaves; vulgare is Latin for "common".

Origins: Fennel was a favourite food and medicine of the Romans and is thought to have originated in Italy.

Description: There are at least two main types of fennel. There is a huge difference between the pungent, roadside weedy fennel and the much-loved, sweet garden Florence fennel, which is also called Finocchio (*F. vulgare* var. *azoricus* – of the Azores Islands). This has large, swollen stem bases.

Cultivation: Grow fast for leaf production, and fertilize well for large stem bases.

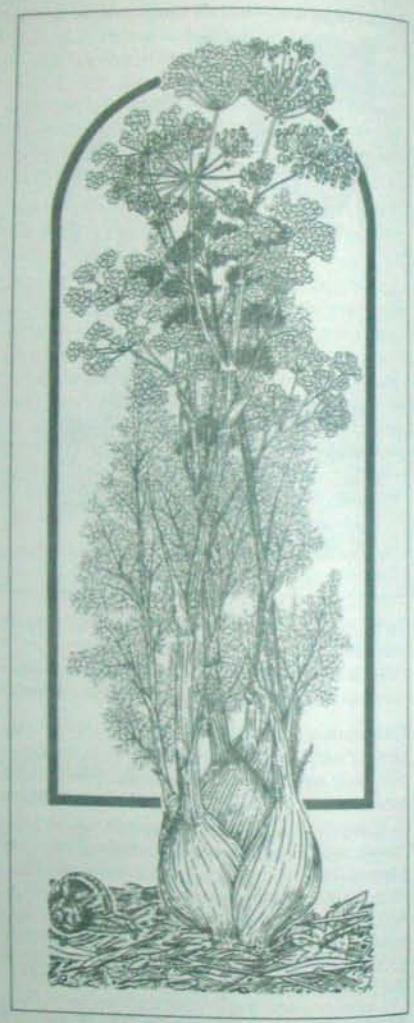
Saving the Seed: Fennel is a biennial and insect pollinated. The fennel you have in the garden will cross with the wild fennel if the two are growing within 400 metres of one another. After the seed head develops (needing no support) yellow flowers appear on umbels. The green seeds dry progressively on the bush, turning brown. They can be harvested as each umbel ripens. Dry on a sheet of paper, thresh and store in jars when bone dry.

Storage: The seeds are oblong, ribbed and light brown; they will last for four years in good storage. There are 500 seeds to the gram.

Usage: The swollen stem base of Florence fennel is served cooked with your choice of sauce – cheesy, milky, wine or piquant. It is also good raw, pared cross-wise and added to salads. An appropriate accompaniment to pasta meals. When fennel goes to seed, it has multiple uses. The shoots that grow along branches to become seed heads are absolutely tender and crunchy; the flowers are profuse and delicious; and the anise-tasting seeds are eaten as a mouth freshener.

Tea made with fennel seeds is said to cure hiccups and expel accumulations of mucus. Although a new plant to Michael Rooney, a seed saver from near Rockhampton, he reports regularly treating his old mother and aunt for indigestion with a tea of fennel seeds.

On the Lookout: Check with your Italo-Australian connections for family fennel seeds such as Cantino and Carosella.
An exceptionally fine flavoured strain of fennel was brought to Australia early this century by the Afghans, and is now growing well as a companion plant in the Banks's well-established, no-spray apple orchards at Pialligo, in Canberra.



Fennel has an important role in organic orchards, acting as a host for wasps which prey on plant-eating insects.

Before you choose what seeds to save, see Simplicity Rating page 51.

GARLAND CHRYSANTHEMUM

ASTERACEAE

Chrysanthemum coronarium – from the Greek chrysos for "gold", anthos for "flower" and the Latin, coronarium, for "garland".

Origins: From western Asia to the Mediterranean.

Description: Garland chrysanthemum has relatively small leaves and flowers in comparison to the ornamental garden chrysanthemum. It is a compact bush, especially when it has been regularly plucked, and grows up to sixty cm at the time of blooming. Its name in Japanese is Shungiku and in Mandarin Chinese, Tong Ho.

Cultivation: Sow the seeds in spring in cold climates, and in autumn where winters are mild. Grow fast with sufficient water for abundant tender shoots and leaves and pick these to keep the plant in its foliage phase. If you cannot keep up with the picking, a week of neglect will show up with the bush bursting into bloom, producing a multitude of handsome, edible, yellow daisy-like buds and flowers.

Saving the Seed: Garland chrysanthemum sets considerably more seeds when insects are working its flowers. When the flowers lose their yellow petals and the centres become brown and dry, they are ready for picking. A little crushing of the dried blooms will loosen the seeds and the rest of the seed head.
The seeds are difficult to differentiate from the old petals, stems and other chaff as they are all the same size. It is not a problem if some of the chaff remains and is stored with the seeds.

Storage: The seeds will last three years and there are 300 to the gram.

Usage: One of its names, Chop Suey Greens, gives an indication of how it is used – the perfect green for adding to a stir fry. Garland chrysanthemum also mixes well with other pot herbs such as beet leaves, water spinach and hibiscus spinach. It can be added to Asian soup just before serving. The yellow flowers, edible raw, make a good garnish for salads, soups and stir fries.
To store dried flowers, dip them into salted boiling water for ten seconds, spread them thinly on white butcher paper and dry them in the sun. These can be used in soups and tempura dishes.

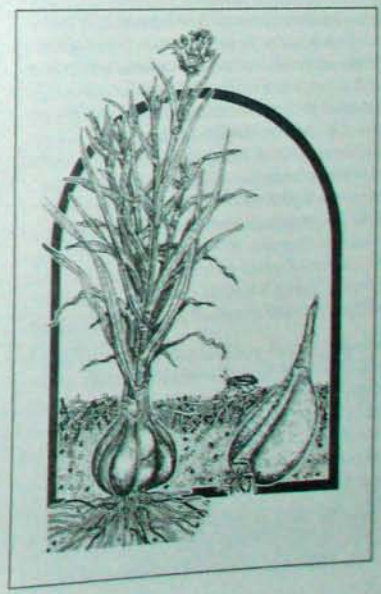
On the Lookout: Seed packets of different garland chrysanthemums are offered in Asian shops from time to time. Look out for different leaf and plant sizes and even different flower colours and shapes, such as the round leaf type. Buy them, grow them and save the seeds as they may not be imported next year.

GARLIC

AMARYLLIDACEAE

Allium sativum – allium was the Roman name for garlic; sativum means "cultivated" in Latin.

Origins: It is believed that garlic originated in the mountains of Central Asia (Kazakhstan, Uzbekistan and Turkmenistan). It was found wild in the Altaic Mountains of Siberia and also



much closer to Europe in the southern part of the massive Ural Mountains, near where the Volga River meets the Caspian Sea.
Garlic's single character in Chinese, pronounced "Suan", indicates its ancient introduction into China, probably by the nomadic Mongols. Early Crusaders thought garlic was native to the Mediterranean because it was depicted on the Egyptian pyramids. It was part of the food supplied by the authorities to keep the builders strong and healthy.

Description: Flat leaves emerge from the clove. Later a stalk appears and grows to sixty cm, ending in infertile flowers. In cold weather the greens die back and the cloves are ready for harvest. Any unharvested cloves sprout again in warmer months. Garlic is more closely related to the leek than to the onion. What we call Levant or Elephant Garlic is botanically a leek.

Cultivation: Most garlic varieties need the lengthening of the days to start forming cloves, unless they are day-neutral like some newly bred cultivars. In Latin countries, braiding the tops is believed to prevent pests entering the bulbs.

Propagation: True garlic is propagated vegetatively as it is hardly ever recorded as producing fertile seed. When the whole plant turns brown, pull it out, leave on the soil for a few days if the weather is dry, and then cure in a shady, airy place to prevent mildew or rot.
At planting time, break the cluster into cloves and plant the larger side ones. One kilogram of cloves will give around 250 plants. To conserve as much genetic diversity as possible, the French National Museum of Natural History – which is in charge of plant genetic resources – recommends that its scientists collect as many as fifty of the best side cloves all from different plants.

Usage: Before peeling and chopping, squash the cloves with a wide-bladed; this brings out the flavour as well as making the cloves easier to peel. The heads are very succulent if roasted whole in a cast iron pot or thrown in with other vegetables in a roast dinner.

Widely acclaimed as a toner for the heart muscles, and as an antiseptic. Various studies have confirmed that garlic lowers blood pressure, prevents clots and dissolves cholesterol. It is beneficial for people with varicose veins, haemorrhoids and arteriosclerosis.
To lessen arthritis, an older friend of ours soaks thirty grams (an ounce) of grated, home-grown purple garlic in half a litre of neat alcohol, such as vodka, for one month. Six drops are to be taken for six weeks before each meal. The Russians are reported to have flown 500 tonnes of garlic into Moscow in the mid 1960's to combat a flu epidemic.
It is also said to be an aphrodisiac, although both parties should indulge because garlic breath does tend to repulse! Parsley and ginger are antidotes for garlic breath.

On the Lookout: Small Purple Mexican and the many Asian varieties are most suitable for warmer climates. Italian Purple, Californian Late and Early and South Australian White have a lot of flavour but small cloves. New Zealand Purple garlic has a small number of very large cloves, is early and is strong flavoured. There is a type of garlic that is called "artichoke" because the free standing cloves around the main stem look like the scales of the globe artichoke. The advantage of this type is that cloves can be harvested one at a time. In their sub-tropical organic market garden, Barbara and Larry Geno grow the early maturing Glenlarge which is day length neutral, bulbing up irrespective of the number of daylight hours.

GARLIC CHIVES

AMARYLLIDACEAE

Allium tuberosum – literally "tuberous garlic" in Latin.

Origins: Southeast Asia.

Cultivation: Very easy to grow, garlic chives are seen mostly in sub-tropical gardens in Australia and the North Island of New Zealand but will grow also at higher latitudes. Like most Chinese plants, garlic chives work hard for you and are worth any space they take. As they are a perennial they need be planted only once, picked often and divided about once every two years.

Propagation: Root division is the fastest way to multiply garlic chives. Give the green tops a "hair cut", lift them, trim their roots and separate the rhizomes with a sharp knife. Each rhizome can then be replanted.

Saving the Seed: When the seed heads, which are smaller than those of onions, start going brown and showing their black seeds, they can be bent and shaken into a paper bag at random. A visit every few days should get most of the seeds harvested. They do not cross with common chives or other Alliums (onions and company).

Storage: As with other Alliums, seeds will remain viable for only a year. There are 250 seeds to the gram.

Usage: The leaves are cut just above the sheath. This can be done until the new leaves have become too narrow to harvest. It is then time to renew the plantation by dividing the crown and replanting.
Green flower buds are sometimes seen in Chinese shops, sold by the bundle. In Java, "toompi" is made by deep frying small bunches of them in rice batter. Garlic chives lose their fine flavour when stewed.

The liquid in which garlic chives along with hen's feathers has been simmered is used to relieve dermatitis. The fresh leaves are chopped and mixed with borax and applied to relieve tinea (Chang Chao-liang et al, *Vegetables as Medicine*, 1989).

On the Lookout: In addition to the common white flowering garlic chives, there is a blue flowering one with stronger flavoured leaves. It seems that Vietnamese gardeners have several thin, small-leafed varieties. Frank Hay, of Lismore NSW, has garlic chives from his father who acquired them from a Chinese man when he was the station master at Emu Plains, near Sydney, in the 1930's. The family took this variety with them whenever they moved to new postings.

GINGER

ZINGIBERACEAE

Zingiber officinale – Greek for "horn-shaped roots" and officinale is Latin for "the apothecary shop".

Origins: Asia.

Description: Although the rhizomes of ginger are commonly seen in shops, not many people have seen the plant. It grows to about a metre and has alternate thin leaves sticking out horizontally from a thin stem.

Cultivation: Ginger is a warm weather crop that is harvested in winter after the leaves have died down.

Propagation: In spring, when the ground has had a chance to warm up, take ginger rhizomes and cut them into their natural sections. Allow a few days for the cuts to heal and then plant them in rich soil. The shoots will appear in a few weeks and during summer will attain full height. Eventually a green flower head will emerge. In the sub-tropics and tropics, harvest time is about eight months after planting.

Usage: Ginger should not be overdone. It is best crushed and added towards the end of cooking. In stir-fries it is mixed with garlic which is its "opposite" plant. Some ginger root (peeled) in a pot of tea, or even a few sips of ginger beer, neutralises garlic breath. Robin Osborne taught us to keep ginger in a screw top jar of lightly vinegared water.

On the Lookout: There are many different species of Zingiberaceae. The seeds of the bright red pods of *Aframomum* spp. were widely used as the spice, Paradise Pepper, in Europe when pepper itself was not easy to obtain.
Cardamon *(Amomum* spp.*)*, also closely related, has seed-pods that are used in Indian curries and Arabic coffee.
Laos *(Alpinia galanga)* also called Galangal, is cooked with chicken in Southeast Asia and was one of the main rare spices in the early spice trade along with nutmeg, cinnamon and cloves. These plants all do well with little care in the understorey of our old Permaculture gardens in northern NSW.

GOURD

CUCURBITACEAE

Lagenaria siceraria – from the Greek lagenos for "flask", referring to the shape and the use of the fruit, and from the Latin sicera, "intoxicating drink"

Origins: Ethno-botanists are reluctant to commit themselves on the origin of gourds, perhaps because they can drift around on ocean currents for a year and still contain plenty of viable seeds (Mordecai, 1978). Cultivation is recorded as ex-

isting in Mexico 5000-7000 BC, in Peru around 4000 BC, in Egypt around 3500 BC and in China in the first century BC.

Description: There is confusion over the name "gourd", because some other Cucurbits are sometimes called gourds, such as the Wax Gourd *(Benincasa hispida)*, the Fig-Leafed Gourd *(Cucurbita ficifolia)* and the Guada Bean, Snake Gourd or Guada Gourd *(Trichosanthes anguina)*. There are separate listings for these. Some decorative "gourds" such as the Spoon Gourd with green stripes are actually a *Cucurbita pepo* (*see* Squash). Here we are dealing only with the night-flowering Lagenarias, the hard-shelled gourds.
The leaves are large, round and as soft as velvet and they emit a particular musky odour when bruised. The white flowers open at night and last no more than twenty four hours. When young, the fruits are soft and somewhat hairy but become hard and brown when ripe for seeds.

Cultivation: Gourds are most suited to the tropics and sub-tropics, although they are reported to grow in Tasmania where they are started early indoors. They are planted in spring in a well prepared hole next to a trellis, tree or fence.

Saving the Seed: As with pumpkins, there are separate male and female flowers. Collectors will have to hand-pollinate the white flowers in the evening if more than one variety is grown within a 400 metre radius (*see* Section Eight). Gourd varieties in the Lagenaria species will cross-pollinate with each other, but will not cross with other Cucurbits. Gourds rely on moths and other night insects for pollination.
Pick gourds when they sound hollow with a tap, when their stem changes from green to brown, or even later, when the vines dry out. When the seeds rattle inside, they are ready to be removed. Cut the gourd near its top and shake out the seeds. A little rubbing between the hands frees the seeds of the bits of dry flesh. They will need very little further drying.

Storage: The seeds have a very particular shape: angular and flat, with a beige colour. They last at least five years stored in a paper bag or in the gourd itself, its natural container. There are thirty seeds to the gram.

Usage: The thin-shelled types should be eaten young, and are relished by the Chinese. They are also eaten by the Zulus and the Xhosas of Southern Africa with their "mealie meal", porridge made of ground white maize.
The hard-shelled types are the best for making into vessels. In the Kalahari Desert of Africa, where plastic and glass are rare – remember "The Gods Must Be Crazy" and the infamous soft drink bottle? – calabashes are indispensable. They are widely used throughout Africa as a vessel to hold and to sour milk.

Gourds and their seeds are used to make musical instruments in many countries: the sitar in India, drums in Hawaii, flutes in Ecuador, rattles in the Caribbean and mouth organs in Burma. The ease with which they can be worked, their light durability and their soft silver lining lends gourds to all manner of crafts such as lampshades and decorative containers. Carolyn Mordecai has written a detailed book on the subject (*Gourd Craft*, 1978).

The Dani men of the West Papuan (Irian Jaya, Indonesia) highlands use gourds as penis covers.
Seed Savers has received over two dozen types of gourd, mainly from Queensland and the Northern Territory, including the Trumpet Gourd, many Bottle Gourds and the Goose Neck.

In parts of Vietnam the bitter seeds were used against intestinal worms. A decoction of the leaves is used in hepatitis cases to relieve jaundice.

On the Lookout: There are many shapes and sizes of gourds, including the Curved Long Neck, the squat, thick-skinned Calabash from Africa, and the subspecies *longissima* which is the Long Handled Dipper.
Common names that persist among older folks in northern Queensland are New Guinea bean and New Guinea gourd. These names seem to be reserved for the thin-skinned gourds that are better for eating. In Maitland, NSW, John Van Tol grows and sells seeds of many exciting gourds and runs the Australian Gourd Society.

Before you choose what seeds to save, see Simplicity Rating page 51.

GRAMMA

CUCURBITACEAE

Cucurbita moschata – cucurbita means gourd in Latin; and moschata "musk-scented".

Origins: When the Spaniards colonized the Americas, the Calabaza squash, a kind of gramma, was ordinary in Central America and the north of South America but virtually unknown elsewhere. Today it is common in all tropical places. It is very popular in Japan; in the USA it is the major ingredient of the famous Thanksgiving pie.

Cultivation: Grammas like a head start in life, grow up quickly and manage to look after themselves when only six weeks old. Plant six to twelve seeds in a ring directly, into very rich soil, where the plants are to grow and thin out the seedlings to leave only one or two strong ones.

Description: Butternuts, grammas and trombones are in this group and will cross with one another. This group of pumpkins can be distinguished from the other three main groups of pumpkins because the leaves often have white patches; the stems of the fruits are smooth, five-angled and flared towards the fruit; and the small seeds are long and thin, not as plump as those of members of *C. maxima*, such as the Queensland Blue (*see* Pumpkin).
Grammas tolerate higher temperatures than pumpkin and squash *(C. pepo)*. *C. mixta* was previously classified as *C. moschata* but is now a species on its own. Its grey, gritty seeds are ridged around the edges. Some of the Japanese pumpkins are in this group.

Saving the Seed: See Section Eight for how to hand-pollinate in order to avoid two grammas crossing. Choose the most vigorous plant and reserve the first few fruits for seed. Pick as for the table when the vines dry out. Store for at least another two weeks for the seeds to become more plump.
Cut open the fruit, select the ones which have a small cavity, and therefore more flesh, and scoop out the seeds with a spoon. Place in a bowl of water and rub the mass between the hands. Slowly the seeds and pulp will separate. Any empty seeds will float and should be discarded. Wash clean in a sieve with running water.
Dry for a week or two on greaseproof paper, or on a sieve, making sure mice do not have a feed. On a dry day, store in a tin or glass jar and, as always, record as much information as possible about the variety.

Storage: Seeds will last two to four years with no special care, and ten to twelve years in a cool, dry place. Seeds kept in old tins in shady sheds have been known to be viable after many years. There are four or five seeds to the gram.

Usage: The best pumpkin pies are made of gramma. The small butternuts lend themselves to being baked whole.

On the Lookout: Look for Tahitian Squash, American Cheese types, trombones, grammas and butternuts of many shapes, tastes and textures. Many Queensland farmers have kept a preferred strain of gramma alive as an integral part of their culture. Fodder gramma has a large cavity with plenty of seeds and these, along with mulberry leaves, seem to relieve intestinal worm problems in horses.

GUADA BEAN

CUCURBITACEAE

Trichosanthes anguina – from the Greek trichos, "hair" and anthos, "a flower", referring to its dainty flowers; anguina is Latin for "snaky".

Origins: It is native to India and northern Australia.

Description: A quick growing annual twiner. The flowers are white and dainty; the seeds are large, light brown, gritty and resemble stones. The fruit will grow up to one metre long, the skin getting harder as it gets older.
It is called the Serpent or Snake Gourd, but it is not a proper gourd *(Lagenaria)* although the fruit is similar in appearance. Nor is it a bean of the Leguminosae family, but a Cucurbit.

Cultivation: Guada bean requires a long growing season. *The Queensland Agricultural and Pastoral Handbook* of 1961 lists it as a miscellaneous vegetable and devotes a page to it. It has fruited in the sub-tropics in our gardens. A stone can be tied to the base of the fruit to straighten the long fruit.

Saving the Seed: Guada beans will not cross with other Cucurbits nor with *Lagenaria* gourds. Leave the fruit far beyond the edible stage and process like a pumpkin. Open it longitudinally and scoop out the flesh-covered mass. This must be left soaking in water for a day; then extract the seeds by hand. Dry the seeds out in the open for a week or so, and then leave them hanging in a paper bag for another week, before storing in a jar with the name and date of harvest.

Storage: The distinctive seeds will last a year or two and there are about six to a gram.

Usage: Pick for the table when thirty to sixty cm (one to two feet) long, before the seeds harden and the flesh becomes puffy. Herklots (1972) says, "Young fruits peeled and steamed make an excellent vegetable, more nutritious than most other gourds."

On the Lookout: Mackay Organic Growers' Group has sent Seed Savers an exceptional striped variety. There are many other edible *Trichosanthes* including Australian ones, whose roots the Aborigines eat.

HIBISCUS SPINACH

MALVACEAE

Abelmoschus manihot [Hibiscus manihot] – hibiscus is from the Greek for "marsh mallow"; abelmoschus is the Arabic for "musky seeds" and man-ihot is the Brazilian name.

Origins: Tropical Asia; a favourite with Pacific Islanders.

Description: A short-lived perennial growing to a two metre high bush and producing lots of shoots that are eaten as a spinach.

Cultivation: A hardy plant that thrives when it is warm and wet. Keep it plucked so that tender shoots keep coming. It has self seeded in our gardens.

Propagation: Some varieties are only propagated by cuttings.

Saving the Seed: Hibiscus spinach's cheery yellow flowers come out in succession all summer and soon fall off. The seed capsules readily form. Care must be taken when removing the seeds, as the capsule is rough and prickly. The medium-sized, dark brown seeds are dry when the capsules have turned from green to brown.

Storage: The seeds last three years or more and there are seventy to the gram.

Usage: Useful as a spinach in warm regions because it is easy to grow and prolific. Harvest the young leaf shoots and throw them into the pot with other spinaches.
Acquiring the taste for a new vegetable takes time. We have found that the mixing of the unfamiliar with the familiar works well with our children and with guests. If this is a new plant for you, cook hibiscus spinach with silver beet.

A coffee substitute is made from the roasted seeds.

On the Lookout: Pacific Islanders may be happy to share their strains with you. There is a form of hibiscus spinach native to North Queensland and the Fijian people in Brisbane have several improved cultivars that are also perennial and are propagated by cuttings. They call them Ibika. There must be a nice collection amongst Islanders in New Zealand.

HYACINTH BEAN

LEGUMINOSAE

Dolichos lablab var. ***niger*** – dolichos is Greek for "long"; lablab is the Egyptian name adopted by Linnaeus; and niger stems from the Latin for "black", referring to the colour of the seed.

Origins: Egypt. Now found in many tropical parts of the world.

Description: Also called Bonavista, Seven Year Bean, Garden Lablab and Poor Man's Bean, it is related to the green manure and fodder crop of lablab but this garden variety gives a wider bean and has no tough parchment inside the pod. The dry seed comes in black, dark and reddish brown with a long white hilum, or strip, on its side.

Cultivation: Hyacinth bean needs a very strong trellis or a fence on which to grow. From the first year, it will flower heavily and bear pods for several months. The vine will last for about five years in warm climates. Its leaves die back in the cool of winter.
It can grow in cooler areas but has a shorter life span. It grows even in Mudgee, NSW where it is treated as an annual because of the frost. Seed Savers' subscribers grow it in Perth, Adelaide and in many parts of Queensland.
In Brisbane the plant has been seen growing wild, sharing a fence with bitter gourds and the Madagascar (lima) bean, which is also perennial. This legume tolerates drought and poor soils. It is, we believe, uncommon in New Zealand, but it would be worthwhile finding local sources and multiplying them.

Saving the Seed: The large vine gives clusters of perfect (both male and female parts in one), insect-pollinated flowers looking like a hyacinth. Each flower produces a pod containing four to six beans. The plant does not seem to lose production when pods are left to go to seed, as happens with some green beans.
In wet weather it is worth harvesting the dried beans as soon as the pods have shrivelled and look light brown. Left on the bush for too long in rainy weather, the bean seeds will turn mouldy. If they are picked at the right time, the beans will not need any further drying and can be stored in a clean moisture-less jar on a dry day.
Storage: In arid regions, beans are stored in cotton bags and are expected to last for a number of years if they are not eaten by weevils. To kill weevils, the beans should be frozen in a jar for forty eight hours after they are completely dried and then coated in edible oil.
The seeds last for three to five years and are a little larger than most french beans.

Usage: Pick the immature pods when the seeds are just visible through them. If the "snow pea" stage is past, it is still possible to eat the green bean, but not the pod which will have grown hard and stringy.
In Bali and Java, the green beans are eaten raw with rock salt. The young shoots and flowers are eaten raw or steamed. In Indonesia the dried seeds are pounded, cooked and eaten as a delicacy, or eaten cooked together with rice. In Mozambique they are eaten with pounded peanuts.
Stir frying at the "snow pea" stage is the quickest way of eating them. Only a few minutes cooking

is needed, as they tend to go floury when even slightly overdone. Worth experimenting with; these seeds are so precious that they should be passed on immediately to other "avant-gardeners".

On the Lookout: There have been a dozen types of hyacinth bean sent to Seed Savers mostly from Queensland and nearly all have black seeds. One from Victoria has brown seeds, and two tropical types have dark brown seeds speckled with red. In Malaysia there is a variety called Kachang Kara Puteh which has pale yellow pods, white flowers and white seeds. The colours of the flowers vary from white through pink to purple, and the pods vary in colour too.

JERUSALEM ARTICHOKE

ASTERACEAE

Helianthus tuberosus – from the Greek helios, "the Sun", and anthos, "flower"; tuberosus means "tuberous" in Latin.

Origins: Native to North America, Sunchokes, as they are also called, were first eaten by the Amerindians and are a close relative of the sunflower. It is recorded that Europeans first used them in Massachusetts in the 16th century and took them back to Italy where they were used as pig fodder and to make alcohol for soldiers. The very prolific young tubers are now regarded as a delicacy, but were considered then as poorly-flavoured food, to be used only in hard times.

Cultivation: Jerusalem artichokes are hardy plants to grow. They can be assigned a corner of the garden and left to do their own thing there. They will even double as a good windbreak.

Propagation: Usually they are propagated by the tubers, which are stored over winter and planted again in spring. The tubers cannot actually be stored dry or they will shrivel and quickly die. In places where the ground is frozen too hard to dig in winter, tubers for eating purposes must be stored in damp sand. However, Jerusalem artichoke tubers are reasonably frost-hardy in the ground.
They will need to be dug, divided and replaced each year to maintain large tubers. The most desirable tubers to select from are the less knobby ones, as they are easier to clean and peel. So replant only the tubers that conform to shape.

Saving the Seed: Seeds may be saved from the flowering heads but only in warm climates where there is a season long enough to produce seeds. Further selection can be done, but the progeny will vary. In Western Australia, a gardener found six seeds in a seedhead, grew them out in the garden and was astute enough to select a particularly productive variety (*International Permaculture Journal*, March 1990).

Usage: Jerusalem artichokes make good soups and are appearing in gourmet restaurants. Raw, they are a crunchy, tasty addition to salads and are used as a substitute for water chestnuts.

Jerusalem artichokes help the secretion of milk for lactating mothers and also facilitate the functions of the intestines.

On the Lookout: Look out for good varieties in local grocery stores and in garden clubs. The "fuseau" (spindle) type is easy to peel as it is rounder and less knobby. Some fodder types are not delicate enough for human consumption.
H. maximilianii is a perennial, grown for its thin but tasty roots.

KALE

BRASSICACEAE

Brassica oleracea var. ***acephala*** – brassica is simply the name used by the Romans for cabbage, and oleracea for "vegetable-like"; acephala means "without a head" in Greek.

Origins: Kale is the closest plant to the ancestor of the cabbage, the sea kale *(Crambe maritima)* that still grows wild along the coasts of Europe.

Description: It is a biennial of very ancient cultivation. It was not developed for its flowers, like the cauliflower and the broccoli, nor for its heads like the Savoy cabbage, but for its profusion of leaves. It is open-hearted like collard and borecole, but generally has frizzy leaves.
This is the hardiest of all the Brassica and will stand the most severe frosts. Some varieties attain a height of nearly two metres while others, such as Labrador kale, produce a low mat of curled shoots.

Before you choose what seeds to save, see Simplicity Rating page 51

Cultivation: Kale needs more space than cabbage, but, because it is so decorative, productive and nutritious, it is still worth growing even in small gardens.

Saving the Seed: Kale will cross with all the cabbages, broccoli, cauliflowers, Brussels sprouts and kohlrabi if flowering at the same time. As a biennial, it flowers in its second year. Keep more than one plant for seeds because of self-incompatibility.
A yellow mass of flowers tops the hefty seed stalk. Harvest the tubular pods when they are brown and the spherical seeds rattle. Lay them on a canvas to dry. A light stamping with the feet and rubbing with the hands will dislodge most seeds. Store in cool and dry conditions.

Storage: The seeds should last for four years and there are 250 to the gram.

Usage: Kale is one of the few hardy winter greens available for very cold areas and is popular in England, but it will grow in the subtropics.

On the Lookout: Considering the many types of kale that have been bred, comparatively few have survived. Look for Dwarf Blue, Cottage, Moss Curled, Asparagus and Russian kales. The Siberian types, which have slightly curled foliage, are considered to be the most hardy of all. The Dunedin area in the South Island of New Zealand is a rich source of family heirloom seed stock. Collard, kale and borecole ("Listivaia Kapousta" in Russian) are all early forms of leaf cabbage.
What the English called "Buda Kale" (Tall Fodder Cabbage, Walking Stick Cabbage, Palm Tree Kale) and the Germans "Schnittkohl", was a fodder cabbage very useful for the small farmer. They are ideal to grow beside the chook yard or next to the dairy so that the individual leaves can be picked and thrown over the fence. In Britanny, which many locals consider a French colony within France, villagers still have neat blocks of Chou-mollier, their stems denuded by the constant plucking of leaves for their animals.
A seed saver, Tony Vlatko, sent us the seeds of a leaf cabbage called "Zeye" that is a pure landrace from the island of Korcula near Dubrovnic (Dalmatia), in the former Yugoslavia, where he was born. He says that very few insects worry the plant and that it is very drought-hardy. It grows to one and a half metres high and is eaten with potatoes and salted pork. Very filling! In his old village only a dozen plants have to go to seed to supply the whole district. They have done so for centuries and let us hope they will continue. The variety is now grown by many seed savers in Australia.

KOHLRABI

BRASSICACEAE

Brassica oleracea var. ***gongylodes*** – brassica is the name used by the Romans for cabbage, and oleracea for "vegetable-like"; gongylodes means "round" in Greek.

Origins: Europe; kohlrabi was selected from the cabbage only about five centuries ago, when it was recorded as being in cultivation on the continent, the English taking a shine to it three centuries later.

Description: Kohlrabi looks more like a turnip than a cabbage. The size of the swollen stem, which is the edible part, ranges from that of an orange to nearly that of a soccer ball. The skin may be light green, or purple, or reddish.

Cultivation: Plant in autumn in warmer climates and spring in cooler climates. It must be grown fast and harvested just as soon as it reaches full size.

Saving the Seed: Like the rest of this family, kohlrabi will go to flower in the second season, producing a dome of yellow flowers. When this happens the actual edible part empties itself. The plant will cross with other Brassicas with the botanical name *B. oleracea*.
Several individual plants should be kept for reasons of diversity and for pollination purposes. The pollen needs to be carried by an insect from a flower on one plant to another flower on another plant. Pollen is not acceptable to other flowers on the same plant.
Harvest the seed when the pods are brown and crisp. Thresh on a canvas as for broccoli and cabbage.

Storage: As with most of the cabbage family, the seeds will last from three to five years in dry storage. There are 250 seeds to the gram.

Usage: Kohlrabi can easily become stringy when left for too long in the ground. Steam the young ones and eat with butter.

On the Lookout: Artichoke Leaf and Blue Delicatesse. The Chinese have adopted this vegetable and developed a good many strains and recipes.

KORILA

CUCURBITACEAE

Cyclanthera pedata – from the Greek cyclos for "circle", anthos for "flower", and pedatum, Latin for "with feet".

Origins: Highlands of Central and South America.

Cultivation: Plant in the warm season near a strong support.

Description: Also called Achoa, this relative of squash is a luxuriant trailing vine suited to tropical and sub-tropical areas. It sets fruit when the days become shorter, i.e. after the summer solstice. In a small garden, korila is better grown on its own short, strong tripod than on a large trellis, because it would simply take over the trellis.

The fruits resemble small hollow gourds and taste similar to cucumber but are of a drier texture. Their flavour has been compared to that of globe artichoke. Besides their native Bolivia, Peru and the Caribbean Islands, korilas have reportedly fruited well in New Zealand, Nepal, southern France and even in England in a greenhouse.

If you are growing them successfully in extreme climatic conditions, send news to Seed Savers. We will pass on your information through the Seed Savers' newsletter, and your seed through the International Permaculture Seed Exchange.

Saving the Seed: The black turtle-shaped seeds can be removed from the fruit easily and should be dried for one week. If korila fruit are left on the vine and the seeds go to full maturity, they tend to self-seed, and the seedlings will need thinning out. In an unattended garden the vines would eventually smother other plants. Korila does not cross with other Cucurbits.

Storage: The seeds will last two to three years and there are about thirty seeds to the gram.

Usage: Pick young and cook quickly in stir fry. Korilas can also be stuffed with mincemeat or rice and baked. They are apparently eaten raw in South East Asia (Herklots, 1972).

On the Lookout: A lot of the lesser known South American vegetables grown only at the village level are found in Australia. In Brisbane we had the pleasure of meeting a Colombian, Graciella Gonzales, who has korila trailing over her mulberry tree.

LEEK

AMARYLLIDACEAE

Allium ampeloprasum var. ***porrum*** – allium is Latin for garlic; prason is simply the Greek for leek.

Origins: Native to Europe and western Asia, having been cultivated since ancient times.

Description: Leeks look like fat spring onions with flat leaves. There are two forms: those propagated by seeds and those by offsets, which are known as multiplier leeks. The Levant or Elephant Garlic belongs here botanically, but only its swollen base is used. It is usually propagated by replanting the cloves.

Cultivation: Leeks for transplanting have to be trimmed of long roots and leaves. They prefer a rich, cool soil. Because they need to grow fat and fast, leeks sold in shops will have been fertilized heavily, but don't dig too much manure into your soil lest you, too, end up with a leek full of nitrates.

Propagation: The multiplier leek is by far the easier to propagate. You simply divide each clump at harvest, taking care that there are roots on each small leek. Trim the roots and leaves, and replant.

Saving the Seed: Leeks are biennial, have perfect flowers and will cross with other leeks but not with other Alliums. If you have the seeding variety, it will go to seed in the second year. The 1.2 metre high flower stalk is very much like the onion's. It will not, however, need staking. When most of the little flowers on the head are open, showing black seeds inside, it is time to cut off the heads, and gently place them in a paper bag. Rub the heads when fully dried, blow the debris away, store and label. Leeks that have flowered also have bulbils at the base of their stems, which grow faster than seed.

Storage: The seeds are somewhat triangular and irregular. They are similar to those of the onion, only smaller. They will last two to three years, a little longer than onions. In Algeria, farmers leave the seeds on the umbels for storage. There are 400 seeds to the gram.

Usage: Cleaning leeks for eating can be done easily by inserting a knife where the green leaves begin and slitting upwards to the end of the leaves. Fold back each half leaf and run the leaf bases, where soil accumulates, under the tap. The word "porridge" comes from a thick vegetable soup with a leek base.

Wonderful sauces can be made with leeks – they go beautifully with butter, mustard and white wine. Leek and potato soup, leek mornay, leek stew, baked leek, piquant sauces on a leek base – one salivates when even discussing leeks. Hail to the queen of winter vegetables!

Efficacious for those who find garlic and onions too strong. Leek is excellent for cleaning out the bowels.

Taken in the form of a tea, the small roots and the very bottom part of the leek help to facilitate the passing of urine – the real derivation of "having a leek"?

On the Lookout: Old named varieties include Scotch Flag, Cannell's Mammoth, and Eel-head leek with its pale grey leaves. The multiplier leek is late to go to seed, therefore producing for longer, and has the advantage of being a perennial in the garden.

LEMONGRASS

GRAMINEAE

Cymbopogon spp. – cymbo means "boat-shaped" and pogon "beard" in Greek.

Origins: Asian highlands.

Description: Lemongrass grows in clumps. The fountain of thin strap-like leaves is decorative in the garden and useful as a weed barrier around garden beds. Its leaves contain a volatile oil.

Cultivation: Lemongrass likes full sun but recovers from light frost. It even grows, in a warm spot, in the southern Snowy Mountains. It is a hardy plant that only needs water when it has been transplanted.

Propagation: Well-established clumps of lemongrass can be dug up for propagating. Cut off the leaves just above the sheaths and divide the clump into individually rooted plants. Trim off the long roots in preparation for planting. If you are making rows as a weed barrier, plant them about thirty cm apart. The roots and bases of the stalks should be firmly embedded in the soil and the water kept up to the young transplants for a few weeks: obviously a job for the wet season.

Usage: We make a knot of the leaves and place it on top of rice to flavour it while steaming. The white centres of the sheaths are either chopped or crushed whole and included in Southeast Asian cuisine.

Lemongrass tea has antiseptic qualities for the stomach and intestines. Knot or chop, dry or fresh leaves, pour boiling water over them and leave to infuse for five minutes to make a tea.

On the Lookout: Apart from the common lemongrass, there is a wide-leafed variety that has bigger sheath centres and is favoured by Thais.

LETTUCE

ASTERACEAE

Lactuca sativa – from the Latin lac for "milk", referring to the white sap, and sativa for "cultivated".

Origins: The origin of cultivation dates from early days in the temperate parts of the Caucasus (Azerbaijan and Georgia), in Kurdistan, Kashmir and Siberia. The Romans grew a pointed, narrow-leafed Cos just like the Rabbit's Ear lettuce that we know today. It was only in the 16th century that the head lettuce was described for the first time. The Great Lakes types were developed only in the early 1940's in the USA, Australia and New Zealand. A recent collection of traditional varieties in Egypt provided the genes of resistance to mosaic virus for a lettuce breeding programme.

Description: Imperial 815 was just about the only lettuce available at the greengrocer's until recently, but a significant number of gardening gourmets are demanding a great deal of variation in size, shape, colour and texture of their lettuces.

Cultivation: Lettuces need to grow fast, with adequate water. In the hot Australian summers, they do better and are more tender under a shade cloth or a bush than in the full sun. To ensure that Romaine lettuces heart up, it is best to grow them close to each other. Tender hearts can also be obtained by binding the leaves halfway up.

For cool areas with a short growing season, crisphead types will have to be started in a hot house to become mature enough to produce seeds. It seems that the most interesting lettuces today – e.g. Butter, Oak Leaf and Frilly Red – are nurtured like bottle-fed babies.

Regarding hydroponics, Allen Gilbert in *Yates Green Guide to Gardening* (1991, facing page 28) writes:

> There are no commercial organic liquid feeds available for hydroponic fruit and vegetable production, but many home gardeners are using home-made mixtures of liquid organic manures, liquefied blood and bone, and seaweed products in an attempt to find an organic substitute for chemical fertilizers.

Saving the Seed: Saving the seeds of lettuces is simple and we recommend that beginners start with them. If you leave a lettuce unattended for long enough it will run to seed and in a short time will self seed. It is that easy.

Lettuces are self-pollinating, but all the same a very small amount of natural cross-pollination occurs – from one to six percent when two varieties are grown side by side. A two to three metre barrier or a tall crop between different varieties flowering at the same time is sufficient to reduce the crossing to zero. However, wild or prickly lettuce (*L. serriola*), especially in parts of Victoria, is a possible source of contamination that would ruin future strains of lettuce growing nearby.

Early bolters are not usually kept for seed unless that is all you have. The habitual selection of these will produce a sub-variety which will tend to give smaller heads for a shorter period.

From the edible stage when you normally harvest for the table, it takes two months to bring the crop to the ripe seed stage. The yellow-flowered seed stalks often need staking and the seeds can easily be dislodged. They ripen progressively and when two thirds of the flowers are turning fluffy white, like thistles do, the plant can be cut and put out to dry on a large sheet of paper.

The first seeds which ripen on the plant are said to be the best fed, plumpest and most suitable for seed stock. In wet climates, seeds may have to be harvested between rains. We have found the whole plant can be harvested early by hanging it upside down. The seeds will ripen as the thick stem continues to supply the necessary nutrients.

Heading types may need help to produce seed. They may need to be lanced in a vertical cut to half way down, or the leaves peeled back or crunched off, to enable the stalk to emerge. The seed stalk would otherwise curl inside the head.

After a complete drying, seed heads are rubbed persistently between the hands until the thousands of little capsules pop open. Three quarters of the mass you will obtain will be chaff and white "feathers". Put the raw mixture in a large bowl and shake. The lighter material will come to the top and can be picked out with the fingers or blown with restraint. Sieving with a small gauged mesh will give a reasonably clean seed. The seeds are flattened long ovals with pointed ends; they are black, brown or white. A good plant will yield up to 60 000 seeds.

Storage: When stored in the best possible conditions – dry, cool and dark – lettuce seeds will remain viable for up to five years. Otherwise they will lose up to fifty percent viability in just two years, and ninety percent in three years – especially in the tropics. There will be about 1000 seeds to the gram.

Usage: Eliza Acton included only one method for preparing lettuce in her mid-19th century cooking tome: boiled whole for thirty minutes, drained, chopped and refried with butter, then gravy with a little lemon juice added at the end.

Before you choose what seeds to save, see Simplicity Rating page 51.

Surely a recipe for disaster! Perhaps lettuces were coarser in texture then.

Delicious mixed lettuce salads are made with torn pieces of well-dried leaves that are tossed in vinaigrette the moment before serving. Mesclun is a southern French salad of young seedlings of mixed lettuces, rocket, sorrel, fennel, parsley, chicory, endive and so on, that are planted and harvested together.

Because of its high cellulose content, lettuce dressed with olive oil greatly helps chronic constipation. Its lactucarium content relaxes nerves and is reputedly a soporific – remember those sleepy bunnies in the Beatrix Potter books?

On the Lookout: Lettuce can be divided into four types:

- *Heading Crisphead Lettuce* or cabbage lettuce, are the "Lakes" varieties: Great Lakes (uniform and widely adapted), Pennlakes (large slow bolting), Imperial types and all the Iceberg types (the original Icebergs had a red tinting on their leaves). They have a coarse mid-rib, quite brittle foliage and a tight white heart. They are slow bolters in hot weather.

  May King has white seeds and is light-green with red tips. Webb's Wonderful, which has a fine distinct flavour, is very large and is slow to bolt. These are summer varieties with an English origin that are now offered in the Seed Savers' newsletter by the subscribers themselves.

- *Heading Butterhead Lettuce* are smaller than the crisphead with a softer heart and soft-textured leaves: Tennis Ball and Tom Thumb are butterhead varieties that indicate their small size. Their inner leaves blanch to a golden-yellow and include the small mignonettes, which are suitable for warmer climates. Other varieties are Matchless and All Year Round (A.Y.R.).

  Harold and Alyce from Toukley, near Sydney, have kept A.Y.R. since the 1950's. Harold writes:

  > In my opinion this lettuce is the nicest one ever bred. It is smaller than the Mignonette lettuce, is a quick grower, with brown or bronze tinges on the upper edges, and when it forms a kind of rosette that becomes firm, it is ready for cutting.

Each leaf is rounded without the usual crimping of the edges, and it has a wide crisp rib, that crunches like celery, and is juicy and sweet. The inner leaves at this stage are not blanched white, but attractively yellow. They will not bolt, if planted before Christmas.

- *Romaine Lettuce* or Cos (cylindrical) with an upright growth and rather stiff leaves that can be ear-shaped: Rabbit's Ear, Deer's Ear and Pig's Ear. They can be either hearting or open-hearted. A brown-tipped Romaine lettuce was sent to Seed Savers in 1987 from Proserpine, Queensland. The new leaves are green and the outer leaves are brownish red. It is heat-resistant due to this red pigment which filters out some of the heat from the sun. Hundreds of packets of this lettuce have been distributed.
- *Looseleaf Lettuce*, also called Perpetual or Continuous, has more or less finely cut or frilled leaves like the Oak Leaf types. It usually has a large spreading habit. Plant in a warm position, such as along a north facing wall, to gather heat. Ron and Myrtle Charteris, the seed bankers of Brisbane Organic Growers Group, have strains adapted to central Queensland's arid climate, such as the Darwin Lettuce which forms three heads that can be harvested separately.

Because of their popularity and wide distribution, lettuces have been brought to Australia by many cultures. Greeks and Italians introduced, respectively, the Cos and Romaine. The Chinese brought numerous varieties, including a large, spreading, looseleaf type with red tinges that came in 1860 to the Ballarat region. The seeds of this lettuce were given to Bruce Hedge by an old lady who had kept the lettuce in her garden for a very long time. Bruce sent a sample to Seed Savers who christened it Gold Rush lettuce. It has been distributed to seed savers and is now available from Eden Seeds.

Sydney's Henry Doubleday Research Association keep a Laotian lettuce, a remnant of French colonial days, recently brought into Australia by boat people. The late Dot McNeil sent seeds of it to Seed Savers.

LIMA BEAN

LEGUMINOSAE

Phaseolus lunatus [P. limensis] – phaselos is Greek for bean, and lunatus, Latin for "moon-shaped".

Origins: Large-seeded types were developed on the coastal plains of Peru 5000 years ago.

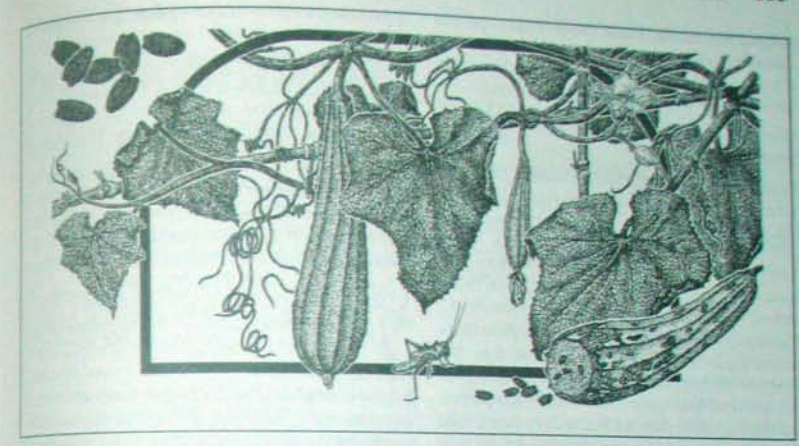
Description: Lima beans are mostly perennial. They flower late in summer and are robust in growth. The small-seeded lima is considered to have evolved about 500 years ago from the large-seeded one. It is a wiry and hardy annual and is called "sieva" in Spanish.

Both small and large-seeded types have bushing and climbing forms, but lima beans are mostly climbers. After one year the plants yield many pods, each having two to four beans. We found a vine growing in wasteland in Brisbane that gave a good bucketful of dry beans.

Cultivation: All limas need a warm soil temperature. They last for several years in the ground in the tropics and sub-tropics, forming thick stems and large masses of leaves. There is usually little production in the first year, but in subsequent years prolific numbers of pods are formed with minimal effort on the part of the gardener. Harvest before they rot on the vine.

Saving the Seed: Limas will not cross with other beans, but small-seeded limas and large ones will cross with one another and need to be separated by one kilometre to discourage insects from doing that. In dry conditions, beans dry in their pods on the vine and split when ready. Do not pick them when the pod is still green but wait for the seeds to rattle.

For the next planting, select the best looking beans from what has been harvested, dry, for the kitchen. The seeds are large, flat and white, or speckled brown. As with all beans, there may be weevil eggs under the skin, so after the beans are harvested and dried well, it is worthwhile freezing them in a sealed container for forty eight hours.



Storage: Limas will last three years if stored in a cool and dark place. One large lima weighs a gram.

Usage: Limas have a creamy texture when picked green-shelled and boiled. Harvested at the end of summer, the dry beans give substance to winter soups.

On the Lookout: Some old varieties may contain high levels of dangerous cyanogenic glucocides, the effects of which can be counteracted with soaking, boiling, draining and peeling off the testa (skin).

Madagascar beans are free of toxic substances and have large seeds that are white with burgundy blotches and speckles. We have seen them growing in many Brisbane front yards on trellises, like grape vines do. This variety was listed in a Yates seed catalogue early this century as an excellent lima for coastal and rather warm areas. Many samples of Madagascar beans have been sent to Seed Savers.

Lima beans come in many colours, indicated by the varietal names: Hopi Yellow, Pima Beige, Red Calico and Thorogreen.

There are cold-tolerant varieties of bush lima beans that mature in just over two months.

LUFFA

CUCURBITACEAE

Luffa cylindrica [L. aegyptiaca] is the Smooth Luffa, and ***L. acutangula***, the Angled Luffa pictured above; the name comes from the Arabic loof.

Origins: Tropical Asia and transported to Arab countries long ago.

The longer a plant has been in cultivation, the more varieties there are. Herklots (1972) writes:

> There is little variation in fruit except in size from a few ounces to a few pounds. This is regarded as evidence either that the plant has not long been in cultivation or that its use until recent times has been restricted to a few purposes.

Description: The Smooth Luffa is also called Vegetable Sponge or Dishcloth Gourd. It is a fast-growing, showy annual climber with leaves that are soft and furry and it has a large fruit with smooth skin containing smooth, oval and jet-black seeds.

The Angled Luffa is similar but with deeply fluted fruits. It is also called Okra Vine, a reference to the taste of its young fruit. Its seeds are black, pitted on the surface and a little smaller than those of Smooth Luffa. The Angled Luffa is more popular than Smooth Luffa in Asian cooking.

Cultivation: Luffa should be planted at the beginning of the warm season and allowed to grow on a trellis, tree, ugly garage, etc.

Saving the Seed: When the fruit dries on the vine, the skin cracks and the seeds are held in the dry fibre. A little shaking gives a bountiful harvest of seeds that are ready for storing.

Storage: The seeds last five years and there are twenty to the gram.

Usage: When very immature, luffa is prized as a tasty vegetable in stir fries, or even raw. Herklots, that great connoisseur of exotic vegetables, said that Angled Luffa was cooked in Hong Kong with meats and added to Ceylonese and Jamaican curries, while in Japan it was dried before cooking (1972, page 328).
The fibrous fruit skeletons are used as dishcloths in the kitchen and as body scrubbers in the bathroom. Even when used daily, the luffa does not get an unpleasant smell and keeps almost indefinitely. For this, pick the fruit when full size, but not dry, and soak it in water, which you should change daily, for about ten days to soften the skin and flesh ready for removal. Bleach the sponge in the sun, or with hydrogen peroxide, as is done commercially.

Luffa is a fun plant for kids to grow and an ideal start to their seed saving lives. Luffa seeds also make a unusual home-grown gift.
The ripe flesh is used in Eastern countries as a purgative.

On the Lookout: Both luffas grow in the North Island of New Zealand, but they are frost tender. Seeds of these are available from groceries in the various Chinatowns, as with many Asian vegetables.

MARIGOLD
ASTERACEAE

Tagetes spp. – Tagetes is from the Greek tage, a grandson of Jupiter.

Origins: *Tagetes* is a genus with about fifty species of strongly-scented herbaceous annuals and perennials native mostly to the Mexican region as well as to Arizona and New Mexico in the USA.

Description: Marigold is a different plant from calendula. *Calendula officinalis*. *Tagetes erecta* is the African Marigold (light yellow to orange), *T. patuta* is the Dwarf French Marigold (orange, yellow, red-brown and parti-coloured) and *T. minutiae* is Stinking Roger. *T. lucida* is the Sweet Mace that the English use as a Tarragon substitute.

Cultivation: Marigolds are very hardy and tolerate both acid and poor soils.

Saving the Seed: Marigolds seeds are amongst the easiest to save. The flowering period lasts a long time and there is constant production of the cylindrical dried seed heads that can be picked for replanting immediately, or for storing away. They can very easily be rubbed between the palms of the hands and only a little winnowing is necessary.

Just like zinnias, marigolds have attracted the attention of plant breeders who have even produced some odourless ones. Some commercially available large marigolds are the result of a cross (a hybridization) between the French and the African kind, so that the seeds saved from them will not come true-to-type and may be partly sterile.
Commercially, the seed heads are gathered by hand in cotton bags and dried in fields on canvas where the climate is dry. Salvia, delphinium, petunia and some pansy seeds are picked in a similar fashion.

Storage: The seeds last two to four years and there are 300 seeds to the gram.

Usage: Another ornamental flower that is edible and is sprinkled on salads.

Marigolds are highly regarded as a deterrent for bean beetles in the garden and in the fields. They suppress grasses in the orchard and are therefore a valuable, multipurpose groundcover.
Stinking Roger is effective when planted with tomatoes or other crops susceptible to nematode infection. Note that it can escape cultivation if it is not chopped before going to seed.

On the Lookout: There are many forms to collect including ones with large pom-pom like flowers.

Before you choose what seeds to save, see Simplicity Rating page 51.

MARJORAM
LABIATAE

Origanum marjorana – Greek for "delight from the mountains" is sweet marjoram. *O. onites* is pot marjoram. *O. vulgare* is wild marjoram, or oregano.

Origins: This perennial can be seen growing wild at the edge of small country roads in southern Europe. It is now naturalized in Mexico where it was transported in the 17th century and has been adopted as part of the Mexican cuisine.

Description: Sweet marjoram was developed from oregano which is a much taller plant. It is a creeping aromatic herb.

Cultivation: Cultivate as for all such Mediterranean herbs. They like a dry summer and a temperate climate. If you are not in such a region, you may create a microclimate imitation, such as in a pot that is sheltered from too much rain, or a rocky, hot spot in the garden.

Propagation: The easiest way to propagate marjoram and oregano is from rooted cuttings.

Saving the Seed: As all the seeds do not ripen at the same time, keep a close watch when the flowers start drying. At this point cut off the seed heads, place in a paper bag and hang in the shade. Later on the flowers can be stripped, sieved and carefully blown or winnowed.

Storage: The seeds will last five years. They are oval and red-tinged. There are 12 000 seeds to the gram.

Usage: The chaff from the seed collecting process can go into the Italian tomato sauce. Oregano is the preferred herb to go with tomato salad in Italy.
Pizza Bianca from Italy is an authentic far-cry from the Pizza The Lot that is home-delivered in a car looking like a telephone. It has a four cm (one and a half inch) thick base with holes punched in its top to hold abundant sprinklings of olive oil, coarse salt and dried marjoram.

An infusion of marjoram flowers is said to prevent sea sickness.

On the Lookout: There is a golden creeping marjoram that is excellent as a potted plant and a variegated variety.
Pot Marjoram is also known as Turkish, Cretan and Rigani and has a strong thyme flavour.
Oregano comes with dark green, silver, golden or variegated leaves and can even be seedless.

MINT
LABIATAE

Mentha species – from the Latin for "mint".

Origins: Europe, Japan.

Description: Mint is a creeping aromatic perennial that likes wet patches. It mounts when it goes to flower.

Cultivation: Ideally, mints should be grown under a tap where they can get extra water, and they are one of those herbs that are essential near the kitchen door, for sprigs in drinks and as garnish. Some gardeners find that mint is invasive, but our experience with numerous species is that they are easily mulched out or can even be used as a living mulch for the vegetable garden.

Propagation: Mints are usually grown from cuttings, which is preferable to seed, because crosses occur easily between different types.

Saving the Seed: The seeds can be harvested after all the flowers open and when the bells are brown and dry. The seeds are extremely small. Once again, a paper bag is useful for harvesting and drying.
Winnowing can be tricky as the seed may blow away with the chaff. The little bits of stalk and petals wend their way to the top with gentle shaking in a bowl. Remove them either with the fingers or with a very fine sieve.

Storage: The seeds will last one year and there are are 40 000 seeds to one gram (or 1.2 million to the ounce!)

Usage: There are many different mints and all are good in pot-pourris (aromatic blends of dry-fermented herbs and spices), including the very strong ones like Pennyroyal. The oil contained in the tiny glands, which are seen under a light as translucent dots in the leaves, can be released in hot baths.
Asians use sprigs of mint to garnish their side salads. For wonderful Moroccan mint tea, pour boiling water over two teaspoons of green tea leaves and garden mint *(M. spicata)* and allow to steep for three minutes. Sugar lumps are added to the teapot.

On the Lookout: Gwen Skinner writes about a Maori mint *M. cunninghamii* or "Hioi", in her book *Simply Living* (1981). It is used by the Maoris in tea to induce sweating. Its round leaves are rather hairy in texture.
Apple mint *(M. rotundifolia)* is soft and furry. The round leaves can be used in pot-pourri and as a ground cover for orchards.
Peppermint *(M. piperita)*, with its sharp pointed leaves, was cultivated by the Egyptians and taken to England by the Romans.
The Eau de Cologne mint *(M. piperita* var. *citrata)* is used in classic perfumes and pot pourris.
In our opinion, Spearmint *(M. spicata)* is the nicest in "cocktails" of herb teas. There is a Chocolate Peppermint that is excellent for desserts.
Menthol mint or Japanese mint *(M. arvensis)* produces menthol useful for inhalation against colds.
M. pulegium is the creeping ground cover Pennyroyal, also called "flea mint" because of its insecticidal properties. Good for pathway edges where feet can liberate its strong odour.
Polygonum odoratum, the sharp Vietnamese mint called "kesom", looks like smartweed and is served sparingly with basil and soya bean shoots as a salad accompanying Vietnamese dishes.

MITSUBA
UMBELLIFERAE

Cryptotaenia japonica [C. canadensis] – from cryptos, a Greek word meaning "hidden" and taina meaning "band" or "ribbon"; the two other words indicate that it is from Japan and Canada.

Origins: Japan, China and North America.

Description: Mitsuba is a hardy annual that self-seeds readily. Mitsuba means "three leaves" in Japanese and aptly describes a plant whose leaves are shaped like those of the strawberry. It is also called Japanese Parsley and Honewort.

Cultivation: Mitsuba grows well in winter but goes to seed when summer comes, in warm climates.

Saving the Seed: When the plant sends up lots of thin stalks, about forty five cm high, its insignificant flowers quickly turn into seeds. Pick the seeds within a week or two of becoming ripe or they will fall on the ground. If you rub the seed head between your hands, you will get a surprising amount of seed that is virtually free of chaff.

Storage: The seed can last for up to three years and there are 500 to the gram.

Usage: Japanese eat mitsuba with raw fish. Its mild aromatic flavour enhances tossed salads and soups. Mitsuba leaves are a good addition to a mixed green salad.

MIZUNA
BRASSICACEAE

Brassica juncea var. ***japonica*** – meaning Japanese cabbage.

Origins: As its name indicates, this cabbage has been developed in Japan.

Description: A very productive and hardy open-leaved frilly cabbage that is like a green, decorative seaweed.

Cultivation: In the tropics, sow in the cooler times, and in temperate climates, in summer. Water well for continuous leaf production, but mizuna will survive drought.

Saving the Seed: Different individual plants will go to seed at different times. As for other Asian cabbages, resist the temptation to keep the first seeders. Make a double selection. Firstly, mark with something like a white peg the seedlings that are the strongest. Later on, choose from them only the last ones to go to seed. The yellow flowers become narrow pods, termed "siliques", which quickly turn from green to brown. Harvest and clean as for other Brassica.

Storage: The seeds will last for no longer than two years and there are 600 seeds to the gram.

Usage: Mizuna can be eaten both raw, in green tossed salads and as a garnish, and lightly steamed as a spinach. Top marks for this Japanese introduction which may also come under the name Japanese Cabbage.

MUSTARD
BRASSICACEAE

Brassica nigra, B. juncea & ***B. hirta*** – Latin for "black", "rush-like" and "shaggy"

Origins: Eurasia.

Description: *B. nigra*, the black mustard, is an annual bush that grows to three metres and yields black or brown seeds that were made into the popular condiment of the same name.
This plant has been nearly completely replaced on the large commercial scale by *B. juncea*, the white mustard, which is shorter and has yellow seeds that do not shatter as easily. Both of these characteristics make it easier to harvest mechanically, but unfortunately *B. juncea* is not as pungently flavoursome as *B. nigra*.
The third species, *B. hirta*, is used as a spicy salad green, as a forage and the seeds are crushed for oil. It is seen flowering in winter all over northern India.
The name "mustard" comes from the common French practice of blending grape *must* (vinegar from green grape juice) into prepared mustard.

Cultivation: Mustard is planted in spring in cold climates and autumn in warm climates.

Saving the Seed: Mustard does not cross with other Brassicas, but watch out for the wild kind as far as several hundred metres away. When it goes to head, mustard will throw a tall, much-branched stem with lots of bright yellow flowers. The first of the erect green pods will mature at the bottom of the stem.
Because the seeds shatter, cut the bushes off at ground level before the whole pods are totally brown, but not so early that the seeds are tinged green. The seeds are borne in somewhat square pods with sharp ends. Stuff the branch into a large paper bag and hang it upside down. When dry, thresh and winnow.

Storage: The seeds are round and blackish, will last three years in a jar in the cupboard, and will germinate at a rate of more than fifty percent after seven years, if stored in the dark at a constant low temperature. There are 600 seeds to the gram.

Usage: Mustard is a good soil-cleansing crop for field and garden. White and black mustard both have fine-flavoured leaves and are used as spinach or in salads. The seeds can be sprouted.

Prepared mustard is a sharpening stone for the appetite and is easy to make – you will find it difficult to return to bought ones. To prepare a good mustard, marinate parsley, tarragon, thyme, garlic and a few celery seeds for two weeks in a good white vinegar. Drain the lot and add partially-hulled, finely-ground seeds of black and white mustard to the vinegar. Mix well and add a little wine and olive oil. After forty eight hours of contact, you can bottle it.

Mustard stimulates the secretion of digestive juices.

On the Lookout: Burgonde and French Brown are the leading French varieties, whereas American, German and English mustards are usually made with the variety Tilney.

MUSTARD GREENS

BRASSICACEAE

Brassica juncea – brassica is Latin for cabbage, juncea for "rush-like".

Origins: China and Japan.

Description: These greens come in the wrapped heart or open frilly form. They can be mistaken for some forms of Chinese cabbage, except that the flowers of the mustard greens are bright yellow and their pods are small and rounded in cross-section.

Cultivation: These are best grown in the mildest times of the year.

Saving the Seed: Annual, and will cross-pollinate with Chinese mustard. Isolation and techniques are as for Chinese cabbage.

Storage: Seeds last three to five years and there are 600 seeds to the gram.

Usage: Wrapped Heart Mustard Greens are pickled with salt in Korea, producing one of the various kinds of the famous Kim Chi, which provides families with a green vegetable through the harsh winters.

On the Lookout: Kai Choy is the general name in Chinese for mustard greens but it comes with romantic names like Chicken Heart, Long Leg, South Wind and Bamboo Mustard. They are all very decorative and unusual looking.

NASTURTIUM

TROPAEOLACEAE

Tropaeolum majus – from the Latin tropaeum meaning "trophy", an allusion to the likeness of the flowers to the helmets and shields displayed at Roman triumphs.

Origins: The garden nasturtium is a native of the cool highlands of Peru. When it was first discovered, it was called Indian Cress referring to the Andean Indians' common usage of it.
Its common name should not be confused with the botanical name of a sort of watercress: *Nasturtium officinale*. The only link between the two is their similar hot taste.

Description: Nasturtium is an annual but behaves as a perennial in warm climates. The bushy, non-running type with deep red, bright orange or yellow flowers is a modern breed. The original wild plants of the Andes were upright bushes with white flowers.

Cultivation: Although it will tolerate being grown in poor soils, nasturtium really flourishes in rich soils. The seeds are best off being planted direct because the seedlings are difficult to transplant.

Propagation: Nasturtiums can be propagated by planting cuttings that are not in their flowering or seeding stage.

Saving the Seed: The spreading bushes are flowering right through the growing season and the harvesting of the seeds can be done whenever the three-lobed seed compound becomes brown and feels light and dry. Alternatively, it is possible to harvest while still green, but mature enough to be fertile, as is done commercially.
As the flowers are worked by insects which love both the nectar and the pollen, only one sort of nasturtium should be grown in each garden for raising pure seeds.

Before you choose what seeds to save, see Simplicity Rating page 51.

Storage: The seed will last for three years. There are thirty dried seeds to the gram.

Usage: The whole plant is useful in the kitchen and the garden. Both the young leaves and the flowers are an excellent addition to a green tossed salad. The green seeds, harvested just after the petals have fallen, are pickled and can be used as a substitute for capers, which the Chinese have done, since its introduction there from South America several centuries ago. Simply pour freshly boiled vinegar into a tightly packed jar of unripe nasturtium seeds. Seal the jar and store in a cool place.

In the orchard and garden, nasturtium deters pumpkin beetles and acts as a catch plant by attracting aphids to itself, keeping the pest in one spot. Furthermore, nasturtium is useful when grown next to Brassicas as it repels the white butterfly, a frequent pest of the cabbage.

In Germany, a natural antibiotic for external use has been manufactured under the Tromalyt™ brand name. It was the first antibiotic to be made from a higher plant, as opposed to a mould.
A hundred grams of nasturtium leaves and green seeds with the same weight of nettles, macerated in half a bottle of vodka for two weeks, is used against hair loss, and as an effective scalp tonic lotion.

On the Lookout: Something interesting to look for is *Tropaeolum tuberosum*, the "Anu" or the "Mashua" which is the fourth most important root crop of the Andes. The pest-resistant tubers are grown in the poorest soil on ancient terraced hillsides at high altitudes where bought fertilizers are out of reach of the villagers.
The frost tolerant tubers are the size of a small potato. They are said to be hot as radishes when raw but mild when cooked. The plants have been recently introduced into New Zealand, and are grown there successfully by Dick and Annemarie from Oratia near Auckland.

NEW ZEALAND SPINACH

TETRAGONIACEAE

Tetragonia tetragonioides [T. expansa] – "square looking" in Greek.

Origins: A native of Australia, New Zealand and Japan.

Description: A low, spreading plant with spearhead-shaped leaves. Sir Joseph Banks took it from New Zealand to the Kew Gardens in England in 1771. The Maoris call it Kokihi or Rengamutu (Skinner, 1981).
Also known as Warrigal Greens in Australia, it is found growing wild and sometimes lushly along the Australian coast on the seaward side of sand hills just above the high tide mark.

It is now naturalized in California, Chile, China and Natal in South Africa, where the Zulus eat it regularly. It became fashionable in Europe earlier this century as a summer spinach.

Cultivation: The seeds are somewhat difficult to strike; an overnight soaking hastens germination. If it is not watered enough, the plant produces small leaves. With adequate compost and water, it develops three to four kilograms of leaves every square metre.

Propagation: New Zealand spinach can easily be propagated by cuttings.

Saving the Seed: New Zealand spinach is a perennial that is treated as an annual in cool climates. Large, green, horned seeds form along the stem. When they turn dark brown at the end of the hot season the seeds fall off the stem and are buried. The plant self-seeds.
To ensure a seed crop, pick the seeds promptly by hand. There is no need to dry the black seeds further but the brown seeds will need a good week in the shade.

Storage: Stored in a cool, dry place the seeds will last from five to seven years. There are twenty seeds to the gram.

Usage: New Zealand spinach tastes insipid when overcooked. Mixing with a small amount of sorrel makes it more palatable. As with true spinach, its calcium is not always made available to the body as it comes in the form of calcium oxalate. However a squirt of lemon juice in the

cooking water helps to remove it. Dairy products and meat are traditionally eaten with New Zealand spinach to overcome this problem.

On the Lookout: Look along the verges of beaches for this easy-to-grow spinach.

OCA

OXALIDACEAE

Oxalis tuberosa – oxalis is the Greek name for both "sour" and sorrel; tuberosa means "tuberous" in Latin.

Origins: As a staple in the Andean Highlands, where it is native, oca is second only to potatoes in popularity. It was introduced into England in 1829 but had only brief success. It was deemed tasteless by the locals.
It is called "yam" in New Zealand and "ibiak" in Spain.

Description: Oca is a succulent, small bush with clover-like leaves that resembles other *Oxalis*. It has a stubby, wrinkled tuber with white, red or yellow skin.

Cultivation: Oca is planted in spring or at the beginning of the wet season, and should be hilled like potatoes. It is suited to temperate Australia, where it can grow at high altitudes and in very poor soils. The plant can tolerate moderately cool climates but freezing kills the foliage. Temperatures of over 28°C cause the plant to wilt.

Tubers start forming four months after planting and production peaks at six months. A yield of seven tonnes to the acre is normal, but forty tonnes has been recorded according to N. Vietmeyer, an expert on South American crops. Although the tubers are harvested in the same manner as potatoes, they tend to be more difficult to handle because their flesh is softer.

Propagation: Oca can be propagated from stem cuttings but usually the healthiest tubers with the least number of eyes are kept for the next season's planting.
The tubers, called "stolons", are selected in early autumn and stored in dry sand in a cool, dark place until next planting. During the long days, these stolons are stems that grow above ground but as soon as the days shorten they penetrate the soil and swell. On some occasions the plant produces seeds which can be used to obtain new varieties.

Usage: Oca tubers can be baked like potatoes. Some varieties are even suited to being eaten raw. Such specialized strains are worth finding. Leaves and stalks are eaten in France as a sorrel substitute.
In Mexico, the tubers are sprinkled with salt, lemon and pepper before eating (the same as for green mangoes). They are also manufactured into candies and other natural sweets.
In the Andes, the tubers are left overnight in freezing temperatures and the water is repeatedly squeezed out of them. This doubles their glucose content.
Ocas are left in the sun in a woollen bag in Bolivia, in order to reduce their acidic taste. After a few days they become sweet and starchy and reportedly taste like dried figs.

On the Lookout: Look for varieties with skins of different colours.

OKRA

MALVACEAE

Abelmoschus esculentus [Hibiscus esculentus] – abelmoschus is Arabic for "musky seeds"; esculentus means "edible".

Origins: Eritrea in Ethiopia and parts of the Sudan, Mali and Burkina Faso. It spread further north in Africa, and across to India very early.

Description: Okra is an annual bush to two metres with sparse foliage, abundant pale yellow hibiscus flowers and green pods. The hibiscus-like flowers become small fruit, ready for eating in less than a week.
The Spanish Moors knew it in the 12th century as Bamiyas. African slaves carried the seeds of okra to America among their meagre possessions. There it became a favourite in the southern states, where it is known as Gumbo and is widely used in the canning industry as a soup thickener.
Greeks and Middle Eastern people introduced Bamiyas, or Lady's Fingers, to Australia.

Cultivation: Plant the seeds directly in the ground in the spring, or start them off in pots indoors, as okra needs a rather long growing season. The germination rate is high so you may have to thin out the seedlings to a spacing of thirty cm (one foot).
Okra plants need very little care in our experience and are tirelessly bountiful. Fruiting occurs over a long period. A dozen plants guarantee a binge of okra every day for months. The hard part is keeping up with picking them young enough.

Saving the Seed: Okra is largely self-pollinating although there is some cross-pollination by insects. It will not, however, cross with rosella or cotton, to which it is related. A collector of okra should pay attention to separating varieties by thirty metres at least.
Let the first few flowers on each of the two most advanced plants go to seed. This will slow down production for the table for a short while, but will encourage early fruiting in future generations. Keen collectors, with more than one variety flowering at once, should cage the whole plant or isolate individual flowers (by bagging them) the evening before the flower is about to open. A little observation will tell you when.
Shut the bottom tightly to exclude any insect that might transport unwanted pollen from another nearby variety. The chosen pregnant flowers should be tagged with a bright ribbon. Remove the bag the following day.
Harvest when the pods are brown and dry, when the seeds start to rattle. With only a little help, the dried pods will open from their apex

in the way bananas are peeled, and the seeds will roll out. The seeds should be grey and hard.

Storage: The seeds will remain viable for three years at room temperature if your region is dry, considerably less if you are in a hot monsoon area.
If they are stored in a cool, dark place, fifty percent of the seeds will germinate after five years. They are about a third the size of a pea, i.e. fifteen seeds to the gram.

Usage: Cook okra for only two minutes in stir fries, or very slowly in soups and stews. It is one of those vegetables you do not cook for a medium amount of time. In Guinea, western Africa, the leaves are eaten as a spinach. The roasted seeds were used as a coffee substitute in the settlement of the USA.

On the Lookout: Okra varieties can be quite diverse in appearance. There are dwarf and tall types with short and long pods. Rustic varieties have spiky stems. Some have stocky fruit, others very long fruit in the shape of antelopes' horns. Greek-Australians introduced a whole range of red and green varieties. They are a part of our ethnic heritage.

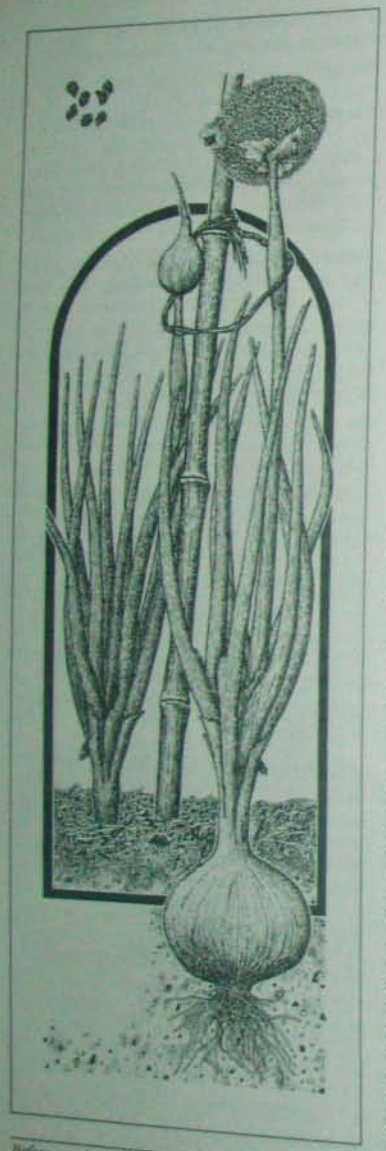
ONION

AMARYLLIDACEAE

Allium cepa – allium means garlic, and cepa means onion in Latin.

Origins: Onion is a hardy biennial from the southern parts of Russia and Iran. It was disseminated by the Indo-European hordes in their numerous migrations.
Very ancient forms of onion are still for sale in Middle Eastern markets. Onions were considered sacred and were eaten in copious quantities by the Egyptians who honoured them in some of their monuments.
In recent times, UN officials have found old varieties in Iran that show resistance to thrips and this has greatly benefitted the industry. Thrips are slender insects with stout, cone-shaped mouth parts with which they scrape the onion stems and suck out the sap, causing yellowing of the leaves.

Description: Onions have many close relatives:



A. cepa var. *aggregatum* (*see* Eschallot, also called French Shallot, Potato Onion and Multiplier Onion).
A. cepa var. *proliferum* (*see* Tree Onion, also called Topset, Egyptian and Walking Onion).
A. fistulosum (*see* Spring Onion, also called Bunching, Welsh Onion, Scallion, Shallot and Self-Perpetuating Onion).

Cultivation: Bending the leaves late in the season will stop premature bolting and encourage development of the bulb. Onions may not form bulbs or seed at all if moved to a different latitude. A Tasmanian onion, for example, is unlikely to produce seeds in North Queensland, even if grown on the cool Atherton Tableland.

Saving the Seed: Several varieties can be grown in the same garden in the first year of their growth. To ensure purity, only one sort should be allowed to flower in the second spring within a 400 metre radius.
At least twenty plants of a variety must be saved in order to maintain diversity for the long term, but this optimum number should not deter you from saving onion seeds if you have grown only a small number of plants.
Onions are pollinated by insects. Some collectors or curators of onions actually bag their onion flower heads. This involves the hand-pollination of at least twenty individual heads of each variety, moving pollen, with a camel hair brush, from head to head, each morning for a month! More simply, onion seed breeders introduce pollinating insects into the cages in which onions are isolated.
Choose well-formed and firm onions for seed purposes. Large onions produce more seed than small ones, but it is worthwhile looking at the whole plant when it is growing and tagging it, rather than just choosing the largest at harvest. The flowering stalk which develops in the second season is leafless, hard and hollow and can grow up to two metres tall. As onions go to seed very rapidly, a stake may be needed at this time.
Seeds are ripe when the stalk changes colour to brownish. The seeds become black and the capsules begin to open and drop seeds if shaken. All the plants' heads do not come to seed at the same time, so they may have to be harvested at random. Put the heads in a paper or cloth bag and hang in a dry shady place. When dry, shake and rub the bunch. A mixture of seed, capsule and stems will result. Little white dried calyces will be amongst the seeds. The mix can be sieved and winnowed or simply blown upon gently until only black seeds are left.

Before you choose what seeds to save, see Simplicity Rating page 51.

Storage: The seeds will last only one to two years. They are best kept in cold and dry storage after complete drying. Onion seeds lose vitality very quickly in warm and humid climates. There are 250 seeds to the gram.

Usage: Onions are much sweeter when grown in warm climates. This explains why the Spanish and Iranians chomp into them as we eat apples.

Onion is believed to be unsuitable for people who are of nervous disposition or who are prone to skin disorders. Onion is reputed to loosen phlegm, drain mucus from the nose and have antiseptic qualities. Onion is also helpful for lowering blood pressure, and blood sugar. Try rubbing raw onions on cracked feet for quick relief.

On the Lookout: The ancient Greeks had many varieties bearing the names of different Aegean Islands.
Multiplier types are very valuable. Some older farmers may still have some interesting ancient varieties.
It is possible to obtain seeds within a few months from particularly good onion bulbs that you find at the greengrocer's. Concerning rare folk strains, Robert, a Seed Saver subscriber from Norfolk Island, writes:

> Approximately 20 years ago, there was on the Island an onion referred to locally as the "Norfolk Island onion" which seems to have died out here. It was a small to medium onion with a distinctive flat button-shaped bulb and a deep-brownish outer dry skin which, when peeled, revealed the purple-coloured inner flesh. The stem was purple until it turned into normal green leaves.
>
> It was grown from the seeds of the previous year's crop. It was similar to the Indonesian onion to look at but it did not multiply by dividing itself to form clumps as the Indonesian one does. It had rather a strong flavour and kept in storage for three to four times longer than other onions. It was excellent for pickling also. The seed originated with visiting American whaling ships between 1850 and 1900. What Yates called the Lord Howe Island onion, bears no resemblance to it.
> Hopefully this variety will be found again.

Margaret Heseltine, a retired market gardener, in Derby WA, sent a sample of onion seeds that she has been keeping for thirty years. She reported obtaining the seeds, that she planted and seed-harvested, from the gardener at the Fitzroy Crossing Hotel. It is a white onion which keeps well and grows easily in the tropics.
Generally, white varieties such as Barletta, Hunter River, Early Flat White and White Pearl are for immediate use. They are known as short-day varieties.
Pukekohe Long Keeper is still number one in New Zealand and lasts for more than nine months in a well-ventilated shed. Ailsa Craig is a huge, straw-yellow globe weighing up to one kilogram but it does not keep quite as long as Pukekohe.
Because onions in general respond to day length for forming bulbs, local varieties are best. Ask market gardeners and older gardeners.

ORACH

CHENOPODIACEAE

Atriplex hortensis – atriplex is Latin for orach; hortensis means "of the garden" in Latin.

Origins: The mountains of the Middle East. Orach was known to the ancient Greeks. It was introduced to England in 1538, according to Sturtevant (Hedrick ed., 1972).

Description: Orach is an annual with large triangular leaves that are slightly puckered. It is also commonly known as Mountain Spinach, and comes in red and green forms. It is related to the saltbush of South Australia and West Australia.

Cultivation: Orach is best planted in autumn, in temperate areas.

Saving the Seed: A stalk that produces very small flowers shoots up as the days get longer. The seeds are slightly larger than tomato seeds and are surrounded by beige papery discs that can be winnowed easily.

Storage: They should last up to five years. There are 250 seeds to the gram.

Usage: Orach is used in the same way as spinach and is mixed with sorrel to lessen the latter's acidity.

On the Lookout: Magenta Purple, an Indian variety, Chakwat and Belle Dame are named varieties.

ORIENTAL COOKING MELON

CUCURBITACEAE

Cucumis melo var. ***conomon*** – cucumis means cucumber in Latin and melo, apple in Greek.

Origins: Southeast Asia.

Description: A vining plant with fruits used for preserves and in Asian stir fries.

Cultivation: It is best planted on well-fertilized mounds, like other melons.

Saving the Seed: This melon will cross with any cantaloupe, honeydew or rockmelon but not with watermelon or other Cucurbits. The fruits are usually eaten at the immature stage but to save the seeds, you will have to wait until the melons are going yellow.
The seeds are smaller than rockmelon's and more plentiful. Wash them under a tap in a sieve and spread them out evenly to dry for a day or two. Label an envelope with date and name, and hang on the line in the shade for a week or so, depending on local humidity.

Storage: The seeds last for up to five years and there are seventy to the gram.

Usage: Use the fruit in stir fries. A pickle that is particularly suited to seafood can be made in the same manner as pickled onions. When pickled in the lees of sake, this is one of the most expensive pickles available in Japan.

The Chinese slow-bake the whole melon until it is charcoal, mix it with fat and apply it to cold sores (Chang Chao-liang et al, 1989).

On the Lookout: Shima-uri has green fruits with pale green stripes. Tokyo Large White is suitable to cold climates and is very prolific.

PANSY & VIOLET

VIOLACEAE

Viola spp. – viola was the name for violet in Latin.

Origins: They are native to temperate regions of all continents.

Description: There are about 500 species of *Viola*, both annual and perennial. "Heartsease", or Johnny Jump-up and Jumping Jack, *(V. tricolor)* which was used as a medicinal herb in 18th century England, was crossed with a wild Asian viola to produce some of today's pansies. Other pansies have resulted from similar crosses.
The common, or florist's violet *(V. odorata)* has heart-shaped leaves and a running habit, with a pea-shaped flower of colours ranging from white through pink and blue to a dark purple. Other varieties have long thin leaves, and some Asian ones *(V. dissecta)* have ferny leaves.

Cultivation: Depending on the variety, grow pansies and violets in a sunny, through to a shady, position. They like rich well-drained soil. The morning sun is said to release the aromatic oils.
The North Americans are deciduous, having rhizomes to carry the plant over winter.
Pick the ripe seed pods and remove the stalk, as well as the straggling growth, to encourage more flowering and prevent future flowers from becoming "leggy".

Propagation: The heavily-scented European species, which includes the common violet and *V. parma*, either do not set seed, or set seed which is not viable. They are propagated by runners just as strawberries are.
While the common native violet which is white with a purple throat *(V. bederaceae)* does set seed, it is much easier to multiply it by runners. The North American violets *(V. sororia)* are propagated by dividing their rhizomes in their dormant phase, just before the new leaves appear.
It is beneficial to all these plants to be divided every year or so.

Saving the Seed: Pansies are annuals and are propagated by seed. Some are shy seed setters when there are no bees foraging, so hand pollination may be necessary in order to get a good seed set.
The Asian violet *(V. dissecta, V. minor & V. manchurica)* and our native Tamworth violet *(V. betonicifolia)* have to be propagated by seeds.
The tri-valved seed capsules of both pansies and violets can be collected when they turn upwards. The capsules may have to be stored at a warm temperature in a paper bag until they are completely dried. They will pop their seeds in the bag. Winnow and clean off any chaff and broken seed capsules before storing.
The seeds have to be collected immediately the little flower dies.

Storage: Pansy seeds will last one year, whereas violet seeds will last only a week. There are about 2000 pansy seeds and 1000 violet seeds to the gram.

Usage: Violet leaves are eaten in salads and the flowers of both pansies and violets can be used to decorate salads, and can be candied. There is a range of recipes for violet products, including violet honey, vinegar, and sherbet.

Some species of violet are used in folk medicine. Pounded dried *V. tricolor* is taken as an infusion to ease phlegm out of the chest. Violet syrup, mixed with oil of almonds is used as a gentle laxative for children, and the leaves and blossoms are mildly laxative.

On the Lookout: There is a range of colours in the florist's violet *(V. odorata)*.
Marie Louise is a large Russian Double Violet, cherished for both its unique flowers, which look like loosely constructed pom-poms, and for its fragrance.
Snow Queen is an unusual white violet worth finding in some old cottage gardens.
Baby Blue is a variety of the Australian native that is a clear sky blue.
Woodland violets *(V. aduncа, V. labradorica & V. sylvestris)* are useful plants as ground covers in a shaded area.

PARSLEY

UMBELLIFERAE

Petroselinum crispum – petros means "rock" and selinon, parsley, in Greek; crispum is Latin for "curled".

Origins: Different ethno-botanists have parsley's origin ranging from northern Africa to southern Europe (Sardinia and Portugal).

Description: Parsleys are either biennial, or short-lived perennials. There are several types of cultivated parsley with different degrees of curliness.
The larger flat-leaved ones are very suited to home gardens as they are tasty both cooked,

and fresh. The Hamburg-rooted parsley is grown in Europe for its fine-flavoured roots.

Cultivation: The seeds are slow to germinate and can take up to twenty days. Once parsley has found a good fertile spot, it will readily self-seed.

Saving the Seed: Like other Umbelliferae, parsley relies on insects for pollination and therefore seed production. A Curly and a Plain Leaf parsley grown in the same garden would exchange pollen. The next generation would show mixed characteristics.
Parsley is a biennial in cold climates but can go to seed in just one season in warmer places.
To improve the strain, select the plant that is most vigorous and let it go to seed without weakening it by over plucking. Professional market gardeners take great care to keep their valued strain of curly parsley true. They select the finest parsley plants with the most desirable features, and allow no other flowering parsley plants, even of the same variety, to go to seed in their vicinity, a kind of selfing.
When fully developed, the seeding plant reaches one metre in height; the flowers are small and white and are borne at the ends of the many umbels. The seeds which turn from green to brown when they are ripe are easily dislodged.
The seed heads should be processed like carrots and celery – they can be harvested continuously as the seeds become ripe, and threshed by hand. Only a little winnowing and sieving with the right gauges is needed to obtain perfectly clean seeds.

Storage: The grey seeds are oval, three-sided and slightly curved. They will last from one to three years, if kept very dry and cool. There are 200 seeds to the gram.

Usage: Apart from its very popular use in salads and as a garnish, the whole plant, including the roots, can be cooked in soups and stews. Whole leaves can be dipped in batter and deep fried.

Chewing fresh parsley leaves counteracts the ill effects that garlic has on the breath.

On the Lookout: In Stephen Facciola's *Cornucopia* (1990) we found more varieties that we would have ever guessed existed. There are twenty one in all including Banquet which is the best for garnishings and suitable for cool climates, Clivi which is intensely fragrant and finely indented, Curlina which is extremely finely curled and is ideal for growing in a pot, Green Velvet which has a piquant flavour, Neopolitan whose stalk may be blanched and used like celery, and Unicurl whose leaves curl inwards instead of outwards.
Fern Leaf, Champion and Moss Curled are curly ones listed in Australian catalogues.
There are a myriad of nameless varieties that are worthy of collection and many can be found in the gardens of different ethnic groups. Italians grow what is called a celery parsley, which is large, flavoursome and useful, both in salads and cooked dishes. Celpar and Giant of Catalogna are forms of this parsley. Look for plain-leafed parsley for use in tabouli.
Parsley galore!

PARSNIP

UMBELLIFERAE

Pastinaca sativa – pastus in Latin means "food" and sativa, "cultivated".

Origins: The parsnip we know today evolved from the wild parsnip still growing in Eurasia. It was a staple in the Middle Ages, but fell into disuse as the potato became popular. It is naturalized in New Zealand.

Description: Parsnip is grown for its large creamy-white roots.

Cultivation: Plant in autumn in warm climates and spring in cooler climates.

Saving the Seed: Considered biennial in cold climates. Different varieties will cross with one another, and with wild parsnip. The flowers and seeds are produced in the spring of the second year on a grooved, and hollowed branching stem. The tiny flowers, borne on large spreading umbels, are fertilized with the help of insects. The large central umbel is considered the best for seed production.

When most of the seed is brown, cut the plants near the base or lift the whole plant and dry

Before you choose what seeds to save, see Simplicity Rating page 51.

further. The seeds are flat, thin and quite large because of their wing-like structure. Harvest should not be delayed as the seed will drop readily. Only a little sieving in a colander is needed to get rid of fine dust and some little sticks.

Storage: The seeds will last only until the next growing season. The seeds of different varieties may vary in shape, colour and size, according to varieties. There are 200 seeds to the gram.

Usage: The English have retained the use of parsnip more than other nationalities. A wonderful soup of creamed parsnips can be made, and there is the famous parsnip wine. Bake them or simply steam them to an al dente texture, and saute gently in butter until golden brown.
In France, parsnips are traditionally grown only for draught horses' fodder but they are starting to gain popularity with cook-gardeners.
Highly regarded for stomach disorders.
Caution: the juice from the green stems and leaves may cause skin irritation.

On the Lookout: Guernsey and Large Jersey were bred in the Channel Islands but have spread elsewhere. For shallow soils, use Oxheart which has a short and stout root.
Melbourne Whiteskin has been selected in Australia for market gardens. Hollow Crown is a common variety. In New Zealand, Freshman, which has a long thin root, is used when an early crop is needed.
Tender and True, named after a popular song in the nineteenth century, is still grown today for its heavily-tapered roots, fine-grained flesh and sweetness.

PEA

LEGUMINOSAE

Pisum sativum var. ***sativum*** – pisum means pea, and sativum "cultivated" in Latin.

Origins: One of the most ancient old world vegetables, the garden pea can be traced to the Bronze Age.
It was domesticated in Europe and later in southern Russia, Armenia, northern India, Pakistan and the mountains of Ethiopia. Primitive peas were found in the old city of Troy. It reached China early in the Tang Dynasty, 600 to 900 BC.

Description: There are both dwarf and climbing forms of peas.
Other species of pea:
P. sativum var. *arvense* – arvensis means "growing in the fields" in Latin is the smooth-seeded field pea used dried in soups and pies.
P. sativum var. *macrocarpon* – macrocarpon means "large fruit" in Greek – is the wrinkle-seeded snow pea, with flowers that are nearly white, which is eaten for its succulent young pods.
The green-shelled pea was only developed last century.

Cultivation: Garden peas should be timed to flower neither in cold weather, as the buds will be damaged by light frost, nor in hot weather, as flower setting is poor. In crop rotation they do well after cabbage.

Saving the Seed: Peas are self-pollinating, but varieties ought to be separated by another tall crop. Roguing out the off-types is most important. Look for exceptionally strong plants from which to save seeds. Peas from plants which display narrow leaves should not be saved, but eaten.

When the peas are at eating stage, a good number of bushes should be marked or tagged with a bright piece of cloth and left in the field or garden for four more weeks. When the peas rattle in the pods, they can be picked and threshed.
If it is rainy, bring them in earlier as peas sprout very easily in the pod. A further week of drying on a rack is necessary before storing in a canvas bag.

Storage: The shrivelled seeds of succulent varieties like Snow Peas have a lower viability than the plump hard ones. Generally peas keep for about three years and lose viability quickly after that. All the same, a few will germinate after eight years' storage in good conditions. There are approximately five seeds to the gram.

Usage: Snow Peas are nicest eaten shortly after picking, which is best done in the cool part of the day. The tops of both field and green peas

are abundant and must be the most delicate and sweet-tasting salad green; throw them into a stir fry just before serving, as a spinach.

Because of their high nicotinic acid content, fresh peas from the garden will lower blood cholesterol level. When eaten as a snow pea, they also help eliminate any toxic waste in the intestine.

On the Lookout: The smooth-seeded types, which have purple or blue flowers are suitable for cold climates. They are the old-fashioned starchy soup pea. Flour was made out of them and was sometimes mixed with wheat flour in bread. There were over 200 strains listed in the Vilmorin (French) seed catalogue of 1904. Yates had over fifty varieties in their 1904 catalogue.
The first variety of garden pea was perfected in Holland and became known to the French as "petit pois" (little pea), but the Victorian English were the first to develop and catalogue the separate varieties of peas.
Many of the 19th century names display Victorian chauvinism: Prince Albert, Victoria, Champion of England, William The First, Conqueror. In response, the French have varieties like Napoleon.
In Australia, gardeners attached to a particularly good one made sure they saved their strain. Little Marvel and Melbourne Market have been the standards for years, giving steady crops, while new introductions like Canners Perfection are more suitable to the commercial grower, because the crop ripens all at once.

PEANUT

LEGUMINOSAE

Arachis hypogaea – hypogaea means "underground" in Greek.

Origins: There are two types of peanut, one from the Andes, and the other, Brazil.
The Peruvian type – our peanut butter provider – which was discovered in the Inca tombs, is an erect, low bush, bearing underground with several large peanuts in each shell, and salmon-coloured nutskins. These were transported to Mexico and from there moved with explorers not only to Europe, but also to Indonesia, India and China, where they became an important crop.

The Brazilian peanut is more of a prostrate form, gives only two peanuts in a shell with dark red nutskins and delivers more taste. The Portuguese introduced this one to Africa, while they were trading in people, ivory and other "commodities". In the beginning of its cultivation there, peanut bushes were reportedly grown in many coastal villages.
After the slave trade was abolished in 1815, it took fifty years for the traders to find another equally rich source of wealth. The peanut became number one item. It was found to be rich in oil and this African product remains the cooking oil that is most used in Europe. Refined peanut oil does not go rancid easily.

Description: The peanut is an annual, drought-hardy but frost-sensitive small bush. Small yellow pea-like flowers grow in the axil of the leaves towards the base of the shoots. The fertilized flower stalks elongate and form a root-like growth, penetrating the soil and terminating in the actual peanuts.

Cultivation: Peanuts thrive in the tropics, but are known to grow as far south as Adelaide. They are planted, in their shells, at the beginning of the hottest time of the year and are harvested when the weather becomes cool. Like potatoes, peanuts need some hilling to be more productive. There is both the bush form, and the runner form, which is harder to harvest commercially, but good in the garden.

Saving the Seed: Largely self-pollinating with a variable amount of crossing between varieties reported in the USA. Fifteen metres' isolation is needed between varieties if you have several in your garden or on your farm.

Peanuts are pulled out when all the bushes have turned yellow. This is the time to choose the best ones for seed stock. Harvest the whole plant and hang or leave in the field or garden turned upside down to dry for a week or so. Separate the peanuts from the bushes. If you have a big crop it can be rubbed over a large-gauged steel mesh on top of a forty four gallon drum. If the weather is dry and the pods are crisp, the seeds can be stored in a hessian bag in their shell without any further drying.

Storage: Peanuts rarely get completely harvested, so a few manage to sprout next warm season. It is possible to keep peanuts alive for up to four years by storing them just above freezing temperature, at five percent moisture. In the open air, they rarely last more than one year.

Usage: Eat them raw at harvest, steamed, as in Sumatra, or boiled as in Queensland. Peanuts can be roasted in a home-made revolving cylindrical griller, that can also be used for coffee roasting. The tough stems are used by the Melanesians in New Caledonia for making fishing nets. The thin reddish skin around the peanut is the richest known source of thiamine (Vitamin B1), which is what refined food lacks.

For insomnia, try a tea made by boiling peanut leaves and stems for ten minutes (Chang Chao-liang, 1989).

On the Lookout: What seems to be missing in commercial peanuts is flavour. Look for varieties that have taste and are low in oil, e.g., amongst the Brazilian types described above, Red Spanish is a small bush with light green leaves and dark red-skinned kernels.
Virginia Bunch has dark leaves and two pale-coloured kernels inside the pod. Garoy is a variety suitable to colder climates and was developed in Canada.

PERUVIAN PARSNIP

UMBELLIFERAE

Arracacia esculentum [A. xanthorrhiza] – arracacha is its Peruvian name; xantho means "yellow" and rhiza, "roots" in Greek; esculentus is Latin for "food".

Origins: The Peruvian Highlands.

Description: A perennial with up to ten roots which at full size are quite thick and up to forty five cm long. Related to carrots, parsley and celery and indeed the leaves look like a very large parsley.
Peruvian parsnip has many hollow stems to sixty cm with dark green leaves. After eighteen months the bush can attain a metre across.
This parsnip is popular in big cities of South America (about 10 000 hectares are grown around Sao Paolo in Brazil). It is more popular there than the potato, because it can be pro-

duced more cheaply (National Research Council, 1989). Its other common name is Arracacha.

Cultivation: In warm areas, Peruvian parsnip can be planted throughout the year. In cool temperate parts of Australia and New Zealand, it should be set out in early spring. Its leaves are frost tender and should be protected in winter. Arracacha is grown as a companion to potatoes in the Andes. It grows very prolifically in the Northern Rivers area of New South Wales.
Its roots can be harvested after fourteen months, but it may take up to two years for good-sized ones to form in cooler climates.

Propagation: It is usually propagated with offsets – the crowns. These are ready ten months after the original planting. Trim off the larger leaves, dig up the whole plant, make a feast of the large and delectable bottom roots and a soup of the central bole.
Cut the offsets into separate crowns and leave them to callous for a couple of days before replanting. They are extremely hardy and can re-shoot even when they look quite dead.
Peruvian parsnip flowers but rarely sets seed; if it does the large flat seeds can be harvested and replanted. This is the way to obtain a new strain, (as with potatoes and Jerusalem artichokes).

Usage: They are delicious when cooked in all the same ways as potatoes. Young roots can be steamed for a mere ten minutes. They also very tasty baked or fried.
The strain that we have grown in Australia has white flesh with a purple streak around the root core, but the yellow one is preferred in some parts of South America. Peruvian parsnip can be eaten raw in thin crisp slices. Colombians make a classic soup of it. The young stems are sometimes blanched and eaten raw in salads, or in a stir fry.
The central root bole is fibrous and is fed to animals in South America. We use it as a soup bone substitute.

On the Lookout: South Americans would be the best source for this unusual vegetable.

POPPY

PAPAVERACEAE

Papaver spp. *P. nudicaule* is the Iceland Poppy, *P. rhoeas* is the Flanders, corn poppy and Shirley poppy, and *P. somniferum* is the breadseed and medicinal poppy.

Origins: *P. somniferum* originates in Southern Europe, Greece and Western Asia, including Armenia. It was cultivated in the gardens of the ancient Greeks for its edible seeds which do not retain any narcotic properties.
Virgil calls it *Cereale papaver* because of its edible seeds, or was it because poppies grow amongst wheat? The seeds were offered to Ceres, the Goddess of the Harvest who was always represented crowned with poppies.
Nowadays *Papaver rhoeas* or Corn Poppy is considered a weed in wheat fields.

Cultivation: The tiny seeds are sown in fine soil in autumn in warm climates and spring in cooler climates. The seedlings need to be transplanted with great care.

Saving the Seed: Poppies self-pollinate but if the flowers are frequently visited by insects, two varieties will cross-pollinate. For example, a Flanders Poppy will mix pollen with a Shirley Poppy, but only if insects are working them. A garden length will be enough isolation between them.
The flowers will appear quite progressively and therefore the seed heads will mature separately. The seed heads can be taken when the seeds are whitish-grey and when they rattle. From now on, the stalks should be kept upright so the seeds do not fall out of the little furrows that open at the top when the capsule dries.
Just by turning the dry heads upside down, the clean seeds will all fall out. There is no need to crush the capsule.

Storage: The seeds last two years, and there are 10 000 seeds to the gram.

Usage: The white or black seeds have been used since antiquity in bread making, and their oil as a substitute for olive oil in France, where it is called *olivette*.

The hardened white sap oozing from the slits cut on the unripe fruit capsule of *P. somniferum* is made into medicines and narcotics. It was used by the Romans to induce sleep and nowadays is refined into the pain reliever, morphine, reserved for those with intolerable pain.

On the Lookout: Varieties suitable for edible seed production are Hungarian Blue-seeded, Hutterite and White Persian.

Before you choose what seeds to save, see Simplicity Rating page 51.

POTATO

SOLANACEAE

Solanum tuberosum – solanum is Latin for "nightshade" and tuberosum for "tuberous".

Origins: The Andes in South America are the homeland of potatoes, where an astonishingly diverse array has been cultivated for 8000 years. Dozens of varieties can still be seen on local highland markets.
Sir Francis Drake brought them from Virginia to England in 1585. From there they spread to Ireland, Scotland and the continent. They were not trusted at first and were fed only to domestic animals. Even in times of famine, people would not eat them. In fact it took 200 years for potatoes to be accepted. Historians think that this was because of the strange irregular shape they had in those days and because some folk ate them with green skins, or ate their berries, and fell sick.
A potato blight, which struck the Irish potato fields in the 1840s causing widespread deaths and mass emigration, resulted in a greater interest in collecting resistant strains and species in America. A lot of varieties were bred then and some of them are still with us today.

Description: Andean farmers have selected thousands of distinct types for each micro-environment of their mountain fields. Many of the little known potatoes of the Andes belong to other species.
Here are a few that Noel Vietmeyer of the National Academy of Science in Washington describes:
S. steniototumum – Pitiquina is the most primitive of the domesticated potatoes. They have a nutty flavor and farmers interplant them with the common potatoes they sell on the market.
S. goniocalyx – Limena produces a deep yellow flesh of exceptional flavour. They are sold as a treat in the streets of Lima, Peru.
The Rucki potato is a cross between two species, a cultivated one *S. juzepczukii* and a wild one *S. curtilobum* which grows in central Peru and northern Bolivia at nearly 5000 metres where frosts occur 300 days of the year. Andean farmers grow the Rucki potato in frosty sites as a sure crop and use it in soups after elaborate processing.
Many of these landraces are nothing like the spud that we are used to. They can be bright yellow, deep purple and black and most of them have a rich flavour. They are often frost, insect and nematode resistant and narrowly adapted to their own growing fields.

Cultivation: Prior germination of seed potatoes, in the dark, helps to produce sturdy shoots. Expose trays of germinating potatoes to light for twenty four hours before planting. Potatoes are very soil-specific and intolerant of frost. Note that potatoes grown in sandy soil may not have a very good flavour.

Propagation: Potatoes are usually propagated vegetatively, that is with the tubers, to ensure the continuity of the selected variety. Choose only perfectly healthy, scab-free medium-sized tubers.

Constantly selecting seed potatoes that are small, and eating the big ones, may result in breeding for disease because some small spuds are the legacy of diseased stock. Make careful observations on growth habits and mark the healthiest plants that are surrounded by other healthy plants. When the tops die down, harvest and let the tubers dry in a airy place for a day taking care not to damage their fragile skin. Seed potatoes can be stored in dark, well-ventilated conditions for months.

If a variety has to be multiplied fast or when there are only a few specimens of an old variety available, slice the seed potato into sections with one eye on each. Allow to callous for a day, before planting. Several varieties can be grown in the one garden.

It has been said that potatoes "run out" in warm climates. It is rather that production slows down because of viruses. There are quarantine restrictions about potato movement within Australia and New Zealand because diseases and pests can be transmitted with the tubers.

Saving the Seed: Seed saver Royce Wiles from Canberra, has this to say about growing potatoes from seed:

> The growing of new varieties by planting the seed ball ought to be practised more than it is. A potato blossom will occasionally produce a small green fruit. The seed balls should be gathered about six weeks after they form, when they are fully matured. They might even be a little soft when ready. Squeeze them into a bowl and ferment them [as outlined in the Tomato listing]. They can be dried and stored until it is time to plant. These seeds will produce varieties that vary widely.
>
> At first, the progeny will be small but after five years of selection, some new strains will emerge. All strains have to be kept apart and good records on their growth kept.

Usage: Different potatoes are for different purposes. Since the days of the Incas, potatoes have been selected for their waxiness for use in salads, or their flouriness, for boiling, baking and chip-making.

The Germans and East Europeans make an alcohol called schnapps from potato.

Grated, and then juiced raw, potatoes are excellent for acid stomachs, ulcers, and diarrhoea in babies. Raw and grated they are used also as a poultice on painful joints and burns.

On the Lookout: Tasmania springs to mind with potatoes, but look locally for seed stock. Look in all tableland areas for possible rare local stock and keep an eye out for skins of different hues: purple, pink, yellow, blue, black and red; and with different coloured flesh too, such as the European fingerling types which have yellow flesh.

Some old favourites are Early Manistee, Early Rose, Up to Date and Brownells. Old catalogues list Carmen, Bovinia, The Dean, Lady Webster, Scotch Blue, Village Blacksmith, Woodstock, Kidney, Victor, Snow Flake and hundreds more. A lot of the potatoes found in shops come from registered strains released by the Department of Agriculture. In most states the main crops are Sequoia, Sebago, Kennebec, Pontiac and Exton, with Delaware selling well in Western Australia, and Kurrel in New South Wales.

Ralph Barraclough found a potato in a lyre bird's scratching in an old Gippsland gold field. The skin is brownish purple and the centre is violet. What Ralph cannot pass on to the East Gippsland Organic Growers he makes into chips. It has been named the Dargo Goldfield potato.

Kevin Curtis from Bruny Island in Bass Strait still grows and maintains many old types such as King Edward and Manhattan, a black potato that was found growing wild in a paddock.

One of the rarest is the Manistee potato. He obtained it from a farmer who claims it was found by his great grandfather in the penitentiary gardens. It was apparently named after a convict. This potato has a peachy colour and always grows flat. It is inclined to break up when it is cooked because of its shape and texture.

Another collector grows a potato called Rosedale or "the Japanese potato" which has a banana-shape and skin that is black to blue, losing some of its purple colour after it is cooked. It has an interesting and rough texture.

Rua is an excellent strain found in the North Island of New Zealand with multiple uses and with a good flavour and keeping qualities. Cliff's Kidney is also a good certified seed potato. The purple-skinned Maori potato is a fine waxy type.

PUMPKIN

CUCURBITACEAE

Cucurbita maxima – cucurbita means gourd, and maxima means "largest" in Latin.

Origins: From the Andean valleys and northern Argentina.

Description: This group is the most vigorous of all the Cucurbits with very long vines and large round leaves that have hairy stems. The stems of the fruits are round, thick and corky. The seeds are thick, yellowish and have a cellophane-like coating.

The group includes Buttercup, Banana, Big Max, Turban, Hubbards, Queensland Blue and Triamble. They are often called winter squash because the fruits are harvested fully mature and eaten into the winter months, as opposed to summer squash which is usually eaten young during the growing season (*see* Squash). For butternuts, grammas and trombones, look up Gramma.

Cultivation: Pumpkin seeds are planted direct into hills of rich compost, from spring through summer. The vines have long shallow roots that feed the plant for a long growing season.

Saving the Seed: Isolation distance is 400 metres and hand pollination is necessary if there are two varieties growing in proximity. See Section Eight for what to do about crossing.

If your pumpkin is the only *C. maxima* in the neighbourhood, then all the seed inside the cavity would come true at next season's planting. All the same, roguing off-type vines before they flower, to prevent pollen exchange between true-to-type and poor vines, keeps the variety in top shape.

Allow a few extra weeks after picking for the seeds to mature inside the fruit. Scoop them out, wash, dry and label. Hang on a line in an envelope for further drying for about a week. Then stash them away in a tin until needed, along with all necessary information about their name, origin, planting date, and any other pertinent details.

Storage: Seeds last three to ten years if stored in an environment that is dry and of an even temperature. There are about four seeds to the gram.

Usage: The shoots and small leaves are tasty when cooked in coconut milk as they do in Papua New Guinea where the dish is called "pumpkin tops".

Pumpkin had the reputation for being a cure for tapeworms. In fact, it involved fasting for a few days and then breaking the fast with pumpkin seeds in order to expel the long worm.

On the Lookout: Many older gardeners and farmers have a very close relationship with their favourite pumpkin. It may be unnamed, but they have kept it for many years and they consider it the best.

The Black Prince that Joe Connolly, a 70-year-old farmer, passed on to Seed Savers was grown by his dad. Upon his dad's death, Joe thought it was lost, but ten years later, he found an old tin in the shed with seeds and a note in his father's handwriting saying "Black Prince". A few of the seeds germinated and the same fine-flavoured, deep-orange pumpkin that Joe had known most of his life was alive again and bearing fine crops.

You may remember the Ironbark pumpkin. It is hard to find nowadays. Les Rigby from Mildura has turned 80 and remembers his school days at Rokewood, a former gold mining town:

> There was an old gardener we called "Dooby Dick" wheeling Ironbark pumpkins to the local show, one Ironbark to the wheelbarrow. I can also see my mother with a butcher's chopper and a mallet to open the pumpkins. They were cooked with the skin on and eaten with butter and pepper. This is one of my fondest memories.

There are rare old strains of the ordinary Queensland Blue to be found, such as the Beaudesert Blue. Some of them are more ribbed than the new "improved" ones, some are drier with more of a chestnut after-taste and some have a thicker skin. In New Zealand there are more varieties to find than the Whangaparoa Crown and Triamble which are very fine strains in their own right.

QUEENSLAND ARROWROOT

CANNACEAE

Canna edulis [C. indica] – canna means reed, and edulis "edible" in Latin; indica connects the plant with India.

Origins: South America and the West Indies.

Description: This edible plant is closely related to the ornamental Cannas, except that it develops large tuberous rhizomes and has small orange flowers.
It has been domesticated in the Andean region, and is now a popular root crop right through South America. It is a market vegetable in Peru and Argentina where it is known as Achira. It even manages to survive at freezing temperatures and resists snow.
These cannas are good multipurpose Permaculture plants.

Propagation: The edible rhizomes are easy to divide. Set them to heal for a few days in the shade, trim the leaves and replant. Flowers are bisexual but seeds are not usually produced.

Usage: A man called G. H. Burke developed a mechanical harvester which was used on a commercial Queensland arrowroot farm in south eastern Queensland until 1965. The famous biscuits were made out of its starch.
One-year-old tubers can be made into arrowroot flour by grating or shredding them and mixing them with water. The fibrous pulp separates from the starch. Dried, the starch is in the form of large granules that can be seen with the naked eye. The arrowroot product is glossy and transparent when cooked, unlike potato starch.
Young shoots are eaten as a green vegetable in Ecuador, and the leaves are used as a wrapper to cook food in Asia and the Pacific. The young rhizomes can be eaten as a potato substitute. It is one of the root crops that can be eaten raw when very young. Pigs and cattle are fattened on its crushed tubers and its leaves. Great planted near the milking shed!
As it grows up to two metres tall, we use it as a windbreak to shelter other crops in the vegetable garden. Correctly installed, a row of arrowroot and a row of lemongrass (and comfrey) makes the garden edge impenetrable to invasive grasses.

Excellent for infants, and for people with digestive problems.

RADISH

BRASSICACEAE

Raphanus sativus – from the Greek raphanus meaning "easily grown" and the Latin sativus, "cultivated".

Origins: Radishes have a long history of cultivation and their origins are not certain. Alphonse de Candolle (1886) mentions that wild specimens were found near Mt. Ararat in Turkey, and in Palestine and Armenia. It is thought there are two major centres of origin: the warmer parts of Europe and Asia.

Description: The radish varies enormously in size and shape, from small red ones to large white ones.

Before you choose what seeds to save, see Simplicity Rating page 51.

Cultivation: Radishes can be sown quite close to each other and the thinnings, leaves and all, eaten. They need a rather mature composty soil to become crisp and mild-flavoured. In summer they would rather grow in shade, even in cool Tasmania.
Radish seeds are used as markers for crops that are slow to germinate, like onions and carrots.

Saving the Seed: Annual radishes such as the little round ones produce seeds in one season while the biennial ones such as the black winter radishes need two seasons. As they are insect-pollinated and self-incompatible, leave more than one plant to go to seed.
They will cross with wild radish, *R. raphanistrum*, but they will not cross with other Brassicas. Save seed from those plants that are last to bolt. They will produce stalks one metre tall. Some varieties send up particularly tall seed-heads and need to be staked and protected from the wind. Flowers are white, pink or purple and rely on insects for pollination. Insects sometimes snub radish in favour of a sweeter nectar such as clover. If you have one variety of radish still flowering when a second starts to flower, you can trim the flowers off the first variety. Utilise these in salads.
The long pods are swollen with only a few seeds in each. Cut the stalks when the pods are a pearl-brown and hang in the garage to dry further. Pods can also be picked individually and set out to dry on a screen. They will not shatter so they must be crushed to obtain the seeds. Be careful not to split the seed in the process. Dry the seed in a shady place for a further week or two depending on the weather. The seed is as large as a match head and the cleaning is easily done with first a large gauged screen to let the seed pass through and then a small gauged screen to get rid of chaff and dust. Pack and label with the date and varietal name.

Storage: The seeds are roundish and somewhat compressed. They will last for four years when stored correctly. If seeds are not properly dried before storing in an airtight container, they will not even last a year. There are a hundred seeds to the gram.

Usage: The French eat the small annual radishes as an entree. They dab a little fine butter on top, dunk them in grey sea salt, and eat them with chewy bread. The taste is very nutty, and is improved by mashing salted anchovies into the butter.
Winter radish used to be kept in a bran box and brought out for hefty soups. Oriental varieties are used in soups and Asian-style stir fries. They are "grated, pickled, carved for banquets and also dried" (Harrington, 1978).

The young seed pods are used as a green vegetable in Asia, and the leaves are edible as spinach if they are cooked in a large quantity of water to eliminate the bitterness.

Half a black radish with a groove scooped out, filled with brown sugar and left overnight yields a juice that relieves the symptoms of flu. Take once a day for a fortnight the extracted juice of radish to lower high blood pressure (Chang Chao-liang, 1989).

On the Lookout: A lot of Europeans have kept interesting winter radish varieties over the years. There are turnip-rooted, olive-shaped and half long types. Long rooted ones are: Long White Vienna, Marsh and Black Spanish.
The Palestinian radish arrived in Adelaide in the 1930's with immigrants and is a fine-flavoured stout black radish that is eaten with rock salt. Japanese Daikon, a long white radish, is slow growing with sparse foliage and a terrific texture and taste. It is the number one selling vegetable in Japan.

RHUBARB

POLYGONACEAE

Rheum rhabarbarum – rha was an old name for the River Volga, rhabarbarum means the "rhubarb of foreigners", from the other side of the Volga.

Origins: A perennial herb from the cooler parts of Asia: Tibet, East China and Mongolia. Marco Polo carried some rhubarb medicine back to Europe, and early explorers brought back different species of rhubarb from which crosses were developed to produce the garden rhubarb.

Description: A leafy plant, reaching a metre in height, with thick red stalks.

Cultivation: Regular watering, along with diluted liquid manure, helps stem formation. A good plant can produce for up to twenty years but the seed stalk should be cut back to conserve the plant's stem production.
Tolerant of shade. In places where there are hot, wet summers, the whole plant is stored in the fridge to preserve it until its next growing season.

Propagation: Rhubarb is usually propagated by root division at the dormant stage.

Saving the Seed: If the seeds are gathered, they can be saved but they will only last until the next growing season. The offspring from the seeds will not all be true-to-type. A wide range of seedlings may pop up, and from there selection should start.

Usage: Slow baking brings out the flavour. Rhubarb and apples are good companions in the kitchen.

The stalks are considered a tonic, but its leaves are so rich in oxalic acid that they can cause poisoning.
A relative of rhubarb, *R. palmatum* has been known to the Chinese for its medicinal properties for thousands of years. The yellow powdered roots are still used nowadays as a purgative, a tonic and for liver complaints.

On the Lookout: Most people acquire crowns of rhubarb through friends and their varietal names are often unknown or forgotten. You may have in your garden, without knowing it, a rare strain that has long since disappeared from commerce, such as Toblosk, Red Champagne, Victoria, Royal Albert or Early Albert.
Helen Fallshaw from Mentone in Victoria has had a rhubarb in her garden for a long time and she swears by it. The crown came from a man who was 90 years old at the time and is now gone. It is a large variety with a particularly fine flavour when cooked. She tells the story of the old man feeding cartloads of sheep manure to his rhubarb plantation.
Everbearing Ruby, Topps Winter and Sydney Crimson are reliable croppers in winter.

ROCKET
BRASSICACEAE

Eruca sativa – eruca is the old Latin name for "rocket", sativa means "cultivated".

Origins: Despite the renewed culinary interest in rocket, it is not a modern plant. It has been eaten for its tender though acrid leaves for at least 2000 years throughout western and eastern Europe.

Description: A low annual herb, it is also called Roquette and Arugula. A few different species of the genus *Eruca* are grown for salad in places like Crimea and Azerbaijan.

Cultivation: For best results, rocket should be planted in early spring or late summer. Successive sowings ensure a continuous supply of fresh leaves. It will prematurely go to seed if it lacks water.

Saving the Seed: Rocket will not cross with any other Brassicas. Insects have to work on the flowers to fertilize them. At the end of the season, or when the temperature is at its highest, rocket throws little fragile stems, at the end of which are small, dainty, pale yellow flowers with purple veins.
Being a Brassica, it forms little siliques. These contain tiny red seeds and shatter when shaken. Hardly any winnowing or sieving is needed to clean the seeds.

Storage: The seeds are very small, reddish-brown, and will remain fertile for another two seasons at room temperature. There are 500 seeds to the gram.

Usage: Only early and tender leaves of rocket are suitable for the table. After the abuse of salad's reputation by the dominance of Iceberg type lettuces there is a revival in the consumption of mixed salad greens. The famous French "mesclun mix" is a blend of a few leaves of several types of lettuces, chicories, other greens and rocket.
Fertilizing with fresh manure gives this plant an unpleasant flavour.

Rocket has a reputation for stimulating digestion.

On the Lookout: Rocket Improved is a spicy new variety that is less inclined to bolt.

ROCKMELON
CUCURBITACEAE

Cucumis melo – cucumis is the Latin for cucumber and melo from the Greek, for apple.

Origins: From tropical western Africa and introduced to southern Europe 2000 years ago. Melon has been a popular fruit for a very long time.
A distinct group of melons, the cantaloupes, was developed in a place called Cantallouppi near Rome, where they became very popular with the Emperor Tiberius. The general Lucullus introduced them to Armenia from where they reached Iran, which became a secondary centre of diversity.
Columbus introduced them to the Americas on his second voyage. The English discovered the delicious fruit in the 16th century.

Description: Rockmelon needs no introduction to most people, but the wide variation that exists is not represented commercially.
Their shape and size can resemble anything between a cucumber and a pumpkin. The surface can be deeply netted and even heavily warted, with skin colouring from white to black with flashes of green and yellow. The flesh can be green, yellow, orange or reddish orange. The seeds are usually beige. In Asia there are non-sweet sorts of melons which are used as squash and for preserves (*see* Oriental Cooking Melon *C. melo*, Conomon Group).
Other subspecies of melons are:
Cucumis melo, Chito Group – Vine Peach or Mango Melons which have small leaves and orange fruit.
C. melo, Flexuosus Group – Armenian Cucumbers.
C. melo, Reticulatus Group – Muskmelons and Netted Melons, including the commonly available rockmelons.
C. melo, Inodorus Group – Cassaba, Honeydew Melons and Sweet Chinese Melons which are smooth, large, with a very thick shell and suitable for storing up to three months.
Please note that watermelon (*Citrullus lanatus*) is in another genus altogether.

Cultivation: Southern European farmers prefer two to three year old seeds. They often pre-germinate them in a warm compost for twenty four hours, wrapped in a moist cloth. To be sweet, melons need a long frost-free growing season. However, Oriental Cooking Melons take only two months to give a crop.
Tip pruning can be done at a very early stage and will benefit the setting of fruit by encouraging many growing tips and the formation of early female flowers.

Saving the Seeds: Rockmelons will cross with the other melons mentioned above but they will definitely not cross with watermelon. There will need to be 400 metres between any two varieties of rockmelons to raise pure seeds, so check what your neighbour is growing. For foundation seeds an even longer distance is required (800 metres).
Hand pollination is a particularly fiddly job on rockmelons. The flowers are very small and the plant naturally aborts three quarters of its female flowers. Note that the very first female flower is the most likely to set fruit. It will be harder to tell with rockmelons whether a flower is ready to open the next day than it is with pumpkins.
Selection must be made for a vigorous plant: to start with, plant six seeds for each hole and rogue out the weak seedlings, leaving only the two best so that the pollen of non-conforming melons will not contaminate the true-to-type ones. Rogue out any weak vines during the growing period. The second selection happens at harvest time: choose the plants with melons that have a fine flavour, deep-coloured flesh and a small seed cavity.
Pick fruit as for the table and allow to ripen another two days. Scoop and rinse the seeds under a tap, drain, and dry for a week or so.

Storage: Store in a labelled airtight container. Rats love the seeds so much that they have been known to deliberately nose a glass jar of seeds down to break it.
The seeds will last five years if stored in a constant cool temperature. There are thirty seeds to the gram.

Usage: Generally, it is better to pick rockmelons a few days before consumption so that they can spend time in a cool spot before being consumed.
Rabelais, a gourmet writer of the Middle Ages, had a delicious method of preparing rockmelons. He punched a hole in them the size of a ten cent piece and with a silver spoon he removed the seeds. He then filled the cavity with

wild alpine strawberries, sugar and a quarter of a litre of Madeira wine. He replaced the cap and stored the fruit in the cellar for a few hours before eating.

The seeds are supposed to contain an active ingredient which hinders giardia, a tropical bowel parasite. Blend seeds and pulp together and drink a cupful at once.

On the Lookout: Many older gardeners fondly remember the Green Climbing Melon, the Pineapple Melon, the Cavaillon, Winter Malta, Hackensack, Early Irondequoit, Greely Wonder and Table Queen.
The more unusual include pocket melons like Queen Anne's, which was kept for its perfume in the gentry's pockets to offset body odours, and winter-keeping melons, like Golden Beauty. Then there are Sakata's Sweet and Takii's Honey which are small, yellow-skinned and egg-shaped and have very aromatic flavours.
From warmer Australia several gardeners have sent us what is fondly remembered as the Indian Cream, or Cobra, Rockmelon. It is mostly older gardeners who are keen to get hold of these. Says Henry Jones from Augathella, in central Queensland:

> I was given the Indian Cream by a drover way back, and have kept it ever since. When it is ripe it splits open, falls off the vine and has a strong smell. It is a very dry fruit with a dark pink flesh and oblong in shape. Many people use them in a fruit salad with passionfruit. The seeds are smaller than regular rock melon's.

ROSELLA

MALVACEAE

Hibiscus sabdariffa – hibiscus is the Greek word for "marshmallow"; sabdariffa is the Turkish name for rosella.

Origins: Native to tropical West Africa, preferring warm climates.

Description: Rosella is an annual bush to two metres with sparse foliage and beige flowers which have a scarlet throat.

Cultivation: Plant at the beginning of the warm season directly where it is to grow.

Saving the Seed: Although related to cotton and okra, rosella will not cross with them. The seeds are a little larger than radish seeds and are easily collected from the pods that are left after harvest.
Wear gloves when crushing the pods as they may be prickly. Winnow until only the seeds remain.

Storage: Seeds will last two to three years. There are seventy seeds to the gram.

Usage: Rosella's reddish leaves and hibiscus flowers add colour to the garden.
After the petals have fallen away, the fleshy sepals which enclose a seed pod remain. These red sepals are boiled to make excellent jams and drinks. They are sun-dried and made into Karkade, a north African tea which is well known in Europe. The proprietary Red Zinger tea has rosella as its essential ingredient. In Switzerland, rosella is popular in wines and sauces.
According to the South Pacific Commission, rosella's leaves are edible when stir-fried or steamed and it is called Red Sorrel (*South Pacific Foods Leaflet, No.6*, 1983). Its stem yields a fibre that is useful as string in the garden.

Before you choose what seeds to save, see Simplicity Rating page 51.

ROSEMARY

LABIATAE

Rosmarinus officinalis – from the early Latin ros maris meaning "dew of the sea", and officinalis, "the apothecary shop".

Origins: The Mediterranean, particularly coastal areas, where it is still seen growing wild.

Description: Rosemary is an aromatic evergreen shrub with needle-like, leathery leaves, the flowers being pale blue and sometimes white. Rosemary can grow wild in dry temperate climates and soils which are similar to its place of origin. When established in the right climate, rosemary can last for decades – we found an ancient rosemary hedge in an abandoned churchyard near Peterborough, in South Australia where the flowers, heavy with oil and smelling divine, thickly covered the bushes.
Sprigs of the rosemary of remembrance are worn on Anzac and Armistice Days in honour of soldiers who died in Europe.

Cultivation: Well drained soil in a rather temperate climate is rosemary's preferred habitat.

Propagation: If you live in a wet climate as we do, then "keep planting it," says Alfredo, our illustrator. Keep taking woody cuttings and planting them in good soil with at least one third of the length under the surface; that way, if "The Wet" gets them, others are replacing them.

Saving the Seed: Seeds of rosemary are very small and can be collected for replanting. Attentiveness to the plant to observe the formation of the seeds after the flowers is essential or they will fall off.

Storage: The seeds last one year and there are 900 to the gram.

Usage: Along with the other herbs of Provence, thyme, sage, oregano and lavender, rosemary is an excellent complement to roast lamb. One method is to serve the meat on a bed of fresh herbs, the dripping juices releasing the perfume up into the meat.

Rosemary is reputed to improve memory and is used as a general tonic.

On the Lookout: Joyce de Baggio is variegated with a yellow edge and green centre and Tuscan Blue's large leaves dry well which makes it attractive to herb growers.

RUNNER BEAN

LEGUMINOSAE

Phaseolus coccineus – phaselos means bean in Greek; coccineus means "scarlet" in Latin. Old gardening books call the runner bean *P. multiflorus*.

Origins: The Aztecs cultivated and bred runner beans in the sub-tropical highlands of Mexico and Guatemala long before Cortez arrived. The seeds of runner beans were found in ancient tombs but predictably they would not germinate.
The English brought this vegetable to Australia in the early days. It is also known as Scarlet Runner, Seven Year and Butterfly Bean.

Description: This bean is a perennial and is often grown as an ornamental, because of its beautiful clusters of red flowers.
The seed leaves, or cotyledons (the two leaves that are kidney-shaped, and are the food reserve for the germinating bean), remain underground. This is the way to distinguish between a climbing (French) bean *(P. vulgaris)* and a runner bean *(P. coccineus)*. Also, the seeds are much larger than the common bean, much fatter and often have a purple seed coat with a few black lines.

Cultivation: Avid climbers, they require a strong trellis, such as a tripod or an archway, a garden shed or a tall fence.
Runner beans will grow for several years, resprouting from their tuberous roots, where the ground does not freeze deeply. This is why they are often called Seven Year Beans. They should be placed in a spot where they can last for some time and where they have plenty of height for climbing. They are nevertheless also treated and behave as an annual in cold areas.
For these beans to really thrive, the soil in which they are to be grown needs some micro-organisms, called rhizobia, to help the plant to fix, or produce, nitrogen. This can be supplied by a handful of soil from a garden where runners have been growing. The process is called inoculation and it improves the nodulation rate. Specific innoculants for many legumes are available from seed houses and produce stores. Note

that some garden soils already have suitable micro-organisms.
In places where winters are severe and the growing season short, runner beans sometimes have to be started indoors to produce mature seeds. Runner beans can take cooler weather than the French bean and are suited to temperate areas of southern Australia and New Zealand.

Saving the Seed: Although they are self-pollinating, they need insects or wind to shake the flowers in order to produce beans. Their flowers are also more apt to be cross-pollinated than those of the common bean.
If you have several sorts of runner beans from which you intend to save seeds, isolate by a garden's length and bag the finest flowers before they open to ensure purity. Tap on the flower as the insects do, in order to pollinate them.
Varieties indigenous to Mexico and other parts of Central America are day-length sensitive and will only start producing pods when the days get longer. Although this trait has been bred out of many cultivated varieties, some runner beans will not set seed at all even though they flower profusely in the warm northern latitudes of Australia.
Harvest and process as for other beans (*see* Bean).

Storage: Provided there are no weevils or other storage insects, the seeds last three years and there is one to the gram.

Usage: The English traditionally eat runner beans as green snap beans whereas southern Europeans eat them as green-shelled beans or as dried beans which contain about twenty percent protein. Their big pods demand to be cut in slivers for faster cooking.

On the Lookout: The beans can grow to mammoth proportions. Vilmorin (1946) records Haricot d'Espagne Blanc (White Spanish Bean) and Haricot Bouquet (Posy Bean), as attaining forty cm (one foot three inch) in length and two and a half cm in width. Some runner beans have white flowers, others red and others two-toned white and red.
A Seed Saver subscriber from Glebe in Sydney, says about her Butterfly Runner Bean:

> It was capable of withstanding the worst wet weather during a month of constant deluge, when ordinary beans rotted before reaching maturity. My runner bean vine also provided a constant harvest as well as providing cover for a ten foot high pergola and an eight foot high netting fence. Those planted last year formed superb tubers.

Runner beans have edible tubers. With the present rise in the amount of UV radiation piercing the atmosphere, it is well worth covering pergolas with all sorts of useful vines.
Look out for Best of All, a famous purple and black seeded English variety, Streamline, Scarlet Emperor, Painted Lady, White Czar and the very beautiful jet black Czar.

SAGE
LABIATAE

Salvia officinalis – salvia comes from the Latin salvere, meaning "to save" and referring to its life-prolonging properties; officinalis means "the apothecary shop" in Latin.

Origins: The Mediterranean coast. The seed was transported by the Roman legionaries to many parts of their Empire.
Sage, rich in essential oils, was cultivated in the late Middle Ages in large acreages for the apothecary trade. There are remains of herb plantations scattered throughout French Provence offering ancient strains which were selected especially for their medicinal properties.

Description: A low-growing, hardy, perennial shrub, sage loves dry limestone slopes. The leaves of various species and varieties of *Salvia* differ in shape and colour. The flowers, produced in spikes, are white, blue, mauve, purple or red.

Cultivation: The fact that sage has dry and rocky ground as its natural habitat means that, for best results, you should emulate this in your garden.

Propagation: Sage can be propagated by cuttings. As with most herbs, take the woody thick stems and bury at least half the length in good soil.

Saving the Seed: Sage plants are reputed to flower earlier when started from seed. In late summer the flowers appear and they turn into sticky, bell-shaped capsules containing several seeds.
Harvest the seeds when the capsules are dry and brittle and thresh them by rolling in the hands. Winnow the stalks and large debris and sieve off the dust with a fine-gauged sieve. Some interesting recessive genes (purple strains for example) may materialize. It may be worth marking the mutants, saving their seeds and regrowing them in isolation.

Storage: The seeds last three years and there are 250 seeds to the gram.

Usage: As a culinary herb, sage is popular amongst Italians, used especially with fish and poultry. In America, sage is the classic herb for flavouring roast turkey stuffing, in England, duck, and in France, pork stuffing.

Sage tea is an antiseptic and is good as a gargle for sore throat and tonsilitis. Rubbing fresh sage leaves on teeth really whitens the enamel and keeps gums healthy. Sage teas used to be massaged into hair to give it a darker hue.

On the Lookout: There are 750 species of *Salvia* with a wide distribution throughout the world.
S. splendens – Scarlet Sage or Pineapple Sage. This tender perennial shrub, a native of southern Brazil, is cross-pollinated by insects. Only one cultivar of Pineapple Sage should be grown in the same garden if you wish to harvest pure seeds.
S. sclarea – Clary Sage grows wild in southern Europe. It is a showy perennial and cross-pollinated by insects. It is the basis for an aromatic and medicinal oil and was used in the Middle Ages for flavouring wines, soups and egg dishes.
S. pratensis – Meadow Sage, the first salvia in spring to bloom in the garden. It is an aromatic perennial with blue flowers and is native of Morocco.
The seeds that you save will come true-to-type, although rigorous selection will have to be done as for most flowers. Intensity of colour and size of flowers are the criteria.
S. colombariae – Chia is a hardy annual growing up to one metre high. The luminous blue flowers are followed by a seed head that looks like an ear of wheat. It is a native of Arizona and Baja California where its seeds were used by the Native Americans as a sustaining food during long hunting parties and wars.
As a survival food, one teaspoonful is supposed to sustain a person for a whole day and night. The Indians roasted and ground the seeds, then moistened them. A mucilaginous mixture, several times its original mass was thus formed. The Conquistadors quickly learned the value of chia and used it, not only as food, but also in a poultice to treat gunshot wounds.

SALAD BURNET
ROSACEAE

Sanguisorba minor and ***S. officinalis*** – from the Latin sanguis for "blood" and sorbere "to soak", referring to the reputed power of the plant as a blood coagulant. You may find it under *Poterium sanguisorba* in older books.

Origins: Salad burnet is found wild on the upland, dry chalky soils and in coastal areas of southern Europe. It has naturalized as one of the many herbs present in natural unploughed pastures.

Description: Salad burnet is a hardy, low, perennial bush. The leaves, which come directly from the root crown, are arranged along long, thin stems.

Cultivation: Sow in spring and keep harvesting and nurturing the plant to encourage the growth of new leaves. Salad burnet is a great border plant.

Saving the Seed: At the end of the first growing season, the luxuriant feathery foliage will throw long, slender flower stems, with an inconspicuous tight rose and white knot of tiny florets at the top. The little heads will drop their ripe seeds if left unchecked.
Burnet is a profuse self-seeder. It seems that there is more seed set if several bushes are allowed to go to seed simultaneously. Roll the dry seed heads, which produce two seeds each, between the palms of your hands, sieve and winnow to remove the chaff. Root division is another valid way of propagating salad burnet.

Storage: Seeds last two to three years, and there are about 150 to the gram.

Usage: This hardy little bush can withstand drought, after which its leaves become tough and barely edible. Only young and tender leaves should be eaten. Cucumber flavoured, they are added to green salads in winter. They are better eaten raw, because they become bitter when cooked.

SALSIFY

ASTERACEAE

Tragopogon porrifolius – from the Greek tragos for "goat" and pogon, "a beard" referring to the bristle-like seed head; porrifolius means "leek-leafed".

Origins: Southern Europe, where it is still gathered wild. The Italians began to cultivate it in the 13th century. In New Zealand as well as the Cape Province in South Africa, where the climate is Mediterranean, the plant has naturalized itself and is wild-harvested for the table.

Description: Salsify, also called Oyster Plant, is a biennial with a long, thin root and flat, greyish leaves.

Cultivation: Sow in autumn directly into ground which has been manured at least a year beforehand. Fresh or excessive manure will cause forking of the roots. During harvest, care must be taken that the root is not broken because the plant will bleed and the flavour will be diminished.

Saving the Seed: Sometimes salsify under stress goes to seed in the first year, but it will usually not produce a seed stalk until the second year. Allow the best specimens of your crop to remain in the ground after the first season. In the rare places where the soil freezes, select the straightest, smoothest roots after the harvest, and store them to replant in their second year. From within its leek-like leaves a branching cylindrical stem will appear. The flowers are a briefly spectacular rich purple, opening around dawn and closing before noon, looking somewhat like thistle-heads. They will grow in succession and therefore mature over quite a long time.

Watch out for birds eating the seeds. When the fluff gets whitish, the flowers must be cut and beaten on a large sheet of paper. Successive seed harvests will have to be made as seeds fall easily to the ground.

The seeds are white, light brown or dark brown, smooth, very long and sharp on one end. They are easy to clean because the seeds and chaff are of a different size, texture and weight. Just rub the ripe heads in your hands, and winnow to get rid of debris which could harbour insects.

Storage: The seeds will last only one year if kept in a paper or plastic bag, but three to five years if stored in an airtight container. There are a hundred seeds to one gram.

Usage: There is a popular belief that salsify tastes like oysters, which accounts for its common name. Its taste improves with cold weather. To scrape salsify roots with ease, soak them overnight.

If some salsify have managed to go unharvested and their roots reach their second year, the young spring leaf shoots can be blanched in the garden, by putting, say, a garden pot on top, to deprive them of light. They make an unusual and tender addition to green tossed salads. The young flower stalks, if cut in the spring of the second year (too bad for seed saving), are eaten as an asparagus.

Salsify juice has been reported as effective in treating warts.

On the Lookout: Ask amongst your gardening southern European friends and neighbours for this somewhat rare vegetable.

Scorzonera hispanica (the first word meaning "black skin" in Italian and the second word meaning "Spanish" in Latin), is also known as Black Salsify, Viper's Grass or Scorzonera. It is a perennial, but is cultivated as an annual and is excellent eating too.

Before you choose what seeds to save, see Simplicity Rating page 51.

SILVER BEET

CHENOPODIACEAE

Beta vulgaris ssp. ***cicla*** – from the Latin for a common beet.

Origins: Native to the sea coast of Spain, Portugal and islands of the Mediterranean Sea. In their *Dictionary of Cultivated Plants and their Centres of Diversity* (1975), Zeven and Zhukovsky pointed out that the sugar beet selected for its root may have had the same origin as silver beet.

Wild sea beets are still found in the Cape Verde Islands, the Canary Islands and Sicily. They provide a source of resistance to diseases like yellow mosaic in beets, and variability for breeding new varieties.

Sugar beet, forage beet and beetroot are also classified as *Beta vulgaris*.

Description: Silver beet has been used for human consumption and animal fodder for centuries. It is also called Swiss chard. The rainbow chard has purple, orange, red or yellow stems.

Cultivation: Popular with gardeners because it is so easy to grow. Each multigerm (polyembryonic) cluster of seeds contains between two and five seeds. If you plant an unbroken cluster you will have to thin the plants out, but clusters can be broken up by placing them in a bag and softly pressing against them with a rolling pin.

Care must be taken not to overmanure the plants as undesirable nitrates will concentrate in the leaves which will turn blueish.

Saving the Seed: Silver beet is wind as well as insect-pollinated, and a biennial. In warmer Australia, silver beet tends to go to seed in less than twelve months. It will cross with other beets and beetroot within miles if the prevailing wind direction runs between them. When flowering, it can be bagged to exclude foreign pollen and insects. If you are after a large number of seeds, do not pick the leaves and let more than one plant go to seed because beets are somewhat self-incompatible – they need company!

The centre of the leaves will start throwing some smaller leaves and developing a flattish and branchy stem, which may attain 1.5 metres. Prune the tips of the branches because the ends of branches give only tiny seeds.

Start harvesting when most of the seed clusters have turned light brown. Run your fingers up the stems. You will get small leaves which can be winnowed out and small seeds which can be discarded with a large gauge sieve. The good seeds will remain in the sieve. Do not dry them in full sun.

Storage: The seeds will last up to ten years if stored in optimum conditions. There are sixty to ninety seeds in a gram.

Usage: Some varieties are bred for their fleshy leaf stalks rather than their leaves. These chard stalks can be used as moisturizers in cooking or served on their own, steamed, with a white or cheese sauce. Italians favour steamed stalks, battered and fried in olive oil. A small amount of silver beet leaf is sometimes added to salads. For teenagers some relief of acne may be gained by applying vinegar that has had silver beet seeds soaking in it for three to five day. Apply every day for one week (Chang Chao-liang et al, 1989).

On the Lookout: The types with light-coloured leaves have a sweet taste and the dark green are more acrid. There are three groups of silver beet:

- The altogether small and quite decorative light green one with much crumpled leaves and a very narrow petiole, or chard. Lucullus is in this group. A variety that we have at Seed Savers, the South European Spinach, has a superior flavour, somewhat like mushrooms. Strains of this spinach are a common sight in Italo-Australian kitchen gardens.
- A medium-sized green one with smooth leaves and very broad chards. Large ribbed White Silver Leaf is in this group.
- A big one with tall dark green leaves and broad chards. Fordhook Giant and rainbow chard are examples of these.

A subscriber to Seed Savers from Melbourne wrote:

> I obtained seed from a Greek friend of something that he calls spinach beet but what I would call silver beet. It has red

stems and red veins on the leaves and he says that it comes from the island of Imros.

These seeds come right from the centre of diversity of *Beta vulgaris*, a true original that may have been domesticated on this very island!

SNAKE BEAN

LEGUMINOSAE

Vigna unguiculata var. ***sesquipedalis*** – from an Italian Professor Vigna and ungui means "bearing a fingernail"; sesquipedalis means "one and a half feet in length".

Origins: The snake bean evolved in South Asia from the cowpea *(V. unguiculata)* which arrived there from Africa in early times.

Description: The snake bean has an extended pod which is the edible tender part, whereas the cowpea is short, has a parchment, and is valued for its dry bean.
There are climbing types of snake beans with very vigorous vines, and dwarf types. Both types are suited to long summers, and they are sensitive to cold. The pale mauve flowers are borne in pairs at the end of an elongated stem. Also called the Yard Long Bean and Asparagus Bean.

Cultivation: They are very prolific and love warm soil, but need to be grown briskly with plenty of moisture. Because the vine or bush gives many crops, care should be taken during harvest not to damage the tip that produces the beans. Just twist, don't pull.

Saving the Seed: The flowers are automatically self-pollinating. To leave the whole vine or bush to go to seed slows down the production of green beans. Beanpods that are left unpicked shrivel, turn beige and end up as seed. It is well worth picking at random the seeds of dried pods that have become too big for the table.

For top quality seed stock, leave all the beans on the most vigorous plants for seed. The dry pods are easily shelled. Hardly any more drying is needed before storage. A medium-sized sieve will get rid of most of the debris.

Storage: The seeds last from three to eight years and there are approximately five to the gram.

Usage: For best use, stir fry the young pods the Chinese way, with a little oil, garlic and ginger and a splash of soya sauce at the end. Boiling sessions make the beans floury and give a bad name to these delightful beans.

On the Lookout: Chinese market gardens are a sure place to find interesting sorts. We have found varieties with striped pods and both black and red-brown seeds. The Country Women's Association of Premer near Mudgee grew and packaged very fine crops of black-seeded climbing snake beans and these were sent as aid to the Penan tribespeople in Borneo.

SORREL

POLYGONACEAE

Rumex spp. – rumex is the name in Latin for sorrel.

Origins: Europe and Asia. Sorrel is a wild herb of the meadows taken to the garden for convenience's sake. In the process, seed savers have greatly improved it.

Description: Sorrel is a hardy perennial that varies considerably between species and varieties. A relative of rhubarb, dock and buckwheat belonging to the Polygonaceae family (also called the goosefoot family).

Cultivation: The more sunny the site is, the more acid the leaves will be. To harvest, pull the outer leaves instead of cutting the lot with a knife.

Propagation: Sorrel is most often propagated by root division. This is done, when the plant is dormant, by cutting downwards with a shovel to break up the clump into separate crowns for replanting.

Saving the Seed: Seeds can be collected and new plants propagated from them. Sorrel tends to form seed heads from spring onwards and shortly after maturity.
The whole stalks can be harvested when the seed is brown, but not darkish-dull. Hang in a paper bag until completely dry. Seed formation slows down the leaf production so reserve just one or two clumps for seed, and trim any seed heads that develop on other plants.

Care should be taken to harvest the seeds when they are light brown. They spoil if left standing too long in the garden.

Storage: The seeds, which are blond, round and flat, will last for only two years in storage. There are 1000 seeds to the gram.

Usage: The acid leaves add tang to green tossed salads. Sorrel is used in many soups and sauces in traditional Parisian restaurant cooking as well as in modern French *nouvelle cuisine*, literally "new kitchen" (low cholesterol cooking served in tiny portions with high price tags).

Its cooking water is used to clean bamboo furniture and silverware. The juice of its leaves is an antidote to nettle stings. Sorrel aids the digestion of hard-boiled eggs. Not recommended for arthritic patients because of its oxalic acid content.

On the Lookout: Some very large leaf sorrels were selected last century.
R. acetosa is the garden sorrel. Acetosa in Italian means sour. It has broader, meatier and tastier leaves than other species. Hard to find cultivars include Belleville Large, Lettuce Leaf and Blonde. The seed is small, shiny, brown and triangular. It grows well in moist soils.
R. scutatus, meaning shield-shaped, is what the English call the French Sorrel and the Russian call Rimsky Tchavel. It is very acid but this is compensated for by its resistance to heat in the garden. Although it grows in dry, sandy soil in a sunny location, French Sorrel responds well to a good supply of moisture. It is mostly grown in summer. Silver Leaf is a named variety.
R. patienta also called Patience Dock, Herb Patience or Monk's Rhubarb has long and narrow leaves and compact heads when flowering. The seeds are light brown, triangular and larger than sorrel seeds. Its leaves are not acid and are very productive. It produces leaves two weeks before the other *Rumex*.

SOYA BEAN

LEGUMINOSAE

Glycine max – from glycys which is Greek for "sweet".

Origins: The soya bean is believed to have evolved from wild ancestors in China over 5000 years ago. There are about 2500 varieties, indicating its wide use.
Even with thousands of years cultivation in China, garden varieties suitable for the table are not easily available, at least in the West. Our breeding efforts concentrate on large acreages of varieties suited for making paint, stock food, cardboard, glue, pet food and oil.

In 1939, Germany stocked several million tonnes from which glycerine and munitions were made. (USDA, 1961).

Description: The plant is a bushy annual and grows from sixty to ninety cm (two to three feet) high, with masses of beans hiding under the leaves.

Cultivation: Soya beans are planted at the outset of the warmest time of the year and need a long growing period.

Saving the Seed: Soya bean's flowers are automatic self-pollinators. They are fertilized before they open. In about three months, when the beans rattle in the pods which split with only a small amount of pressure, it is time to harvest the thickest, healthiest bushes. This is when the first selection is made.

Dry indoors until all the seeds are thoroughly dry and feel hard. To shell, place them on a tarpaulin and then walk over it. The second selection is made by choosing the largest and heaviest seeds. This is done with a large-gauged screen.

Storage: In dry climates, seeds can be stored in a hessian bag for a few years. There are five to ten seeds to the gram.

Usage: In industry, soya is a great emulsifier and binder. A synthetic hormone has been extracted to make a birth control pill.
Make soya milk in the kitchen the Vietnamese way by soaking one kilogram of soya beans for eight hours, reducing them to a pulp in a blender or food processor. Extract the raw milk by forcing cold water through a muslin containing the mush. Then remove all bitterness by simmering the frothy milk, constantly stirring for twenty minutes. At this point the milk can be sweetened and flavoured, if desired.
There is also a hot water method which gives a more creamy texture similar to commercial soya milk. Use gloves for this process.
Soya milk goes sour just as cow's milk does and should be stored in a cool place.
Soya sauce is made in Asia by a process of fermentation. Tofu (soya bean curd) and tempeh are fermented derivatives and are common throughout Japan, China and Southeast Asia.
The young leaves of some garden varieties of soya bean bushes are eaten steamed in Java. A mixture of soya beans and barley, both roasted and ground, made a coffee substitute in wartime Europe.

On the Lookout: Some varieties are only suitable for making into soya milk, others contain more fat for fodder or industrial use. There are some varieties that can be eaten as green shelled beans (Vegetable Soya – worth enquiring around for) and others that, as dry beans, require hours of cooking to be edible.
Seeds can come in white, beige, black, greenish-grey with white spots, and variegated red.

SPINACH

CHENOPODIACEAE

Spinacia oleracea – oleracea means "vegetable-like" in Latin.

Origins: South-west Asia, Iran to Manchuria. Spinach is recorded as arriving in China via Nepal in the 7th century, and in Spain with the Moors around 1100.

Description: Spinach is a low, broad-leaved annual.

Cultivation: Broadcast in autumn and thin out. Spinach can grow in the semi-shade. It withstands below-zero temperatures, but bolts rapidly in the heat.

Saving the Seed: Hollow seed stalks shoot from the centre of the bunch, triggered by lengthening days. If you let enough plants go to seed, you will notice that there are five different sexes – that is ordinary males; extreme males that are usually short; females that produce the seed; hermaphrodites with both male and female flowers; and extreme, vegetative, males that produce no flowers.
Both male and female flowers are inconspicuous, having no petals. Extreme male plants are small and, being undesirable, should be rogued out as they have early-bolting characteristics.
Crossing between varieties will occur over long distances because spinach depends on wind for pollination. Harvest the selected plants when the stalk is still green and the seed heads are brown and hard. Leave them to dry further in the shed.
Using gloves, start stripping the plants upwards. Spinach seeds are either prickly or smooth depending on type.

Before you choose what seeds to save, see Simplicity Rating page 51.

Storage: Seeds will retain fifty percent of their vitality after five years' storage. There are seventy prickly seeds, or eighty smooth ones in a gram.

Usage: Spinach takes quick cooking, and dairy products as accompaniments.

On the Lookout: Considerable breeding and selection has been done on spinach to reduce the percentage of male plants, as they go to seed first.
The Savoy, or crinkly, types are slower growing and do not bolt to seed rapidly. Examples are Victoria and Long Standing Bloomsdale.
Varieties with a spiny seed: Japanese Soshu, (the fastest growing of all) and the English Spinach.
Those with a round seed: Broad Flanders, Savoy Leaf, Elephant Ear, Victoria Dark Green and Monstrous Viroflay.

SPRING ONION

AMARYLLIDACEAE

Allium fistulosum – allium means garlic in Latin and fistulosum means "hollow-stemmed".

Origins: Spring onions originated in the Altaic Mountains east of Mongolia and were probably cultivated first in China and Japan. They entered Europe from Russia with invaders in the Middle Ages.

Description: Spring onions are a perennial. If you are using a recipe book there are many other names that spring onions may be called. They are commonly referred to as shallots, as well as welsh onions, scallions (particularly by Americans), and Japanese bunching onions. The Chinese call them green onions.

Each onion does not form a proper bulb, as the eschallot does, but rather divides its stalks throughout the year to develop a cluster of little onions at its base. One spring onion makes more!
Spring onions as a product can be obtained by harvesting an early variety of white-bulbed onion at a very immature stage.

Cultivation: This is another very useful Permaculture plant as it can be harvested from the side of a clump as required without having to pull out the whole bunch. The Japanese hill soil around spring onions in order to blanch them.

Propagation: Clumps can be divided most easily in winter when they are dormant. Cut the clump into individual onions with a downward stroke of a sharp knife. Make sure that the root bases are left intact. As with most onions, trim both the tops and the roots before transplanting.

Saving the Seed: If you have more than one sort of *Allium fistulosum* and want pure seeds, you will need to use the caging technique. Alternatively separate your plants by a garden length or a hundred metres from another simultaneously flowering onion.
Treat them as onions for seed saving, keeping in mind they have been known to cross with an ordinary onion *(Allium cepa)*. Incidentally, the flowers at the apex of the umbel (flower ball) open first.

Storage: Like all onions, the seeds will not last longer than a year or two in ordinary conditions.

Usage: Use as a garnish either whole, or chopped.

On the Lookout: The cold-hardiest spring onion is Red Welsh, which the French call Ciboule Commune Rouge. Benizone has violet-coloured stalks and is also suited to cold areas. Beltsville Bunching will withstand hot and dry conditions more than most.

SQUASH

CUCURBITACEAE

Cucurbita pepo – cucurbita means gourd, and pepo pumpkin in Latin.

Origins: South and Central America. The name squash comes from Askuta meaning "uncooked" in Massachusetts and Algonquin American Indian tongues. Pumpkin and squash are interchangable terms, depending on what country you live in.

Description: There are both vining and bush types but both have leaves shaped rather like grape vine leaves. The stems of the fruits are prickly and have five angles. The seeds are small, flat, white and grooved around the edge.

Included in this group are zucchinis, crooknecks, vegetable marrows, acorn squash, scallops, vegetable spaghettis, and some small decorative gourds.

Summer types, such as zucchini, grow fast and are all eaten immature. If they reach full seed saving size, they are hardly recognizable and barely edible. Winter varieties are eaten at maturity.

Just to confuse us, members of *C. maxima, C. moschata* and *C. mixta* groups are also called squash. Hubbard squashes, for instance, are a *C. maxima*.

What Americans call squash, we call pumpkin. However, if the foregoing description of the leaves, fruit stems and seeds is referred to, positive identification of *C. pepo* can be made.

Cultivation: Plant squash in spring and summer. Place manure or compost into a hole that is a metre wide and thirty cm deep, and build the topsoil back up into a plateau. Sow three to six seeds in a ring on top of the plateau. Thin out to the two or three strongest plants.

Saving the Seed: See Section Eight for details on isolation and hand pollination. Choose a good-looking plant free of powdery mildew. Allow a single fruit to grow to full size and become hard. This will be about two months after the flowering stage. The plant will slow down in yield as a great deal of energy goes into the production of seeds.

Store the fruit after picking, to further mature the seeds. Scoop out seeds, wash, dry for two weeks and label.

Storage: Seeds last three to ten years. There are six to eight seeds to a gram.

Usage: Summer squash should be picked for eating while very immature and tender (one of the advantages of having your own garden).

Some squashes are even picked with flowers still attached. Squash flowers are eaten raw, and stuffed.

Matured winter varieties can be baked much like varieties of gramma and pumpkins, or made into soups. Squash seeds are tasty and nutritious.

On the Lookout: Squashes divide into the summer types which are harvested when about half-grown before the seeds have become hard, and winter types which have shells that are hard enough to permit them to be stored during the winter, (often called pumpkin in Australia).

The Gem Squash from South Africa is a prolific and hardy vine. Emmie Ramsay of Warooka, SA, who obtained some seeds from a man who has since died writes:

> It climbs or spreads along the ground like pumpkins or cucumbers, has leaves about cucumber size and grows to about orange size. We started picking them before the end of January and we were still picking a few in mid May. They should be picked while still green – before they turn orange. We have been growing them for thirty years.

They are also picked mature, stored and then boiled whole and eaten in their own shells.

There are the scallop-shaped types such as the Yellow Bush or Yellow Custard, which is exceptionally fine-grained, and the white Patty Pan. Tender and True which is round and flattened at top and bottom is an old English squash. Yellow Crookneck is curved and extremely decorative as well as productive.

Amongst the zucchinis, Cocozelle is striped and best harvested when 15 cm long, and Ronde de Nice (round of Nice, a southern French place) is round and eaten in ratatouille when about cricket ball size.

SUNFLOWER

ASTERACEAE

Helianthus annuus – from the Greek helios for "sun" and anthos for "flower".

Origins: Sunflower is native to North America (Utah and Arizona) where it has been cultivated for 3000 years.

It travelled early to South America where the Inca priestesses of Peru were crowned with sunflowers in the temples of the sun, in which sunflowers made of pure gold were found.

The Spanish took sunflowers to Europe in the 16th century and Peter the Great introduced them to Russia in the 17th century where a secondary centre of diversity arose. They are still popular and many varieties, including very decorative ones, have been home-bred in Georgia and Moldavia. Scientists are now collecting in these regions.

Description: A frost and drought-resistant annual with a deep root system and growing from thirty cm to an amazing five metres tall.

Saving the Seed: Partly self and partly cross-pollinated. Seventeen to sixty two percent crossing has been recorded, according to insect activity.

If a neighbour grows a few sunflowers of a different variety, there is little risk of crossing with yours, but if your garden has fields of sunflowers nearby, your variety has a strong chance of losing its particular characteristics. Each kernel needs to be pollinated. Pick the selected heads when the petals have withered and the seed cases feel hard. Save seeds from as many heads as possible, so as to preserve all genetic characteristics.

Cut the heads with a sickle or secateurs, tie them in bundles and dry in the sun for a week or more during which time some of the late-formed seeds will mature.

A big crop of heads can be threshed by beating them with sticks on a concrete floor. For a smaller crop, heads can be rubbed by hand. Clean the seeds by winnowing and sieving.

Dry for a further week on a screen or by hanging in a bag out of the reach from vermin. Select the largest and best formed before storing and mix the seeds from different heads.

Storage: Seeds last for up to five years when dried well and stored in a cool, dark and dry place. There are ten to twenty seeds to the gram.

Usage: Sunflowers will suppress weed growth beneath them. This characteristic can be used in Permaculture design to combat the seemingly perennial problem of too many weeds.

Young leaves and roots are used as vegetables, and blanched flower petals are a nice addition in salads. American Indians used the matured dried leaves as a tobacco substitute and the stems as bean poles. Sunflower seed is made into a highly nutritive flour.

Before the Revolution, Russians soldiers on campaign were issued with a kilogram of sunflower seeds to sustain them in an emergency. In the farmyard, sunflower heads can be fed whole to the chickens.

For the kitchen, the whole head is laid on top of mulch and watered twice a day. Soon sunflower sprouts will emerge. Cut with scissors when five cm (two inches) long as a salad green. Most tender and flavoursome!

On the Lookout: There are sunflowers for different purposes: for oil, for eating by kernel, and as cut flowers.

The gene pool of sunflower is most varied. Armenian farmers grow ones with extra long kernels. Look for some exceptional strains that may have reached Australia such as Mammoth Russian, which is large and grey-striped.

Arrowhead was bred in Czechoslovakia and will mature in cold places where other varieties will not. The smallest of all is Sunspot. It only grows to half a metre high, but produces a large head thirty cm (one foot) diameter.

SWEET POTATO

CONVOLULACEAE

Ipomea batatas – ipos and homois mean "worm-like" in Greek, referring to the twining stems; batatas is a South American word for potato.

Origins: Of South American and West Indian origin, though grown in antiquity in all the Americas and Polynesia. Columbus brought the first sweet potatoes to Europe. From there, early Spanish explorers took them to the Philippines and Indonesia, whence they spread to India, China, and Malaysia

They were relished in Queen Elizabeth I's time as Spanish imports and when Shakespeare's Falstaff importunes the sky to rain potatoes, it is the sweet potato to which he refers. Its ancient name in Peru is Umara, in New Zealand, Kumara.

Description: Sweet potato vines have a variety of leaf shapes ranging from plain round to deeply indented ones. The tubers come in many flavours, textures and colours.

Cultivation: Although they last many years in the ground, in the warmer parts of Australia, sweet potatoes become fibrous in the second year; they are therefore grown as an annual very much like potatoes.
Sweet potatoes do well in both sandy and loamy soils. Extra creeping vines will have to be pruned or thrown back to confine the plant to its patch.
In New Guinea, carefully selected mixtures of varieties are planted together to ensure continuous cropping. Field rats and bandicoots love them and can be real pests.
Sweet potatoes can last six months and more, if kept in woodash or sawdust, or wrapped in newspaper, but only if they are totally free of damage at harvest.

Propagation: Sweet potatoes can be propagated by the tuber and shoots, but cuttings of the stems are easier. Put two thirds the length of a runner into soft soil and gradually hill the plant for greater production.
Sweet potatoes have to be started indoors in cool Australia. This is done by sprouting tubers in late winter, then planting the shoots directly into the garden when the ground is warming up.

Usage: The roots are a valuable energy food containing high levels of mineral salts and vitamins. Vitamin A is especially high in varieties which have coloured flesh. Raw roots can be grated for salads. Cook sweet potatoes just like potatoes – steamed not boiled.
The young leaves make an excellent spinach, especially during the wet season in the tropics and sub-tropics.
Permaculture farmers use sweet potatoes to smother weeds and grasses in orchards and fields.

On the Lookout: The tubers come in many different flesh qualities from the dry and mealy types to very moist types. Their skin colour varies from light yellow to dark purple.
In Papua New Guinea, where it is the most important root crop, a sweet potato flour is made and used to supplement wheat flour in bread.
Some market gardeners have been hanging on to the best strains of their sweet potatoes long after they have retired. Wesley of Fingal Head, northern NSW grew a strain of yellow sweet potato that he obtained when ship-wrecked on Fiji forty years ago. He was keen to swap some for home-bred seeds. It was a most easy food to grow for an independent ninety three year old bachelor.
In Byron Bay, Jan Oliver presented Seed Savers with a local strain that had been kept in this sandy area for several decades. It clumps in the one spot and has produced tubers as big as soccer balls.
When introducing an old strain, it is always wise to isolate it in one part of the garden to observe it. A poor crop is often the sign of viral infection. If this is confirmed, the plant should be burned. Modern strains have been bred for resistance to viral diseases.
There are at least six edible *Ipomea* native to Australia:

- *I. abrupta* – hairy-leaved
- *I. brasiliensis* – mauve-flowered
- *I. costata* – an important staple in the desert called Yala which can grow quite large and the leaves eaten
- *I. gracilis* – purple beach convolvulus
- *I. graminea* – grass-leaved
- *I. velutina* – found in northern Australia (Isaacs, 1987).

TARO

ARACEAE

Colocasia esculenta, et al – possibly from colon, the Greek for "food" and cazein, "to decorate"; esculenta is Latin for "edible".

Origins: A native of tropical Asia, taro flourishes in sub-tropical and tropical places with a good supply of water.
Captain James Cook sighted it in the Sandwich Islands, while it was recorded in Egypt at the time of Christ and in Japan in the 14th century.
Taro possibly first arrived in Australia centuries ago from New Guinea – which is real taro country. We know also that fishermen from Macassar, eastern Indonesia, left patches of taro at their campsites in northern Australia, as Nick Romanowski of the Australian Taro Project (Colac, Victoria) reports in *Grass Roots* No. 91.

Before you choose what seeds to save, see Simplicity Rating page 51.

Chinese brought taro into the gold fields last century. More recently, Maltese, Vietnamese and other immigrants have brought in their strains.

Description: Taro is more of a generic name than a single, definite plant. Taro leaves are large, and look like elephants' ears. They are borne on thin stems and have large, often hairy, tubers which are edible.
Colocosia is the most common plant used as taro in Australia, but other species are grown. They are described below.

Cultivation: While taro thrives in running water and bogs, it will also grow on dry land.
In cold areas, the leaves die in winter and shoot again when the weather warms up. Taro is more productive when it is given more care and grown in rich, dark soils.

Propagation: The top section, which is dark and has a fibrous skin, is chopped into pieces, left for a day or so to allow the surface to heal, and replanted. This procedure can be followed after the whole large corms have been stored for several months. The small corms that form at the side of the main one can also be used for planting.

Usage: A most nutritious and easily-digested starchy food, especially useful to feed children and the elderly. It is the equivalent of the potato in the tropics. Taros can contain oxalide crystals that are shaped like needles and are set free explosively during mastication. Ouch!
It is best to ask the gardener who gave them to you how to prepare them for the table. Some varieties can be picked, boiled and eaten directly and these are well worth multiplying and passing on.
Most varieties have to be soaked for an hour or more, perhaps with changes of water, after peeling and cutting into large chunks. This soaking rids the taro of the oxalide crystals.
Traditionally taro is wrapped in a breadfruit leaf with coconut cream and seawater and cooked underground.
Some taros have leaves that can be used as a spinach. Care should be taken that your variety has edible leaves as there are oxalide crystals in the leaves of most varieties.
Bill Mollison in *The Permaculture Book of Ferment and Human Nutrition* writes of the enhanced nutritional value of taro when it has been fermented. The Polynesians then call it *poi*.

On the Lookout: Many species and strains of taro are found between northern Queensland and lower Western Australia. The Eddoe taro has small, young, edible side corms that are harvested without pulling up the whole plant.
Eleele Naioea is one of the royal black taros of the early Hawaiians and the Hawaiian Ohe is adapted to high altitudes. The Chinese Bun-long is especially used for chips. The Japanese Tsurunoko is a very good keeping taro.
Other plants of the same Araceae family are also sold and eaten as taro:
Amorphophallus spp. – Elephant Yam has exciting flowers, and is a native of India and Sri Lanka. It is a source of starch in India and some Pacific Islands but needs long washing to become edible. It is the Teve of Tahiti and the Cook Islands, and the Daga of Fiji.
Xanthosoma violaceum – is called the Hong Kong or Chinese taro in New Guinea. It originated both in the West Indies and South America in pre-Colombian times. Just to confuse

things, in New Caledonia it is called the Fijian Taro.
Xanthosoma brasiliense – is called Tahitian Spinach in Hawaii and the Celery Taro in Australia. It has small tubers and is grown for its edible stems and leaves.
Cyrtosperma chamissonis and *C. edule* – natives of Micronesia are the kind of taro that is grown in holes dug in atoll coral. The islanders also place baskets in the holes and fill them up with compost material. In this genus there is the giant swamp taro of the Solomon Islands.

TARRAGON

ASTERACEAE

Artemesia dracunculus – the former means "wormwood" in Greek; dracunculus means "little dragon" in Latin.

Origins: Here we are talking of French tarragon which originated around the Mediterranean.

Description: The leaves are about five cm long, dark green, pointed and highly aromatic. Any seeds advertised in a catalogue cannot be French tarragon because it bears no seeds. It would most likely be Russian Tarragon (*see* On the Lookout).

Cultivation: French tarragon grows best where thyme grows – in poor, rocky alkaline soil.

Propagation: The flowers are small, greenish and never fertile, so that the plant is propagated only by root division.
Dig up the whole plant and cut into several pieces, each with a stem and plenty of roots. Replant these rooted cuttings in well-drained soil.

Usage: Tarragon grown for the market rarely delivers the true, delicate tarragon taste either because it has been fertilized too much or because it is not French tarragon.
Tarragon is mixed into salads, pickles, vinegar, fish sauce and drawn butter sauce. Dried tarragon loses the fine taste.
Tarragon was believed to counteract the effects of snake venom. In Persia, the leaves are eaten to create an appetite and the French use it for the same purpose. Thirty grams (an ounce) of fresh tarragon grown in a poor rocky soil is macerated for a week in a bottle of good white wine and a glassful taken before each meal as a terrific tonic.

On the Lookout: *A. dracunculoides* is the Russian tarragon which sets seeds but has much less flavour.
Tagetes lucida is a tarragon substitute that has bright yellow flowers and slightly serrated leaves that are wider than tarragon's. They have a strong and hot aniseed taste (*see* Marigold).

THYME

LABIATAE

Thymus vulgaris – thymus is a derivative of the Greek word thumus for "courage"; vulgaris means "common".

Origins: Native to the drier parts of Spain, France, Italy and Greece on rocky slopes. Thyme was associated in antiquity with positivity, humour and courage, and was worn by the Republicans during the French Revolution.

Cultivation: Try to emulate the habitat of their place of origin by providing alkaline soil in a warm well-drained spot.

Propagation: To conserve particular characteristics, multiply thyme by root cuttings.

Saving the Seed: Thyme is self-pollinating but insects love it, and push their way into the flowers, so therefore different varieties will cross with one another. In Provence, France, we helped in the harvest of twelve strains growing wild on the one hill slope.
Ripe seeds come in bell-shaped capsules soon after the blue, or white, flowers turn brown. Tiny seeds will drop if left too long on the bush. Collect and hang in a paper bag until dry.

Storage: The seeds last five years and there are 6000 to the gram.

Usage: Pick thyme for cooking and for medicines when the plant is blooming. Twigs of dried thyme (not powdered!) can be placed on top of steamed vegetables and underneath roasts.

On the Lookout: Something like fifty varieties of thyme have been described. Interesting rare strains are sometimes available in small local nurseries.
English Wedgewood is an excellent culinary type, the Silver Thyme is an attractive plant for borders and hanging baskets. The German Winter is the most cold-hardy of all.
What is called lemon thyme is *T. serpyllum* var. *citriodorus* which is a selection from the wild serpyllum that the English call Mother of Thyme and that grows as a carpet, right on road verges in Provence. People there cook it in rabbit dishes and make an after-dinner herbal tea with the fresh flowers and leaves. Its essential oil is an ingredient of Benedictine liqueur.

TOMATO

SOLANACEAE

Lycopersicon lycopersicum – is the ordinary "supermarket" tomato and *L. pimpinellifolium*, the cherry tomato.

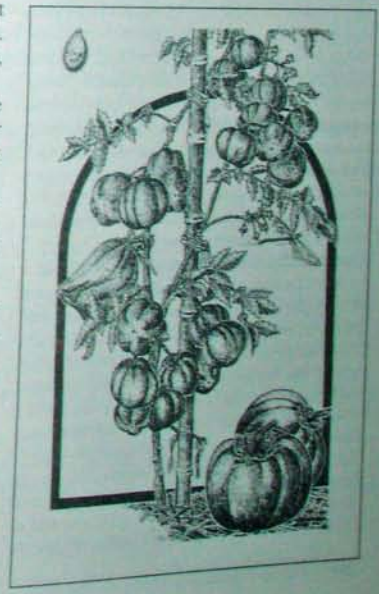
Lycopersicon is derived from the Greek likos for "wolf" and persicon for "peach", referring to the beautiful, but supposedly deceptive appearance of the fruit.

Origins: Although the tomato originated in South America as a weed in fields of corn, it was domesticated in Mexico and Central America.
The name tomato comes from the word tomatl in the Anahuac language spoken by ancient Mexicans. The Spanish called them tomata. When they were taken to Europe by Colombus, they were suspected of being poisonous.
In a Vilmorin seed catalogue of 1760, they were featured as ornamentals and it took another century for them to be offered as a vegetable by the same seed house.
Its Italian name pomodoro ("golden apple") is evidence that yellow varieties predominated. They were called love apples in 19th century England.

Description: *Determinate* tomatoes are very productive but do not have a long bearing time. After one set of flowers appears at the end of a branch they stop producing more flowers. The fruits all ripen at about the same time.
The *indeterminate* type keeps on producing terminal buds and is therefore productive for longer and needs staking as it continues to grow. The fruits ripen in sequence, over a period of time.
Potentially perennial in warm climates, even indeterminate tomatoes are nearly always grown as annuals.

Cultivation: The extreme diversity of the tomato has yielded varieties adapted to a wide variety of climates, from sub-arctic areas to the tropics.
Cold-tolerant varieties usually have large leaves enabling them to absorb the maximum of sunlight. These are termed "potato-leafed tomatoes".
The American Indians of the hot, dry south-west bury their plants, leaving only the tops poking out of the ground, which encourage roots all the way down the stems.
For a long lasting crop, you can graft tomatoes. Use a primitive variety as rootstock, and a long bearing variety for the scion.

Saving the Seed: Tomatoes are self-pollinating. The fact that they are easy to save can be seen by the large number (hundreds) of home-saved varieties which are in Australian backyards.
Breeders of modern tomatoes separate each row by only three metres, mostly just to avoid mixing up fruit at harvest.
In modern varieties with male and female parts of equal length, pollination is instant. But a certain amount of natural cross-pollination



(NCP) will occur between varieties, and the more so with older varieties of tomato, such as cherry and potato-leafed types, whose style (the organ which receives the pollen) is longer than their stamen (the organ which sheds the pollen). We recommend that you plant the older varieties in a block shape and save seeds from the central plants. Rows of several varieties grown close together in a garden that attracts lots of flying insects may cross to a slight degree. These may lead to improvements, but also possible losses of quality. Planting a tall row of beans, or other climbers, in between rows will reduce the chances of hybridization to zero.

The earliest and more attractive plants of a variety should be marked, staked and inspected during the growing season for disease and immunity from pest attacks.

The fruit of the lower three hands of each plant is best for seed, but this should not preclude collecting from the whole bush. Seed can be collected from only one bush if that is all you have.

Allow the fruits to ripen just beyond the eating stage. Cut them open, squeeze out the jelly and seeds, putting the seeds of one variety in a jar or bowl. If you are saving the seeds of a dry, meaty tomato such as the excellent Italian Plum you may have to add a tiny amount of water.

Label the jars and leave in a warm spot for two to three days. If it is not stirred, a foam will form on top and a beneficial fermentation will take place, caused by a microbe, *Geotrichum candidum*, acting on the sticky gel that surrounds the seeds. Antibiotic activity deals with diseases such as bacterial spot, speck and canker (tomato breeder M. Courtney in Whealy, 1986, p.146). The only danger is in leaving the fermentation process for too long, leading to premature germination.

As soon as the foam forms, scoop it off the top, add water and pour the lot through a sieve. Wash and rub until clean.

The jelly around the seeds will have been washed off and the seeds will appear somewhat hairy. Spread them on sheets of shiny paper in a single layer and dry somewhere safe, out of the sun. After a few hours of drying, rub the seeds between your palms to stop them from sticking.

Francis Durdin, a foundation member of Seed Savers from Port Elliott, South Australia, has a simple method for home use, if there is no time for fermenting the seeds. Soak the jelly surrounding the seeds off on a slice of bread, shake the seeds off onto a bit of newspaper, write the varietal name and dry the seeds and sheets together in an envelope.

It is a good idea to put the seeds in a labelled envelope and hang to dry for two weeks. If you are dealing with more than one variety, be fastidious over labelling at each stage and wash sieves meticulously between varieties. Commercially, litres of hydrochloric acid are added to tons of juice and the seeds are cleaned very quickly. However, this method does not get rid of bacterial canker.

Storage: Seeds may be stored for up to four years in temperate regions. There are three to four hundred seeds to the gram.

Usage: Because acidic food is known to help the digestion of fats in eggs, cheeses, and meat products, it is not surprising to find tomatoes eaten traditionally with each of these. In fact, the use of tomatoes really took off in Europe when the consumption of meat increased sharply.

Before you choose what seeds to save, see Simplicity Rating page 51.

What better place than sunny Australia to dry those fleshy varieties and then store them in olive oil? Luxury starts at home.

Tomatoes have the reputation of being bad for people with arthritis. Low-acid, yellow salad tomatoes have become popular recently as a precaution against this effect.

On the Lookout: Lack of flavour in tomatoes is a very common complaint. Luckily some tasty ones are still being preserved by ardent gardeners. Of all the types of seeds sent to Seed Savers, tomatoes come in the most frequently. Tomato colours range through yellow, orange, pink and red. Early types were quite uneven in shape and when the first famous smooth type was bred it was called Grosse Lisse, meaning "fat and smooth" in French.

Look for these varieties: Australian Large Red, Bendigo Smooth Large Red, Big Boy, Bonny Best, Burwood Prize, Earliana, King Humbert, Klondyke Red, Matchless, Orange Prolific, Peach, Ponderosa, Rutgers, Tatura Dwarf, Walker's Recruit, Wilding's Prolific.

Some of the more popular tomatoes sent to Seed Savers are:

Burbank, a famous variety bred by Luther Burbank and assessed by seed savers Linden and Toni Green from Greta in the Hunter Valley, NSW, as having fruit that is very even in size and shape, and as having a good flavour, juice content and texture. They say that this bush tomato survived a frost just nearby and that it produces a heavy crop that ripens simultaneously (determinate). A brilliant tomato.

Burwood Prize is a vigorous early maturing plant with heavy foliage (potato-leafed style) and flattish globe-shaped, medium-sized scarlet fruit.

Pink Ponderosa is a massive indeterminate plant that needs staking, and has fleshy and pink fruits that reach 250 grams (eight ounces). Like a lot of other cooking tomatoes, it does not store well, because it is soft.

Rouge de Marmande is a very early maturing, dwarf, compact grower with light green foliage that sets fruit in cooler conditions than most other varieties. Its fruits are flattish, ridged and medium to large.

White Beauty has fruits that change from green to white to pale yellow. They are not very easy to grow and are really only worth the effort for their novelty value.

Although unavailable commercially now, Manalucie has been grown by a subscriber from Rockhampton since the 1930's. It was then a popular winter tomato variety in south-east Queensland. The golf ball-sized yellow fruit grows on an indeterminate vine which produces many continuous crops in cooler weather.

Mac Howe of Frankston writes:

> My brother and I were big tomato growers years ago. I grow only a few now in my garden, mostly Rouge de Marmande.
>
> I started working with tomatoes when I was about eight years old and saw many varieties come and go.
>
> I have kept the Tatinta that was grown after the war. It is a large dwarf, a heavy producer, thin skinned and with a flat-shaped fruit. The leaves are inclined to fold and you would think there was something wrong with them. They like new ground, no pruning or staking. It was crossed with the Burwood Wonder, a round thin skinned tomato, and that one was called the Intermediate.
>
> The way for a small grower to save seeds: pick when real ripe, dig out with a knife and spread on a sheet of paper in a line. Cut into strips, paper and all, when it comes time to plant.

Des and Ada from the Atherton Tableland swear by Sioux tomato: "They were grown in western Queensland early this century, are resistant to lots of pest and diseases, and will bear fruit in our hot climate. You are welcome to the seeds."

Rutgers is also recommended for warm areas. It is determinate in growth habit and has globular, medium-sized bright red fruits.

At the time of writing there are more than two hundred varieties in Seed Savers.

Family-owned Diggers Seeds in Dromana (Victoria) have acquired a terrific collection of tomatoes, many of them heirlooms, from the American Seed Savers' Exchange, our sister organisation in the USA.

TREE ONION

AMARYLLIDACEAE

Allium cepa var. ***proliferum*** – allium means garlic, cepa means onion and proliferum "prolific" in Latin.

Origins: Tree onion originated in western Asia, as onion did, then was taken west in early times. Tree onion is also called Walking, Egyptian or Topset onion and is believed to have been brought back to Europe by the crusaders. They came into Australia with early Irish settlers, and are common in Tasmania.

Description: Tree onions have a large bulb at the base and a stiff stem which has several bulbils, or little onions, at the top.
At the turn of the century many different sorts of tree onions were grown in Australia. They have all but disappeared from commercial seed sources, because they are unsuitable for mechanical harvesting, and difficult to harvest and cure properly in commercial quantities.
Another commercial disadvantage is the risk of carrying diseases from year to year with the bulbs. However they are a hardy plant that is a delight in the garden.

Cultivation: An entertaining biennial which self-propagates. The stems fold to the ground and the bulbils at the top of each stem plant themselves.
It is the most cold-hardy of all the onions and survives deeply-frozen ground.

Propagation: When the stalk dries, gather the top bulbils and plant out straight away.

Usage: The top bulbils have been used for a long time for pickling. The base bulb is a tender, juicy salad onion.

On the Lookout: Tree onions are offered from time to time in the seed exchange section of Seed Savers.

TUMERIC

ZINGIBERACEAE

Curcuma spp. – kurkum is the Arabic for tumeric.

Origins: Southeast Asia. Naturalized in teak forests in Indonesia.

Description: Tumeric is a broad-leafed plant that looks not unlike aspidistra. It grows to sixty cm and has waxy white, beige or yellow flowers that appear from the centre of the plant from the second year.
There are numerous types of tumeric, differentiated from one another by their flowers, the colour of their roots and their taste.

Cultivation: Tumeric leaves die back in the winter and the rhizomes re-sprout when the soil warms up.
A native of tropical forests, tumeric thrives in the shade although it will grow in full sun, and even as far south as Adelaide. The more fertile the soil, the greater the rhizome production.

Propagation: Towards the end of the dry time of year, lift the plant when the leaf and stem have withered.
The secondary lateral rhizomes, known as fingers on account of their shape, are used for propagating. They are planted about seven cm deep. The mother rhizome is conical and faster to produce roots.

Usage: The whole plant is edible. Both the fresh and the dead leaves can be used to wrap up fish before cooking, and as a flavouring in rice dishes and curries. The swollen rhizomes are used like ginger – crushed, chopped and added toward the end of the cooking.
In Indonesia the young shoots are often eaten steamed in vegetable dishes. To make tumeric powder, boil the rhizomes for two to four hours and dry for two weeks before peeling and pounding. Tumeric is used for dying cloth.

Some of the lighter coloured types are reputed to have the medicinal property of alleviating stomach troubles. Vietnamese Australians minimise scarring by rubbing tumeric onto wounds once they have healed over.

On the Lookout: Good greengrocers sometimes sell fresh rhizomes that can be used for replanting.

TURNIP

BRASSICACEAE

Brassica rapa [B. campestris] – rapa means "turnip-like" in Latin.

Origins: Europe. The Romans, Gauls and Germanic tribes used them in their stews.
Virtually each European alpine village had its own strain until a mail-order seed company started to sell modern strains of rutabaga, turnip and swedes to these areas early this century.
When a farmer allowed a foreign improved strain to go to flower the pollen contaminated the traditional strains. Thus the erosion of diversity intensified. This was realized in scientific circles a few years ago and European botanists have been collecting remnants of the hundreds of primitive varieties of turnip.

Description: Turnips on the market these days are delicate, small, white and violet but in the past the larger ones which stored well were favoured. Swedes, which look like, and in fact are, large yellow turnips are suited to very cool regions.
In American cookbooks swedes are called rutabaga. But rutabaga proper, *B. napus*, may be a rare form of cross between turnip and cabbage. It is like a large turnip, weighs up to a kilogram and is used mostly for forage. The first records of rutabaga (also called Lapland or Swedish turnip) were made in 1500 by the Swiss botanist Bauhin. Swedes take about five weeks longer than turnips to mature.

Cultivation: Turnips are adapted to cold weather. They do well in heavy and cold soils. Plant in early spring in cold regions, and in autumn in warm regions.

Saving the Seed: Turnips are biennial. The root grows the first year and the flower stalk is produced in the second. Only in extremely cold regions will they need to be lifted, stored over winter and set in the ground the following spring.
The best specimens carrying all the characteristics of the variety are replanted for seed. The flower stalk can reach as high as one and a half metres with numerous branches and yellow flowers (yellow-fleshed turnips have pale orange petals).
The flowers are self-incompatible and need insects for pollination and seed production. Turnips cross with one other, winter rape and fodder turnips.
When the pods start to form, pinch off the tips, so that the lower pods will have larger, stronger seeds. Birds can be a problem at this stage. Cut when pods turn yellowish-brown. Put the whole bunch upside down in a large paper bag and hang in a dry place for a couple of weeks. Thresh and dry further, as for other Brassicas.

Storage: The small, round, black to reddish-brown seeds vary in size and colour between varieties. The seeds will last for a good five years if stored in ideal conditions. There is an average of 300 seeds to the gram.

Usage: The English boil their turnip tops and love it. This blanching gets rid of the bitterness. These roots store well in cool storage.

On the Lookout: Named varieties of turnips are: Scot's Yellow, Kashmir Red, Orange Jelly, Cowhorn, Red Top Viarmes.
Laings Garden is the fastest-growing of all and is therefore a good spring variety while Champion Purple Top is the best one to grow in a dry climate with irrigation.
Tipperary and Royal Rose are old favourites amongst swede growers. Nowadays White Perfection is the most grown mid-season swede.

WATER CHESTNUT

CYPERACEAE

Eleocharis dulcis [E. tuberosa] – from the Greek helodes meaning "growing in marshes" and charis, "grace"; dulcis is Latin for "sweet".

Origins: China and Australasia.

Description: The leaves of the water chestnut resemble reeds. The corms form in the mud at the base of the leaves. This exquisite, high-yielding water vegetable has long been a delicacy in Southeast Asia. Existing domestic stock in Australia came with Chinese settlers.
Native water chestnut in northern Australia is sometimes called "spike rush" and is relished by Cape York and Kakadu Aborigines.

Cultivation: They are grown at the edges of ponds, and rice paddies in China. The corms are started in a nursery and when the shoots are ten cm tall, they are planted in the underwater soil. As the water rises, so does the length of the water chestnut leaves.
Water chestnuts are favourites in the Permaculture water garden, where they can easily be grown in a washtub or any other kind of container. Water depth should be kept at five to fifteen cm during the warm months. Little native rainbow fish will take care of the mosquito larvae.
Because the oxygen is transferred through the tubular stems to the roots, the water chestnuts in fact purify the water. Occasionally, in order to boost production, the water is drained and a slurry of manure is added around the plants.
Harvest in the colder months when the ground dries up, the leaves dry and turn yellow and the corms are fully developed.

Propagation: The corm is planted in late spring, in a rich mixture of well-rotted animal manure and compost or rich humusy soil at least seven cm deep. The corm will shoot, sending up slender, cylindrical stems.
Rhizomes spread out from the bottom of the plant and grow laterally to form more corms. In turn these will turn upwards and shoot.
For the next planting, water chestnuts can be sealed and stored in the fridge, or kept in cool moist sand.
They shrivel and deteriorate quickly at room temperature.

Usage: The tubers retain their crisp apple-like texture even after cooking. In China they are eaten just like apples. In fact they have a taste between an apple and a coconut.

On the Lookout: While they are getting easier to obtain, there is scope for more nurseries and farmers to reproduce this delicious vegetable. The indigenous water chestnuts in the north could be grown out and selected for size and taste.

WATER SPINACH

CONVOLULACEAE

Ipomea aquatica – ipos and homois mean "worm-like" in Greek, referring to the twining stems; aquatica means "water" in Latin.

Origins: Asia, Africa and Australia.

Description: Water spinach is a kind of hollow-stemmed aquatic morning glory that sprawls along banks and in boggy patches. It is called Pak Bhum in Thai, Kang Kong in Malaysia, and

Before you choose what seeds to save, see Simplicity Rating page 51.

Oong Choy (water vegetable) in Mandarin. It is also native to northern Australia.

Cultivation: Water spinach thrives in swampy places where it sends out long runners like sweet potatoes. It needs plenty of water in the hot season when it produces abundant quantities of spinach greens.
Very suited to the tropics, water spinach grows happily around the edges of a pond.

Propagation: Propagate water spinach by taking cuttings and standing them in water until they send out roots. Plant them out in rich mud preferably beside a body of water.

Saving the Seed: Flowers are shaped like morning glory's, but are white or mauve. Seeds are borne in pea-sized round shells, which turn brown at the end of the hot season.
They should be dried to a crisp, which takes only a day, and then rolled between two chopping boards to loosen the seeds.

Storage: The seeds last only from one year to the next if kept in the open, and for three years if stored away sealed in cool, dry and dark conditions. There are 150 seeds to the gram.

Usage: Low in oxalic acid and high in mineral salts, the young leaves, stems and tips are cooked very briefly in stir fries. It is the most used spinach in Thailand.

On the Lookout: Look in Asian shops for good sized cuttings, and for seed packets. There are dry and wet types with pink, mauve and white flowers.

WATERCRESS

BRASSICACEAE

Nasturtium officinale – from nasus torsus meaning "twisted nose" in Latin, referring to the pungent smell and taste; officinale is from the Latin for "apothecary's shop".

Origins: Watercress grows wild in many parts of Eurasia and was well known to the ancients.

Description: There are many types and species of plant called cress, such as mustard cress, upland cress, land cress (*see* On the Lookout below). Watercress is the one that prefers to grow in running water.

Cultivation: Watercress thrives in boggy ground. Its natural habitat is a running creek, but it will do very well in a pot or pond. It runs to seed fast in hot weather, so it produces most leaves in winter in warmer parts of Australia and New Zealand.

Propagation: It is easy to propagate watercress by cutting. If you cannot find rooted cuttings, then stand stems in water for a week or so.

Saving the Seed: The plant should be tagged and the leaves left unpicked for seed saving. Watercress will give masses of tiny white flowers on short stalks. Very fine red seeds appear in slightly curved pods, which should be individually harvested.

Storage: There are 4000 seeds to the gram. Stored in dark and dry conditions, the seeds will last more than five years.

Usage: As well as the traditional cress sandwiches, a very tasty soup can be made by blending a mix of onions (fried), potatoes (boiled), and chopped watercress which is added at the end, along with sour cream.

Balding Romans consumed it daily in season in the belief that it prevented hair loss.

On the Lookout: An excellent variety can be bought in Vietnamese shops as greens, and propagated from rooted stems.
Cardamine pratensis is a cress that is native to Europe. The English call it Cuckoo-flower, Lady's Smock or Meadow Cress, while it is

Aangskrasse in Swedish and Sedetschnick in Russian. It looks like watercress and also belongs to the Brassica family.

Lepidium sativum or garden cress and pepper grass, is a short frizzy plant with a strong flavour.

Barbarea praecox is the American upland cress. It is also called Winter Cress, Earth Cress, Sisymbrium, Zimny Kress in Russian or Rzezucha Zimowa in Polish. It has similar looking leaves to the watercress but is a completely different plant. It grows best in the cool time of the year. Sown in autumn, its shiny leaves spread out and develop yellow flowers the following spring. Its thin siliques contain small grey seeds, a little depressed on one side and round on the other.

WATERMELON

CUCURBITACEAE

Citrullus lanatus – in Latin citrullus is the diminutive for citrus and lana means "wool", referring to the fuzziness of the young fruit.

Origins: Africa. Nineteenth century explorer Dr. David Livingstone found large patches of watermelon growing wild in central Africa. They are cultivated as well as found in a semi-wild state in Namibia and Botswana.

In southern Russia and the Middle East, watermelons have long been grown and their seeds roasted. A thousand years ago they reached China, where their seeds are still the sole source of oil in some remote areas.

Description: A rambling vine which has small male and female flowers that become large football sized fruits.

Cultivation: Watermelons need a long, hot growing season and a lot of space but are easy to cultivate in the right climate. They prefer loamy soil. Pruning of the vine is beneficial but less so than for rockmelons.

Saving the Seed: Watermelons will not cross with any other Cucurbit except other watermelons, Pie Melons and Citron Melons (*C. lanatus* var. *citroides*).

Depending on bee activity, isolation distances should be adjusted. In the USA it was found in a series of trials that a variety that did not cross in one locality at 200 metres, crossed at 800 metres in another. Isolation of different varieties by 400 metres was recommended for commercial seed and 900 metres for stock seed (USDA 1961).

Hand pollination ensures purity but is only seventy five percent successful. Use several males for one female (see Section Eight). As with other Cucurbits the first female flower to appear is the surest to set in most varieties, but there are a few varieties whose fruit does not set until several weeks after the first female blossoms appear.

The watermelon is ready to pick when the little tendril next to the fruit turns brown and a sharp tap with the finger produces a hollow sound. Store for a week longer until totally mature.

Scoop out the seed, or save while eating, wash in a colander and dry them on a cloth. Seeds from the central portion are the most robust and fully developed, being the first to form. It is neither necessary nor advisable to ferment the seeds.

Storage: Seeds last five years. There are six seeds to the gram.

Usage: Citron varieties have a thick rind that is used for candying and jam. Americans pickle watermelon rind.

Melons in their native African deserts are a major source of water for cooking in the dry season. Kalahari Bushmen are known to have survived months on melons as their sole source of water.

In Botswana, where the fruit is cut into slices and dried on frames in the sun, nothing goes to waste. The seeds are roasted, and pounded without shelling, to an edible meal. A porridge is made of ground corn and melon flesh.

The Chinese, Armenians, Turkish and Iranians are amongst the peoples who relish roasted watermelon seeds. They are often seen sold on street corners in cones made of recycled office paper.

Watermelon is recommended for kidney weakness and for cleaning skin.

On the Lookout: Watermelon flesh colours include red, pink, orange, yellow and pure white. Butter and Champagne melons are examples of yellow fleshed ones.

The Barwick white-seeded watermelon, named after a farming family, arrived in the mid 1850's with the ancestors of Harry Barwick, a farmer from near Gunnedah, NSW. The seeds have been saved ever since. It is a round watermelon with heavy dark stripes, not unlike modern watermelons. It has a wonderful fine flavour and a crystal, sugary texture but it would be useless for the market as it is very brittle and cracks open when bumped. Harry grows it and passes seeds on to family and farming friends.

Oliver Carter from Toowoomba, Queensland, has kept a variety of watermelon, called Port Said, going for sixty years. His brother had brought the seed back from Egypt after World War One.

Ron Cousins from Rosewood, Queensland, has been growing the Mississippi watermelon organically since 1945 for his local market. It was given to him by an American soldier who wanted to see if his melons would grow "out there", as he intended to settle in the region after the war. It is a large melon with a very thin rind and better coloured and flavoured flesh than the modern ones, Ron reports.

Moon and Stars, dark green with large and small yellow spots on the skin, and with yellow speckled leaves, is an old native American variety rediscovered by the Seed Savers Exchange in America and now grown by many seed savers in Australia. It is one of the American heirlooms sold by Diggers Seeds in Dromana, Victoria.

Look also for Kleckley Sweet with white seeds and a fine grained, super sweet broad stringless heart. The white-seeded Ice Cream Melon was one of the earliest fruits to be grown in Australia.

Desert King, a yellow-fleshed one is the most drought resistant and can stay on the vine for a month after it is ripe without losing quality.

King and Queen, which is also called Winterkeeper and Winter Queen, will last until mid-winter if dipped in wax.

WAX GOURD

CUCURBITACEAE

Benincasa hispida – Count Benincasa was an Italian botanist and hispida is Latin for "hairy".

Origins: Asia, found wild in Java. Also called Ash Pumpkin and Winter or Chinese Preserving Melon.

Description: A hairy, single-stemmed, climbing annual that can reach considerable height in the tropics. The leaves are rough to the touch and the flowers are yellow, up to ten cm across and handsome. They may need hand pollination to set fruit.

The melon-like fruit has a thick and crisp white flesh, is the same shape and size as a watermelon and is covered with white fluffy hair until it is mature (when the surface becomes waxy). Thirty kilogram fruits are not uncommon.

Cultivation: In China the plants grow on mounds and over roofs, or on bamboo frameworks erected over village ponds (as depicted in *Permaculture: A Designers' Manual*, 1988, page 497).

As well as providing ample water for the plants, this permits land to be used for other purposes. Shading the water also reduces evaporation. A strong support is necessary because of the weight of the fruits, which themselves may need slings.

Saving the Seed: Wax gourd does not cross with any other Cucurbit. Leave the gourd on the vine until it is well-matured. Scoop out the small white seeds, which are one cm long, grooved around the edges and slightly winged; wash and dry them on a screen.

Storage: The seeds last three years and there are ten seeds to the gram.

Usage: Because of a waxy coating that preserves it from attacks of micro-organisms, the fruit can be stored for a year to eighteen months without refrigeration.

Hollowed fruits with decoratively carved rind are used to hold the famous Chinese winter melon soup. Wax gourds fetch a high price in Chinese and Vietnamese shops in Australia.

The tendrils and young leaves are cooked in Java. The fruits are low in starch and taste like something between a zucchini and a cucumber. To westerners they may appear to provide texture rather than taste to the meal. Try them diced with oyster mushrooms, lotus roots, bamboo shoots and water chestnuts and cooked in a home-made chicken broth. A most delicious soup!

The Chinese regard it as light to digest, good for weak stomachs and a fabulous food for the overweight.

On the Lookout: Rose-Marie Lacherez, an extraordinary gardener and astute seed saver, grows a long cylindrical variety that weighs up to ten kilograms as well as a large round variety in south eastern Queensland.

WINGED BEAN

LEGUMINOSAE

Psophocarpus tetragonolobus – psophocarpus means "noise fruit", tetragonolobus, "four angled lobes" in Greek, referring to its seed pods.

Origins: Madagascar and Asia.

Description: Winged beans are a very vigorous perennial climber for the tropics. The beans are rarely available commercially but are grown regularly by Filippinos and Pacific Islanders living in warmer Australia where the plants are seen climbing over fences.

Also called Four-angled bean.

Cultivation: When the hot and humid weather starts, it is time to plant direct scarified winged beans. Flowers will only appear after mid-summer. They need a long growing season to set fruit. Though they may grow and even flower in cool climates, they are not productive.

Saving the Seed: In the right climate, the vine will bear many successive heavy crops. Flowers are perfect and self-pollinating. Let some pods grow to full size and snip them off when they are brown and the large ripe seeds rattle. As with other types of beans, this tends to slow down the productivity.
Left in the sun the pods open by themselves and release up to twelve round brown seeds. In the wet tropics the seeds will not last long at all in the open. A very thorough drying and storing in a glass jar in a cool place will ensure a long life.

Storage: The seeds last one or two years and there are eighteen to the gram.

Usage: The whole plant is edible. Picked half grown, the pods are very tender and compare with the snow pea in texture. The green seeds are very digestible. The tender shoots, flowers and leaves are eaten and the tuberous roots are consumed raw or roasted, like potatoes.

On the Lookout: There are two main sorts, one grown for the pod and one for the root. The University of Papua New Guinea has a large collection of both. We would do well to look for varieties that set pods in cooler climates.
Chimbu has long tender red pods.

YAM

DIOSCERACEAE

Dioscorea alata and ***D. esculenta*** – named after Dioscorides, 1st century Greek herbalist; alata is Latin for "winged", referring to the four wings on the square stems; esculenta is Latin for "edible".

Origins: 600 species of the genus *Dioscorea* occur naturally in most tropical countries, including several in Australia and even one in Europe.
The name "yam" comes from a west African dialect. The tuber that is called "yam" in New Zealand is *Oxalis tuberosa* (*see* Oca).

Description: Yams are vining plants that send up one or more vigorous square stems that are profusely covered with heart shaped leaves. The brown rough-skinned tubers quickly swell underground and can grow to a prodigious size.
Of all the *Dioscorea* species that grow in the tropics and subtropics, only a handful produce an edible tuber. They are well-known in the Pacific where they are a staple as well as a ceremonial item.

Before you choose what seeds to save, see Simplicity Rating page 51.

Among Melanesian peoples some varieties of large yams are reserved for chiefs only, and yams generally are associated with masculinity.

Cultivation: Cultivated yams require a fertile deep soil with a high organic content and will need a large trellis or tree to climb. They are planted at the beginning of the warm season and really take off in wet warm weather.
The whole vine dies back in winter and the tubers are then ready for careful harvesting by excavating a good distance all around the tuber. A crowbar may be necessary in clay soils.
Note that yams growing several shoots will be irregular in shape and those with a single shoot will be straight.
D. alata has been grown since the 1800's in temperate France where it is called Chinese Yam. This suggests that it would grow in southern Australia.

Propagation: Dig up the yams when the prolific tops die down at the onset of cold weather, then store in a cool, dry place for up to twelve months.
Large sections of the yam are cut and left to heal before planting. Some varieties bear tubers in their leaf axils, which are fit to replant. Harvest and store in a cool spot for later use.

Usage: We find that yams are best peeled, cut into chunks and roasted. They can be boiled, steamed and eaten in all the other ways that potatoes are.

On the Lookout: Yams come in many different shapes and sizes. We grew one that was about a metre and a half long and thirty cm wide. In Australia at least three varieties are used as food by Aboriginal people:
D. bulbifera, a very hairy yam, is found throughout the north. This one is the aerial yam that has huge heart shaped leaves and purple-fleshed tubers in its axils. Some are reported to be "cheeky" and to require preparation.
D. bastifolia of south western, and western, WA is described as "a yam so prolific that it supported a sedentary population" (Isaacs, 1987, page 220). Julie Firth reports that this yam is very common in the Yilgarn area around Geraldton.
D. transversa is found from the north down the east coast to NSW and is called the Long Yam.
All these species could further be domesticated and improved, particularly in size, by selection.

YAM BEAN

LEGUMINOSAE

Pachyrrhizus erosus – pachys is Greek for "thick" and rhizus for "roots".

Origins: A climbing perennial from Central America.

Description: The root of the yam bean develops swellings (up to five per plant) under the surface of the ground.
Very popular in Mexico where it is called Jicama and is sold on street corners by the slice. The seeds and seed pods are dangerous to eat.

Cultivation: Yam bean will grow as far south as Adelaide and Sydney. In New Zealand, it is reported growing in the North Island.

Propagation: Propagated by tuber or seed. The plant may die back in winter in cool climates but the tubers will shoot again in spring.

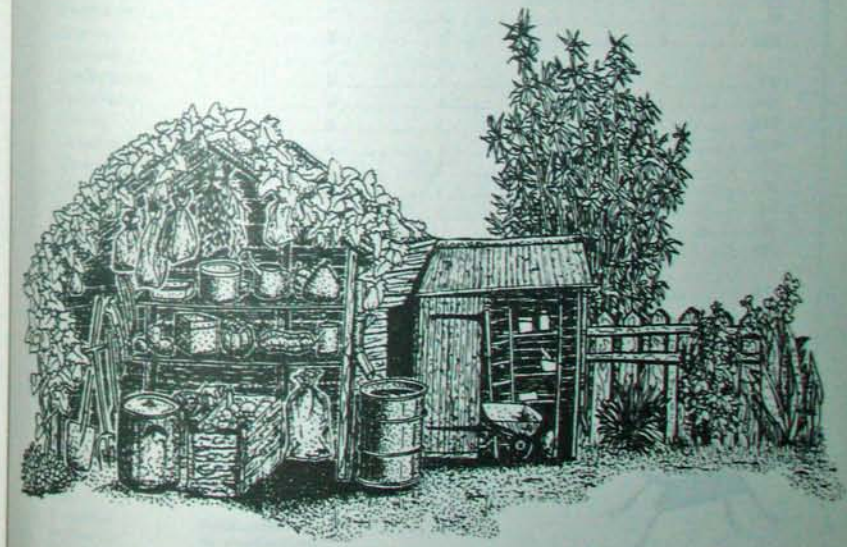
Saving the Seed: At the end of the season when the roots have developed, the vine will give bunches of purple flowers and then wide, flat, hard pods. The seeds should be planted in spring time.

Storage: The seeds will store for several years without much attention. There are five seeds to the gram.

Usage: The raw tubers taste like apples. Because the cut root does not discolour and stays crisp, it is the perfect ingredient for garnishes or hors d'oeuvres and a fair replacement for water chestnut in stir fries.
It is sliced, sprinkled with lemon juice, salt, pepper and hot chillies.
Jicama is now a top selling specialty vegetable in American supermarkets.

On the Lookout: A relative of the yam bean, the Ahipa or Potato bean, *Pachyrrhizus ahipa*, grows in Bolivia and Peru on the valley floors at 3000 metres elevation. It is non-climbing, unlike its cousin but is low in calories, and fries like a potato.

Appendices



APPENDIX A

Pollination and Storage Table

Name of Plant	Annual, Biennial or Perennial	Manner of Reproduction – Vegetatively and, if by seeds also, Cross-pollinating and/or Self-pollinating	If Cross-pollinated are they Wind, and/or Insect-pollinated?	How many years the seeds last in good storage conditions	How many seeds to the gram
Amaranth	A	C	W	5	800
Artichoke	A,P	V,C	I	5	30
Asparagus	P	V,C	I	3-5	50
Basella	A,P	V,S		5	50
Basil	A,P	V,C	I	5	600
Bean	A	S		3	5-10
Beetroot	B	C	W&I	5	50
Bitter Gourd	A	C	I	5	12
Borage	A	C	I	5	65
Broad Bean	A	S,C	I	4	1
Broccoli	A,B	C	I	5	300
Brussels Sprouts	B	C	I	4	270
Cabbage	B	C	I	4	250
Calendula	A	C	I	2	100
Cape Gooseberry	A,P	S		3	400
Capsicum & Chilli	A,P	S,C	I	5	150
Cardoon	P	C	I	4	25
Carrot	B	C	I	3	1000
Cassava	P	V			
Cauliflower	B	C	I	4	500
Celeriac	B	C	I	5	2000
Celery	B	C	I	5	2000
Celtuce	A	S		5	1000
Chervil	A	C	I	1	450
Chicory	B	C	I	8	600
Chilacayote	P	C	I	5	5-8
Chinese Cabbage	A	C	I	5	350
Chives	P	V,C	I	1	600
Choko	A,P	C	I		
Collard	B	C	I	4	200
Coriander	A	C	I	3	90
Corn	A	C	W&I	2-10	5-8
Corn Salad	A	C	I	4	700
Cowpea	A	S		5	50
Cucumber	A	C	I	4-10	40
Dandelion	P	S		2	1000
Dill	A	C	I	3	900

KEY:

A–Annual
B–Biennial
P–Perennial
C–Cross-pollinated
S–Self-pollinated
W–Wind-pollinated
I–Insect-pollinated
V–Vegetatively reproduced

APPENDIX A cont'd.

Name of Plant	Annual, Biennial or Perennial	Manner of Reproduction – Vegetatively and, if by seeds also, Cross-pollinating and/or Self-pollinating	If Cross-pollinated are they Wind, and/or Insect-pollinated?	How many years the seeds last in good storage conditions	How many seeds to the gram
Eggplant	P	S,C	I	5	200
Endive	A	S		5	900
Eschallot	A	V			
Fennel	A	C	I	4	500
Garland Chrysanthemum	A	C	I	3	300
Garlic	A	V			
Garlic Chives	P	V,C	I	1	250
Ginger	P	V			
Gourd	A	C	I	5	30
Gramma	A	C	I	3-8	5
Guada Bean	A	C	I	2	6
Hibiscus Spinach	P	S		3	70
Hyacinth Bean	P	S		4	4
Jerusalem Artichoke	P	V,C	I		
Kale	B	C	I	4	250
Kohlrabi	B	C	I	4	250
Korila	A	C	I	3	30
Leek	B,P	V,C	I	3	400
Lemongrass	P	V			
Lettuce	A	S		5	1000
Lima Bean	P	S		3	1
Luffa	A	C	I	5	20
Marigold	A	C	I	3	300
Marjoram	A,P	V,C	I	5	12 000
Mint	V,C	I	I	1	40 000
Mitsuba	A	C	I	3	500
Mizuna	A	C	I	2	600
Mustard	A	C	I	3-7	600
Mustard Greens	A	C	I	4	600
Nasturtium	A	V,C	I	3	30
New Zealand Spinach	P	V,C	I	6	20
Oca	P	V			
Okra	A	S		5	15
Onion	B	C	I	2	250
Orach	A	C	W	5	250
Oriental Cooking Melon	A	C	I	5	70
Pansy & Violet	A	V,C	I	7 days, 1	1-2000
Parsley	B	C	I	3	200
Parsnip	B	C	I	1	200
Pea	A	S		3	5
Peanut	P	S		1	12

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APPENDIX A cont'd.

Name of Plant	Annual, Biennial or Perennial	Manner of Reproduction – Vegetatively and, if by seeds also, Cross-pollinating and/or Self-pollinating	If Cross-pollinated are they Wind, and/or Insect-pollinated?	How many years the seeds last in good storage conditions	How many seeds to the gram
Peruvian Parsnip	P	V			
Poppy	A	C	I	2	10 000
Potato	P	V			
Pumpkin	A	C	I	3-10	4
Queensland Arrowroot	P	V			
Radish	A,B	C	I	4	100
Rhubarb	P	V,C	I	1	250
Rocket	A	C	I	2	500
Rockmelon	A	C	I	5	30
Roselle	A	S		3	70
Rosemary	P	V,C	I	1	900
Runner Bean	P	S		3	1
Sage	P	V,C	I	3	250
Salad Burnet	P	V,C	I	3	150
Salsify	B	C	I	3-5	100
Silver Beet	B	C	W	10	60-90
Snake Bean	A	S		3-8	5
Sorrel	P	V,C	I	2	1000
Soya Bean	A	S		3	5-10
Spinach	A	C	W	5	70
Spring Onion	A,P	V,C	I	2	250
Squash	A	C	I	3-10	6-8
Sunflower	A	C	I	5	10-20
Sweet Potato	P	V			
Taro	P	V			
Tarragon	P	V			
Thyme	P	V,C	I	5	6000
Tomato	A	S		4	400
Tree Onion	P	V			
Tumeric	P	V			
Turnip	B	C	I	5	300
Water Chestnut	P	V			
Water Spinach	A	V,S		3	150
Watercress	P	V,S		5	4000
Watermelon	A	C	I	5	6
Wax Gourd	A	C	I	3	10
Winged Bean	A,P	S		2	18
Yam	P	V			
Yam Bean	P	V,S		5	5

KEY:
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P–Perennial
C–Cross-pollinated
S–Self-pollinated
W–Wind-pollinated
I–Insect-pollinated
V–Vegetatively reproduced

APPENDIX B

List of Plants by Family

Those species marked with an asterisk do not appear in this book but if they are of interest, the techniques of propagating will be similar to those for their close relatives.

AMARANTHACEAE
Amaranthus spp. – Amaranth

AMARYLLIDACEAE [sometimes known as ALLIACEAE, and formerly included in LILIACEAE]
Allium ampeloprasum – Leek and Elephant, or Levant, Garlic
Allium cepa – Onion
Allium cepa var. *aggregatum* – Eschallot
Allium cepa var. *proliferum* – Tree Onion
Allium fistulosum – Spring Onion
Allium sativum – Garlic
Allium schoenoprasum – Chives
Allium tuberosum – Garlic Chives

ARACEAE
Amorphophallus spp. – Taro, Elephant Yam
Colocasia spp. – Taro
Cyrtosperma spp. – Taro
Xanthosoma spp. – Taro

ASTERACEAE [formerly COMPOSITAE]
Artemesia drancunculus – Tarragon
Calendula officinalis – Calendula
Chrysanthemum coronarium – Garland Chrysanthemum
Cichorium endivia – Endive
Cichorium intybus – Chicory, Witloof
Cynara cardunculus – Cardoon
Cynara scolymus – Artichoke
Helianthus annuus – Sunflower
Helianthus tuberosus – Jerusalem Artichoke
Lactuca sativa – Lettuce, Celtuce
Scorzonera hispanica – Black Salsify
Tagetes spp. – Marigold
Taraxacum officinale – Dandelion
Tragopogon porrifolius – Salsify

BASELLACEAE
Basella alba and *B. rubra* – Basella

BORAGINACEAE
Borago officinalis – Borage

BRASSICACEAE [formerly CRUCIFERAE]
Armoracia rusticana – Horseradish *
Barbarea praecox – American Upland Cress
Brassica birta – Mustard
Brassica juncea – Mustard Greens
Brassica juncea var. *japonica* –Mizuna
Brassica napus – Rutabaga
Brassica nigra – Black Mustard
Brassica oleracea var. *acephala* – Kale
Brassica oleracea var. *acephala* – Collard
Brassica oleracea var. *botrytis* – Cauliflower
Brassica oleracea var. *capitata* – Cabbage
Brassica oleracea var. *gemmifera* – Brussels Sprouts
Brassica oleracea var. *gongylodes* – Kohlrabi
Brassica oleracea var. *italica* – Broccoli
Brassica rapa – Turnip
Brassica rapa var. *chinensis* – heading Chinese Cabbage
Brassica rapa var. *pekinensis* – open-hearted Chinese Cabbage, Turnip
Cardamine pratensis – Meadow Cress
Crambe maritima – Sea Kale *
Eruca sativa – Rocket
Lepidium sativum – Upland Cress
Raphanus sativa – Radish
Nasturtium offfícinale – Watercress

CANNACEAE
Canna edulis – Queensland Arrowroot

CHENOPODIACEAE
Atriplex hortensis – Orach
Beta vulgaris – Beetroot, Silver Beet
Chenopodium bonus-henricus – Good King Henry (Fat Hen)*
Chenopodium quinoa – Quinoa *
Spinacia oleracea – Spinach

CONVOLULACEAE
Ipomea acquatica – Water Spinach
Ipomea batatas – Sweet Potato

CUCURBITACEAE
Benincasa hispida – Wax Gourd
Citrullus lanatus – Watermelon
Cucumis anguria – West Indian Gherkin *
Cucumis melo – Rockmelon, Oriental Cooking Melon, Armenian Cucumber *
Cucumis metuliferous – African Horned Melon
Cucumis sativus – Cucumber
Cucurbita ficifolia – Chilacayote
Cucurbita maxima – Pumpkin such as the Queensland Blue
Cucurbita mixta – Some Pumpkins, often called Japanese
Cucurbita moschata – Gramma, Butternut
Cucurbita pepo – Squash, Zucchini

APPENDIX B cont'd.

Cyclanthera pedata – Korila
Lagenaria siceraria – Gourd
Luffa acutangula – Luffa, Angled
Luffa aegyptiaca – Luffa, Smooth
Luffa cylindrica – Luffa, Smooth
Momordica charantia – Bitter Gourd
Sechium edule – Choko
Sicana odorifera – Casabanana *
Trichosanthes anguina – Guada Bean

CYPERACEAE
Eleocharis dulcis – Water Chestnut

DIOSCERACEAE
Dioscorea alata – Yam

EUPHORBIACEAE
Manihot esculenta – Cassava

GRAMINEAE [sometimes known as POACEAE]
Cymbopogon spp. – Lemongrass
Zea mays – Corn

LABIATAE [sometimes known as LAMIACEAE]
Mentha spp. – Mint
Ocimum basilicum – Basil
Origanum spp. – Marjoram, Oregano
Rosmarinus officinalis – Rosemary
Salvia spp. – Sage
Thymus vulgaris – Thyme

LEGUMINOSAE [sometimes known as FABACEAE]
Arachis hypogaea – Peanut
Cajanus cajan – Pigeon Pea *
Canavalia gladiata – Sword Bean *
Cicer arietinum – Chick Pea *
Dolichos lablab var. *niger* – Hyacinth Bean
Glycine max – Soya Bean
Pachyrrhizus erosus – Yam Bean
Phaseolus coccineus – Runner Bean
Phaseolus lunatus – Lima Bean
Phaseolus vulgaris – Bean
Pisum sativum – Pea
Psophocarpus tetragonolobus – Winged Bean
Vicia fava – Broad Bean
Vigna umbellata – Rice Bean *
Vigna unguiculata – Cowpea
Vigna unguiculata subspecies *sesquipedalis* – Snake Bean

LILIACEAE
Asparagus officinalis – Asparagus

MALVACEAE
Abelmoschus esculentus [Hibiscus esculentus] – Okra
Abelmoschus manihot [Hibiscus manihot] – Hibiscus Spinach
Hibiscus sabdariffa – Rosella

OXALIDACEAE
Oxalis tuberosa – Oca

PAPAVERACEAE
Papaver spp. – Poppies

POLYGONACEAE
Rheum rhubarbarum – Rhubarb
Rumex acetosa – Sorrel

ROSACEAE
Sanguisorba minor – Salad Burnet

SOLANACEAE
Capsicum annuum – Capsicum, Chilli
Capsicum baccatum – Chilli
Capsicum fruescens – Chilli, tabasco types
Capsicum pubescens – Chilli, manzano types
Lycopersicon esculentum – Tomato
Lycopersicon pimpinellifolium – Cherry Tomato
Physalis ixocarpa – Tomatillo *
Physalis peruviana – Cape Gooseberry
Solanum melongena – Eggplant
Solanum muricatum – Pepino *
Solanum tuberosum – Potato

TETRAGONIACEAE [sometimes known as AIZOCEAE]
Tetragonia tetragonioides [T. expansa] – New Zealand Spinach

TROPAEOLACEAE
Tropaeolum majus – Nasturtium
Tropaeolum tuberosum – Anu

UMBELLIFERAE [sometimes known as APIACEAE]
Apium graveolens – Celery, Celeraic
Anethum graveolens – Dill
Anthriscus cerefolium – Chervil
Arracacia xanthorrhiza – Peruvian Parsnip
Coriandrum sativum – Coriander
Cryptotaenia japonica – Mitsuba
Daucus carota var. *sativus* – Carrot
Foeniculum vulgare – Fennel
Pastinaca sativa – Parsnip
Petroselinum crispum – Parsley

VALERIANACEAE
Valerianella locusta – Corn Salad

VIOLACEAE
Viola spp. – Pansy and Violet

ZINGIBERACEAE
Aframomum spp. – Paradise Pepper
Alpinia galanga – Laos, or Galangal
Amomum spp. – Cardamom
Curcuma spp. – Tumeric
Zingiber spp. – Ginger

APPENDIX C

Index of Alternative Names

This list is to help you to look up a plant that you know by a name that is different to what we have used, for example, if you want to find Achira, you will need to look up Queensland Arrowroot in Part Three.

Achira see Queensland Arrowroot
Achoa see Korila
African Horned Cucumber see Cucumber
Alacayote see Chilacayote
Anu see Nasturtium
Apple Mint see Mint
Armenian Cucumber see Rockmelon
Arracacha see Peruvian Parsnip
Arugula see Rocket
Ash Pumpkin see Wax Gourd
Asparagus Bean see Snake Bean
Asparagus Lettuce see Celtuce
Aubergine see Eggplant
Barlotti Bean see Bean
Basalm Pear see Bitter Gourd
Belgian Endive see Chicory
Bitter Cucumber see Bitter Gourd
Bitter Melon see Bitter Gourd
Blackeyed Pea see Cow Pea
Bok Choy see Chinese Cabbage
Bonavista Bean see Hyacinth Bean
Borecole see Collard, also (in NZ) Kale
Borlotti Bean see Bean
Bottle Gourd see Gourd
Brinjal see Eggplant
Bulb Shallot see Eschallot
Bunching Onion see Spring Onion
Bush Bean see Bean
Butter Bean see Bean
Butterfly Bean see Runner Bean
Buttermut Pumpkin see Gramma
Calabash see Gourd
Canteloupe see Rockmelon
Cassaba see Rockmelon
Celery Cabbage see Chinese Cabbage
Celery Mustard see Chinese Cabbage
Ceylon Spinach see Basella
Chard see Silver Beet
Chayote see Choko
Chia see Sage
Chicory see Endive
Chilicayote see Chilacayote
Chilli see Capsicum & Chilli
Chinese Chives see Garlic Chives
Chinese Lantern see Cape Gooseberry
Chinese Lettuce see Celtuce
Chinese Mustard see Chinese Cabbage
Chinese Parsley see Coriander
Chinese Preserving Melon see Wax Gourd
Chinese Spinach see Amaranth
Chop Suey Greens see Garland Chrysanthemum
Christophine see Choko
Cilantro see Coriander
Citron see Watermelon
Clary Sage see Sage
Climbing Bean see Bean
Cobra Melon see Rockmelon
Cole see Collard
Colewort see Collard
Cos see Lettuce
Courgette see Squash
Cress see Watercress
Crookneck see Squash
Dasheen see Taro
Dent Corn see Corn
Dishcloth Gourd see Luffa
Doucette see Corn Salad
Eau de Cologne Mint see Mint
Edible Chrysanthemum see Garland Chrysanthemum
Egyptian Onion see Tree Onion
Elephant Garlic see Leek
Endive see Chicory
English Spinach see Spinach
Fig-leafed Gourd see Chilacayote
Finocchio see Fennel
Flageolet see Bean
Flint Corn see Corn
Flour Corn see Corn
Fodder Beet see Beetroot
Four-angled Bean see Winged Bean
Four-winged Bean see Winged Bean
French Bean see Bean
French Shallot see Eschallot
French Tarragon see Tarragon
Garden Lablab see Hyacinth Bean
Garden Mint see Mint
Gherkin see Cucumber
Globe Artichoke see Artichoke
Gow Choy see Garlic Chives
Green Onion see Spring Onion
Groundnut see Peanut
Guada Gourd see Guada Bean
Gumbo see Okra
Honewort see Mitsuba
Honeydew Melon see Rockmelon
Horse Bean see Broad Bean
Ibiak see Oca
Ibika see Hibiscus Spinach
Indian Cobra Melon see Rockmelon
Indian Cream Melon see Rockmelon
Indian Running Spinach see Basella
Jam Fruit see Cape Gooseberry

APPENDIX C cont'd.

Jam Melon see Watermelon, also Chilacayote
Japanese Cabbage see Mizuna
Japanese Mustard see Mustard Greens
Japanese Parsley see Mitsuba
Jelly Cucumber see Cucumber
Jicama see Yam Bean
Kaffir Bean see Cowpea
Kai Choy see Mustard Greens
Kang Kong see Water Spinach
Kidney Bean see Bean
Kiwano see Cucumber
Kokihi see New Zealand Spinach
Kumara see Sweet Potato
Lablab Bean see Hyacinth Bean
Lady's Fingers see Okra
Lamb's Lettuce see Corn Salad
Lamb's Quarters see Corn Salad
Levant Garlic see Leek
Loofah see Luffa
Mache see Corn Salad
Madagascar Bean see Lima Bean
Maize see Corn
Malabar Gourd see Chilacayote
Malabar Spinach see Basella
Mangel see Beetroot
Mango Melon see Rockmelon
Manioc see Cassava
Marrow see Squash
Menthol Mint see Mint
Mitzuna see Mizuna
Mountain Spinach see Orach
Multiplier Onion see Eschallot
Muskmelon see Rockmelon
Navy Bean see Bean
Netted Melon see Rockmelon
New Guinea Bean see Gourd, also Guada Bean
New Guinea Gourd see Gourd
New Zealand Yam see Oca
Okra Vine see Luffa (Angled)
Oong Choy see Water Spinach
Oregano see Marjoram
Oyster Plant see Salsify
Paak Choy see Chinese Cabbage
Pak-tsoy see Chinese Cabbage
Pak Bhum see Water Spinach
Paprika see Capsicum & Chilli
Paradise Pepper see Ginger
Patty Pan Squash see Squash
Pe-tsai see Chinese Cabbage
Pennyroyal see Mint
Pepper see Capsicum & Chilli
Peppermint see Mint
Pie Melon see Watermelon, also Chilacayote
Pinto Bean see Bean
Pole Bean see Bean
Poorman's Bean see Hyacinth Bean, also Lima Bean
Popcorn see Corn
Pot Marigold see Calendula
Potato Onion see Eschallot
Radicchio see Chicory
Rainbow Chard see Silver Beet
Red Sorrel see Rosella
Rengamutu see New Zealand Spinach
Romaine see Lettuce
Roquette see Rocket
Rutabaga see Turnip
Scallion see Spring Onion
Scallop see Squash
Scarlet Runner Bean see Runner Bean
Scorzonera see Salsify
Serpent Gourd see Gourd
Self-perpetuating Onion see Spring Onion
Seven Year Bean see Hyacinth Bean, also Runner Bean, also Lima Bean
Shallot see Eschallot, also Spring Onion
Shungiku see Garland Chrysanthemum
Snake Gourd see Guada Bean
Snap Bean see Bean
Snow Pea see Pea
Soup Bean see Bean
Spearmint see Mint
Spike Rush see Water Chestnut
Spinach see Silver Beet, also Spinach
Spinach Mustard see Mustard Greens
Stinking Roger see Marigold
String Bean see Bean
Summer Squash see Squash
Sunchoke see Jerusalem Artichoke
Sunroot see Jerusalem Artichoke
Swede see Turnip
Sweet Mace see Marigold
Sweet Pepper see Capsicum & Chilli
Sweetcorn see Corn
Swiss Chard see Silver Beet
Tampala see Amaranth
Tapioca see Cassava
Tick Bean see Broad Bean
Tong Ho see Garland Chrysanthemum
Tongan Bean see Lima Bean, also Hyacinth Bean
Topset Onion see Tree Onion
Trombone see Gramma
Turnip-rooted Celery see Celeriac
Vegetable Spaghetti see Squash
Vegetable Sponge see Luffa (Smooth)
Vietnamese Mint see Mint
Vine Peach see Rockmelon
Walking Onion see Tree Onion
Warrigal Greens see New Zealand Spinach
Welsh Onion see Spring Onion
Winter Melon see Wax Gourd
Winter Squash see Gramma, also Pumpkin, also Squash
Witloof see Chicory
Yam (in NZ) see Oca
Yard Long Bean see Snake Bean
Zambo see Chilacayote
Zebra Bean see Bean
Zucchini see Squash

Glossary

Accession: A sample of seed entering a collection, private or public, and given a code name or a number to be recognized easily. All seeds sent to Seed Savers are "accessed" and given a chronological number in the accession book. e.g. Brown Romaine Lettuce is accession number 189.

Allium: The genus (group) including onion, spring onions, garlic, chives, garlic chives, eschallots, and leeks.

Annual: A plant living for one year or less. It flowers, produces seeds and dies. Peas, lettuce, sweetcorn and okra are annuals.

Anther: The sac in which the pollen is formed in the flower and from where the pollen is released.

Axil: The angle between the branch and the leaf stem.

Biennial: A plant which takes two growing seasons, with a cold season in between, to bear seeds under normal conditions. Carrots, cabbages and parsnips are biennial.

Biodiversity: The total variability within all living organisms and their habitats.

Blanching: Covering a plant to stop the sunlight from turning the stalks and leaves green.

Bolting: Rising to seed. Warm and long summer days usually induce bolting.

Brassica: A term given to the group of plants that includes the cabbages, kales, broccolis, kohlrabis, Chinese cabbages, turnips, mustards, Brussels sprouts and mizuna.

Bulbil: A small aerial bulb on a flower stalk that is capable of producing a new plant.

Calyx: The envelope of sepals encasing the flower bud.

Centre of Diversity: Area where great genetic variance of a plant species occurs.

Chook: Colloquial Australian word for hen or poultry.

Coppicing: The growth of new trunks after a tree has been lopped.

Cotyledon: Seed leaves that store reserve food.

Cross-pollinated: A term used to describe plants that need, for their survival, to have their flowers pollinated by pollen from flowers of other plants mostly in the same species (the opposite of self-pollinated). This term is also used to describe the situation of a transfer of pollen (accidental or deliberate) between two varieties.

Crown: The growing point above the roots, where the shoots start, as with rhubarb and peruvian parsnip.

Cucurbit: A term given to the group of plants that includes the pumpkins, squashes, marrows, grammas, melons, luffas, gourds, cucumbers, etc.

Cultivar: Used in place of "cultivated variety".

Curd: The edible part of a cauliflower.

Day-neutral: When a plant forms a bulb, flowers or goes to seed regardless of the length of the day, unlike short-day or long-day plants which need the trigger mechanism of change in day length.

Determinate: A type of plant whose stem growth stops when the top bud turns into a flower bud. A determinate tomato is said to be self-pruning.

Dioecious: A plant with male and female flowers on different plants such as the asparagus.

Dominant pollen: A hereditary factor or gene passed on to another plant through the pollen and causing a character to be manifested strongly in the next generation.

Diuretic: Helping to eliminate excess water from the body.

F1: Literally first filial. The first offspring of a cross between two distinct varieties which have been selfed.

F2: The second generation of hybrid seeds.

FAO: (United Nations) Food and Agricultural Organization, based in Rome, Italy.

Family: Botanical classification ranking above genus, e.g. Leguminosae.

Floret: A little flower in a flower head.

Folk variety: A variety which has been developed through farmers' selection.

Foundation seed: The first increase from the initial seeds that have been provided by the breeder (an agency, department of agriculture, university, a private plant breeder etc). It is from foundation seed that all multiplications are made. Therefore the purity of the seed must naturally be very high and the isolation distances very much on the safe side.

Gene: The living stuff of the cell nucleus that carries heredity from one generation to the next.

Genebank: Institution or private facility where seed, pollen or tissue culture is stored.

Genera: Plural of genus.

Genetic erosion: Gradual loss of genetic diversity

Genetics: Science that deals with the mechanism of heredity.

Genus: A category of botanical classification that fits between family and species. A genus encompasses related species.

Germplasm: A general term covering the variety of forms, such as seeds, cuttings and tubers, in which a plant's genetic material are preserved for reproduction.

Greens: The leaves or shoots of vegetables that are cooked, sometimes called potherbs, as opposed to leafy greens like lettuce and chicory which are primarily eaten raw as salads.

Green-shelled beans: Beans that are picked for the table when full size, but still green, and shelled. Broad beans are usually eaten green-shelled.

Guild: Plants growing together for their mutual benefit.

Heirloom vegetable: A non-hybrid variety that has been passed on in a family from one generation to the next.

Hilum: The scar on a seed which shows where the seed has been attached.

Humus: Organic matter that has been broken down. A "sense of humus" (the Earth Repair Foundation maxim) means garden-wise.

IBPGR: International Board for Plant Genetic Resources, Rome.

Inbreeding depression: The loss of vigour and variation caused when too few plants are chosen to cross-pollinate for seed production.

Indeterminate: A type of plant which keeps on producing buds at each terminal growth. An indeterminate tomato will produce continuously in frost free areas for several seasons.

Infusion: A tea made by pouring boiling water over dried or fresh herbs and leaving it to draw for five to ten minutes.

In situ: Literally "in the place", and where plants are concerned, in their traditional situation.

Landrace: An early, cultivated form of a crop species, developed by peasant farmers in the early days of agriculture and still grown today.

Monoecious: Having male and female parts in different flowers, such as the Cucurbits.

NGO: Non-government Organization.

Nitrogen fixation: The useful transformation of nitrogen by plants (mostly legumes) of the air in the soil into an actual fertilizer with the help of bacteria (rhizobia) living in symbiosis with the plant roots. The nitrogen is stored in nodules which are visible lumps on the roots. The nodulation rate is the rate at which this occurs.

Open-pollinated: There is a free flow of pollen between individual plants (as opposed to controlled, or closed, pollination).

Perennial: A plant that lives more than two years.

Perfect flower: A flower which contains both male and female parts, also called a complete flower. Most vegetables have perfect flowers.

Permaculture: A contraction of **Perma**nent Agri**culture.** An environmental science and art of designing a sustainable future. Bill Mollison is the father of Permaculture.

Plumule: The first leaves to emerge from the seed after germination.

Pollen: Dust-like particle produced by the male part of a flower.

Population: Group of plants that hold an ensemble of characteristics in common.

Radicle: The first root to emerge from the seed after germination.

Rhizome: An underground stem, often swollen.

Roguing: Action of pulling out or cutting off all plants that are not suitable for pollinating nor for bearing seeds. They may be diseased, weak, too early to go to seed or generally not conforming to the image the seed saver has of the variety.

Rustic: Refers to a traditional plant that is similar to its wild relatives.

Scion: Cutting of a plant that is used for grafting onto rootstock. The plant is selected for its good fruiting characteristics.

Selfed: When the ovary of a flower is pollinated by the pollen of that flower.

Sepal: Petal-like segment of a calyx.

Silique: Seed pod of a Brassica. Have a look at one and notice the way in which the seeds line up on either side of the central membrane.

Silk (corn): The female part of the corn flower which receives the pollen during fertilization. Each silk is attached to one ovary and must be pollinated to develop a kernel.

Stigma: The female part of a flower that receives pollen.

Stolon: Prostrate branch that strikes root and may develop a tuber.

True-to-type: The offspring having the same characteristics as the parent.

Umbel: A cluster of flowers which looks like an umbrella, as seen with parsley, parsnip, carrot, dill etc. flowers.

Variety: Subdivision of a species, sometimes called cultivar. If a species has varieties, this indicates that there has been a great deal of breeding done on the plant, or that it has made a local adaptation.

Viable: Capable of germinating and developing normally.

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NOTES

For feedback slip and details of how to join The Seed Savers' Network, see coloured insert.

Subscribe to Seed Savers' Newsletter

Packed with news, views, and seedy insights from around the world, the Seed Savers newsletter is a unique resource for beginners and experts alike.

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Training in Seed Saving

Jude and Michel Fanton, co-authors of the Handbook, are available for small or large group training. A great way to get your local seed network growing brilliantly! Jude and Michel also conduct training courses at the Byron Bay Seed Centre each early April and October.

[ ] I'd like to receive information on the next regular training session in Byron Bay http://www.seedsavers.net/training/html
[ ] Please contact us about a custom training programme for our local seed network

Internships and International Projects

Seed Savers participates in a number of international projects and actively trains and places outstanding volunteers through its internship programme.

[ ] I'm a qualified gardener and committed volunteer. Please contact me for an internship interview and assessment http://www.seedsavers.net/interns.html

Join or Start a Local Seed Network

The best way to get involved with seed saving is to make it a part of your social activities. Just ask around with family and friends, and you'll probably discover that those tasty tomatoes or delicious herbs come from seeds that have been saved and shared for generations. We can help you locate seed saving enthusiasts nearby, and can let others know that you're interested. If you have access to the internet, you can use the Seed Savers website to post your seed lists and contact details so that other people can get involved with your network.

[ ] Please send an information kit to help me organise a local seed network http://www.seedsavers.net/networks.html
[ ] Send me contact information for seed saving networks near me http://www.seedsavers.net/networks.html
[ ] Let other people contact me about exchanging seeds

Participatory Website

Our website is designed to support the many local seed clubs, exchanges and networks around Australia and around the world. The site can be updated with content that you can submit either online or by sending material to us and we can publish it for you. For complete details, please see the instructions online at http://www.seedsavers.net/content.html)

[ ] I'd like to contribute information to the website, but don't have Internet access. Please send details on how I can participate.

Name: .....

Address: .....

Suburb: .....State: .....Postcode: .....

Expertise/Occupation:. .....

TICK METHOD OF PAYMENT: ❒ Cheque ❒ Money Order ❒ Mastercard ❒ Visa ❒ Bankcard

Name as on card: .....Signature: .....Exp. Date: .....

THE SEED SAVERS' NETWORK, BOX 975, BYRON BAY, NSW, 2481, AUSTRALIA

Overseas Extension

Seed Savers has a comprehensive training programme for people intending to work on sustainable agriculture and domestic food security projects in communities and overseas. Traineeships are available, courses are held regularly and placement in projects may be arranged.

- ☐ Volunteering Overseas and Seed Saving Courses
- ☐ Internships
- ☐ Starting a local seed network

Participatory website
www.seedsavers.net <http://www.seedsavers.net> allows you to participate in a number of ways through an easy on-line publishing facility. These sections are specially designed to receive your contributions:
News: such as biodiversity issues, GMOs, local seed networks, school seed activities and seed training.
Resources: searchable databases of Seed Savers' Network seed bank and 2000 volume library; seed databases of local seed networks, and reference documents.
Projects: descriptions of seed saving projects both in Australia and abroad.
People: biographies and cameos of people involved with the issues, whether as individuals such as journalists, farmers, volunteers, or as members of projects.
If you have an addition to make you can submit content online at any time. Just send an email to info@seedsavers.net <mailto:info@seedsavers.net> for a password.
There are several other sections to the website such as About Us, Upcoming Events and a Virtual Tour of Seed Gardens.

Michel and Jude Fanton, the founders of Australia's Seed Savers' Network, show how gardeners can protect our global food heritage — and eat it too.

They describe the seed collecting, growth cycles, propagation, cultivation and traditional kitchen and medicinal uses of over one hundred vegetables, culinary herbs and edible flowers.

the Seed Savers' Handbook

Many people care passionately about the [illegible]ment and conserving it for future generations. An [illegible]al part of this is concern for the demise of old-fashioned varieties of useful plants and vegetables.

But philosophical thought and rhetoric alone cannot turn the tide — the timely publication of this informative and practical book will do much to guide ordinary people to becoming caretakers of our diverse seed heritage.

Megg Miller, editor of *Grass Roots*

Our best recommendation for this book is that it will help you strengthen the wholesome connection between soil, plant and self, by showing you how to select and reproduce the seeds that best respond to the region in which you live.

Scale is not important here. At whatever level you wish to work — from the single pot on the window-sill to a paddock full of earthly delights — you will find *The Seed Savers' Handbook* waiting for you, to tell you things you need to know.

Michael Boddy, editor of *Kitchen Talk Newsletter*

I believe this book to be essential for all caring farmers, gardeners, cooks and parents, and I trust that it will speed our return to good nutrition and a healthy society.

Bill Mollison, founder of *Permaculture*

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