Although this book is about controlling "weeds" without resorting to poisons (weedicides, herbicides, and similar quick-fix "solutions"), it really covers much more. It offers a complete growing strategy for your garden or farm, whether you grow flowers, vegetables, fruit, lawn or pasture.

Jackie French simply sees the health, vigour, richness, and variety of the whole garden as the only effective means of managing individual problems like weeds, insects, fertility, drainage, or plant disease.

*Organic Control of Common Weeds* informs you about:

- Making a weed-free garden out of weeds
- Biological control, natural herbicides and companion planting
- Using weeds as pesticides, mulch, and compost
- Green manuring and tyre gardens
- Home-made herbicides
- Edible weeds and medicinal weeds
- Weed control strategies for lawns, flower beds, orchards, pasture, and vegetable gardens

ISBN 0-947214-06-2

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ORGANIC CONTROL of Common Weeds

Jackie French

# ORGANIC CONTROL OF Common Weeds

A safe environment guide

BY Jackie French

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PO Box 122
Flemington, Vic. 3031
Phone (03) 376 4461

First published by Aird Books in 1989



National Library of Australia
Cataloguing-in-publication data

French, Jacqueline.
Organic control of common weeds.
Includes index
ISBN 0 947214 06 2

1. Weeds–Biological control–Australia. 2. Organic farming–Australia. 3. Organic gardening–Australia. I. Jorgensen, Greg. II. Title
632.58



Design by Pauline McClenahan, Bookworks
Illustrations by Greg Jorgensen
Typeset by Midland Typesetters, Maryborough, Victoria
Printed by Australian Print Group, Maryborough, Victoria

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# INTRODUCTION

This book shows that weeds can be a useful and integral part of your growing system and that, where necessary, they can be controlled by better management without resorting to herbicides. We hate weeds: it's part of our culture. It often takes years to come to accept that we can co-exist with them.

Many languages don't have a word for "weed". It wasn't an Aboriginal concept. White settlers did not just bring weeds to Australia, they brought the *idea* of weeds. The Aboriginal people saw their landscape as dynamic harmony. We see it as something that must be recreated: endless paddocks of the same species, gardens filled only with what can be bought from local nurseries.

Nowadays "weed control" means using herbicides. Conventional gardening and farming in Australia has become chemical-reliant; chemicals have replaced good management for fertility, weed control, pest control, and disease control, and food has become more and more doctored. We are losing the *joy* of growing things; we are losing our insights and near-instinctive growing strategies. With the quick-fix solutions of chemicals we no longer need to know our land; we need only read instruction labels and spraying calendars and work by rules of thumb.

To use a herbicide you only need to be able to recognise a weed and read a label. But this is not a book of quick-fix solutions. This book is for those who choose to know their land, their gardens; for those who want to work *with* them, and not douse them in a chemical blanket.

## What is a weed?

The term "weed" is more of an insult than a precise category. It describes how people feel about a particular plant, not the plant itself. There is no such thing as a weed until a plant comes into conflict with human wishes, for example by invading crop land or a garden, by looking ugly or by poisoning stock. Weeds are plants that shouldn't be growing there: in other situations they may not be weeds. The couch in our lawn is valued, until it trespasses

into the vegetables. What is a weed to one person isn't to another. I love the "weed" lawn daisies and have worked to get them in my lawn. Paterson's curse is a weed to many graziers, but to beekeepers or farmers in a drought it can be a blessing. (Hence its other name, salvation Jane.)

There are no special biological features that make a weed. On the other hand, plants which become regarded as weeds usually have certain things in common. Weeds are colonisers, the first invaders of disturbed soil. They are usually tough, able to grow on exposed ground, and prolific seeders. Most weeds of economic importance in Australia have been imported, though native re-growth is sometimes called "weed" in grazing areas, and overgrazing or other disturbance sometimes makes a problem of a previously unaggressive native plant. Native weeds include native pigweed, wood sorrels, the native form of the sowthistle (there is also an introduced form). Many weeds were introduced deliberately as garden plants like Paterson's curse, which "escaped" from at least three different gardens. Many weeds, like prickly pear, aren't a problem in their native countries. But because of the different climate, the lack of plant or animal competition, or soil disturbance due to erosion and land clearing, their growing habits here are different and they become weeds.

And then there is the "new wave" of weeds: plants that are becoming weeds because they are resistant to various herbicides. Weed-resistant kikuyu may be the worst of these so far; it is likely that more will develop.

## Cherish your weeds

Weeds stabilise disturbed soil. They prevent soil loss from rain and water in ploughed areas, and stop moisture loss with increased leaf cover. The less you disturb your system with repeated digging, wide spacing between plants, high-nitrogen fertilizers, and soil bare of leaf litter or mulch, the fewer weeds you'll have.

Weeds can indicate soil conditions. Sorrel, for example, indicates acid soil, bracken means nitrogen deficiency, and thistles mean high nitrogen levels.

Deep-rooted weeds can bring up leached elements from deep in the soil where shallower-rooted plants can't reach. As their leaves break down these nutrients are returned to the top soil where shallow-rooted plants can use them.

Weeds help control pests. A background weed population (an easy way to have diverse species in your garden) can have a dramatic effect on the number and range of predators available year-round to attack insect pests. The weeds provide a "home base" for pests and their predators so that, when pest numbers build up on a planted crop, predator numbers rise to match them.



Above all, weeds are *useful*. In my garden they are the main source of mulch; an excellent source of slow-acting organic fertiliser; the basis for plant tonics and pest control remedies; and many other uses, which are described in this book: weeds mean a varied garden.

Flowering weeds attract predators like hoverflies, and they in turn help control pests.

## Don't use herbicides

There are basically three reasons for avoiding herbicides: their effect on human health, on the environment, and on garden and farm management.

### *Human health*

The effects of herbicides are still relatively unknown. They have only been used widely for some forty-five years, so data on their impact is still accumulating. A herbicide is innocent until proven guilty: even with evidence for carcinogenic, mutagenic, teratogenic, and other harmful effects on animals, several products continue to be assumed "innocent" until their harmful effects on humans have been proven beyond doubt. There are many arguments against particular herbicides (like 245T), but even if they were completely harmless to humans there would still be good management reasons for avoiding their systematic use.

### *Environmental effects*

Any herbicide—directly dangerous to humans or not—may have harmful long-term consequences for the environment through unintended, spreading phytotoxicity (herbicides may, for example, kill marine plankton), reduced richness of species, changes in plant diversity, and growing plant resistance to herbicides. In some situations crops and their "associated" weeds are becoming more closely related.

### *Management problems*

Herbicides reduce the need to rotate crops, permitting the continuous monoculture of the same crop. This leads in the long term to reduced yields, as crop-specific pathogens and parasites build up in the soil; and the environment management response is likely to be increased fertiliser and water use rather than changing the cropping system.

Herbicides may do enormous damage to beneficent soil populations, including earthworms and mycorrhiza. (Mycorrhiza are fungal associations with roots which increase nutrient uptake and disease resistance.) This could explain that their use is associated with increased plant disease, particularly damping off, fusarium infections, and other fungal problems, and herbicides may also promote viruses. Although it does not kill them, 245T makes ladybirds and other predators less efficient natural "pest controllers".

Herbicides increase the growers' reliance on the chemical industry. They also cost a lot of money, whilst good management is free. More importantly, herbicide use makes us forget how valuable weeds can be to a growing system. The fact is, that weed problems



are a symptom of bad management, and herbicides are, at best, a temporary solution.

## Natural weed control

When weeds invade disturbed ground, they stabilise it, allowing other, long-term plants to grow. Fifteen years ago, when we first came to Araluen Valley (NSW) most of our land grew weeds: mostly blackberry, but a good range of others as well. There are still a lot left, including blackberry, but it's a vast improvement on what it used to be. Left to itself for a hundred years or so, there would be very few weeds left in the Valley. Weeds are stabilisers, the first arm of an invasion force that brings back the bush.

You can see it with the blackberries here. They provide a moist, dark shelter for the pittosporum seedlings, which eventually grow into a dark canopy. The pittosporums gradually spread, shading out the blackberries, and after a few decades there are trees instead of blackberries.

You can see it with the bracken. It grows on overgrazed flats and slopes, and nothing much eats it, or even penetrates it to pick at the grass underneath. Its wide fronds protect the soil from wind and water erosion, the grass underneath re-seeds and so do tree seedlings, away from heavy feet and hungry mouths. And eventually, again, the bush grows back.

You can see it with the thistles. They appeared here when the land was overgrazed by newly-introduced sheep. Finally, the sheep were removed, leaving paddocks of thistles almost too thick to walk through. Yet, just one year later: no sheep, no grazing, and no thistles. Animals avoid thistley areas, which lets the grass grow up around the thistles and eventually out-compete them.

Of course, not all weed problems can be solved by leaving them alone. Land regenerated to bush is usually the last thing a farmer wants; and in the suburbs there is little bush from which to recolonise. Still, it is presumptuous to believe that all weed problems must be solved by active human intervention: the trick is to know when to leave well enough alone.

CHAPTER 1

# Learning to Live with Weeds

Our home vegetable garden is a mess. It gets two hours' work a fortnight; it is filled with weeds, plants gone to seed, giant misshapen radish, and cauliflower stalks—first forgotten and now growing again.

It has none of the neat rows, bare soil, and giant vegies of a "normal" vegetable garden. But it *does* produce large quantities of vegetables at almost no effort or cost.

I weed our vegetable garden once or twice a year, to make room for more seedlings to germinate from plants that have gone to seed the season before. If the weeds get too big, I trample them down. If I want to plant a seedling there, I dig a small hole and surround it with newspaper. I operate on the principle that a healthy plant will outgrow the weeds—by and large they do.

There are exceptions to this. Firstly, in poor soil—and our soil was just that for years, whilst it was built up with mulch and compost—the weeds will outgrow your vegies: they are after all opportunists. Secondly, the vegies must have a head start, as most weeds grow faster than they do. Hence the occasional weeding and the newspaper. Once the plants are about one-third grown, new weeds hardly affect them. Thirdly, the vegies must be thickly planted. (They usually are, provided they are self-sown.) Bare soil produces a lot of weeds, and the vegies get choked out.

Weeds take up food and moisture. They also give it back: once slashed, weeds return their nutrients to the soil. The leaf cover of weeds helps retain soil moisture and protects plants against too much sun. Weeds also protect your garden against frost. This year, in among the weeds of our vegetable garden, we had tomatoes in mid-July; flowering borage; zucchinis in June: and this in an area where tomatoes should be dead by May at the latest. The weeds kept the tree tomato cuttings from being frozen; the cuttings I placed in the weed-free cutting bed not far away were all killed by mid-winter. (On the other hand, we didn't get zucchinis until late summer: the early plants were shaded out by our weeds.)

I rarely dig the garden. I pull out weeds instead. The disturbed soil is perfect for planting seedlings. Thus, I weed when I need a bare patch for seedlings, or a bare patch for seeds to germinate. At about the time the borage, leeks, or tomatoes should be germinating I pull out a patch of weeds—hopefully the right patch, around where the parent plant went to seed the previous years. A few weeks later, up come the seedlings.

Weeds mean material for mulch and compost. I pull out annual weeds before they've gone to seed and use them fresh around the



vegies; perennials or seedy weeds, (and giant woody parsnips), I compost. Weeds also make an excellent liquid manure. Weeds store fertility until you need it. Many nutrients are lost in bare ground, whilst weed mulches release their nutrients slowly and steadily to feed the plants around them.

Why then are weeds considered a problem? Probably because a weedy garden requires timing: you need to know *when* to pull them out. Also, unless your soil is soft, moist, and full of humus it is extremely difficult to pull out weeds. As a rule, I believe that if you can't pull out your weeds by the handful (and then plant your seedlings in the soft, disturbed ground afterwards), you need more organic matter in your soil. And weeds are a wonderful, fast growing source of such organic matter. This way, weeds tell you how good your soil is: if they are a problem, your soil needs improving.

Of course, there are weeds and weeds. Heaven protect me from kikuyu! And couch! Or blackberries! There's no happy co-existence with kikuyu, couch, or blackberries in the garden: the only thing is to keep pulling them out, to keep mulching and close planting, until your garden is clear of them.

This is where the "good" weeds come in. Even if you have couch, kikuyu, or blackberries waiting in the wings, waiting to pounce on your garden patch, a thickly weed-choked bed will protect you. Weeds are colonisers, invading and stabilising disturbed soil. Although my vegetable garden is surrounded by couch and kikuyu, they no longer invade the vegetables: they cannot get a toehold. There rarely is bare ground to be colonised in the messy patch that is our garden.

Actually, weed-infested gardens are fun. They're like Christmas stockings. You never know what you might find in them.

At the time of writing (July) I'm having a weed-hauling-out few days: mostly so I have room to plant the beans and corn and a few other things that don't re-seed themselves this spring; and to make room for the plants that *do* re-seed themselves—the leeks I trust will germinate down in the clump by the foliage turnips, the tomatoes that should spring up among the silverbeet, the sunflowers wanted down by the compost bin, the purple beans known to exist under the peas now climbing up the trellis, and lots of other "surprises".

It is exciting to discover exactly *what* is in the garden. Sweet peas I thought long-choked have poked their tips above the slender vetch. I planted those sweet peas, but the ones just starting to flower

near the compost bin are self-sown—they've been coming up for four years now, tangling round the silverbeet, then straggling up the old bit of wire left for them. There's borage, some oak-leaf lettuces, chinese cabbage, and a broccoli plant gone horizontal. The latter had sprouted all along its stalk, giving us nine broccoli stalks instead of one, all bearing large clumps of broccoli. Next year I'll do the same thing deliberately: push the main stalks down till they are horizontal, hoping to get from each plant ten times as much broccoli as before.

At the moment (early winter) the garden is as bare as it will ever be. Not even weeds are germinating now. As soon as the soil heats up I'll bung some seedlings in, and then—and only then—keep the weeds down around them until they are well-established. As I said before: weeds won't reduce your crop as long as they grow after your plant is one-third mature. By that time, a healthy plant should "out-compete" the weeds.

## What to do with weeds

Most weeds can just be let lie, as fresh mulch. Some may re-root, especially dock, young oats, couch, kikuyu, and anything that grows from runners or small bulbs. You can toss these onto one big heap, though these heaps tend simply to expand with weeds growing on top of them.

Gradually, I have fallen back on three strategies with my "re-rooting" weeds. First of all, I use "re-rooting" weeds as mulch, but only on top of several layers of newspaper so they are dead before they touch the soil. Others are stuffed in the compost bin. This at least keeps them tidy and recycles them fairly quickly: moist, green, fertile weeds—without much stalky matter—break down quickly. The bin can be emptied whenever it has been full for two weeks in a row; in other words, when nothing more can be crammed in, not even after the last lot had wilted. Then, the bottom layers of decomposed matter are dumped all over the garden, and the rest is thrust back into the bin.

Other weeds are thrown into a large, fibreglass container. Cover them with water, and screw the lid back on to discourage mosquitoes and frogs. The water gradually turns slushy-brown: wonderful liquid fertiliser, perfect for slushing on celery, lettuce, and other plants that need something extra to keep them growing strongly. The sludge at the bottom is seed-free, and also makes wonderful fertiliser. The bin is regularly topped up with weeds and water, to be harvested as needed.



Two other sorts of weeds can be a problem: fruit that might be infected with codlin moth or fruit fly, and large quantities of stalky weeds from commercial vegetable growing areas. One option is to let animals eat them: hens, or sheep, or horses. That way, weeds instantly become manure. Infected fruit can also be placed in plastic garbage bags, sealed, and left in the sun for at least two months, or until the fruit has decomposed.

### *The weedy pumpkin crop*

The pumpkins were planted in large clumps of compost on a strip of grass and weeds (until recently these were blackberries, with a few still peeping through). Sheep, wallabies, and wombats grazed at will through the crop, though the horses were kept out by a rough pole fence: I was afraid their feet would crush the pumpkins.

The pumpkins grew strongly. So did the grass and the weeds, as we kept the area well-watered. The sheep grazed carefully through the lot, nosing out the lush grass and weeds and ignoring the tougher pumpkin vines. This kept the grass from competing with the pumpkins, and also added manure to the area.

I have repeated this several times since, with melons as well as pumpkins, using sheep and also mowing with a whippersnipper. The latter was very effective indeed, as the mown grass and weeds mulched the crop, though whippersnipping is definitely more work than letting in the sheep.

### *Corn, weeds, and lucerne*

The sheep grazed the area to the ground, the corn was planted in a scratched trench among the sod, and the lucerne and weeds were kept in check with a whippersnipper. The corn didn't grow particularly high, but the harvest was as good as a trial patch elsewhere, grown in a weedless area: the cobs were just as large and as numerous. Where we neglected to whippersnip, however, the cobs were appreciably smaller. Frequent whippersnipping was crucial, as were fertile soil and steady watering.

### *Beans in clover, weeds, and lucerne*

Again, the clover, weeds, and lucerne were kept down by whippersnipping. This was effective until a rainy week and a dose of the

flu meant the whippersnipping was neglected. Many beans got bean-fly; though those that had been whippersnipped recently and weren't choked with tall growth, didn't. The mature beans also started to rot. Even when the whippersnipping was resumed the beans didn't get back to normal.

Interestingly, the competition didn't dwarf the beans (which were more than one-third grown) or lessen their crop. On the contrary, they seemed to shoot up even more in the moist, hot micro-climate provided by the lucerne, dock, etc. It was this heat and moisture that seemed to be the problem: soft, lush, sap-sucker enticing growth and mildew.

### *Parsnips, carrots, and radish*

I have grown all three of these in a closely-mown paddock, with no previous digging at all. Fresh seed must be used, and a lot of it. I just shook the seed heads over the ground and made sure the area was kept moist till germination of couple of weeks later. The radishes germinated first and opened the soil for the carrots and parsnips. The parsnips grew massive and eventually shaded out the grass and weeds.

The parsnips grew well: nicely-shaped roots and an excellent harvest. The carrots didn't germinate as well as the parsnips, but were also deep-rooted and well-shaped. The radish bolted upwards and produced excess leaf growth before they rooted. They tended to grow as much above ground as below: curly, misshapen radishes we would have been stuck with had we tried to sell them, but they tasted excellent, and were perfect for home consumption.

All three crops were grown in good soil: humus-rich and moist. Those that grew in the driveway however—a lot of the seed blew away and we had vegetables coming up all over the place—had stunted roots, and were misshapen with excess leaf growth. Our grass/weed/vegetable root culture only worked in good soil. Since then we have had parsnips, carrots, etc. still popping up everywhere: they are a useful seed reserve.

### *Italian parsley in weeds*

This was a weedy (but not grassy) patch next to a bed of parsley. The parsley went to seed, the seeds germinated in the weeds, grew tall to get to the sunlight, and eventually overtook the weeds. (This would not have been possible if the soil hadn't been moist and fertile.)



### *Celery (all leaf)*

A celery plant shot to seed at the edge of the garden. The seedlings germinated in the grass. We kept the grass mowed. The celery kept growing: small, close plants nearly all leaf, but the leaves were sweet and intensely flavoured and were used in soups and stews.

### *Broad beans (small, weak, and yellow)*

My first crop of broad beans in grass were planted in a thin, scratched row of soil. They grew thin and yellow, and hardly cropped, even though I kept the grass slashed. The soil wasn't fertile enough to support the grass and the beans. This year our broad beans were mostly self-sown in a large patch of weeds. The first I knew of them was when they poked their heads up over the dock and parsnips. They cropped excellently, with no work on my part (they kept the weeds down themselves), but the soil was very fertile and very moist.

### *Pumpkins in un-mown clover and lucerne*

These were planted, after the lucerne was mown, in small heaps of compost. They grew wonderfully, even when the lucerne crowded over them, and kept fruiting late in the season after vines on barer ground were burnt off.

### *Potatoes in tyres*

Place old tyres on grass or weeds about two or three deep; fork some compost in the bottom, throw in a potato, throw on more compost, then water and wait. Even on poor ground the crop should be excellent and need no digging: just pull out the plant, spuds and all. Tyre-grown potatoes are relatively frost proof here; the black tyres absorb heat and the extra height helps take them out of reach of the frost.

### *Asparagus in weeds*

The asparagus was planted in weed-free ground and kept relatively weed-free for a year. Since then it hasn't been weeded at all, so the patch is filled with weeds. Every winter when the asparagus dies down I whippersnip the weeds; these thickly mulch the asparagus and provide the fertiliser for the next crop. I have done this for seven years now—no fertilising, no weeding—just one slash, then pick the asparagus in spring.

### *Rhubarb in blackberries*

The blackberries were trampled by gumboots and slash hooks; thickly-coated with newspapers, then with mulch. The rhubarb was planted on top. A few blackberry canes straggled through the mulch, but they were yellow and spindly and easily pulled out—especially as we were in the patch every day, picking the evening's rhubarb, no blackberry shoot had time to grow large. Now, eight years later, the patch is blackberry-free (except for the odd seedling dropped by birds).

### *Choko over dock and skeleton weed*

The choko was supposed to grow over the dunny but went the other way, overrunning the patch of weeds that had once grown corn. The chokos cropped excessively as chokos are wont to, and the weeds were destroyed.

### *Hops over blackberry and stinking roger*

The hops were a nice, fat root when I planted them in a spade-ful of compost. They overran the blackberries, the stinking roger (both at least one metre tall), and clambered over the dunny.

### *Vegetables to choke out weeds*

Plant these to choke out weeds, or to cover bare ground. (Pick when the ground is needed.) They are all fast-germinating, thick-growing, and fast-maturing.

*Border plants* (to keep out weeds and grass)
*Chinese mustard*
*Comfrey*
*Parsnips* (as long as the seed is fresh—that is, your own, just gathered; parsnip seed is only viable for one year)
*Radish*
*Raspberries* (these will have to be thinned every few years)
*Rhubarb*
*Rocket*
*Thyme* (clumps of at least 100 cm wide)
*Watercress* (wet areas only)
*Zucchini*
*Dahlias* (these come up in summer, when weeds are a problem)
*Foliage turnips*
*Horseradish*
*Mint* (this will also invade the garden but is easier to pull out than most grasses and many weeds)
*New Zealand spinach*



Never leave the edge of a garden bare: make sure it is thickly-planted to keep out invaders.

### *Some rambling weed chokers*

These can be planted to ramble over weeds. In good condition they will smother a clump of blackberries; other, less vehement weeds can be devastated by them. Try planting them too at the edge of the garden. With their roots away from other crops they won't compete for nutrients, but the vines can be trained to smother weeds.

*Banana passionfruit* (these will tolerate light frosts, unlike ordinary passionfruit, and can be grown in a sheltered place—say among weeds—through most of Australia)
*Chokos*
*Hops*
*Kiwi fruit* (these can be left to ramble over the ground and the weeds instead of being trained up a pergola; they are fast-growing and hardy)
*Nasturtiums* (these are perennial in warm areas; while they won't choke out vigorous weeds, I have found they suppress couch here and other, soft weeds like sorrel, dock, and cobblers pegs; a barrier of nasturtiums keeps kikuyu out of our garden)
*Ornamental grapes*
*Pumpkins* (I have found crown prince, jarrahdale, and Queensland blue the most rampant)
*Wisteria*

### *Some fast plants to choke out weeds*

Plants that grow from roots or bulbs are excellent in reclaiming weedy areas, as they start with next year's food supply stored in their roots, which gives them a head start on the weeds. In your

weed-infested garden, or an area newly mulched over with weeds, try big hop root; dahlias; rhubarb; three-year-old asparagus crowns; Jerusalem artichokes; horseradish, and New Zealand yams (these will crop even in a cold climate: they are different from tropical yams).

## *Green manure to choke out weeds*

Green manuring is the growing of a fast, nitrogen-fixing crop which is either dug in or slashed for fertiliser or humus. Green manures also help suppress weeds, and a thick green manure can clear a weedy patch of ground.

The classic green manure crops are nitrogen-fixing, mostly legumes. Although it is actually the associated bacteria that fix the nitrogen, it is easier to refer to the crop itself as a nitrogen fixer. One legume crop can convert 150 kg of nitrogen per hectare per year from the air to the soil.

A barley crop dug in as green manure greatly increases the uptake of phosphorous in the crop that follows it, while a buckwheat green manure is also said to make a greater proportion of "locked up" phosphorous available. Deep-rooted green manure crops draw nutrients from levels that other, shallow-rooted crops cannot reach. If these deep-rooted crops are green manured, the nutrients which would otherwise be lost are recovered.

### Growing green manures

Green manures must grow quickly to free the soil for other crops. Sow them more thickly than normal, so they choke out weeds, and harvest them just as they start to flower, or while they are still soft and green. Green manure can either be slashed or dug in.

### Crops for green manuring

*Broad beans* These are "nitrogen fixers". They tend to fall over and rot if not supported, but this is all for the better if your aim is to suppress weeds. They can be planted in autumn and dug in in early spring for summer crops. Plant broad bean seed fairly deeply, about 5 cm deep. Plant them thickly, at about 5 g of seed to the square metre. Slash them just as the first flowers are falling.

*Peas* These can be either conventional green peas or field peas, usually used for stock food. Peas are nitrogen fixing. Sow them in early spring for replanting in December, or sow them in autumn for spring replanting. Seed should be sown at about 15 g per square metre; slash at flowering.



*Buckwheat* This is an extremely fast grower. Plant it in spring and it will be ready for slashing six weeks later. It is one of the best crops for choking out weeds, is attractive to bees for an early spring flow, and is a traditional crop for loosening heavy or clayey soils. It grows on the poorest soils, without additions, and is said to draw phosphate and calcium from the soil, making them more readily available to other crops.

Buckwheat is the exception to the rule that you must tend your green manure. Sow it thickly, about 10 g per square metre, rake it in, and slash it when it flowers.

*Mustard* This is another quick maturer: six to eight weeks. Sow in spring or summer at about 1 g per square metre. Mustard helps control potato eelworm if grown between crops, and has slightly alkaline root secretions that are good for acid soil. A warning though: mustard is of the same family as cabbages, caulies, etc. and should not be grown either before or after them. It may also attract cabbage white butterflies.

*Oats* Oats help control root knot eelworm and are one of the best "natural herbicides", suppressing weed growth and germination. Sow oats in autumn and slash in spring, or sow in spring and slash in mid-summer. Sow at about 10 g per square metre. Slash the oats as the heads start to form.

*Lupins* These are nitrogen-fixing and produce excellent quantities of organic matter. They grow on acid or alkaline soils as long as they are well-drained. They are also good for crop rotation and are said to make phosphorous available for following plants.

Lupins need to be inoculated with the right strain of bacteria to fix nitrogen, or even to grow well. Buy the inoculants from the seed company where you buy the seed. If lupins have been grown in your soil before you may not need to do this, but it's best to be safe.

Sow lupins in April for the best crop, and dig in spring just as the first flowers are showing. They may also be sown in spring and dug in mid-summer, but they are more susceptible to weeds and disease at that time of the year. Sow at about 15 g per square metre. There are many varieties available and all are suitable for green manuring.

*Rye* Rye will grow reasonably well without adding fertiliser. It is deep-rooted and good for scavenging leached nutrients. It produces a good quantity of organic matter and is an excellent inhibitor of weeds, including grasses and chickweed. Sow rye in autumn; slash in spring, just before any heads appear.

### Other green manures

Sunflowers can be sown thickly in spring and slashed while still tender, before flowers form. Borage is a fast grower and an excellent forager of leached nutrients. Marigolds ploughed under or slashed will help control nematodes. Clover is nitrogen-fixing, helps to aerate the soil and breaks down easily if dug in before it flowers. (But it may be hard to get rid of, and it also needs an inoculant.) Radish can be sown as a green manure at any time of the year, depending on the variety of radish. Plant them between the rows of other crops that are nearly mature. Slash, or dig both residues in together.

## CHAPTER 2

# Weed Management

## Establishing a weed-free garden

If you are establishing a new garden, a new garden bed, or a paddock of carrots, try to start them off weed-free. Three examples of weed-free gardens are described below.

### *A no-dig garden made from weeds*

Mow or slash grass and weeds as finely as you can. Run the mower over it several times if necessary; lay down a thick layer of newspapers, overlapping well; cover them with at least 10 cm of compost, or wilted comfrey or lucerne hay with a thinner layer of compost on top, or even good garden soil after you have sterilised it in the oven. Don't use "first cut" lucerne which may have weed seeds in it. If your hay has weed seeds, try shaking it thoroughly—or better still, give it to the chooks for a few days before using it; they will clean up any seeds.

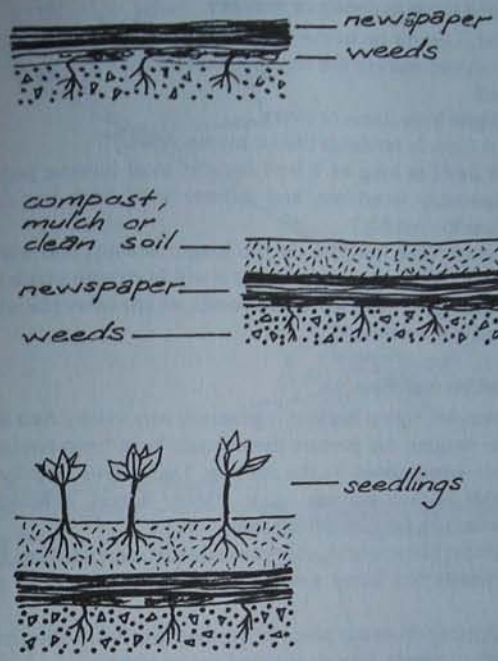
At one stage when I had no compost, I used sawdust to make my garden. This has practically no available nutrients until it breaks down, but it was at least weed-free. So I watered it every day with home-made liquid manure, made by steeping weeds in water till it was pale brown. Every time I took out some water I added more. Later, the gluggy residue at the bottom of the barrel was used for mulch.

Seaweed is seed free, as is algae from dams and rivers. Both break down quickly and have been used for hundreds of years to make gardens, with no other major additions at all: just pile your seaweed on the newspaper. If it is going to be more than a handspan thick you won't need paper: the weight and heat will suppress the seeds below.

I have made gardens like this on top of slashed blackberry bushes—the first was ten years ago and is filled with rhubarb and asparagus—and on a stretch that was almost pure skeleton weed. It took a strong whippersnipper to chop it down, but it has never grown back. It is also a good way to deal with thistly patches: just throw down the newspaper on the mown thistles, throw on mulch, and plant. By the time the mulch has broken down the thistle prickles will have too.

For many years I used old stable tailings as garden bases, until in the drought they sprouted Paterson's curse. (They always did sprout oats and maize, but these were easily pulled out, or left to be used.) Whichever material you use, remember:






*Making a no-dig garden.* Put at least six thicknesses of paper over trampled weeds, cover the paper with compost, mulch with lucerne or clean soil, plant in compost (or in pockets of soil or compost) on top of the mulch. Water well. Use liquid fertiliser if the mulch is low in nitrogen, to help it break down quickly.

- the thinner your layer of mulch, the thicker your newspaper must be: very thick mulch needs no paper, and very thick paper needs no mulch, except where you plan to plant the seeds;
- try to use weed-free materials (if you are using hay, shake first to get rid of some of the seeds; lawn clippings or hay should be given to the chooks first: they clean up all seeds);
- if you are using low-nitrogen materials like sawdust, or material that will take some time to break down, water every day with home-made liquid manure, diluted urine, or compost water (this is made by suspending compost in water, and used when it is a weak tea colour).

### Weed-free garden materials or mulches

- compost, bought or home-made (compost is ready when you can no longer discern the original materials)
- seaweed
- green algae from dams or rivers
- sawdust (low in nutrients until it breaks down)
- lucerne hay (as long as it isn't first-cut most lucerne paddocks are reasonably weed-free, and lucerne seed from hay doesn't germinate too readily)
- hen manure (this must be old, no longer heating, and will need to be mixed with other materials or it will burn your plants)
- lawn clippings (from golf courses, ovals, or any other place where the lawns are manicured)

### Weedy garden materials

- Most manures; sheep manure is generally very weedy. As a simple rule, the rougher the pasture the animals have been feeding on, the more weed seeds in the manure. Dairy cows usually have few weeds in their manure, as do stabled horses, although you may get oats and maize germinating.
- First-cut hay; this may also collect weeds that were seeding. Rough hay generally has more weed seeds than pure lucerne or oat hay.
- Lawn clippings from any place where the grass is not often mowed or is high in weeds, like abandoned nature strips.

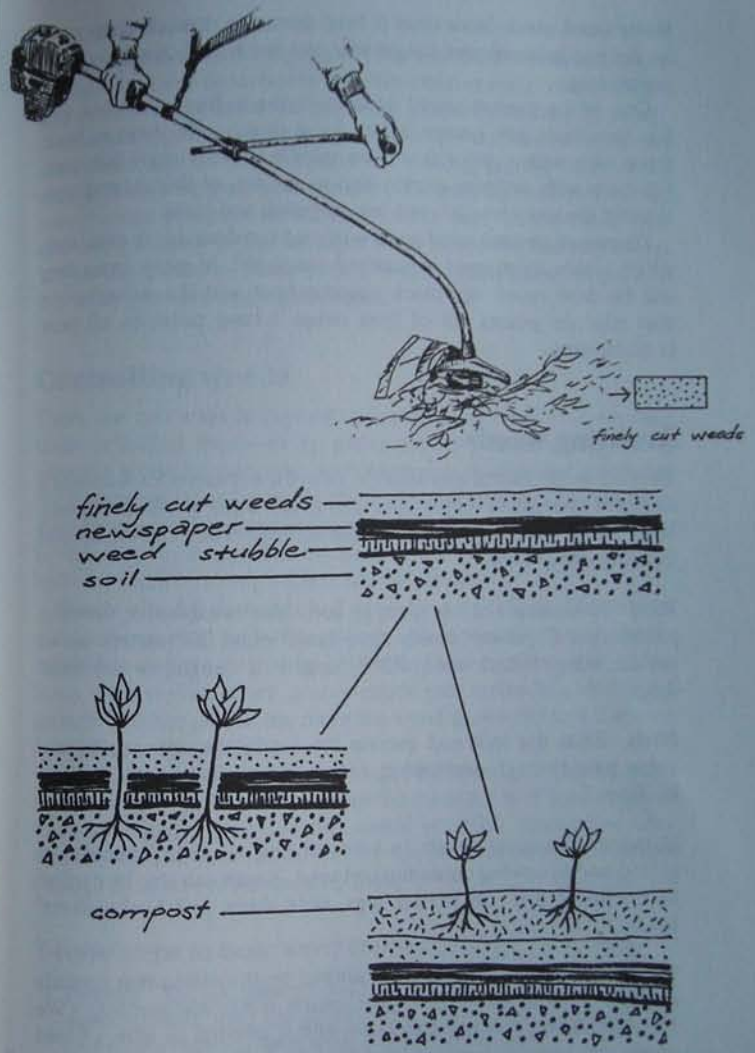
## *A weed-free garden out of weeds*

Take a very weedy area—preferably where the weeds are above your head. Mow them down and rake them up. If you have any blood and bone or manure or even urine handy, give it a sprinkle. (This is not essential.) Lay down newspaper on the stubble. Now pile the weeds on top. After about one month (in warm weather), dig small holes through the decomposing weeds and plant your seedlings. Water well: the moisture will need to penetrate the newspaper to the ground below. You will probably need to give home-made liquid fertiliser as well, until the weed mulch starts breaking down and begins to release its stored-up nutrients.

## *Raised gardens*

These can be made with weed-free materials or just garden soil. A raised garden is easier to kee[illegible]-free: lawns can't encroach,






*Making a garden from weeds.* Slashed and finely cut weeds are raked up, a layer of paper put down, the weeds put on top. Left for a month you can part the mulch and plant through the paper. *OR* Put paper over the stubble, finely cut weeds on top, compost over that, put in the plants, sprinkle with blood and bone, and apply liquid fertiliser to help the weeds decompose.

fewer weed seeds blow onto it from lawns or disused areas, and as the bed is nearer eye height you can easily grab any weed that germinates.

One of the easiest raised gardens is made from old tyres. Get the tyres from you garage or the local dump, pile them at least three high with a stake down the middle so they don't fall over. Fill them with ordinary garden soil to the top of the second tyre. Now fill the rest up with weed-free material, and plant.

These tyre gardens need good watering: the drainage is excellent, which makes them good in poorly drained soil. In many areas they will be frost proof: the black absorbs heat and the extra height may take the plants out of frost range. I have potatoes all year in black tyres.

## Avoiding weeds

The best weed control is avoidance: one of the reasons for Australia's stringent quarantine regulations is to avoid weed seeds in imports. Most weeds produce large amounts of seed. They can be spread in a number of ways.

*Wind* An example of this is poppy seed with its explosive, opening parachutes. Capeweed seeds have been found 150 metres up in the air, winged dock seed will fly until it is caught, or the wind drops.

*Birds* Birds eat fruit and excrete the seeds; they eat seeds, and some pass through undigested; and seeds can get caught in their feathers.

*Humans* We carry weeds in bales of hay, in carted manure, in grains, and by sowing contaminated seed. Weeds can also be carried in the fur of pets, on trouser legs, wide skirts, and bushwalkers' socks.

*Cultivation* Some weeds are scattered by cultivation that spreads rootlets, like blackberries, kikuyu, couch, oxalis and comfrey. (We once ploughed one comfrey bush, and it infested an acre.) Weed seeds can remain dormant for a long time. Ploughing can expose them to light and warmth so they germinate; or ploughing may reduce other competition temporarily so the weeds can gallop away.



### *Keep weeds out*

Weeds colonise disturbed ground. (You won't find weeds in a forest, unless it has been disturbed by a severe storm or some other disaster, and even then the forest will probably, gradually, reclaim its own).

Weeds are a human problem, caused by our mismanagement. Disturb the soil as little as possible. Leaving ground bare invites weeds: it may be bare soil around your seedlings, a patch in the lawn (which you have mown too short or that has died from lack of water), a newly ploughed area, or an area overgrazed by sheep. Try no-dig methods, plant thickly, mulch, plant cover crops, and use other ground-covering strategies.

## Controlling weeds

There are two ways to control weeds: by direct action—removing them or killing them—or by giving the crop an advantage so it wins the battle for resources with the weeds. Weeds that grow after the first two-thirds of a crop's life won't affect the yield of the crop, though weeds that seed in that period may affect young plants in the crop to come. But in many cases weed control after the half-way point in a crop's life is wasted labour.

Weeds should be controlled as early as possible: before they can seed or spread, and while there is little labour or other resources needed to remove them, and before they can compete with crops. Many weeds—like couch grass—exude root toxins that inhibit the growth of other plants: the more the weed grows the less the crop is able to compete with it.

Once your crop is growing strongly, however, you can be more tolerant of weeds. Weeds hardly inhibit the amount of food cropped from your plants provided the weeds establish themselves after the first third of your plants' life. By then a plant should be strong enough to suppress the weed by itself.

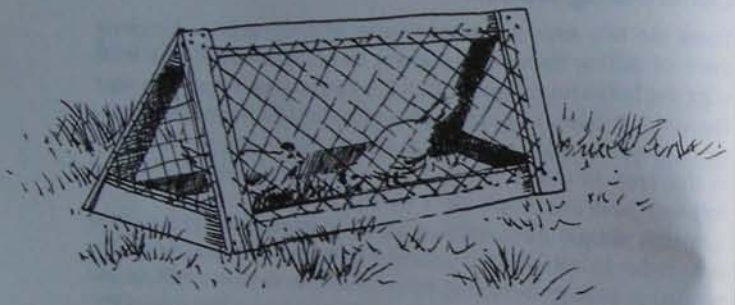
### *Twelve steps to basic weed control*

1 *Digging* Dig the ground, wait for weeds to germinate whilst watering well, then dig again three weeks later. Levelling the bed with a rake will help weed seeds to germinate.

2 *Green manure* Plant a green manure crop as thickly as it will grow, to choke out weeds.

3 *Mulch* Cover the soil—dug or not—with mulch, and plant seedling in whole or part of the mulch. If you are planting seedlings in mulch, douse them with chamomile tea to prevent damping off and add some nitrogen-rich material like blood and bone or liquid manure to compensate for the nitrogen locked up by the decomposing mulch. With higher nutrient mulches like comfrey, compost, and green lucerne or a leaf-and-grass clipping mixture this shouldn't be necessary.

4 *Grazing* Sheep, pigs, hens, goats, and rabbits in cages, placed over the area you want to clear, will clean up weeds. Try tethers in small areas, a small round fence made from reinforcing mesh, or even electric fences.



5 *Rotation* Sometimes old-fashioned crop rotation and cultivation is enough: it cuts down on the build-up of weeds associated with a particular crop, and interferes with weed seeding. But rotation might also simply increase the weed bank.

6 *Companion planting* It is a Mexican tradition to plant melons with corn. The melons suppress the weeds, and the fruit is a bonus. Plant your crops as thickly as possible: bare ground invites weeds. Sweet potatoes are another traditional weed suppressant crop planted with corn. Try planting peas thickly, with taller vegetables to provide a quick weed-suppressing, nitrogen-fixing soil cover.

7 *Solarisation* This method clears weeds in an area before you plant. It involves stretching a sheet of clear plastic over the soil and sealing it in shallow trenches at the perimeter. The trapped



heat raises the soil temperature by several degrees and destroys young weeds, many seeds, and soil pathogens like verticulum wilt that attacks tomato crops.

8 *Burning* This can be effective, but also leads to a loss of humus in the soil and to air pollution. It simply involves burning a heap of leaves or crop debris on the ground that is to be planted. Inter-crop weeding is also possible with a hand-held blowtorch through lines of plants.

9 *Temporary flooding* This is used extensively in rice culture, where young plants are flooded. It can be used to remove weeds before land is planted with crops; but unless the terrain is well-prepared, it can lead to topsoil loss, a loss of oxygen in the soil, and to other changes in soil structure and micro life.

10 *Weed mats* These are starting to be used extensively. They effectively control weeds, reduce moisture loss, and often store or radiate extra heat which promotes plant growth. The only disadvantage is the initial expense, soon recompensed by increased plant yield and less labour needed for weeding.

11 *Drip irrigation and minimum tillage* Drip irrigation along lines of crops can cut down weed growth as well as encouraging the crops to out-compete them. Minimum tillage too can reduce weed germination: weeds need disturbed soil, and any bare ground will attract colonisers.

12 *Slashing* Regular slashing between crops will stop annual weeds from seeding and, depending on the type of weeds you have, this may be enough for effective weed control. However, perennial weeds with runners, like couch, may in fact be encouraged by regular slashing.

## Lawns

Regular mowing and good lawn care is usually enough to keep down lawn weeds. Weeds usually grow where grass is thin. Look after your lawn, and you'll have less trouble with weeds.

Choose the right lawn type for your area. If your lawn dies off in cold, heat, or drought, consider changing it. Treat your lawnmower with respect. Lawns should be at least two centimetres high: any shorter and they become weak. Summer grasses should be allowed to grow slightly longer in autumn, or they may not re-grow after mowing, leaving the ground patchy and allowing weeds to colonise. Dig a small hole in your lawn to root depth. Check how much water is needed to saturate the soil to this depth and how long it takes to dry out. Lawns shouldn't regularly be dry or waterlogged.

High-nitrogen fertilizers inhibit clover and make grass soft, green, and sappy, and easily burnt off. Lawns need phosphorus for clover and greening. The best lawn food is a light sprinkling of compost a couple of times a year, with the lawn cuttings lightly sprinkled over the remaining grass. This avoids ugly heaps left by a lawn mower and returns the nutrients to the soil. Never fertilise dormant lawn.

Most grasses and lawn weeds can be killed with fresh urine or sulphate of ammonia, if necessary. Spread them while the lawn is wet with dew, but the soil is dry. Water the next day; the remaining urine or sulphate of ammonia will spread, fertilising the grass. Urine and sulphate of ammonia applications are best done in spring and early summer when the grass is growing strongly, thus quickly re-colonising the burnt area.

### Some lawn weeds

*Annual grasses* Summer (crab) grass and winter (*poa annual*) grass can be controlled by regular mowing so seed heads can't form.

*Paspalum* Give it a chop with the mattock: one blow should be enough. Or cut it below the crown with a knife: the root doesn't regenerate.



*Bindii eyes* Look for light green patches in early winter and use urine or sulphate of ammonia.

*Oxalis* This can be kept in check by vigorous grass; it often becomes a problem under trees or where grass is mown or grazed too closely.

## Paving

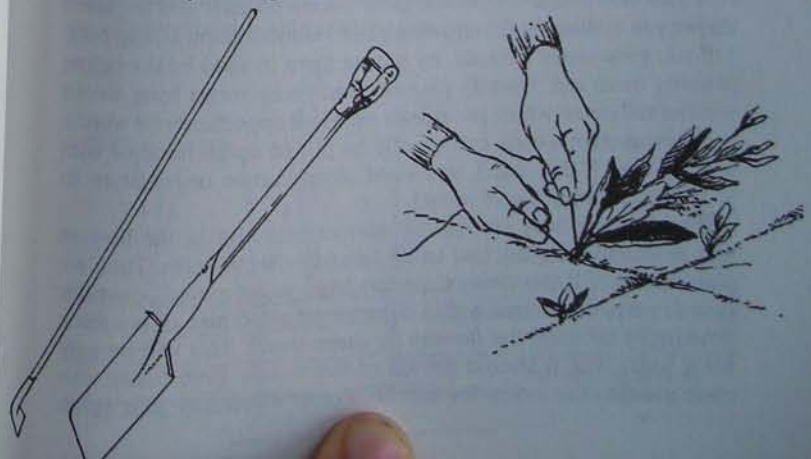
Paving is perfect for weeds: warm and plant free, nothing to compete with, and mowing or digging impossible.

Make sure all material is weed-free to begin with: weed-free sand under the pavers, and no weeds underneath. Try planting in the crevices: creeping thymes, chamomile in cooler areas, yarrow, dwarf lavenders, catnip, marjoram, oregano, dianthus, ajuga, even mint. They won't be able to become too rampant in the paving.

### Getting rid of weeds in paving

The easiest method is to chip weeds out with a special chipper: a small blade on a long pole. This can be quicker than squirting them with herbicide. If you don't have a chipping tool, chip them out with a spade. With practice you can angle the spade along the edge of the paving stones and get a good cut.

Water thoroughly and pull them out. If your fingers don't do the trick make a "weed puller". I use fuse or copper wire. Twist this around the weed till it's tight—but not too tight or it might cut the plant—and pull. You get more leverage with long wire than you do with your fingers.



Whip them out with a whippersnipper. This will have to be repeated, but with practice it is as easy as mowing the lawn. Whenever I cut the grass with the whippersnipper I go over the paving too. It kills some weeds, others just get stubby-rooted and branch, but this makes them easier to pull out by hand later.

Sprinkle weeds with borax. But be warned: this will kill all other plant life around it!

Paint weeds with kerosene. This is smelly, but it works.

### *Flower gardens*

Flower beds have their own weed competition: the flowers. Keep flowers growing strongly: feed with compost or good mulch, water them when needed, choose appropriate varieties, and control pests and they should out-compete the weeds, as long as you avoid large bare areas. Try to have a cover of flowers all the time: plant seedlings instead of seeds, and fill up spaces with white alyssum, alpine strawberries, lawn thyme or chamomile, or some other easy to grow ground cover that will keep out weeds.

Consider permanent garden barriers of stone, concrete, or metal to keep grass and other invaders out of flower beds. Alternatively, use an edging of alyssum, thyme, or other small, matting, thickly-growing flower plants. Mulch any bare areas between plants: dark bark chips, grass clippings, or leaves can all look attractive in the garden.

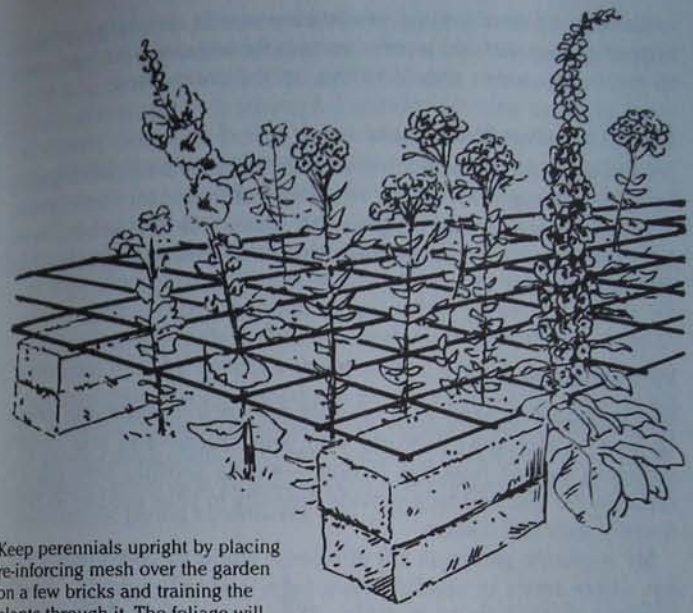
A garden of perennial flowers means less opportunity for weeds. A method advocated by Edna Walling was to place reinforcing mesh over your perennials. The flower growth soon hides it and the mesh allows you to have thickly-growing plants without them falling over.

If you grow many annuals, try raising them in seed boxes before planting them out. Directly planted seeds may mean long weeks without soil cover, which provide an excellent opportunity for weeds.

Flower-garden weeds can usually be pulled up by hand or with a hand hoe. If they can't, you need more humus or moisture in your soil: add mulch and water.

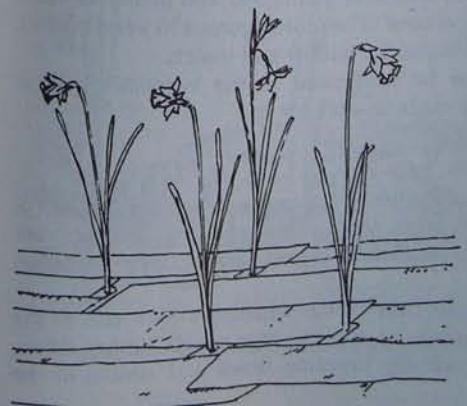
If your bed is very weedy, consider carefully lifting the flowers and re-establishing the bed using weed-free techniques. Then re-plant the bed. If the flowers are too large to be moved, consider covering the whole area with a commercial weed mat, or put thick newspaper between the flowers for three weeks. This will be ugly for a while, but it should get rid of the weeds. Even better, use clear plastic. Cut holes for the flowers or cut it into thin strips





Keep perennials upright by placing re-inforcing mesh over the garden on a few bricks and training the plants through it. The foliage will soon cover the mesh, but weeds can be easily reached.

and arrange them around the beds. The latter allows the plastic to be used again. This method will germinate and kill weed seeds, as well as killing weeds. Putting up with an ugly garden for three weeks will produce a flourishing one.



A temporary clear plastic mulch round flowers will kill weeds. Cut the plastic into strips to fit easily round the flowers.

As with all weed control, make sure weeds do not go to seed in your garden. Annual weeds can simply be pulled out and used as mulch. Perennials should be dug up and composted.

### A minimum-effort flower bank

Several years ago I planted flowers and herbs directly into a grassy bank. They staggered along, weak and stunted, for three years. Gradually however they outgrew the grass and the weeds. Now, five years later, the flowers have won, and I have a garden bed with minimum effort.

## *Vegetable gardens*

Weeds should be seen as a valuable resource in vegetable areas. As long as they don't compete with your crops—and this book's strategies explain how this is done—weeds provide free mulch, stabilise the soil, and help provide diversity in your garden to help control pests and disease.

My vegetable garden is full of weeds. The only weed-free areas are where seeds or seedling have been planted recently. Weeds are kept down here by mulching (but not near tender stalks in case they rot) or by layers of newspaper around them. Mostly, the seedlings are planted on bare ground where another crop has just been pulled out: radish especially, thickly planted, chokes out weeds. Healthy vegetables—grown in compost, well-mulched and watered—will out-compete weeds, and once plants are one-third grown, weed competition will not markedly diminish the crop. You may have to try this to believe that it is possible to "live with" weeds. Crops grown with weeds also need fertile soil and plenty of water. If your soil isn't fertile you need to be more rigorous in weed control, or give it more organic matter for fertility and mulch.

Weeds should never be eradicated in the vegetable garden. Instead, they should be made to work for you.

### Control

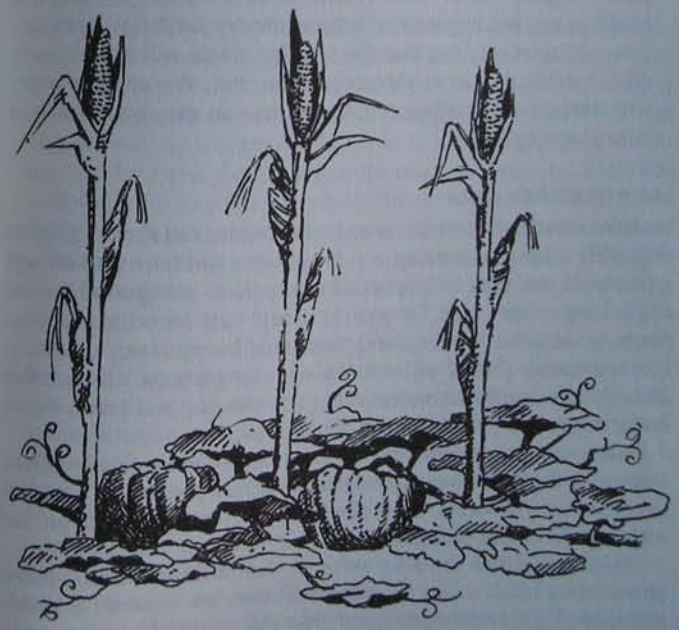
Apart from the twelve basic weed control points listed before (of which mulching, weed mats, solarisation, and drip irrigation are particularly relevant to vegetable areas), a few other strategies should pay off.

1 Try a "moving rubbish heap". Start weeding at one end of the garden. Toss the weeds on top of other weeds further down. They'll kill them, gradually breaking down and adding to the garden's fertility. (Weeds that have gone to seed need to be composted or made into green manure, see chapter 1.) Weeds that may re-root should be placed on paper.

2 Keep plants growing strongly. Consider planting crops at their optimum time. Late beans, for example, will be less susceptible to set backs from bean fly and will grow more vigorously, allowing them to compete with weeds. Crops planted too early will be slow to take off and weeds may outgrow them.

3 Use sprawling plants to keep down weeds. Consider intercropping: try vine crops like pumpkin, even chokos grown on the ground, melons, etc. Hops or banana passionfruit grown at the side of the garden won't steal nutrients from your vegetables, but their greenery can be used as living mulch. Think of fast-maturing radishes that can be pulled out as more productive crops start to grow; or crops to be slashed to provide mulch between rows of other crops: think of clover (excellent with brasicas to inhibit cabbage white and cabbage moth caterpillars), lucerne, foliage turnips, or young sunflowers.





Grow pumpkins round your corn: sprawling plants will help keep weeds down round tall plants.

4 Make sure you control undesirable weeds. Weeds like couch, kikuyu, etc. won't co-exist with vegies. Pull out perennials before they seed; slash annuals: cover them with mulch or use any of the twelve basic weed control measures. Try not to introduce new weeds with mulch or on your clothes: grass seeds, bindi eyes, cobbler's pegs, etc. stick to your clothes—that is their way of expanding their territory.
5 Try barriers around your garden to keep out grass and other unwanted species: either solid barriers like sleepers, cement walls, or old tyres, or a living barrier like thick, deep-rooted comfrey. I prefer comfrey: its deep roots bring up leached nutrients and the leaves are an excellent mulch and fertiliser for the garden.
6 Plant thickly: much thicker than recommended rates on seed packets. Thicker planting means no bare ground for weeds to colonise. Excess seedlings can be pulled out. Tiny carrots are sweeter than big ones, young beetroot leaves can be cooked like spinach, tiny lettuce leaves can be tossed in salads. Many plants will be stunted by their more vigorous neighbours, then start to grow when these have been cropped. I find with cauliflowers, red mignonette lettuce, carrots, beetroot, leeks, and many other vegetables that the smaller plants will stay dormant till I harvest the more vigorous ones, then the smaller plants will start growing and crop in their turn—an easy way to stagger your cropping.

### Larger vegetable areas

Let hens scratch for an hour or so in the evenings in almost-matured vegetable crops. By evening free-range hens will have had enough green stuff, and they will scratch for insects in soft ground instead of pecking at the crops. Be warned though: the hens must be free-range, it must be evening, and they must be watched, at least in the beginning. (Hens will scratch up young plants.) Geese may also work under the same conditions to clear up soft green weeds under crops like potatoes, corn, melons, etc.

I have seen pigs and hens used as "between crop" ploughers: sent in in force to clean up vegetable debris and weeds and turn over the soil. The next crop is planted in the newly-manured ground without any further ploughing.

Other useful aids are long strips of weed mat that can be rolled down rows and rolled up again (there are several available commercially), and long strips of clear plastic stretched over weeds. (These will burn weeds off.)



Living mulch is an excellent strategy: a quick-growing crop like radish or foliage turnips that is sown between slower vegetables then slashed to provide a weed blanketing mulch after three or four weeks. Even lucerne can be used in this way, as long as it is planted in strips. This need not reduce your cropping area as the vegetables can later expand over the "companion" crop.

A rotary hoe will dig up weeds, so avoid this option if you can; or at least time it for when your plants are young and vulnerable, simply slashing weeds later when the vegies can compete with them.

## *Orchards*

Weeds are usually only a cosmetic problem in orchards: though they may do no damage they are associated with bad husbandry. Don't bother about weeds in orchards unless they are a problem. They may usefully stabilise soil, bring up leached elements, fix nitrogen (wattles, bracken, nettles, etc.) add to plant diversity, and help pest control.

1 Don't plough. Bare ground washes or blows away, loses moisture, and invites weeds. Ploughing disturbs roots and encourages dust; and a coating of dust may kill small predators without harming pests like San Jose scale. Often, changing to a non-ploughing regime leads to a dramatic decrease in pests. Some grasses too are bad for trees. Couch grass, for example, releases a growth inhibitor from its roots that stunts the roots of several fruit trees. Kikuyu may choke trees and compete for nutrients and moisture.

Establish a pasture between your trees, preferably one with a nitrogen-fixing component like clover or lucerne. Lucerne is excellent below fruit trees, as long as it is mown very short. You can use lucerne like a grass species. Mown lucerne responds like grass by forming a sward. It is perennial, nitrogen-fixing (you need to innoculate it with the correct bacteria), and reputed to encourage earthworms, whilst the roots will continue to travel downward year after year. I have known them to extend to 7 metres down a rocky well site. A thick-mown or grazed sward of lucerne will keep out weeds.

The pasture under trees can be grazed: in winter if the trees are deciduous; when the trees have grown out of the animals' reach; by small animals like geese, hens or Suffolk sheep; or by goats tethered so they can't reach the branches. I find that even horses will ignore the trees and concentrate on the grass

or lucerne if they are only let into the orchard for a few days at a time—and provided there is plenty of grass. Hungry animals, however, may soon learn that trees are to their taste.

Animals will not only keep down the grass, they will add manure (rich in micro-organisms that help fertility), and they will clean up old fruit and fallen leaves that may harbour pests (like codlin moth or fruit fly) or pathogens like powdery mildew: animal-grazed orchards are healthier.

2 Weeds and grass need to be kept down around young trees. Mow regularly, graze with small animals like geese, hens, rabbits, or guinea pigs in hutches, use a whippersnipper (careful, ringbarking is easy!).

Consider using a permanent mulch around young trees: a sheet of plastic, old carpet, etc. that can be left for a couple of years till the tree is able to out-compete the grass and the weeds.

*Caution* Leave a small breathing space around the trunk to avoid disease and do not extend out as far as the drip line, or the tree will die of thirst and lack of food unless you also place drippers under the mulch which should be renewed yearly or twice yearly.

3 Keep invaders like kikuyu, couch, etc. out of your trees with permanent tree base guards: flat metal collars, or even old car tyres, around your trees. These will stop couch or kikuyu forming an impenetrable mat around them.

4 Mulch will help control root diseases like phytophthera (root rot)—either cinnamon or citrus fungus—improve water storage, and water drainage. Mulch your trees:

To keep down weeds round young trees, lay newspaper down and surround the tree with an old tyre. This will also help keep off rabbits, and keep in moisture.



- when they are young, to keep down grass competition;
- in late summer, to retain warmth in the soil;
- in late winter, in frost-prone areas; this will keep the soil colder, and delay fruit budding so leaves and flowers are delayed until after the frosts;
- just before they fruit, with a low-nitrogen mulch; this will mean slight nitrogen starvation for the fruit, giving it a better colour and longer storage capacity: as the mulch breaks down the nutrients will again be available for the tree;
- instead of feeding them with artificial fertilisers—one or two applications of good mulch is sufficient for most trees; for some, like cherries, simply mowing the grass under them is ample once they are fully-grown.

High-nitrogen fertilisers promote soft, sappy growth: easily burnt off by frost, susceptible to pests and diseases, and producing soft, pest-prone fruit that doesn't store well. If you doubt this, experiment by feeding one tree with a mulch of compost and one next to it with artificial fertiliser, for two or three years. Count the pests, the diseased leaves, the amount of frost damage, and note the quality of the fruit. The results are dramatic, but usually need to be seen to be accepted.

Try growing "living mulches": comfrey, chicory, or other plants that can be slashed for mulch. Lucerne and clovers interplanted between rows can be raked up to mulch around trees. A crop of pumpkins or other vines make good weed mats under trees. One year I planted beans under the young trees. The bean/tree combination needed more water and feeding than either on its own, but I got both beans and trees in the same space, with less effort, and the worked-out beans were wonderful mulch.

*Warning* Don't mulch right up to the trunk: the warmth and moisture may encourage collar rot or other disease, although a mulched tree is of course more resistant.

### Orchard carpets

Once trees are established, consider permanent plants underneath them. This will keep out weeds and eliminate the need to mow around the trunks: mowing down a central aisle is much easier. Mulch for fertiliser can be forked around these plants, dry compost can be sprinkled over them or placed outside the drip line of the tree to encourage root growth.

These "orchard carpets" are not just weed controllers. Many plants like chamomile, yarrow, nettles, parsley, and borage are reputed

to be "growth promoters". Try thickly-planted buckwheat (this is reputed to make phosphorous more available to your plants and is also a wonderful predator attractor), or "natural herbicides" like pumpkin, poppies, rye, and oats if you want to control especially tough weeds.

Nitrogen fixers will also improve plant growth. They can be part of the ground cover under the trees: clover, nettles, lucerne, peanuts, woad, lupins, beans, peas, or even a climbing circle of sweet peas, which will also attract predators.

Try yellow and orange-flowered nasturtiums under your trees; they repel pests like aphids and whitefly by disrupting the visual clues they use to find their food supply. (Nasturtiums only repel aphids flying over them though, so they are not of use as pest repellents in the vegetable garden.)

Other useful "orchard carpets" include lavenders, feverfew, pyrethrum, thyme, native or introduced pennyroyal, prostrate grevilleas, rosemary (bush and prostrate): all heavily-scented, they will help repel pests. Beware of some strongly-scented plants like mugwort: they produce toxins in their leaves that may supress growth around them.

Shallow-rooted rhubarb grows tall and slender under fruit trees. A mat of strawberries is productive, and strawberries prefer the broken light under trees. Any of the matting, native plants should be especially useful in attracting bird and insect predators.

### Useful orchard weeds

An abundant variety of weeds appears to reduce the number of San Jose scale on apple trees; aphids, and cabbages white butterfly caterpillars on brussels sprouts; and bean fly on mung beans.

*Blackberries* around vineyards appear to reduce the number of grape-leaf hoppers by increasing alternative hosts for parasitic wasps.

*Dandelions* produce ethylene, so your fruit trees bloom earlier—though the flowers may not last as long—and fruit may ripen slightly earlier. This effect will be related to how windy your garden is: a still, warm garden will be more affected by the ethylene. Dandelions are also deep-rooted, and will bring up nutrients leached deep down, returning them to the soil as the dandelion leaves decompose. Dandelions too are reputed to encourage earthworms and improve soil condition.



*Flowering umbellifera* like dill is associated with greatly reduced numbers of codlin moth in apple orchards.

*Mustard weeds* control a range of nematodes.

*Nettles* fix nitrogen from the air (or their associated bacteria do). They are also reputed to attract earthworms and enhance the growth of plants around them.

*Stinking roger (Tagetes minuta)* This is a tall weed, up to 2 metres with deeply-divided leaves and small, long, yellow flowers. The leaves are pungent and on a hot day the plant can be smelled from some distance away. Stinking roger is an effective insect repellent. It can also be used as a companion plant to repel certain root knot nematodes.

### Orchard pest control

Birds can clean up 40 per cent or more of any pest on your tree. Other valuable predators of pests like pear and cherry slug, aphids, thrips, scale, codlin moth, etc. include a range of wasps, hoverflies, ladybirds, dragon and damsel flies, and lacewings. Most adult forms of predators feed on nectar, not insects, and a year-round supply of flowering weeds and clovers may supply them.

Weeds provide alternative habitats and food supply for predators, and even where they themselves harbour pests these will be the food supply for a constant, regulatory range of predators. Predators need a year-round food supply to feed them when the pests aren't on your plants. Besides, even pests like "red spider" mite that move from weeds to trees may not do so if there is sufficient alternative ground cover.

## *Berry beds*

These are permanent beds, fruiting for many years. It is worthwhile establishing a permanent weed control regime. A well-designed berry bed should only need to be harvested and mulched once or twice a year and pruned or thinned if necessary. No weeding or other fertilising should be needed.

Plant a weed barrier around the bed like comfrey (this can be used as mulch as well), or use old sleeper, stone, or concrete walls.

Always mulch around berries with a good mulch like compost, lucerne, or comfrey if possible; even old newspaper is better than

nothing. This mulch will both feed the berries and keep down weeds.

Consider interplanting the berries with low-growing plants that won't compete, and may even help your berry crops; lawn chamomile or a low-growing thyme (not the bushy culinary thyme, but one of the many "carpeting" thymes). White or purple alyssum won't compete with strawberries, raspberries etc., while violets do well when shaded by raspberries, currants, etc.

### *Pasture*

Most pasture weeds can be prevented by good pasture management. Unfortunately, this isn't always possible. Around here (southern NSW) in the drought, even with stock taken away, native animals and dry skies keep the ground bare and grassless, and prone to weed invasion at the end of the drought. Many weed seeds remain dormant in the soil for a long time, germinating only when competition lessens, when it rains, or when ploughing or disturbance brings them to the surface. Different weeds germinate under different conditions. The silver grasses, for example, proliferate under minimum tillage.

Scotch thistle can be reduced by at least five years of thick phalaris pasture. Thick subterranean clover can help control skeleton weed and many other perennials that dislike shaded roots. Spring ploughing eliminates wild artichoke, stinkwort can be suppressed with increased fertility, and winter ploughing kills cape tulip.

#### Stop weeds seeding

Mow or graze heavily before they head, and make silage or compost from weeds that are starting to seed. Note however, that if you can't stop weeds from seeding, they need to germinate before they can be controlled.

If weeds are left undisturbed they will remain in the soil for a decade or more and provide steady infestation whenever soil cover varies.

Burning will kill a few weeds; better still, it forces others to germinate so they can be controlled by ploughing, digging, grazing, etc.

Cultivation: the finer the tilth, the more weeds will germinate. Combined with cultivation, or very close grazing, irrigation will encourage weeds to germinate.

All weed control must be kept up: one year's cropping won't control weeds. It may in fact make the problem worse by encouraging more weeds to germinate.



#### Some general points for pasture weed control

Know your weeds—how they spread, when they germinate—so you can decide how to control them. Ask your state Department of Agriculture for pamphlets on weeds in your area.

Never leave bare soil: don't overgraze, and check out fast-growing crops for your area. Green manure instead of leaving soil fallow, even if only for a few weeks. Watch where weeds spring up in your paddock, say under trees, along road sides, near dams. This may mean these areas are getting overused.

Change pasture use from time to time. Certain cropping systems or animal habits favour specific weeds. A change in growing methods for a few years may mean a marked decline in weeds.

Grow crops; thickly-planted crops can force out weeds, and the change in cropping system may help your pasture later. Remember, any crop must be thickly planted and the ground must not remain fallow even for a few weeks. As a very rough guide annual weeds can usually be controlled by thick spring sowing of weed-competitive pasture.

Plough: winter ploughing will kill cape tulip for example, and spring ploughing will kill wild artichoke. Ploughing in late winter will stop capeweed from re-seeding, ploughing at rosette stage will control (though not eliminate) Paterson's curse. Find out the vulnerable times for the weeds in your pasture. Always either graze or mow heavily before you plough to stop weeds setting seed.

Choose weed competitive, long-term pastures like lucerne and phalaris as well as short-term ones. These will prevent re-infestation by competing for moisture and sunlight if you sow thickly enough. Use pasture mixes so if one fails another will take over. Ask your state Department of Agriculture for weed-competitive species suited to your area. Phalaris, for example, is deep-rooted and drought resistant with good spring growth that helps to smother weeds. It can also withstand extremely heavy grazing; and this heavy grazing will help knock out weeds. It can also be cut regularly without thinning out.

Lucerne is another excellent weed choker, also deep-rooted, competing with both annuals and perennials. Lucerne can also be mown or grazed reguarly, and this too will help to control weeds.

Reduce stressed areas:

- plant more trees and shelter belts so animals don't congregate in a few small areas;
- use movable or electric fencing around dams, so that animals have changing corridors to get to the water, or pipe the water to movable trou

- think about establishing other species on much used areas, even if they aren't pasture species: a small area lost to grazing may be worth it if it means losing a reservoir of weeds.

### Woody weeds

*Burning* Many pasture "weeds" are simply wood re-growth from native shrubs, and the best control for these is burning. Unfortunately, this also interferes with pasture. Small, localised burns—in patches, not whole paddocks and in early autumn when grass regenerates but birds and animals are less affected than in spring—will help keep woody weeds under control. Fire has less of an impact on grasses than on shrubs: Aboriginal burning maintained grasslands for thousands of years.

*Goats* will eat woody shrubs, as long as they haven't lived all their lives on lucerne and stud mix. Small-scale grazing pressure can be increased by electric fences around problem areas. Grazing must be combined with re-sowing grass however, or by a subsequent reduction in grazing pressure so the grass can re-seed naturally.



### Annual grasses

Grasses like silver grass, Wimmera, ryegrass, barley grass, brome grass, summer grass, and crab grass are all annual grasses. Most of them set a lot of seed. Silver grass for example sets up to 80,000 seedlings a square metre. (This corresponds with 15–25 grass plants per square metre.) However, the seed rarely persists for more than one year. Thus, the main control for these grasses is to stop them from setting seed. This can be done by heavy grazing, slashing, and mowing at the right time. If you can do this for two years, the problem should be under control. But good timing is essential: with grasses like silver grass, for example, you only have about ten days between flowering and seed setting.

### Renovating a weedy paddock

A weedy paddock may have a couple of hundred kilos of weed seed per hectare. It will have to be "cleaned", which will take more than one season. Plough and sow the paddock in spring before weeds go to seed. Sow a thick crop like turnips, rape, or millet. The following autumn, sow a cereal crop like oats that can be heavily grazed (oats will also inhibit weed germination). The second spring sow pasture. Turnips, rape and millet are not as effective as autumn oats in smothering a weed problem. It is the ploughing that is needed to grow them that does most of the weed cleaning; the crops are simply sources of feed.

Alternatively, sow a cereal like oats in autumn, graze heavily, plough again the second autumn, and sow pasture. Oats, winter wheat, and barley can all stand very heavy grazing, cold, and drought and can be sown early. Rape or turnips can also be sown, but they don't "smother" weeds as well as oats or wheat or the other grains. Oats are the best smothering crop of all, but they must be sown early enough to be well-established by the time the weather cools down. If early weeds are a problem—growing quickly in early spring before the oats take off—try growing barley. Barley starts growing earlier in spring than oats and will smother early weeds; but it isn't as effective as oats later in the season.

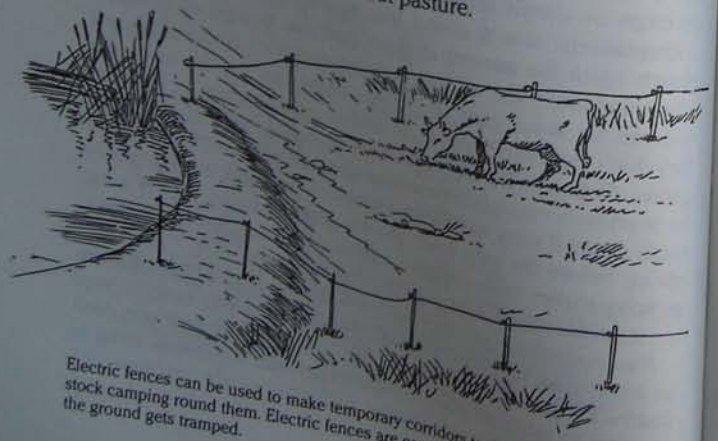
Always sow weed-cleaning crops as thickly as possible, and graze as heavily as possible. The more weed seed you have in your paddock (i.e. the more weeds) the more pasture seed you need in order to establish good competition. Even if you sow 10 kg of crop seed in per hectare, thistles and other weeds may have self-sown 100 kg per hectare!

Sow pasture only when there is sufficient moisture in the soil for the seed to germinate quickly: many weed seeds germinate with less moisture than do pasture seeds.

Always combine general weed control with specific control measures aimed at individual weeds.

*Follow-up* Remember, good pasture keeps out weeds and, besides, there is no point in having bad pasture. Pasture renovation will get rid of your weeds, but not all of them. To make sure you don't have a weed build-up again when next your pasture is stressed, for example by drought, continue to be vigilant:

- Clean up the remaining weeds with a hoe, or slash them; refer to the individual weeds for the easiest removal method.
- Don't let any weeds build up to become a problem: it's much easier to attack them early than to re-establish pasture.
- Watch your pasture: if it starts to thin out, oversow. This should probably be done at least every five years anyway.
- Beware of overgrazing. Stock may have favourite spots in a paddock that become overgrazed. Try dividing the paddocks with temporary or electric fencing to manage your pasture more efficiently.
- Make sure the pasture is well fed: use ground rock phosphate, potash, sewage waste, and trace elements where needed. Pasture needs to be vigorous to keep out weeds.
- Watch for pests that may thin out pasture.



Electric fences can be used to make temporary corridors to dams and rivers to stop stock camping round them. Electric fences are easy to erect and can be moved as the ground gets tramped.

# CHAPTER 3

# *Fighting Weeds*

This chapter is one of extremes: aggressive plants and aggressive people. The first part looks at poisonous weeds, those that fight plants to watch out for, as they can be harmful to animals or people. The second part first takes a quick look at the side effects of a few common herbicides, used by so many of us who can't accommodate diversity, who have not learned to live with weeds. It then suggests a few less harmful alternatives.

## Poisonous weeds

Some plants—but not many—are toxic at all times. Others are only toxic at certain times or under certain conditions. Sometimes weeds may be poisonous in large quantities, but there are too few of them to be harmful. Some plants are poisonous at a certain stage, like Noogoora which has a high cyanide content at seedling stage but only causes scouring when it is older. Burr medic, for example, only appears to produce toxins after a burst of sunny weather following long, dull conditions. Cobalt deficiencies in the soil, as another example, may cause animals that eat phalaris (which has a low uptake of cobalt) to suffer from phalaris staggers. Herbicides can also alter the chemistry of some weeds and cause a build-up of toxins. Herbicide spraying of variegated thistle and blackberry, for example, causes a great increase in nitrate content, so they become dangerous to stock.

In addition, the age and condition of animals may make them more vulnerable to poisoning. Young animals need more calcium, for example, and so they are more vulnerable to plants like soursob that are high in oxalates. Travelling or drought-stressed stock may eat dangerous plants they otherwise wouldn't touch.

Plants that may cause sudden death (these usually contain cyanide; the animal trembles, may froth at the mouth, struggle, and die) are:

- Blue couch (*Cynodon incompletus*)
- Chenopodiums like goosefoot
- Hemlock (*Conium maculatum*)
- Native couch or spider grass (*Brachyachne convergens*)

Plants like button grass, Iceland poppy, rhododendron, lobelia, indigophera, linseed, peach, oleander, larkspur, delphiniums, potato plants, and sorghum are also poisonous to stock: they are classic examples of useful plants becoming "weeds" by being in the wrong place.



### *Nitrate poisoning*

With nitrate poisoning the animal breathes deeply, moves away from the others, twitches and is dead within a few hours. The mouth linings are brown instead of pink. The following weeds are mostly dangerous a few days after herbicide spraying:

- Oats
- Blackberry
- Variegated thistle (*Silybum marianum*)
- Mint weed (*salvia reflexa*)

### *Plants causing delayed death*

These are less obviously poisonous. Death or symptoms can be delayed by several days, or many only occur after the plant has been eaten repeatedly. Sometimes no symptoms may occur at all. The first signs of poisoning are usually a lack of appetite, or pain.

- Lamb's tongue (*Chenopodium atriplicinum*)—young stage only
- Native parsnip or carrot weed (*Didiscus glaucifolius*)
- Red-leafed cotton bush (*Asclepias crassavica*)
- Larkspurs and delphiniums (*Delphinium sp*)
- Iceland poppy (*Papaver medicale*)
- Potato plants (*Solanum tuberosum*)

### *The "staggers"*

Phalaris is a problem where the soil is deficient in cobalt. Staggers occur on green, strongly growing fresh pasture where phalaris is the dominant grass. The nervous system is damaged. Symptoms can be slight, or the animals may get progressively worse and die. The damage can't be cured, but sheep that are put onto new pasture—preferably lucerne—may survive with rest. Phalaris staggers can be prevented by top dressing with cobalt every year or by restricting the grazing on new phalaris growth to two weeks with a fortnight's interval before the next phalaris feed. Sheep can also be drenched with cobalt sulphate.

Animals may also get the staggers from feeding on:

- Ryegrass (remove the sheep till they recover)
- Darling pea
- Prickly melon (*Cucumis myriocarpus*)
- Ragwort (*Senecio jacobaea*)
- Marshmallow (*Malva parviflora*)
- Stagger weed (*Stachys arvenis*)

- Ferns (*Cheilanthes sp*)
- Native parsnip
- Carrot weed (*Didiscus glaucifolius*)
- Native cherry (*Exocarpus cupressiformis*)

Most of these plants are, of course, not weeds—unless they are feeding sheep on cobalt-deficient soil.

### *Oxalic poisoning*

The following plants cause kidney damage from oxalic poisoning. The amount of calcium in the blood is also reduced and the intestines are irritated from scouring.

- Soursob (*Oxalis pres-caprae*)
- Dock (*Rumex sp*)
- Pigface (*Portulaca sp*)
- Roly poly (*Salsola kali*)
- Sorrel (*Rumex acetosella*)

## Common herbicides and their side effects

Herbicides can affect people by being inhaled, swallowed, or absorbed through the skin. Often the victim has no knowledge of the effect: spray equipment may be leaky, weeds in rows of vegetables may have been recently sprayed, or bare feet may run on sprayed pavements.

If you suspect herbicide poisoning, induce vomiting or wash your skin, then seek immediate medical advice. Try to identify the herbicide; save vomit for analysis.

Symptoms of herbicide poisoning include vomiting, abdominal pain, diarrhoea, breathing difficulty, mental disturbances, miscarriage or menstrual problems, convulsions, rashes or skin eruptions that reappear or won't go away.

Remember that herbicide damage may be long term. Poisoning symptoms appear relatively early. It may be years or decades before the teratogenic, mutagenic, or carcinogenic effects appear.

In 1982 the US Congress found that because of low laboratory standards between 70% and 93% of pesticides and herbicides had not been validly tested for health safety. Most pesticides and herbicides in Australia are assessed on US data, but Australia lags behind the US in reviewing new evidence. Amitrole, for example, is still registered for spraying footpaths even though ICI has stopped manufacture as it causes cancers in rats.



*Amitrole* Extremely carcinogenic, this causes liver and thryoid tumours in animals.

*Bromoxynil* Although moderately toxic to mammals, this is extremely toxic to fish. It soon breaks down in soil.

*Dicamba* This is probably the safest herbicide for use against broad-leaved weeds, and against problem trees by injection. Dicamba has a low toxicity to humans but is often used in conjunction with 24D and 245T. It may be toxic to aquatic species.

*Glyphosphate* This has been recommended as the safe herbicide to use should one be needed. Recently, however, the research data on glyphosphate has been in doubt and its safety cannot be assumed.

*Hexazinone* is a replacement for 245T, and so far no major side effects have been shown; it is relatively persistant.

*Paraquat* and *Diquat* These can be absorbed through the skin and are damaging to lung tissue. Long-term problems include failure of wounds to heal, nose bleeds, eye damage, and nail damage. Paraquat poisoning may not be obvious for days or weeks. Early hospitalisation is essential even before symptoms appear. Symptoms of long-term poisoning include lung damage, nose or eye bleeding, and cracking nails. There is no antidote to paraquat. It appears to be less harmful to the general environment than it is to humans.

*Simazine* reduces earthworm populations and other soil life; it may be mutagenic and appears to persist for some time in the soil.

*24D* Probably carcinogenic, it may induce miscarriages, or cause nerve damage with prolonged use, or menstrual troubles; it is mutagenic and teratogenic in animals.

*245T* There is enormous controversy over the effects of 245T, especially associated with its use in Agent Orange during the Vietnam War, and with claims that it is responsible for birth defects, miscarriage, sterility, cancer, skin problems, and mental illness. Various studies on humans and animals have produced conflicting results, but there is considerable evidence against it.

*Trichloroacetic acid* (TCA) This grass killer can cause skin irritations and eye damage. It is poisonous to earthworms and other forms of soil life.

*Triclopyr* is a new herbicide. It degrades rapidly and appears to

have only a moderate toxicity. As with all new products however, evidence may yet appear against it.

## Sterilising soil

I don't recommend sterilising soil unless it is really necessary: you kill the good with the bad, leaving the soil dead and inactive. But if you have no other weed-free material you might consider it.

Small batches of soil can be rendered weed and disease free by placing them in a baking tray in the oven with a couple of large potatoes. Bake until the potatoes are done. Larger amounts can be placed in half 44-gallon drums over an open fire. Build the fire well up around them, then cover the lot with wet newspapers, hessian, etc. to keep in the heat. The aim is to keep the soil at 180°F (62°C) for half an hour or longer. On a still larger scale, a large fire on the ground you wish to plant will render it weed-free, though in the process it eliminates much of the nutrients, humus, and microflora in the soil. Weed seeds can also be killed by immersing the soil in water for about three weeks, but there won't be much else alive at the end of it either, and the soil structure will be destroyed.

## Biological control

The best-known biological control of a weed in Australia is the destruction of thousands of acres of prickly pear by the catoblastus beetle. The CSIRO has been manipulating weed populations with biological control for over fifty years, together with various universities and Departments of Agriculture. Their projects include a rust to control skeleton weed, a beetle that feeds on St John's wort leaves, a beetle and moth that feed on water hyacinth, and a weevil for salvinia water fern. Current projects include the release of beetles that feed on lantana, and a blackberry rust fungus. (One strain of blackberry rust has been released illegally, so far without the major harm that could do.)

Biological weed control is still mostly in the hands of institutions, not individuals, though some forms are available: try applying to your state Department of Agriculture if you are interested in pursuing biological control for a large area of weeds. The latter is important—small areas aren't suitable for biological control—the "control" would die without adequate weeds to feed on.



## Natural herbicides

All gardeners know that some plants don't grow well with other plants. If your vegetables are infested with couch grass, for example, they'll do badly.

Often, of course, this is simply the result of competition for water and nutrients. But, as in the case of couch grass, some plants actually suppress the growth of others. Some plants produce phytotoxic substances—either from their roots or washed down from their leaves—that inhibit other plant growth. Other plants stop seeds from germinating. This is probably most useful, as even weakly growing weeds may still set seed.

Some plants stunt any other plants around them as part of their natural defence against competition. Others only affect a certain range of plants. This is the most useful effect in the search for "natural herbicides". Couch grass, paspalum, bracken, pittosporum trees, red gums, and wormwood will inhibit weeds, but they'll also inhibit almost anything else you try to grow near them.

Over long periods, however, some plants do develop a tolerance to the phytotoxins of others. Barley inhibits many plants, but does not affect wheat for example—possibly because wheat and barley have been grown together for so long. Often, traditional peasant associations, like Mexican squash and corn, make use of the toxin secreted by one of the plants (the squash); this inhibits weeds, while the other plant (the corn), uninhibited by the herbicide effect, grows more strongly in the absence of weed competition.

Natural herbicides, unfortunately, still aren't much use to the home gardener. Even reproducing peasant "companion planting" may not give you the desired herbicide effect, as it has been bred out of many of the modern commercial varieties.

On the other hand, research into natural herbicides is growing, especially attempting to develop cultivars that inhibit weeds, and to pinpoint the chemicals that do so: either to harvest them or synthesise them. Endothal, a United States herbicide used against water weed, is based on a naturally occurring growth inhibitor.

In practical terms, for the home gardener or commercial grower, there are a few strategies you can use to suppress weeds with "natural herbicides".

1 Use "natural herbicides" to "clean" a paddock or garden of weeds before you plant your crop. Try a barley, oat, or other grain "green manure", either digging it in or slashing it and letting it decompose on top of the soil. Germination suppressors include all grains—

oats in particular—but wheat, buckwheat, and rye will also help clean an extremely weedy paddock or garden bed.

2 Try poppies in the home garden to keep down weeds. Plant them after your other flowers are established, and they will help stop weeds from germinating. They are most effective if sown thickly. Poppies can also be grown as a companion plant in the vegetable garden.

3 Use cucumbers or pumpkins between tall crops like corn, broad beans, etc. to keep down weeds—not just by their smothering effect, but also through the substances produced in their leaves.

4 Potatoes suppress the germination of many weeds around them. Many of the "stately home" lawns were first planted with potatoes by gardeners who knew their value in cleaning up weedy ground.

5 Try crops of witloof, chicory, the cabbage family (especially if the residue is left in the soil to rot), or mugwort to clean up a weedy vegetable garden. I once experimented with two trial plots of cauliflowers. The first were dug up as they were harvested, the second were simply cut and the stalks and leaves left in the ground. The plots were then left for a month, at which time the plot with the stalks was still almost weed-free (only clover seemed to spring up around them); the dug-up plot was almost knee high in at least seven species of weeds.

6 If you are growing pasture, Canadian thistle inhibits the growth of at least three sorts of annual thistle, as well as ryegrass and clover.

### *"Herbicide" mulches*

I have tried using nut tree leaves, oak leaves, cypress leaves, and pumpkin leaves, as well as mugwort and bracken as weed-suppressing mulches. Slash the bracken or the mugwort, or use the foliage from the trees. You have to be very careful not to place the mulch near your other plants or they too may be inhibited. While these "natural herbicides" have been successful in keeping weeds down (much more successful than adjoining plots with ordinary mulch), I think the extra work involved is not usually worth the result. It is, however, an interesting area to experiment with, and it might be worthwhile trying a large amount of "natural herbicide" mulch on an area you want to clean of weeds. At least nut trees, oaks, and cypress provide large amounts of material to work with!



### *Natural herbicides to avoid*

Be wary of couch, bracken, or paspalum under fruit trees: they inhibit all plant growth. Even used as mulch they have an inhibitory effect.

If you are growing pasture, serrated tussock inhibits white clover, bent grass and cocksfoot. Many thistle species inhibit a wide range of grasses. Buttercups and other ranunculi inhibit clover in your lawn and under trees. Beware of pines and cypresses. They not only make the soil around them acid, but the exudates washed down from their leaves inhibit both the growth and germination of most other species. (Have you ever wondered why pine forests are so bare?)

Keep grass out of your garden: most grasses suppress other species. Watch out for aromatic herbs, especially mugwort: water washing down from their leaves may contain growth suppressants. Keep other plants away from their drip line, especially if you are using them as a garden border.

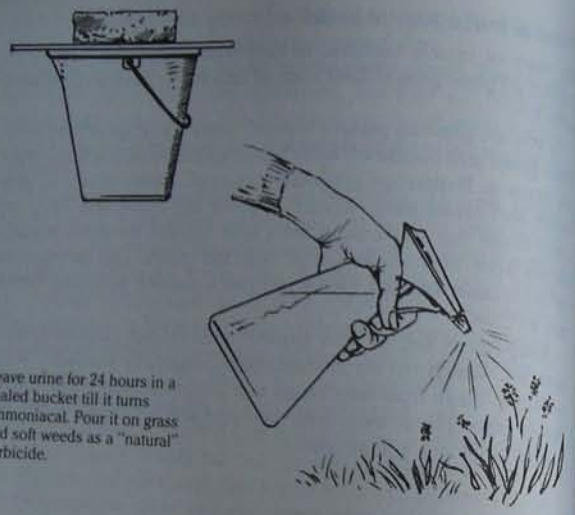
### *"Herbicide" trees*

Many trees are natural herbicides, though they are difficult to use for weed control: most nut trees, especially walnuts, most pines and cypresses, red gums, pittosporum undulatum, and many other canopy trees will supress growth underneath them. Sometimes the inhibiting effect is washed down from the leaves; at other times it is associated with the roots.

Don't plan to grow other plants under these trees. But grow them anyway: they make wonderful canopies where animals can shelter and children can play.

## Home-made herbicides

*Urine* Undiluted urine can kill plants, especially if they are shallow-rooted. Urine is especially useful for lawn weeds. For best effect, urine should be more than 24 hours old (it turns more ammoniacal as it ages) and should be applied to dry soil. Two applications over a 48-hour period are best. The main disadvantage is the difficulty in obtaining enough urine. I have even killed young blackberry plants with undiluted urine, but the older roots are longer and deeper so urine control isn't practical.



Leave urine for 24 hours in a sealed bucket till it turns ammoniacal. Pour it on grass and soft weeds as a "natural" herbicide.

*Sulphate of ammonia* I don't advocate this for growing plants, but as a plant killer it is excellent. Use it like urine on dry soil, undiluted, and on shallow-rooted plants.

*Borax* Use this with extreme caution, if at all. It kills plant life. While its side effects don't spread—unlike most herbicides—too much is toxic for the soil.

*Kerosene* Paint cut-off plant stalks with kerosene while they are still wet after cutting. Several applications may be necessary depending on the size of the plant and the size of its roots.

Many other substances will kill plants, like salt, which will kill any plant life if it is concentrated enough. The ill effects however more than outweigh the benefits.

## CHAPTER 4

# *Using Weeds*

## Edible weeds

### Bracken

Young shoots are edible, and good stir-fried, especially with sliced almonds and a touch of honey. Too many however are harmful: don't eat them more than once a week. Bracken rhizomes are said to be good baked, but those I've tried have been tough and fibrous.

### Burdock

A cultivated, improved form of burdock is called gobo. Burdock roots can be eaten like young parsnips, but they get tough after about three months. It is worthwhile collecting burdock seed for sowing in spring.

**Burdock root in cider**

Clean the roots, lay in an ovenproof dish, cover with cider, dot with butter, and bake till tender.

### Chickweed

Eat the shoots and young leaves steamed, or sauteed in garlic and butter, or however you might eat asparagus. Chickweed can also be eaten raw, but I don't recommend it.

### Chicory

The leaves can be eaten fresh, though they are slightly bitter, or cooked like silverbeet, which removes much of the bitterness. Otherwise, blanch them before picking by covering the whole plant with a large pot or fruit box for about three days.

### Cobbler's pegs

The young leaves and shoots can be cooked like silverbeet, though the flavour is too strong for many people. Soaking them in milk before cooking them takes away some of the pungency.

### Couch grass

Couch grass roots can be cleaned and steamed, or chopped and



stir-fried with other vegetables—if you can be bothered. A steady diet of couch grass roots might harm you, but the occasional taste does no harm. I have tried them steamed then dipped in soy sauce and sesame oil, which makes anything taste good. Never eat raw couch grass roots: they must be well-cooked.

### Dandelion

Dandelion leaves can be eaten fresh in salads or cooked like silverbeet. They are excellent stuffed with rice and cooked in chicken stock. The roots are also good eaten like parsnips. Try them steamed or baked or mashed, with plenty of butter and black pepper.

### Dock

Dock leaves are often bitter; some aren't. They are best cooked slowly in milk, or blanched in two changes of boiling water.

### Fat hen (*CHENOPODIUM ALBUM*)

This is a dull-leafed, fleshy, erect herb with diamond-shaped leaves. It can be eaten raw if you are determined—I find the texture unpleasant. Fat hen can also be eaten like silverbeet, though it is rather strong for most tastes. It is better dried and added to soups or stews. It is very rich in vitamin C. The seeds can also be eaten, either like poppy or caraway seeds on cakes or bread, or ground to a rich meal, or even used to thicken stews. The seeds are much nicer than the leaves.

### Mistletoe

In ancient Britain the mistletoe was reputed to have magic powers, and was used in Druidic ceremonies. Mistletoe was rare on the sacred oak, and it was assumed that the mistletoe kept the oak alive and not vice versa: the mistletoe was seen as the heart of the god that lived in the tree. Mistletoe too was the only plant to fruit in the heart of winter: green and flowering when all the world was barren. It was considered a great ill omen if mistletoe fell from its trees, and mistletoe was gathered only with a silver sickle after prayer and fasting for new year celebrations. The memories of these still persist as we "kiss under the mistletoe" at Christmas and New Year.

Mistletoes also stood for fertility. A traditional Austrian custom is to hide mistletoes in the bedroom of honeymooners. The Japanese Aino believed that eating mistletoe cured infertile women, and in ancient Rome women carried mistletoe to help them conceive. Another legend has it that Christ's cross was made of mistletoe, and as a punishment mistletoe was forbidden to root on the ground. Mistletoe was once called *Herbe de la Croix*.

According to the great herbalist Nicholas Culpepper, the mistletoe "is good for the grief of the sinew, itch, sores, and toothache, the bighting of mad dogs and venomous beasts". Modern herbalists prescribe mistletoe berries for nervous disorders, digestion, regulating menstrual flow and blood pressure. But these probably apply to the English mistletoe, *Viscum album*, and while many Australian mistletoes are in the same family, they may not have the same properties.

### Mistletoe fruit

Many mistletoes' berries are edible; none are poisonous. Most mistletoe fruit has a soft seed, sweet pulp, and a thin rind. Most are small; some almost grape size. They range from bright red through yellow to duller pinkish browns, white and black. Some fruits are very sweet and have an excellent flavour, though the stickiness is a nuisance.

Mistletoe fruit can be cooked, or eaten straight from the plant. It is great fun for children to harvest; kids usually don't mind the stickiness. As with all "wild" fruit, some plants even within the one species give better-flavoured fruit than others; it is worthwhile tasting them to check. Make sure before you eat it that the fruit is quite ripe for the best flavour. Ripe mistletoe fruit is soft and also faintly translucent. An Aboriginal use for the half ripe fruits with their soft seeds was to chew them like chewing gum. They were also used as "bird lime": rubbed on branches to trap small birds like finches for eating.

### Mistletoe jelly

Take two cups of ripe berries, avoiding those that are tasteless or bitter. Simmer in a cup of water for two hours, adding more water to make up for evaporation, then press out the juice through fine cloth. Add the juice of two lemons, and sugar to taste. Boil again till the liquid sets jelly-like in a saucer of cold water. Bottle, and use when cold—either on bread, or over icecream, or stirred through whipped cream.



This jelly can range from clear yellow through pink to red. Every version I've tried has been edible; some have been delicious; and all have been interesting and subtle enough to cause comment. I find mistletoe jelly best served with whipped cream.

## Nettles (*URTICA SP*)

Nettles are unpleasant things to have in the garden unless you are sure no one will brush against their stinging leaves. (If they do, rub the juice from the nettle stem on the rash to relieve it, or use some bracken stem juice.) But if you happen to need a meat stock (without any meat on hand), try boiling a handful of nettles (use gloves to pick them) in a cup of water for twenty minutes. The taste is similar to beef stock. Boiled nettles can be used as a green vegetable: they won't sting your mouth. Use young ones for this, the older ones are stringy. Boiled nettle leaves taste like boiled nettle leaves. Some people like them.

## New Zealand spinach

This is a spinach substitute: not as delicate by any means, but a quick-growing, rampant vegetable that will tolerate very high temperatures. You can buy seed in packets or find it growing wild.

## Pigweed (*PORTULACA OLERACEA*)

There are both native and introduced pigweeds: the one in your garden, green and fleshy, is probably introduced. Pigweed has triangular leaves, slightly rounded with darker margins, and yellow flowers. It grows in bare, often hot or dry ground.

I was once served a pigweed salad. The creator enjoyed it—or said he did. Pigweed is better cooked. Both the stems and the leaves can be finely chopped and added to stews or even to mixed greens in omelettes. They don't add much except green bulk: neither the taste nor the texture is particularly noticeable.

Pigweed seeds on the other hand are delicious. The tiny seeds can be easily shaken out when they are ripe. I use them like poppy seeds in bread and cakes or scattered over buttered pasta. The Aborigines used to grind them into flour to bake cakes. They make a rich, oily meal, very high in protein.

## Prickly pear

The fruit is good, red, and sweet; so are the young stem joints once the skin and prickles are removed. They can be boiled or—even better—crystallised, and used instead of angelica for fruit cakes, etc. Try pickling prickly pear stems (peeled) in vinegar with honey and ginger. Simply bring the stems and vinegar to the boil, simmer for three minutes, then bottle and seal and leave in the fridge for three weeks.

## Rose hips

Wild briars are a common roadside and paddock weed, with pink single flowers in spring. Make sure they haven't been poisoned with herbicide, or lead accumulated by the side of busy roads.

### Rose honey

Take 100 g rose hips, "tail" them, boil in a cup of water in a stainless steel saucepan for 20 minutes. Strain the pulp through a sieve. Warm 500 g of honey, add to the rose hips, bring to the boil for five minutes, place in clean jars, and seal.

### Rose hip jam

"Tail" the rose hips, and boil with an equal volume of water until tender. Push the pulp through a sieve, add half a cup of sugar for every cup of pulp and the juice of a lemon for every two cups of mixture. Boil till it sets like jam in a little cold water. Seal and store.

### Rose hip tart

Line a pastry dish with shortcrust pastry, and bake blind. Take big hips—rugosa hips are excellent, though any large hip will do—or smaller ones if you don't mind fiddling. Top and tail the hips, open them and clean out the seeds, stew them in a very little water with a touch of sugar. When soft, place the mixture in the tart. Serve with cream or yoghurt, with an optional sprinkle of cinnamon or ginger.

## Saffron thistle

True Saffron comes from the dried stigmas of the flowers of the bulb *Crocus sativus*. The false or Mexican saffron *Carthamus*



*tinctorius L.* is not related to true saffron, but is often used as a substitute flavouring and colouring. It is a thistle, closely related to saffron thistles, and the stigma of these, picked just at the start of flowering, can also be used as a saffron substitute.

## Sorrel

Narrow-leafed sheep sorrel is smaller and stronger but just as edible as large French sorrel. Sorrel is a perennial, preferring acid soil. It is acid-tasting, but make a lovely sauce, especially with fish, and a few leaves are good in salads. Add it to a white sauce or to mayonnaise. A few leaves can be added to salads for piquancy; too many are bitter.

### Sorrel soup

Simmer sorrel leaves in a clear chicken or onion stock; puree, and add a dash of cream and black pepper.

## Sow thistle

There is some argument as to whether there is a native as well as an introduced form of sow thistle. It has yellow flowers—which open only once in the morning—milky latex, and hollow stems. It is sometimes misnamed dandelion, but the dandelion has only one flower per head while the sow thistle has several.

The leaves of sow thistles are delicious to anyone who likes endive, and can be cooked or eaten raw in the same way. I prefer them cooked like silverbeet. The young buds can also be dipped in batter and deep-fried. They get tough, though, as soon as the flower colour starts to appear.

## Wandering jew

Young shoots can be boiled and eaten; they are bland but quite pleasant. Stir-fry them with soy sauce or garlic and lemon juice.

## Water hyacinth

Very young leaves can be boiled or deep-fried and eaten; however, they tend to be stringy and don't taste of much.

### Yellow wood sorrel (*OXALIS CORNICULATA*)

Wood sorrel has heart-shaped leaflets in threes, slightly clover like. The flowers are yellow with five petals. Wood sorrel leaves are sour but add an interesting tang to salads. I have used it in place of French sorrel, for sorrel sauce with fish and sorrel soup; add finely-chopped sorrel to a good stock—fish or chicken—and add cream to taste. Blend if a smooth, pale-green soup is wanted.

## Drinks

Coffee and tea

*Dandelion coffee* is made from ground dandelion root: dug, scrubbed, dried, chopped, then slow-roasted till it is brittle, it makes a thick, dark flavourful drink, rather like Turkish coffee. Always use the freshly-roasted root, if possible, for the best flavour. Dandelion coffee is made in the same way as ordinary coffee.

Dandelions grow almost anywhere. They are perennial, with a long tap root and yellow flowers in spring and summer. The leaves are also edible, but dandelion should be grown as an annual, with the seed sown in spring, if it is to be eaten fresh, otherwise the leaves are bitter. Older plants give fleshier roots. Alternatively, the leaves can be blanched by covering with mulch or an old fruit box for about a week before picking.

Dandelion coffee is reputed to stimulate the appetite, be a digestive and anti-rheumatic, an excellent tonic, and a very mild laxative.

*Chicory* can be either added to coffee or drunk on its own. Chicory is reputed to be a tonic, mildly laxative and diuretic. To make chicory coffee: dig up the root at any time of the year, though it is sweetest in winter; clean the root thoroughly, slice it if it is thick, bake it in a slow oven till it is crisp, then pulverise it with a mortar and pestle, or grind it in the blender.

*Rose hip tea* is high in vitamin C and is naturally sweet. Gather the hips from wild briars, though not near roads, as there they may contain too much lead. Pick them when they are red and swollen.

*Nettle tea* tastes rather like beef tea. It is a good hot drink for winter. Pick your nettles using gloves, either old or new leaves, cover them with water and bring them to the boil. Simmer twenty minutes, let cool and strain. Reheat and drink warm. A little garlic or onion improves nettle tea.



Wine and beer

*Dandelion wine* Boil for one hour: 2 litres of dandelion flowers in 4 litres of water with the rinds of two oranges and two lemons and 1.25 kg sugar. Cool till tepid, add the juice of the oranges and lemons, 50 g of raisins and two tablespoons of fresh yeast or the dried equivalent. Leave for 24 hours, strain and bottle; screw down the tops only when fermentation has finished—this may be a month or more.

*Horehound beer* Boil a cup of chopped horehound leaves in 6 litres of water with 500 g of treacle. Strain, cool, add a teaspoon of dried yeast when it is blood heat. Cover with a clean tea-towel. Bottle after 24 hours. Check bottles every day to release excess gas or they may burst. Drink after three days if the weather is warm, after about a week if it's cool. Keep the beer in the fridge if possible, and don't keep it for more than two weeks.

## Medicinal weeds

Many medicinal weeds are too dangerous for home use. The following are reasonably safe to be experimented with at home for minor ailments and tonics.

### Bidgee widgee (*ACAENA ANSERINIFOLIA*)

*Identification* This wiry ground cover produces painful burrs.

*Use* Boil the leaves for five minutes and apply to bruises and wounds or drink as a general (and nasty) tonic.

### Blackberry (*RUBUS FRUCTICOSUS*)

*Use* Blackberry is held to be a restorative, especially for the digestive tract in chronic diarrhoea or urinary tract infections. It can be used as a gargle for sore throats and mouth ulcers and as a warm douche for thrush. Either the leaves or root bark are

used. Make sure *that any blackberry leaves you use have not been sprayed with herbicide.*

## Burdock *(ARCTIUM LAPPA)*

Burdock root ointment or leaf poultices can be applied to ulcers, pimples, inflammation or other skin problems, or as a tonic to the hair and scalp. It can be drunk as a tea to increase resistance to infection.

## Castor oil plant *(RICINUS COMMUNIS)*

*Identification* A large shrub with lobed leaves, sometimes reddish.

*Use* The seeds are poisonous, but the extracted oil is the laxative castor oil.

## Chickweed *(STELLARIA MEDIA)*

*Identification* Soft prostrate weed with downy opposite leaves and small white starry flowers.

*Use* The leaves can be used fresh, dried, powdered or as tea for inflammation, haemorrhoids, eczema, burns, wounds, etc. The leaves can be eaten as a kidney tonic, and chickweed ointment can be used for all skin irritations and sores, or the leaves can be made into a poultice.

## Cleavers *(GALIUM APRAINE)*

These are traditionally used as diuretic and mild laxative. Pour boiling water over the flowering plant and infuse till pale-coloured. It is also reputed to slightly lower fevers and blood pressure.

## Coast morning glory *(IPOMOEA PES-CAPRAE)*

*Identification* This member of the morning glory family is a succulent, prostrate coastal plant with large red to purple trumpet-shaped flowers.

*Use* The juice can be used as a laxative, and the heated leaves for skin irritations like boils, bruises, and haemorrhoids.



## Cobbler's pegs *(BIDENS PILOSA)*

*Identification* The pegs are the narrow-spined fruit that stick to you when you brush past this tall, annual weed.

*Use* An infusion of the flowerheads can be used for diarrhoea and coughs. The flowers can be chewed against toothache.

## Common dodder

*Identification* This is a climbing parasite with twining yellow stems and suckers. It draws nourishment from its host plant.

*Use* A decoction of common dodder has been used for liver and kidney complaints and as a laxative.

## Couch grass *(CYNODON DACTYLON)*

*Identification* This is a common lawn grass with underground runners.

*Use* A decoction of couch grass root has been used for urinary problems like cystitis and kidney stones, and gout. It must be boiled before use or it is poisonous and has been associated with cyanic acid poisoning.

## Dandelion *(TARAXACUM OFFICINALE)*

Either the dried root or the leaves of the dandelion are used as a diuretic and liver tonic. It is reputed to improve digestion and appetite.

## Dill *(ANETHUM GRAVEOLENS)*

*Identification* This tall, feathery, dark-green plant smells of anise.

*Use* Drink dill tea as a digestive; give to babies for colic; feed to lactating mothers—human or animal—to increase milk yield.

## Dock *(RUMEX CRISPUS)*

*Identification* These are mostly found in damp areas; green leaves, growing up to 60 cm, form a basal rosette.

*Use* Dock root is reputed to stimulate digestion and is an effective laxative. It is also high in iron. A tea made from dock root can be used as a gargle for sore throats. Apply a poultice of the leaves to stop bleeding or to areas infected with skin parasites like ringworm. The stewed leaves can be used as a tonic or for liver complaints.

## Horehound *(MARRUBIUM VULGARE)*

*Identification* Rounded grey furry soft leaves, with a white flower: a bushy perennial, up to one metre in height.

*Use* Horehound is mostly used as a cough remedy. Pour boiling water on the leaves for a cough syrup; candy the stems for cough lollies or add the horehound tea to toffee.

## Mullein *(VERBASCUM THAPSUS)*

*Identification* The first year's rosette of leaves later develops a tall stem with yellow flowers, which grows up to two metres in height.

*Use* Infuse the leaves in boiling water and inhale the steam for asthma, colds, hayfever, sinus, etc. Use as a gargle for laryngitus. Make mullein oil for haemorrhoids, nappy rash, and bruises: chop the leaves, place them in a jar and cover them with olive oil; leave in the sun and shake every day for three weeks.

## Nettles *(URTICA SP)*

*Identification* Tall, green, and hairy, they sting you when you brush them.

*Use* Patients with rheumatism were traditionally flogged with nettles. Nettle tea can be drunk as a tonic, especially for anaemia or loss of appetite; the boiled leaves can be used as a poultice for sprains. Note that nettles lose their sting when boiled.

Drink nettle tea to reduce nose bleeds or excessive menstrual bleeding; sweeten with honey to lessen the symptoms of asthma or use as a hair rinse for a hair tonic. Nettle juice (from the stem) can be used to reduce the pain of nettle rash.



## Pigface *(CARPOBROTUS GLAUCESCENS)*

Pigface juice is a weak anaesthetic; apply it to your skin against ant bite, midge bites, bluebottle stings, grazes, or sunburn.

## Plantain *(PLANTAGO MAJOR or LANCEOLA)*

*Identification* Rosette of stalked leaves to 30 cm, with spikes of small flowers on long stems.

*Use* The leaves are antibacterial and promote blood clotting: rub them on nettle or insect stings, add powdered leaves to ointments for skin disease and irritations, and on healing wounds to promote new tissue. Plantain tea can also be taken for diarrhoea.

## Prickly pear *(OPUNTIA)*

The thick juice can be used as a cough mixture, either by itself or with additions.

## Rose hips

These are high in vitamin C as well as some B vitamins, iron and copper. Drink rosehip tea for bleeding gums, fluid retention, and as a kidney tonic. The leaves can be used as a mild laxative (use them in tea) or as poultices on skin irritations.

## Shepherd's purse *(CAPSELLA BURSA PASTORIS)*

*Identification* This common member of the mustard family has a basal rosette of coarsely-toothed leaves and small white four-petalled flowers.

*Use* Shepherd's purse can be made into a tea to help control internal bleeding or bruising. Simmer 20 g of fresh leaves in 500 mL of water till reduced by one-third. Strain and drink warm by the cupful every three hours until excessive menstrual bleeding is reduced. Cotton wool soaked in this tea, then dipped in the nose, stops nose bleeds.

### Sorrel *(RUMEX ACETOSA)*

*Identification* Long arrow-shaped leaves, pale green, very acid-tasting.

*Use* Apply pulped leaves to skin complaints; drink the juice or eat the leaves for fevers.

### Wood sorrel *(OXALIS CORNICULATA)*

Rub the stems on warts and corns to remove them; use the juice for skin rashes and prickly heat.

## Pesticides

Weeds can help control your pests just by being there. They may do this in several ways: by inhibiting pests (stinking roger for example will inhibit a range of harmful nematodes), or by attracting predators—flowering weeds are attractive to a range of wasps, hoverflies, ladybirds, and other predators—and the more insects they attract the more insect eating birds will help control your pest populations.

Weeds may harbour pests, but that is not necessarily a bad thing. All predators—birds and insects and other natural pest controllers in your garden—need a year-round supply of food. This may not be provided by your garden's crops. A diversity of weeds may mean a greater insect and bird population, and thus more natural pest control when you need it.

Weeds can be associated with the build-up of pests like thrips, especially when winter-flowering weeds die off and the thrips move into your spring flowers like fruit blossom and roses. The answer is not to get rid of the weeds but to make sure you have more flowering ground covers—"weeds" or otherwise—when the annual weeds die off. Some weeds also act as trap crops for pests: our caulies were free of caterpillars this autumn as the cabbage-white butterflies laid their eggs on the wild brassicas.

Weeds can also disguise your crops. The cabbage-root fly, for example, lands on a plant, "tastes" it with its feet and moves on if the plant is "wrong", relying partly on cabbage scent. Companion plants will confuse it, but they must be about the same size, and rows must be about 50 cm apart. If 50% of space is given to a companion crop, this gives 50% reduction in damage and this rate is fairly stable depending on the proportion of companion plants.



Weeds may also act as companion plants, increasing the vigour of the plants near them. Nettles, for example, "fix" nitrogen (or their associated bacteria do). Their leaves break down quickly and add humus to the soil; they are reputed to encourage earthworms and also to transmit some as yet unspecified "tonic" properties to plants which seem to work: plants grown with nettles really do seem less prone to pests and disease and to grow better.

Broom is another nitrogen fixer, as is bracken. Don't forget either, that even where seeds don't "fix" nitrogen, they will lock up any surplus nitrogen in the soil that might otherwise be washed away. A crop of thistles may be a nuisance, but they will rot down and release their stored fertility.

Deep-rooted weeds like chicory and dandelions will benefit shallow-rooted plants: the deep roots will forage nutrients leached deep down, and as the leaves of the deep rooters decompose, the nutrients will be made available to the shallow-rooted plants.

### Broom *(CYTISUS SCOPARIS)*

*Use* Crush the twigs and heat in oil till near boiling point; cool, and use against lice or other parasites.

### Castor oil plant

The scented leaves of this plant will repel insects that sense their targets by smell. Powdered castor oil leaves have been marketed in the USA as an organic mosquito and general insect repellent. The seeds can be pressed for "castor oil".

Pick the castor oil plant leaves at any time of the year, dry them in the sun or in a "cool" oven, and crumble to a powder. They can be used for at least a year or as long as they are fragrant. If you want to use the leaves as a personal insect repellent, soak the fresh leaves in oil for three weeks in a sunny spot, shaking every day. Test the oil on the inside of your wrist first to make sure that you aren't sensitive to it.

### Horehound *(MARRUBIAN VULGARE)*

Horehound will repel insects; use it as a hedge around the garden or plant it under tall growers, or with tomato bushes. It will also repel grasshoppers, as long as there aren't too many of them.

### Lantana

Lantana spray is effective against aphids. Boil 500 g of leaves in one litre of water for twenty minutes. Strain and spray.

Lantana is a well-known, troublesome weed. If you intend to plant something for aphid control, use something like wormwood—but if you already have lantana you may as well make use of it.

### Nettles

Nettle spray can be used to combat powdery mildew or to control thrips, aphids and other soft-bodied sap suckers.

#### Stinging nettle spray

Cover nettles with water, leave for three weeks or until the liquid is pale brown to green. This can be diluted with two parts water and used against aphids. It is also a valuable foliar fertiliser and an excellent tonic for your plants: use it freely.

### Nutgrass *(CYPERUS ROTUNDIS)*

*Identification* Common grass weed with underground nuts.

*Use* Nutgrass oil is an effective insect repellent.

### Stinking roger *(TAGETES MINUTA)*

Stinking roger is an effective insect repellent. Traditionally it was hung in doorways to repel flies, and mattresses were stuffed with the dried leaves to repel bed bugs and other insects. Stinking roger can also be used as a companion plant to repel certain root knot nematodes.

### Tea tree *(LEPTOSPERMUM)*

The scent of tea tree leaves can mask the pest-attracting scents of other plants. Tea tree oil is also used to repel flies, mosquitos, and other insects by rubbing it on the skin, but I haven't found it very effective. Branches of tea tree inside the house are reputed to repel cockroaches—but nothing really deters a hungry one.



### Thistles

Several thistles are pest repellent, but they are probably too much of a pest themselves to be deliberately grown in the necessary quantities.

### Wild mustard

The root secretions of mustard will inhibit harmful nematodes, including the worst Australian pest species.

## Fertiliser

Place the weeds in a lidded barrel or bucket; cover with water, and place the lid on to keep out mosquitoes. When the liquid starts to turn pale-brown, use it as liquid fertiliser: watered into your plants (it is especially good for pot-plants that are hard to mulch) or sprayed as a foliage spray onto trees or larger plants. Keep topping up the bucket with water. The decomposing muck in the bottom of the bucket can also be used as mulch: by this time there will be no chance of it re-growing.

## Mulch

As long as the weeds aren't setting seed, or are perennials that grow from bulblets or root divisions that might set again in the ground, you can simply use as mulch any weeds you slash or pull up. If you fear they may take root again, place a sheet of newspaper under them. This will soon break down, but by then the weeds will no longer be viable.

#### Slashed weeds

Deep-rooted weeds may bring up leached minerals from deep in the soil where shallower roots can't reach. These minerals are transferred to the weed leaves, and as they decompose the minerals return to the surface of the soil where they can be used by other plants. You can accelerate this process by slashing your weeds regularly. It will also stop them from seeding and helps keep them in check.

## Compost

Weeds make excellent compost: to be successful, compost needs air, nitrogen, and moisture. An easy, fast compost is made by shredding all ingredients finely with the mower, adding either liquid manure, or hen manure, or blood and bone and enough water just to moisten it. Toss every day; it should be ready in three weeks.

Alternatively, just pile up your weeds—no more than one-and-a-half metres high—and water-in some liquid manure or high nitrogen animal manure, even human urine at a pinch.

Even if you aren't prepared to put in the effort, a weed pile will always rot eventually; and when it does, the residue can be used. But well-made compost has no equal, either as a fertiliser or for keeping your plants healthy and pest free.

# CHAPTER 5

# Common Weeds

- Aaron's rod
- African boxthorn
- Algae
- Bamboo
- Bathurst burr
- Bidgee widgee
- Blindii eyes
- Bindweed
- Bitou bush
- Blackberry
- Bracken
- Briar rose
- Burdock
- Cape broom
- Cape ivy
- Capeweed
- Castor-oil plant
- Cat's ear
- Chickweed
- Chicory
- Cleavers
- Cobbler's pegs
- Cotton bush
- Coreopsis
- Couch
- Crab grass
- Creeping buttercup
- Crofton weed
- Dandelion
- Dock
- Dodder
- English couch
- Fat hen
- Fennel
- Five-spined saltbush
- Goosefoot
- Flat weed
- Great mullein
- Hedge mustard
- Horehound
- Ink weed
- Kikuyu grass
- Lamb's tail
- Lantana
- Large plantain
- Lawn daisy
- Mignonette vine
- Mintweed
- Mistletoe
- Morning glory
- Nettles
- Nutgrass
- Oxalis
- Pampas grass
- Paspalum
- Patterson's curse
- Pigface
- Pigweed
- Potato vine
- Prickly pear
- Privet
- Purple top
- Purple verbena
- Ragwort
- Ribwort
- Roly poly
- Salvation Jane
- Serrated tussock
- Skeleton weed
- Slender vetch
- Small-leafed privet
- Sorrel
- Spiny rush
- Stinking roger
- Swamp dock
- Thistles
  - Canadian or creeping thistle
  - Malta thistle
  - Nodding thistle
  - St Barnaby's thistle
  - Saffron thistle
  - Scotch thistle
  - Slender thistle
  - Soldier thistle
  - Sow thistle
  - Spear thistle
  - Star thistle
  - Stemless thistle
  - Variegated thistle
- Tree of heaven
- Vetch
- Wandering jew
- Water hyacinth
- Wax tree
- Wild carrot
- Wild turnip
- Wood sorrel

## AARON'S ROD, *see* GREAT MULLEIN

## AFRICAN BOXTHORN (*Lycium ferocissimum*)

*Identification* Perennial, tall, ragged shrub with rounded, oval leaves and red, oval berries with yellow patches and white to pale-purple flowers hanging from thin stems. Native to South Africa, mostly a pest in high rainfall areas.

*Control* African boxthorn can be winched out with a rope and tractor or four-wheel drive vehicle: circle it with a rope and pull. Alternatively, cut it back with a brushhook and chainsaw, then chop at the roots. I have found that while roots do re-grow, if you continue to whippersnip the re-growth regularly the plant will eventually die; but you must be rigorous with the re-growth and attack it every few weeks. Alternatively, heavily stock the area after the initial slashing and let animals control the re-growth for you. Try burning African boxthorn, preferably with a fine spray of diesel for a hot burn, then re-seed with grass or other cover as soon as the ground is cool and damp. The best control is long term: tall, wide umbrella-like trees will smother it. (See also chapter 2: Pasture, woody weeds)

## ALGAE

Algae-infested water can poison the stock that drink it, or at least make it offensive to them. Algae are very sensitive to copper, and 10 g of bluestone to 9000 litres of water will kill the algae and stop it from spreading. Calculate the amount of water in your dam and spray a slightly stronger solution over the surface. This small amount of bluestone won't cause copper poisoning but will kill algae. Only use copper when absolutely necessary however, and not as a regular preventative, as it can build up in the soil.

## BAMBOO (*Bambusa spp.*)

*Identification* There are over 200 species of bamboo, mostly woody perennials. Not all are pests and most have a multitude of uses,



as animal food, building materials, or human food (for example, bamboo shoots, bamboo grain, and bamboo coffee). Some bamboos flower; some spread only by suckering, by cuttings, or by spreading rhizomes. *Bambusa vulgaris* is the most common ornamental bamboo in Australia and gives the most trouble, as ornamental clumps spread further than intended. It originated in Asia and can grow from 3 to 30 metres high, depending on conditions. It is most troublesome when it begins to spread down gullies and waterways.

*Control* Bamboo must be thoroughly cut out—this is usually a job for a mattock, and re-growth must be controlled. It may be worthwhile digging in a deep bamboo "fence", about half a metre deep, to stop it from spreading.

## BATHURST BURR (*Xanthium spinosum*)

*Identification* Annual with shiny, divided leaves, white underneath, and with three spines at the base of each leaf stalk. The hairy, oval fruit has sharp spines. Native to South Africa, Bathurst burr is often found on road sides or near sheep yards. The burr is carried in wool.

*Control* Bathurst burr is a problem of disturbed soil and needs good grass cover to compete with it. Dig it out by hand or chop it back before seed sets. (See also chapter 2, Pasture)

## BIDGEE WIDGEE (*Acaena anserinifolia*)

*Identification* Perennial, toothed leaves, erect flowering stems, green to purple rounded flowers. The flower head burrs stick to clothes.

*Control* Dig out by hand before seed sets.

## BINDII EYES (*Solvia spp.*)

*Identification* You will feel bindii eye barbs in late winter, early spring, when its sharp seeds are produced. Look for light-green bindii eye patches among your darker green lawn in early winter; the leaves look a bit like low-growing carrot tops among the grass.

*Control* Pour on sulphate of ammonia in the early morning (and water in the area the next day), chop them out, or paint them with kerosene.

## BINDWEED (*Convolvulus arvensis*)

*Identification* Perennial herb with trumpet-like flowers in groups of one, two, or three; pale pink to white with deeper pink veins. Native to Europe and Asia. *Convolvulus erubescens* is a native bindweed with smaller flowers. The stems don't twine, it is not such a strong grower, and is rarely a pest.

*Control* Bindweed is hard to remove as the underground rhizomes grow fast, deep, and are wide spreading. All the root system must be dug out. Otherwise, try blanket mulching, which should be more effective than digging. Dense grazing with goats or heavy-footed animals searching for food is also effective, as long as a dense ground cover is planted on top.

## BITOU BUSH (*Chrysanthemoides monilifera*)

*Identification* Perennial shrub from one to four metres high, depending on the soil; thick stems; leaves vary in shape; yellow, daisy-like flowers, mostly in spring, with hard black fruit. Native to South Africa.

*Control* Removing the surface root system is enough to kill the bitou bush. Use full-strength old urine or borax on small bushes. (See also chapter 2: Pasture, woody weeds.)



## BLACKBERRY

*Identification* Blackberries are a problem in a temperate climate. In cold areas they are dormant for a large part of the year, and thus less rampant. (They can also be burnt when the foliage dies off.) Blackberries don't thrive in hot areas either. Round here (southern NSW) they grow unchecked for nine months of the year, never quite dying off in winter; there is no time you can get a really good burn going to get rid of them.

Blackberries are native to Europe, Asia, and North Africa. They can ramble almost flat over the ground or, more often, form great clumps up to 3 metres high. The stems and leaves are prickly. They produce white flowers in spring, then fruit that turns from green to purple, and has bright red juice. They spread from seed (usually carried by birds) or from rooting branches that seem to leap up out of the bush and burrow down before you've realised it.

Small amounts of blackberry aren't a problem. (Except where the local weeds inspector insists you spray.) Blackberries can form

a stock-proof hedge, and the berries are a lovely fruit with no work on your part. But once they get away they can cover many square kilometres of grazing land, cover creek banks and gullies, and cover houses even. It is a myth that blackberries only invade ground disturbed by people: a flood down a creek, a falling tree in the rainforest, and blackberries can invade quickly.

*Control* Choking them out can be done naturally, as tree cover reduces the light and moisture available to blackberries, or deliberately, with chokos, pumpkins, hops, and other fierce growers.

Blackberries often grow on disturbed land that likes the stability of blackberry roots and cover: old farm land in particular. Around here (southern NSW), blackberries grow on the old abandoned mullock heaps, and spread out from there into land disturbed with orchards and pasture: most often where that land has been over-grazed or overcleared and tends to "slump" or erode after heavy rain. Slowly though, this picture changes. instead of the bare ground with huge mounds of blackberries, trees start peering out of the clumps; here mostly *pittosporum undulatum*, a rainforest fringe species that germinates in the warm, dark moisture of the blackberry clumps. It grows tall and spindly until it reaches the top of the blackberries, then branches out, gradually shading the blackberry clump, eventually reducing it to a few canes, starved for light and moisture.

Pittosporums seem particularly effective in choking out black-berries—they also have root secretions that inhibit the growth of nearby plants—but I have seen the same happen with black wattles, although the effect was not as complete.

The same process can be imitated by growing banana passionfruit or chokos or even pumpkins over the clumps: the blackberries are starved for light, semi collapse under the weight, and their growth is checked. I did this with pumpkin vines, years ago. The vines didn't kill the blackberries, but they helped squash the large clumps so I was able to throw thick wads of newspaper over them, mulch them and plant rhubarb on top instead.

### Chopping

The fastest blackberry control is done with a bulldozer or tractor with front-end loader. The blackberries are simply uprooted, pushed into a heap, and burnt. This is quick and effective as long as you immediately sow grass or another thick ground cover in the bare patches. The blackberries grew there in the first place because they are opportunists, like all weeds, colonising the disturbed soil.



So, if you don't get a grass cover there soon you will have only opened up the land for another weed invasion.

If you choose to chop out blackberries by hand, slash them down first. We use a brush hook or a whippersnipper, hauling down the canes with a rake. This method is easiest with two people. Chop out the remaining roots, or stock the area intensively with goats, chooks, or horses: most animals will eat small, new blackberry shoots that are close to the ground. Blackberries usually shoot from a swelling below the ground. The root must be cut below this swelling: make sure you follow each cane in case it has rooted, because the roots will re-grow.

You will always get some re-growth, which can be chopped out again, heavily grazed, or whipper-snipped. This must be done every week or the roots will just get bigger and more persistent.

### Burning

I've known burning to work by itself, but only if the fire was hot enough to destroy most of the blackberry bush. This may mean using flame guns or a spray of diesel if the clumps are in a damp place, as blackberries often are. Again, as soon as the blackberries are burnt some cover must be planted, and usually follow-up is needed through the season, digging up new blackberry shoots that rise from the roots or stocking with blackberry-eating animals like goats.

### Grazing

Animal grazing can be magic. Friends have cleared most of their creek flats with tethered goats, moving them every few days, slashing down blackberries for them to reach, then sowing grass as the goats are moved to another area that needs clearing. It is a lot of work, but the result is beautiful lovely loam, enriched with years of blackberry leaves and goat droppings, and a good rich grass growth that attracts other stock (even wallabies eat young blackberry shoots), so any blackberry re-growth is either trodden on or eaten.

An old neighbour had an even faster technique: he circled each clump with an electric fence and tossed in some pigs and a bag of "pig nuts". By the time the pigs had finished rooting for the nuts the blackberries were finished too.

### Sheet mulching

Small clumps of blackberries near the house can be more or less ignored; any that can be reached by lawn-mower will gradually disappear after a few mowings.

My asparagus bed used to be a blackberry clump: I just trampled it down a bit with my boots and a brush hook, threw over newspapers and enough mulch to plant the asparagus, pulled out a very few errant shoots the next year—and that was that! But no non-herbicide blackberry control is a one-off operation: all techniques require follow-up, and a certain level of dedication. Blackberry control has to become part of your on-going management plan. And this is not a bad thing, as bad management (though probably not yours) led to the problem in the first place.

Points to remember

- Never leave weeded blackberries on the ground: they will re-root and you'll soon be back where you started.
- Always follow up blackberry control: a small shoot now is easier to deal with than a clump in three years' time.
- Always sow cleared land with grass or other ground cover, *as soon as the land is cleared.*
- Even herbicide control of blackberries is rarely complete effective. Not any control of blackberries is easy: you are after all trying to re-claim damaged land as well as control a weed.

## BRACKEN

Bracken spreads quickly, especially where land has been overgrazed or burnt. Its spreading rhizomous root system stabilises disturbed soil and the spreading bracken "ferns" also stop erosion from wind and water by covering the soil. Bracken (or its associated bacteria) fixes nitrogen, and the wide fronds add humus to the soil.

On the other hand, almost nothing eats bracken. The wide fronds shade out the pasture, and stock won't venture into a stand of bracken to eat the grass underneath, unless hard pressed. This helps regeneration: tree seedlings often grow up in bracken stands so the forest establishes again. In one orchard here the fruit and leaves of trees surrounded by bracken aren't attacked by wallabies. But forest regeneration is usually the last thing a grazier or gardener wants in cleared areas. (Bracken can also harbour rabbits, may be a fire hazard, and choke out pasture.)

Bracken is often a symptom of overgrazing, especially by rabbits. The closer the grass is grazed the less chance the root system has to grow deeper, and the more depleted the surface soil becomes; the less grass cover to stabilise the soil, the more nutrients are



leached down to a depth where the shallow grass roots can't get them; and the less grass competition the more the bracken thrives, and the cycle goes on.

Once bracken establishes itself, the land begins to recover: there are fewer heavy feet compacting it, there is less grass to tempt animals among it, and there is less grazing pressure on the grass that remains. Don't be in too much of a hurry to get rid of your bracken: it may serve a useful purpose!

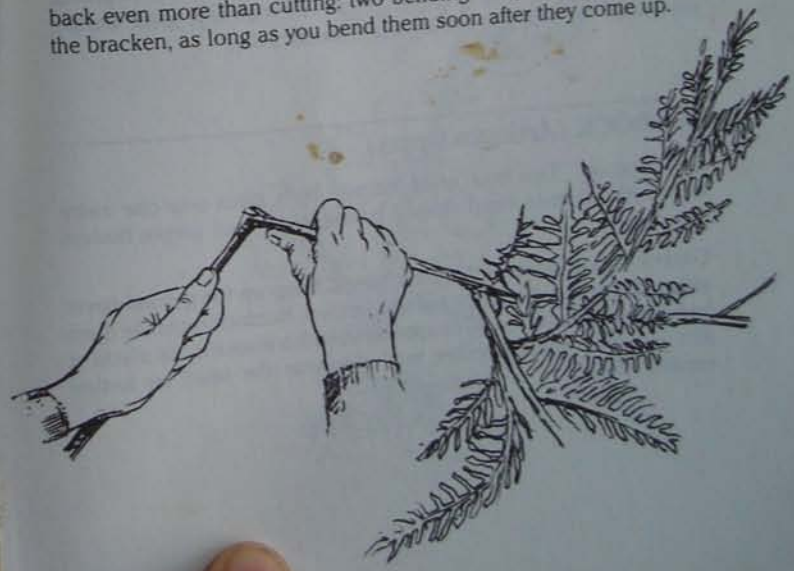
### Slashing

Repeated slashing or mowing will get rid of bracken. I have found around here that four slashes usually get rid of it as long as you don't leave too much time between them. If you leave the bracken alone too long, the root system increases.

Cut bracken is good bedding for stock, excellent deep litter for chooks, and it can be used as mulch. Although bracken does have a minor growth retarding impact on plants, I've found that bracken-mulched plants do much better than those with no mulch at all. It can of course also be composted (it is high in potash), after which there will be no growth-retarding effect left.

### Bending

Just wound the plants, don't cut them. This seems to set them back even more than cutting: two bendings may be enough to kill the bracken, as long as you bend them soon after they come up.



### Pigs and hens

Pigs both eat bracken and root it up; hens scratch up the bracken. Try pigs in small electric enclosures moved from bracken patch to bracken patch.

### Trees

Alternatively, let your bracken areas go back to trees. The trees will shade the bracken and eventually kill it, whilst the bracken will protect the trees when they are young. If you don't want the bush regenerating on your land, try orchard trees or stock feeding trees like kurrajongs, paulonias, leucaneas, etc.

## BRIAR ROSE *(Rosa rubiginosa)*

*Identification* A perennial with several stems up to three metres high, with thorns and small rose-like leaves. It has small pink and white single rose flowers in spring, followed by large red hips.

*Control* Briars reproduce from their stems if slashed, and from seed—though this can take three years or more to germinate. Usually briars are a problem of overgrazed or disturbed pasture, and especially of roadsides. They can be dug out, and the re-growth also needs to be dug once or twice. Alternatively, graft another rose on to the briar, for beauty if not productivity.

## BURDOCK *(Articum lappa)*

*Identification* This is an erect biennial herb, often over one metre high, with alternate heart-shaped leaves, and round purple flowers in summer.

*Control* Slash burdock before it seeds. Keep up the ground cover around it, so that seedlings are suppressed. Burdock roots are deep and strong and need to be chopped out with a mattock; but slashing and improved ground cover may eliminate the need for further control efforts.



## CAPE BROOM *(Genista monspessulana)*

*Identification* Perennial, up to three metres high, round-tipped longish leaves, pea-shaped yellow flowers from September through November, flat silky pods containing five to eight seeds. It may be toxic to stock if heavily grazed.

*Control* Broom used to be the material for making brooms (hence its name), because it won't burn. Around here (southern NSW), broom often becomes a nuisance after blackberries are burnt: the lack of competition after burning allows the broom to become rampant. The seeds are carried by wind and water. In one striking example around here, broom has taken over a corner of an overgrazed orchard, but hasn't advanced at all into the undisturbed bush behind.

Repeated ploughing will get rid of broom. Try slashing it, whipper-snipping the new growth as soon as it appears. Or drive a wedge into the stem after the top has been cut off, and pour down a borax solution. Broom doesn't like its roots disturbed, so even incomplete digging is often successful.

## CAPE IVY *(Senecio mikanioides)*

*Identification* A very dense, twining ground cover or climber, it can cover large areas. The leaves are five to seven lobed; young leaves may be edged with fine white hairs. It has many small yellow flowers from autumn to spring with feathery wind-dispersed seed.

*Control* Ivy is hard to remove: it roots at every node on the stem, so the whole stem must be pulled up. Once this is done however it shouldn't re-grow: the roots are small and don't persist. Regular whippersnipping or mowing—which chops the stems—is also effective, but will probably take at least a year of persistent work.

## CAPEWEED *(Arctotheca calendula)*

*Identification* An annual which forms rounded clumps of yellow flowers with black centres, the leaves are divided into lobes, and finely haired underneath. The seed is woolly and will stick to clothing. Capeweed grows in pasture, footpaths, and other disturbed ground. It can taint milk, though it isn't poisonous to stock.

*Control* Chop capeweed out before it sets seed. Tough, competing grass cover may be enough to control it naturally. Try lowering grazing pressure in late winter and spring, or re-sow grass with a tougher variety.

## CASTOR-OIL PLANT *(Ricinus communis)*

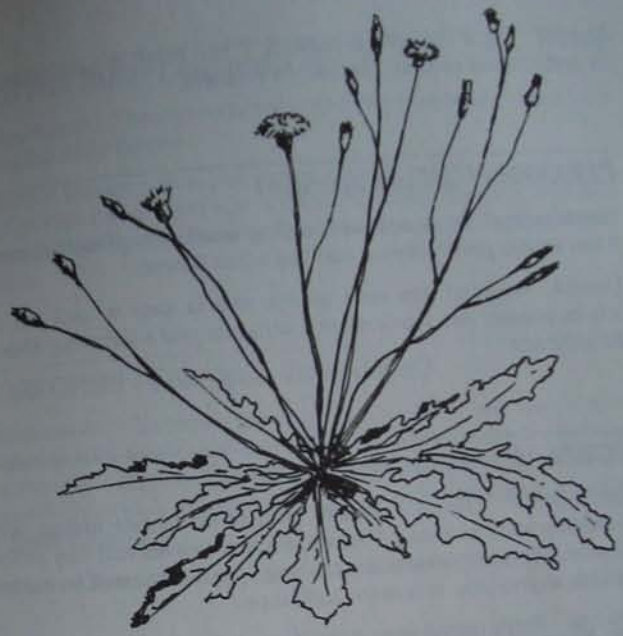
*Identification* This is a tall plant of over two metres with large leaves with serrated edges and spiky, pink flowers.

*Control* Dig it out.

## CAT'S EAR *or* FLAT WEED *(Hypochoeris radicata)*

*Identification* Often mistaken for a dandelion—the seed heads are like dandelion clocks and the flowers bright yellow—cat's ear has several flowers per stem (unlike dandelion which has only one), and coarsely-toothed dandelion-like leaves. It may flower most of the year. Cat's ear is native to Europe, Asia, and Africa.





*Control* Dig out at least the upper half of the tap root. Try mulching, repeated whippersnipping, or grazing: chooks and rabbits love cat's ear. It is mostly a lawn weed, and frequent mowing and fertilising of the grass will probably eradicate it.

## CHICKWEED *(Stellaria media)*

*Identification* An overwintering annual with oval leaves and star-shaped white flowers, it grows mostly in high rainfall or watered areas. Chickweed is native to Europe.

*Control* The root system is thin and easily broken, and chickweed is easily removed.

## CHICORY *(Cichorium intybus)*

*Identification* A perennial with a deep tap root and tall stems of blue flowers.

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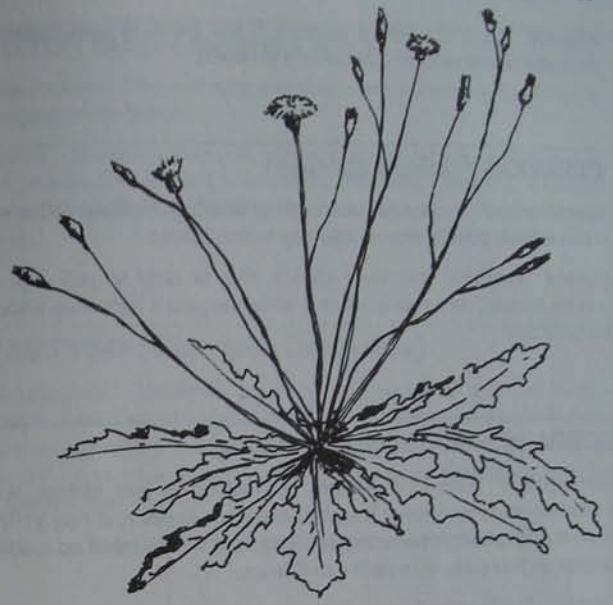

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*Control* Dig it out with a mattock if you must; in well-cultivated or undisturbed ground it is rarely a problem.

## CLEAVERS *(Galium aparine)*

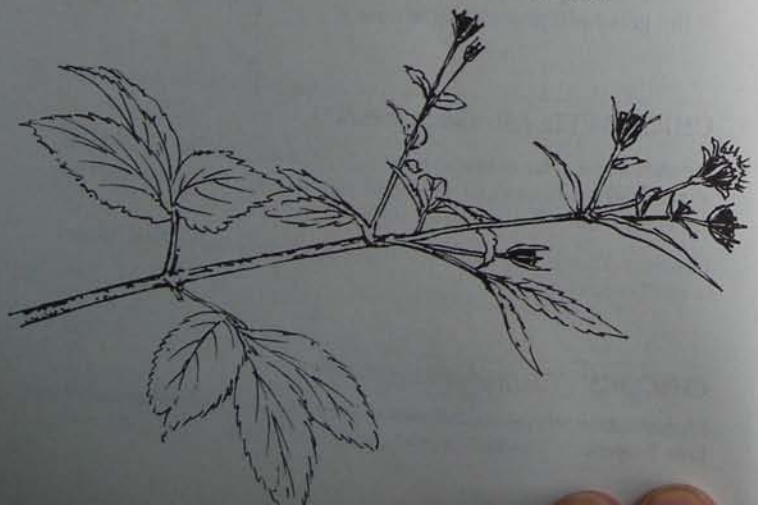
*Identification* An annual scrambling weed of high rainfall areas, it has square prickly stems, and tiny white flowers.

*Control* Provided you wear gloves, this is easy to pull out. As it is an annual, one year's control with one year's follow-up should be sufficient.

## COBBLER'S PEGS *(Bidens pilosa)*

*Identification* This is a slender herb of up to two metres, with a reddish stem and long, fragrant, serrated leaves and tiny yellow flowers followed by characteristic, long "pegs" that catch on clothes or skin as you pass. It is native to Europe.

*Control* Easily pulled from moist ground. Be careful not to spread the seeds which can get caught on socks, etc. It can be covered with mulch, and although it re-grows more thickly when mown, repeated damage with a whippersnipper will finally kill it.





## COTTON BUSH *(Asclepias spp.)*

*Identification* These shrubs are about two metres high, and have drooping white flowers.

*Control* Though poisonous, cotton bush is not attractive to stock, and provided other feed is available they won't touch it. It should be controlled like other woody weeds; *see* chapter 2: Pasture, woody weeds.

## COREOPSIS *(Coreopsis lanceolata)*

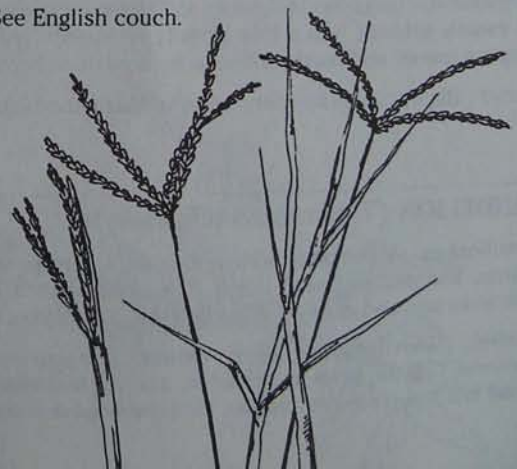
*Identification* Coreopsis grows up to one metre tall, and is thin-stemmed with small hairs and ridges. Most leaves are divided, but not the upper ones. It has bright yellow flowers with darker centres about 6 cm across in late spring and summer. Coreopsis is native to North America.

*Control* Chop out the upper tap root, or mow repeatedly.

## COUCH *(Cynodon dactylon)*

*Identification* A perennial, common lawn grass with four spiked seed heads, very slightly purple in colour.

*Control* See English couch.



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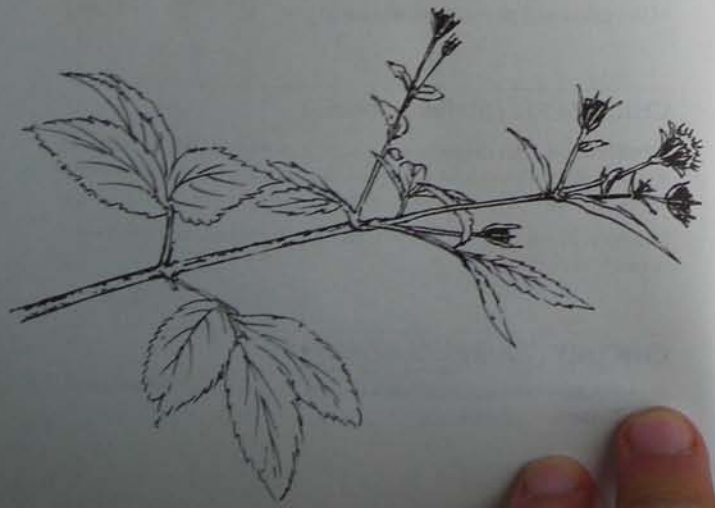



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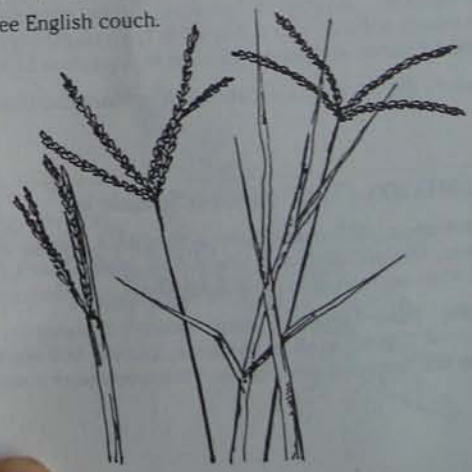


## CRAB GRASS *(Digitaria sanquinalis)*

*Identification* Crab grass spikelets can be seen in your lawn waving their hairy, slightly darkish tops above the grass.

*Control* Crab grass can be controlled by regular mowing which prevents it from going to seed. After one year's mowing it should disappear the following winter. Your lawn may also need re-sowing with perennial grasses or clover, to choke it out.

## CREEPING BUTTERCUP *(Ranunculus repens)*

*Identification* An attractive, creeping yellow-flowered herb with bright yellow flowers about 3 cm wide, usually with five petals. Native to Europe and Asia. Creeping buttercup will inhibit clover and nitrogen-fixing bacteria in pasture.

*Control* The stem produced many nodes; these must all be removed or they will re-grow. Try frequent whippersnipping (not mowing), mulching, solarisation, or heavy-footed grazing; or place a mobile hen yard over the problem area.

## CROFTON WEED *(Ageration adophora)*

*Identification* This perennial grows up to three metres high, though it is usually smaller, with a thin stem covered with reddish hairs, triangular leaves, and heads of tiny white flowers in September.

*Control* Dig out the main root system, or slash and blanket mulch.

## DANDELION *(Taraxacum officinale)*

*Identification* A perennial with a rosette of leaves, large yellow flowers, and puff-ball seed heads. The flower heads are hollow with white sap, and carry only one flower at any time of the year.

*Control* Dandelions are deep rooters, bringing up leached nutrients. They are ethylene producers, causing fruit nearby to ripen faster and flowers to drop earlier. They rarely pose a serious weed

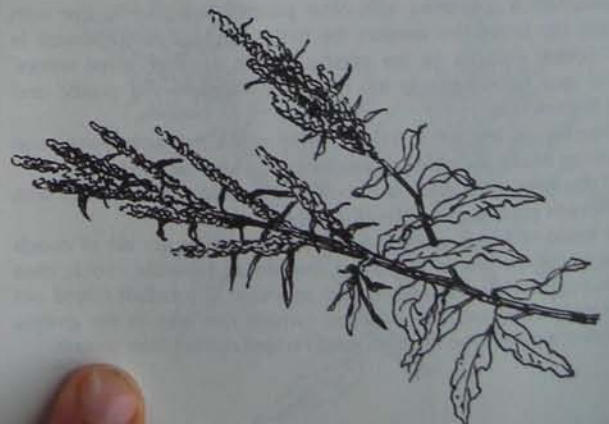


problem, and can be easily pulled up from moist, humus-rich soil. Control them in your lawn, if you must, by regular mowing or dabbing with urine, borax, or sulphate of ammonia.

## DOCK *(Rumex spp.)*

*Identification* There are many docks in Australia. They have long, strongly-veined leaves, and sticky seeds on long stems.

*Control* Dock is impossible to pull out, and it grows again from the roots. Mulch over it; try solarisation; paint the leaves with kerosene; dig it out completely with a spade; never let it seed.



## DODDER *(Cuscuta spp.)*

*Identification* These annuals are parasitic on other plants. Their remnants form "roly polys" that gather around fences.

*Control* Dodders can't be pulled out, so use a mattock before they seed. Dodders are a worse problem in the drought when grass cover is poor.

## ENGLISH COUCH *(Agropyron repens)*

*Identification* A perennial, native to Europe and Asia, and widespread throughout cold to subtropical Australia, it has dull green leaves and erect seed spikelets.

*Control* Couch grows either from seed or—more often—from runners. Couch gets worse where the ground is frequently cultivated, like gardens, or areas around trees that you want to keep clear. The rhizomes can spread a long way underground—across paths and under barriers—and will even penetrate potatoes or flower bulbs.

I have managed to get rid of couch by covering it from early spring onwards with newspaper or mulch of at least 20 cm thick, or with black plastic. Later efforts don't work as well, and the mulch may have to be re-newed as the couch re-grows to the surface. In larger areas: dig and weed, dig and weed. It takes about two years to get rid of couch in this way. Covering with even a thin layer of mulch helps, as that makes the couch easier to pull out.

Solarisation (covering with clear plastic) is also effective with couch: the hotter the weather the better. Make sure the couch is wet before you put on the plastic. In hot weather, three weeks' cover may be enough to kill the grass. Remove the plastic and use it elsewhere.

Pouring on undiluted day-old urine will kill couch grass—and anything near it. Sulphate of ammonia can also be used.

If you have large areas of couch, think about stocking them with chooks or pigs, enclosed by small electric fences.

I found with our garden that the best way to get rid of couch was to dig the whole bed once, remove all possible couch, then sow very thickly with radish and parsnips. The radish edged out the early re-growth, the parsnips (which can stay in the ground for over a year if you let them seed) edged out the later growth.



### Disposing of couch

Never leave couch grass you have dug out on bare soil or on the top of a slow compost heap: it will re-root. Place it on a few sheets of newspaper if you plan to use it at once for mulch, or in the middle of a *hot* compost heap. Better still, soak it in a bucket of water for three weeks, then use the slush, liquid and all, as a combination mulch and fertiliser.

### Keeping couch out of the garden

Couch invades any bare soil. Keep it out of vegetable and flower gardens with a permanent edging of wood or concrete or, better still, thickly-planted comfrey (which can be cut for mulch and fertiliser and will bring up deep-leached nutrients), thyme, chicory, or even a thick-sown row of radish or turnips. Any thick-matting or deep-rooted plant will help keep out couch, but comfrey is almost infallible.

## FAT HEN *(Chenopodium album)*

*Identification* An annual, with an erect green stem up to one metre high in good soil, though much shorter in poorer, dryer areas. The

upper leaves are triangular, the lower leaves more rounded, and the edges of both are slightly toothed. Fat hen forms clusters of small greyish green flowers. Native to Europe, it is now widespread throughout Australia on most waste land or disturbed ground.

*Control* Dig, mulch, or use solarisation. Grow plants thickly around it and fat hen should cease to be a problem.

## FENNEL *(Foeniculum vulgare)*

*Identification* Biennial, erect, and tall with feathery leaves and greenish-yellow umbrella-shaped clusters of flowers, fennel is native to Europe and Western Asia, and a common weed in bare areas.

*Control* Cut fennel before it seeds, or at least before the seed heads shatter.

## FIVE-SPINED SALTBUSH *or* BLACK ROLY POLY *(Bassia quinquecuspis)*

*Identification* A perennial, small, native shrub with long, thin branches and leaves tapering at the base. It has single flowers and five-spined fruit.

*Control* Five-spined saltbush is usually only a problem of over-grazing, as it colonises disturbed soil. Don't root it out until after pasture and ground cover is re-established: it helps prevent the wind and rain eroding the soil. See woody weeds under "Pasture" in chapter 2.

## GOOSEFOOT *(Chenopodium spp.)*

*Identification* Goosefoot are a small bush weed of pastoral areas.

*Control* Goosefoot can be easily chopped out. See chapter 2, Pasture, woody weeds.

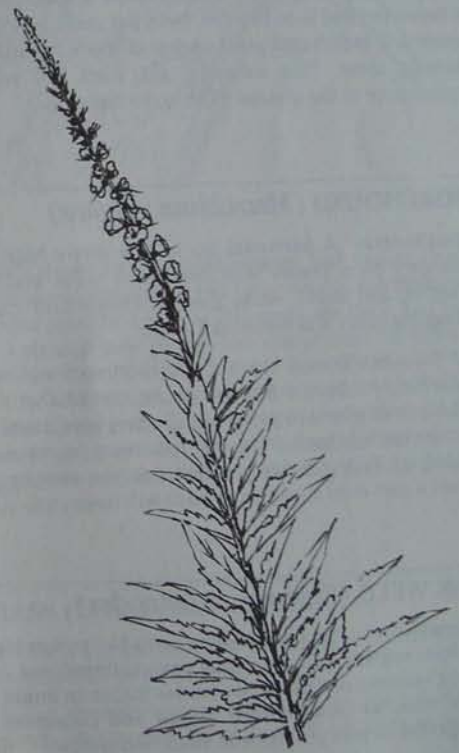
## FLAT WEED, *see* CAT'S EAR



## GREAT MULLEIN *or* AARON'S ROD *(Verbascum thapsus)*

*Identification* This biennial herb forms a towering pyramid of oval, hairy grey-green leaves topped with yellow stalks of flowers. It is native to Europe and Asia. Twiggy mullein (*Verbascum virgatum*) is similar, but smaller, though it can grow as high (2.5 metres) and is also biennial.

*Control* Mullein can be mattocked out: it is easier to remove than its height would suggest. Mulching and other common weeding techniques are also effective. Otherwise, just let it complete its cycle, slashing the seed head before seed sets and making sure that the ground around them isn't disturbed, so they cannot germinate.



## HEDGE MUSTARD (*Sisymbrium officinale*)

*Identification* This is an annual, hairy and long-stemmed (to 90 cm high), with rosette leaves at the base and tiny yellow flowers. It is closely related to Indian hedge mustard, the biennials *S orientale*, and *S irio*, and the annual London rocket: treat these all the same way.

*Control* Although these can be slashed, they usually grow again, thicker at the stem and bushier. If possible, leave them till just after flowering then slash before they set seed. They will die naturally, and if the ground is well-planted around them no more should appear.

If you need to remove them at once, try digging them out, though they are deep-rooted and usually need a spade even in soft soil. A better method is to trample them flat and cover them with newspaper and mulch and plant on top of them. Alternatively, just keep mowing them. This may not kill them but will improve the appearance of the ground till they die naturally.

## HOREHOUND (*Marrubium vulgare*)

*Identification* A perennial up to one metre high with rounded, pale-grey hairy leaves with depressed veins and scalloped leaf margins, and small, white flowers. Horehound can form a wide straggling bush. It is native to Europe.

*Control* Horehound has a thick, short root and is easily dug or pulled out of most soils; though be careful that the seeds don't fall for more plants to germinate. Cutting horehound off at the base just makes it branch more: the root must be removed, or at least disturbed. They are easily pulled out: you may be surprised how small a root even a very large bush will have.

## INK WEED (*Phytolacca octandra*)

*Identification* This perennial is up to two metres high with a thick, brittle, reddish stem and long leaves, tinged red in autumn, and long bunches of dark purple berries that stain bright red. Its flowers are white to pink between August and December. It may cause digestive or skin problems in stock and people.



*Control* Inkbush grows on disturbed ground and prefers shade: it is a real problem under trees and can twine up through branches, though it will also grow in full sun. The roots are thick and long and if a bush is slashed new growth will sprout from the laterals, so that the growth is more luxuriant than ever. However, a few slashes at the root with a mattock will kill the main plant; make sure to follow this up by slashing new plants for one or two years afterwards. Re-sow grass or other ground covers as soon as the inkbush is dragged away: it bears much seed and unless the ground is planted, more will grow.

## KIKUYU GRASS (*Pennisetum villosum*)

*Identification* This is a coarse, thick-stemmed grass. It is excellent fodder, but can choke out trees, gardens, and bush.

*Control* Dig it out; try solarisation in summer or apply a weed mat for one month. Mulch must be at least 20 cm thick to have

a chance of smothering it, and even then it may invade from around the edges. Ploughing large areas is successful only if repeated at weekly intervals (kikuyu grows fast) for several months and followed by planting a vigorous crop. Pigs or chooks in moveable cages can also be successful. See also chapter 1, Green Manure.

## LAMB'S TAILS *or* MIGNONETTE VINE *(Anredera cordifolia)*

*Identification* A twining ground cover or—more usually—a climber with tough hairless stems, long greenish-white flower sprays in summer, and thick, fleshy, heart-shaped leaves (the juveniles are more oval). It has characteristic ginger-like tubers on the stem and underground, and is native to South America.

*Control* All tubers need to be removed or the plant will re-grow. For this reason blanket mulching is not successful unless you are prepared to keep it up for five years or so: the tubers can stay dormant and resprout when close to the surface. Frequent whipper-snipping however, which also damages the tubers, will be successful if you are prepared to mow regularly for at least a year.

## LANTANA *(Lantana camara)*

*Identification* This rambling, prickly shrub has strongly-smelling leaves and dense heads of flowers—red, pink, or yellow—with black fruit at any time of the year. Native to South America and widespread from Sydney northwards, lantana is a problem where it is too warm for blackberries. It grows anywhere from dry railway embankments to wet gullies.

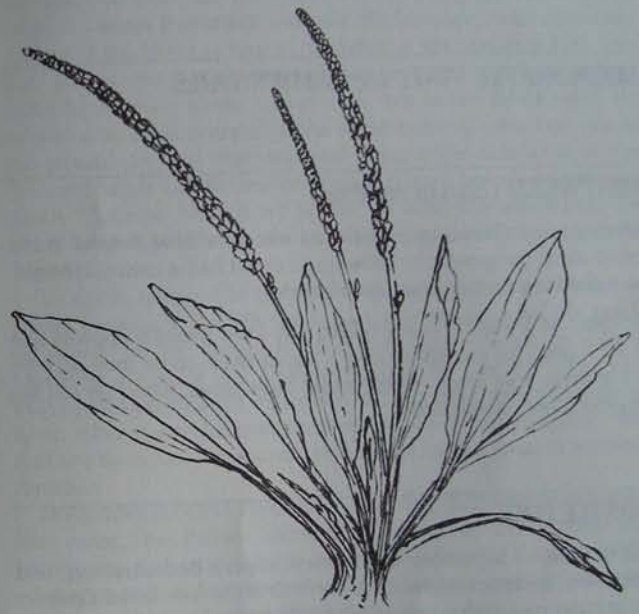
*Control* Like blackberries, all surface roots and branches must be removed or they will root and sprout again. See blackberries for control measures. Try grazing, chopping, mulching, outgrowing, etc. Lantana grows in warm areas, so there are many fast-growing competitors: try chokos, pumpkins (burn the residue after the vines have died down), and hops.



## LARGE PLANTAIN *(Plantago major)*

*Identification* This is similar to ribwort, but it is larger, with fewer long oval leaves, and has distinct long veins and tall flower stalks. A perennial, it is native to Europe and Central Asia.

*Control* Plaintain has a large taproot but if this is badly damaged (it need not be totally removed) the plant should die.



## LAWN DAISY *(Bellis perennis)*

*Identification* A perennial with long, bright, green leaves narrower at the base, with flower stalks longer than the leaves and slightly hairy. Each stalk carries a bright white flower with a yellow centre. Lawn daisy clusters through grass.

*Control* This is a "weed" I have gone to some trouble to establish in my own garden: it is hardy and beautiful and tolerates being mown. If you need to eradicate it, dig it up: the roots are short and thick and easily dug when the soil is wet. If you dig under each of the characteristic leaves you should remove the whole plant, though seedlings will have to be dug up for a few years as well.

Undiluted day-old urine (or sulphate of ammonia) will kill lawn daisy, as will a cover of mulch.

## MIGNONETTE VINE, *see* LAMB'S TAILS

## MINTWEED (*Salvia reflexa*)

*Identification* This annual herb has whorls of blue flowers. It can creep along the ground or grow up to about half a metre in height. Mintweed is a common poison of stock.

*Control* Mintweed is easily pulled out. Even where it appears like a thick coat, for example along a moist bank, there may only be a few major root areas. Whippersnip large areas, then pull out the re-growth one month later.

## MISTLETOE

*Identification* Mistletoes are mimics, superb bird attracters; and their very existence depends on their ability to lure birds. Contrary to popular conception they are not even true parasites.

Mistletoes make their own food by photosynthesis. Some don't make enough food, and prey on their hosts; others make all their own. However, they all take water and minerals from their hosts; none have their own root system and all depend on their host plant for survival. Mostly, they hang down in stiff, leathery branches. Some mistletoes mimic their host's appearance; some have thick leathery leaves and some have no leaves at all. Even the "camouflaged" mistletoes are easy to pick out: the leaves are usually thicker than the rest of the tree, and you can see where they join onto their host.



There are at least 76 native mistletoes and even more introduced species. Some of Australia's native mistletoes have survived since Australia was still part of Gondwana Land, joined to Antarctica.

### *How to get mistletoe*

You don't plant mistletoes. They come unasked, usually dropped by birds, though some mistletoes have explosive fruit that fly through the air. The birds eat the sticky fruit and deposit the seeds on branches where they attach and grow. Birds also pollinate mistletoes.

One of the best carriers of mistletoe is the mistletoe bird. This bird almost exclusively eats mistletoe berries. These have a sweet outer layer and a slimy, coated seed that is rapidly excreted. For mistletoe to be successful it has to be excreted on a tree, not on the ground, and the mistletoe bird twists while defecating so that the seed lands on the branch beside it and doesn't go tumbling down. Mistletoe birds don't fly far, so mistletoe infestations are often in clumps. There are no mistletoes or mistletoe birds in Tasmania.

Of course, many other birds also eat mistletoe berries. Mistletoes flower irregularly, though some have distinct seasons, but nearly all flower for an extremely long time—six months or more—providing a regular and abundant source of food for birds, with fruiting also extended to six months or more. Most flower in summer when other nectar sources for birds are scarce. Some species will fruit and flower all year round in the wetter coastal areas of southern Australia.

Thirty-three species of birds have been recorded feeding on mistletoe berries. They include honeyeaters (especially the New Holland honeyeater that mostly feeds on mistletoe nectar), wattle birds, silvereyes, orioles, parrots, cockatoos, and currawongs—all eat large numbers of fruit or feed on the nectar.

Mistletoe attracts more than birds. Many nectar-seeking insects also feed on mistletoe berries. They include valuable garden predators like hoverflies, and lacewings, and predatory tachinids "flies" which help clear up pests like aphids, pear and cherry slug, and scale. (The birds too, will, of course, help keep these in control.) Bees, wasps, moths, and butterflies also take nectar from the berries and possums feed on them.

If no bird has spread mistletoe into your garden it is possible to plant if there yourself. Find a mistletoe-infected plant like one already in your garden: banksia, fruit tree, or eucalypt. If it is too

high to reach, haul down a loop of mistletoe with a long stick with a nail on the end (some botanists with good eyesight shoot down specimens). Take one of the ripe berries; there is usually one to be found at any time of year. Stick the berry on a branch or, better still, in a moist crevice between two branches.

*Control* Mistletoe (like any good parasite) hardly ever kills its host tree in a natural situation unless the tree is stressed, for example by drought or clearing. In fact, if the tree is stressed by drought the mistletoe usually dies before the tree because its leaves have a far higher rate of water loss. Mistletoes usually only kill trees when people have interfered with the surrounding land. For example, if there are only a few trees around, these become the targets for the mistletoe birds and, through seeding, the trees get overloaded with several mistletoes instead of just one or two.

The best mistletoe clearers are possums. Early this century, mistletoes started to increase while possum numbers were dwindling; and in New Zealand mistletoe started to decrease when the Australian possum was introduced.

If you have a mistletoe in your tree don't just assume that it will kill it, or even greatly affect its vigour; once you have two or more, however, there may be need for concern. There are various poisons that will kill mistletoe if injected into the tree, or you can lop off the "host" branch. I have found that spraying the leaves with kerosene also works.

## MORNING GLORY (*Ipomoea indica*)

*Identification* A twining ground cover or climber, with alternate three-to-five lobed leaves and long, deep-blue flowers like opened trumpets. It usually likes damp soil, and semi shade under trees or gullies.

*Control* Morning glory is difficult to remove as it can root at any stem node. All pieces of stem must be pulled up. Alternatively, try mowing with a whippersnipper then blanket mulching; this must be kept up for three years.



## NETTLES (*Urtica spp.*)

*Identification* *Urtica urens* is a small annual nettle, *U incisa* and *U dioica* are larger, coarser, and perennial; all have small green flowers and indented hairy leaves that sting.

*Control* I have found regular mowing or slashing controls nettles. Unless they are in a place where they will sting your bare legs, however, think again about disturbing them: nettles are reputed to be a growth stimulator for plants near them; the bacteria associated with their roots fix nitrogen; and they are reputed to encourage earthworms. Nettle liquid fertiliser is a plant tonic and may help frost resistance; and nettle tea is both a pesticide and a mild fungicide. See chapter 4, Using Weeds.

## NUTGRASS (*Cyperus rotundus*)

*Identification* A perennial, common lawn weed with grass-like leaves and triangular flower stems bearing purply-brown seed-like flowers.

*Control* Nutgrass is hard to get rid of: the rhizomes are very tough and wiry, and any small pieces broken off by digging continue to grow. In addition, the roots develop tiny tubers that also spread with digging. Dig in early spring or late winter, at the old bulb's exhaustion stage, just as they start to make new growth. Carefully dig to fork depth; shake out the soil so the roots do not break from the bulblets, and you can see the material that must be removed. Dig them out repeatedly at this stage and with luck any bulblets left will be too small to survive. Mulching must be deep to be effective—at least 20 cm—and must be maintained for at least one year, as the bulblets provide a long food supply for the plant. Try mulching thickly, then plant directly into the mulch to choke out any new growth that may emerge. Repeated cultivation should get rid of nutgrass.

When you dig out nutgrass it is best to take as much soil with it as possible; leave the soil under water for three weeks, and replace it with fresh soil in the hole.

## OXALIS (*Oxalis latifolia*)

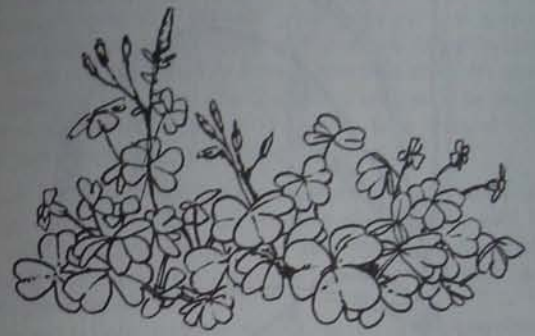
*Identification* A perennial, oxalis has bright-green clumps of clover-like leaves, and its flowers are usually pink to purple, but white and dark red forms exist (though these are usually less of a problem). Oxalis is a weed of cultivated or disturbed ground, especially in gardens and moist, shaded spots.

*Control* Oxalis has spreading underground stems and many tiny bulbs, each of which will grow to produce another plant. Thus, oxalis is very difficult to eradicate. Dig the bulbs in early spring or late winter, at the old bulb's exhaustion stage, and proceed as with nutgrass.

Solarisation is effective, but the plastic must be kept on the oxalis for a couple of months, not a few weeks as for most weeds. It takes a long time for the plastic to exhaust the food res[illegible] the bulbs: first by stimulating growth, then killing it.



I have found the easiest way of controlling unwanted oxalis in my lawn is to plant quick-growing daisy or grevillea bushes over it. These successfully competed with the oxalis and could be removed after a couple of years. So, if oxalis is spreading in your garden you may need a new variety of lawn to compete with it.



## PAMPAS GRASS (*Cortaderia selloana*)

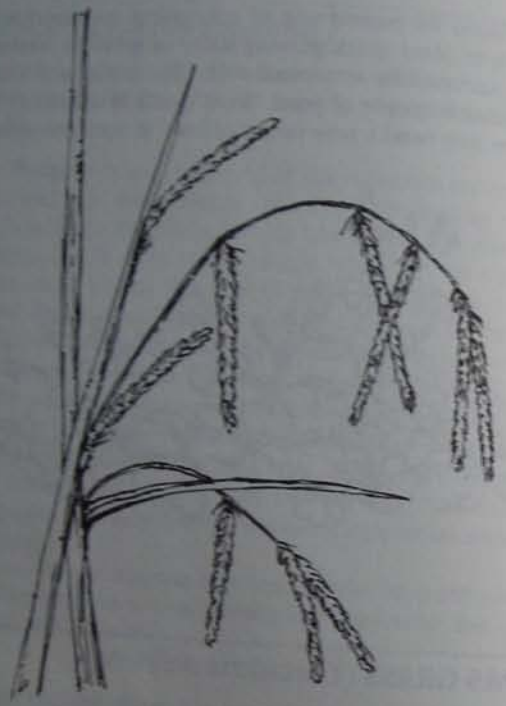
*Identification* This is a tall grass with white feathery tops up to three metres high on rigid stems. The leaves are sharp. It is native to South America. When it escapes, it can be a pest in gardens or in damp sunny places.

*Control* Cut down the plants first with a whippersnipper or slash hook, then dig out the base.

## PASPALUM (*Paspalum dilatum*)

*Identification* Paspalum is a perennial matting grass, tending to crowd out clover and less vigorous grasses.

*Control* Mow and feed grass regularly so it can compete with the paspalum; give any paspalum plants a blow with the mattock; paint them with kerosene; or pour on sulphate of ammonia in the early morning, washing it in the next day.



## PATERSON'S CURSE or SALVATION JANE (*Echium spp.*)

*Identification* Paterson's curse is reasonable stock feed at any time, excellent stock feed in a drought, and always wonderful bee fodder. But in good years it is a much poorer stock feed than alternatives and it will outgrow better pasture. Overgrazing on it may lead to liver damage, and it is for this reason that Paterson's curse is regarded as a weed.

Paterson's curse can take over a paddock quickly. The wide, flat rosettes can crowd out other pasture and the seed can stay dormant for up to a decade. Three plants can seed a hectare. There are at least three species of Paterson's curse in Australia: the most



common is *E planagineum*, which is blue to purple; *E italicum* is a pink-flowered Paterson's curse found mostly in South Australia.

Paterson's curse is an erect biennial with large, oval, hairy leaves and blue-purple flowers (though sometimes white forms are seen). The plants are usually 60 to 90 cm high, depending on soil and rainfall. In temperate areas it can flower any time of the year.

Paterson's curse is a "ten year" plant: once you have it one year, you have it for ten years. I imported it in mulch during the drought, after which it spread rapidly through the orchards. Even now, ten years later, the odd plant still springs up and has to be dealt with quickly before the seeds spread and we have acres of it again. Thick pasture around it will help choke it out.

*Control* Cultivation will have to be repeated several times as seed may be dormant in the soil. Try to cultivate before seed is set. This can be difficult as you may have plants at rosette stage at any time of the year, flowering and setting seed. Usually, at least two cultivations are necessary.

Paterson's curse at rosette stage is easily chipped: one blow with a spade or mattock or even your boot in moist soil is enough to dislodge the roots. The plants can be left where they fall on the ground without risk of re-rooting. You can chip a lot in a day. This is probably the best method of dealing with Paterson's curse before it spreads.

Heavy sheep or goat grazing will eliminate Paterson's curse. Don't graze them exclusively on it, or for too long, because that might cause liver damage. Make sure the ground is grazed almost bare; re-seed with perennial grasses, lucern or oats. Keep an eye on your paddocks for the next few years and chip out any other seedlings before they set seed.

Biological control has been controversial: after much court action the French moth *Dialectica scalariella* was released in 1988 around infested areas in NSW.

## PIGFACE (*Mesembryanthemum aequilaterum*)

*Identification* This is a prostrate weed of coastal and salty areas. It has fleshy leaves and pinky-purple flowers.

*Control* Although this weed spreads rapidly, it is easily pulled out. Don't leave it in a heap, or it may re-root.

## PIGWEED (*Portulaca oleracea*)

*Identification* An annual succulent with round-to-oval fat green leaves, reddish yellow stalks, and small yellow flowers. Usually a weed of high rainfall areas or well-watered gardens. Can cause oxalate poisoning to stock.



*Control* Pull pigweed out of moist ground; cultivate; blanket mulch; or plant other ground covers. Tall plants will shade it out. As it is an annual, thick planting around it should prevent it becoming a problem.

## POTATO VINE (*Rumex sagittatus*)

*Identification* A rampant ground cover and scrambler, though not to any great height. It has a ridged stem, alternate leaves varying from triangular to three-lobed to almost oval, tiny flowers, and three-winged paper fruit about 1 cm long, green at first then brown; papery with a single three-sided seed. Native to South Africa.

*Control* Potato vine produces tubers to match its name. They must all be removed or the plant will re-grow, and the interlinking stems must also be removed. Blanket mulching must be kept up for several years; digging or ploughing just increases the problem. Heavy-footed grazing can be effective.

## PRICKLY PEAR (*Opuntia spp.*)

*Identification* Round-leafed cactus with red fruit and flowers at the top of the leaves; its small, fine, piercing prickles are hard to pull out of your skin if you brush against it. Several species occur round Australia.

*Control* Prickly pear once covered millions of hectares. The cacto-blastis beetle now controls it in most areas, though it is still a considerable pest. However, it is easily dug out: a few blows with the mattock, partially severing the roots, is enough to kill a bush. Around here the odd bush fruits year after year without spreading unless the surrounding land is overgrazed or otherwise disturbed.

## PRIVET (*Ligustrum lucidum*)

*Identification* A large shrub or small tree with hairless stems and leaves of up to 12 cm, pale underneath. It has many small white flowers in summer followed by clusters of purple black fruit in

winter. It is mostly a problem in gardens or along damp gullies or creeks near gardens. Native to China and Japan.

*Control* Privet is resistant to most herbicides, organic or not, and burning only encourages more stems from the roots. Sometimes the bush grows back up to five years after herbicides have been used on it. The whole plant and at least the major roots must be dug out. Look out for seedlings.

## PURPLE VERBENA *or* PURPLE TOP *(Verbena bonariensis)*

*Identification* A hairy, long-leafed perennial with blue to purple flowers, hairy quadrangular stems, and long, stiff roughish leaves. The dense heads of purple flowers can cover a whole paddock. It was introduced from Europe, North and South America, and Western Asia. A native form (*V Officinalis*) is similar but not as spreading and the leaves are joined to the stem by a slender stalk. Verbena likes sunny places and disturbed or overgrazed soil; it may colonise after fire.

*Control* Pull out the upper part of the tap root, or chop it a couple of times with a mattock; purple verbena should not re-grow. Try heavy grazing with goats or chooks or pigs. A mulch cover or solarisation are also effective.

## RAGWORT *(Senecio jacobaea)*

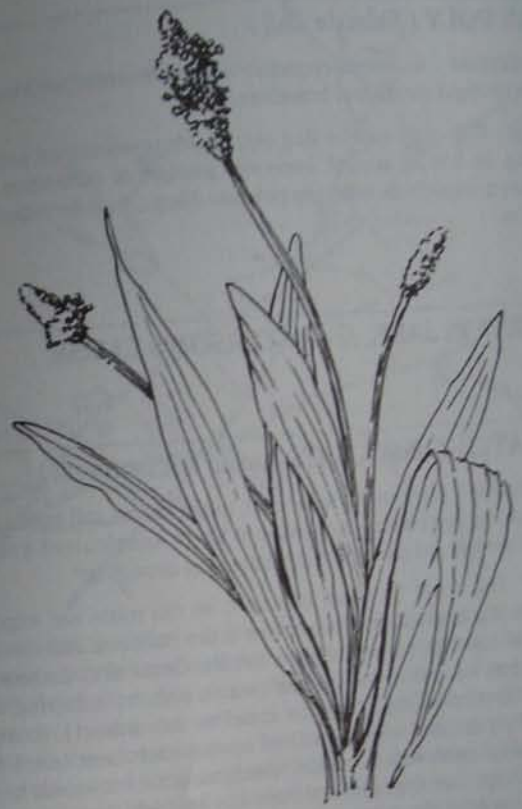
*Identification* This perennial has tough roots, rosettes of leaves, and bright yellow flowers.

*Control* Bruise the plants with your boots or slash them; try sprinkling them with a half cup of sulphate of potash.

## RIBWORT *(Plantago lanceolata)*

*Identification* A perennial with erect, ribbed leaves which rise from a broad crown with conspicuous long veins. Leafless flower stalks





rise above the leaves with a spike of tiny white flowers on a thick cylindrical spike. Native to Europe and Central Asia, it is a wide-spread weed of gardens, lawns, and footpaths. Many people are allergic to it and it is a major cause of hayfever.

*Control* Ribwort has a long, thick taproot but can be easily dug up or even pulled by hand out of moist soil. At least half the taproot needs to be removed or it may re-grow. If you can't pull it out you need more humus in your soil: add organic matter. Regular mowing with vigorous grass growth should control it in lawns; mulching, solarisation, etc. should do the same in garden beds.

## ROLY POLY *(Salsola kali)*

*Identification* An annual roundish weed, with small prickle-pointed leaves on rigid stems and branches.

*Control* Roly poly can be dug out, or whippersnipped just before seeding. As it is an annual, improved pasture or cultivation should increase competition with roly poly seedlings, thereby reducing the problem.

## SALVATION JANE, *see* PATERSON'S CURSE

## SERRATED TUSSOCK *(Nassella trichotoma)*

*Identification* A perennial with short, tough leaves, tall seed spikes, and drooping seed heads. It is native to South America and a serious weed of overgrazed pasture, especially after droughts.

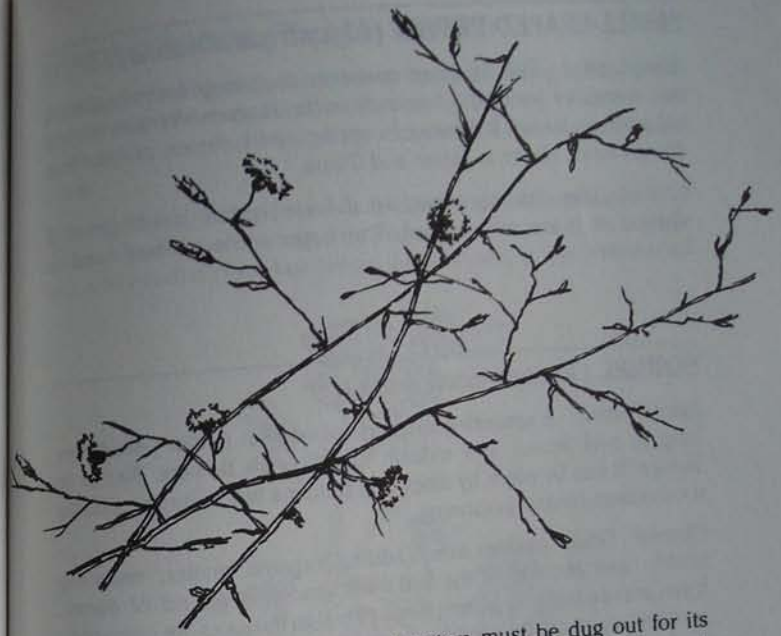
*Control* Dig it out by hand; up-end it so the roots are exposed, and leave the tussocks to decompose in the paddock. Alternatively, plough at least twice and re-sow *thickly*. Goats and camels will eat serrated tussock if they haven't much else: try tethering them for short periods (any longer is cruel to the animal). Intensive grazing by pigs and chooks will of course root them out. I have tried ripping them with a tractor, which makes them easier to pull out. Don't try burning serrated tussock: you will just lessen the competition from the grass.

## SKELETON WEED *(Chondrilla juncea)*

*Identification* A perennial with many tangled, firm but flexible branches, tiny scattered stem leaves, and tiny yellow flowers. Native throughout much of Europe.

*Control* Skeleton weed is extremely hard to eradicate. The root grows very quickly to one metre underground, and the plants spread quickly from lateral roots as well as through wind-blown hairy seeds. Ploughing or digging only stimulates new growth from the lateral





roots. *All* the skeleton weed root system must be dug out for its removal to be effective, and this must be combined with improved ground cover around it so that new plants have less opportunity to develop. I have found very thick clover chokes out skeleton weed; but where the clover is grazed or compacted by feet or vehicles the skeleton weed soon outgrows it. Blanket mulching on the other hand removes it quite effectively, but that must be kept up for at least a year. Try planting on top of it.

## SLENDER VETCH *(Vicia tetrasperma)*

*Identification* A small, soft ground cover or climber, with ridged stem and small, long leaves and purple pea-like flowers. The fruit has four seeds. It is native to Europe.

*Control* Slender vetch is easily pulled out or can be whipper-snipped. Though it is a nuisance I find that it does keep other weeds out of the garden—ones that aren't as easily removed when I need the ground.

## SMALL-LEAFED PRIVET (*Ligustrum sinense*)

*Identification* This is more common than large-leaved privet. It has a smaller bush and leaves than ordinary privet with slightly hairy young leaves. It flowers in spring, not summer, and the fruit droops more. Native to Japan and China.

*Control* Like ordinary privet, small-leafed privet just re-grows if slashed or burnt or poisoned. The larger roots at least need to be removed.

## SORREL (*Rumex acetosella*)

*Identification* A spreading prostrate plant with tender pale-green, long to oval leaves, and reddish to yellowish flowers. Native to Europe. It can be eaten by stock and humans but in large amounts it can cause oxalate poisoning.

*Control* Good garden care (adding organic matter, reducing acidity, and aeration of the soil) will gradually get rid of sorrel. If you are in a hurry try pulling it out. (Though the roots are extensive, and unless you dig thoroughly you won't remove them all.) Mulching works excellently: the added organic matter helps control future outbreaks. Chooks love sorrel and will peck it in preference to grass.

## SPINY RUSH (*Juncus acutus*)

*Identification* A perennial tussock-like rush with upright cylindrical stems, dark green and smooth, tapering to 1.5 metres, and dense clusters of dark brown seeds. Native to European, African, and South American coasts, spiny rush is very salt tolerant and grows in disturbed ground. It can easily be confused with common rush (*J polyanthemos* or toad rush, *J bufonis*). Control is the same.

*Control* These rushes have a shallow root system and are easily dug out. Try making the soil less acid with lime or dolomite or wood ash, or add humus so it is better drained and aerated. If this is done, rushes should cease to be a problem.



## STINKING ROGER (*Tagates minuta*)

*Identification* This tall annual has opposite, compound leaves. Stinking roger has small yellow flowers with a very characteristic smell; some people like it. It is sometimes mistaken for Indian hemp.

*Control* Thick ground cover will choke out stinking roger. It is also easily chopped out or even pulled out of wet soil. One slash with a whippersnipper, just before the seed sets, is also effective.

## SWAMP DOCK (*Rumex brownii*)

*Identification* Long slender stems carry whorls of flowers that stick to your trousers as you pass. Flower stalks have long, oval leaves with a thick central vein.

*Control* Dig swamp dock out: the roots are too deep for it to be pulled. Try mulching and solarisation. Swamp dock can be shaded out by close planting around it, but some plants usually survive to seed, and you may end up with an even more severe problem.

## THISTLES

Thistles are mainly (though not always) a problem of high fertility. Add superphosphate and sub clover to your paddock, stock it so you get high nitrogen levels in animal camps, and you may find you have made perfect conditions for a thistle invasion.

Thistles are either annuals, biennials, or perennials. Annuals complete their life cycle in a year. They can germinate at any time but usually flower in early spring to summer, though this can be prolonged by early slashing. Annual thistles can be controlled by slashing, *just as the seed is setting*, and by pasture renovation. Biennials complete their life in two years—flowering and producing seed in the second year—though they can behave like annuals or perennials in some circumstances. Biennials are more difficult to eradicate as they may be flowering or seeding at different times. Slashing them may just prolong their life. Slashing perennial thistles will encourage new seed heads and increase the problem.

### Canadian or creeping thistle *(CIRSIUM ARVENSE)*

*Identification* Perennial; tall, with shiny leaves that are woolly underneath; leaves which are sometimes winged down the stem; and pale-purple flowers on top of the plant. Native to Europe and Asia.



### Malta thistle *(CENTAUREA MELITENSIS)*

*Identification* Annual, stiff and upright to one metre; hairy, almost vertical alternate leaves and stems; globular flower heads with small yellow flowers surrounded by dark spines from September to March. Native to the Mediteranean, Asia, and Africa.

### Nodding thistle *(CARDUUS NUTANS)*

*Identification* Perennial; tall, erect—up to 2 metres—with sharp, thin leaves and a rounded, pale-red flower.

### St Barnaby's thistle *(CENTAUREA SOLSTITIALIS)*

*Identification* Annual, stiff, erect, thin-stemmed and leafed, grey greenish-white from 30 to 60 cm; yellow flowers from October to March. Native to central Europe. Associated with poisoned horses.

### Saffron thistle *(CARTHAMUS LANATUS)*

*Identification* Annual, up to 80 cm, erect and often branching with long, narrow, spiny leaves, no stalk, and single pale-yellow flowers. Saffron thistle is a common dry land weed, especially in wheat areas.

### Scotch thistle *(ONOPORDUM ACANTHIUM)*

*Identification* This annual is grey-white and grows up to two metres. It has leafy, bladed stems, and purple tubular flowers from December to February. Possibly, this is the heraldic thistle of Scotland.

### Slender thistle *(CARDUUS PYCNOCEPHALUS)*

*Identification* Slender thistle can be annual or biennial. It grows up to 60 cm with many small pale-purple flowers. Winged slender thistle (*C tenuiflorus*) is similar, but with continuous wings along the stem and more numerous flowers on each stem. Both are common weeds of overgrazed paddocks and roadsides, and both have thick tap roots.

### Soldier thistle *(CIRSIUM ACARNA)*

*Identification* Annual grey-green thistle with white hairs, long spikes, and lance-shaped leaves that continue as ridges down the stem. The purple flowers are surrounded with spikes, and bloom from December to February.

### Sow thistle *(SONCHUS OLERACEUS)*

*Identification* A bright green annual, with yellow flowers forming "puff balls" like a dandelion (which it is sometimes called), though sow thistle has several flower heads and dandelion only one. Native to Europe and Central Asia, it is mostly a weed of gardens and waste areas.

### Spear or black thistle *(CIRSIUM VULGARE)*

*Identification* Often incorrectly called Scotch thistle, this is a biennial, erect and branched thistle. It has spiny wings a short way down from the leaves, and deeply lobed leaves ending in thick spines; the upper surface is dark green and the underneath cotton white. Spear thistle is a native of Europe, Asia, and North Africa, and is common on roadsides and in overgrazed pasture. Spear thistle has a long, thick tap root and will re-grow from this if cut too soon.

### Star thistle *(CENTAUREA CALCITRAPA)*

*Identification* Annual or biennial; bushy, slightly woolly, grows in a clump, pale-green and narrow-leafed with many pale-pink to pale-purple flower heads surrounded by long yellow spines. It flowers in spring and early summer, propagating by seed or by runners, especially in light soils.



### Stemless thistle *(ONOPORDUM ACAULON)*

*Identification* A rounded, grey spiny clump with flowers in the middle, it stays low down and has no stems. Native to the Mediterranean it is mainly a pest of drier areas. Dig it out, whip it to death with a whippersnipper, or slash the centre with a spade and pour some borax solution down the gash.

### Variegated thistle *(SILYBUM MARIANUM)*

*Identification* Annual; tall and purple-headed to 2.5 metres in good soil, much smaller in poor areas. The leaves are large, shiny, and mottled with white veins. It mostly occurs near manure piles, stock yards, streams and other damp places, preferably fertile. It will poison stock, though unless stressed for food they mostly avoid it. Variegated thistle consumption can lead to nitrate poisoning, weak limbs, convulsions, and finally death.

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## TREE OF HEAVEN *(Ailanthus altissima)*

*Identification* Perennial; originally from China and planted on graves so they would always be covered. It grows to 20 metres in good soil, and has slightly rough, brown bark, feathery tips with opposite leaves on young wood, and tiny green-white flowers which form from November to January. Tree of Heaven sucker readily. It can cause dermatitis and stock deaths. The winged seeds are spread by the wind.

*Control* Don't chop these down; don't—you'll only get more! The roots must be dug up completely. Try ripping the ground with a tractor in large areas.

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## VETCH *(Vicia sativa)*

*Identification* An annual climber or rambler with purple pea-shaped flowers.

*Control* Vetch is easily pulled out or can be whippersnipped. Stamp on it, and leave it as mulch.

## WANDERING JEW *(Tradescantia albifolia)*

*Identification* Usually encountered as a garden pest or in damp areas, where it has escaped from gardens. It is a climber or rambler, with a fleshy strongly-noded stem, alternate dark-green shiny leaves, sometimes with hairs at the base, and small, green to white flowers. Native to South America.

*Control* Wandering jew is hard to remove as it roots at each stem node, and the stem is brittle and easily broken so, when you pull it up, many nodes usually remain—only to sprout again. Repeated whippersnipping or heavy-footed grazing will remove it; so will blanket mulching or solarisation.



## WATER HYACINTH *(Eichhornia crassipes)*

*Identification* A floating, blue-flowered weed with bladder-like "waterwings".

*Control* There are effective biological controls for water hyacinth (see your state Department of Agriculture). You can also rake it out and use it as a high-nutrient mulch.

## WAX TREE *(Rhus succedanea)*

*Identification* A tall shrub to 3 metres with long, dark green leaves with paler undersides that turn deep red in autumn. Small yellow flowers in spring and brownish clusters of fruit in winter.

*Control* Be careful when chopping out the wax tree: the sap can cause skin irritations or even severe swelling in sensitive people. Wear gloves. The main root needs to be dug up or it will re-grow.

## WILD CARROT *(Daucus carota)*

*Identification* This biennial looks like a tall carrot with umbrella-shaped umbels of white flowers.

*Control* Pull it out or slash it just as it starts to flower but before the seeds set. Early slashing may mean more seed heads, so wait until the flowers have formed.

## WILD TURNIP *(Brassica spp.)*

*Identification* There are several wild turnips in Australia, annuals or biennials, with characteristic yellow flowers on thin tough stalks and long pale green leaves wider at the bases. Introduced from Europe they are a common weed in overgrazed or disturbed soil and along the road where seeds have dropped from passing cattle or hay trucks.

*Control* Wild turnip taproots are long and tough, sometimes tuberous, and always hard to dig out. They may re-grow after incomplete digging, and if mown they just become more woody. It is best to mow them only if they are an aesthetic problem. Otherwise, let them live out their allotted time and slash them only as they are setting seed so that more don't germinate. With a thick grass or other cover you should then get very little growth the next season.

If brassica weeds are a problem in cultivated areas you can either dig them out or mulch over them. The latter is very effective. Don't bother to slash them first: just jump on them, so they lay flat enough to be covered with several layers of newspaper, then pile on at least 10 cm of mulch. Re-apply paper to any sharp bits that break through. Leave this mulch for a month before planting.

Brassica weeds (brought in with a load of hay) used to be a bad problem in one of my gardens, but one mulching and then thick planting was enough to solve the problem.

## WOOD SORREL, *see* OXALIS

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