

# Oyster Mushroom Cultivation

## Part I. Mushrooms

### Chapter 2

#### Mushroom Growing for a Living Worldwide

## POVERTY ALLEVIATION BY MUSHROOM GROWING IN ZIMBABWE

### A case study : The Chakowa Orphanage Group

**Canford K. Chiroro**

University of Zimbabwe, Zimbabwe



Figure 1. Zimbabwe in Africa

Although knowledge and production levels are still limited in Zimbabwe, no other agricultural crop has generated as much interest in the past three years as the mushroom. One might say that the mushroom industry has literally mushroomed here recently. The white button mushroom (*Agaricus bisporus*) and the oyster mushroom (*Pleurotus ostreatus* and *P. sajor-caju*) are the most commonly cultivated varieties, with the latter being the most popular among the economically vulnerable sector of our society. It is hoped that the new cottage industry of mushroom cultivation in Zimbabwe will soon provide an important tool for the generation of income and the creation of food security for hundreds of households.

Zimbabwe is a country with over 70% of its population of about 1.4 million people living with HIV-AIDS and a much higher proportion suffering from protein malnutrition. Reduced income coupled with increased expenditure on healthcare in a country already facing stiff economic challenges has worsened the poverty situation. Due to the frequency of drought and livestock diseases in this part of the world as well as the high cost of conventional agricultural production, the people of Zimbabwe are anxious to develop an alternative source of protein with a high income generation potential. Mushroom cultivation could possibly offer the solution for poverty alleviation in this situation. Unlike other agronomic crops, the set-up costs for mushroom production are low. Fertilizers, machinery, and pesticides are not used, the market price is relatively high, and profit margins for mushroom crops can be considerably higher than traditional crops. In general the enterprise takes very little space and can produce returns within a short period of time.

Zimbabwean farmers who are using local varieties of seed can grow maize and wheat crops that take an average of four months to reach harvest maturity. This time period is equivalent to at least two crops of mushroom cultivation. Considering this scenario, the relative profitability of these three crops can be compared as shown in Table 1.

Even if the input costs in the mushroom enterprise were to be doubled, the enterprise would still remain more profitable than that of either maize or wheat. Considering that about five crops of oyster mushroom can be produced per year, the poverty alleviation potential of mushroom cultivation cannot be overemphasized.

**Table 1. Compared profitability of maize, wheat, and oyster mushroom in ZWD\***

	Maize	Wheat	Oyster Mushroom
GROSS INCOME	ZWD1,050,000	ZWD2,000,000	ZWD2,400,000
Expected yield	3 ton /ha	5 ton /ha	240kg /20m <sup>2</sup>
Average price	ZWD350,000 /ton	ZWD400,000 /ton	ZWD10,000 /kg
TOTAL COSTS	ZWD531,500	ZWD860,000	ZWD697,000
Labor	ZWD60,000	ZWD25,000	Labor ZWD50,000
Land preparation	ZWD26,000	ZWD25,000	Firewood ZWD20,000
Seed	ZWD35,000	ZWD10,000	Spawn ZWD180,000
Fertilizer/Lime	ZWD285,000	ZWD580,000	Plastic bags ZWD12,000
Insecticides	ZWD40,500	ZWD45,000	Straw ZWD120,000
Transport	ZWD40,000	ZWD55,000	Antiseptics ZWD15,000
Levy	ZWD12,000	ZWD10,000	Construction ZWD300,000
Miscellaneous	ZWD33,000	ZWD110,000	
NET INCOME	ZWD518,500	ZWD1,140,000	ZWD1,703,000

### Cultivation Method for Mushroom in Zimbabwe

Being an agro-based country with more than 70% of the population employed directly in that sector, Zimbabwe produces vast quantities of crop residues that may be used in mushroom production. Wheat straw, grass, banana leaves, sawdust and water hyacinth are some of the fibrous residues that have been tried as mushroom cultivation substrates. Wheat straw and grass are the most commonly used substrates among current mushroom operations.

The pasteurized substrate is usually spawned and packed into polythene bags of about 30cm wide and 90cm long for the bag culture of the oyster mushroom. The growing rooms are maintained at between 18°C and 25°C, with a relative humidity of about 75%. Although up to 6 flushes may be obtained from each bag, the first three are the most important in commercial production. For every 10kg of dry substrate used, as much as 20kg of mushroom can be harvested from the first 3-4 flushes. On average, Zimbabwean oyster mushroom growers obtain about 60kg of mushrooms per month. At least 2kg are usually harvested per bag. During the cooler winter season, *P. ostreatus* is cultivated while the more heat tolerant *P. sajor-caju* is produced in summer. Summers in Zimbabwe may be quite oppressively hot and maintaining the optimum growing room conditions is often a challenge.

The button mushroom, most often grown by well-financed growers, is the main export mushroom. For button mushroom cultivation, wheat straw and horse manure are mixed and used as substrate. Some farmers add inorganic fertilizers and/or peat. Cultivation is carried out in trays. Lower temperatures of about 18°C need be maintained and diseases and pests must be closely monitored. The expenses and requirements for strict management of the growing room have restricted the number of newcomers going into button mushroom production in Zimbabwe.

Unfortunately, funding to promote the consumption and production of mushrooms has been limited in Zimbabwe. In spite of this, the potential of mushroom cultivation for poverty alleviation among such vulnerable groups as women and orphans has been noticed by some organizations. The Chakowa Orphanage Group

\* ZWD (Zimbabwean Dollar, ZWD1 = USD0.0012 in Jan. 20043

mushroom project is a prime example of the successful results mushroom cultivation can produce among typically vulnerable Zimbabwe citizens.

### A Case Study : The Chakowa Orphanage Group



Figure 2. Trainees of Chakowa Orphanage Group

Technology is finally reaching out to some of the resource disadvantaged communities with a tremendous impact, thanks to the effort of the Intermediate Technology Development Group (ITDG) and a team of trainers who are currently running a mushroom production training course in Chakowa. As a result, the locals do not need to wait for the rainy season to enjoy the delicacy of the wild mushrooms collected from the forests and anthills. They can now grow oyster mushrooms throughout the year and get paid for their efforts as well. At Chakowa, ITDG is not only concerned with technology transfer, but also the human factor. In this situation ITDG is impacting positively on the lives of 56 households, including many orphans and those looking after children

orphaned due to HIV-AIDS related deaths.

### Background



Figure 3. Margaret Tagwira in oyster mushroom growing room (Photo courtesy of Mike Dubose)

Chakowa, a Shona word that means “that which has been harvested.” is an appropriate name for this farming community located about 50km from the picturesque Birchenough Bridge in Zimbabwe’s lowveld region. In addition to the recently introduced mushroom cultivation, the locals are involved in the production of field crops like maize, millet, sugar, beans, tomatoes and okra. These crops are grown here under supplementary irrigation due to the unreliability of rainfall in this part of the country.

The Chakowa Orphanage Group, initiated a few years ago to assist orphaned children is the brainchild of Mrs. Margaret Tagwira (Fig. 3). With only a few children involved initially, the project supplied spawned bags to trainees and taught them the basics of mushroom growing room management. Today a large project has grown from those humble beginnings. The group now comprises a wide range of participants including youths, women, and men, from sixteen to over sixty years of age. The primary goal is still to improve the livelihood of orphans, and the program is working wonders in that area. The group has not only paid the school fees and bought uniforms and books for the orphans, it has also significantly reduced protein malnutrition among the beneficiaries and the community at large. Although still in

its infancy, the potential and success of the mushroom project cannot be underestimated. Their success can be attributed to the commitment by members of the group and the prior training in other technologies also facilitated by ITDG. The group has also previously been trained in embroidery and tie ‘n’ dyeing of fabric with pleasing results.

### The training

The emphasis of the training has been to impart hands-on experience to the trainees and, at the same time, enough theory has been included to bring about an understanding and appreciation of the mushroom and its production. To achieve this, the farmer’s field school concept of training was adopted. This training method has a participatory

approach that has the advantage of including the trainees in every decision-making step all the way through the course. The trainees or growers feel they are the owners of the project, and this is a vital element that ensures that the project succeeds since all the members are aware of the goals and modus operandi of the project.



Figure 4. The training programme emphasizes hands-on experience (Photo courtesy of Mswake)

Although the trainer to trainee ratio is high, the trainers believe that the training has been effective, and the growers can now produce the mushrooms with minimum input from the trainers. According to Mrs. Musariri, one of the trainers, the success of the project will not only be measured by the yields attained in this cooperative farming, but also in the establishment of individual enterprises by members of the group and community, thus demonstrating their interest and knowledge of this industry.

### The growing room

Chakowa lies in the lowveld region of Zimbabwe, an area characterized by high temperatures that sometimes exceed 35°C in summer. Winters are generally mild here. The feasibility of any mushroom cultivation project in this region hinges on the grower's ability to control temperature and humidity inside the growing rooms.

For this project, a single growing room was constructed. This was made from thatch grass (*Hyperrhenia* spp.), a traditional material that keeps the internal environment cooler during hot weather. To counter the effect of low relative humidity in this drought prone region, plastic tubes filled with water were suspended from the roof adjacent to each bag. The plastic tubes were punctured to allow water to drip out and produce a fine spray that provided a cooling effect in the growing room. The plastic tubes are then re-filled with water once a day. This technique was introduced after it was realized that the initial technique of wetting the floor was labor intensive during hot weather as such watering had to be done three or more times a day. The advantage of using the suspended plastic tube structures is that it has a low input cost. The materials used are available locally and thus easier to reproduce by those wishing to go into this business. The group, with the financial backing from ITDG, is currently constructing a larger growing room. This will be made from brick walls and is intended as a more commercialized production system.

### Spawn

The spawn used in this project is being donated by ITDG. This means that input costs are relatively low and the group has a more competitive edge on the market. The mushrooms, often sold within the village, are therefore as cheap as ZWD1,500/kg (USD1.8/kg) compared with about ZWD5,000/kg (USD6/kg) charged by other producers. ITDG is planning to venture into spawn production. As the group matures and starts realizing sustainable incomes, it is expected that most of spawn produced will go to the group itself first to be self-sufficient. In fact, some of the group members will have to undergo training on spawn production to reduce operational costs.

### Substrate

Although a variety of crops are grown in Chakowa, the availability of substrates remains a constraint. Grass is the major substrate preferred (Fig. 5), so mushroom



Figure 5. Mushrooms grown on grass substrate

production therefore competes for grass with livestock feeding programs. The substrate use potential of other locally available crop residues needs to be investigated in order to encourage the possible adoption of other substrates with less supply competition from other sectors.

### **Feasibility**

Yields attained at the Chakowa project are fairly good, and average about 1kg of fresh mushroom harvested per bag. Although more specific yield levels could not be obtained, the trainers estimate that the growers are currently obtaining about 60% of the yield obtained by other producers and they are catching up fast. The project now emphasizes the need for continuous production, and at any given time, at least 30 bags should be bearing some fruit. Although a lucrative tourist spot known as the Hot Springs is located near Chakowa, the growers in this group are still less than confident about tapping the potential in this market. Their main concern is whether they will be able to meet given orders if they obtain a contract to supply mushrooms on a more regular basis.

### **Competitive advantages**

- Spawn is donated. The project can therefore sustain lower market prices and earn higher incomes from increased sales.
- The mushroom project is primarily focused on helping orphans. This adds an emotional appeal to the product and improves sales.
- There is a potential for both fresh and dried mushrooms. Fresh mushrooms can be sold or consumed by the locals while dried mushrooms, because of reduced perishability, can be transported to other markets.
- Farmers have the experience in growing other crops. This allows for product diversification.

### **Competitive disadvantages**

- The growers cannot produce a reliable supply to meet regular orders. The group lacks experience in order fulfillment.
- Adequate substrate is not available due to competition for grass with livestock.
- Temperatures are often very high and humidity quite low. This results in a high labor input in growing room management.
- The group does not have the organic certification that could improve the market base, especially the export market, leading to higher returns.

### **Conclusion**

The Chakowa Orphanage Group is a viable project with a bright future. More technical and financial support could further raise the incomes attained and greatly improve the lives of the Chakowa community. Mushroom is the right crop which can much contribute poverty alleviation thanks to its low set-up cost, high price margin and quick returns. The fact that it requires agricultural waste cheaply acquired and relatively small space makes mushroom growing more accessible for the destitute and landless farmers. In addition, mushroom presents growers high nutritional value as well as income. Mushroom boom in Zimbabwe during last three years proves much of it.