AGRI UPDATE
Information from the *KZN Department of Agriculture, Environmental Affairs & Rural Development*
2010/08

BASIC GUIDELINES FOR OYSTER MUSHROOM FRUITING MANAGEMENT IN KWAZULU-NATAL

C I Macdonald – Juncao Project, Research & Tech Development Cedara
Prof Lin Zhanxi,, Lin Hui & Mdm Lin Dongmei - Juncao Institute, Fujian Agriculture and Forestry University, Peoples' Republic of China

Background

Contrary to popular belief, mushroom production is not simply a matter of spending a few moments each day in a damp, semi-darkened room, harvesting a handful of mushrooms which have miraculously appeared overnight.

Indeed, there are a number of critical, interlinked phases which have to be undertaken in order to arrive at the point where mushrooms can be harvested and utilised. Fruiting management is the final phase in this process. It is also the least technical and most rewarding phase of the entire production cycle. As a direct result of this, Departmental policy is that only mushroom packs which are on the point of fruiting are distributed to our clients. For this reason, this article will address only the fruiting management phase of the production cycle. Subsequent articles will cover practical aspects such as selection and preparation of substrates, sterilisation and inoculation of substrates, the subsequent spawn run, and preparation, processing and packaging of the harvested crop for marketing.

Figure 1: Research Support to Juncao Project, Research and Technology Development Directorate, DAEA, Cedara.

Site selection and preparation

A number of factors need to be considered before undertaking a mushroom enterprise. For instance: Is the site suitable for both the immediate and longer term needs? Is access to the site easy? Are markets and transport facilities close at hand? Are more people to become involved in the enterprise? Is the site suitably drained? Is the water run-off properly managed to prevent spilling into the mushroom trenches? Is natural shade available? Is the local water supply clean and suitable for use in mushroom cultivation? Are there any chicken houses within 250 m of the proposed mushroom trenches? What pests are prevalent in the area? Once these (and other) basic factors have been considered proceed as follows:

Figure 2: Juncao Institute, Fujian Agriculture & Forestry University, Peoples' Republic of China

- Select a site where the ambient temperature can be manipulated to vary between 15 and 25℃, and the clay content of the soil at 40 cm deep is about 20%. In practical terms this means that

relatively dense shade is required during summer at lower altitudes and relatively little shade is required during spring and autumn at higher (1000 m above sea level) altitudes. If no shade is available, a shade structure will have to be built. A suggested design is attached.

- A trench (1.1 m wide, 4.5 m long and 0.4 m deep) must be dug and then disinfected by treating with 2.0 kg hydrated lime. If pests such as termites and moles are common in the area, appropriate measures must be taken at this stage to prevent subsequent damage to the mushroom substrate. Note: Experience has shown that two trenches of the above dimensions can be managed easily by a single individual. The daily tasks occupy less than one hour of their time.
- While digging the trench, a portion of the top-soil (say 20 kg) should be set aside for later use as a 'cover' over the mushroom substrate (see below). This 'cover' soil must also be sterilised with hydrated lime (0.5 kg).
- Grass mulch (used to prevent soil contamination of the mushroom cap prior to harvesting) must be sourced and disinfected with an appropriate pesticide.
- Remove the plastic bags from the substrate packs and neatly place these vertically into the trench (80 per square metre.)
- Cover the substrate with (disinfected) soil to a depth of 10 mm.
- Cover the soil and substrate with (disinfected) grass mulch to a depth of 5 mm.
- Construct a plastic 'mini-tunnel over the filled trench. (Note: The use of 20 mm electrical, plastic conduit piping for support braces and appropriate "tunnel plastic" sheeting has proved to be ideal.)

Figure 3: Digging the trenches.

Figure 4: Packing the trenches with substrate – note chicken wire to protect against moles.

Figure 5: An opened, plastic 'mini-tunnel' over the trench.

Fruiting induction & management

- Water the trench containing the mushroom substrate with 60ℓ **clean** water.
- Close the plastic tunnel and wait for four (4) days.
- From day 5, until the pins appear (this normally takes place within 6 days), water with 10ℓ clean water.
- Once the fruit bodies (mushrooms) appear, reduce the amount of water applied to **5ℓ** per day. DO NOT WATER DIRECTLY ONTO THE FRUIT BODIES AND CAPS.
- In spring and autumn (up to 1000 m above sea level) and winter (low altitudes i.e. coastal) open the tunnel between 10.30 and 11.00 am for 30 minutes every day for aeration.
- In early summer (October and November) open the plastic tunnel between 8.30 and 9.00am (30 minutes) every day.
- During the mid-summer heat (December to February), open the tunnel from 8.30 to 9.00am (30 minutes) and then again from 2.00 to 2.30 pm (30 minutes). Note: Experience has shown that high summer temperatures at low altitudes preclude successful mushroom cultivation unless a cooling mechanism is used.

- If it is windy reduce aeration to 15 minutes at a time – irrespective of season.
- If it is raining, leave the tunnel closed for that day – irrespective of season.
- ALWAYS WATER ONCE A DAY – irrespective of the season.
- Harvesting should commence once the mushroom caps are about 40 mm in diameter. The caps should have a fresh, smooth appearance and be free from obvious blemishes if they are to be marketed.

Second Flush Management

Two options are available:

A. Continual fruiting

- Follow the procedure detailed above in terms of daily management practices.

B. Mass fruiting

- Stop watering after the first flush for between 10 and 14 days to allow the mycelium/substrate to recover.
- Increase the air exchange by opening both sides of the tunnel from 10.00 am to 4.00 pm every day.
- On day 15 start watering again with 10ℓ clean water, until the pins appear.
- Thereafter, reduce the water application to 5ℓ per day.
- Follow the procedures set out above.

Once no further fruit bodies are produced (normally after 3 months) all the substrate should be removed from the trench. The trench should then be left open/empty for 7 days. On day 8 the entire procedure (commencing with disinfecting the trench and the covering soil) is repeated. The used substrate and soil should be utilised elsewhere as an organic fertilizer for vegetables or other crops.

Figure 6: Preparing to water the trenches – note the bagging over the spout of the watering-can to prevent scouring while watering.

Figure 7: Mass fruiting due to manipulation of watering technique

Post-harvest activities

Cleaning and preparation for cooking/marketing

All activities undertaken in this regard should be done in the shade and preferably indoors as soon as the harvesting is completed. The mushroom caps and stems (stipes) can be rinsed and brushed lightly, or wiped gently with a soft, damp cloth before being patted dry with an absorbent paper towel. The stipes can then be removed (depending on market requirements) using a sharp knife, whereupon the mushrooms can be cut into small pieces and sun/air dried before packaging.

The mushroom caps should be sorted into batches of uniform size and colour, whereupon they can be packaged (with the gills uppermost) for sale. Any product found to be aesthetically unacceptable for sale can and should be used for home consumption.

Figure 8: Cleaning the mushroom caps and removing the stipes

Storage

It is preferable to refrigerate the product as soon as possible even though oyster mushrooms can be stored at room temperature (22℃) for up to 2 days.

Cooking

Ideally, fresh oyster mushrooms should be stir-fried (using a minimum of oil and salt) for no longer than 2 minutes. Boiling this product significantly reduces taste and food value. Dried mushrooms can be used with great value in soups and stews.

Further information

While every effort has been made to cover the basic requirements necessary in cultivating mushrooms, it is possible that further information may be required by prospective producers.

Requests for further information can therefore be made to any of the authors at the following address:

Juncao Mushroom and Upland Rice Project Department of Agriculture, Environmental Affairs & Rural Development
P/Bag X 9059
Pietermartizburg,
3200

Figure 7: Everyone is happy!