



Agriculture & Horticulture
DEVELOPMENT BOARD



New Project

M 060

Developing alternatives to peat in casing materials for mushroom production

Project Number:	M 060
Project Title:	Developing alternatives to peat in casing materials for mushroom production
Project Leader:	Professor Ralph Noble
Contractor:	East Malling Research
Industry Representative:	Mr Jim Rothwell, Little Hall Farm Mushrooms Ltd
Start Date:	01 January 2013
End Date:	30 June 2015
Project Cost:	£85,254

Project Summary:

Recent developments in peat substitution

The following aspects of peat substitution in mushroom casing will be reviewed:

- Relevant commercial and scientific developments that have occurred in peat substitution within the last two years
- Developments in the recycling of spent casing, particularly in the Netherlands
- Changes in the legislation affecting the use of different raw materials in growing media.

Development of casing formulation and mixing

Five materials will be developed into 25-30% peat substituted mixes for commercial-scale farm trials using facilities at Eversis:

- Aggregate washing plant filter cake
- Composted or aged pine and spruce bark
- Granulated used rockwool slabs
- Matured green waste compost from specific PAS100 accredited sources
- Pasteurised recycled spent casing.

The effect of using individual materials and combinations of materials will be investigated. The effect of reducing and replacing sugar beet lime (SBL) with filter cake, other lime sources, mature green waste compost and/or recycled spent casing will be examined.

Sustainability of peat substitute materials

The long-term availability and economics of casing substitute materials will be analysed and compared with currently used peat casing materials. The feasibility of separating and recycling spent casing on-farm against recycling in ready mixed materials will be compared.

Legislation concerning use of recycled materials

Where required, information and chemical analyses of raw materials and mushrooms will be obtained by EMR to achieve a low risk waste status and exemption from EA Waste Licencing for use in mushroom casing, and for other regulations concerning the use of recycled materials in food production.

Commercial farm trials

Commercial farm trials will be conducted with peat-based casings containing one or more of the above five materials in the casing mix. The trials will be conducted on tray and shelf farms according to a Standard Operating Procedure.

Preliminary trials will be conducted with the most promising experimental blends from M 38 and M 53 on trays or shelf areas within a growing room. The best materials and mixes in terms of cropping performance will then be tested on larger cropping areas on the farms. Comparisons of peat reduced casings will be made against Everris standard peat casing, and other commercial peat casings used on the farms. The replicated trials will be designed to enable comparison of casing materials both within farms and across farms.

Standardisation of casing

Small scale cropping tests

Each of the casing blends produced commercially will be tested in small-scale cropping tests against standard peat-based casings in replicated small tray experiments. Mushroom yield, quality grades, cleanness and disease incidence from each material will be assessed, as well mycelial growth and the level of pinning.

Physical and chemical properties

Each of the raw materials used and casing materials produced commercially will be tested for water retention characteristics, air-filled porosity (AFP), bulk density, pH and electrical conductivity. Correlations between the analytical results and mushroom cropping in commercial trials and small scale cropping tests will be tested.

Pseudomonas species

The real-time PCR diagnostic test for the mushroom blotch pathogen *Pseudomonas tolaasii*, developed in pot experiments in M 54, will be used to test the commercial casing mixes before and after use in the farm trials. The occurrence of bacterial blotch and fungal diseases on the different casing mixes will be recorded.

Electronic monitoring of casing water

The availability of water from the casing will be measured electronically using tensiometers which measure the water tension (matric potential) on a continuous basis using data loggers. Miniature tensiometers (Delta-T) will be positioned in the casing layers at the time of casing application. Watering patterns on different

farms and in different casings will be monitored. Mushroom crop yield and quality and the occurrence of bacterial blotch and water stress symptoms will be related to the data obtained.

Communication of results

As well as publications, results will be communicated in demonstration crops during and at the end of the experimental programme. A standard operating procedure for the production and use of peat substituted casing will be produced. A diagnostic test will be available to the industry for testing the population of blotch causing *Pseudomonas tolaasii* in casing.

Uptake of casing

Following the completion of large-scale trials, successful peat reduced casing blends will be tested on additional GB farms where appropriate. At the end of the 2-year project, uptake of the peat reduced casing(s) will be monitored according to:

- Peat consumption and production of Everris casing material and proportion of substitute materials used
- Survey of casing materials used by major mushroom producers in the UK
- Peat/SBL/other materials used in imported casings from Ireland and the Netherlands
- Survey of performance of new casing materials against standard commercial peat casings.

Aims & Objectives:

(i) Project aim(s):

1. To develop alternative casing products for peat, without compromising mushroom yield or quality, and get these into commercial practice with a target of 20% substitution by 2016
2. To test how experimental standards for mushroom casing relate to commercial cropping performance
3. To determine how crop watering and casing water status interacts with the performance of casing materials.

(ii) Project objective(s):

1. To update and summarise any more recent information on peat alternatives in casing published since M 53
2. To produce data that meets the requirements of EA low risk waste status and/or food safety regulations
3. To undertake commercial farm trials with the five most promising alternative materials identified from small-scale experiments in M 38 and M 53
4. To test how experimental physical, chemical and microbial standards for casing materials relate to mushroom yield, quality and blotch incidence on commercial farms
5. To electronically monitor crop water management and casing water status, and determine how these interact with the performance of casing materials and the occurrence of blotch
6. To communicate and disseminate results to industry
7. To monitor industry uptake of peat substitute casing materials.

Benefits to industry

- Substitution of peat in casing with recycled materials, improving environmental performance over imported mushrooms grown entirely on peat
- Commercial use of recycled casing from SMC, and improved fertiliser value of separated compost
- Reduced carbon footprint of casing and mushroom production
- Identification of properties of new and existing casing materials that relate to mushroom cropping performance
- Electronic monitoring of casing water status to improve consistency of water management and diagnosis of watering and bacterial blotch problems
- Potential suppressive effects of new casing materials and improved water management on bacterial blotch
- Developed casing materials may also have a potential use in vegetable blocking composts and growing media for modules/plugs which have similar physical properties

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