Grower Summary

M 053

Mushrooms: Developing new sustainable mushroom casings in relation to supply of raw materials, and mushroom cropping and quality

Final 2012

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Further information

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Project Number:	M 053
Project Title:	Mushrooms: Developing new sustainable mushroom casings in relation to supply of raw materials, and mushroom cropping and quality
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Headline

- Several peat alternative materials were identified which increased mushroom yield from commercial peat + SBL casing.

Background and expected deliverables

To obtain casing for producing high yields of quality mushrooms, the industry is reliant on supplies of wet, deep-dug peat and sugar beet lime (SBL). However, these materials will no longer be locally available in Great Britain and Ireland respectively. Import of alternative sources of casing materials will increase costs.

Milled surface peat is widely available, cheaper, easier to transport, and under less environmental pressure than wet deep dug peat. However, increased use of milled peat and other materials in casing may have an impact on mushroom initiation, cropping and quality. Selection of the optimum materials and blends will therefore be essential.

Although the casing layer has certain known requirements in terms of physical, chemical, and microbial properties, the definition of an optimum casing material in terms of mushroom yield and quality remains elusive.

The commercial objectives of this project are to:

- Investigate new materials which can be beneficially added to casing to substitute wet deep-dug peat and SBL, and suppress diseases.
- Compare a range of existing commercial casings based on deep-dug peat and SBL with new casing materials and blends in terms of mushroom crop husbandry, yield, and quality.
- Explore the use of recycled casing, separated from the compost, as a component in new casing.
- Conduct physical, chemical and microbial analyses on new and existing casing ingredients and blended mixes which relate to subsequent performance in terms of mushroom initiation, yield and quality.

Summary of the project and main conclusions

A series of four cropping experiments were conducted in plastic trays to test the performance of commercial peat + SBL casings, when different materials were used to substitute 12.5 – 50% by volume of the peat + SBL. The materials used were: used granulated rockwool slabs, filter-cake clays from mining and quarrying, wood fibre, green waste compost, recycled cooked-out separated spent mushroom casing and aged spruce bark fines. This was followed by trials at two commercial mushroom farms to test the effect of substituting 25% of fresh casing with cooked-out, separated spent casing. The water and air holding characteristics, electrical conductivity, pH and bacterial populations of each of the casing materials were determined, and their influence on the cropping performance of the casing materials was examined.

- Several peat alternative materials were identified which increased mushroom yield from Everris peat + SBL casing when added to casing at 12.5% v/v in small tray experiments. These included multi-roll filter cake (MRF), filter-cake clay from sand quarrying, spent casing and bark. Used rockwool and MRF, when added together, each at 12.5% v/v, also increased mushroom yield from Everris and McDon peat + SBL casings.
- When used at 25% by volume in Everris casing, the effect of the above materials on mushroom yield was not significant, except spent casing which slightly reduced yield in small tray experiments.
- In two farm trials, addition of spent casing at 25% v/v in Harte casing did not affect mushroom yield.
- The effects of adding green waste compost to casing on mushroom yield were variable.
- Wood fibre reduced mushroom yield when added at more than 12.5% v/v to casing.
- Under the cropping conditions of the experiments, and without the addition of any alternative materials, mushroom yields were higher from the McArdle and McDon casings than from the CNC, Harte and Everris casings.
- A relationship was identified between the air-filled porosity (AFP) of casing materials and mushroom yield. The optimum casing AFP in terms of mushroom yield was 19 ±4% (Figure i).

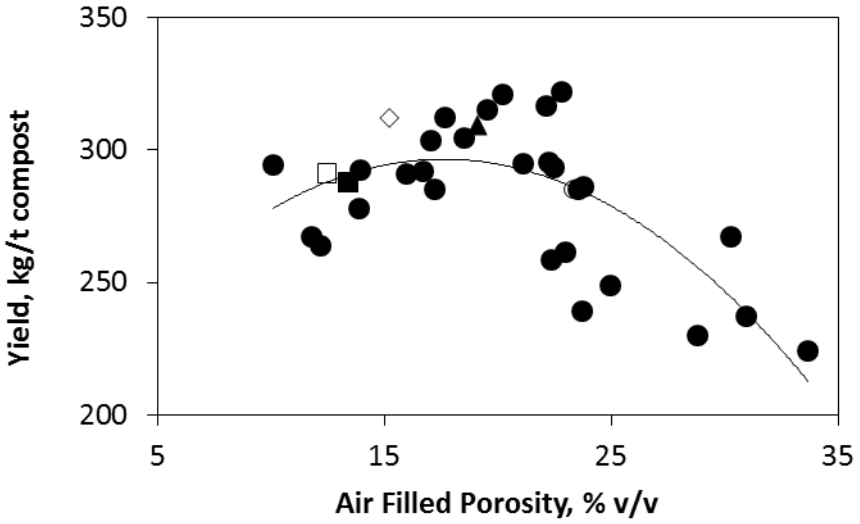

Fig. (i) Relationship between the air filled porosity of different casing materials and mushroom yield. Each value is the mean of four replicate crops. Commercial peat + SBL casings are indicated by: Everris ○; Harte □; McDon ◊; McArdle ▲;CNC ■

- There was a trend for casing materials with an EC of <600 µS/cm to produce higher mushroom yields than casings with an EC of >600 µS/cm.
- Adding substitute materials to commercial peat + SBL casing reduced the volumetric moisture content of the casing at equivalent matric potentials (suctions). This effect was small for green waste compost and spent casing at inclusion rates up to 50%, and for wood fibre at inclusion rates up to 25%. The effect of adding 12.5% MRF and 12.5% used rockwool, individually or together, on the water release characteristics of Everris peat + SBL was also small or not detectable.

Main conclusions

- Several peat alternative materials were identified which increased mushroom yield from commercial peat + SBL casing when added to casing at 12.5% v/v in small tray experiments: multi-roll filter cake (MRF), filter-cake clay from sand quarrying, spent casing and bark.
- Used rockwool and MRF, when both added to peat + SBL at 12.5%, increased mushroom yield to a greater extent than the individual materials.
- In two farm trials, addition of spent casing at 25% by volume in fresh casing did not affect mushroom yield.

- A relationship was identified between the air-filled porosity (AFP) of casing materials and mushroom yield. The optimum casing AFP was 19 ± 4%.

Financial benefits

This project has demonstrated that spent casing can be used to replace a proportion of fresh casing without affecting yield. This could reduce the volume of fresh casing required by up to 25%. Used granulated rockwool (a waste product from glasshouse vegetable production) should be an economically and environmentally viable ingredient in casing, providing the low risk status requirements of EA waste regulations can be met. A further casing ingredient, filter-cake clay, has been identified that should be a lower cost replacement for SBL in casing. Routine testing of casing for AFP and compacted bulk density should improve the reliability of cropping performance.

Action points for growers and casing producers

- Growers should test the recycling of cooked-out, separated spent casing on the cropping performance of casing when added at up to 25% by volume.
- Casing materials should be tested for air-filled porosity and compacted bulk density on a routine basis.