



Agriculture & Horticulture  
DEVELOPMENT BOARD



# **Grower Summary**

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## **M 55**

Mushrooms: Desk  
study/literature review of the  
potential alternative materials to  
peat in mushroom casing

Final Report 2011

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HDC  
Stoneleigh Park  
Kenilworth  
Warwickshire  
CV8 2TL

Tel – 0247 669 2051

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## Headline

- A review of 71 publications and consultations with casing manufacturers and other researchers has shown that there are currently no peat substitute materials available or sufficiently developed in the UK for use in mushroom casing that compare with peat in terms of cropping performance and price.

## Background and expected deliverables

The UK horticulture industry, including mushroom production, is under environmental pressure to reduce the consumption of peat. Mushroom casing accounts for about 2.5% of the four million cubic metres of peat used annually in the UK. To be economically competitive with peat, any substitute material must produce a similar mushroom cropping performance, and be available in sufficient quantity and at a competitive price. There has been a considerable amount of research and development work on the use of different casing materials to substitute or replace peat. The objectives of this review were:

1. To conduct a literature review on previous research and development work on the use of alternatives to peat in mushroom casing.
2. To contact casing and growing media companies and other researchers to determine what is currently available and being tested.
3. To assess the availability and cost of potential casing materials to the UK mushroom industry, and the impact of waste and other regulations on their use.
4. To incorporate the findings in future research and development work and to disseminate the results to the mushroom industry.

## Summary of the project and main conclusions

Peat is still the major component of mushroom casing in developed countries, and even where peat is not locally available; it is imported for this purpose. Information on the use of different casing materials was obtained from 71 references in scientific journals, conference proceedings, technical articles, research reports and patents, as well as from consultations with casing producers and other researchers. Comparison with peat-based casing materials was possible using information from 42 of 71 references.

Overall, there was a weak negative relationship between the proportion of peat substituted in casing and mushroom yield. The most promising materials for peat substitution in the UK are recycled granulated rockwool and recycled spent casing. Wood fibre and mature PAS 100 green waste compost are also potential materials but there is no information on using them at low inclusion rates in peat-based casing. By-product clays and silts can be used in casing; at inclusion rates below 20% v/v they can be considered to be sugar beet lime replacements but at higher inclusion rates, they can also substitute peat in casing. Coir has been used to a limited extent in casing, at inclusion rates of <20% v/v, but the practicalities and economics of using coir on a large scale are doubtful.

Spent mushroom substrate and anaerobic digestate, even after storage and leaching, are unsuitable casing ingredients, mainly due to high EC. Bark and paper waste products have also been investigated by several workers; watering of bark casing can be difficult and paper wastes can encourage the growth of competitor moulds.

Casing materials can have a large effect on mushroom quality, particularly cleanness, as well as whiteness, and possibly cap spotting caused by bacterial blotch and *Trichoderma* sp.

There was a weak negative relationship between casing EC and mushroom yield, although EC values of 1 mS/cm or less had no effect on yield. Overall, none of the physical properties of the casing materials measured in the references were significantly correlated with mushroom yield.

There are currently no parameters for defining the properties of the best peat or peat substitute casings. Low EC, high water holding capacity at a range of matric potentials and a defined bulk density are probably the most important criteria in selecting materials that may be suitable for use in casing but this requires further investigation.

Waste License regulations are currently inhibiting the utilization of certain peat substitute materials such as clays and silts from mining. This should not affect separated spent casing which can be recycled on the same site.

## *Main conclusions*

With the exception of coir, there are currently no peat substitute materials available in the UK for mushroom casing, without the need for further development work and/or exemption from Waste License regulations. However, coir is a more expensive material than peat and the practicalities and economics of using this material at inclusions rates >15% v/v are doubtful.

## **Financial benefits**

The cost of new casing could be reduced by recycling separated spent casing into the mix. It is unlikely that other substitute materials will significantly reduce the cost of peat-based casing since transport costs are also substantial. The quantity of sugar beet lime in casing could be reduced by partial substitution with cheaper clays and silts to produce similar physical characteristics.

## **Action Points**

- The feasibility of separating spent casing from spent compost on emptying cooked-out growing rooms and re-use in new casing needs further investigation.
- The effect of adding small proportions of wood fibre or mature PAS 100 green waste compost into casing on mushroom yield and quality should be examined.
- The industry needs to engage with the Environment Agency to allow the use of safe by-product materials as peat substitutes without the requirement for Waste Licenses.

## **Further research and development**

Based on the findings of this review, the most promising materials for further research and development on peat substitutes in mushroom casing in the UK are:

- recycled spent casing
- recycled granulated rockwool
- dewatered clays and silts
- wood fibre
- PAS 100 mature green waste compost (screened to a fine particle size).