

Project number: 5173
Funding source: DAF RSF 099, Teagasc

Date: June, 2013
Project dates: Jan 2003 – Oct 2007

Changing formulations for mushroom casing



Key external stakeholders:

Mushroom industry, Mushroom Casing Producers, Researchers

Practical implications for stakeholders:

Mushroom casing, a blend of peat and lime, is a critical component of mushroom production affecting both yield and quality of the crop. There is some pressure on the horticulture industry in general to reduce the amount of peat being used. The main objective of this project was to investigate the use of reprocessed Spent Mushroom Substrate (SMS) as a casing ingredient and to determine its relative effect on cropping of *Agaricus bisporus*. The SMS must be leached of soluble salts to give an EC value of around 4 mS/cm prior to use.

- A novel casing blend consisting of 80:20 (Black: brown) peat mix, incorporating 18% SMS by volume was found to be comparable to a commercial peat-based casing in terms of yield.
- The addition of vermiculite to SMS was found to increase its yield potential as a casing significantly, due to improved porosity and water retention.

Main results:

- A novel casing blend consisting of 80:20 (Black: brown) peat mix, incorporating 18% SMS by volume and containing spent sugar beet waste lime was found to be comparable to a commercial peat-based casing in terms of yield. The SMS was leached with water to give an EC of 4 mS/cm prior to use.
- The addition of vermiculite to SMS was found to increase its yield potential as a casing significantly, due to improved porosity and water retention.
- While, at present, an SMS-based casing is not commercially viable when compared with peat-based casings, at some point in the future, when peat can no longer be used due to conservation or exhaustion of supplies, SMS incorporating Vermiculite could be used as an alternative.

Opportunity / Benefit:

Currently, Irish mushroom growers are not under immediate pressure to find alternatives to peat as a casing ingredient. However, the Irish mushroom industry is a major supplier to supermarket chains in Great Britain, where peat conservation and peat replacement are the subject of considerable debate and legislation. Given the importance of the British market for Irish mushrooms, alternative materials for use as a peat replacement or as an ingredient in a peat based casing may be required in the future. The results of the work reported here will form the basis for future research and development in this area.

Collaborating Institutions:

UCD, AFBI, NI.

Teagasc project team: Dr. Jim Grant (PI)
Dr. Helen Grogan
Mr. Jason Barry

External collaborators: Ms. Mairead Kilpatrick, AFBI, NI.
Dr. Owen Doyle, UCD

1. Project background:

Mushroom casing, a peat and lime based substrate, is a critical component of mushroom production that affects both mushroom quality and yield. Alternatives to peat are sought to reduce usage of this non-renewable resource.

2. Questions addressed by the project:

Can reprocessed SMS be used successfully as an ingredient in novel mushroom casing formulations?

3. The experimental studies:

Research was conducted at Teagasc, Kinsealy and University College Dublin to develop formulations for mushroom casing using novel ingredients to replace some, or all, of the peat. Reprocessed spent mushroom substrate (SMS) and vermiculite were incorporated at different rates. Spent mushroom substrate was irrigated with water to remove soluble salts and to achieve an electrical conductivity (EC) measurement of around 4 mS/cm. Modified casing formulations were applied to mushroom crops and their effect on mushroom yield and quality was compared with standard commercial casing formulations.

4. Main results:

A specific success was a novel casing blend consisting of a reduced peat mix, incorporating 18 % reprocessed spent mushroom substrate (SMS) by volume, and using spent sugar beet lime (SSBL) to neutralise the peat. It was found to be comparable to a commercial peat-based casing in terms of yield. Experiments incorporating 10, 12 and 15% SMS by volume also gave good yields. Incorporation of SMS into casing gave some biocontrol of damage by sciarid fly larvae but further research is required here. The use of novel components like vermiculite in SMS-based casings increased yield potential but the high ingredient costs preclude them from commercial viability in the near future.

5. Opportunity/Benefit:

Currently, Irish mushroom growers are not under immediate pressure to find alternatives to peat as a casing ingredient. However, the Irish mushroom industry is a major supplier to supermarket chains in Great Britain, where peat conservation and peat replacement are the subject of considerable debate and legislation. Given the importance of the British market for Irish mushrooms, alternative materials for use as a peat replacement or as an ingredient in a peat based casing may be required in the future. The results of the work reported here will form the basis for future research and development in this area.

6. Dissemination:

Mushroom Casing Workshop: Challenges for Mushroom Casing Production. Hillgrove Hotel, Monaghan, June 28th 2007.

Main publications:

Barry, J., Grant, J., Doyle, O. and Grogan, H. (2008). Partial substitution of peat with spent Mushroom substrate in peat-based casing blends. Proceedings of the XVIIth International congress on the Science and Cultivation of Edible and Medicinal Fungi, Cape Town, South Africa, 20th – 25th May 2008.

Barry, J., Grant, J., Grogan, H. and Doyle, O. (2007). Comparative assessment of additives to spent mushroom substrate (SMS) to improve efficiency as a casing material for use in the production of *Agaricus bisporus*. Agricultural Research Forum, March 14th and 15th Tullamore, Co. Offaly, p. 35.

Popular publications:

Barry, J., Grant, J., Doyle, O. and Grogan, H. (2008). Mushroom Casing: Science catching up with technology. TResearch Vol 3 (No 2): 56-58.

http://www.teagasc.ie/publications/2008/19/19_tresearch200805.pdf

Compiled by: Helen Grogan, Jim Grant, Jason Barry