



Agriculture & Horticulture
DEVELOPMENT BOARD



New Project

M 57

Mushrooms: Influence of ammonia during compost pasteurisation and disinfectants on eradication of *Trichoderma aggressivum* (Th2).

Project Number:	M 57
Project Title:	Mushrooms: Influence of ammonia during compost pasteurisation and disinfectants on eradication of <i>Trichoderma aggressivum</i> (Th2).
Project Leader:	Prof Ralph Noble
Contractor:	East Malling Research
Industry Representative:	John Collier, Monaghan Mushrooms
Start Date:	01/04/2012
End Date:	31/03/2013
Project Cost:	£33,572

SUBJECT TO CONTRACT

Project Summary:

The term 'pasteurisation' in this concept note refers to the elevated temperature stage during the phase 2 stage of compost production. The term 'eradication' refers to reducing the concentration of inoculum to below a detectable limit.

The results of project M 50 showed *Trichoderma aggressivum* (Th2) isolate 23443B to have considerable tolerance to compost time-temperature treatments. A compost temperature of 60°C needed to be maintained for 12 hours to reduce spore and infected compost inocula of isolate 23443B to below a detectable limit. Project M 50 also showed that the isolate could survive an ammonia concentration of 300 ppm, although there was evidence that survival declined with increasing ammonia concentration.

This project will determine the ammonia concentrations that are needed to eradicate *Trichoderma aggressivum* (Th2) from compost during different time-temperature pasteurisation treatments. *Trichoderma* will be introduced into phase 1 compost before pasteurisation as spore and infected compost inoculum. Detection of *Trichoderma* in the 'pasteurised' composts will be attempted using

selective plating of samples, dilution plating of compost suspensions, and mushroom culture pot bioassays. Real time PCR will also be used to detect *Trichoderma* in the 'pasteurised' phase 2 composts and in the spawn-run composts from the pot bioassays. Ammonia concentration data will be obtained from commercial phase 2 tunnels and compared with those needed for eradication of *Trichoderma* from compost in the flask composting experiments.

Disinfection of mushroom cropping sheds to control *Trichoderma* spp. and other pathogens has traditionally been conducted with formaldehyde. This treatment is no-longer available; this is a particular problem where cook-out is not used. This project will establish the efficacy of other liquid and gaseous disinfectant treatments at a range of concentrations in controlling and eradicating *Trichoderma aggressivum* (Th2) inoculum. The residues of disinfectants applied to cropping tray wood, with and without subsequent cook-out treatment will be determined.

Aims & Objectives:

(i) Project aim(s):

- (a) Provide information on the ammonia concentration required during specified time-temperature 'pasteurisation' treatments to eradicate *Trichoderma aggressivum* (Th2) from compost.
- (b) Compare the limits of different detection methods for *Trichoderma aggressivum* (Th2) in phase 2 and spawn-run composts, in order to confirm eradication.
- (c) Assess how ammonia concentrations in commercial phase 2 tunnels relate to eradication of *Trichoderma aggressivum* (Th2).
- (d) Determine the best disinfectant treatment(s) for *Trichoderma aggressivum* (Th2).

(ii) Project objective(s):

- (a) Determine the influence of ammonia during compost 'pasteurisation' on the eradication of *Trichoderma aggressivum* (Th2).
- (b) Confirm eradication of *Trichoderma aggressivum* (Th2) from phase 2 and spawn-run compost using different detection methods.
- (c) Obtain ammonia concentration data from commercial phase 2 tunnels and compare the levels with those needed to achieve eradication.
- (d) Determine the effect of different liquid and fogging disinfectants at different concentrations on the eradication of *Trichoderma aggressivum* (Th2).
- (e) Determine the residues of disinfectants applied to cropping tray wood, with and without subsequent cook-out.
- (f) Make recommendations on the optimum ammonia concentrations needed for eradication of *Trichoderma* in phase 2, and how they can be achieved practically.

Benefits to industry

The benefits to the industry of the proposed work are:

- Information on ammonia concentrations in phase 2 pasteurisation necessary for *T. aggressivum* (Th2) eradication
- The potential for using shorter and/or cooler pasteurisation treatments if a sufficiently high ammonia concentration can be maintained
- How the above conditions relate to those achieved in practice, and how adequate but not excessive ammonia concentrations can be achieved in commercial phase 2 tunnels
- Information on detection limits for *T. aggressivum* (Th2) in compost following different pasteurisation treatments and subsequent spawn-run, using semi-selective plating, mushroom pot bioassays and real time PCR.
- Information on the most effective liquid and gaseous disinfectant treatment(s) for controlling *T. aggressivum* (Th2).

Remedial action may involve changes to compost formulations, pasteurisation, disinfectant and fogging practices. The costs of these are likely to be relatively small, and justified if used either prophylactically or in the event of a *Trichoderma* outbreak.

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