The Development of Sustainable Growing Media Components from Composted Specific Bio-Waste Streams ©

N. Bragg
Bulrush Horticulture Ltd, Newferry Road, Bellaghy, Magherafelt, Co Derry. BT45 8ND, Northern Ireland

T.F. Brocklehurst, A.C. Smith, M. Bhat, and K.W. Waldron
Institute of Food Research, Norwich Research Park, Colney, Norwich NR4 7UA, U.K.

This paper describes a feasibility study into the preservation of plant structural remains, which can then be used as components of growing media for containerised plant production. The drivers for the work are both the need to use bio-waste streams rather than disposing of them to landfill and the need to find long-term sustainable components for growing media that have properties as beneficial as the peats currently used.

INTRODUCTION

Currently within the U.K. there are specific drivers that are challenging the use of traditional components of growing media used for container-grown plants on nurseries. The drivers for change come from a number of directions: E.U. directives on wetland habitat protection — and hence the desire to reduce the use of peats in growing media; E.U. directives to reduce the amount of compostable material going to landfill and finding alternative markets for the composted material: major retailer pressure to reduce reliance on the peat component of growing media in order to achieve national government aspiration targets for peat reduction and to reduce the impact of environmental lobbyists on the public perception of their business ethics.

In order to try to find suitable alternative components to the use of peats in growing media, attention has been focused on the use of composted materials. The process of composting materials in an aerobic fashion has been reviewed by many authors, for example, Lopez-Real (1990). The natural process is basically one in which various phases of degradation can be identified. The phases are characterised by changes in temperature of the decomposing mass, which relate to changes in micro-

bial population, which in turn relate to the breakdown components of the mass at any one time. The end result of a well-aerated composting process can be shown to consist of any mineral particles originally present in the material and clumps of microorganisms. The original structural nature of the materials placed in the compost. process is often completely lost.

Conversely, when peats are exhumed and examined it is quite evident that the physical structure of the plant remains that entered into the mire are maintained. The fact that the plant structural remains have in some way been preserved in the mire gives peats the specific properties that make them ideal for use as components of containerised growing media.

The challenge of the work described here is to identify the components of the plant structures within peats that give them their functionality in growing media, then to emulate this functionality via the aerobic composting process. This might involve either stopping the normal processes that occur or altering the conditions to maintain the structure of the plant material throughout the process.

MATERIALS AND METHODS

The work program for this project is shown in Fig. 1.

Phase one of the work has two components: first the characterisation of peats to identify the components that confer functionality as growing media and, second, a parallel study of various aerobic compost mixes from selected food and agricultural bin-waste streams (non-animal waste) to fully characterise the processes and changes in structural nature of the mixes throughout the natural aerobic composting phases. The selection of materials for use in the composting study has been governed by the need to have long-term access to bio-waste streams of consistent type, in large quantities, and with good traceability.

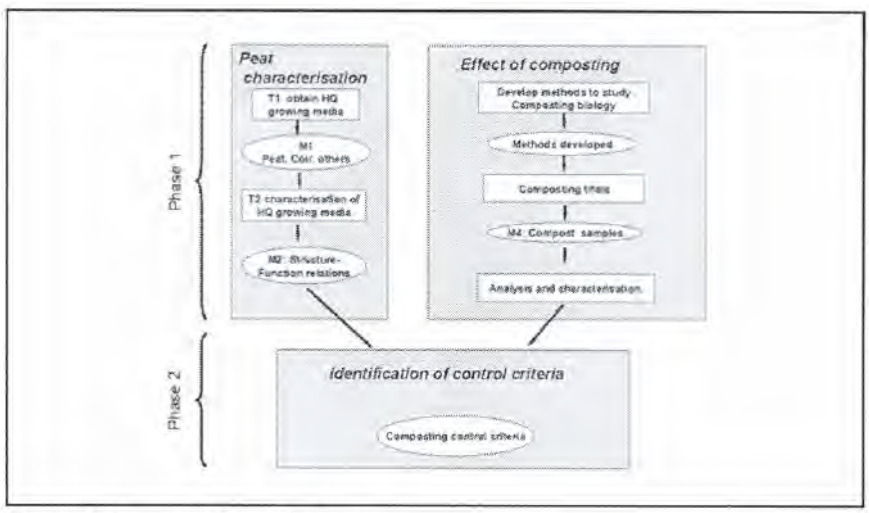

Figure 1. Overview of feasibility project.

Phase 2 of the work draws together the experimental data from Phase 1 and is designed to produce a model system that uses the normal aerobic composting process to tailor the structural nature of the plant remains and hence produce a

well defined, structurally sound material from the normal composting process. This again is drawn together in Fig. 1.

RESULTS AND DISCUSSION

At the time of writing this paper the work programme, which is sponsored by the U.K. Government Department for Environment, Food, and Rural Affairs (Defra) under the LINK programme, is approximately halfway through the initial feasibility study period. The project partners are acknowledged below. Phases 1 and 2, indicated in Fig. 1, are well progressed, and an initial batch of material from one of the compost treatments has been identified as having preserved structural composition, which is considered to be a considerable step forward from the normal end product of the composting process. Germination trials (using French marigold Dwarf Double Mixed™) have been undertaken using the newly produced material as a component of a growing medium, and the initial results in terms of growth are extremely good.

As a result of the initial findings, further mixes of the components have been set up and the aerobic composting is being monitored and sampled to replicate the material previously identified for further and more extensive trials.

In addition, further grant applications are being made to develop both the process control aspects of the work and also to fully exploit the potential of the findings of the feasibility study. A further feasibility project for this aspect of the work has recently received a grant from the U.K. Government Department of Trade and Industry Zero Emissions Enterprise Scheme.

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