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PRODUCTION OF NOVEL HIGH QUALITY HORTICULTURAL GROWING MEDIA

Interim Research Report E2009-53

INTRODUCTION

Paper mill biosolids (PMB) have been studied extensively as soil and growing media amendments for revegetation, field crops, vegetable production, and nursery container culture. Currently there is very little information available on composted PMB use in the greenhouse. Detailed research on the use of PMBs as a growing media in promoting plant growth and development in greenhouses is critical to developing improved production systems.

Soil-less media are used in horticulture for growing seedlings, plant propagation, vegetable production and the production of ornamental plants in pots. The most common media for these purposes is prepared with Sphagnum peat, due to its high physical and chemical stability and low degradation rate. The cost of high quality peat for horticultural use, together with the declining availability of peat in the near future due to environmental constraints, especially in countries without peat moss resources, make it necessary to look for alternative materials.

Table 1. Water-Holding Capacity (WHC) and Bulk Density (Db) for mixes . The letters following the measurement numbers indicate their relationship to other measurements in the table. Letters that are the same show that the measurement averages are not significantly different.

Treatment	WHC - % (m/m)		Bulk Density kgm^{-3}	
C-1	247.67	e	442.99	ab
C-2	168.37	e	580.99	a
C-3	345.93	de	327.73	bc
C-4	435.20	d	224.50	bc
C-5	213.57	e	487.89	ab
C-6	365.23	de	310.70	bc
C-7	622.73	c	206.51	bc
M-1	296.43	e	334.68	b
M-2	307.43	de	338.74	b
M-3	544.90	cd	225.01	bc
M-4	718.63	bc	168.85	c
M-5	279.63	e	292.73	bc
M-6	502.57	cd	228.65	bc
M-7	760.93	b	148.95	c
P-1	945.03	a	100.92	c
PR-1	884.90	ab	98.70	c

Figure 1: Clarendon Paper mill Compost

RESEARCH OBJECTIVES

The general objective of this research is to evaluate the suitability of composted pulp mill bio solids (PMB) and dehydrated PMB compost as peat replacement in the development of novel professional growing media for horticultural and export markets and to determine any limitation to their use. More specifically, the objectives are to:

1) Determine the effect of raw, dehydrated, screened and mixed with peat at 25%, 50% and 75% volume PMB on the physio-chemical and microbial properties.

2) Determine the effects on physio-chemical and microbial properties; and based on the results of objective 1: Selected growing media will be assessed for phytotoxicity (through germination assays) and performance (through vegetable transplant greenhouse trials).

Treatments

C-1 - Raw Clarendon	C-2 - Clarendon – DNS
C-3 - Clarendon – DNS. 50:50	C-4 - Clarendon – DNS. 75:25
C-5 - Clarendon – DS	C-6 - Clarendon – DS. 50: 50
C-7 - Clarendon – DS. 75:25	M-1 - Raw Miramachi
M-2 - Miramachi. DNS.	M-3 - Miramachi. DNS. 50:50
M-4 - Miramachi. DNS. 75: 25	M-5 - Miramachi. DS.
M-6 - Miramachi. DS. 50:50	M-7 – Miramachi. DS. 75:25
P-1 – Peat	PR-1 -Pro-Mix

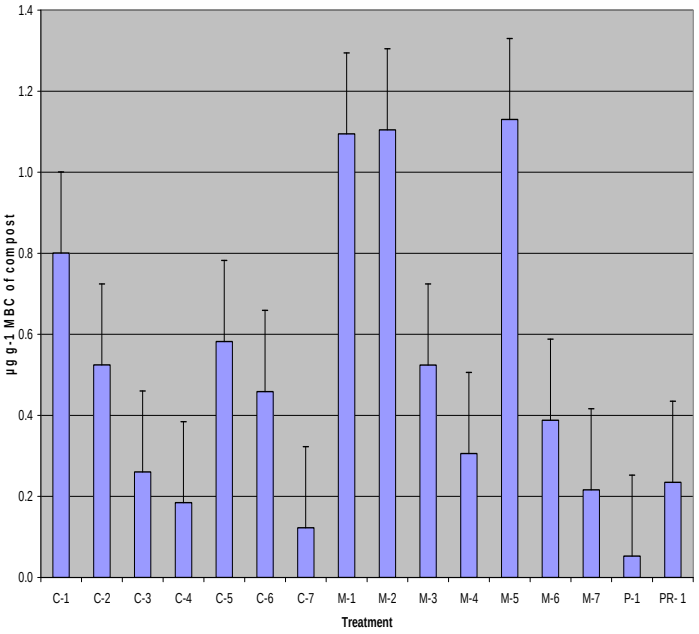

Figure 1: Microbial biomass-C as % of total c

PRELIMINARY RESULTS

PMB composts have a pH ranging from 7.2 to 7.6 and Electrical Conductivity ranging from 286 to 1010 $S \cdot m^{-1}$.There are no significant pH differences between the raw, dehydrated and dehydrated and screened compost. Both have reduced pH with the addition of peat. Screening of the compost and the addition of peat improves the bulk density (Table1). In most compost treatments, the addition of peat significantly increases the water holding capacity (Table 1) and decreases microbial content Figure 1).

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Figure 2: Tomato seedlings grown under greenhouse conditions

BOTTOM LINE

Our long term goal is to expand the high value markets and lead to the development of high quality growing media for certified organic greenhouse production systems. Interim results suggest PMB compost when combined with peat may provide a quality growing media of benefit to organic production systems.

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