Container Growing with Spent Mushroom Compost

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Nursery experts in the United States believe that the issue of waste recycling will continue to be a priority for the next 20 years. Alternative materials other than peat moss and wood by-products in container mixes must be found and evaluated (8).

During the past decade, the Ornamental Nursery Research Program at the Horticultural Research Institute of Ontario (HRIO), Vineland Station, has focused its research on recycling waste organic products as growing medium components for container culture of nursery crops (5). We have published many research articles describing successful use of wastes such as: papermill sludges, recycled municipal compost, apple pomace, waxed corrugated cardboard, various types of bark and composts, and spent mushroom compost.

Spent mushroom compost has long been known to be beneficial to garden soils. It is a good source of organic matter and is also high in certain nutrients. Since over one million tones of spent mushroom compost are generated annually in North America, its use in the plant growing industries has been rather limited (4,6). The potential for plant injury due to high salt content is largely the reason for concern in using spent mushroom compost as a soil amendment or potting substitute. However, the key to successful use of spent mushroom compost is knowing how to manage salt levels in these mixes (1,4,6).

Several trials at HRIO (2,3,7) have demonstrated that growth of most test species increased with, or was minimally affected by increasing proportions (up to 100 percent by volume) of spent compost. However, these container studies were restricted to simple mixtures containing bark and spent mushroom compost.

The replicated trial discussed and summarized in this paper evaluated a wider assortment of media used in combination with spent mushroom compost. However, the mushroom compost constituted 20 or 50 percent of the media. These amounts of compost are more suitable for commercial practice. A detailed account of this research was previously published (2).

THE EXPERIMENT

In early May, #2 (2 gal) containers were filled with one of 13 experimental media shown in Table 1. The control was 100 percent pine bark. Eight other media consisted of 25 or 50 percent peat or pine bark, 25 percent sand, and the remainder one of two sources (Greenwood and Leaver) of spent mushroom compost. Four media contained 50 percent peat or bark mixed with 50 percent spent mushroom compost.

Plug-rooted cuttings of four test species were used: Coral Beauty cotoneaster (*Cotoneaster dammeri*), Tartarian dogwood (*Cornus alba*), Lynwood forsythia (*Forsythia intermedia*), and Variegata weigela (*Weigela florida*).

Each container was watered manually to run-off with about one liter of water before planting to moisten the media, and with a half liter immediately after planting. Thereafter, plants were trickle-irrigated daily with one liter of water per container twice per day and fertigated three times weekly with triple 20 at a rate of 200 ppm of N.

The chemical and physical composition of all media were determined at the beginning of the experiment. The pH and soluble salt readings were monitored at various intervals during the season. In mid-July, leaf samples were collected and analyzed later. In late September, plants were harvested and the dry weight of shoots determined. The subsidence (volume reduction) of the medium in each container was measured in terms of depth from the container rim.

THE RESULTS

Growth. This container production system resulted in vigorous plants of all species. By the end of the growing season, all plants reached marketable size.

As shown in Table 1, growth of three species (dogwood, forsythia and weigela) was better in all compost-amended media compared to 100 percent bark medium used as control. The fourth species, cotoneaster, grew equally well in all media (data not shown).

Closer examination of the results further showed that a) growth was 20 percent greater in peat-based than in bark-based compost media; b) there was little or no difference with 25 percent or 50 percent spent compost in the media; c) the presence of 25 percent sand had no negative effect on growth. Media with sand, however, was heaviest and subsided only marginally by the end of the season.

Salts. Four days before planting (May 3) the salt levels in all media, except the 100 percent bark control, were at intermediate levels between 1.2 and 4.6 dS/m (Table 1). A salt level of less than 1.0 dS/m is considered desirable. Within one week after planting (May 15), the salt levels in all media declined substantially (Table 1). Our past studies have indicated that newly transplanted plants are able

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to withstand higher salt levels under our growing conditions (2,3,7).

Close attention to watering at planting and during the first several days after planting is a normal cultural practice of container growing. Watering is especially critical when using spent mushroom compost since the initial applications of water result in rapid and substantial loss of potentially toxic salt levels. Until salt levels become low, it is important that the media never be allowed to dry out, since drying increases salt levels and the danger of burning the roots.

Throughout the growing season, we observed no visible plant injury attributable to salt levels in the media. Leaf analysis indicated acceptable ranges of all leaf mineral nutrients. The exemplary performance of four species in different media is noteworthy.

SUMMARY AND CONCLUSION

This study provides additional new information on recycling of spent mushroom compost in container growing.

Four deciduous ornamental shrubs - Coral Beauty cotoneaster (*Contoneaster dammeri*); Tartarian dogwood (*Cornus alba*); Lynwood forsythia (*Forsythia intermedia*); Variegata weigela (*Weigela florida*) were grown in trickle-fertigated containers containing 13 different experimental media. Eight media contained 25 or 50 percent sphagnum peat or composted pine bark, 25 percent sand, and the remainder one of two sources of spent mushroom compost; four media contained 50 percent peat or bark mixed with 50 percent spent mushroom compost, and one medium (control) was 100 percent pine bark.

Initially higher than desirable levels of salts in all compost-amended media were quickly leached (within one week of planting) and were of no detriment to the species tested.

The results demonstrated that under our growing conditions bark-and peat-based media with 25 or 50 percent spent mushroom compost promoted excellent growth of all four container-grown de-

Table 1 Soluble salt levels (dS/m) in the 13 experimental media during the growing season

Media[x] (by volume)		3 May	7 May[y]	8 May	15 May	22 May	27 June	24 Aug.
Control	100B	0.4[x]	0.1	0.1	0.1	0.1	0.1	0.1
GREENWOOD								
Bark-Based	50B:50SMC	2.8	1.5	1.5	1.2	0.7	0.3	0.2
	50B:25SMC:25S	1.3	1.1	0.7	0.5	0.3	0.1	0.1
	25B:50SMC:25S	2.6	1.8	0.9	0.8	0.5	0.3	0.2
Peat-Based	50P:50SMC	4.0	4.0	2.3	2.0	1.0	0.3	0.3
	50P:25SMC:25S	2.2	1.6	1.4	1.1	0.5	0.3	0.2
	25P:50SMC:25S	4.6	3.1	2.0	1.2	0.9	0.4	0.2
LEAVER								
Bark-Based	50B:50SMC	2.3	2.0	1.4	0.5	0.4	0.3	0.2
	50B:25SMC:25S	1.2	1.0	0.6	0.3	0.2	0.1	0.1
	25B:50SMC:25S	2.5	1.5	1.2	0.5	0.3	0.2	0.2
Peat-Based	50P:50SMC	4.0	2.9	2.2	1.6	0.8	0.4	0.3
	50P:25SMC:25S	1.6	1.6	0.9	0.8	0.2	0.3	0.2
	25P:50SMC:25S	2.9	2.5	1.7	0.9	0.3	0.4	0.3

[x] B = bark; P = peat; SMC = spent mushroom compost; S = sand. [y] Date of planting.

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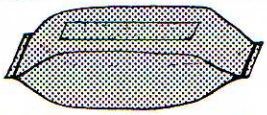
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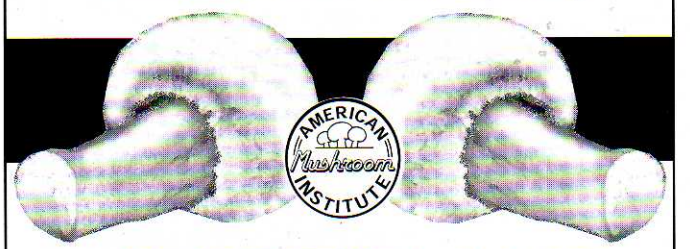
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ciduous nursery shrubs. Slightly better growth occurred in the peat-based than in the bark-based media. The addition of sand (25 percent) to a mixture of 50 percent peat or bark and 25 percent spent compost had no negative effect on growth and produced a medium with minimal subsidence.

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