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Effects of Peat Moss Substitution with Arboretum and Greenhouse Waste Compost For Use in Container Media

M.W. Olszewski, T.A. Trego, and R. Kuper
Department of Landscape Architecture and Horticulture, Temple University, Ambler, Pennsylvania
olszewsk@temple.edu

Plugs of impatiens (*Impatiens walleriana* Hook.f.), salvia (*Salvia splendens* Sellow ex Roem. & Schult.), and vinca (*Catharanthus roseus* (L.) G. Don) were transplanted into containers filled with commercial *Sphagnum* peat moss plus perlite medium (Sunshine Mix #1) or arboretum and greenhouse waste compost (CT), *Sphagnum* peat moss (PS), and perlite (PE) medium at percentages of (by vol.) 50:50 PS:PE and 75:25 PS:PE (controls). CT media included 25:50:25, 25:25:50, and 50:25:25 CT:PS:PE, or 50:50 and 75:25 CT:PE. Shoot dry weight of vinca and impatiens and stem diameter of vinca were greater for 25:50:25 CT:PS:PE than controls. Shoot dry weight and stem diameter of salvia were similar for CT media and controls. CT additions increased bulk density but decreased particle sizes, total porosity, and container capacity. It was concluded that CT-growing methodology could be implemented without loss of plant quality, although physical media characteristics limit the amount of compost and component ranges within container media.

Introduction

Peat moss is used extensively in the greenhouse and nursery industries. However, peat bogs are a major source of carbon sequestration (Gurevitch *et al.* 2006) and environmental and ecological considerations are likely to make compost a competitive alternative to peat (Goldstein 2001). Hartz and Giannini (1998) and Hartz *et al.* (1996) stated that one of the highest economic values for compost was its utilization in container media. Compost sources for impatiens have included biosolids/sewage sludge/yard trimmings/mixed paper, refuse-derived fuel residues/biosolids/sewage sludge/yard trimmings/municipal solid waste, municipal solid waste, and biosolids/yard trimmings (Klock 1998; Klock and Fitzpatrick 1997; Klock-Moore 1999a; Moore 2004), while sources for salvia have included yard trimmings/sewage sludge (Grigatti *et al.* 2007), biosolids/yard trimmings, and seaweed/yard trimmings (Klock-Moore 2000; Wilson *et al.* 2003), and for vinca have included municipal yard/landscape waste (Hartz and Giannini 1998).

Toxicity symptoms such as reduced seed germination, reduced shoot dry weight, plant size, and reduced growth may occur when plants are grown in different composted waste products (Bugbee and Frink 1989; Hartz and Giannini 1998; Klock and Fitzpatrick 1997). A 'bell curve' response to compost additions may be due to properties within the medium including high element concentrations and/or high percentage of fine particles (Moore 2005). Another problem with using compost is excessive binding of manganese in some compost products resulting in nutrient deficiency (Broschat 1991).

The purpose of this study was to determine plant growth responses of three bedding plant species and to compare the physiochemical properties of media containing compost derived from arboretum and greenhouse waste

Materials and Methods

The greenhouse and arboretum compost used in this study was from The Landscape Arboretum of Temple University Ambler (Ambler, Pennsylvania, USA) with materials originating from arboretum plant refuse, garden weeds, leaf litter, turfgrass clippings and greenhouse plants with horticultural media. Plant waste and media waste were composted for nine weeks in outdoor windrows with interior temperatures reaching 56-77°C. Windrows were turned three times during the composting stage. Final compost processing consisted of heating in a SS60R electric soil sterilizer (Pro-Grow Supply, Brookfield, Wisconsin, USA) at 82°C for 40-minutes. All composted materials were sieved through a 1-cm screen and materials passing through the sieve were retained for further testing while larger particles were removed. Fin-