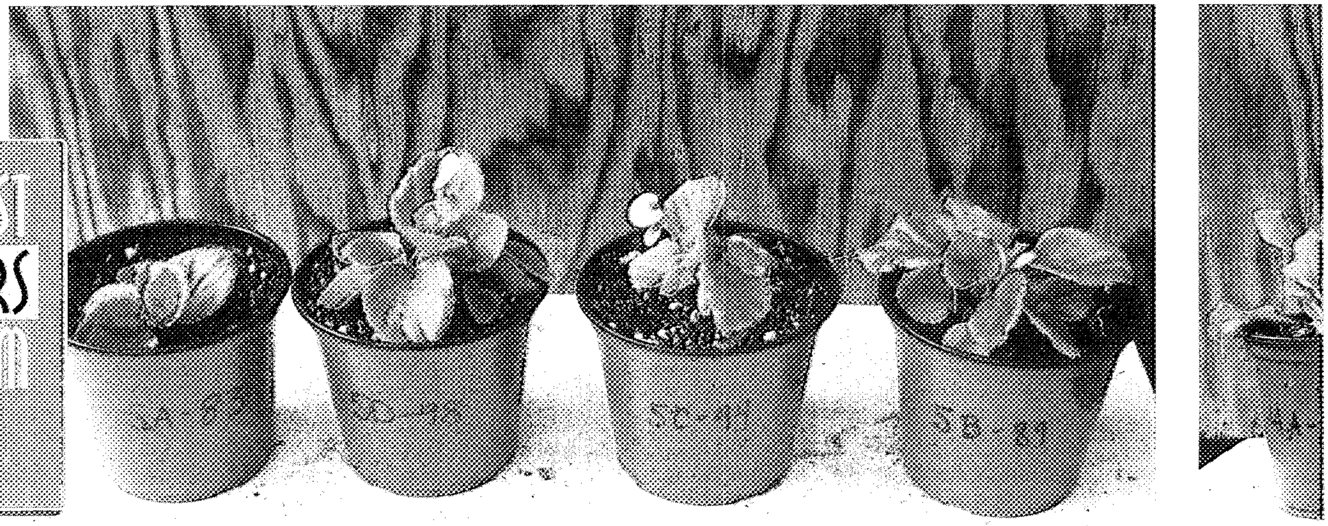
COMPOST USERS FORUM



Container Production Of Ornamental Horticulture Crops

Florida researchers emphasize that composters should communicate with growers about feedstocks, process methods and end product content to maximize crop response.

Kimberly A. Klock-Moore, George E. Fitzpatrick and Gladis Zinati

A MAJORITY of ornamental horticulture crops are produced in containers in either an outdoor nursery or greenhouse setting. Because the container and growing media are sold along with the plant, these items must be replaced in order to produce another crop. A very attractive potential market for the composting industry is to sell its product as a growing substrate component. However, the question arises as to how much compost should be used in the growing media for optimum production of ornamental horticulture crops.

There is no magic percentage that can be applied to all situations. For example, there are some recommendations that state that compost should not be used in excess of 30 percent of the substrate, while other recommendations state concentrations up to 100 percent compost can be used.

To determine how much compost to recommend using in the growing substrate, the composting industry should communicate with the growers who are using and will be using the compost. In general, growers want substrates that are consistent, reproducible, available, easy to mix and work with, cost-effective and have the appropriate physical and chemical properties for the specific crop that they are growing. They need to know: What parent materials were used to make the compost; Nature of any preprocessing that might have been done; What, if any, postprocessing was done; Composting time; Compost maturity; Content of inert materials; Concentration of regulated heavy metals; and Physical and chemical properties (Table 1).

The composting industry should consult with growers on which crops will be grown using their compost product because the appropriate physical and chemical parameters of the media will vary with the type of crop (Table 2). For example, impatiens grow best in substrates with a pH of 5.8 to 6.2 and a soluble salt concentration of 0.25 to 0.75 dS/m, while philodendron plants grow best in substrates with a pH of 5.5 to 6.5 and a soluble salt concentration of 0.57 to 1.43 dS/m.

Begonias (far left) and petunias (near left) were grown in substrates containing 0, 30, 60 or 100 percent compost made from biosolids and yard trimmings. Begonias illustrate a positive plateau response while petunias exemplify a bell curve response.

Big Differences In Compost Response

Another important reason to know which plants will be grown is that different plant species can vary tremendously in how they respond to increasing concentrations of compost in the media. Some plants show no response to increasing percentages of compost in the growing substrate while others show a rise in growth up to a point with no further increases (plateau). Other crops show an increase in plant growth as the percentage of compost in the substrate increases (linear). Finally, some crops show a gain in growth as percentage of compost increases and then a decrease (bell curve). On rare occasions, some plants will show a decrease in growth as the percentage of compost in the substrate increases. This is frequently the result of using immature compost products. Knowledge of any particular plant species' tolerance to immature compost coupled with knowing the maturity of the compost product is critical for growers of such sensitive crops. The goal in using compost in the growing substrate is to use enough to get the desired growth effect at a cost-effective price.

There is no magic percentage of compost content that can be applied to container media for all crops.

Because it is often difficult to determine which response group fits the situation, some research with different crops has been published that describes these various responses. However, the responses observed in the research may not be reproducible under different conditions. Ideally, bioassay trials should be conducted by growers or their advisors on selected compost products prior to their use in container production. Before we conduct experiments with a new compost product, we conduct a bioassay using radish seeds (*Raphanus sativus* L.) because this species has a rapid germination

Table 1. General guidelines for compost suitable for use as a component of container substrates (Rynk *et al.*, 1992).

Parameter	Guideline
Particle size	1/2 to 3/4 inch
pH	5.0 to 7.6
Soluble salt	Less than 2.5 dS/m (SME)[z]
C:N	Less than 20
Air-filled porosity	5 to 30%
Water-holding capacity	20 to 60%
Foreign material	Less than 1% dry weight
Heavy metals	Not exceeding EPA standard
Respiration rate	Less than 200 mg per kg per hour O_2 consumed

[z]SME stands for the saturated media extraction method.

rate and easily measurable root mass for comparisons. We fill a seed flat with the compost in question and fill another seed flat with a standard commercial growing substrate of known characteristics. We then sow a known number of seeds into each container and record the number of seedlings that germinate after eight days. We then calculate percent germination (number of seeds that germinated ÷ the number of seeds sown ×100). Radish seedlings are allowed to grow for another 20 to 30 days before harvesting of the radish for fresh weight comparisons of the substrate.

This bioassay procedure also will work with compost blends. For example, if growers want to test the suitability of a blended media containing compost (e.g. 60 percent compost, 25 percent vermiculite, 15 percent perlite by volume), they can fill the test flat with the compost blend and the other flat with a control medium. They could even test several blends (e.g. 30, 60, or 100 percent compost versus commercial media with no compost) using this bioassay procedure.

There are many opinions about the utilization of compost in the ornamental horticulture industry, but many believe in the increased use of compost. However, commercial compost companies must monitor and manage their product to produce a consistent product that can be used by container growers. By communicating with growers about their needs, the composting industry can help guide the horticulture industry about how to use compost most effectively. ■

Table 2. General guidelines for the chemical and physical properties of container growing substrates for bedding plants, foliage plants, and woody ornamentals*

Parameter	Bedding Plants[z]	Foliage Plants[y]	Woody Ornamentals[x]
pH	5.8 to 6.2	5.5 to 6.5	5.8 to 6.2
Soluble salts	0.75 to 2.00 dS/m	0.57 to 1.43 dS/m	0.50 to 1.00 dS/m
Nitrate	80 to 160 ppm	50 to 90 ppm	NA
Phosphate	6 to 10 ppm	NA	NA
Potassium	150 to 225 ppm	NA	NA
Total pore space	75-85%	NA	NA
Air-filled porosity	5 to 10%	5 to 30%	NA
Water-holding capacity	NA	20 to 60%	35 to 50%

*Dickey *et al.*, 1978; Fonteno, 1996; Poole *et al.*, 1981; Warncke and Krauskopf, 1983.
[z]Soluble salt, nitrate, phosphate, and potassium determined using saturated media extract (SME) method.
[y]Soluble salt determined using 1:2 method and nitrate determined using SME.
[x]Soluble salt determined using 1:2 method.Heavy metals
NA means that values were not given in these references.

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Kimberly Klock-Moore and George Fitzpatrick are in the Environmental Horticulture Department at Fort Lauderdale Research and Education Center, University of Florida. Gladis Zinati is at the Tropical Research and Education Center of the University of Florida in Homestead.