

Growing Calibrachoa and Geranium in Cranberry Pomace Mixes

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Cranberry pomace compost (or “cranpost” as one grower calls it) is a waste material of the cranberry processing industry in Massachusetts and as such it poses a disposal problem. At the same time its appearance and physical characteristics suggest that an opportunity exists to use it as growth medium amendment in the greenhouse industry.

The use of organic waste materials and composts as amendments to greenhouse potting mixes has been studied and practiced for many years. Today, many organic waste and compost mixes are being produced from “cleaner” or “less offensive” materials like farm manure and other agricultural wastes, paper, leaves and other landscape wastes, and food processing byproducts. For municipalities, industries, and farms and other agricultural operations composting is becoming an important means of waste disposal because of the rapid increase in disposal costs and the shrinking number of acceptable disposal alternatives.

Growing mixes containing organic wastes and composted materials are used with great success in the greenhouse industry, but sometimes problems occur which are serious enough to reduce plant growth and quality. These problems are often related to several factors: the use of the compost alone as a growing mix without blending with other materials, poor drainage and too much weight, excess soluble salts or ammonium-nitrogen, nutrient deficiencies resulting from waiting too long after planting to start applying fertilizer, or toxicity of an especially abundant nutrient.

Trials utilizing cranberry pomace have been conducted for several years by Paul Lopes with commercial growers in Massachusetts. Growers have produced crops such as hardy mums, poinsettias, flowering hanging baskets and mix containers of flowering annuals. These trials have shown promise in utilizing cranberry pomace as a component in soil media and have familiarized the growers with the use of cranberry pomace. This project was conducted to study plant growth response to cranberry pomace mixes more carefully under controlled conditions. It is part of a larger project supported by a grant from The New England Greenhouse Conference.

How the plants were grown

Calibrachoa. Cuttings of ‘Million Bells Pink’ were taken and stuck in 72-cell plug trays of Fafard 3B soilless growth medium on January 25, 2007. Before sticking the cuttings were dusted with RooTone rooting powder. The cuttings were placed under intermittent mist to root. Rooted cuttings were transplanted to 4-inch pots of Fafard 3B (control) or to various formulations of cranberry pomace growth media on March 1.

Two types of cranberry pomace were tested. One consisted of pomace that had been composted for about 3 years (we call it “old”) and had the appearance and consistency something like coffee grounds. The initial pH and EC of this material was 5.5 and 0.57 mmho/cm, respectively. The second type of pomace was about 6 months old (“new” pomace) and was not probably completely composted as seeds and recognizable fruit skins were obvious. The initial pH and EC of this material was 5.8 and 0.88 mmho/cm, respectively.

Different growth media were formulated using the “old” and “new” types of cranberry pomace: 100% pomace, 50% pomace + 50% sphagnum peat moss, and 50% pomace + 50% Fafard 3B (volume basis).

There were 8 single-plant replicates per pomace growth medium and the control. The only fertilizer amendment added to the media was dolomitic limestone at a level of 5 lb./yd³. Plants were fertilized with 180 ppm N from Technigro 17-5-24 alternating with 15-0-15.

On April 5 plant height and diameter were measured and the tops were harvested for dry weight determination. After harvest the growth media were sampled for pH and EC measurements. EC was determined using the 2:1 method.

Seed geranium. Seeds of ‘Ringo 2000’ were sown in 144-cell plug trays of Metro Mix 250 on March 2, 2007. Seedlings were transplanted to 4-inch pots of Fafard 3B (control) and the various formulations of cranberry pomace growth media described for calibrachoa on April 9. There were 8 single-plant replicates per pomace growth medium and the control. Plants were fertilized with 180 ppm N from Technigro 17-5-24 alternating with 15-0-15.

Days to flower from time of seed sowing were recorded when the first floret of the first flower cluster opened. On June 3 plant height, plant diameter, and length of the first flower stalk were measured and the tops were harvested for dry weight determination. After harvest the growth media were sampled for pH and EC measurements.

Results

Calibrachoa. Plants grown in the various cranberry pomace media were indistinguishable from the Fafard 3B control in terms of foliage color and flowering (Figure 1), height, and diameter (Table 1). In one treatment (“100% new”) plant diameter was significantly less than the control and in three cases shoot dry weight was also less than the control. However these differences were too small to be of practical importance. No growth medium formulation tested, including Fafard 3B, resulted in clearly better plants than another.



Figure 1. Calibrachoa grown in (L to R) Fafard 3B, 100% old pomace, and 100% new pomace.

No differences between the roots of plants grown in pomace media and the control were apparent upon visual inspection of root structure and development (Figure 2).

The pH and EC of pomace media was lower or not different and higher or not different, respectively, than the pH and EC of Fafard 3B control (Table 2). In general

all media were acidic and of moderate EC at the end of the experiment.

Table 1. Growth of calibrachoa 'Million Bells Pink' in cranberry pomace growth media.

Growth medium	Plant height (cm)	Plant diameter (cm)	Shoot dry weight (gm)
Fafard 3B (control)	19.8 ^z	40.7	7.8
Old 100%	18.7	38.9	7.2
Old + 50% peat	20.0	40.7	7.7
Old + 50% 3B	17.8	39.1	<u>6.6</u>
New 100%	17.9	<u>36.4</u>	<u>6.4</u>
New + 50% peat	19.9	37.6	6.9
New + 50% 3B	20.6	37.8	<u>6.8</u>

^zUnderlined means are statistically different from Fafard 3B (control) at P=0.05. (1 inch = 2.54 cm).



Figure 2. Root systems of calibrachoa grown in (L to R) Fafard 3B, 100% old pomace, and 100% new pomace.

Table 2. pH and EC of cranberry pomace growth media.

Growth medium	Growth medium pH	Growth medium EC
Fafard 3B (control)	5.4 ^z	2.15
Old 100%	<u>4.8</u>	<u>1.70</u>
Old + 50% peat	<u>4.9</u>	<u>1.67</u>
Old + 50% 3B	<u>5.2</u>	<u>1.54</u>
New 100%	5.5	2.21
New + 50% peat	<u>5.0</u>	<u>1.75</u>
New + 50% 3B	5.2	<u>1.95</u>

^zUnderlined means are statistically different from Fafard 3B (control) at P=0.05.

Seed geranium. All cranberry pomace treatments produced geranium plants of acceptable growth and quality (Figure 3), however plants growing in the three media formulated with “old” pomace were significantly smaller in diameter and had less dry weight than the Fafard 3B control (Table 3). Plants in the “100% old” treatment were also shorter than the control. In media containing “new” pomace geranium growth was not different from the control.

Flower stalk length and days to flower were not affected by pomace compared to the control.

The root systems of plants growing in media containing “old” pomace appeared to be healthy, but were not as extensively developed as the roots of the control or with “new” pomace (Figure 4). This was especially true in the “100% old” pomace treatment. In this case the root system could be easily pulled from the medium and it did not seem to adhere or be attached in any way to the organic materials.



Figure 3. Seed geranium grown with (L to R) Fafard 3B, 100% old pomace, and 100% new pomace.

Growth medium pH and EC measurements at the end of the experiment do not explain the poor root growth in the “old” pomace treatments because it was similar to the control and “new” treatments: moderately acid pH (a little low for geraniums) and low to moderate EC. In a commercial greenhouse we have observed similar abnormal root growth by poinsettia in the same media, but as yet we don’t have a conclusive explanation for it.

Table 3. Growth of seed geranium ‘Ringo 2000 Red’ in cranberry pomace growth media.

Growth medium	Plant height (cm)	Plant diameter (cm)	Flower stalk length (cm)	Days to flower from sowing	Shoot dry weight (gm)
Fafard 3B (control)	27.8 ^z	32.2	23.9	87	18.8
Old 100%	<u>21.4</u>	<u>26.6</u>	22.1	88	<u>13.9</u>
Old + 50% peat	25.0	<u>29.0</u>	21.8	86	<u>15.8</u>
Old + 50% 3B	27.2	<u>29.4</u>	23.3	87	<u>16.8</u>
New 100%	25.6	30.3	23.5	<u>84</u>	<u>16.9</u>
New + 50% peat	25.1	30.4	21.4	87	<u>17.7</u>
New + 50% 3B	26.3	30.1	22.1	86	<u>17.3</u>

^zUnderlined means are statistically different from Fafard 3B (control) at P=0.05. (1 inch = 2.54 cm).



Figure 4. Root growth in 100% old pomace (left) vs. 100% new pomace (right).

Table 4. pH and EC of cranberry pomace growth media.

Growth medium	Growth medium pH	Growth medium EC
Fafard 3B (control)	5.9 ^z	0.88
Old 100%	6.0	0.81
Old + 50% peat	5.8	1.00
Old + 50% 3B	<u>5.6</u>	0.77
New 100%	5.8	0.95
New + 50% peat	5.7	1.06
New + 50% 3B	<u>5.6</u>	1.07

^zUnderlined means are statistically different from Fafard 3B (control) at P=0.05.

Conclusion

Our work with cranberry pomace media so far suggests that it has good potential as an alternative growth medium component. If we only tested calibrachoa we'd probably conclude that pomace has no problems and it's "good-to-go" for use by growers. However, results with seed geranium demonstrate why we plan to grow other species of crops in pomace media beginning this fall with poinsettia and to continue commercial field trials. Right now the only explanation for the different response of calibrachoa and geranium to "old" pomace may be that the calibrachoa cuttings had a much larger and more extensive root system at potting than did the seed geranium which was started in a much smaller-sized plug cell.