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Biocontainers offer several choices

By Michael R. Evans, Jeff S. Kuehny and Matt Taylor

Biocontainers provide the floriculture industry with an opportunity to adopt sustainable products and practices.

Plastic containers helped to revolutionize the floriculture industry. This has been particularly true for bedding plant growers who use large numbers of plastic containers in various sizes, shapes and styles. However, as sustainable production practices have become increasingly important, there has been an increased interest by growers and consumers alike in the use of biocontainers.

Biocontainers are made from a variety of organic components that readily decompose, although the time to decompose varies widely depending on composition. Biocontainers are also considered to be more environmentally friendly than traditional plastic containers. Depending upon their composition and intended use, biocontainers may reduce labor, provide new marketing strategies and contribute to the mineral nutrition of a crop.

Testing biocontainers

A better understanding of the differences in the physical characteristics of biocontainers, as well as plant performance in these containers, is critical for growers to make informed decisions on how to use them most effectively. Researchers at the University of Arkansas, Louisiana State University and Longwood Gardens are conducting studies on container characteristics, including strength, durability and water use. Plant growth in the greenhouse and field and container decomposition rates are being evaluated.

Types of biocontainers

Biocontainers may be divided into two broad groups. The first are those that decompose, but do so slowly, and may present a barrier to root growth when planted in the field. These types of containers are designed to be removed before plants are transplanted into the field or into their final containers. After removal, these containers may be ground up, broken apart and/or composted.

Geraniums grown in (left to right) feather/fiber, plastic and peat pots.

Another group of biocontainers is designed to be planted directly into the field or into final containers without having to remove the plants from the biocontainers. These are designed so that the roots can grow through the container walls. The containers decompose relatively quickly once plants are transplanted into the soil.

Biodegradable containers are made from a variety of materials that range from peat, cow manure, rice hulls, straw fiber, coir fiber, biodegradable plastics, chicken feathers and wood byproducts. The cost of the containers varies significantly and the claims of added benefits, in addition to being biodegradable, range from improved root growth, increased insect or disease resistance, inherent nutritional properties, improved water management and transplantability.

Biocontainer properties

Shapes and sizes. There are numerous characteristics of biocontainers that growers should consider. One of the first considerations is whether a given type of biocontainer is available in the required shape and size.

Cost. Biocontainers may also be significantly more expensive than traditional plastic containers. Therefore, the advantages of biocontainers must compensate for any additional costs.

Rate of decomposition. All biocontainers are designed to decompose, but the rate of decomposition varies among the containers. Furthermore, the strength and rigidity of the containers vary. Because of these factors, not all biocontainers are plantable into the field or final container. CowPots, made from 100 percent composted cow manure, are recommended for planting directly into the soil. But bioplastic containers should be removed before final planting. Bioplastic containers are made from nonpetroleum materials such as starch.

Strength. Strength is a function of the materials from which the containers are made as well as the binding agents used. Strength is very important because if the containers tear or break during handling and/or shipping, this can result in the loss of salable product.

It is important to consider both the dry strength and the wet strength of containers. A container that appears relatively strong when dry may lose a great deal of its strength after it remains wet in the greenhouse for a period of time. In a study at the Univer-

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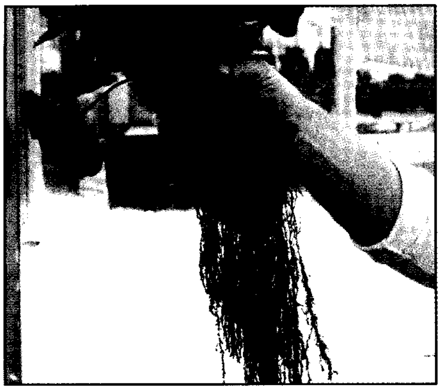


After 12 weeks geranium roots have grown out of the walls of a feather/fiber pot.

sity of Arkansas, a peat pot had a longitudinal (upright) dry strength of 25 kilograms (amount of weight to break the container) when dry but only 3.4 kilograms when wet. The peat pot had a lateral (on side) dry strength of 3.1 kilograms when dry and 1.5 kilograms when wet.

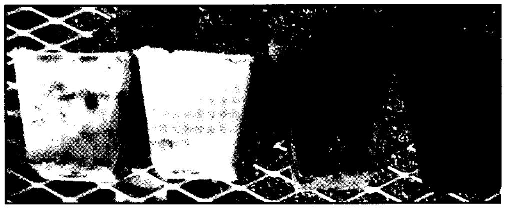
Water usage. Water usage is an important property of biocontainers because some of the containers allow more or less water to evaporate from their surface walls. This can increase the amount of water in production.

Typically, the denser and more hydrophobic the container wall, the lower the evaporative water loss from the wall. The average interval between irrigations for a plastic container used to grow vinca and impatiens was three days but the interval between irrigations for feather and peat containers was two and 1.3 days, respectively. Likewise, the total volume of water used to grow these crops was 1,943, 3,112 and 4,406 milliliters per plant when grown in plastic, feather and peat containers, respectively.

Algae, fungal growth. A problem that some biocontainers experience is the growth of algae or fungi on the outside surface. This has been a problem for biocontainers made from components with significant amounts of nitrogen or containers that absorb nitrogen-containing fertilizer solutions. Where no algae or fungi grew on the outer walls of plastic containers, 5 percent and 56 percent of the container wall surface of feather/fiber pots and peat pots, respectively, were covered in algae or fungi.

Odorous containers. Those made from components that contain significant amounts of nitrogen have tended to have the most notable odors. However, the odor is usually minor and usually dissipates during greenhouse production before marketing.

Intertwining plants. If biocontaners are placed into trays, and plant roots are able to penetrate the container walls to a significant extent while in the greenhouse, roots from different containers may begin to grow together. This



Algae growing on the side walls of a feather/fiber (two on the left) and a peat pot after 12 weeks.

Commercial biocontainers

There are numerous biocontainers on the market with more products under development and evaluation.

- **Jiffy-Pots** are a type of peat container that has been used by the floriculture industry for many years. They are manufactured from a combination of sphagnum peat, wood pulp fiber and lime to adjust the pH.
- **Kord fiber pots** are manufactured from recycled paper and cardboard.
- **Fertilpots or DOT Pots** are biodegradable containers that contain no glue or binders and are composed of spruce fibers and peat.
- **Coir or coco fiber containers** are manufactured by using high pressure to bond coconut husk fibers and latex from rubber trees.
- **The StrawPot** consists of 80 percent rice straw and 20 percent coco fiber sprayed with natural latex.
- **CowPots** are manufactured from 100 percent renewable composted cow manure.
- **Ellepots** are made from a degradable, non-woven paper tube filled with rooting medium, cut to the desired length and placed in support trays. Ellepots are typically used for vegetative propagation and not typically used as a final growing container.
- **Various types** of bioplastic containers are also being evaluated. These containers are made from compounds such as starch and are designed to decompose over a two- to four-year period.
- **There are biocontainers** for commercial growers and others (i.e. Vipot, Graine De Pot, etc.) that are designed for consumers. These containers may be produced from a variety of materials such as bioplastic, coconut shells or other organic materials. They are designed to last for several years. When they are broken apart they can be composted because they readily decompose. Although all of these containers fit into a sustainable program, the Fertilpot is the only one of the listed containers that is currently in the Organic Materials Review Institute Products List, which includes nearly 1,600 products.

may make it difficult to separate plants when transplanting or when consumers attempt to remove individual plants from the trays.

Nutrient levels. Some biocontainers such as feather pots and CowPots may contain significant levels of mineral nutrients, especially nitrogen. Nutrients may leach from the container wall into the root substrate and roots may grow into the container wall. The container may serve as a significant source of some nutrients. This may require growers to make adjustments to fertilization programs to account for the additional nutrient source.

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