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The perfect solution

The green industry continues its search for a durable, but biodegradable, nursery container

These molded fiber containers by Western Pulp Products are made from post-consumer waste paper and will break down in the soil or during composting.

By Miles McCoy

Plastic containers revolutionized plant production. In today's green industry a significant percentage of plants are grown in some type of container. At the retail level, containers not only hold plants and soil, but they have become a visual part of the marketing.

Yet, environmental concerns increased with plastic products, both in how they are made and how they become a waste stream. As a result, container manufacturers began to look at other materials. The challenge was to find materials that could contain the soil and plants as they moved through the production and marketing system, yet break down after they were used, usually in composting systems.

Numerous substrates are being used and tested to create a range of biodegradable pots including waste paper, peat, coir, cornstarch resins, wheat, bamboo, and even cow manure.

Finding replacements for plastic containers has become an important research topic, with the American

Nursery and Landscape Association (ANLA) starting research several years ago to identify useful container substrates. The key challenge is finding compounds and resins that, when combined, will hold their integrity in normal environmental pressures.

"We need materials that will stand up to the south's warmer temperatures, heavy irrigation schedules, and high levels of nitrogen," Agricultural Research Service horticulturist Donna Fare said. These environmental factors work together to break down non-plastic pots in the field, she said.

Fare is heading up the ANLA-sponsored research project in McMinnville, Tenn., which will finally test a chicken-feather based container during this year's growing season.

Recycled plastic an option

Many nursery container producers have morphed from using virgin plastic to using recycled materials. This is a major step toward sustainability, since it at least recovers the plastic already in use in the nursery industry, plus absorbs some of the consumer waste stream.

For instance, ITML Horticultural Products Inc. has a line of recycled

containers, called Elite and Euro System Nursery Containers, made with "100 percent recycled, indestructible polyethylene material," according to marketing claims.

Another example is the Root Pouch containers from Avena and Associates. These are made from polyethylene terephthalate (PETE), which comes from recycled plastic beverage bottles, which are turned into non-woven fabric. It is used to manufacture a full line of nursery containers, including propagation liners and various sizes of plantable pouches, available in different densities and degradable life spans.

What are biodegradable containers?

While there are differences between aerobic and anaerobic degradation, "biodegradable" usually refers to material that can be broken down into its organic components. Essentially, biodegradable materials avoid filling up landfills by returning their components to the soil through effective composting.

"Effective composting" is a key step to making any of these containers actually biodegradable. In fact, some national and international standards have stricter

criteria, defining “compostable” as having three requirements:

First, they must “biodegrade” which is defined as “breaking down into carbon dioxide, water and biomass.” Secondly, they must “disintegrate,” so that after three months of composting and subsequent sifting through a 2 mm sieve, there is no more than 10 percent residue remaining. Finally, there can be no “eco-toxicity,” so the bio-degradation does not produce any toxic material and the compost can sustain plant growth.

These global standards exist to certify compostable plastics and packaging under controlled conditions typically found only at industrial facilities rather than standard landfills or backyard compost bins, and until recently, it has been uncertain whether many of the new plastics will degrade effectively in standard landfills or compost bins.

Anderson Die & Manufacturing, however, reports that its “Eco Choice” container is both unaffected by temperature and moisture, yet breaks down between nine months to five years once exposed to other biodegrading biomass, such as that found in home composts, commercial compost, or landfills.

Molded fiber an early option

Many decades ago, molded pulp or fiber found uses in the horticulture industry. Molded pulp products are made from natural cellulose fibers, including waste papers and peat, and are biodegradable, breaking down in compost systems and most landfills.

These molded fiber products were often used in early propagation stages in combination with rigid plastic trays. But, as plants moved into gallon sizes, most growers continued to use plastic pots, especially if they were shipping plants. The early fiber pots just were not rigid enough to withstand handling damage.

One of the earlier producers of non-plastic containers was active here in Oregon. For more than 50 years, Western Pulp Products has been making containers using waste paper collected by charitable organizations (“post-consumer”),

while other sources are “pre-consumer,” including Kraft, waxed, and other waste paper. Only the metal rings and hanging wires are not decomposable. “Even the wax paraffin used to bind the pulp will degrade during composting or in the soil,” sales manager Jim Lee said.

While their products are not considered “organic,” they can be used to grow organic plants, according to Lee. He said their growers received approval from Oregon Tilth that organic vegetable transplants can be grown in their molded fiber containers, but the plant must be removed from the container before it is planted in the soil.

Jiffy Pots are another decades-old name in nursery containers, entering the market in the mid-1950s. The George Ball Company bought the U.S. rights from the Norwegian firm that developed the technology. They found numerous uses in nursery propagation, becoming a standard tool for growing plants. But, again, they tended to be too fragile for field and shipping uses.

Wide range of substrates now available

Many of the newer biodegradable containers are actually manufactured by processes similar to the Western Pulp method – a plant-based substrate held together with a binding agent. Choices for substrates continue to expand.

One example is the Fertil biodegradable plant pots, made from 100 percent natural biodegradable wood fibers, composing 80 percent of the substrate, plus 20 percent peat moss. Meanwhile, Summit Plastics Company has a biodegradable line, “Eco 360,” that features containers made of corn, wheat and wood fibers.

Another company, T & R of Woodburn, Ore., is offering a new line of containers called Ecotainable®. Manufactured by Kelmar’s Creations, the products use ‘patented’ bioresin materials, made from wheat, tapioca, potato starches and corn, to form pots and other products.

CoCo Coir Pot, made by Green



ANDERSON DIE & MANUFACTURING

Its creators say the new Eco Choice line of containers from Anderson Die & Manufacturing will hold up when in use, then break down into humus and biomass when composted.

Neem, is a biodegradable cultivation pot made of coconut fibers, which have exceptionally high permeability to water, air and roots. Coir products are now available through several companies.

Cow Pots is taking a different approach, using “odor-free, 100 percent composted cow manure” as the substrate. They claim the manure also adds more nutrition when the plant is growing or transplanted.

A radically different approach is the EcoCradle products.

The new product is made from agricultural byproducts including cottonseed hulls, buckwheat hulls and rice husk that are mixed with a filamentous fungus (mycelim) as a bonding agent and allowed to grow inside molds.

The mycelium secretes an enzyme that decomposes the organic waste as it grows. After seven days at room temperature in the dark, a compact, ultralight, malleable material is formed that can resist high temperatures, according to company literature.

Downsides to plastic alternatives

While there has been increasing availability of alternative containers, most nurseries have been slow to switch from plastic. Even Northwoods Nursery of Molalla, Ore. – well-known for its many sustainable efforts – is still using plastic pots.

“We are just not sure they will hold up over a longer time frame,” said Laura O’Leary, sustainability director for Northwoods. The nursery has implemented other “sustainable practices,” including recycling plastic containers, but they are still holding back on moving to these newer options, she said. Like many nurseries, they plan to test new

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products, hoping to find containers that prove tough.

In addition to needing perfect conditions to decompose, some manufacturers are also cautioning consumers that the pots need to be handled correctly when planting to avoid problems.

For example, Bonnie Plants uses biodegradable pots extensively, with the smaller versions made by Jiffy. They listed the following rules for using their pots:

- To ensure success, drench the pots thoroughly just before planting.
- Remove the shrink-wrap label from the rim of the pot by cutting it with scissors.
- Also tear away the top of the pot so that the rim is not exposed above ground after planting. If the pot dries out, it can rob moisture from the roots when capillary action pulls water up to the dry rim.
- Finally, tear away the bottom half of the pot before placing the plant in its hole to expose some roots to direct contact with the soil.

Conclusion

Like any new technology, biodegradable containers will need further refinement and testing in order for the industry to create products that growers will use confidently, especially if plants are shipped.

While there are ongoing research projects testing how well plants grow in these non-plastic choices, work done over a decade ago showed that plants would grow as well, or better, in biodegradable pots.

It seems that the chief concern remains durability. Once solved, biodegradable products could have a bright future in the nursery industry. ©

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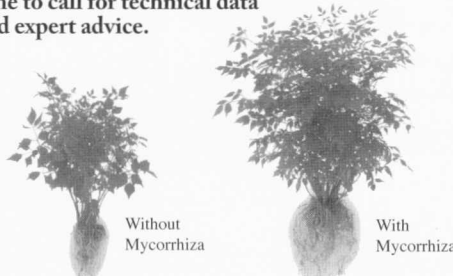
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Contents

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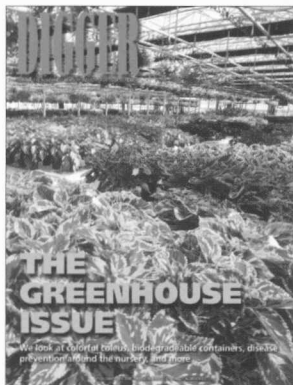
April 2010
Vol. 54 No. 4

COLUMNS

- 7 President's Message
- 21 What I'm Hearing
- 25 Growing Knowledge
- 62 Director's Desk

DEPARTMENTS

- 9 Calendar
- 10 Northwest News
- 34 Picks from the Pros
- 52 Classifieds
- 54 Subscription Info
- 55 Advertisers Index
- 57 OAN Member Profile
- 59,61 Digger Marketplace



Cover: These Splish Splash coleus plants combine with others in the greenhouse to create a colorful scene at Tanasacres Nursery in Hillsboro, Ore. Photo by Heather Leyrer.

This page: Deby Barnhart and her husband, Ed Blatter, started their Portland nursery back in 1987, with just a few geraniums, fuchsia baskets and cherry tomatoes. The Cornell Farm owner gives her views on the future of garden centers in this month's OAN Member Profile. Photo by Curt Kipp.



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- 57 STRONG ROOTS, HEALTHY GROWTH**
Deby Barnhart of Cornell Farm looks at the future of independent garden centers.
- 25 INTO THE BLUE**
Researchers at Oregon State University test what works when it comes to growing the bluest hydrangeas.
- 32 FABULOUS FOLIAGE**
Coleus is all the rage, thanks to the many varieties available and the psychedelic colors and textures they can offer.
- 41 HIDDEN IN PLAIN SIGHT**
Think you have a clean and healthy growing operation? A plant pathologist may not agree.

Other Features

- 45 CONTAINER SOLUTIONS**
The search for a durable and biodegradable nursery container continues.
- 49 TOWARD HEALTHIER EMPLOYEES**
Are your employees smiling? Dental care is a key to keeping them healthy and productive.