

Sustainable Production Resources for Container Plant Nurseries

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Sustainable production practices are methods that conserve or reduce natural resources needed to produce a crop. A team from the University of Georgia, Florida A&M University and University of Florida compiled and developed resources for Extension faculty to help move the container nursery industry towards sustainability. An advisory committee of existing nursery producers assisted in developing and revising resources and curriculum to result in effective, "real-world" tools for county Extension faculty and their clientele. Sustainable production topics include reducing the levels of chemical fertilizers and pesticides; managing insects, diseases and weeds by utilizing an integrated pest management approach; reducing, reusing or recycling materials and supplies; increasing production efficiency; and using conservation practices aimed at reducing water consumption, managing runoff and controlling erosion. Resources for Extension faculty include a website, publications, PowerPoint presentations and a series of short videos illustrating sustainable practices filmed at selective nursery operation site visits in Florida and Georgia. The long-term goal of this project is to enhance the environmental sustainability of nursery production while maintaining economic sustainability.

Introduction

Conventional nursery production relies heavily on use of plastic containers, chemical pesticides, synthetic fertilizers and imported substrate ("potting soil") components. This reliance on non-indigenous and/or synthetic materials is costly as well as unsustainable. Social, economic and regulatory trends suggest nursery producers will be receptive to sustainable production methods. The Floriculture Sustainability Research Coalition defines sustainable production as one that aims to reduce environmental degradation, maintain agricultural productivity, promote economic viability, conserve resources and energy and maintain stable communities and quality of life (Dennis et al., 2010; Hall et al., 2010).

Sustainable Nursery Practices

Funding from the Sustainable Agriculture Research and Education program (<http://www.sare.org/>) enabled us to compile and develop resources to help Extension train nursery growers to become more sustainable (Bolques et al., 2011). Over a three year period, we compiled existing resources on nursery sustainability and visited growers in Georgia and Florida

to view and learn about sustainable practices already successfully used by these growers. At each location, growers were asked to demonstrate production practices including methods and techniques that they considered to be sustainable or that it added a sustainability dimension to their current production practices.

Environmental sustainability in nursery production will not be effective unless these practices are also economically sustainable, thus our resources emphasize both aspects. We also developed new resources to fill gaps in teaching about sustainable nursery production, including videos as well as publications and presentations. These resources are available for use from the website, SNPP Project - Moving Nurseries Toward Sustainability (<http://caesblog.caes.uga.edu/snpp/>). These resources feature short, You-Tube-like videos covering topics including: Why is sustainability important?, Sustainable options for nursery containers, Effective overhead irrigation, Low volume irrigation, Use of reclaimed wastewater for irrigation, Runoff management, Sustainable substrates, Integrated Pest Management, Improving nursery production efficiency, Re-purposing and recycling in the nursery and a Project overview.

As a result of our field work, interviews and resource-gathering, we identified some of the most effective nursery sustainability practices, from both environmental and economic standpoints. Many of these "best practices" can be grouped into five broad categories: reducing energy and fossil fuel use, reducing natural resource inputs, reducing pest and disease problems, re-purposing materials currently on your nursery and reducing the amount of labor required to produce a crop.

ENERGY AND FOSSIL FUELS. Reducing energy and fossil fuel use is one of the most effective methods of becoming more sustainable. One example of an opportunity to reduce fossil fuel use is with petroleum based plastic containers. As a standard in the industry, plastic nursery containers are lightweight, durable, work well with automation and can be reused or recycled. However, petroleum based plastics are subject to the whim of the rapidly changing availability and price of petroleum, leading to considerable variation in plastic container costs. Although plastic containers can be recycled, in practice, they are rarely recycled, despite efforts by nurseries and manufacturers alike.

One of the easiest and most cost-effective means of improving sustainability of plastic containers is to reuse them. Plastic containers are very durable and may be washed and reused many times. Washing is necessary to remove decomposing plant parts and minimize disease transmission to new crops potted in the reused containers.

A sustainable alternative to plastic containers is to use containers made from alternate materials. Advantages of alternative container types are the possibilities that they are made from waste or recycled materials and therefore reduce waste going to landfills and reduce U.S. dependence on foreign petroleum. Containers made from non-petroleum based components sidestep issues relating to petroleum and may decompose naturally, thereby eliminating or reducing landfill waste.

Many other nursery production practices involve energy and fossil fuels. Manufacture of most fertilizers requires significant amounts of energy. Sustainable alternatives include the use of organic fertilizers or simply minimizing leaching of controlled release fertilizer to use fertilizer more efficiently. Heating and cooling can consume a tremendous amount of fossil fuels used in nurseries. Solutions include use of energy curtains and shade cloth to increase energy efficiency in greenhouses. Pumping irrigation water also requires a great deal of energy, so maximizing irrigation efficiency can significantly reduce pumping costs while saving energy. Finally,

shipping and transportation consume enormous amounts of fuel and are often a hidden cost because it is incurred when shipping anything to or from the nursery.

NATURAL RESOURCES. Reducing inputs of natural resources is a second broad area where a nursery can become more sustainable. Water is the most obvious natural resource used by nurseries, and water availability and quality are increasing concerns. Both aspects of water can be more sustainable by utilizing low volume irrigation, increasing irrigation efficiency and uniformity, reducing leaching and subsequent nitrification of surface water, and collecting and reusing irrigation runoff and rainfall. Another aspect of natural resource conservation is to recycle organic waste and discarded substrate into new substrate (although these components must be properly composted to prevent disease transmission).

PEST MANAGEMENT. Pest management is the third broad category in which nurseries can become more sustainable. Sanitation is one of the easiest and most cost effective sustainable practices. Sanitation is based on the exclusion of pests before they become problematic in growing areas. Scouting is an extremely easy means of monitoring pest populations and taking action to manage pests before they become problems. Host plant resistance is the concept of producing crop plants that are naturally resistant to pests, thus reducing pesticide needs. Finally, when pests or diseases occur, consider the use of less or non toxic bio-controls.

New technology is another tool for sustainable pest control, such as using specialized sprayers to increase efficacy (e.g., boom sprayers) or new pesticide products with fewer environmental impacts. On a larger scale, keep in mind that entire systems, for example ebb and flow irrigation systems, can reduce pest and pathogen pressure by creating environments that are not conducive to pest growth.

RE-PURPOSING AND RECYCLING. The fourth broad area to improve nursery sustainability is through re-purposing and recycling. For example, used containers and propagation trays can be washed and reused for growing or may be repurposed to line runoff ditches, support flats above the ground or other nursery tasks. Greenhouse coverings can also be re-used if in good condition or may be re-purposed to cover end walls of greenhouses or as lining for runoff ditches. Also as stated earlier, capturing and re-using irrigation runoff can significantly reduce the environmental footprint of a nursery.

Shipping materials like boxes, packing material and even pallets can easily be reused or recycled. On a smaller scale, even office waste paper can be shredded and used as packing material or mulch.

LABOR. The fifth (and last) broad area to easily improve nursery sustainability is by reducing labor. Technology is one means of reducing labor needs and therefore increasing sustainability, especially economic sustainability, of a nursery. Precision irrigation, robots and other container moving systems are good examples of emerging technologies that can reduce labor needs and cost. Along with specific technology, major production systems can also lead to labor savings, such as systems for automated precision irrigation or greenhouse bench- and container-moving.

On a smaller scale, specialization of labor allows employees to become “experts” in specific areas that result in improved production efficiency. Examples include a pesticide applicator, irrigation manager or even something creative such as a ‘weed czar’ in charge of overall weed management.

Finally, the simple task of being a good manager can increase sustainability. These managerial aspects include identifying good employees and providing a positive and employee-

friendly workplace that would result in minimal employee turnover. Or on a broader managerial scale, a good manager is able to recognize changes in consumer trends and adapt production and marketing to account for these changes.

Summary

After three years of visiting nurseries and interviewing innovative growers, a few factors are common to all operations successfully using sustainable practices:

- Most innovative growers are very proactive about seeking out sustainable solutions; they recognize that sustainability is the right thing to do and aren't waiting for government to possibly impose regulations.
- Most growers view sustainability as a financial opportunity; they seek out sustainable solutions that make economic sense as well as environmental sense.
- Growers who implement sustainable practices find that they soon become a "way of life" on the nursery as opposed to a defined task.

Growers have realized that a wide array of practices are sustainable, from very easy and inexpensive practices like washing and reusing pots all the way to installation of new nursery systems like ebb-and-flow irrigation. But above all, becoming more economically and environmentally sustainable requires each grower to find those things that best fit his/her nursery. For more information on these topics, please view the videos and resources associated with this project at SNPP Project - Moving Nurseries Toward Sustainability (<http://caesblog.caes.uga.edu/snpp/>).

Literature Cited

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