THE UNIVERSITY of TENNESSEE Extension

A Comparison of Field, Conventional Container, and Pot-n-pot Production

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General Considerations

A conventional container operation requires less land, a lot of gravel for drainage, a lot of water for overhead irrigation, poly covered Quonset houses for winter protection, one employee per acre, a higher degree of management and time to stand plants back up that blow over during every wind.

A field growing operation requires more land, a well drained soil that will hold together when dug as a rootball, and less labor per acre.

A Pot-N-Pot (PNP) operation requires a very well drained soil, no gravel, less water than conventional containers, time to check irrigation, no winter protection, no staking and no blown over containers. Dr. John Ruter's research on 8 woody ornamental species at Tifton, GA, found greater or equal shoot and root dry weight on PNP grown plants compared to conventional container-grown plants.

Container, field and Pot-N-Pot operations each have their own specific requirements for equipment. Container nurseries require specialized equipment for media mixing and handling as well as more transportation equipment for containerized plants and people to manage those plants. A field nursery requires sophisticated harvesting equipment and a hard working labor pool, which is becoming more and more difficult to find.

Labor is the single greatest expense and the greatest problem for any type of nursery business. Any technique, mechanization, or technology that can adopt to either reduce the amount of labor needed or make existing labor more efficient will be worthwhile.

Weed control is a major consideration in all nursery production systems. Accurate application rates are more critical for herbicides in containers than they are in the field due to the more open container media with lower cation exchange capacities. Disease and insect control requires closer attention in the container nursery than the field nursery. Higher

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plant density and daily overhead wetting of the foliage in a container nursery reduces air movement and creates an environment more conducive to development and spread of diseases.

Quality plants can be grown by any of these methods. The production method selected depends on the market evaluation, plants selected, potential requirements of the plant, site conditions, amount of land available, soil type, slope, irrigation capacity, financial situation of the owner, personal expertise and preferences of the owner.

Container Nursery Specifics

A container nursery requires less land, but container areas are much more expensive to construct and maintain than field areas. Approximately 5-10 acres is the size of a small container operation. About 1/3 to ½ of the land will be allocated to roads, buildings, storage areas, etc. About 0.8 square feet is required for each one gallon container. At least one employee per acre of containerized plants is required.

Container production is more labor intensive but offers greater returns per acre than field nurseries. In general, the return on an investment in a container operation can be realized in one-half to one-third the time of a field nursery. One can hopefully expect to see return of money invested in four to five years in a container operation.

The most important requirement for any container nursery is the availability of large quantities of high quality water. At least 27,000 to 40,000 gallons are required per acre, for approximately 200 irrigations a year. Plan to capture and re-use the runoff.

Start-up costs for a container operation are much higher than for a field operation (road grader time, gravel, irrigation pipe, pump, pump house, fittings, labor, trenching, containers, media, controlled-release fertilizer and minor elements, storage building, blender, potting machine, potting shed, conveyors, tractors to pull numerous wagons, poly covered overwintering houses, shade cloth, poly for winter, break room, restrooms, etc.).

Container plants can be harvested, shipped, and planted almost any time of the year, whereas with field-grown plants, the main harvest is when plants are dormant. A container produced plant affords the option to the grower of shifting a plant to a larger container for sale the next season if it is not sold during the current season. There is a time in the field where plants reach maximum density and must be dug and sold or sacrificed to make room for growth of remaining plants.

Plants requiring shade for optimum growth are usually produced in containers under artificial shade or under the canopy of trees in the nursery. The requirements of shade can sometimes be met through more frequent watering of the containers. However, this practice can also be detrimental.

The intensity of management for a container nursery is greater than for field. Containers can dry out quickly when a pump goes down, if power is lost or if sprinkler heads become clogged or malfunction, etc. Extra parts should be kept on hand to avoid repair delays.

Container plants are more susceptible to physiological stresses such as heat and cold than field produced nursery stock. Roots in containers are more sensitive to these stresses than the tops. Soil provides an excellent buffer to these extremes, in a field nursery. Winter protection is a must for container-grown plants in Tennessee. Plant roots are more tender than the tops. The roots of only a few plant species will tolerate the extreme cold temperatures in conjunction with the sporadic warm spells.

A container nursery requires greater year-round attention and labor than a field nursery. It is hard to be a part time container nursery producer. A container nursery cannot be left while on vacation, without having a competent manager.

Field Nursery Specifics

A small field nursery is considered to be less than 50 to 70 acres. A field nursery's labor demands vary with the season. A family operation with both husband and wife actively involved in the business, requires about 3 to 4 additional workers during peak times of digging and planting.

The major field production costs are for liners, labor, pesticides and harvesting expenses. Harvesting expenses include labor, machinery, pinning nails, burlap, wire baskets, twine, etc. Six-foot budded liners from the West coast can be rather expensive; if planted 9x6, means 807 plants per acre at $20 each, or $16,140 for the liners to plant 1 acre.

Field production is a little more forgiving; plants can last more than a day without water, due to the reserve and buffering capacity of the soil. Field-grown plants can also tolerate human error better than container-grown plants.

The same species of plants that are field-grown can be container-grown and vice versa. However, some of the more difficult to transplant plants or those plants that do not produce a dense fibrous root system to hold a good ball may be more successfully produced in a container. Prunus laurocerasus 'Otto Luyken' is an example.

There are some plants that can be produced more economically in the field versus a container. Larger specimen trees and shrubs are an example. However, there is a niche for producing these types of plants in large containers in order to have year-round availability for planting. These plants command a higher price and the demand trend is currently promising.

The major advantage to container-grown plants is the ease of harvesting and handling of these plants (which is year round); as opposed to the digging of B&B plants from the field. Field digging must occur regardless of how wet, muddy, or cold it is in order to finish during the narrow window of dormancy.

Bare root plants and container plants can easily be handled, stacked and shipped whereas the rootballs of large B&B plants are very heavy and costly to ship, requiring a mechanical loader of some sort.

Pot-N-Pot Specifics

One PNP producer reported that his customers liked the advantage of buying large container plants as needed, without having to tie-up capital and maintain a large inventory of B&B trees that must be received before the digging season ends.

Large field-grown liners can be potted during the winter and sold after one growing season in the container, in most instances. A nursery may produce 2-3 sizes of PNP; which may include 5, 7, 10, 15, 20, 25, and 45 gallon containers. The most common sizes currently produced are 15 and 25 gallon.

One of the major concerns regarding PNP has been start-up costs, particularly since 2 containers must be purchased in the beginning for each plant. It was assumed that PNP had a higher initial capital investment requirement, along with higher fixed and variable costs compared to conventional container and field production.

An Auburn study compared the 3 production systems and found that PNP was the cheapest system to build from scratch, with each growing on 10 acres. A local PNP producer after 3 expansions shared that $20,000 per acre is required. Another said $15 to $25 set-up cost per acre for 10 gallon containers.

In field production, inclement weather can force field labor home without pay. A field producer with some PNP (or conventional containers or propagation) can shift the labor to potting, sticking cuttings, pruning or various maintenance tasks when the soil is to soft or the weather too inclement to perform typical field tasks.

The PNP Production System is a viable complement to traditional field-grown nursery stock and even a viable alternative to traditional field production.

PNP provides a cooler root system than conventional containers in the summer (91 degrees vs. 102 degrees); and a well insulated root system in the winter. The importance of keeping media temperatures below 100 degrees is well-documented; however, media temperatures of 136 degrees have been recorded in aboveground #7 black containers.

Plants produced PNP generally have more white roots on the exterior of the rootball at the container-media interface than plants grown aboveground. Since media temperatures are generally greatest within 1 inch of the container wall, and a significant portion of the roots of a PNP plant are in this area, PNP plants are more susceptible to lethal high temperature damage during post-production handling. To reduce potential heat-stress at the point of sale, some nurseries shrink-wrap PNP containers in white poly before shipping. The white poly reflects solar radiation and thereby reduces media temperatures.