

A set of production guidelines known as Best Management Practices (BMPs) for the purposes of this manual are voluntary activities undertaken to minimize negative effects on the environment. The manual is not intended for regulations. BMP considerations for field and container nurseries and horticulture distribution centers include nursery layout, water management and irrigation, nutrient management, soil conservation, composting, prohibited plants, pesticide use and storage, insect, mite, disease and weed management, wildlife damage management, organic and inorganic waste management, and alternative energy and energy conservation. BMPs are adaptable for the diversity that exists within the industry. Applying these practices will help Massachusetts nurseries to remain (or become) healthy and profitable.

TYPES OF NURSERIES

There are three types of nurseries: *field*, *container*, and *horticulture distribution centers* or holding areas. Each type has advantages and disadvantages, and many nurseries use a combination of the three systems.

Nurseries produce either finished plants or growing-on stock. Finished plants are ready for planting in the landscape or retailing through garden centers. Stock for growing-on is sold to other nurseries for finishing.

Types of Field Nurseries

Bare root production is generally used for small groundcovers, herbaceous perennials, ornamental grasses, and small deciduous trees and shrubs. Field-planted seedlings are lifted bare root while they are dormant, and used as nursery liners, fruit trees, Christmas tree seedlings, windbreaks, and conservation plantings.

Plants that are dug with a portion of their roots contained in a ball of soil are called balled-and-burlapped or balled-in-burlap (B&B). B&B is used for evergreen as well as deciduous plants, and for much larger plants than those that are harvested bare root. Most B&B harvesting is done while plants are dormant, but recent improvements in holding and acclimating techniques have allowed increased digging during the growing season. B&B harvesting requires trained staff, and at times requires hydraulic tree spades and other mechanical harvesting equipment as B&B plants are heavy to handle.

Field production of nursery stock has several advantages. It is often less demanding than container production in terms of water and fertilizer requirements. In addition, the labor required *during* production is less intensive than in container production. Field production also offers growers the option to avoid or minimize winter protection methods.

Field production also has several disadvantages. A primary disadvantage is the loss of topsoil from B&B nursery operations. Over the long term, B&B harvesting can deplete the farm's most important resource. Also, digging is typically limited to specific windows during the year--spring and fall--and the harvest operation is very labor intensive. Although improvements have been made in recent years the process is still labor intensive and difficult.

The type of field soils preferred for B&B operations also means that the average weight for a B&B plant is greater than for a similar sized container-grown plant. This additional weight translates into increased shipping cost for B&B plants.

Transporting plants that weigh more than 50 pounds requires mechanical assistance. Table 1 contains examples of the size of rootballs needed for B&B coniferous evergreens, and the resulting soil weights. More information is available in the American Standard for Nursery Stock ANSI Z60.1-2004

(<http://www.anla.org/applications/Documents/Docs/ANLAStandard2004.pdf>).

Table 1. Nursery standards for coniferous evergreens

Height	Spread	Minimum Rootball(inches)		Rootball
		Diameter	Depth	Weight (lbs)
18 to 24 inches	12 to 18 inches	10	7.5	30
2 to 3 feet	15 to 24 inches	12	9.0	45
3 to 4 feet	21 to 30 inches	14	10.5	70
4 to 5 feet	2½ to 3 feet	16	12.0	100
5 to 6 feet	3 to 4 feet	20	15.0	200

Root Containment Bags

Although not widely used in Massachusetts, another method of production for some crops is a modified field production system using root containment bags. Plants are grown in field soil but the bags keep the plants’ roots confined, minimizing the root balls. Installing root containment bags in the nursery takes extra effort at establishment time; the process involves augering holes and keeping the sides straight as soil is backfilled and liner trees are installed. To harvest, a straight nursery spade is inserted around the edges of the root containment bags to cut off fine roots that penetrate the bags and the trees are removed. Once plants are harvested, the root control bags are removed. If bags are left on when trees are planted in the landscape, the roots will be confined and the trees will decline as they mature.

Container Nurseries

Fifty years ago, most ornamental plants were grown in the field, and then dug for transplanting purposes. Today, 80% of ornamental plants are grown in containers. The switch has occurred for several reasons: container production does not require native soil and with proper handling can utilize areas that have poor soil; containers take up less acreage; and container stock enables the grower to extend the planting season and marketing.

Other advantages are the handling convenience in production and shipping and the ability to customize the growing media to meet the needs of the plants. Container production also allows producers to grow "transplant sensitive" crops with less attentiveness.

While container production offers many advantages, it also has several disadvantages. The growing media used in containers--soilless mixes--require more frequent monitoring of water and fertilizer than do field production soils. Container-grown plants require special overwintering structures and are prone to blowing over and circling roots. Exposure of roots to temperature extremes in summer and winter causes stresses not often seen in field-grown plants. Container-grown plants cannot be held as easily for as long as B&B plants. Unsold crops of field-grown plants can simply stay in the field; unsold container plants will likely require transplanting to larger containers, which adds to the cost of the final products. In general, initial land development costs (e.g., grading, bed preparation) for container nurseries are higher than for starting field nurseries.

There are many types of containers used for nursery production. Starting in the early 1990s, a hybrid production system began to appear in the nursery field called pot-in-pot (PIP). This system combines features of both field and container production systems. Socket pots are permanently buried with their top rims extending somewhat above ground level. Production pots containing the trees or shrubs in customized soilless growing media are then set into the socket pots and watered using drip irrigation. The field production system advantages of PIP are elimination of plant blow-over, even though plants are growing in containers; conservation of soil; and less dramatic fluctuation in root zone temperatures. Because the plants are actually growing in rigid containers placed in the field soil, PIP grown plants are easier to harvest than traditional field-grown plants. The major disadvantages to the PIP system are the initial expense of land preparation and the necessity of placing two pots in the ground per plant. Lack of drainage can be another disadvantage and drainage systems need to be installed under the socket pots.

Horticulture Distribution Centers

Although not used for production, horticulture distribution centers play an important role in the nursery industry. They may consist of growers who produce plants themselves, or nursery professionals who purchase and hold large numbers of container and B&B plants on their lots for retail or wholesale markets. Horticulture distribution centers can follow the same BMP considerations as container nurseries for water use and runoff.

