HOLDING CONTAINER-GROWN PLANTS: LIQUID VS. SLOW-RELEASE FERTILIZERS

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Ask retail nurserymen what factors most influence their decisions when buying plants and they will generally say price, availability, and quality. Ask retailers what quality plants are and they will generally say plants that have a good appearance, that hold up well on a sales lot, and that will sell well.

CHARACTERISTICS OF QUALITY PLANTS

Several specific characteristics contribute to "quality" plant appearance including good foliage color, adequate foliage density, appropriate flower (and fruit) size, color, and number; appropriate overall plant size and form, an adequate growth rate, absence of any major pests or damage, an attractive overall appearance with a clean, undamaged container or root ball, and an appropriate and attractive name or information label.

Though a grower may produce plants that reflect these various quality characteristics, there are often problems once the plants leave the grower. Rarely is an increase in quality seen as plants are held for sale on retail lots, and more often quality begins to decline, sometimes quite rapidly, after the plants leave the grower.

QUALITY MAINTENANCE—POST HARVEST PHYSIOLOGY

For many horticultural crops the transition stage from the grower to the retailer has been well researched. Referred to as post harvest physiology, we think of controlled environment storage that keeps apples from becoming soft and grainy, and rapid cooling that keeps broccoli heads from turning yellow and the buds from opening prematurely, as good examples of "maintaining quality."

With landscape plants, more so trees and shrubs than bedding plants (where considerable "keeping" work has been done), there is a void with regard to helpful information concerning the transition period from the grower to the retailer. Growers need to know what to do to help insure that quality is maintained once their plants are shipped, and retailers need to know what to do to maintain the growers' quality when plants arrive and are held for sale.

HOW GROWERS CAN HELP MAINTAIN PLANT QUALITY

For the grower, there are several important "quality maintenance" factors: Using the best quality liners available, providing optimum growing conditions, hardening-off or conditioning plants for the harsher conditions encountered on retail lots, selling plants at their peak, handling and shipping plants in a way that will minimize damage and stress; and sharing with retailers cultural practices that can affect quality maintenance.

Due to increased competition and demand for quality, growers can no longer afford to stop worrying about their crops once they are trucked out their front gates. While, in all fairness, growers cannot bear the greater part of the responsibility for maintaining the quality of their plants once they leave their property, they can greatly help retailers by providing certain production information.

THE EFFECTS OF FERTILIZATION ON QUALITY MAINTENANCE

One of the most important items to share is the fertilization regime that is used. Fertility practices can have a profound effect on retail quality maintenance of container-grown plants. Most growers will use either a slow-release fertilizer, a liquid-feed system, or a combination of both. Therefore the effect of these two fertility programs on retail quality maintenance has been investigated at our Experiment Station with the cooperation of two Virginia container nurseries. One of these nurseries uses a slow-release feeding program, the other the Virginia Tech liquid fertilizer system.

With certain test species (azalea and Japanese holly, but not juniper), dramatic visual foliar color decline was observed on liquid-feed plants once they had been removed from the grower's liquid-feed system for several weeks. This visual decline was paralleled by drops in tissue nitrogen content and medium soluble salt extractions. A corresponding decline was not visually observed for the slow-release-fed plants, and tissue and medium nutrient content level decline was far less rapid.

When liquid-feed plants were provided with supplemental fertilizer at the time they were removed from the liquid-feed system, all evaluation criteria declined less rapidly, with variation dependent upon whether the supplemental fertilizer used was short-term quick-release or slow-release.

GROWER-RETAILER COMMUNICATION

If information about production fertilization is supplied by growers to retailers, it will allow retailers to make educated decisions about how to handle plants grown on different fertility regimes so that they can help to minimize fertility-related quality

decline. It is our recommendation that if a liquid feed system is used, either the grower or the retailer supplement with some other fertilizer. The application of supplemental fertilizer should be done either immediately, if the plants are to be held for several months prior to sale, or after one to two months, if plants have not yet sold. Also, with slow-release-produced plants, growers and retailers should be sure that the slow-release fertilizer has not been completely depleted, and if it has, or is near the end of its release period, supplemental fertilizer should also be applied.

Fertilization information, coupled with other information such as how to water the different types of media used in container production, and what pest problems the grower has been treating, will be of great benefit to the retailer. The grower will benefit by maintaining greater retailer loyalty and by having a superior quality plant on the market.

INFLUENCE OF NUTRITION AND CARBOHYDRATES ON ROOTING OF CUTTINGS

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It has been difficult to correlate nutrition and carbohydrates to the rooting of cuttings. However, nutrition and carbohydrate status certainly do play an important role in the rooting process.

Carbohydrate pools. There are three carbohydrate pools or sources in the plant system (14). These three pools consist of: 1. free reducing sugars (soluble carbohydrates such as glucose, fructose, sucrose), 2. storage carbohydrates (starches, insoluble carbohydrates), and 3. cell wall polysaccharides. Reducing sugars and storage carbohydrates are the most important for the rooting process.

Carbohydrates are used as building blocks for complex macromolecules in chemical pathways, and also serve as building blocks for structural elements. Keep in mind that in root initiation and development new cell walls are being formed from macromolecules largely composed of carbohydrates.

Carbohydrates are also energy sources. Primary requirements for rooting are: 1. parenchyma cells with the genetic capability to dedifferentiate into root primordia; 2. presence of auxins plus rooting cofactors such as phenolics and essential enzyme systems;