Harvesting of Bareroot Nursery Plants

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Carlton Plants is currently producing over 500 cultivars of deciduous trees and shrubs. All items are harvested, handled, and delivered as bareroot plants. This creates some unique challenges when it comes to harvesting, storage, and finally, transplanting of our products.

There are many factors that influence the harvesting dates of deciduous trees and shrubs. As an Oregon nursery, we employ several methods for determining the proper digging date to meet both production and sales objectives.

The major factors that influence our decision are: (not necessarily in this order.)

1) General health and condition of the plants.
2) Carbohydrate reserves in the root system.
3) Visual defoliation status of the plants.
4) Field conditions and weather.
5) Requested delivery dates from our customers.
6) Past history of the plants regarding specific digging dates.

In Oregon, we are always anxious to begin harvesting before the fall rains begin. However, we must be patient when it comes to harvesting a live product. Some operations may be successfully manipulated to accommodate our schedules and some may not.

To elaborate on this decision-making process, let's look at each one of the major factors considered and some of the following examples that relates to each.

General Health and Condition of the Plants. This is a very important factor to consider when you are preparing to severely shock the plant materials by lifting them out of the soil and exposing them to handling and dehydration. Plants must be grown properly in the first place to overcome such a shock. An example that would indicate the importance of this factor is *Gleditsia triacanthos* f. *inermis* 'Skyline' and 'Imperial' (Shademaster and Imperial thornless honeylocust). Several of the more popular cultivars of locust, including these two, are subject to a certain canker disease that becomes more severe if the plant is stressed prior to harvesting from lack of moisture or any other form of predisposition. A healthy plant may usually be described as a plant with good color, lustrous leaves, and a regular growth habit.

Carbohydrate Reserves. Starch testing of the roots just prior to lifting has become a method that we are still developing at our nursery. Although it is not as accurate as laboratory techniques such as enzyme assays or gas chromotography, it is a much more practical dormancy assay for use in a nursery setting. The process is simply to collect random root samples from the cultivars to be tested and remove any soil or organic matter by lightly scrubbing the surface. At this point a root cross section is removed and placed on a microscope slide. By applying a very small amount of Lugol's strong iodine solution (available through laboratory chemical supply companies) to the sample and immediately observing this stained section under a low, 10 × 30 power microscope, one can see the stored, carbohydrate filled cells in the phloem, phloem rays, and the pith. With experience one may relate this visual observation to a physical percentage of dormancy. The collection of data

based on visual starch contents in the root system prior to harvesting is becoming a part of our evaluation program to determine proper harvest dates.

Visual Defoliation Status. This has been the tried and true method for determining dormancy in our industry for years. Although we no longer rely on this one factor to completely determine our digging dates, we still use it as part of the overall program. A specific example of where starch testing and the visual defoliation status of the plant may give differing results would be in *Fraxinus pennsylvanica* or *F. americana* cultivars (green or white ash cultivars). Cultivars of both species may be deceiving when it comes to defoliation versus dormancy. They have their own schedules that cannot be altered without damage to the plants or reducing transplant percentages. Several years worth of data have shown that in Oregon, when the ash cultivars are 60% defoliated they are usually only about 30% dormant as determined from their stored starch content in the root systems Much of the carbohydrate reserves needed for survival and transplant root regeneration are still moving downwards in the limbs and main trunk of the trees.

Field and Weather Conditions. These are the most uncontrollable factors that influence our digging dates. No matter how much data you have to base your digging dates on, these two can still be the limiting factor in any operation They are the ones to make notes about and learn from for future planning. An example that goes beyond the obvious connotation, such as a piece of equipment that is inoperable due to the field conditions, or a severe freeze during harvest that blackens every cultivar to some degree, could be seen in our *Hydrangea macrophylla* cultivars. We have found that hydrangeas are very brittle. Knowing this, we would not want to harvest them in wet conditions for fear of root damage or breakage.

Delivery Dates. We must be sensitive to the delivery dates that have been requested by our customers. In certain parts of the country, the main spring selling season may come very early or it may come very late compared to ours. When possible, we must schedule our digging to meet the needs of our customers This may mean harvesting certain cultivars prior to physical defoliation and allowing them to complete their dormancy storage requirements in the refrigerated cold storage area. It might also mean keeping them in the cold storage area for an extended period of time and root packing them to retain moisture or using a polymer anti-desiccant to help reduce moisture stress at transplant time We are constantly looking for ways to manipulate the plant materials or our facilities to meet the service requirements of our customers.

Past History. Finally, past history measured by credits and claims is a factor that is also a continual learning process. Not only do we have to be concerned with the factors that influence harvesting, but those that influence transplanting and growth for our customers as well. This information has led to the sharing of techniques, such as forcing of items like *Crataegus* (hawthorn), and *Betula* (birch), to get the plants growing before transplanting or trunk wrapping the *Liriodendron* (tuliptree). This helps us all to be better prepared to handle and transplant our products.

In summary, the harvesting of bareroot trees and shrubs must incorporate all of these factors into the decision making process All participants must be considered: the customer, the plant materials, and the grower.