WHY WE SHOULD USE SEEDLINGS INSTEAD OF GRAFTS AND BUDS

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A number of years ago the National Landscape Association began periodically tallying the species of trees its members were satisfactorily using on their projects. Their most recent survey of the top 15 species of shade trees and the top 15 species of flowering trees indicates the basic list has not changed much in the past 20 to 25 years. The dramatic change, however, has occurred in the use of named cultivars of the species most commonly used. To properly discuss this change one should look at the changes occurring in the nursery business.

PROPAGATING FOR A CHANGING MARKET

Historically the nursery business has been a grower-oriented business where the grower basically decided what plants to grow and how to grow them. Once produced they were made available to the retailer for sale.

Today, improved selections of most species of shade and flowering trees have been made and propagated asexually, most commonly, by budding or grafting and made available to the trade. Rooting cuttings of shade and flowering trees is increasingly becoming a standard nursery practice. These selections most often are superior individuals emphasizing certain characteristics such as form, fall color, fruitfulness, fruitless (where fruit is a problem), disease resistance, and other characteristics that set the cultivar apart from the native species.

Many cultivars have been patented and substantial money has been spent on promoting their sale and use. Urban foresters, designers, and architects desiring special shapes and forms of plants to complement their designs have created a demand for more cultivars. The retailer also has become more demanding in what they want particularly in the area of flowering, fruiting, fall color, and form.

The result is we no longer have a grower-oriented industry but instead have a market-orientated industry forcing growers to produce what is demanded in the market place. In the long run I believe that some mistakes are being made to satisfy this demand.

SEEDLING IMPROVEMENT

Contrary to my assigned title I believe we need to approach this subject from the viewpoint of seedling improvement. This improvement can come about by continued selection of genetically superior plants for use as understock and for growing on to be used directly in the landscape, urban forest, and other purposes such as conservation. As propagators we should address all aspects of propagation and their interdependence in an effort to make progress and not to be arguing sexual vs. asexual propagation. I am convinced the answer to work toward quality plant improvement and enjoy the best of both worlds. We need not have a trade-off between uniformity and risk.

Plant species differ greatly in their abilities to withstand pests and environments. This favors the argument that a broad genetic diversity is necessary to survive under wide and varied growing conditions and pest attacks within a year and from year to year. The dangers from clonal plantings of the same genotype occur because they have the same set of resistance genes. When these are overcome or exceeded, catastrophic losses can occur. Certainly this is an argument in favor of using seedlings to maintain a broad genetic base.

Seed selection can solve many problems related to pests and environment. The original geographic source of seed (provenance) is of paramount importance in plant use whether it be in the landscape, urban forest, or out-planting for conservation purposes.

Will a clone selected in one part of a natural range survive and grow in other parts of the range or in some instances far removed from its native range? Here the possibility of selecting proper seedling understock with seed coming from the original geographic area of the clone becomes important. Also there could be a factor here that presents another problem with grafted and budded materials, incompatibility.

INCOMPATIBILITY

There is substantial suspect that incompatibility is in many instances virus-related, the virus being present in either the scion or rootstock. A seed source from the local area could be resistant to the problem virus, illustrating the importance of seedling stock used for budding and grafting. To further emphasize the importance of seedling understock, we find increasing evidence where seedlings from crosses bearing a common parent will yield better bud stands, and exhibit faster, more vigorous growth, is no doubt a factor linked to hybrid vigor of the seedling. Due to common parentage and genetic makeup one can conclude the risks of

incompatibility are greatly reduced. We have made this observation for a number of years of seedlings produced by crossing *Pyrus calleryana* 'Bradford' × *P. calleryana* 'Redspire'. The F_1 seedling is then used as understock for either clone, showing great improvement in compatibility.

GLOBAL RELEAF

Currently, the environment and specifically the "greenhouse effect" is setting the stage for programs such as "Global Releaf," with goals of planting millions of trees in urban areas across the country.

Recent discussions with our local and state foresters indicate they will be specifying planting of native species primarily produced from seed with provenance of foremost consideration. Their primary reason, to maintain a broad genetic base for better pest and disease resistance and be better adapted to local environmental conditions and to give a naturalistic effect.

When addressing the subject of seedlings vs. asexually propagated plants one must not overlook major genera where seedlings are still the primary means of propagation, such as *Quercus*.

Also those species that come true from seed should not be overlooked. These normally occur in certain species of plants such as *Malus*, and *Crataegus*. Most commonly these occur through apomixis where the seed embryo develops from an unfertilized egg or from the nucellus.

ECONOMIC FACTORS

Any commercial propagation program must be cost-effective. These are extremely competitive times, with less available competent help to perform labor-intensive skills such as budding and grafting. There can be no argument that seedling propagation is the most economical cost-effective way to propagate plants.

Recent years have seen us producing more woody seedlings under controlled greenhouse conditions in bottomless containers. Here we are able to greatly accelerate growth and to realize a much higher degree of uniformity, which persists after these liners are planted into the field.