

New Seedling Techniques for Woody Plants®

Mic Armstrong

North American Plants, LLC, 9375 S.E. Warmington Road, McMinnville, Oregon 97127

Earlier this year I attended a conference on seedling root development in Eugene, Oregon. I believe there was only one other nursery represented from the shade and ornamental industry.

The interesting thing about a conference on roots is that it has never, to my knowledge, been done before. It wasn't really a fun conference, mostly because root research is extremely difficult to do and not everyone agrees on even basic concepts, but that made it a great meeting (Jacobs, et al; 2005). There were several forestry propagators in the group, some foresters, and the rest were research scientists from around the world. There was even a Yorkshire man who presented a paper on root systems comparing *Quercus rubra* seedlings grown from plugs to those from bare root (Wilson, 2004).

Tree seedlings are grown for a range of purposes — they may be for commercial forestry, for conservation, restoration, or erosion control. They are grown as an understock for grafting and as a rootstock for budding for fruit tree and ornamental production. They may even be grown just for themselves or for their seasonal attributes.

I've been growing seedlings for a while now and I have learned a few things along the way that I hope will help someone in the audience.

Seedling growing is probably the most exciting side of plant propagation. Knowledge is gained in the school of hard knocks and if you forget to make notes of these phenomena, you will probably make the same mistakes again. Different growers have different methods and tricks. They may not work for you and you may never know why, but I think I am right in saying that the International Plant Propagators Society Proceedings and meetings have helped me more than any other source of information. The production of high quality seedlings in commercial quantities has even more challenges.

Are the tops straight, healthy, and of the caliper, and height relationships needed by the customers? This is a real art and every seed source is different.

I find that buying all my seeds off the shelf is just plain boring. Also, you don't always get what you want. Like to travel, climb things, and outsmart trees? Seed collection is for you. Seed cleaning is another joy that our vegetative propagators miss out on.

Did I mention roots? Some seedlings perform beautifully in certain soils. Other soils produce seedlings with pathetic root systems. If the things don't have any roots, what are they for? Perhaps mycorrhizae would help in certain circumstances, I don't know. I do know that if your soil doesn't grow a certain species of seedlings with healthy, fibrous, transplantable root systems, change seed source, change location, or change the system.

Changing system usually, but not always, involves going to greenhouse production. Some huge nurseries produce their own seedlings in wooden-sided raised beds of potting soil outside or in polyhouses. They harvest them, break them apart, pot them up, and are happy. Some things work well that way but not everything.

At Meadow Lake, we start many types of seed in a Jiffy and then bump them to the appropriate container. Jiffy pellets are a clean way to propagate. They arrive

on a truck palletized in boxes. Jiffy has developed some marvelous systems to automate the process, with many levels of flexibility.

In addition, we utilize over 100 acres of bare-root seedling production each year and about 2 acres of containerized seedlings under poly (Armstrong, 1999). The product line is diverse. Oregon has the ideal climate and soil for many species. Meadow Lake also propagates from cuttings and tissue culture and produces finished bare-root trees by budding or grafting onto clonal or seedling rootstock (Scott, 2003).

Recently we have discovered that peach seedlings (virus-resistant strains for rootstock) can be grown superbly in 36-mm Jiffy pellets. They have revolutionized the practice of field budding for growers on the cutting edge, by allowing them to make rootstocks with scions with less misses than in the traditional field-seeded method.

Our system for growing oak seedlings involves pruning roots as they are in the radicle stage at about 1 inch in length. The fibrous root systems produced in the plug are so much more transplantable than bare-root-grown oaks. The finished trees are generally more uniform. We produce a line of oaks from sources hardy for the Midwest and East from selected provenances.

There is still a wonderful range of indoor or semi-indoor seedling growing systems out there. Any type of container designed to produce an excellent root system has to be admired. Not all species fit the "mold" and experience and follow up with end users ultimately shapes the way a nursery decides how to grow each product. Here are a few new "container" types to investigate: Jiffy (small pellet transplanted to larger one) <www.jiffyproducts.com>; air-pruning pots <www.rootmaker.com> and <www.superoots.com>; Proptek Systems <www.proptek.com>, I am especially enamored with the white bag and the concept of light pruning. Apologies to other pot people, they all have merit. Assume nothing, you will probably need to prune the roots of both bare-root and container-grown seedlings prior to planting. I was taught to prune roots by a Dutchman and sponsored by Theo Grootendorst and Marion Van Slooten for membership in IPPS. I've seen some fine inventions — the butcher's knife and a substantial wooden block usually works well.

The seedling propagation systems we employ at Meadow Lake Nursery have evolved and continue to evolve. High-grading seed lots are essential for efficient use of the bench. There are advantages to greenhouse production for some species regarding disease control; others prefer the field as stratification protocols and timing work out advantageously. Some grow better under poly. We aren't necessarily hell bent on accelerated growth systems. Some things go better at their own pace. The branching structure and caliper need time to develop. However the main thing I look at as a grower you can't see. You guessed it — the roots. It is wonderful to play with low-cost mechanized plug systems but if the roots end up spiraled, it is all for the negative. I produce a half million Jiffy 7 18-mm pellets every spring, which involves an orchestration of seed collection, procurement stratification, and seed high grading and mechanical seeding that seems to work well. Planning is the key.

I also utilize a variety of other trays and cells filled with loose media for species that work best that way and the eventual product available may be a bare-root transplant grown from a plug, or an Anderson band grown via a Jiffy 36-mm or a 2¼ inch pot in a 32 tray grown from transplanted 18-mm Jiffies. Contract-grown Jiffy pellets are produced using high-value seeds often provided by the client. A revolutionary concept will be revealed next January in Chicago at the ANLA New Ideas Forum at Mid-Am Trade Show.

Did I mention that plug-grown seedlings transplant well in the fall — no transplant shock the roots grow naturally until soil temperatures drop and the tops take off the following season. Picture that idea — spring vacations.

Scandinavian foresters have discovered that by taking a tiny 18-mm Jiffy seedling directly to the out-planting site, they get better regeneration than with bigger seedlings. It is all about below ground management! There is a take home-message here — buy liners with the root systems you need for the date you need them and always prune them.

LITERATURE CITED

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Hardy Shrub Rose Research Trials®

Laura G. Jull

Department of Horticulture, 1575 Linden Dr., University of Wisconsin-Madison,
Madison, Wisconsin 53706-1590

BACKGROUND AND RATIONALE

Roses are among the most popular plants in the United States among amateur and professional gardeners. Traditionally garden roses (floribunda, grandiflora, and hybrid tea) have attracted the majority of market attention, however, the care and attention required to grow them successfully has spawned a demand for rose taxa that require less intensive management, i.e., hardy shrub roses. The climatic conditions of the upper Midwest can make garden rose culture a challenge. High summer humidity and sub-zero winter temperatures can cause numerous disease problems and lack of winter hardiness. In addition, homeowners and green industry professionals would like roses that have a reduced reliance upon pesticides without sacrificing plant vigor, health, and flowering.

Characteristics of hardy shrub roses such as cold hardiness, repeat flowering, and pest resistance make them attractive choices for modern landscapes, yet not all cultivars exhibit these desirable traits. In a review of 30 common rugosa rose (*Rosa rugosa*) cultivars, Epping and Hasselkus (1989) found that only 10 of the selections could be recommended for Midwestern landscapes with the remaining cultivars considered inferior due to inadequate pest resistance, lack of cold hardiness, or poor flowering characteristics. Similarly, Hawke (1997) evaluated 51 English and Canadian (Explorer and Parkland Series) roses and found only three of the English and seven Canadian cultivars to be acceptable for the Midwest. With new cultivars