

Successful Propagation of Native Plants®

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I have not always grown native plants. It was not too long ago that many of the herbaceous plants I am growing now were sprayed with herbicide! After graduating college I was hired by Richard Hesselein at Princeton Nurseries in Allentown, New Jersey. Little did I know I would be there for 23 years and I would manage the Allentown seed beds and later become their propagator. I learned seed production, grafting, budding, rooted cutting, tissue culture, and container production of shade trees and shrubs. Princeton Nurseries was a great place to work since the Propagation Department was always well funded. But all good things must come to an end, and with the passing of Bill Flemer III, I knew it was time for a change. Lucky for me, I accepted an offer from Pinelands Nursery & Supply in Columbus, New Jersey, which allowed me to continue to live in the community where I grew up and my daughter did not have to switch schools.

Pinelands Nursery specializes in wetland mitigation, coastal plant restoration, stream bank stabilization, storm water basins, and erosion control products. The goal is to be a "major source of plants and products for storm water management projects." As the propagator, my responsibility is to "propagate plants from regional seed sources that are genetically adapted to local conditions." We grow native trees, shrubs, ferns, grasses, sedges, and wildflowers at our facilities in New Jersey, New York, and Virginia. Founded in 1983 by Don and Suzanne Knezick, Pinelands Nursery produces plants on 30 acres of production space for landscape contractors, municipalities, and re-wholesalers throughout the Northeast.

Seed collection of woody and herbaceous plants from local provenances is a cornerstone of what we do at Pinelands. Correctly identifying adequate seed sources often requires driving great distances to find natural stands and securing permission (usually) to collect seed. With three nurseries in the region where we market our plants, we are able to provide customers with regionally adapted plants. We believe plants of local seed sources are better adapted to local conditions on restoration sites. I was surprised to learn how many thousands of acres of preserved land are in the Garden State. We have permission to collect seed from the Brendan T. Byrne State Forest, Bass River State Forest, and the Franklin Parker Preserve, as well as from many county parks.

Identifying adequate seed sources and checking for the correct time to harvest the seed can be very time consuming. We may check a site four or five times before the seed is actually collected. Every year is different. Some collection dates can vary by up to a month. Some sites are very easy to collect and others require hip waders and even boats. Collection of seed can be by hand, tarps, rakes, ladders, and sickles. As a propagator it is my responsibility to assure that we will have ample seed yearly. Furthermore having multiple sites for collection (3 to 5) increases my chances of success.

Processing of collected seed takes place at our New Jersey nursery. *Aronia*, *Celtis*, *Cornus*, *Nyssa*, and *Viburnum* are stored in buckets and allowed to ferment until ready to clean.

These seeds are cleaned in a seed macerator to separate the seed from the pulp. Many of the *Quercus* are collected with rakes and floated in water (bad ones float),

air dried, and stored in our cooler until ready to sow. *Carex*, *Eupatorium*, *Juncus*, *Panicum*, and *Scirpus* are collected with sickles or Felco clippers and allowed to dry on tarps until seed falls off. These seeds can be cleaned with hammer mill efficiently. Finally, many seeds are cleaned with a gravity separator for a finished product. After the seed are processed, it is labeled with the date, location, and amount. All this information is entered into our in house computer system which our sales manager can review to book future orders. I also keep a personal log of information, which I have done for the past 20 plus years.

Herbaceous and brackish plants are a significant part of our production. Seed sowing is an easy task that begins in the middle of January and ends late June. In our flat filler, we fill 392 cell trays with Pro Mix XP and add mycorrhizae. The 392 cell trays are labeled by name and color coded (NJ, NY, VA) for location. Pre-measured seed and Pro Mix XP are mixed together in a tub and soaked with water until the mix resembles mud. This "mud mix" is then placed on top of the 392 cell trays and smoothed out by hand. Trays are then placed on bottom heat in our newly renovated propagation greenhouses. This is not the most accurate method but a little extra seed does not bother the herbaceous plants we grow. Seed that requires light to germinate is sown on top of the 392 trays. These trays require very careful watering until germinated which is my responsibility. Most seed germinates in 7 to 10 days if stratified correctly. The germinated trays are usually allowed to grow on the bottom heat for 4 to 5 weeks before they are transplanted in 50-cell trays. We have good air movement (ventilation) in our greenhouse and we treat with a preventive fungicide every 10–14 days and usually have very few disease issues.

We also grow herbaceous plants in wet frames (*Caltha palustris*, *Nymphaea odorata*, *Nuphar lutea*, *Pontederia cordata*, *Peltandra virginica*). A 4 ft × 8 ft (2 in. × 6 in.) rectangles are placed on top of bottom heat in a greenhouse and lined with double layer of greenhouse plastic. The box is filled with our herbaceous potting soil mix and leveled. Stratified seed is sown and covered with 1/2 in. of potting soil. The boxes are flooded weekly with water which usually results in excellent germination. Many of these plants are shifted into 50 cell trays. The overwintered plants are transplanted into quart pots and are much easier to work with.

Spartina alterniflora is our largest herbaceous crop. Many years we grow up to 1,000,000 plugs. The seed is collected along brackish waterways and salt marshes near the coast. We use boats and hip waders to gain access to these sites. The sites are ready to collect during the later part of September and it takes a crew of five about 6–7 days to collect enough seed to propagate 1,000,000 plugs. Seed collection is controlled by the tide and we can usually only work 4–5 h per day on actually collection. After collection the seed is ripe (smells terrible) when it will fall through screens very easily. After the seed is clean it is stored in buckets filled with salt water covered with the lid and placed in our cooler at 41 °F. Once a month the salt water is drained and replaced. This can be time consuming but will assure the seed will continue to have good seed viability. In late January, I conduct a germination test to determine the correct sowing rate. Many of the other species do not need a germination test, but during collection, if the seed does not look good or I can not find sufficient amounts of seed, a test will be required. Depending on weather, seed will be sown the 3rd or 4th week in February using our soil mixing and potting machine. We will mix sand and peat moss in a 2-yd soil mixer and add the correct calculated amount of *Spartina* seed. After the seed, sand and peat moss are mixed

together and run through our potting machine into 50-cell trays. A 2-yd mix will fill approximately 350 trays in a very short time span. The sown flats will be placed in unheated greenhouses in lined wet frames in standing water. After the *Spartina* germinates the salinity of the wet frames will be adjusted to avoid dieback. It also eliminates any weed seed! Brackish water plants respond well to growing in wet frames and many of these species need to be acclimated prior to being installed on job sites. Many customers send us a water sample from their site and we acclimate their plants to their specific needs. Salinity in wet frames can fluctuate widely due to transpiration, irrigation, and natural rainfall.

Fern production has increased yearly. We currently grow cinnamon, sensitive, and royal ferns and hope to add Christmas and hay scented this upcoming year. We purchase our ferns at the tissue culture gametophyte stage which are small interdependent generation that bears sex organs. The gametophytes are grown in liquid or solid medium which have come from spores that we have collected. We will take the gametophytes and add liquid fertilizer and grind them up in a blender. They are quickly spread evenly onto a 384 community flat. We then provide proper conditions for sexual reproduction which is keeping them moist with mist and or water. With a little patience, the gametophytes will develop into small ferns sporelings and will be suitable for transplanting into 50-cell trays. Finally they are acclimated to normal greenhouse condition. They are very forgiving plants! They may even look dead during the fertilization stage but hang in there and you will be surprised!

Another area of increased production has been our tubeling program for woody plants which is my personal favorite. We use tubelings for sales and our production. Most of our tubelings start in our outside raised beds. Many of our species are sown in the fall in time for natural stratification. Our raised beds (4 ft x 16 ft) are covered with a winter blanket from December to March. After the winter blanket is removed the raised beds are covered with frost cloth until the seed germinates, usually the last week of April. Depending on the weather, the frost cloth may have to be removed daily and recovered nightly. Seedlings are ready to shift into tubelings when the first true leaves harden off. The tubelings are transferred to shade houses on raised benches for most of the summer. Some species will be directly sown into tubeling trays from the raised beds when they begin to germinate but this requires perfect timing. We also stratify some of our species in plastic bags with Pro Mix XP in our cooler. This has been an extremely popular item the past few years and we plan to double our production this upcoming year.

Growing native plants is a great addition to my propagation knowledge. I still believe the propagator's job is the best position at any nursery. What other job allows for hours of searching state forests and county parks looking for seed collection sites? Also the sales manager may think he controls the production plan but who do you think has the final say? I consider myself very lucky to be working for a company that has fared very well through hard economic times and continues to grow. Learning from past mistakes, surrounding myself with the best personnel, listening to the people who do the day-to-day work, and a little luck has helped me be a successful propagator.