



# Virginia's Best Genetics in Loblolly Pine



## Loblolly Pine Crop Highlights

Forestry Topic 1

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### Why are Virginia Department of Forestry Nursery Seedlings Your Best Choice?

#### Cooperative Efforts

The Virginia State Nurseries are proud to be a member of The Cooperative Tree Improvement Program at North Carolina State University (Cooperative). The mission of the Cooperative is to economically increase forest productivity through the genetic manipulation of loblolly pine populations. Enhanced productivity through breeding, selecting and deploying superior loblolly pine families is a major goal of the Cooperative.

- ◆ Due to the cooperative sharing of genetic material, all of the best families that are suitable for Virginia are in our program.
- ◆ Selections have continuously placed extra emphasis on properties desirable for solid wood products (straightness, crown characteristics).
- ◆ Some families from other provenances and cold hardiness zones either fail in Virginia or perform erratically.

#### Advantages of Our Genetically Improved Loblolly Pine

- ◆ Improved genetics for fast-growing, straight and disease-resistant seedlings.
- ◆ Increased growth and yield over unimproved seedlings.
- ◆ Increased profits from improved growth.
- ◆ Our seedlings go completely dormant for shipping, and fully dormant seedlings withstand shipment and planting significantly better than non-dormant seedlings.
- ◆ We top clip our seedlings, which controls the shoot/root ratio contributing to excellent survival rates.
- ◆ Pioneered pales weevil treatment.
- ◆ Limited supply due to scarcity of seed.

#### Benefits of Top Clipping Seedlings

Top clipping seedlings is a cultural practice that makes a big difference in seedling performance. This practice controls the shoot/root ratio, which is the single biggest reason for good survival. Our research in Virginia has shown repeatedly that seedlings with a shoot/root ratio of more than 2:1 will not

survive as consistently well as seedlings with a shoot/root ratio of less than 2:1.



*Top clipped seedlings perform more consistently.*

#### Importance of Dormancy

Our seedlings go completely dormant. This is very important for storage, shipping and planting. Fully-dormant seedlings can be stored for two to three months without survival loss and can withstand shipment and planting much better than non-dormant seedlings.

Virginia is at the northern end of the loblolly growing range. Garland Gray Forestry Center participated in a cold hardiness and dormancy study as a member of the Auburn University Nursery Cooperative. As expected, this study showed that the more northern loblolly families are much more cold hardy. Our families are quicker to go dormant and slower to come out of dormancy. Southern families react much faster to a warm spell and tend to come out of dormancy sooner. Due to warmer weather, seedlings grown farther south frequently never go completely dormant.



*Lifting seedlings while dormant improves survival.*

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## Pales Weevil Treatments

Pales weevil can have a devastating effect on seeding survival, ultimately causing high mortality in newly-planted pine stands. This insect feeds on the stems of pine seedlings, primarily in newly-cutover stands being replanted.

VDOF pioneered the use of permethrin in treating seedlings for pales weevil control. Studies were done to develop an application method that works. To successfully treat pine for pales weevil, the stem must be treated; simply applying over the top with a three-point hitch sprayer does not work since it does not reach the stem. VDOF's treatment method penetrates to the stem, treating the most vulnerable part of the seedling.

## Virginia's Best Genetics

After nearly 60 years of research, the VDOF tree improvement program has extensive data on the field performance of the family selections in our orchards. In particular, we rank the families based on growth gains compared to unimproved "wild" seedlings planted in carefully-designed and monitored field trials. This "**P**" (**for productivity**) **rating** is the percentage gain in volume growth through age six in those trials. Individual selections from our seed production orchards and breeding programs have P ratings as high as 100 (i.e. 100 percent faster growth – or twice as fast – as wild seedlings). By collecting and carefully blending seed from individual selections, our nursery is able to offer Virginia landowners seedlings with a range of expected growth rates to suit individual landowner objectives. It is important to remember, however, that outstanding genetics is just one small part of a successful loblolly pine plantation. Only by paying careful attention to other silvicultural decisions, such as site preparation, planting density, competition control and mid-rotation thinning or other cultural treatments, can the maximum genetic growth potential of these seedlings be realized. The VDOF nursery offerings include:

### Control Pollinated (CP)

This seed lot comes from isolating female flowers on high-quality trees and fertilizing them with pollen collected from a different high-quality parent. Therefore, when seed collection occurs, we can be assured that we know the true parents of the offspring. This is a much more labor-intensive and costly process than the traditional wind-pollinated seed production, but it pays off with a **P rating of 90 or higher** (i.e. a 90 percent or greater growth gain over unimproved seedlings.)

### "Virginia's Best"

As the name implies, this is a select mix of just a few of our very best producing open-pollinated (OP) parents within our seed

orchard. The biggest difference compared to our CP seedlings is that these are from a known high-rated female parent that is fertilized by a random mix of pollen from the other trees in the orchard. These seedlings deliver a **P rating of 65 or higher**.

As our orchards mature, the supplies of CP and Virginia's Best seedlings may be limited in the early years and increase as the trees grow larger and produce more cones.

### Elite

Elite is an OP mix of seed from families ranked just slightly behind the very best. The advantage is that even in our relatively young orchards, the quantities of these seedlings will be greater and still offer substantial growth advantages with a **P rating of 60 or higher**.

### Premium

The Premium seed lot comes from a mixture of a large group of parent trees proven to deliver a **P rating of 50 or higher**.

### Orchard Mix

All of the seed produced by our seed orchards is significantly improved compared to wild seed in terms of growth rate, straightness and vigor. Even after we have sorted out the top performers for our CP, Virginia's Best, Elite and Premium offerings, we still have enough additional excellent parent selections to offer an orchard mix seedling blend that has a **P rating of 35 or higher**.



*Seedbeds at Garland Gray Forestry Center*

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