

QUALITY CONTROL

TREE PROCESSING OPERATION¹

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ABSTRACT

Discusses some methods and procedures for monitoring seedling quality control during tree processing operations at U.S. Forest Service, Wind River Nursery, Carson, Washington. Describes why and how the quality training of people and good communication with the field improves stock quality and thus field survival.

INTRODUCTION

The aim of nursery stock quality controls is to provide stock which will survive, become established, and produce vigorously growing plantations.

I believe that at Wind River Nursery we have attained high quality control through the continuous training of our people in the handling and care of tree stock. This is accomplished by annual orientation and training sessions for all temporary employees.

They have responded with a dedication, interest, and hard work that is truly amazing and heart warming to see. We believe that growing quality seedlings is really not a big secret. It is the application of available and tested knowledge to a management system. It's the attention to a constant stream of daily details that many take for granted. It's the constant anticipation, vigilance and careful handling every step of the tree growing process - from the time the soils analysis is made, the seed is sown to the planting, and eventually to the survival of a high quality seedling. When you give people increased responsibility and greater opportunities in seedling production, attention to detail comes much easier.

COMMUNICATION AND DOCUMENTATION

We stress open communication with our customers. We try to eliminate any surprises. One way to do this is through field visits to our nursery. We have been invited to most Forests to view successes as well as problems. We know these

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visitations are successful as we now are having far fewer problems in meeting their needs. Also, we produce a stock catalog. This has helped keep everyone informed of what our seedlings look like and their average size. Every phase of our operations is governed and documented by a list of procedures. These are kept in a "Brain Book" and continuously updated.

Chairman, Dick Thatcher, has asked me to tell you about our quality control in seedling processing at Wind River Nursery. I thank him for asking us to share with you. I can best tell you in this short time by showing a few slides of some of the various steps we take. I will highlight our seedling handling from the time the trees leave the beds until they reach the requesting unit. I will now begin by introducing you to our nursery with a few general slides of the area.

LOCATION

Wind River Nursery is located in the State of Washington ten miles north of the mighty Columbia River and Bonneville Dam and about fifty miles east of Vancouver, Washington and Portland, Oregon. You may be interested in the fact we are only about 25 miles SE of the now famous and unpredictable Mt. St. Helens.

WIND RIVER NURSERY

These are overall views of our nursery fields and our landmark, known as "Bunker Hill." We have produced over 30 million seedlings annually the past seven years. This consists of about 55% Douglas-fir, 25% true firs (mainly Noble). The remainder is pines, spruces, and cedars. We sow for about 14-15 species annually.

PROCESSING FACILITY

These are views of our new Processing Facility constructed in 1977 at a cost of about 2 1/2 million dollars. We estimate this building will pay for itself in 15 years if regional seedling survival increases only 3%. This building contains three main sections: the employee wing, the main packing room, and six storage coolers with a capacity of about fifteen million seedlings. This facility was designed with our weather in mind. When the seedlings are dormant and can be lifted we lift all we can. When the weather is bad we stay inside and pack them.

Quality control in tree processing begins with our lifting priorities. They are normally as follows:

1. Cleanest lifting possible.
2. To supply field units that are ready to plant.
3. Lift the greatest number of trees at the most effective cost.
4. Lift those seedlings most likely to break dormancy earliest.
5. Lift those seedlings most likely to be in storage over three months.
6. Lift those areas last where the soils are protected from warming up due to seedbed arrangement, snow cover or shade.

SEEDLINGS LEAVING FIELD

We dedicate ourselves to getting the seedlings into cold storage as rapidly as possible, especially on days with the plant moisture stress (PMS) approaching the marginal levels. We shut down at a plant moisture stress reading of 12-15. This only occurs one or two days during the lifting season. You need to be ready and able to take action immediately.

We have found that watering the seedlings has a cooling effect and holds down the plant moisture stress.

Each seed lot is assigned a number. All seedling boxes in that lot are numbered after the box is filled with seedlings in the field. This is one of the many steps taken to assure individual lots are not mixed up and the lot qualifies to be certified at a designated level.

SEEDLINGS ARRIVING AT PROCESSING BUILDING

This series of slides is taken at our unloading area. These two coolers are designated as pre-coolers where the unpacked seedlings are stored before being processed.

TESTS

Samples for testing are taken from each lot as it arrives from the field.

LABORATORY

This is an overall view of our laboratory. Here you observe two instruments used to measure plant moisture stress in every seedlot. Our laboratory is located in close proximity to the unloading area, coolers and processing room. Size classification is taken. Also, in our laboratory the processing supervisor can examine tree quality to see if any specific grading guidelines are required.

PLANT MOISTURE STRESS TEST EQUIPMENT

We use the J-14 Pressure Jack and Pressure Bomb to measure moisture stress in our seedlings. We have also participated in the Oregon State Forest Research Laboratory Program of testing to determine the physiological soundness of seedlings prior to outplanting.

TESTING FOR DORMANCY

We have used the dormancy meter mainly in the field in fall and feel it gives us a quick indicator of approaching dormancy. We also have used the square-wave oscilloscope. Our problem is the great cost and care to keep the instrument in operation.

(What we need is Russ Ryker around to keep it running).

SHOOT-ROOT RATIO TEST

The shoot-root ratio test is a volumetric measure of water displacement of both the top and the roots. Here is a shoot-root ratio of about 1/1 on a Douglas-fir. This is an excellent ratio for Pacific Northwest planting sites.

PROCESSING ROOM

This shows the general layout of our processing and grading room. We have eight tables which were running this particular day. Our daily production is 1 million seedlings in an eight hour day.

INFORMATION BOARD

Each grading table has this board mounted on the wall with grading specifications and any special instructions. One quality control person assigned to each table is responsible for recording correct grading specifications on the board before each lot is graded. Each grader is required to read this board and thoroughly understand the "specs" before beginning work. The main requirement for a grader is to know minimum shoot and root lengths, seedling caliper and how to cull for damage. Also, the pruner needs to know pruning lengths.

GRADING AND COUNTING SEEDLINGS

This series of slides shows our overall grading and counting process. A grading table consists of twelve sorters, one buncher, one bander and a packer. Persons count seedlings in groups of five or ten. We have had requests for double sorts. We can also combine seedling species if desired. The next slide shows one of our happy nursery employees. Note the table arrangement, whereby one side faces the other. The next two slides show counting, grading and placing seedlings on a designated target line, one inch above the top lateral root. This aids in a higher quality root pruning job. This shows a watering device we can use if seedlings need washing off or appear to be drying out. One table can process an average of 130 thousand seedlings daily.

FUNNEL

A tunnel runs the length of our processing building. It is used to dispose of culls, soil, debris and excess water. Between each seed lot culls are scraped into the tunnel to avoid seed lot contamination. This definitely is a plus for quality control and seedling certification. Also, the room is kept cleaner and thus safer. When you have this condition the employees are happier and efficiency increases.

BUNCHING AND ROOT PRUNING

This person bunches the graded seedlings into bunches of 25 or 50, depending on the size. Then the seedling roots are pruned to the requested length. This is an extremely important step, because in order to eliminate contract problems the correct root length is needed.

GRADING TABLE AT BREAK

All seedling boxes are covered during break periods to prevent drying out. Also, we try not to give any seedling a total of one hour accumulated time out of cold storage. The bottom line conveyor carries the full boxes in, the top line carries empty boxes out. Empty cardboard boxes are then broken down and returned to the field. A box handler does this job for two tables.

MARKING SEEDLING BAGS

At each grading table quality control records are kept. We mark all bags with table number and lot numbers, the seed lot description, lift and pack dates and number of seedlings in the bag. When the bag is shipped, we also mark the shipping date.

BAGGING AND QUALITY CHECKS CONTROL

Each table has a leader who is also the quality control person. The quality control person checks many things according to established procedures. We need to make sure specifications are being met and we are shipping the proper number of seedlings.

BAG CLOSING

We use one sewing machine to close the bags for two tables. Our seedling bag is three layers with a waxed bottom over stitching. We try to keep bag weight under forty pounds for easier handling. Normally a bag holds about 500 Douglas-fir and 800-1,000 true fir. Good storage conditions have eliminated the need for packing media in most situations in Pacific Northwest Region nurseries.

PACKED TREES TO STORAGE

Seedlings come from the field on pallets in boxes and processed trees are stored on the same pallets. Note seedling certification tag on bag.

PACKED AND SHIPPING RECORDS

Numerous warehousing records are kept to insure we know where the trees are stored, how many were packed, how many were shipped, and when and how this was all done.

An earlier record of each seed lot information was kept on a McBee Card. Then we refined the system and now use what we call a seed lot information card. This card gives much information as to sowing, inventory and cultural practices. Another sheet which we call the silvicultural sheet originates when the order is received and is sent to the receiving party upon seedling shipment. It tells us things such as dormancy, temperatures, and humidities, and plant moisture stress, equipment used, time and day lifted. It can also give any special instructions. This helps us adjust operations accordingly. This sheet also has a section that the field can fill out upon receiving the trees. This record has helped us often identifying why a particular problem occurred and in other communications with our customers.

TREE STORAGE AND MECHANICAL ROOM

Temperatures and humidities are constantly monitored and documented to avoid any large fluctuations in the storage rooms. Fluctuations are only about one degree for temperature and 5% for relative humidity. I feel that our excellent cold storage facilities are a big factor in our increased survival.

SHIPPING

The seedlings are taken out of storage and loaded into a truck. Note the large loading dock and person checking the seed lot and numbers being loaded. We try to schedule most deliveries so that delivery is made in one day. Temperatures are monitored by thermographs placed among the bags. Our people are instructed to handle the bags as if they were eggs.

DELIVERY

Presently we deliver about 20 million seedlings or 2/3 of annual production to our customers in Oregon and Washington. All Forest Service seedlings are shipped in refrigerated vans. With our present mileage restrictions we are being forced to seek other means to deliver our seedlings.

SEEDLING CERTIFICATION

Every step of our seedling processing is also monitored by our seed certification agency, which operates both in Oregon and Washington.

CONCLUSION

Now if St. Helens cooperates and doesn't cover us with a foot of ash we hope to continue producing quality seedlings for the Pacific Northwest Region. We invite you to visit us.

In conclusion, I say to you that we can afford to take most every precaution in seedling care and handling that is known. All costs are continuously going up and we can't afford to plant a low quality seedling. I believe the "proof is in the puddin'."

Our Region's field survival has increased dramatically. The key to this increase is management's ability to provide us with equipment and facilities. Another key is communication and documentation for our customers, the Ranger District people. Last, but not least, is our ability to handle seedlings in such a manner that vigor is not diminished. All this is accomplished through procedures and communication with our own people.

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