Mr. Cameron: I just wanted to say one more thing that isn't really new, but when Jim started out he said we pay a lot of attention to our storage of seed. We haven't paid a great deal of attention to our collection and extraction. I think that one of the things that is most frequently overlooked is in the de-winging of seed, no matter what species it may be, that you are very liable to damage the seed coat, and if it is even a very slight dent in the seed coat, you are going to affect your seed, not for any sowing that year, but for sowing after it has been stored for some years, and we had an experience along that line that showed it very definitely to us. It takes a very slight dent in your seed coat to affect your seed in storage. Apparently it displaces the embryo, and perhaps a hole through the seed coat where it might affect the transfer of gases, but it is a point that I think has been overlooked considerably.

Chairman Webster: Thanks, Jim and Ronald Adams for doing a good job here.

Mr. Finnis: I remember reading about two years ago in Swedish Research Notes, they called de-wingers murderous weapons, and I have often wondered in doing some of these staining tests, when you get a seed which to all outward appearances looks perfectly normal, and you cut it open and it is quite sound, quite normal, but it just doesn't take the stain and therefore we presume that it is dead, whether maybe it hasn't been killed by bruising in the extraction process, possibly the de-winging process.

Chairman Webster: That is a good point which has been brought out here. Now we are going to pass on to our next subject, which is last but not least, "Short Cuts in the Nursery - From Seed to Seedlings Packed for Shipment," and Vern McDaniel from the Oregon State Board of Forestry is going to present the topic.

Mr. McDaniel: I think this is last and also least, boys. This working partner of mine, Mr. Ladd down there, commonly known as Charlie, contacted me on this confounded thing and he sent it in unbeknownst to me, on this topic. All you fellows have short cuts probably better than these, and then Mike here had the nerve to write and ask me if I would talk on a thing like this, and due to certain conditions in our nursery we have been forced, like all you fellows, to do a certain amount of little types of work, special training of a man, and such as this in order to get our work done and to save cost. My paper, which I will take all afternoon to read -- I am going to read it because if I get off on a tangent here, I am liable to be here till six o'clock, and you fellows want to get going.

SHORT-CUTS IN THE NURSERY
FROM SEED TO SEEDLINGS PACKED FOR SHIPMENT
by
Vern McDaniel
* *

Short cuts in the forest nursery. Just what does this expression mean? To me it means getting a better job done in a shorter time at a minimum cost. That cost per thousand is the one that always haunts the nurseryman. Even a few cents per thousand amounts to a substantial saving when the nursery raises several million trees annually. The hopes and dreams of every nurseryman are to produce the best tree possible, the tree that will give the maximum survival for field plantings, at the least possible costs.

We are attempting to do this very thing at the Oregon Forest Nursery. If a tool needs wheels to do a better job, it is our aim to put wheels on it. The same applies to a motor. If a man needs more attention and training to do his work more efficiently in a shorter time and still stay in a cooperative mood, then he is going to get that attention and training.

The Oregon Forest Nursery is the only State-owned and operated nursery in Oregon. This institution has a two-purpose job. We raise trees for the farmer demand and for the State Board of Forestry tree planting program. We aim to produce from six to seven million trees annually of which the State planting program calls for five million.

We have found that to save costs per thousand, we must spend money. By that is meant a nursery must have good, servicable buildings, a good water system, and up-to-date and dependable machinery and equipment.

The most important "must have" on any nursery is man power. If a nurseryman can find men today that are good, dependable, honest, efficient workers, he is a lucky man. They can be found but they cost money. The secret is, if obtained, they will reduce your costs per thousand.

Irrigation System

The Oregon Forest Nursery has a gravity water system. The lowest pressure is 40 pounds. We have an "A-1" irrigation system. Most of the overhead lines are aluminum alloy. This metal has the least amount of friction in the lines; therefore more water is placed on the ground in a shorter time. All lines are mounted on metal posts 2 feet above ground. The pipe lines are run by Skinner type water motors. Our water source is a man-made lake having a ten million gallon capacity. Very little trouble is had with foreign material stoppage in the silver stream, Skinner nozzles.

Nursery Buildings

The nursery has several large, strongly built, well kept buildings. They include a warehouse, a machine and tool storage building, and our latest structure is a refrigeration and packing building. This building houses an office and supply storage space upstairs, and a tree seed storage room kept at 0° F., a large tree storage room kept at 35° F., a smaller seed stratification room and a large counting and packing room downstairs.

Nursery Tractors

Tractor power is a very important factor on the Forest Nursery. Our nursery has two tractors. The "Work Horse," as we call it, is a new H. G. Oliver track-layer. This tractor is well adapted to nursery work because of its high clearance above the ground and wide width between the tracks. It has 23 horse power at the drawbar and 29 horse power on the power take-off. A lower gear box was also installed on this tractor for slower speed work. A hydraulic system installation also makes this tractor just about an all around piece of equipment in any nursery. The "Handy Man" machine is the Ford Wheel Tractor. This is a very powerful little piece of equipment with its hydraulic system and lower gear ratios. It is used for all kinds of jobs around the nursery, such as groundwork, pulling the mower, pulling the sprayer, bringing trees in from the field and innumerable jobs.

Nursery Machinery

Each of our tractors is equipped with its own plow. The track layer pulls a 2-bottom, 14-inch plow with cast mold boards. The Ford tractor carries a single 16-inch Case plow that also has a cast mold board. Steel mold board plows will not scour in our soil. Each tractor has its own disc. Two harrows are also included on our machinery list. A serviceable horse mower is used to great advantage in mowing along roads and fence lines to keep down weed and grass growth. A pipe line plow has also been developed. This plow is operated on the Ford tractor and will work right up to a nursery pipe line or fence. An 8-foot tandem roller or soil pulverizer is also a valuable piece of nursery equipment. This tool is used for clod breaking and ground packing.

Our number of specialized nursery machines is increasing. They will be mentioned below and why we are using them with great success. Any one of these machines is adaptable to either tractor. The seed drill is the type similar to the one used by several Forest Service nurseries. It has the 18-inch roller in front with Planet Junior appliances behind including an 8-inch compressor wheel 2 inches wide, a furrow opener, a furrow closer and last, another 8-inch compressor wheel. This drill does a very good job of sowing tree seed. The drill sows 8 rows, 6 inches apart.

A 7-row cultivator mounted on the Ford Tractor and handled by two men is used to cultivate the true fir 1-0 beds and the hardwood beds.

A money saving machine is our Hardie 100-gallon sprayer used for weed control. This machine has saved the nursery many dollars. We spray our hardwood and conifer tree beds before plant emergence. This operation kills a large percentage of the weeds. When our spray program is worked out we plan on practically controlling our weeds in our conifer beds and along our roads and fences. The sprayer carries a boom that sprays a strip 72 inches wide. We use 40 gallons to the acre of Stoddard Solvent.

One of the handiest little machines on our list is the Ezzy-Flow fertilizer spreader. It is called the number "66" and spreads material 6 feet wide. We spread any type of commercial fertilizer with it. We also plant our clover and grass seed with this machine. These grains are used for cover crop purposes.

Our sub-soiler is a very necessary piece of equipment. The deep ripping and tearing of the soil gives better aeration and tends to make the soil a better water reservoir. The plow sole or hard pan is also broken up.

A utility blade carried on the rear of either tractor is a very valuable piece of equipment in our nursery. It can be used for ditch digging, clod busting, filling, land levelling, snow plowing and many other jobs.

Our conifer stock is raised as 2-0 and sometimes 3-0 root-pruned trees. All hardwoods are raised as 1-0 stock except Caragana which is 2-0. A strong metal frame to carry either the root-pruner or tree lifter blades is in use. This frame is equipped with depth control wheels. The implements can be operated on either tractor. Two men root-pruned eight million 1-0 conifers in 6 hours this last April. It is our policy to have an extra root-pruning and tree digger blade sharpened and ready for use.

Transporting, Sorting, Counting and Packing

The moving of trees from their beds to the counting and packing building has always been a headache to all nurserymen. Our problem is a tough one due to a very sticky, heavy soil, rainy weather, and distant hauling. We have reduced these costs considerably in several ways. (1) We made a simple metal carrier frame handled by the Ford tractor. (2) We made two wooden, portable carrier frames. These frames are made to handle 12 tree boxes. (3) We made 200 tree boxes. Each box will hold an average of 2000 trees. Every box has special size burlaps to protect the trees while in transit. The boxes measure 15½" wide, 22½" long and 12" deep. All boxes have hand holds in each end. As the trees are pulled from the beds, they are placed in the boxes across the 15½" side. Two separation sticks (1" by 1½" by 22") are used to keep the trees from pressing together. This makes it easier for the women counters to take the trees from the box. When 12 boxes are filled, they are taken to the packing building for counting and packing. The loaded carrier frame is set down and the Ford tractor is backed up to the other frame loaded with empties and the driver goes back to his tree pulling job. Three portable, wooden shingle tow bins have also been built. These are also handled by the Ford tractor equipped with the metal carrier. This little implement has really saved us much carrying and lifting.

Sorting and Counting

This job is done on a table with an endless, moving belt. This table is similar to the one used at the Wind River Nursery. It is 14 feet long, 3 feet high and 30 inches wide. An endless canvas belt 16" wide moves on a 4" diameter roller located at each end of the table. The rollers travel at a speed of 16 revolutions per minute. A draper stick is riveted onto the belt every 20 inches. These sticks are longer than the belt is wide. They protect the belt and keep it traveling straight. The belt also travels over a removable solid table top. We have had practically no trouble with this belt development. There are two dropleaf table boards hinged to each side of the table. They are 24" by 30". Two women counters work opposite each other on each table leaf. They sort and count to 5 or 10 in number and place on the moving belt. The trees travel to the end of the belt where they are picked up by the table women and put in bundles of 50 or 100 each. Every bundle is recorded on a tally recorder. All root trimming is done by this table woman.

Tree Packing

Tree packing at the Oregon Forest Nursery is far more complicated than at most forest nurseries. This is because we raise many different species of trees for the farmer demand throughout the State of Oregon. Both conifers and hardwoods are raised. Our own Forestry Department demand is for only Douglas Fir. The farmer can order a minimum of 50 trees of all the species if he wishes in both conifers and hardwoods. This type of order makes it impossible to standardize one packing system. The farmer trees are usually sowed in bundles of various sizes. Waxed paper and burlap are used for packing material. The larger orders are packed in rolled bales, roots to roots, and tied with baler twine. A lumber tie type of knot is used to hold the bale together. We pack several thousand each of the much-in-demand species such as Port Orford Cedar and Douglas Fir in bales of from 500 to 1000 each, as they come from the counting table and are placed in storage. This saves us from handling the trees more than once which saves time and money. The Forestry Department orders are packed as they come from the table in standard bales of 2000 each. We use Ordinance cloth for packing material. The cloth is ripped

into small rectangular pieces 18" wide and 42" long. The trees are packed roots to roots 1000 trees to each side. The bundles are rolled tight by using a 1" x 2" wood strip 2 feet long and tied with the lumber tie knot. All of our trees are packed in very wet shingle tow.

Tree Storage

The trees are stored in the tree storage rooms. The rooms are kept at a 35° F. temperature and high humidity. The Forestry Department's bundled trees are stored in movable racks. We have enough room to store around 2½ million of these trees.

The farmer trees are stored by two methods. The baled method, that is, several of the more important species are packed in bales of 500 and 1000 trees pending orders. The second method is as the trees come from the counting table, the packer and a woman helper tie them in bundles of 50 and 100. These bundles are placed carefully in storage boxes. The loaded boxes are placed outside, weather permitting, by means of a hand truck. When cooled out they are put in storage in the 35° room. Each box will average around 3000 trees. The boxes have 2 sides and 2 ends. The ends have hand holds. Dimensions are 16" by 15" deep and 24" long. The sides are made of ½-inch lumber and the ends 3/4-inch material with strengthened corners. They are stored from 3 to 4 boxes high with ventilation sticks in between. All boxes are properly labeled. This system of storage certainly makes it much easier and cheaper in handling the trees for packing and shipment.

Activity Reports

Our entire nursery Work Plan is divided into 12 daily labor activity reports. When these reports are properly kept, the nursery will know just how much the cost per thousand trees will be. They are as follows:

No. 1	1-0 Conifers
2	2-0 Conifers
3	3-0 Conifers
4	1-0 Hardwoods
5	2-0 Hardwoods
6	Distribution of regular stock
7	Distribution of State trees
8	Equipment repair
9	General administration
10	General maintainence
11	Soil maintenance
12	Non-nursery work

Conclusions

In concluding, I do hope that I have made myself clear and understandable. If some little idea that you might get from this paper will save you a few cents per thousand, then my efforts have not been in vain. Our costs per thousand have been reduced considerably by using these simple methods. Might I again stress that to save we must spend money. That is, we must have a good nursery site, have good buildings, a well working water system, up-to-date machinery, and maintain an easy working, well-producing nursery soil.

Mr. McWilliams: I was wondering how much it cost to install your refrigeration plant and how long ago was it installed?

Mr. McDaniel: It is going on our third year -- $18,000.

Chairman Webster: Have you seen it, Harold?

Mr. McWilliams: Yes.

Mr. McDaniel: It is good, but it is not as good as it should be.

Chairman Webster: Are there any other questions now you want to ask Vern? He is going to put his pictures on the table and I have a couple of sets of pictures here of a new weeder that Red Ward has developed. It is a rotary weeder. It weeds 8 rows at a time between the rows and leaves a very nice mulch on the ground. It can only be used on seedlings in drills.

Mr. McDaniel: I might say the old nursery where the buildings are, the nursery entrance is being turned into what we call Nursery One, and that will be the nursery where we are raising our farmer trees, an area there of around 11 acres. The Nursery Two is the area on which we hope to raise the straight trade, comprising an area of around 23 acres, so you see some of that will be a haul of almost a quarter of a mile from the nursery. That is why we had to adopt this little carrier set-up, and every time we had to take a load of trees of 12 boxes, it is about 25,000 trees. I might say that this little table -- you will see a picture of it -- we work 9 women to the table, 8 counters and 1 taker offer, or one table woman. She root prunes the trees, and then a packer. I hope I can develop a woman packer, but we can't seem to have one that will tie that knot. I haven't even learned it myself good yet. So that is the plan we are running on, having two separate nurseries.

Chairman Webster: Now, fellows, we are running just about right on schedule. There is one thing I do want to say, especially to you boys who took part in the program and presented papers. One reason why the meeting has been good is the fact that you all contributed to the discussion and did such a good job. When I wrote out to all the membership sometime ago and asked for their ideas on what they wanted, almost to a man everybody came back and gave me a suggestion on the articles or the topics they thought should be covered. That is one reason we had the type of program we had today and yesterday, because of the fact that you all said what you wanted. You all entered into it, and I feel that has especially helped to make this meeting a success.

I want to say to Harold McWilliams, Jim Pedley and Tom Wells, words cannot express our appreciation for the wonderful job you have done as hosts here at Green Timbers. We want you to carry back to your Chief, Mr. Orchard, what a wonderful job we feel you have done and how much we appreciate it. I know we could never hope to do nearly as well down there in the States as you fellows have done up here.

Chairman Webster: Now we have one other item that we should cover before we go on -- two items, in fact -- Mr. Chapin wants to make an announcement.

Mr. Chapin: I just wanted to invite you fellows who are driving through Bellingham tomorrow to stop off at the nursery and we will be glad to show you through. We won't give you a place to sleep, and we won't give you any meals, but we might be able to show you our operation there. (Mr. Chapin proceeded to give instruction how to reach the nursery.)

Chairman Webster: We have one other thing to consider before we adjourn, and that is do we want another meeting and if so, when do we want it and where do we want it? I will throw that open for discussion now. You fellows can decide on when you want another meeting and where. Anybody have any suggestions?

(After a discussion it was decided to have another meeting in two years. Then there followed a discussion as to whether it should be a summer meeting or a winter meeting. After discussion it was decided to work towards a meeting about the middle of October, 1954, in California, at Mt. Shasta Nursery or the Forest Genetics Station.)

Chairman Webster: By reason of the fact that I am chairman of the committee on Nursery Practices, which is a sub-committee of the Nursery and Planting Committee of the Western Forestry and Conservation Association, I have handled the chairmanship of this group, and I don't feel it is quite right to continue on indefinitely. I feel someone else in this group should handle the chairmanship. I feel we should rotate the chairmanship. I would be very happy if we could elect somebody right today that would handle the chairmanship of our next meeting. I think if we get a little new blood in it, it kind of keeps an organization pepped up. I would like to see you fellows today appoint a chairman for the meeting next year. Now I will throw that open and let you fellows go to it.

Mr. Rindt: Can't you do it, Mike?

Dr. Wright: I think Mike has done such an excellent job, I, for one, see no reason for changing.

Chairman Webster: Well, I tell you, how about Charlie Rindt, how about you taking it?

Mr. Corson: I feel for Mike, so I think you ought to give Mike the leeway of picking. Name Charlie Rindt associate chairman.

Mr. Rindt: I would rather not. If you have an associate, you ought to have a nurseryman.

Chairman Webster: I could use some help on it very nicely, I tell you that, because it is quite a job. It takes quite a little time. Perhaps John Nagle - we need a school man in there.

Mr. Nagle: I am a little isolated, being across the state. Get some western one.

Chairman Webster: How about letting me just appoint somebody. If it is satisfactory to your fellows, I will do that. I will think this over and somebody is going to get a letter from me one of these days.

Mr. Stubbs: Mike, I have a camera set up out here all in focus and we haven't got a complete group picture, and I would like to try and get a picture of this group.

Chairman Webster: That is fine. Let's all assemble just as soon as we adjourn and we will let Jim take our picture. We are just ten minutes behind schedule, really better than I expected, and thanks very much, gentlemen. The meeting is adjourned.

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