DESIGN FOR A NURSERY SEEDBED LIFTER

Robert H. Heintz

Nurseryman, State Forest Nursery
Towner, North Dakota

The tree lifter used here at Towner Nursery does our work very well. It is simple, rugged, and quick to operate (figs. 1-4). It was made at a local machine shop.

The axle or 2 1/2-inch shaft was taken from a combine and is of cold rolled steel. The cutting edge of the blade is the hard steel edge of a road grader blade. We determine the pitch of the blade by adjusting the turnbuckles; the depth of the blade is determined by the pump. To remove the blade, just remove the two chain bolts and the two hanger bolts and the tractor is ready for other work.

Figure 1. - Lifter in action. Chain hook up and turnbuckle determine angle of blade at a certain depth. The 1-inch bolt holding blade to hanger has a double nut to allow blade to swing.

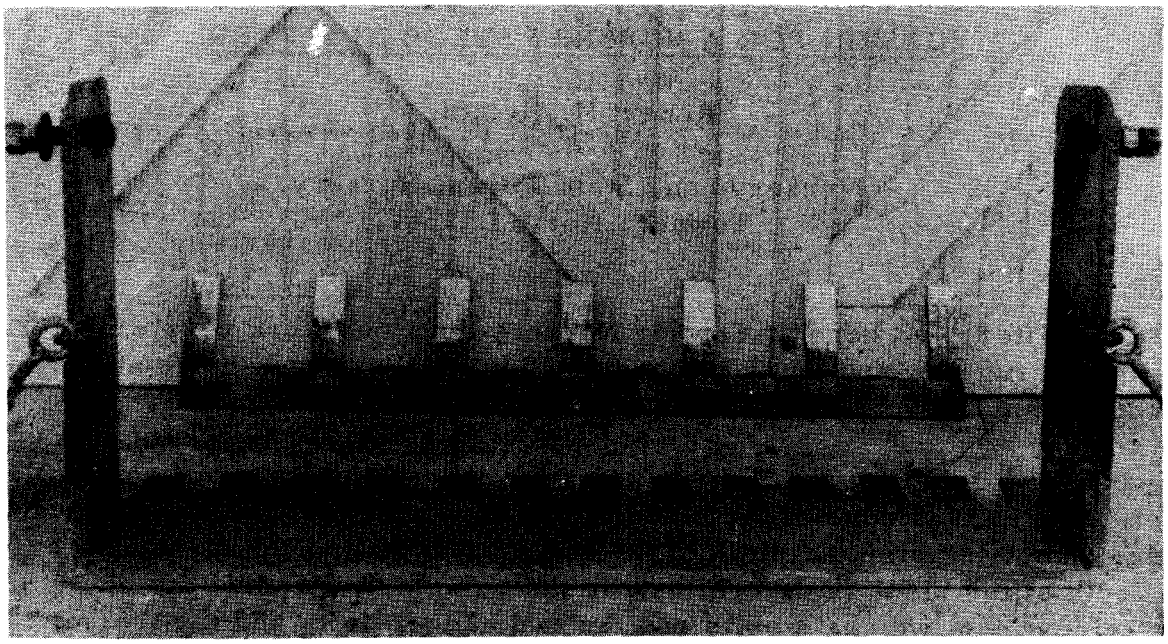

Figure 2.- Blade as used for seedlings. When blade is used for transplants, the set of teeth in the background is bolted onto the regular teeth.

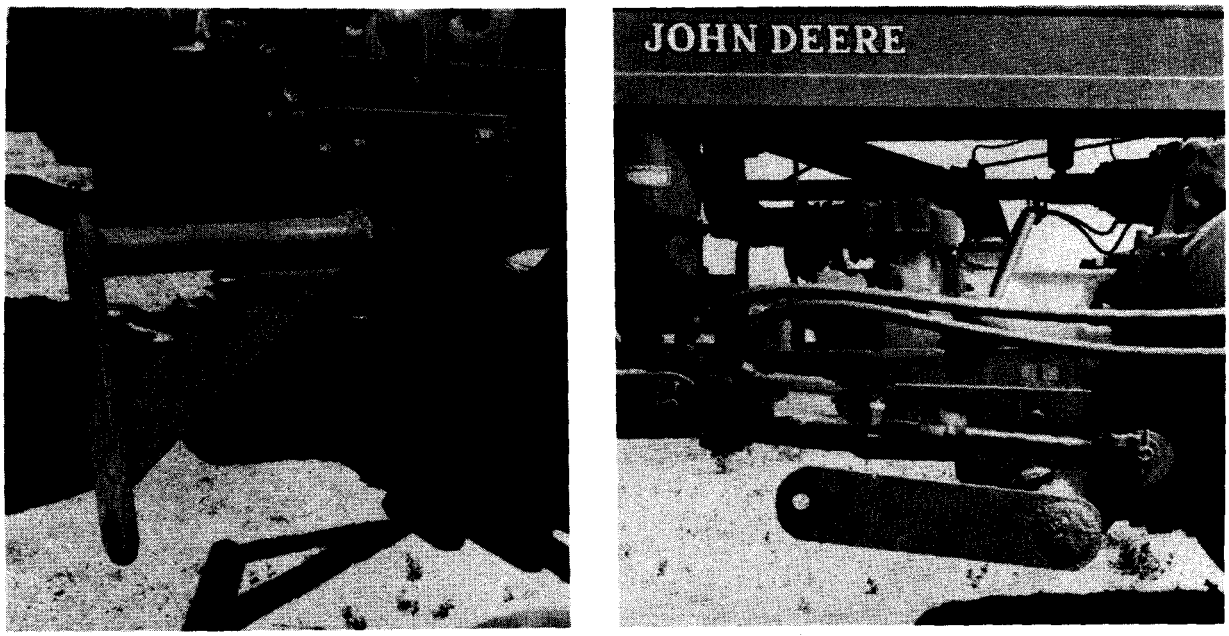

Figure 3.- Left, blade hanger, shaft, keeper ring, and tractor mounting. Right, pump mounting and blade hanger in up position.

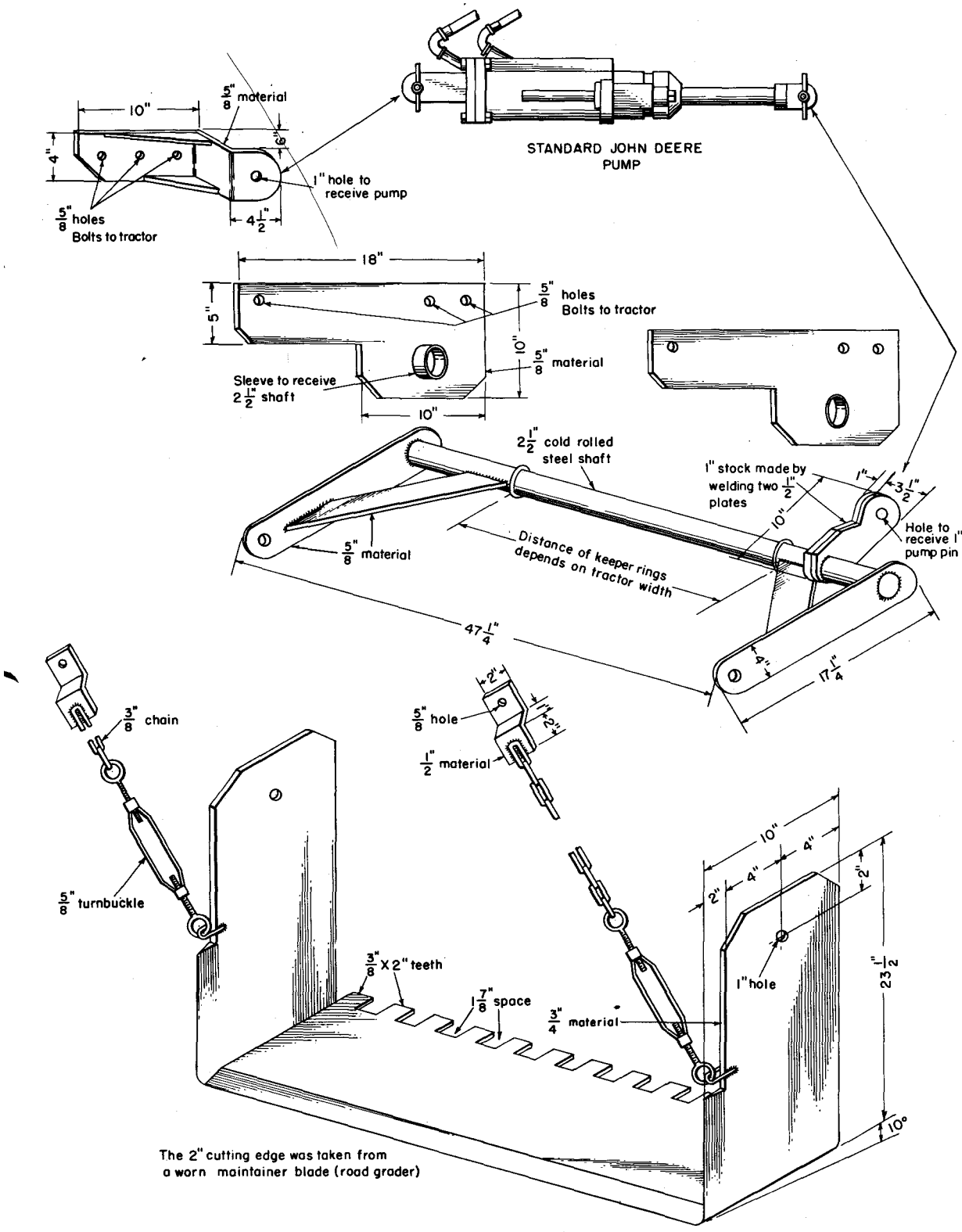

Figure 4.- Construction details of lifter.

SINGLE-ROW, TRACTOR-MOUNTED TREE LIFTER FOR HARDWOODS

Dean W. Einspahr

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Proper handling of experimental seedlings becomes quite a problem when large-scale tree breeding and testing programs are instituted. Often large numbers of experimental lineout stock must be lifted for field planting. Experimentally it is desirable to have the trees handled carefully, uniformly, and as expediently as possible.

The Institute of Paper Chemistry's forest genetics program requires the handling of large numbers of aspen seedlings. To reduce the problem of handling the experimental trees a single-row tree lifter was designed and built (figs. 1 and 2). The lifter is attached by a three point hitch that fits the hydraulic system of either the Ford or Ferguson tractor.

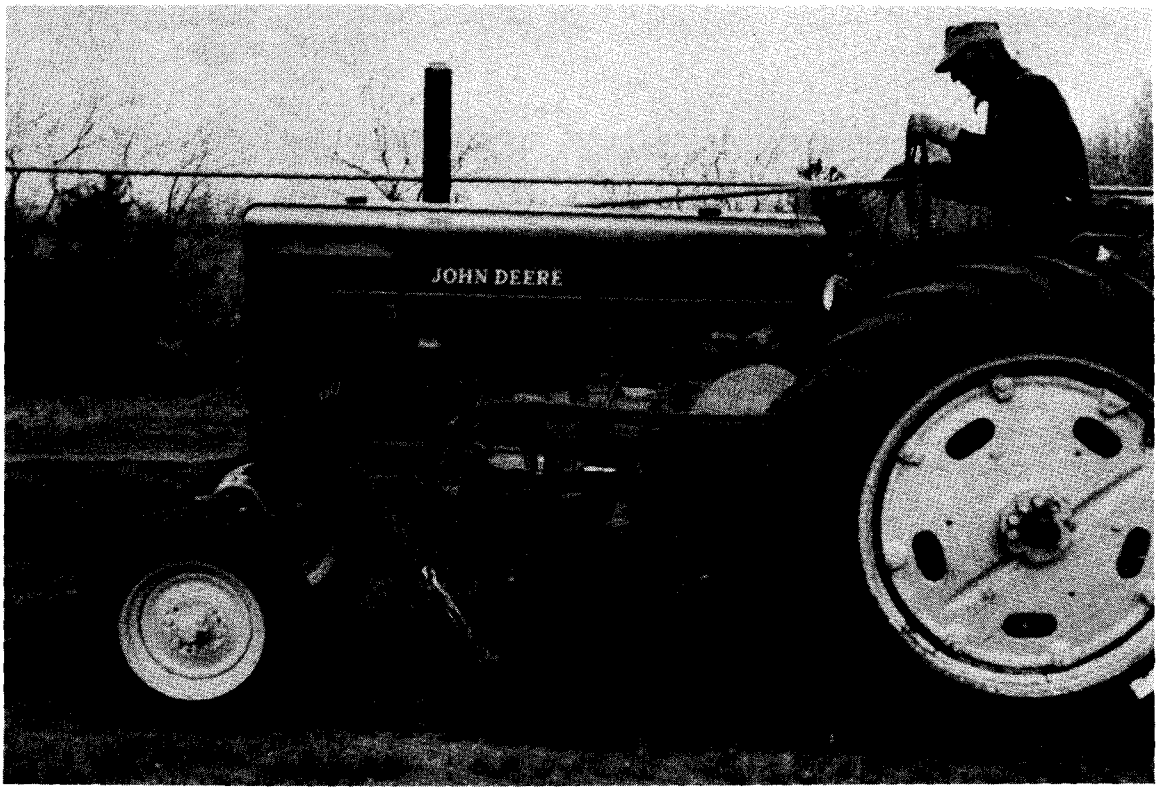


Figure 1. This tractor-mounted tree lifter was designed to undercut, side prune, and lift experimental aspen seedlings.

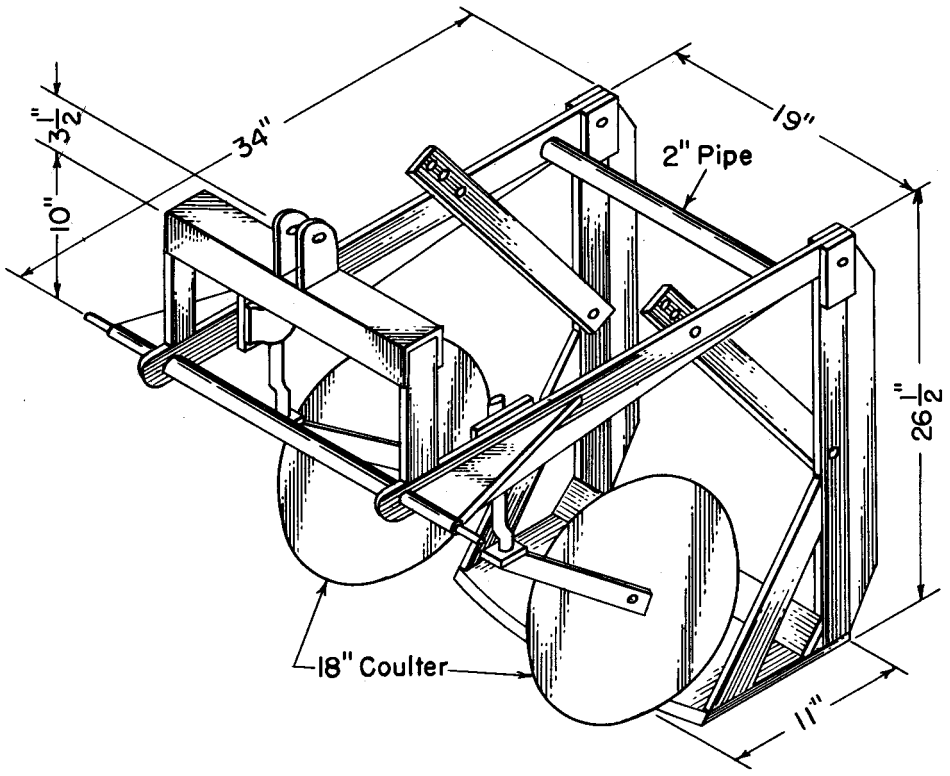


Figure 2. -Overall dimensions of the single-row tree lifter. The basic structure is made from 1/2"x2" cold rolled steel.

By means of the hydraulic control the lifter can be run at any desired depth from 0 to 9 inches. The 18-inch rolling coulters, which are mounted on the frame in front of the lifter shoe, prune the side roots. The lifter shoe prunes the lower roots, lifts the trees, and loosens the soil so the "bare-rooted" trees can be pulled from the soil with a minimum of injury to the root system.

Cost of two 18-inch rolling coulters completely equipped for mounting runs from $40 to $50. The materials and labor for the remainder of the machine runs close to $80.

A CONVENIENT TREE LIFTER

M. W. Day

Superintendent, Dunbar Forest Experiment Station
Sault Ste. Marie, Michigan

Tree lifters vary greatly from nursery to nursery, and probably most nurserymen feel that their own lifter is best suited for local conditions. The lifter developed at this station is the result of many years' experience with several types of lifters. After two years of use it is considered to be very satisfactory for our set of conditions. This piece of equipment may prove worthy of trial and use at other nurseries. In any event, our lifter may have features of design that can be incorporated in similar equipment elsewhere.

Our lifter is used with an International 300 tractor equipped with quick hitch and torque amplifier. We have been able to lift both seedlings and transplants under most soil moisture conditions with this outfit. The quick-hitch feature permits use of the tractor for other work, and makes it much easier to move the lifter from place to place in the nursery.

The accompanying photographs (figs. 1 and 2) and sketches (fig. 3) are selfexplanatory. Except where bolts are shown, parts are joined by electric welds' The front edge of the blade is ground to a sharp cutting edge with the bevel up.

Figure 1. - Tractor with tree lifter attached.

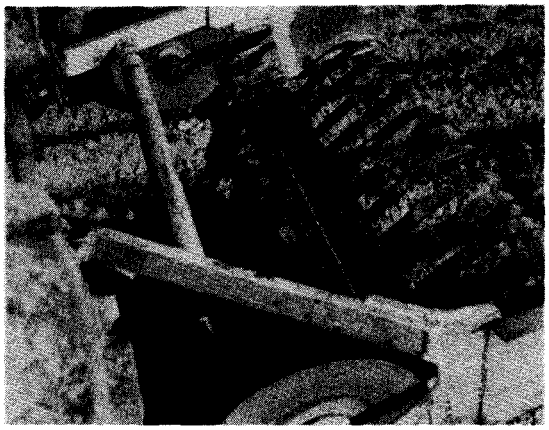
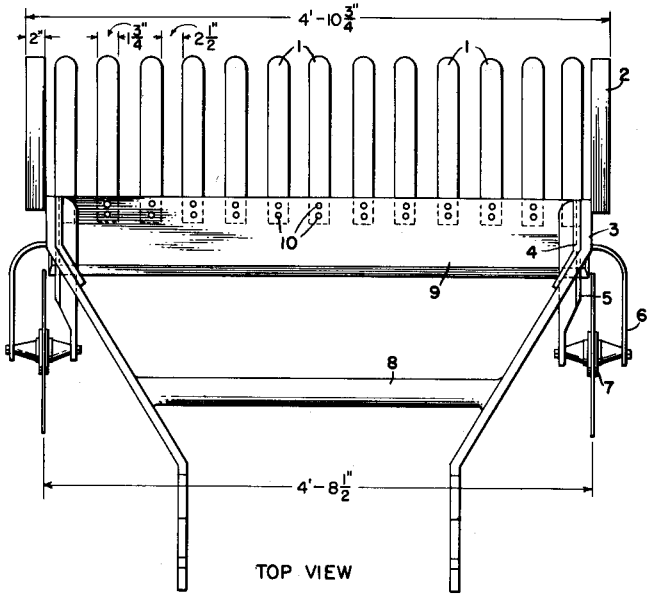
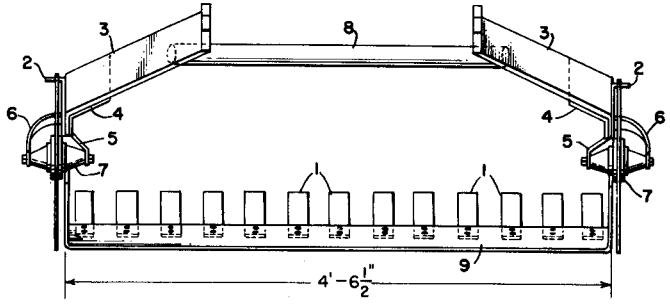


Figure 2. - Closeup view of lifter and hitch.



TOP VIEW



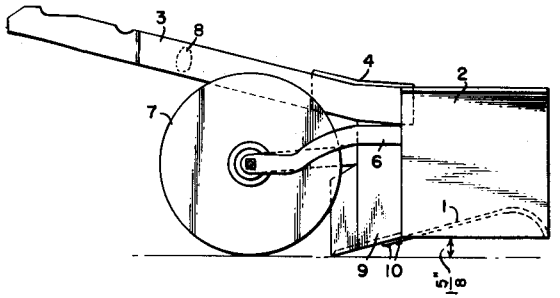
FRONT VIEW

TREE LIFTER

DUNBAR FOREST EXPERIMENT STATION

PARTS LIST

		Number needed
1.	Car spring leaf, 1/4" x 1 3/4" x 18"	13
2.	Plate shield, 1/8" x 16" x 16"	2
3.	Tractor hitch, 1" x 3" x 3'6"	2
4.	Welded brace, 1/2" x 4" x 9 1/2"	2
5.	T-iron sprocket/brace, 3/8" x 1 1/2" x 15"	2
6.	Iron sprocket/brace, 3/8" x 1 1/2" x 12"	2
7.	Coulter, 16", 1/2" diam. axle	2
8.	Iron pipe, 2 1/2" outside diam. x 2'4"	1
9.	Grader blade, 8"	1
10.	Plow bolts, 1/2" diam., nuts on bottom of blade	26



SIDE VIEW

PINE NEEDLES FOR SEEDBED COVERING

Thomas S. DeLong and Charles R. Nolder 1/

The benefits to be obtained from the use of pine needles for seedbed cover were particularly noticeable at the Clearfield State Forest Tree Nursery where severe and frequent rainstorms occurred during the spring and summer of 1956. The value of the protection offered to seedbeds and seedlings by the mulch of pine needles was studied in conjunction with operations in the Pennsylvania State Forest Tree Nurseries.

Counts and measurements were taken on four adjoining beds of red pine having two different bed coverings. Preparation of beds, seeding, and covering were done on the same day. Two beds were covered to a depth of 1/4 inch with a mixture of half sand and half sawdust, over which was placed a layer of burlap. The other two beds were covered with approximately
1/2 inch of red pine needles followed by 1/2 inch of half sand and half sawdust. Lath shades were used on the four beds to hold down the burlap and pine needle cover.

On newly seeded beds not covered by lath shades, several heavy rains washed away much of the needles, sawdust, and seed, prior to germination. The shades, however, on needle-covered beds broke the force of the rain and the sides of the lath shades prevented cross washing and breaking down of the berms. After germination, the shades and burlap were removed. The seedling stems then prevented the washing away of the needles and the needles in turn retained the sawdust.

The effects of the two types of seedbed covering on quantity and quality of germinated red pine seedlings 2 1/2 months old at the Clearfield Forest Tree Nursery in 1956 were as follows:

	Burlap 2/	Needles
Trees per square foot .....number	37.7	64.9
Tree height ..... inches	1.32	1.56
Stem diameter .....millemeter	.58	.59
Trees with bent stems.....percent	18.0	3.5
Bed width ..... inches	44.1	46.8

1/ Dr. T. S. DeLong is Sr. Research Forester for the Pennsylvania Department of Forests and Waters, Harrisburg, Pa. and Chas. R. Nolder is Nurseryman for the Pennsylvania State For. Tree Nursery, Clearfield, Pa.

2/ Burlap removed after germination; only sand and sawdust cover remained.

Outstanding as the greater number of trees present on the needle-covered beds may be, more important is the number of trees that were not washed flat by sheet erosion and rilling. Erosion on the beds not covered by pine needles resulted in rounding off the berms, narrowing the beds, forming rills, some approaching gully size, and washing out many of the trees.

The greater height measurements recorded on needle-covered beds were probably due to greater moisture retention of the soil under the mulch of needles. The needles also served to hold the sawdust and sand mixture in place, thereby providing additional mulch. On beds from which the burlap had been taken, the sawdust was almost completely washed away, and adhering to the stems of the seedlings was a mixture of soil and sawdust that had been splashed up by the rains. This condition did not exist on the needle-covered beds.

Hand weeding of the needle-covered beds was easier and faster according to the weeders; the soil under the mulch tended to be more moist which permitted easier loosening of the roots in the soil.

Two possible disadvantages in the use of needles as mulch must be considered. One is the chance of introducing diseases such as needle cast; however, the needle cast fungi Lophodermium and Hypoderma can be controlled by fungicides. Another disadvantage is that pine needles may not be readily available in usable quantities, and the cost of procuring needles may make this type of cover more expensive than other types.

The possible advantages pine needles may offer as a seedbed cover are these:

1. Retain moisture; which lessens critical danger periods during droughts and reduces amount of irrigation needed.
2. Prevent hardening of surface soil, with greater precipitation absorption and less runoff.
3. Hold sawdust in place to provide additional mulch after germination.
4. Resist erosion and breaking over of seedling stems.
5. Build up organic matter.
6. Increase growth.
7. Reduce loss of berm and border seedlings.
8. Provide winter mulch, lessen frost heaving.
9. Eliminate removal operation.

Observations made during this study and data collected indicate that the benefits from the use of pine needles as a seedbed cover outweigh the disadvantages. It is interesting to note that since the pine needles are left on the beds after germination, cost of removal incident to most other coverings is eliminated. Also, since seedbed covering is only a fraction of the total cost of bed preparation and seeding, the higher quantity and quality of seedlings may more than make up any difference in the initial cost, particularly where risk of adverse weather conditions is a factor of production.

SCREENING FOR SEEDBED PROTECTION AGAINST BIRDS

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Forest Genetics Research Division School
of Forestry, University of Georgia
Athens, Georgia

Several species of birds, especially doves, are notorious for their damage to seed and seedlings in forest tree nurseries. Seedlings are particularly vulnerable until the seed coats have dropped from the cotyledons. The seed is eaten and the newly germinated seedlings are clipped below the adhering seed coats and are often pulled out of the soil. Bird activities are greatest at dawn and dusk. The authors have observed the consumption of 67 slash pine seed by a single dove in less than one minute. This was confirmed by an analysis of stomachic contents. Where relatively small numbers of valuable seed from selected parent trees are available, the mischievous activities of birds can often be disastrous to a tree improvement program. To allay the destructiveness of their feeding habits a framed screen has been devised to fit over permanent type seedbeds (fig. 1) .

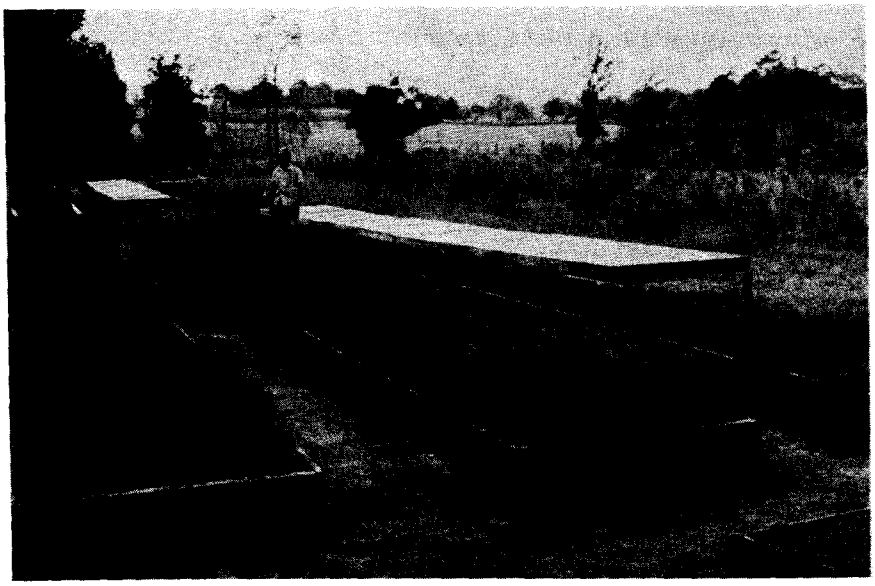

Figure 1. - Screened frames in elevated position providing shade for permanent type seedbeds below.

Subsequent to sowing and mulching with pine straw, the framed screens are placed directly on the seedbeds. Their construction allows sufficient headroom for seedlings to grow until they shed their seed coats and protection is no longer the major objective. The screens are then raised to a higher level where they continue to provide shade. During the early growing season, the screens serve effectively, both as a means of warding off birds and rodents, which can also cause severe damage, and as a means of shading seedling beds to prevent heat injury or sunscald. The value of shade becomes particularly important when growing shortleaf pine and many exotic species. Seedbeds can be watered through the screens, which in effect cuts down the eroding force of water as it comes from a nozzled hose. Damping off has been no problem where normal applications of fungicides are made.

The framed screens are 4 feet wide and 6 feet long, the width of the frame coinciding with the width of the seedbed. The length of the frame was dictated both by the ease of handling and by the length of seedbed, 10 such sections covering seedbeds 60 feet long. The interior frames are made of two 5'10" lengths of 1" x 2" 's with wood blocks for corner bracing. The end frames have the same-dimensions and are generally of the same construction except that one end piece is a 1" x 4". This allows for complete enclosure of the beds. Fiber glass screening is then stapled to each frame.

These screens are not necessarily designed for a large nursery. They are ideal for small experimental ones such as the Tree Improvement Nursery at the University of Georgia, Athens, Ga. This nursery has a capacity of 50, 000 to 100, 000 seedlings. At the cost of present day labor necessary to patrol a nursery during the critical period, the screens will pay for themselves in two to three planting seasons.

A SIMPLY MADE COVER FOR SEEDBEDS

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Tropical Forester, Florida Forest Service
Fort Myers, Florida

An easy and efficient method of shading seedbeds has been developed at the Tropical Forestry Project in Fort Myers, Fla. This method may prove useful at other nurseries where temporary shade is required. It consists of covering a simple wood and wire framework with muslin or tobacco cloth, which can be quickly removed when desired.

At the four corners of a bed 2" x 4" stakes are driven in until the tops are about 18" above ground. Two additional stakes, approximately 12" longer, are placed midway between the corner stakes at each end. The three stakes are then fastened together by nailing a 1" x 4" across the top of the corner ones (fig. 1).

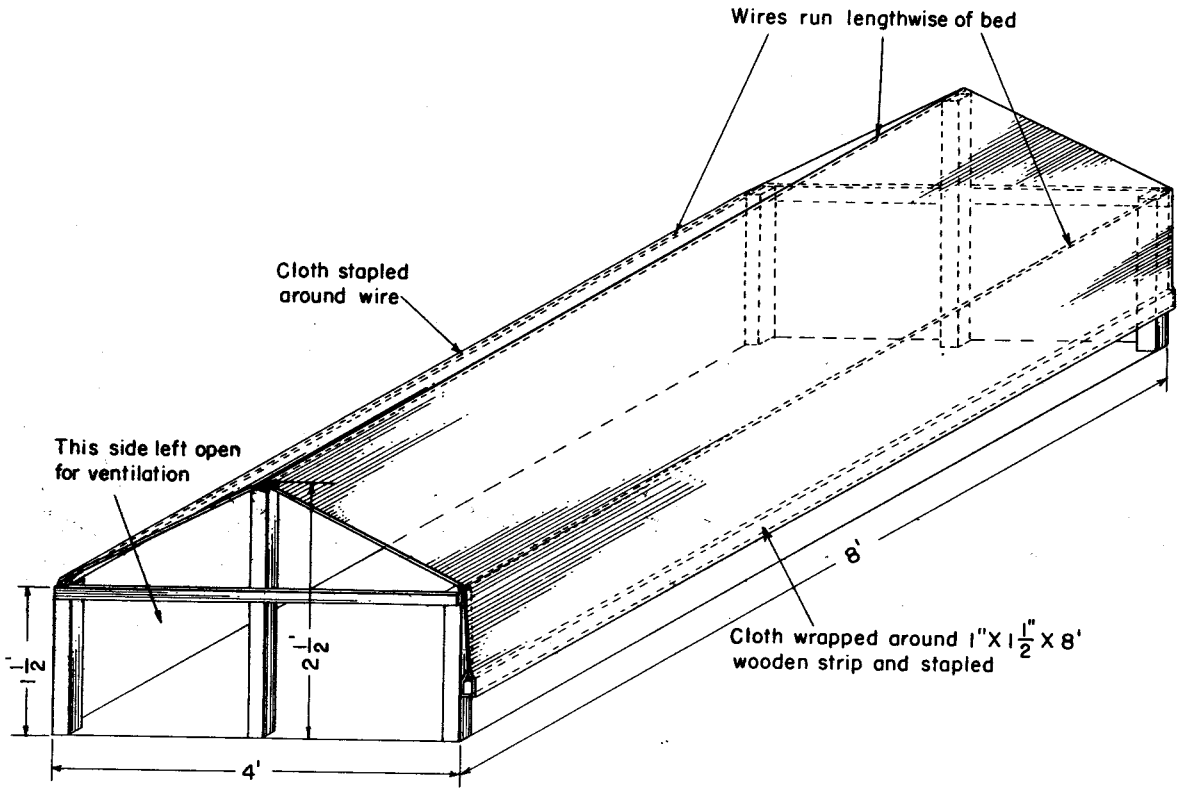

Figure 1.- This simple seedbed cover can be easily constructed, moved or stored.

Next, "bailing wire" is run lengthwise between the two sets of stakes to support the cloth. The final step is to staple one edge of the muslin or tobacco cloth to the wire on the north or east side of the bed and the other edge to a 1" x 1 1/2" strip of. wood, which is then simply dropped over the wire on the opposite side of the bed. The cloth is held in place by weight of the wood strip.

This device was originally developed as a matter of expediency because snow fence, which is commonly used for shading, is not readily available in south Florida. Other advantages were soon discovered:

1. The beds can be easily uncovered for watering, fertilizing, weeding, etc. , by merely tossing the shades across the beds into the opposite path.

2. Exposure to sun or rain can be easily controlled in the same manner.

3. Beds can be covered easily with plastic for fumigation.

4. Frames and covers can be readily removed for storage or for use in another part of the nursery.

No comparison of costs with other methods has been made, but with reasonable care, treated cloths should last several seasons. The savings in labor and the above advantages should offset the increase in depreciation which might be expected.

INCREASING PRODUCTION OF NURSERY STOCK BY IMPROVEMENTS IN BUNDLING AND PACKING

C. Ingersoll Arnold

Director, Russ Forest and Nursery
Michigan State University
Decatur, Michigan

Increases in the cost of production, particularly labor cost, make it necessary to mechanize our nursery operations as much as possible. Mechanization usually means a speed up of work or a reduction in the length of time from seedling or transplant bed to finished bundle of trees. Such reduction in time not only cuts the cost of production (if crew is same size) but also reduces the chance of roots drying out through exposure to air and sun.

The present layout of the packing shed here at the Russ Nursery was developed to increase production of nursery stock without adding to the cost (fig. 1).

In 1955, the grading table designed by P. W. Robbins of Michigan State College (Jour. Forestry 40: 809-811. 1942) was transferred to Russ Nursery. In the spring of that year, we found trees could be handled more quickly by

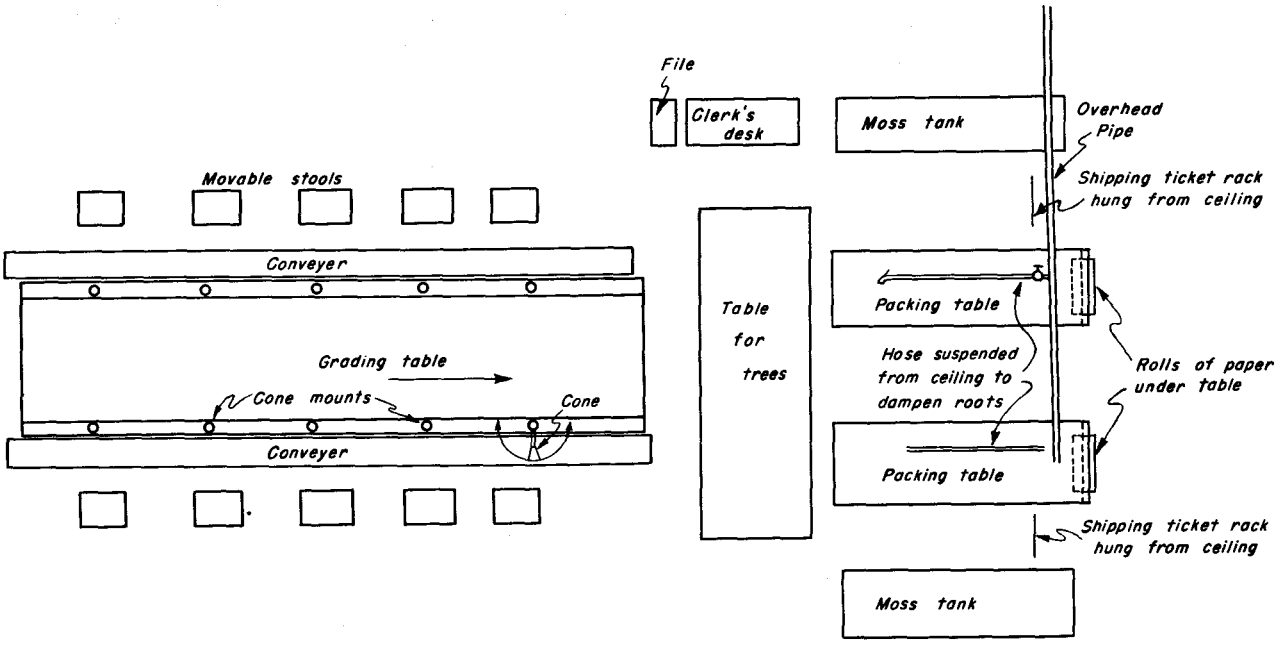

Figure 1. - Packing shed floor plan.

counting 25 and placing them on the endless belt than by placing two trees per mark as described by Professor Robbins in his article. The trees were picked up by a worker at the end of the line, two bundles of 25 combined, tied by an automatic tier, and placed in a wooden rack which contained 10 spaces. Thus 500 trees were placed in one rack. This rack was removed when full by the two men packing on the packing table.

Several problems arose. Packers were unable to keep up when handling certain species, the automatic tier had breakdowns and we could not get all trees out within the shipping time period. While this method did increase average daily shipment over that of previous years, it was still too slow to handle the volume of stock which had to be shipped. The crew averaged 70, 000 trees per day shipped. It was evident the method had to be modified because, except for dribble orders, shipping was not completed until May 6.

In 1956, modifications were made on the grading table. The racks along each side which held boxes and seats for sorters were removed and replaced by conveyers. Wooden stools were constructed for the counters, and metal cones, one per counter, were mounted on the sorting table.

These metal cones are a modification of those described by Professor J. T. May, A.P.I. Ag. Expt. Sta., Auburn, Ala., in Tree Planters' Notes No. 18, December 1954. Each cone was 12 inches long overall, 6" in diameter, and welded onto a 1-inch union for easy removal from a pipe which acted as rubber band storage and support (fig. 2). In the fall of 1956, new cones as described by J. T. May, 5 inches in diameter and 12 inches long with no cylinder were installed (fig. 3). A 4-inch cone was found to be too small.

Each counter counts out 50 trees, inserts roots in cone, holds the bunch of trees with his left hand, pulls rubber band off cone with his right index finger onto tree bundle (a small finger groove enables worker to do this without fumbling with the rubber band), and tosses bundle on table. We have found that the #31 rubber band is best with the 6-inch cone; #29 and #30 break too often when pulled over this cone. The #29 or #30 bands work well with the 5-inch cone which we now use for nearly all stock except red pine transplants.

Using this system meant reorganizing the crew. The person on the tier was free for other duties and it was necessary to have two packing tables with 3 packers to handle the flow of trees. The crew consisted of 18 or 19 people: 4 or 5 pullers, 10 graders (one of whom transferred trees from sorting table to storage table when sorting table was filled), 3 packers, 1 clerk. One puller drove the loaded truck to the express office. Average production rose to 120, 000 trees per day shipped, with 175, 000 the highest in one day.

Packers rolled the trees in waterproof paper, with sphagnum moss, by hand. The center man, alternating between the two tables, helped roll and tie the bales on both. While two men were rolling and tying a bale, the other packer laid out moss and trees; by the time he had his bale ready for rolling, the center man was ready to help him roll and tie it.

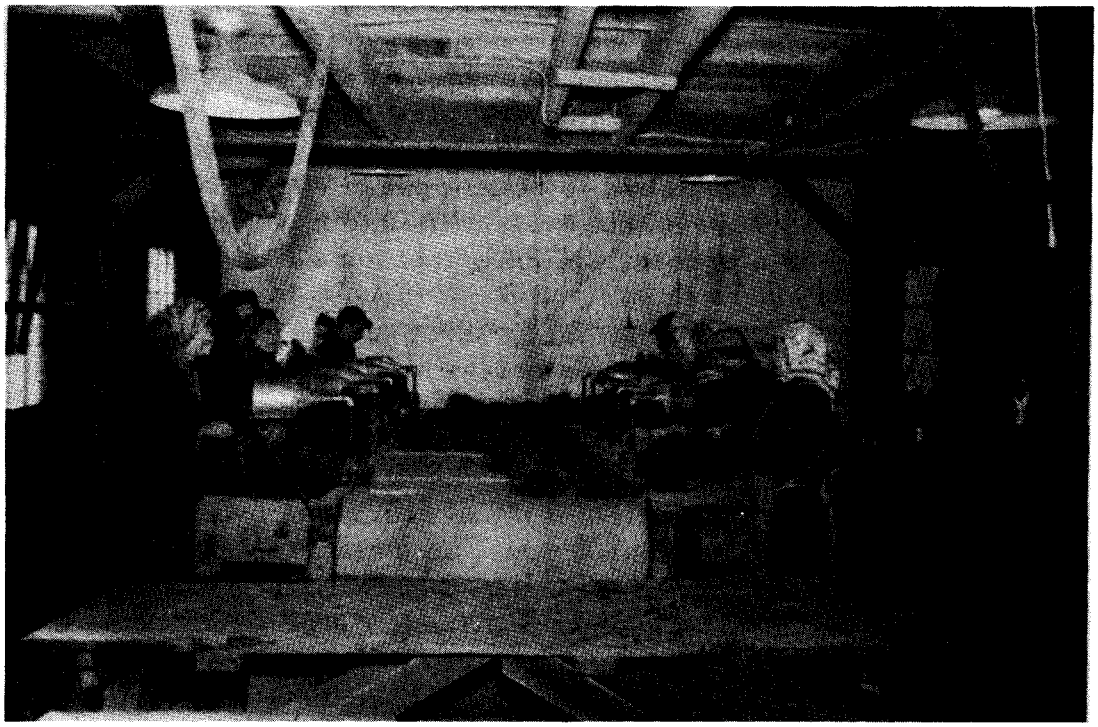

Figure 2. - Counters working with 6-inch cylinder type cones.

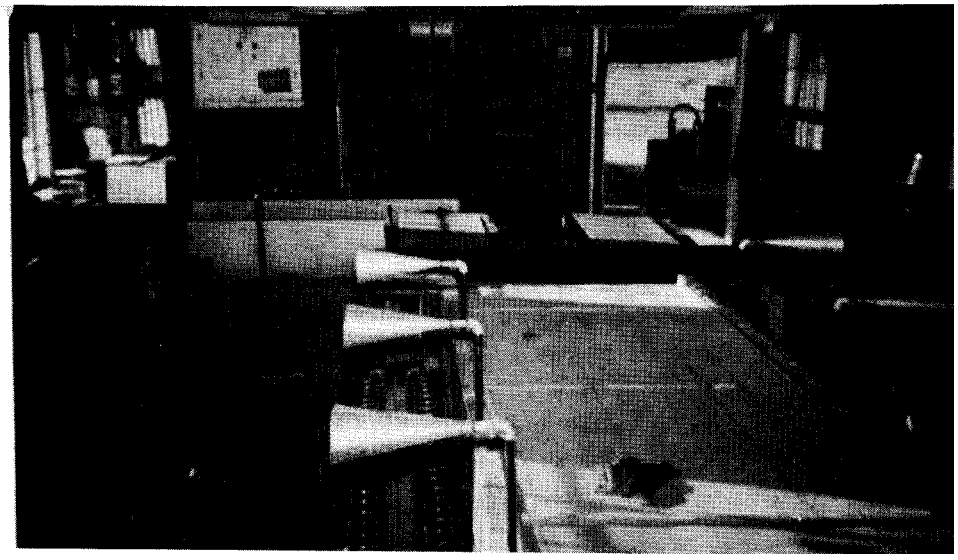

Figure 3. - Present arrangement with 5-inch, cylinderless cones.

Confusion and mixup in getting the proper number of trees baled for each customer had been experienced in previous years. With the addition of a second packing table, we knew more confusion might result unless we adapted our method of handling shipping tickets to packer technique. In addition to customer name and address, the number of trees per bale he is to receive is typed on the ticket. Ten small spring clips were nailed to a board and tickets for one bale of trees inserted in each clip by the clerk. Four such boards were made so that the clerk could be filling out express bills and putting tickets in two while packers were working from the other two. The boards, filled with tickets, were hung in a location for convenient plucking by the packer, who referred to ticket for number of trees for that bale before getting bale ready.

With this setup we can run over the table and pack two species at once. There is no chance of mixup with one species per side of table and each packing table handling a separate species. This avoids any need for stock piling except when two or more species must be packed in one bale. Usually, however, the orders are large enough to pack mixtures in separate bales.

In 1955 it took 25 days to get out 1, 583, 000 trees with 12 people. In 1956 it took 18 days to get out 2, 176, 000 trees with 18 people. In 1955 the average daily wage for workers was $1.28 per hour, in 1956 this rate had risen to $1.36 per hour. The change in method of packing, however, resulted in a reduction of 12 cents per thousand trees in cost, as indicated in the following tabulation. This 12-cent saving when multiplied by the number of trees shipped comes to $261, which more than offsets the $35 the cones cost.

		1955	1956
Trees shipped per day	number	70,000	120,000
Crew	do	12	18
Man-hours per day	do	96	144
Rate per man-hour	dollars	1.28	1.36
Crew cost per day	do	122.88	195.84
Cost per M trees shipped	do	1.75	1.63

We are now working on plans to increase efficiency of moving trees from grading table to within reach of packers mechanically, but these are not yet developed.

SEEDLING LOSSES IN ARIZONA CYPRESS

A. A. Foster and Robert P. Harrison

Southeastern Forest Experiment Station, Forest Service Asheville, North Carolina 1/

The practice of growing Arizona cypress in forest nurseries for Christmas tree plantings has been expanding during the past few years. Susceptibility of the species to various insects and diseases, however, is the major limiting factor in its culture. Losses in nursery beds often amount to more than 50 percent of the growing stock. Mortality has been particularly high during the 1956 growing season in the Georgia Forestry Commission nurseries.

Most of the mortality has, in the past, been attributed to Phomopsis blight. Nurserymen routinely follow a spray schedule recommended by Slagg and Wright 2/ in which they apply 3/4 pound of Special Semesan 3/ with 5 ounces of DuPont spreader-sticker in 75 gallons of water per acre weekly from June 1 through September 30. Phomopsis was found commonly on the trees in early June but could not be isolated later in the season. This suggests that the recommended spray program is effective in checking; this disease.

Despite the fact that Phomopsis blight was being controlled, mortality in the beds continued and by mid-July had become severe. Examination of the seedlings revealed that a high percentage of them had been girdled below ground by an insect. Silken tubes were often found attached to the girdled seedlings. In addition, a number of head capsules and frass of lepidopterous larvae were found. Later a few larvae were found feeding on the seedlings. These have been tentatively identified as the lesser cornstalk borer.

Applications of benzene hexachloride (BHC) at the rate of 1 gallon of the 12 1/2 percent gamma isomer in 60 gallons of water per acre applied at 4-week intervals have provided adequate control of this insect. In addition to the BHC, tests have indicated that parathion at a dosage of 2 pints of the 50-percent emulsifiable concentrate to 100 gallons of water per acre or

1/ This work was done in cooperation with the Georgia Forestry Commission and the Georgia Forestry Research Center at Dry Branch, Ga.

2/ Slagg, C. M. , and Wright, E. Control of cedar blight in seedbeds. Amer. Nurseryman 78 (7): 22-25, Oct. 1, 1943. (Also Kansas State Hort. Soc. P roc. 1943: 22-25.)

3/ Manufactured by E. I. DuPont de Nemours Company, Wilmington, Del.

guthion (Bayer 17147) at a dosage of 2 pints of the 25-percent emulsifiable concentrate to 100 gallons of water per acre will control the insects.

A survey of the cover crops in the nurseries showed that field peas were heavily infested with the insect. Damage to the beds was generally greatest nearer the cover crops. The moths apparently fly from the peas and lay their eggs in the Cypress beds.

A third source of losses is the dying in August and September of the tips of terminals and laterals. The fungus Sclerotium bataticolum is present on some of these stems, and a species of Alternaria is fruiting on others. Both of these fungi might be pathogenic under some conditions. However, observations of the trees indicate that the tips may have been killed by some other organism and that these fungi are merely secondary. Inoculation studies are now under way to determine whether or not they are primary pathogens.

A REPORT ON GEORGIA'S NEW DEWINGER

S. P. Darby

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Macon, Georgia

During the 1955 cone collection season, the Georgia Forestry Commission installed a Crippen Model EP polisher in its seed extraction plant for dewinging purposes. The machine was described and illustrated in the September 1956 Journal of Forestry (54: 579-581), and this report is the result of inquiries from various organizations requesting further information. The majority of questions asked were concerned with the single thought, "Is the machine mechanically sound after prolonged use?"

After approximately 50, 000 pounds of slash (Pinus elliottii) and loblolly (P. taeda) seed had been dewinged by the Crippen polisher, seed began to emerge from the machine improperly dewinged, (fig. 1, left). One will observe that most of the wing was removed; however, a short stub remained. It was felt that dewinging had become substandard and that this stub should be eliminated.

The machine was dismantled to expose the revolving brushes and the corrugated rubber liner. Although the brushes were in excellent condition, the liner was worn considerably. Figure 2, right, shows the liner that was removed from the polisher. The corrugations, which are normally about

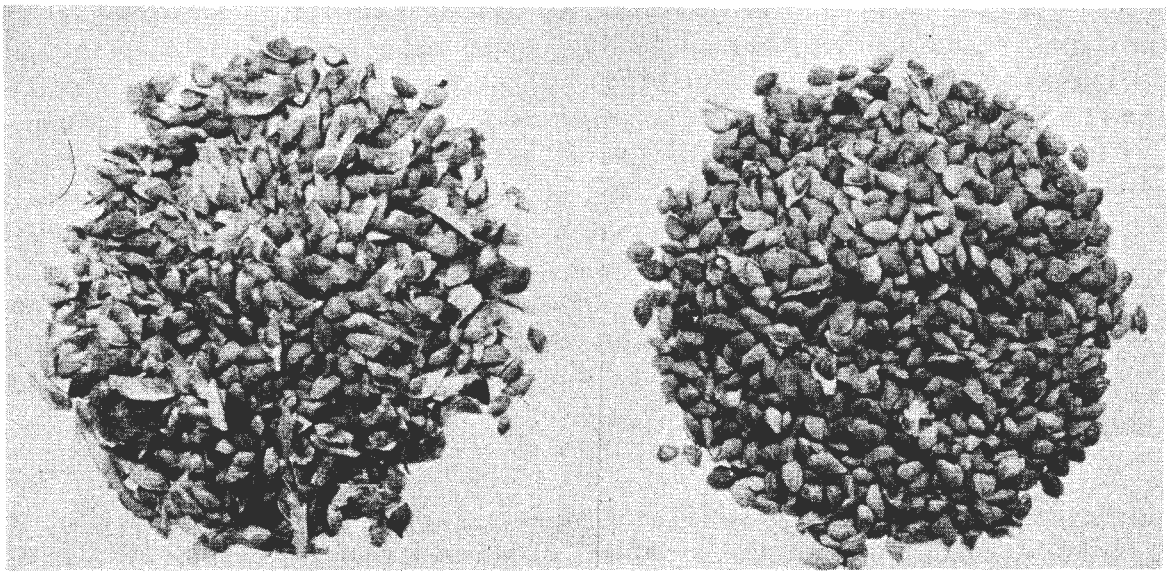


Figure 1. - Left, Seed improperly dewinged by Crippen Model EP polisher because of worn corrugated rubber liner. Right, Seed properly dewinged after liner was replaced.

1/8 inch deep, were completely worn off by the abrasive action of the seed. A new liner is shown in figure 2, left, for comparison. After installation of the new liner, the quality of dewinging became standard. Figure 1, right, illustrates the product obtained.

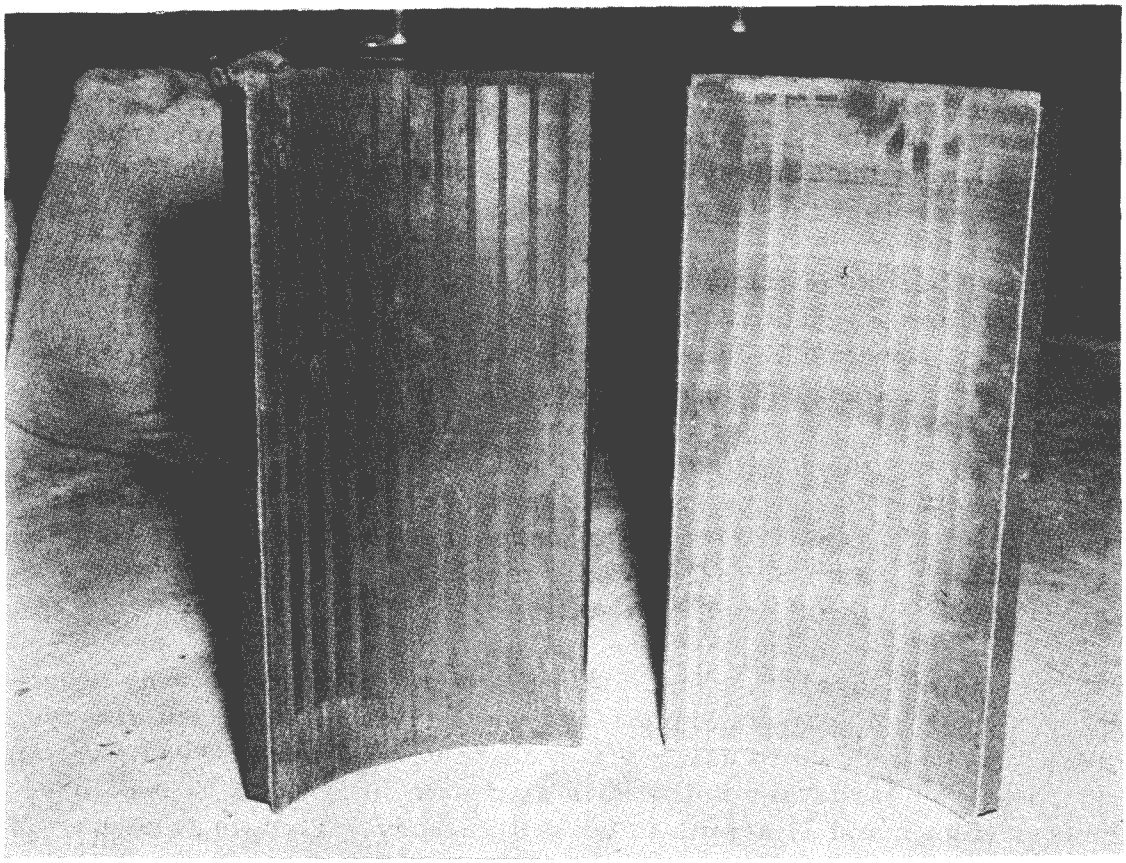


Figure 2. - Right, Corrugated rubber liner from Crippen Model EP polisher worn smooth by abrasive action of seed. Left, New liner; corrugations are 1/8 inch deep.

Considering lost time due to mechanical difficulties, none has been experienced. The dewinger has functioned properly, and no maintenance has been necessary except lubrication and cleaning. The polisher after two seasons of use is in excellent condition and has many more years of useful life.

In conclusion, I would like to point out that the Crippen Model EP polisher has performed most satisfactorily. An expenditure of $49.50 for new rubber liner is certainly justified considering the machine has been used 2 years and has dewinged, as previously stated, 50, 000 pounds of seed.

TAPE FOR TYING SEEDLING BUNDLES

G. W. King

Nursery Superintendent, Virginia Division of Forestry Boulevard, Virginia

Do you have a bundle tying problem at the end of your grading table? We did, and at times the confusion resulted in our producing bundles, the likes of which we were not the least bit proud.

Many approaches were tried to improve and speed up our bundle tying. Several different mechanical string tiers were tried but could not be depended upon. Apparently the units are not designed for rugged, dirty work. Rubber bands preloaded onto metal cones, fine wire covered with paper ribbon, and cotton covered copper wire were all tried. Hand tying with precut string was the most expedient, but because we had to have high production per table, two tiers per table (and sometimes three) were needed. This, in spite of careful selection of personnel to do the tying, was still not satisfactory. Two or three people meant four to six hands and elbows trying to work in a very limited area.

"Brain storming" finally started us in the right direction -- why not use tape. A variety of self-adhering tapes were tried in a variety of ways. We eventually settled down to using 3/8-inch Scotch pressure-sensitive tape which comes 60 yards per roll and is available in six different colors. The dispenser (figs l and 2) seems to be satisfactory. To date (February 25) we have bundled over nineteen million seedlings, 50 trees per bundle. One employee, with a few minutes training, can take care of one grading table running at the rate of 25, 000 trees per hour.

We have estimated that the tape system cost us about three-fifths of a cent more per thousand trees. This difference was arrived at in the following manner. Two string tiers per table at 75 cents per hour cost $1. 50, plus the slight cost of string. The tape at 46 cents a roll (approximately 2 rolls per hour) and one tier cost $1.67, or 17 cents more per hour at a production rate of 25, 000 trees. Not taken into account was the frequent assistance of a third string tier when trees jammed up and the unavoidable slow-down of grading when the graders saw a jam at the end of the table.

In straight dollars and cents we believe we are at least breaking even. The important factors are the very noticeable improvement in packing and a smoother functioning grading room. Another advantage is the use of color

in separating species, orders, grading table production, day's production, etc. A variety of schedules can be carried out with no effort simply by assigning colors according to the job or information desired.

Do the customers like the change? We think so. A small contract planter working near Charlottesville maintains that the change from string to tape saved him about $1. 50 per day in time saved cutting bunches. Since this man does hand planting it is rather evident that large planters using mechanical tree planters would save a proportional amount and be just as pleased.

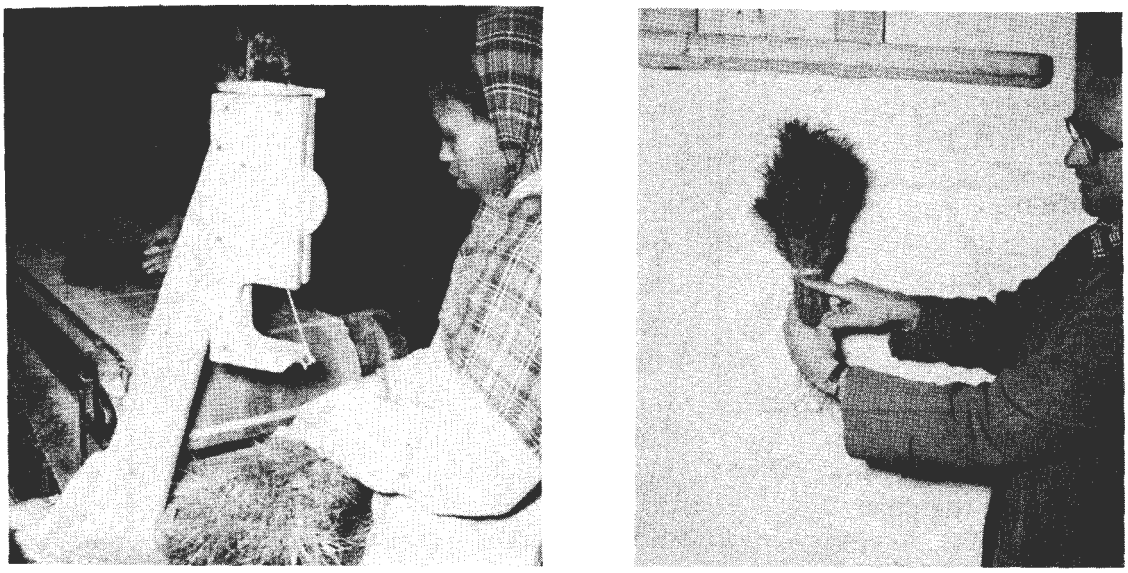
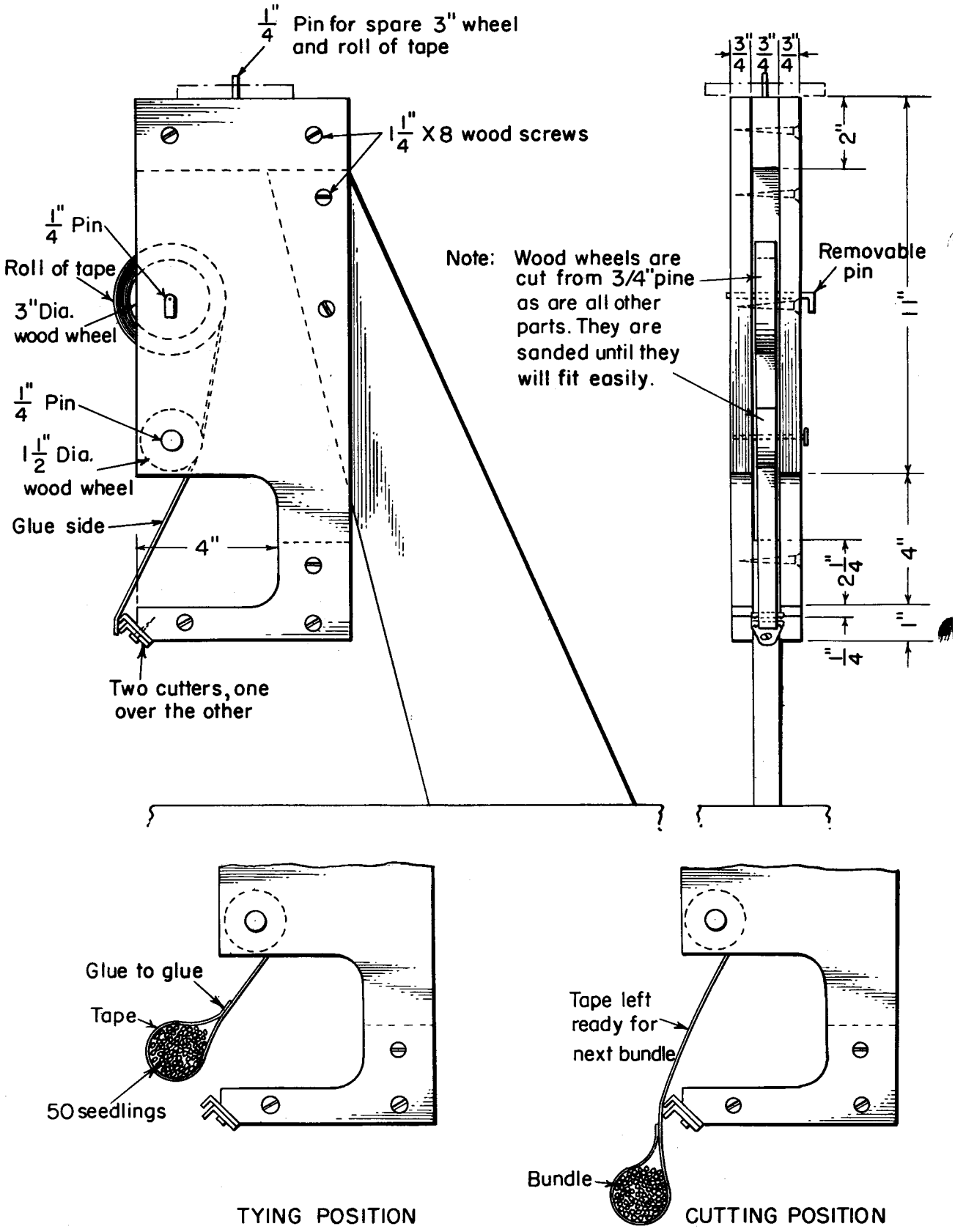


Figure 1.- Left, Tape dispenser ready for next bundle. Right, Taped bundle ready for packing.


1/4" Pin for spare 3" wheel and roll of tape
1 1/4" X 8 wood screws
1/4" Pin
Roll of tape
3"Dia. wood wheel
1/4" Pin
1 1/2" Dia. wood wheel
Glue side
4"
Two cutters, one over the other
Note: Wood wheels are cut from 3/4" pine as are all other parts. They are sanded until they will fit easily.
3/4" 3/4" 3/4"
Removable pin
2"
11"
4"
2 1/4"
1"
1/4"
Glue to glue
Tape
50 seedlings
TYING POSITION
Tape left ready for next bundle
Bundle
CUTTING POSITION

SIMPLIFIED FORM FOR INSTRUCTIONS NEEDED TO ACCOMPANY TREE SHIPMENTS

Charles C. Mony

Nurseryman, Vallonia Nursery, Forest Service
Vallonia, Indiana

A mimeographed instruction sheet as shown below accompanies all stock shipments from this nursery. It is the simplest, fastest way we could devise to give the consignees of our trees the specific instructions they need for each shipment.

_____
(Date)

CONSIGNEE OF NURSERY STOCK

Your attention is called to the items checked.

1.--- Unload and water upon arrival.

2.--- Do not over-water ----------

3.--- Do not stack bales at destination.

4.--- Store in cool place out of wind and sun or heel in.

5.--- Bales ---------- average ---------- M each.

6.--- Untagged bales approximate ---------- M each.

7.--- Not necessary to water dormant hardwoods.

8.--- Additional culling or pruning at your own judgment.

9.--- Bales are graded to within 10% of plantability and count. (Per R-9 Standards)

10.--- Credit for over-run or under-run in bales must be made prior to last load of stock to be hauled.

11.--- Advise NURSERY OF EXACT DATE, HOUR, & COMPOSITION OF NEXT LOAD WANTED.

12.--- Save, dry out, and store nursery burlap and sticks.

13.--- WE NEED YOUR USED BURLAP VIA NEXT TRUCK.

14.--- SEND TARPAULIN & ROPE WITH STOCK TRUCK.

15.--- Advise condition of bales if in bad shape.

16.--- Stock may normally be held for a few days by opening bales and spreading stock thinly in shady, sheltered spot, in lee of hill, cliff, or in cool building on floor. Cover with wet burlap or moist packing material. Keep MOIST.

17.--- Up to 25% BROWNING (FROST BITE) OF SHORTLEAF PINE TOPS IS ACCEPTABLE.

18.--- _____

Charles C. Mony
Nursery Superintendent
U. S. Forest Service
Vallonia, Indiana