

USE OF MACHINES BY PUBLIC, PRIVATE, AND INDUSTRIAL FORESTERS IN SOUTH CAROLINA

E. B. Price

Assistant State Forester, Columbia, South Carolina

Private (Contract) Operator

I pick up seedlings at nursery in lots of 50M to 100M depending on whether using only one planter or more than one; heel seedlings in without breaking the bundles. Am sure that with seedlings tied 100 to the bundle, it would be better for the seedlings to break the bundles in the heel-in beds, but have found that when handling a large quantity for custom planting, it is just too hard, or impossible, to keep the count straight if the bundles are broken for heeling in. Also seedlings heeled in the trailer for transport to the field often get an unexpected bad jolt which throws them out of place. If they are in bundles, order can quickly be restored while if they are loose, much time and a good many seedlings are sure to be lost in the straightening up. I am much in favor of

having seedlings tied 50 to the bundle so that they can be heeled in with soil closer around the roots without breaking the bundle. (North Carolina State Nursery does this).

I carry seedlings into field heeled in (not bedded down) in sawdust in a Z-wheel trailer. High sides are kept on the trailer to protect seedlings from wind. Under unfavorable conditions (warm or windy weather, long drive to field, or necessity of parking trailer in open, sunny place during the day) I try to keep a cotton sheet stretched across the top of trailer to shade seedlings and protect from wind.

With only one planter operating, I use a 2-man crew. With more than one planter, one extra man supplies seedlings and water to the planter. Crews rotate on all jobs to avoid fatigue.

Under most conditions I find it better to pull only one planter behind a tractor. However, in large, open fields I have used a double tow very successfully. A 25 hp tractor (John Deere B, Farmall H, etc.) can pull 2 Lowther planters easily in a light, well-settled soil, such as in an old field that has been uncultivated for some time. Soft fields, recently cultivated, give trouble to the tractors, as well as the planters. The double tow arrangement is more maneuverable than would be expected and has a number of advantages, but has the disadvantage that if any one of the 3 units breaks down (tractor or either planter), time is lost on the whole operation.

I seldom load my equipment on trucks to move; have found it cheaper and usually quicker to drive the tractors, even up to 40 or 50 miles or more.

Thorn punctures in packing wheel tires have caused much trouble. If tire is once allowed to get slack (which is bad from standpoint of packing seedlings too) it seems to pick up thorns much worse than when properly inflated.

Consider the Lowther planter a good machine, but it (my model, at least) is just not adapted to some soils. On soft sands or recently cultivated fields, it often does not work as well as the newer type planter which works off the tractor hydraulic lift. These latter can be lifted slightly so that the packing wheels do not bog in the soil so badly and then too, they are not as heavy on the back end to start with. Also, on wet savannah soils and other sticky soils, the packing wheels often get so clogged with mud and debris that they stop turning. A local machine shop made a set of wheel scrapers to try to stop this, but not much luck. I also rigged up an extra set of 4.00 x 8 packing wheels on back to cope with soft soils, but not much luck there either. I have not tried the new large-diameter Lowther packing wheels, but believe they should largely correct both the above troubles.

On wet savannahs much less trouble with wheel clogging is experienced if the area is not burned over prior to planting; the grass cover keeps the wheels off the sticky earth. However, with the heavy grass cover on the ground, there is great danger to the tractor tires from hidden sharp lightwood stobs in the ground.

I also have a Chapman planter that fits on the hydraulic lift of a Ford tractor. I consider it good for some planting conditions, but less suited to general custom work, with all sorts of planting conditions, than the Lowther. The most serious fault is the fact that the packing wheels are on a rigid frame with the rest of the planter. The back end of the planter should be hinged to the front so that the packing wheels are free to ride up and down over irregular ground and especially so that they will ride on the ground and pack the seedlings in soils where the trencher runs fairly shallow. With the rigid arrangement, the planter simply will not work in many heavy soils, for the trencher does not run deep enough to let the packing wheels do their job. Another objection to the Chapman and similar planters is their generally light construction. They just can't take it like the heavier Lowther. For one thing, mine is continually getting twisted so that the coulter does not run directly in front of the center of the trencher. In light soils this is often not serious, but in heavy soils the planter will not pack the seedlings properly if the coulter is off center more than a very small amount.

The design of the coulter and its relation to the trencher are very important features of the planter. Under some conditions (light soils and recently cultivated fields with no large roots) these factors are not so important. On the old Lowther machines, such as mine, the coulter bearing consists of a brass sleeve instead of ball bearings. When this sleeve becomes worn, the coulter tilts to one side and again causes trouble in heavy soils. In the newer ball-bearing-mounted coulters, I have not noted any trouble in this respect.

In areas where roots and ether underground obstructions are frequently encountered, it is very important that the coulter blade be large enough to run well below the trencher point and that the clearance between the blade and the trencher point be kept to a minimum. Otherwise, much time will be lost removing roots, wire, old cans, etc., from the front edge of the trencher. Also, now and then, the coulter blade will ride over a large root and let the trencher drop back immediately and catch under it. Sometimes considerable time is lost freeing the planter caught in this way.

In the newer Lowther planters the coulter is large and the clearance between coulter and trencher point so small that when the coulter fails to cut a root or other obstruction, it rides over and carries the trencher clear too. With many of the newer type light planters the coulter blade is small and the clearance large and the point much too long, so that much trouble is encountered

with roots, etc., fouling the trencher. Also, the coulter blades on most of these-planters that I have seen are not rugged enough. Large roots and lightwood knots give the coulter of a tree planter a rough time and I have had the coulter on a Chapman machine break into a half dozen pieces. At present my Chapman machine is equipped with an old-type coulter from a Lowther machine cut down to fit in the assembly. The newer Lowther coulter blades are very expensive, but highly satisfactory in every respect. The old ones were too soft.

Another trouble I. have encountered with the light planters is that the packing wheels are not always properly lined up when the machine is built. If properly aligned to start with, they can get out of line due to the twisting of the trencher assembly. I have lost a good deal of time in the field trying to keep all the elements of my light planter - coulter, trencher and packing wheels properly lined up.

On both the Lowther machines that I have used the packing wheel bearings require a good deal of attention because the grease seal does not exclude dirt effectively. In soft soils anything that increases the resistance to the turning of the packing wheels (such as a dirty bearing) causes more trouble with the wheels pushing up dirt in front and makes proper planting more difficult..

Some of the soil conditions which have given me trouble in planting are:

1. Very light sands. Packing wheels bog down. Chapman-type planters often work better here than Lowther.

2. Recently plowed fields. Same trouble as above.

3. Wet, sticky soils. Packing wheels foul up.

4. Dry, heavy soils. Sometimes so hard that even the Lowther coulter and trencher will not go deep enough for planting. In other soils the coulter and trencher go down all right, but the soil breaks up in clods and does not pack uniformly.

5. Field cultivated in past few years with high beds. Cannot plant across beds, as packing wheels bog. Cannot plant in bottom of furrow because the tractor wheels (and the large wheels on the Lowther planter) run, high up on the beds so that the trencher assembly will not penetrate deep enough to plant the seedlings with the roots straight. In such cases, I run the machine slightly off center with the furrows and plant on the sides of the beds as near the bottom of the furrow as I can.

State Forest Director

Re first started machine planting of pine seedlings on the Forest in 1947-48 using a Lowther tree planter borrowed for us by Mr. H. F.

Bishop. That year we planted 150,300 trees. The machine, was pulled by a Ford-Ferguson tractor and planting was done on 8-foot rows. For the 1948-49 season we bought a Lowther planter and planted 418,850 seedlings. Because checks on the previous year's planting had showed that on 8-foot rows we got only about 100 trees per acre because of spaces left while the man planting reached for more trees, we changed to 6-foot rows and got nearly 1,000 trees per. acre. For the 1949-50 season we used both the Lowther planter and the small planter built by H. T. Hunter to operate on the hydraulic lift of a Ford-Ferguson tractor. Altogether we planted 628,050 seedlings. We found the small planter was more maneuverable and therefore was quicker: and easier to use in small openings. For the 1950-51 season we used only the Hunter planter and planted 140,000 trees.

#### Remarks

Small planter. operated on hydraulic lift of tractor is much better in our light sandy soils.

1. Not being so heavy does not make a deep trench in sand.
2. If planter starts to sink, tractor operator can raise planter with hydraulic, lift and not stop planting.
3. Planter can be picked up clear, enabling tractor to make short turn at rows end.
4. Planter can be picked up easily for transportation from one planting site to another.
5. Light weight and small size of planter makes replanting at end of first year easy.
6. Light planter can be built for about 1/8 of the cost of Lowther and maintenance is easier and cheaper.
7. By using hydraulic lift on tractor to raise and lower tree planter, the man on planter has both hands free at all times to handle trees.
8. Tractor and small planter can be walked up ramp onto truck and transported to planting site. Fire plow can also be carried on truck. And in event of getting a fire call, a quick change in the field will send the tractor to the fire already equipped, thus saving much time on fire.
9. We have planted successfully slash, loblolly and longleaf.

10. We have planted successfully in "new ground" clearings with the small Hunter planter. The tractor operator can dodge or run around stumps, picking the planter up quickly and easily when any obstruction is sighted.

#### Industrial Company

Both the Lowther machine and the new Webster planter were put to use. Each has its peculiar advantages and disadvantages which recommend it for some jobs and disqualify it for others.

The Lowther machine was used at Georgetown, where it planted in old fields, cut-over woods, and open savannah. It surprised even its admirers with a demonstration of ability to plant well on a day-in-day-out basis under these rough conditions. Pulled by a Farmall-H wheeled tractor and manned by a steady 3-man crew, it wove its way among the stumps, roots, boards, bombs, ditches, and other obstructions to plant 125 M seedlings on 184 acres in 25 working days. The seedlings were well planted and packed in spite of the rough nature of the job, which made riding the planter difficult and ruined the coulter. The production average of 5M per day is not spectacular and falls considerably below claims made for the machine, but the volume was a welcome contribution to the over-all job, the trees were better planted than those set out by hand, and the cost was lower by machine than by hand. The bell and tapper system provided uniform spacing, and the pneumatic-tired packing wheels set the trees firmly behind the plow. The record day's production was 8M.

The Webster machine was used only at the end of the planting season at Summerville, and would have planted a considerably larger acreage except that the tractor gave trouble. The single rear wheels of the Ford tractor pulling the planter cut into the dry, sandy soil of the fields and bogged down. As greater flotation would correct this, arrangement was made at once for purchase of a set of dual rear wheels for the tractor. Delivery on these was promised for the following day, but more than 2 weeks passed before they arrived. Equipped in this way, the tractor pulled the planter nicely until motor trouble forced its withdrawal from the work. By this time the season was almost over, so the job was finished by the hand crew.

Although the Webster machine planted only 17 acres, its performance could be observed. The experience produced an improved technique and suggested mechanical improvements which can be made. The planting machine operators ride directly behind the tractor exhaust, which must be extended to the side so that the fumes will be blown away instead of into their faces. Also, if the plow wings can be spread farther apart, correct placement of the seedlings will be facilitated. And perfection of a tapper device to provide uniform spacing will relieve the men of paying constant attention to obtaining good spacing and allow the tractor to proceed at a faster pace.

The Webster machine is well adapted to planting in fields, as it can make short, quick turns. It can also be used for planting on

curves, which allows perimeter planting and avoids the need for lost time on turns. It does not appear to be sturdy enough, however, for use in the woods.

The planting machines work very well when operating conditions are just right. The difficulty, though, is to find conditions which are just right and which remain so. Thus far, the Lowther planter has worked successfully under the widest range of conditions. The Webster has planted well in only loamy sand and sandy loam soils. In lighter soil (sand) it bogs and in heavier soils (sandy clay loam and heavier) it loses traction and can operate only with partially raised plow. All of this fault, however, lies with traction and flotation, both of which could be overcome through use of a standard half-track assembly and perhaps by use of mule cleats.

The problem of signaling the plant setter when to set trees to maintain a constant spacing was solved this year for the Webster machine. An electric bell was mounted on the rear of the machine, with a power wire extending to the battery terminal on the tractor. The bell is activated by an electric brush which makes contact each time a large gear makes a complete rotation. Because the spacing desired is 8 feet and the circumference of the tire on the packing wheel is 4 feet, a small gear having one-half as many teeth as the large one was installed on the axle near the packing wheel, and when the gears are meshed, its size requires that it (and the 4-foot packing wheel) must make 2 full revolutions to rotate the large gear once. The bell then rings every time the packing wheel turns over twice, and signals the planter to plant at 8-foot intervals.

Operation of the planting machines is a problem not readily solved under company planting conditions. If the units are to be operated efficiently, trucking capacity must be available to move them from place to place when needed, and not when or if it is convenient to somebody else. Supervision is also a problem, but is vitally necessary to successful planting by machine. If the supervisor is required to serve as a crew member, his expense runs up the operating cost. If he does not serve in the crew and operates only one or two machines, his expense is completely nonproductive in seedling establishment on a job which will plant less than LOM trees per day. At the same time, this same man could supervise a hand crew of 30-40 men who would plant twice as many trees per unit of time as the 2 machines or about 4 times as many as one machine. This is of critical importance in our supervisor-short planting work.

The machines operate quite efficiently in large, contiguous areas where they can be used close to a hand crew and a single supervisor can oversee both jobs. But on small, scattered tracts, they are a problem.