FURROW SEEDERS CAN SAVE MUCH MONEY

THOMAS C. CROIER, *JR., Principal Silviculturist, Southern Forest Experiment Station, U.S. Forest Service, Brewton, Ala.*

Savings in seed, manpower, and machine hours---these are the advantages of successful furrow seeding. In large-scale regeneration projects these savings can be very large indeed. It is a one-man, one-trip operation. Furrow seeders are designed to prepare a favorable seedbed and simultaneously to plant tree seeds at a specified depth and interval. The fire protection offered by furrows during the first winter after planting is another important advantage.

"Do they work? Can I buy one?", you may ask. Yes, they do work when they have been properly designed for the sites on which they operate. No, they cannot be bought. So far, all these machines are custom built, either from available standard plans or from new plans tailored to local conditions.

A survey in 1963 revealed that more than 50,000 acres had been furrow seeded in the South alone since the first machine was built in 1958. As might have been expected with a new technique, failures were frequent. But there were successes too. Results have been encouraging enough to stimulate the design of dozens of models.

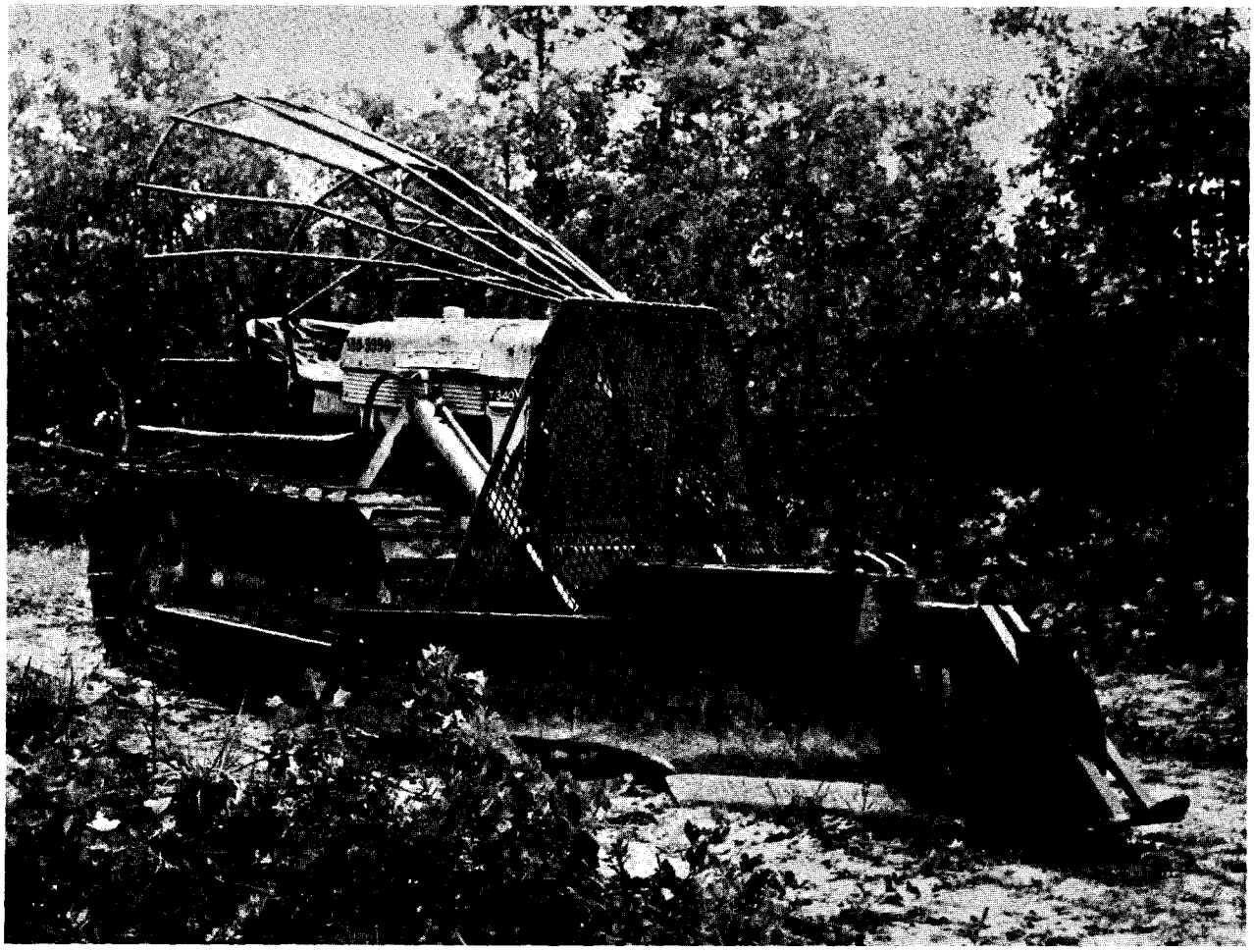


Figure 1.—The Hatcher seeder features a wide front-mounted scalper that does a good job of brush control. It prepares a broad scalped bed with a raised center.

Figure 2.—In the compact H–C seeder, the scalper, bedder, sower, and packer are all in one compact unit which can be attached to any tractor with a standard three-point hitch. It is good for small open areas.

Before deciding whether to try furrow seeders, a land manager should know how they work, how models differ, and what precautions must be taken in using them.

Four Components

All furrow seeders contain (1) a scalper to remove debris and vegetative competition, (2) a bedder to prepare the seedbed, (3) a sower to dispense seed, and (4) a packer to firm the soil and restore its capillarity. There are many variations in the type and arrangement of these four basic components.

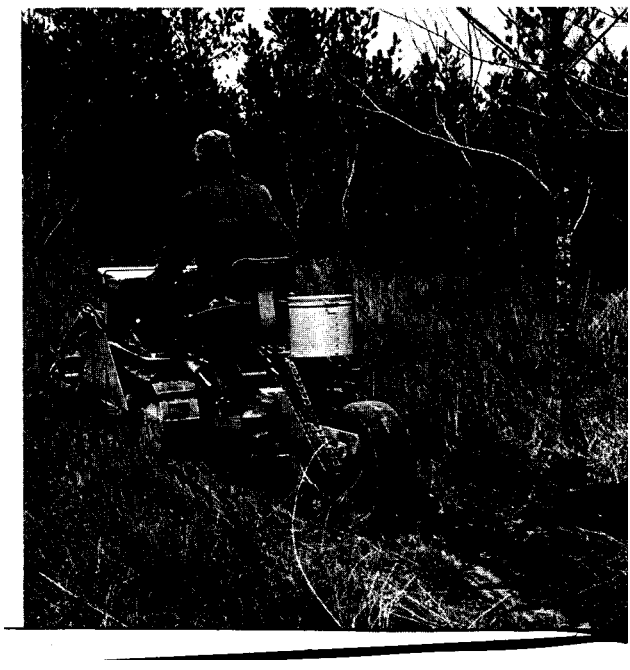
Scalpers.-The widths of scalper blades, for example, range all the way from 8 inches to more than 6 feet. Some seeders have specially designed blades, others use conventional fire plows set to operate at a shallow draft for scalping. Blades can be mounted on the front or rear of the tractor. The Hatcher seeder (fig. 1) has a good example of a front-mounted scalper; the compact H-C (fig. 2), a good rear-mounted one.

In heavy brush where a wide furrow is desirable, a wide front-mounted scalper is best. The same type of scalper is needed to clear logging slash and debris that will interfere with the tractor operation and functions of the other components. Clearly, however, a wide scalper requires a larger tractor to move it. This means higher equipment cost. 2

Under dense scrub hardwood stands with frequent 3-foot or wider passages between trees and a light understory, the Auburn seeder (fig. 3) with a narrow front-mounted scalper has worked effectively.

Rear-mounted scalpers such as the one on the compact H-C are limited to sites where a tractor can pass without moving debris. While this is a big limitation,, it is offset by the advantage of having all four com-' ponents in a single unit. The seeder can be quickly attached to a farm tractor with a three-point hitch,,

Figure 3.-The small Auburn seeder is cheap to operate! and can infiltrate dense scrub hardwood stands.



and it is light enough to be moved in a %2-ton truck. Because of this mobility, it plants small patches t economically.

Bedders.-There has been more variation in bedding equipment than in any other component. Disks, cultipackers, rotary hoes, rotovators, hillers, drags, rippers, and similar devices have been employed. The types of beds produced are either scalped (not modified after scalping), hilled, chopped, or bermed.

Hilled beds are probably best for germination and survival. In an elevated seedbed seedlings are protected from standing water, silting, and leaves that collect in sunken beds. Unfortunately, so far no satisfactory device. has been developed for making hilled beds in rough terrain. Machines that construct hilled beds are therefore suitable mainly for old-field seeding.

The wide scalped bed has been very successful in sandy soils in South Carolina. Probably the key to the success of these beds was the raised center that protected seed from silting and erosion.

Sowers.-The sower consists of two major parts: the dispenser and the opener or planting foot. Most furrow seeders have conventional agricultural seed dispensers with their plates modified in some cases to handle tree seed. Careful selection and assembly of plates is essential to prevent damage to the seed.

Dispensers can be activated by rubber wheels in contact with the ground, by a separate power supply, or by the tractor wheels. Ground press wheels should be well guarded or they will be stopped by trash and limbs. Separate power systems and power from the tractor wheels may be more dependable under some conditions. A newly developed pneumatic hopper may prove best. In tests, it dispensed seeds more precisely than agricultural hoppers without damaging them.

Floating swords, disks, and similar devices have been used to open the soil and plant seeds at the proper depth. Some machines press the seed into the soil without making a special opening, and some leave the seed lying on the surface. Since one of the major advantages of furrow seeding is that the seeds are covered, there is little to recommend a machine that does not place the seeds in the soil.

The opener or planting foot must be rugged enough for woods operation, but flexible enough to sow seed at a uniform depth on a rapidly changing contour. So far, no completely satisfactory device has been developed. Perhaps the best available opener is the floating sword on the compact H-C.

In rough terrain, the performance of most sowers has been, at best, fair. There is much room for improvement in these devices.

Packers.-Rubber wheels with zero tire pressure are the most common type of packer. These wheels also activate the dispenser on some seeders. Recently, a seeder was designed that dispenses seed in front of the crawler tracks. The tracks press the seeds into the soil, apparently without damaging them.

Plans.-After years of trial and testing, some promising furrow seeders have emerged. The Forest Engineering Project of the Southern Forest Experiment Station, headquartered at Auburn University in Alabama, keeps track of such developments. Information, including plans and specifications for some models, can be obtained there. The novice will gain by consulting these plans before designing his own furrow seeder.

Special Precautions

It should be recognized that some sites are completely unsuitable for furrow seeding-steep rocky slopes, bogs, areas with excessive slash. Generally, to operate efficiently, a seeder must make long, uninterrupted passes. Stops, backups, and long detours are expensive.

In addition, some special precautions must be taken. Many if not most furrow seeding failures have been caused by things other than inadequate or faulty equipment.

The freshly prepared soil in furrows attracts seed predators. This means that, even though the seeds are buried, they must be coated with bird and rodent repellents. The need is greater in furrow seeding than in broadcasting.

Cattle like to trail down cleared furrows, and in doing so will trample many seedlings. They must be completely excluded.

Newly germinated seedlings on furrows, especially those made with a wide scalper blade, are extremely vulnerable to frost damage. To prevent frost heaving on such sites, seeding should be timed to insure spring germination.

Leaves from a deadened overstory may collect in furrows, smothering the seeds. Narrow furrows are particularly vulnerable to this hazard. Deadening the overstory a year or so ahead of seeding will reduce the danger. Burning before sowing may be needed in some cases.

Sowing rate is important. Many factors, of course, determine the proper rate, including site conditions, expected losses, and seed quality. Local experience is the best guide, but one viable seed per row foot is a good rate to try while gaining experience. This is about half the rate required for broadcasting.

Proper sowing depth depends upon species, soil, and other factors such as expected change in seedbed contour. On sandy soils, a sowing depth of about %2 inch has been acceptable for slash and loblolly. Longleaf seed should not be sown quite as deep. Here again, local experience is the best guide.

Selected References

Anonymous.
1959. Planting pines like corn. Pulpwood Prod. 7 (1) : 6-8, illus.

Burns, Russell M.
1966. Machine seeding-row and broadcast. Proc., Direct Seeding Workshops, Alexandria, La., and Tallahassee, Fla., pp. 18-20. U.S. Forest Serv., Atlanta, Ga.

Cassady, John T.
1962. Pine seed sowing methods. Forest Farmer 21(6) : 7-8, 13-14.

Croker, Thomas C., Jr.
1964. Two H-C furrow seeders. U.S. Forest Serv. South. Forest Expt. Sta. Res. Note SO5, 4 pp., illus.

1960. The H-C furrow seeder. U.S. Forest Serv. Tree Planters' Notes 43: 15-16, illus.

Mann, W. F., Jr., and Derr, H. J.
1964. Guides for direct seeding slash pine. U.S. Forest Serv. South. Forest Expt. Sta. Res. Paper SO-12, 27 pp., illus.

and Burkhalter, H. D.
1961. The South's largest successful direct-seeding. Jour. Forestry 59: 83-87.

Richardson, B. Y.
1965. New tools for direct seeding. South. Lumberman 211(2632) : 150-151, illus.

Stevenson, Gene
1966. Direct seeding machine. U.S. Forest Serv. Tree Planters' Notes 76, 1-2, illus.

germination should have given the best results Samples were stratified at 41' F. for 3 months an

germinated at 70° F. for 3 weeks.