

March 1992

ALLEGRO SP1200 INTERMITTENT TREE PLANTER

This field note describes a preproduction prototype of an intermittent-furrow machine for planting containerized and bareroot seedlings and cuttings. The patented machine design of the ALLEGRO SP1200 is a cooperative effort between Agro Forest Technik North America Inc. of Prince George, British Columbia, which also markets the machine, and the J.E. Love Company of Garfield, Washington, the manufacturer.

BACKGROUND

Attempts in Canada and in other countries to develop tree-planting machines have been underway for many years. Numerous concepts have been tried and most have failed owing to the complexity of the operation and the resulting high development costs. The continuous-furrow concept has been the most successful, but these planting machines are strictly limited to afforestation of old agricultural fields or to sites that have been intensively prepared. The intermittent-furrow concept involves creating slits in the ground, into which the seedlings are inserted. This method is more adaptable to less heavily prepared planting sites, but nevertheless has limitations under boreal forest conditions. The machine described here is an intermittent-furrow type. It uses simple technology and has low capital cost.¹

The third and most versatile type of tree-planting machine uses the spot planting method with the seedlings planted only at selected spots. At present, only one machine of this design (the Swedish-made *Silva Nova*)² has proven successful. This machine is characterized by advanced technology, complexity, and high capital cost.

MACHINE DESCRIPTION

The ALLEGRO SP1200 Intermittent Tree Planter (Figure 1) is relatively simple and robust in design. It is designed to plant containerized seedlings, bareroot seedlings, or hardwood cuttings (e.g. pop-

lar). The standard model is pulled by a farm-type tractor, but when equipped with an optional drawbar it can be pulled by either a skidder or a crawler tractor. The main frame of the planter is attached to the three-point hitch of the prime mover or to the drawbar. The A-frame, supported by this main frame, carries the planting arm. One hydraulic cylinder positions the A-frame at the correct height for the predetermined planting depth, while a second cylinder rotates the planting arm during the planting cycle. The scarifying tool—a scraper blade—is attached through a pivot to the main frame. This tool also serves as the ground-sensing device. When microsite preparation is not required or desirable, the scarifying tool is replaced with a ground-sensing foot. Two packing wheels are positioned in front of two rubber-tired support wheels which bear the weight of the planting machine. To reduce rutting in soft ground conditions, the pressure on the packing wheels can be transferred to these wheels, during the non-planting portion of the cycle, through a single-acting hydraulic cylinder. Two extension springs reverse this action. The device on the planting arm that holds the seedling or the cutting is opened mechanically for loading and planting, and is closed by a spring.

The planter operator can adjust the duration of both the down and up cycles through two solid-state time-delay relays. These are the only electrical controls and they can be adjusted “on-the-go.”



Figure 1. ALLEGRO Intermittent Tree Planter.

¹ Base price - US\$34 000.

² FERIC report in progress.

The planting cycle is manually activated by a foot pedal. This closes a micro switch, thereby initiating the automatic planting function. When the seedling is released into the slit by the plant-holding device, a limit switch on the planting arm activates the up-cycle relay. The up and down cycles are controlled by a solenoid-operated hydraulic valve.

The nonpowered scarifying device is lowered ahead of the planting arm, allowing the blade to scrape away the surface debris and the top of the humus layer. The amount of downward force on the scarifying blade is also adjustable.

Spacing between the seedlings is manually controlled. An optional timing device, driven off one of the carrying wheels, can be adjusted to indicate, by means of a flashing light on the operator's control panel, when the desired spacing is reached. The same device could also be used to initiate the planting cycle automatically.

The following adjustments can be made:

- Depth of the planting furrow—to suit the stock being planted.
- Degree of opening and closing of the plant-holding device—to accommodate various stock types and seedling sizes.
- Distance between the packing wheels—to achieve the desired depth of packing.
- Distribution of force on the packing wheels in relation to the support wheels—to avoid rutting in soft ground.
- Length of the furrow.
- Downward force on the scarifying tool.

The hydraulic pump must deliver a constant 75 L/min at a minimum pressure of 19 300 kPa (2800 psi). The pump can be driven directly off the PTO of the tractor, or by a hydraulic motor driven by the hydraulics on the prime mover. A 150-L hydraulic storage tank is carried on the planter and the hydraulic oil is dual filtered. If the planting machine is attached to a skidder or crawler tractor, the required drawbar is designed to hold additional hydraulic oil. The hydraulic system is designed to operate at temperatures of up to 93°C and no cooler is provided.

Prime Mover

The planting machine weighs approximately 1300 kg. A prime mover of at least 75 kw is therefore recommended by the manufacturer (e.g. Ford 100 PTO hp Bidirectional Tractor 9030, or a Caterpillar D4 or larger crawler tractor).

Current Status of the Machine

The planting machine is still in a preproduction prototype stage. Tests in the Southeastern United States in 1990 led to some design modifications.³ The manufacturer now considers that the planter is ready for field testing in Canadian forest conditions. The structure for seedling storage has not been finalized pending further modifications. Storage may have to be custom designed to ensure compatibility with planting crew logistics and stock characteristics. Designs for the protection of the hydraulic components and the planter operator will also be finalized after any modifications are completed.

A brief demonstration in September, 1991 in Prince George, British Columbia showed that this machine is capable of planting poplar cuttings to a depth of 28 cm in old field conditions, and containerized seedlings in easy terrain conditions with little slash. The machine provided satisfactory packing, despite the hard, dry, clay soil conditions on both sites. The operation of the planting function is easy and should not be difficult to learn. No productivity or planting cost estimates are available yet.

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DISCLAIMER

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³ Robert van Nus, Director, Agro Forest Technik North America Inc., Vancouver, British Columbia; personal communication, 1990.

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Institute of Canada ISSN 1180-4432