

Seedling Box Lifter

Dick Karsky

Project leader, USDA Forest Service, Missoula Technology and Development Center, Missoula, MT

A seedling box lifter, mounted on the side of a farm tractor, is designed for use in bareroot nurseries, to lift and deliver boxes from the ground to a transport trailer, thus minimizing manual box handling and moving boxes from the field to the packing shed quickly. Manual loading of seedling boxes onto transport trailers is labor intensive and has the potential of causing back injuries in field workers. Tree Planters' Notes 42(4):6; 1991.

A 1984 survey of Forest Service nursery managers indicated that an improved method of lifting seedling boxes from the ground to the transport trailers was a high priority. The Missoula Technology and Development Center (MTDC) initially used a hay bale loading device to determine what features would be required of the new machine. It had to be capable of loading different sized boxes and elevating them to a trailer at a level of approximately 1.2 m (4 feet) above the trailer floor. From there, personnel can handle and stack the boxes. A prototype box pickup was designed and built by MTDC engineers. Initial tests were conducted at the Forest Service's Coeur d'Alene, Lucky Peak, and J. Herbert Stone Nurseries.

The seedling box lifter is mounted along either side of a farm tractor and attached to the tractor's 3-point hitch. The tractor also tows the transport trailer (figure 1). A frame mounted onto the side of the tractor with a lift cylinder attached raises and lowers the front of the lifting machine. The first part of the box lifter is a pickup unit that grabs the box and places it on an elevator chain. This elevator chain lifts the box to a height .9 to 1.2 m (3 to 4 feet) above the trailer floor and delivers it to an inclined gravity conveyor, which then moves the box to the front center of the trailer and provides temporary storage of up to three seedling boxes. Stackers or box handlers then move the previously lifted boxes to the appropriate position on the trailer. A hydraulic motor driven by the tractor's hydraulic system provides power for the lifting mechanism. The speed of the lifting mechanism can be changed by adjusting an hydraulic flow valve. The side-mounted mechanism allows boxes to be picked up in only one direction of travel. The machine can be installed on either

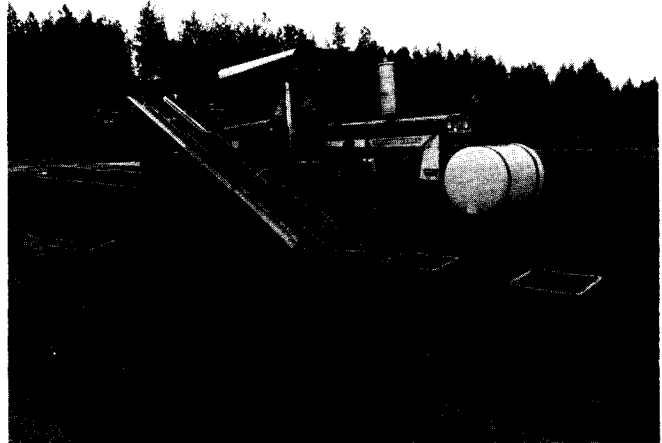


Figure 1—*The seedling box lifter in use.*

side of the tractor, but it is not easily switched from side to side. The tractor moves at a speed of about 1.6 km (1 mile) per hour.

A corrugated belt/chain assembly can be adjusted to pick up boxes from 35 to 48 cm (14 to 19 inches) wide. It can typically deliver 10 to 12 boxes per minute to the trailer. Boxes containing the lifted seedlings should be aligned in a row to allow minimal maneuvering of the tractor. However, the tapered entry of the pickup mechanism reduces the need for precise alignment.

The seedling box lifter does an excellent job of picking up both plastic and corrugated seedling boxes and elevating them to personnel on a trailer. From there, the boxes must be off-loaded from the seedling box lifter. Thus, additional work is needed to develop a complete seedling handling system that integrates all aspects of the seedling harvesting process.

Drawings are available for the side-mounted box pickup from MTDC. For information on the seedling box lifter (drawing No. MTDC-850) contact:

Dick Karsky, project leader
Missoula Technology and Development Center
Bldg. 1, Fort Missoula
Missoula, MT 59801
(406) 329-3921; FTS 585-3921