

## AGITATOR SEEDLING LIFTER

Ernest W. Cooler, Jr., Nurseryman  
Piedmont Nursery  
Pickens, S. C.

A tractor-drawn agitator-type seedling lifter was built at the Piedmont Nursery, Pickens, S. C., by fastening spring steel tines to the rear of a stationary blade. This is not a new idea. Tree Planters' Notes No. 18 describes a tree lifter of this general type which was developed and used at the U. S. Forest Service nursery at Eveleth, Minn. Also the Atlanta office of the US Forest Service made blueprints available for a three-point hitch agitator lifter. However, I believe the type of machine described below has some features of interest to readers of Tree Planters' Notes.

Essentially, the lifter consists of a metal frame through which another (channel iron) frame, supporting the lifting device, rotating agitator shaft, sprockets, drive chain, etc., is moved either up or down hydraulically (fig. 1). The basic frame is supported by two wheels and pneumatic tires at the balance point of the lifter. The vertical frame also supports a truck transmission which receives power from the tractor power takeoff and delivers power to a truck differential, which, in turn, drives a sprocket and link chain. The agitator shaft, with eccentric blocks located clockwise around the shaft, is turned by this chain. As the agitator shaft is turned the blocks strike the spring steel tines in a regular order from right to left. This action permits gradual, but rapid, agitation of the roots by the flat spring steel tines.

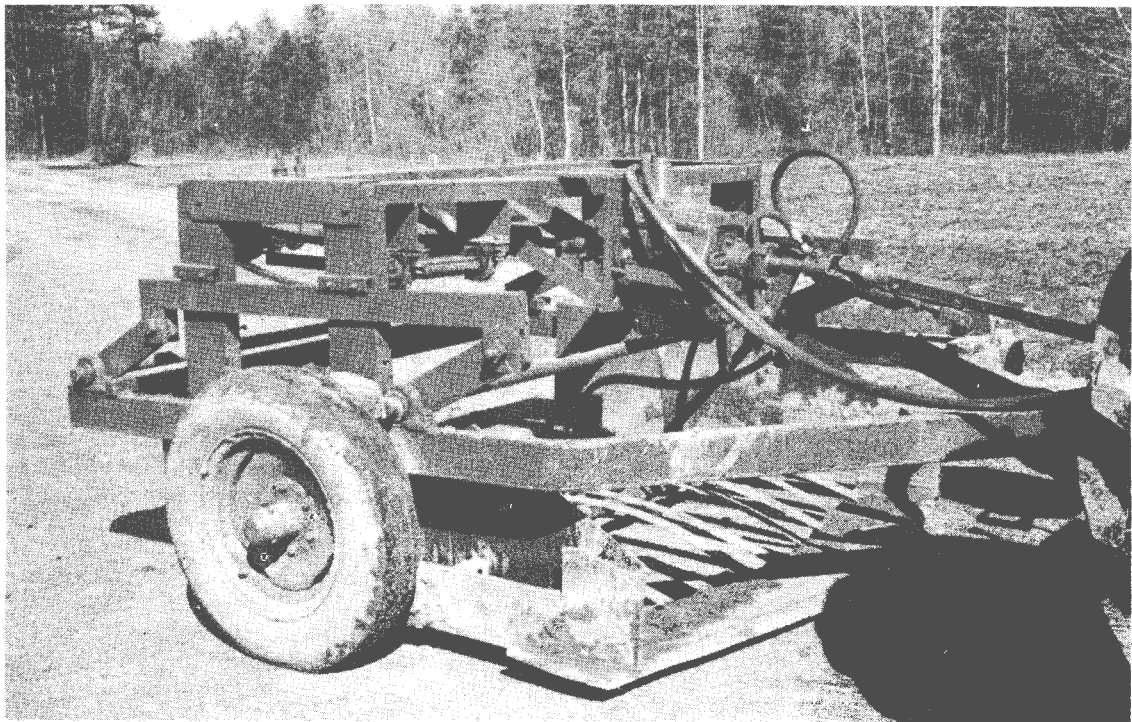


Figure 1.--Spring steel tines fastened to lifter blade, whose depth is hydraulically controlled. Lifter is used with a conventional hitch.

Test data were developed by Dr. R. D. Shipman of the Clemson College Forestry Department from a sampling of 24 loblolly seedlings lifted by the device described and 24 loblolly seedlings lifted with a standard, rigid blade. Seedlings were taken from adjacent beds which appeared to be identical. Measurements averaged for each group of 24 seedlings as follows:

	<u>Conventional lifter</u>	<u>Agitator lifter</u>
Top height.....cm.....	29.0	31.0
Stem diameter .....mm.....	3.45	3.21
Root length.....cm.....	22.70	26.88
Top weight.....gms.....	2.58	2.29
Root weight.....gms.....	.44	.33
Top root ratio.....	1:6	1:7
Total adsorbing capacity (root system).....	5.89	6.32
Weight before transpiration.....gms.....	6.72	6.10
Weight after transpiration.....gms.....	6.46	5.73
Water loss.....gms.....	.26	.33

A statistical analysis and determination of significance were not made, but a practical examination of the above data indicates the essential conclusions that must be derived. While the 24 seedlings lifted with the standard lifter possessed greater root weight, those lifted with the agitator lifter had greater root length (fig. 2) and greater adsorbing capacity. It appears that the difference in adsorbing capacity is explained by the agitator-lifted seedlings having a greater number of fibrous roots and mycorrhizae.

No data were taken on the effort required to lift the seedlings from the two treatment beds. However, a general observation definitely showed those lifted with the agitator to be more easily pulled from the bed.

The degree of agitation can be adjusted by lengthening or shortening the spring steel tines. However, an excessive length causes the seedlings to be entangled and roots mixed with tops.

An interesting feature of this lifter is the possibility of extending the spring steel tines over another agitator shaft with adjusted agitation and angle of lift to permit complete removal of the seedlings from the nursery bed. From this point it would appear that the seedlings could be fed into a detachable hopper ready for transportation to the packing shed. This work has not been tried thus far, however.

A detailed drawing has not been supplied because of the many variations possible employing the principle outlined herein. For example, very little power is needed to rotate the agitator shaft, and it is entirely possible to get the desired agitation without the transmission and differential. Further, the hydraulic depth control mechanism, and other features, can be improved.

The principal advantages of this lifter are that it can be drawn by a conventional type tractor, agitator speeds can be selected independent of tractor speed or gear, and it is readily adaptable to further refinements in lifting procedure for those interested in experimentation.

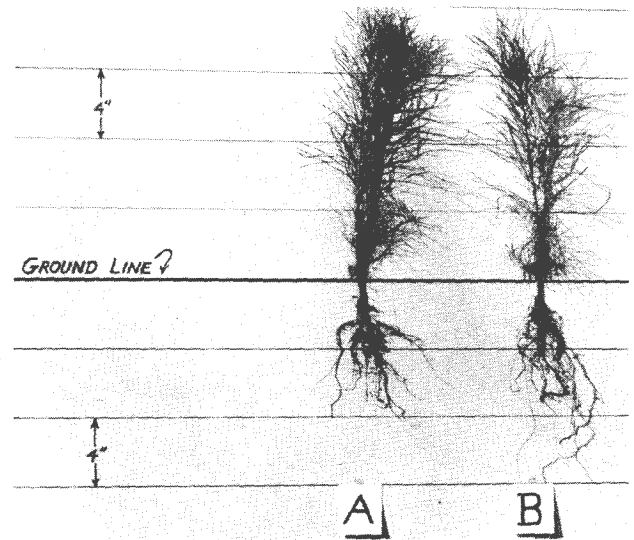


Figure 2.--Seedlings lifted by (A) conventional lifter and (B) agitator lifter.