

UNDERCUTTING OF SEEDLING IN A LOUISIANA STATE NURSERY
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Since 1983 the Columbia Nursery has been undercutting and root-wrenching seedlings. In 1983, wrenching was performed on an experimental basis. Three nursery beds, about 180,000 loblolly pine seedlings, were wrenched in mid-September. During 1984 all the seedlings except control beds were wrenched once. In 1985 and 1986 the seedlings were wrenched on a prescription basis, lot by lot, as needed. Some lots received only an initial undercutting. Other lots received an initial undercutting plus as many as 4 wrenchings during the months of June through October.

After the first undercutting in 1983, nursery personnel noticed an early color change in the undercut seedlings. Since this color change tends to indicate hardening-off, an advantage may have been gained with respect to initiating hardening-off and therefore allowing earlier lifting.

In addition to the apparent early hardening-off, there seems to be several other advantages of root-wrenching. One of the most important advantages is the increase in number and size of lateral roots. The disturbance of the root-soil relationship causes the development of more and better developed laterals. This development of laterals is caused from the physical breaking of some roots when the bed is lifted over the blade. Other roots are air-pruned from new air pockets in the soil. These roots then initiate root buds closer to the tap and form a more fibrous system. Growth of the seedling shoot can be almost or completely stopped due to the stress suffered in the root system. The seedling tends to put all its resources into the wound response and top growth is slowed.

The larger seedlings seem to be stressed more from undercutting and wrenching. This is probably related to the proportion of the root system disturbed during the process.

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Small seedlings with a small, short root system may escape untouched and

undisturbed by the blade. In most cases, undercutting and wrenching have become an alternative to top-pruning at Columbia.

The wrenching process reduces the density of soil by increasing the air space. This allows better percolation of water and seems to increase mycorrhizae growth. The condition of the silt loam soil at Columbia is changed favorably by wrenching, especially if the nursery has received heavy rains during spring and early summer.

The cost of undercutting and wrenching can be significant from three view-points. The purchase price, or construction cost, of the wrenchers can be high, especially if a reciprocating wrencher is considered. Also, the labor required to perform this operation must be taken into account. Most importantly, the loss of seedlings caused by improper performance or operation of the wrencher can accumulate rapidly.

Timing of the undercutting and wrenching process is critical if height growth is to be controlled. Columbia Nursery makes the initial undercutting when seedlings average 6 1/2 - 7 inches. Cutting at this point allows for some growth to occur during mid-season and still obtain a target height of 8-11 inches. After suitable height growth is obtained, wrenching is carried out on a prescription basis using Walt Chapman's "Root Halo" method. Seedling roots are surveyed regularly to determine growth.

The presence of a "halo" of a new root growth indicates that new growth will occur soon afterwards. At this point a wrenching is performed to prevent or truncate shoot growth.

Despite the possibly costly disadvantages of undercutting and wrenching, Columbia considers this process a valuable cultural tool and has made it an intergral part of the crop management.