HANDWEEDING TIMES REDUCED IN HARDWOOD SEEDBEDS BY A MODIFIED ROLLING CULTIVATOR

A Lilliston rolling cultivator was modified for use in hardwood seedbeds. Six weekly cultivations reduced handweeding times by 56 and 57 percent in sweetgum and sycamore, respectively.

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Growing large numbers of quality hardwood seedlings can be expensive and labor intensive. Seedlings have to be grown at relatively low seedbed densities to produce large quality seedlings (*4*). The additional nursery space required for growing hardwoods helps to magnify weeding cost.

Handweeding is still one of the major weed control methods in many nurseries. Herbicides areconstantly being screened with varied results (*3*) but in general, hardwoods are more sensitive to available herbicides than conifers. Fumigation is used to control weeds, but often more complete control is needed (*7*). Also, many of the desirable hardwood species are dependent upon mycorrhizal fungi for their normal growth and development, and these beneficial fungi are all but eliminated by soil fumigation.

Various methods of mechanical seedbed and path cultivation have been developed. *The Nursery Equipment Catalog* (*5*) shows a variety of cultivators used by nurseries. Mony (*6*) and Baker (*1*) each developed a seedbed cultivator, which they used with adequate success on their own nurseries.

To improve weed control in hardwood seedbeds at the Natchez Forest Research Center Nursery in Mississippi, attempts were made to modify a Lilliston rolling cultivator and determine if mechanical cultivation could reduce handweeding time.

Methods

A tractor-mounted, 3-point hitch Lilliston rolling cultivator was modified to cultivate 4-foot-wide seedbeds with hardwood seedlings planted in four drills, 12 inches apart (fig. 1). Five modules containing four multi-tined, self-penetrating wheels each were mounted approximately 18 inches apart on a 6½-foot tool bar. The middle three modules were reduced from four wheels to two wheels by replacing two wheels with a spacer. The modules were then adjusted to the proper spacing by sliding them from the side on their adjustable mounting brackets. The outside modules were adjusted by turning them at a slight angle to the bed and sliding them against the bed edges. Tractor speed was maintained at approximately 2 miles per hour.

Treatments consisted of cultivation and noncultivation of each of four uniform seedbeds in both sweetgum and sycamore. Two cultivation periods of 4 and 6 weeks, consisting of weekly cultivation in each species, were begun in mid-June and early July. In mid-June, sweetgum seedlings averaged 3 to 5 inches and sycamore, 4 to 8 inches tall. The early July sweetgum were 6 to 10 inches and sycamore, 8 to 14 inches in height. Six 10-linear-foot plots were established in each of the treatment seedbeds. Plots were handweeded at the time of installation and just prior to cultivation. At the end of the cultivation periods, weeding times were recorded on all treatment plots.

Results and Discussion

Handweeding times were reduced by cultivation in both sweetgum and sycamore seedbeds (table 1). Six weekly cultivations reduced handweeding times by 56 and 57 percent in sweetgum and sycamore, respectively. Four weekly cultivations reduced weeding times in sweetgum by 50 percent and sycamore by 9 percent. One possible explanation for the relatively low reduction in weeding times for the 4-week cultivation of sycamore beginning in July is that the seedlings had started to close together and shade out weeds when cultivation began. Commencing cultivation by early June may reduce handweeding further.

The modified rolling cultivator did a good job of lifting weed root systems out of the ground. In many instances, weed root systems were almost completely exposed. Weeds not destroyed by cultivation were those growing adjacent to

Figure 1.—*Modified Lilliston rolling cultivator with five adjustable modules cultivating 8-week-old sweetgum in nursery seedbeds.*

seedlings in the drills. Best results from cultivation occurred when soil conditions were moist and showing good tilth. There were no problems in keeping modules between seedling drills because of the easy adjustments on the cultivator. Further modification of the cultivator would allow it to work between drills of different numbers and spacings.

Visual observations indicated no seedling growth responses resulted from cultivation, but cultivated seedbeds did maintain a weed-free and more attractive appearance. Species such as oaks, which are very nutrient dependent, might show significant growth responses to weed control. Also, beginning cultivation as soon as seed germination is completed may increase seedling responses.

Hardwood species differ greatly in their tolerance to hericides. Therefore, each species must be individually evaluted (*2*). It can take several years to develop a high degree of confience in an herbicide and even longer to get it labeled. It apears that rolling cultivation of hardwood seedbeds may be a good alternative or supplement to chemical and handweeding control.

Application

There are several possible benefits from use of the modfied rolling cultivator: (1) Costly handweeding could posibly be eliminated by combining proper scheduling of preemergence herbicides and post emergence herbicides with cultivation; (2) Top-dressed ferilizers and postemergence hericides could be incorporated directly between seedling drills; (3) Soils that tend to crust could be broken up and aerated by cultivation, which could possily improve germination and early growth.

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Table 1.—*Handweeding times following cultivation of sweetgum and sycamore seedbeds with a modified Lilliston rolling cultivator*

Species	Cultivation Period	Handweeding time (Sec)[1] Cultivated	Non-cultivated	Weeding time reduction (%)
Sweetgum	4 weeks	23	45	50
	6 weeks	19	43	56
Sycamore	4 weeks	30	33	9
	6 weeks	19	44	57

[1] Average time in seconds required to handweed a 4- by 10-foot plot in seedbed.

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