

CULTIVATION VS. CHEMICAL WEED CONTROL IN WHITE ASH

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White ash, (*Fraxinus americana* L.) is a valuable hardwood tree in eastern U.S. It grows rapidly on medium- to heavy-textured soils and its wood has properties that make it desirable for many uses. If white ash plantations are to be successful, however, weeds must be controlled at least the first 2 years. Von Althen (1, 2) and Erdmann (3) made recommendations for controlling weeds in white ash plantations in Ontario and Iowa, but it was questioned whether their recommendations would be appropriate for areas farther south where rainfall is greater, the growing season is longer, and weed growth more intense. So, studies were begun in southern Illinois and Indiana to study the survival and growth of white ash under various weed-control treatments.

Study 73

Treatment

In the spring of 1973 an exploratory white ash weed control study was established in southern Illinois. The study area had a Hosmer silt loam soil that was covered predominantly with fescue. The entire area was sprayed uniformly with 8 lbs/A of dalapon (2,2-dichloropropionic acid) and 50 oz/A (actual) of 2,4-D ([2,4-dichlorophenoxy] acetic acid). Two hours later half of the plots were rototilled to a depth of 10

inches. Seedlings (1-0) were then planted in the sod and tilled plots followed immediately by weed control treatments of: (1) Black plastic mulch; (2) simazine, 2.4 lb/A; (3) simazine, 3.2 lb/A; and (4) simazine, 4.0 lb/A. The plastic and simazine were applied in 4-foot-wide strips.

Results

After one growing season it was evident that tilling before planting favored white ash. Trees were larger in tilled than in sod plots for all treatments (figure 1). Although no trees were killed, there was evidence that white ash was sensitive to simazine: Simazine at all three rates caused chemical burning. Although weed control was better the more simazine used, in the tilled plots the trees most heavily treated with simazine did not grow as tall. Plastic mulching—the most expensive weed-control method—did a good job controlling weeds: Trees in these plots were large, vigorous, and showed no burning.

Study 74-75

Because white ash seedlings seemed sensitive to simazine, we included other herbicides in a study begun in 1974. The new study was established in Illinois and Indiana to compare survival and growth of white ash where weeds were treated with

White ash seedlings survived better and grew larger where weeds were controlled by cultivation rather than by any chemical weed control treatment tested.

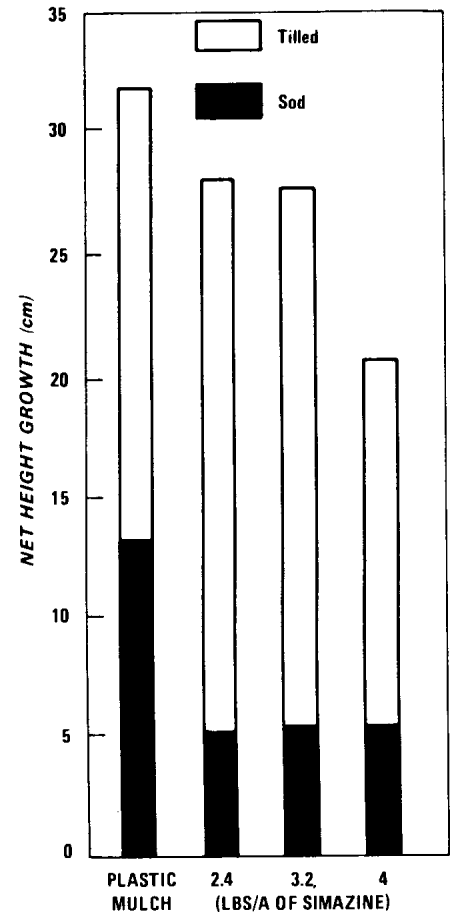


Figure 1.—First-year growth of white ash using plastic mulch and simazine in tilled and sod plots.

diphenamide (N,N-dimethyl-2,2-diphenylacetamide), karbutilate (m-[3,3-Dimethylureido] phenyl tert.-butyl carbamate), dalapon, simazine, and cultivation (3 times per year) (table 1). An untreated control was also included.

Table 1.—Weed control and injury rating on white ash in Illinois and Indiana

Treatment (chemical rate in lbs/A)	Weed control		Injury (trees showing leaf curling, yellowing, brown- ing, or leaf loss)		
	Illinois		Illinois		Indiana
	June 21	May 23	June 21	May 23	June 27
	— — — — — Percent — — — — —				
<i>Sod plots</i>					
Control	0	0	3	0	0
Dalapon 8.5	50	15	7	0	0
Dalapon 8.5 + simazine 3	85	50	100	20	28
Dalapon 8.5 + simazine 4	82	60	90	57	46
Dalapon 8.5 + diphenamide 4	62	35	0	0	0
Dalapon 8.5 + diphenamide 5	63	35	27	0	8
Dalapon 8.5 + karbutilate 3	97	90	100	93	88
Dalapon 8.5 + karbutilate 4	95	90	97	83	83
<i>Tilled plots</i>					
Control	0		0	0	6
Cultivation	100		0	0	0
Simazine 3	83		100	37	50
Simazine 4	88		93	43	40
Diphenamide 4	37		3	0	0
Diphenamide 5	17		13	0	0
Karbutilate 3	95		100	63	84
Karbutilate 4	93		100	73	77

Treatment

Half of the plots were plowed and disked in the spring just before planting. In the other half, the seedlings were planted in sod. At each of two locations in Illinois there were three blocks, each of which contained eight tilled and eight untilled plots. Ten trees were planted in each plot. In Indiana there were five similar blocks. The soils in both States

were well-drained silt loams and considered good sites for white ash. Planting sites in both States were covered with fescue (primarily) and herbaceous weeds. Weed-control treatments were applied immediately after the trees were planted, and repeated the second year before growth began. No special care was taken to protect the dormant seedlings while spraying the herbicides.

Results

White ash seedlings survived better and grew larger where weeds were controlled by cultivation rather than by any chemical weed control treatment, chiefly because of more complete weed control and no herbicide toxicity to the trees (table 1). Although there was no way to separate the effects of the weed control and toxicity, the leaf injury ratings and rate of survival indicate that simazine and karbutilate were detrimental to the trees.

After two growing seasons, the trees in the plots tilled before planting had better survival and were larger than those planted in sod (figures 2 and 3). In the sod plots in the two Illinois plantations, dalapon alone eliminated 50 and 15 percent of the grass competition (table 1). However, for the same plots, dalapon plus another chemical was more effective in eliminating fescue than dalapon alone. In the tilled plots herbaceous weeds came into some of the chemically treated plots about midway in the growing season, but generally were not dense and apparently not severely competitive with the trees.

In both the sod and tilled plots karbutilate gave excellent weed control, but it also killed most of the trees. Surprisingly, the few trees that survived in this treatment grew very well. Perhaps

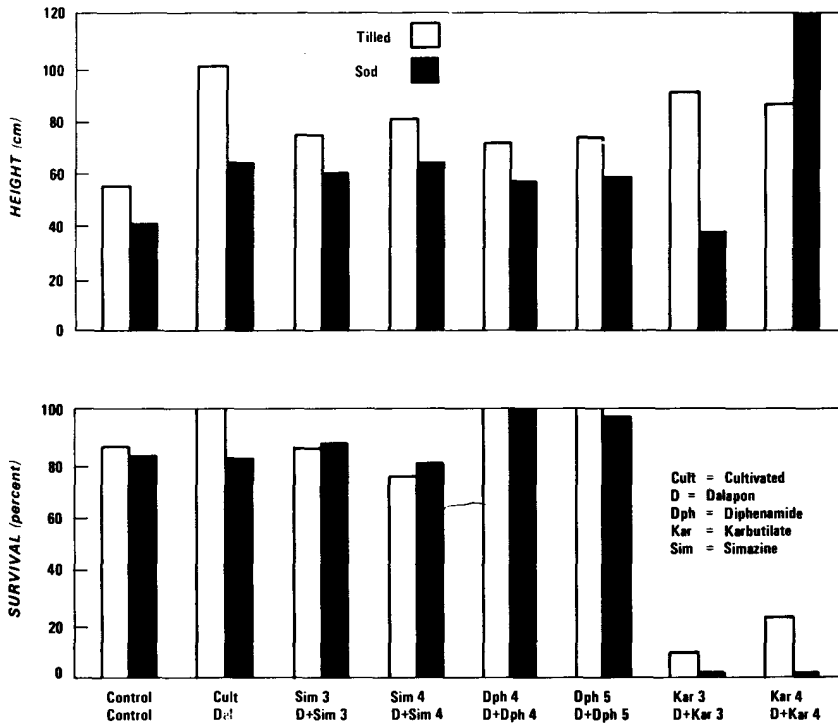


Figure 2.—Average survival and height of white ash in Illinois and Indiana.

there are inherent differences in the sensitivity of white ash to karbutilate. However, because of the low survival, further investigation with karbutilate for weed control in white ash does not seem warranted.

For the rates tested, diphenamide was definitely safer than simazine for the trees. Trees treated with simazine had 80-percent survival on the tilled plots and 85 percent on the sod plots compared with almost 100

percent for tilled and sod plots for those treated with diphenamide. However, on the average, trees treated with simazine were 76 cm tall on the tilled an 60 cm on the sod plots compared with 71 and 56 cm for trees in the diphenamide plots. Growth differences may be related to the degree of weed control. At the rates tested, simazine controlled weeds more completely. than diphenamide in both the tilled and sod plots.

Our white ash studies in southern Illinois and Indiana and other studies elsewhere all show a great benefit of tilling before planting, followed by cultivation. The effect appears to be due to more than just better weed control and the resulting moister soil. We speculate that young white ash trees are very sensitive to soil aeration. If this is the case, soil aeration should be considered in site selection, preparation, and later treatments.

Recommendations

Cultivation is safer and more effective than herbicides in white ash plantations. Where no cultivation equipment is available, diphenamide should be used. Although the number and degree of weed species controlled with diphenamide is not as great as we would like, growth of white ash trees is much better than with no treatment. Diphenamide is registered for trees at rates of 6-8 pounds per acre for light- to heavy-textured soils. Although simazine is an effective herbicide, it is not registered for white ash. Until further tests with higher rates and other herbicides prove superior, diphenamide seems to be the best herbicide to use for controlling weeds in white ash plantations.

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Figure 3.—*Trees on the left were planted in tilled ground and cultivated three times during the growing season; those on the right were planted in sod and had no weed control.*

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.



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