CHEMICAL CONTROL OF VEGETATIVE COMPETITION IN ASPEN PLANTINGS

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During the past decade. aspens have become the most important pulpwood species in the Lake States. These species have many assets; these include rapid growth, short rotation, and regeneration into a fully stocked stand when properly harvested. Genetic manipulation of the species has vast potential for further improving growth and wood quality.

Raising aspen from seed has been described earlier by the authors (2), and apparently the method described can be modified for commercial use. The immediate problem after production of the hybrids is outplanting the seedlings in a manner which is economical and will give good results.

One of the major problems is the need to reduce vegetative competition during the first and second growing seasons. Mechanical means are satisfactory but too costly for establishment of commercial plantings.

Chemical control of vegetative competition is a possible solution. However, chemicals and levels used for planting other species are not appropriate. In addition, the chemicals and levels recommended are often based on 1 year's results; thus, residual effects are not considered. A series of studies was undertaken at The Institute of Paper Chemistry to determine what chemicals and levels could be used to aid the establishment of aspen plantings and how these chemicals would affect the planting after the first year. The objectives were to increase survival of the seedlings, to control the vegetative competition, and, if possible, to accelerate the growth of the trees.

Methods and Procedures

In 1961 a three-replicate, completely randomized weed control trial with seven chemical treatments and an untreated check was established on a cultivated, well-drained, loamy sand test area in northern Oneida County. Plots of 20- by 20-foot squares were laid out, with nine 1-year-old seedlings planted in each plot. The trees were planted in the center of each plot, with three rows of three trees at a 4- by 4-foot spacing. The chemicals and levels of active ingredients used are listed in table 1. Records were kept on tree growth and survival for three growing seasons. Weed control was recorded, using a system very similar to that described by Anderson (1). Weed and grass control were rated from 0 to 10 (no control to complete control). Control of grasses and broadleaved weeds were considered separately because they reacted differently to the same chemical. The control of grasses and weeds and injuries to the trees were observed three times during each growing season. Because the observations were made on all plots without knowledge of the treatment being observed, some weed control was recorded on the check plots.

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TABLE 1.--Weed control chemicals

Chemical code	Chemical name	Active ingredient	Application		Date of application	Manufacturing company
			Solution	Method		
		Pounds/acre				
Di-1............	Diuron..........................	1	water.....	sprinkling can....	April 27, 1961..	E. I. du Pont de Nemours & Company
Si-1............	Simazine........................	1	....do....	....do...........	....do.........	Geigy
At-3............	Aminotriazole....................	3	....do....	sprayer..........	June 26, 1961...	American Chemical Company
I.P.C.-15........	Chloro-I.P.C.....................	15	granules..	broadcast........	April 27, 1961..	Columbia Southern Chemicals
Da-5............	Dalapon..........................	5	water.....	sprinkling can....	....do.........	Dow Chemical Company
2,4-D + 2,4,5,-T.	2,4-D and 2,4,5-T 1 to 2 mixture..	5.5	....do....	sprayer..........	June 26, 1961..	California Spray-Chem. Corporation

Results

Height growth and survival of the trees and the control of vegetative competition are summarized in figure 1. Only on the Diuron-treated plots did tree growth and survival equal or surpass that on the check plots. Diuron should be used carefully because it has been found to be a soil sterilant with residual properties at levels as low as 10 pounds per acre of active ingredient. Differences in average heights between treatments were not statistically significant at the 5 percent level. The primary reason was the large variability between replications. The trees in the ChloroI.P.C. treated plots showed greater average heights than the control in the third year; however, the low survival of the trees for this treatment was significant.

There were significant differences between the treatments in the control of grasses and broadleaved weeds. The control of broadleaved weeds is shown in the top graph of figure 1 by solid bars and reads from the top down. The grass control is shown on the same graph by the open bars at the bottom and reads from the bottom up. The third-year measurements of broadleaved weed and grass control were complicated by the encroachment of the grasses and the control of broadleaved weeds by the grasses. Because of these two reasons and to make the weed control graph easier to read, the third-year weed control ratings were left out of the graph. The treatments for which the control of grasses and broadleaved weeds meet or overlap on the graph, in one or both of the first 2 years, are the treatments with the lowest tree survival at the end of the third year.

From this study and additional studies that have been undertaken at the Institute, it appears that if complete control of weeds and grasses is obtained, injury and/or poor survival of the trees result. When no control of competing vegetation is obtained, lower survival and retarded growth results. The right chemical applied at a level providing light to medium control (3-5 on the graph scale) would provide adequate control of vegetative competition and release the trees without injuring them.

Summary

All treatments provided some control of weeds and grasses. Generally, when over half of the vegetative competition was controlled, low survival or reduced tree growth resulted. The best treatment for control of both grass and weeds was Chloro-I. P. C., but it also caused low survival of the trees: Use of a mixture of Dalapon and 2,4-D +2,4,5,-T gave the next best control, but survival was less than on the check plots. The two treatments with Diuron gave slight to moderate control of the weeds and grasses, tree survival equal to that on the check plots, and better than average total tree height. Significant difference between tree growth on the Diuron and the check plots was not obtained because of the variability between replications. The differences that were obtained may be real because of similar results obtained in a later study.

In conclusion, complete control of competing vegetation is not necessarily the best criterion

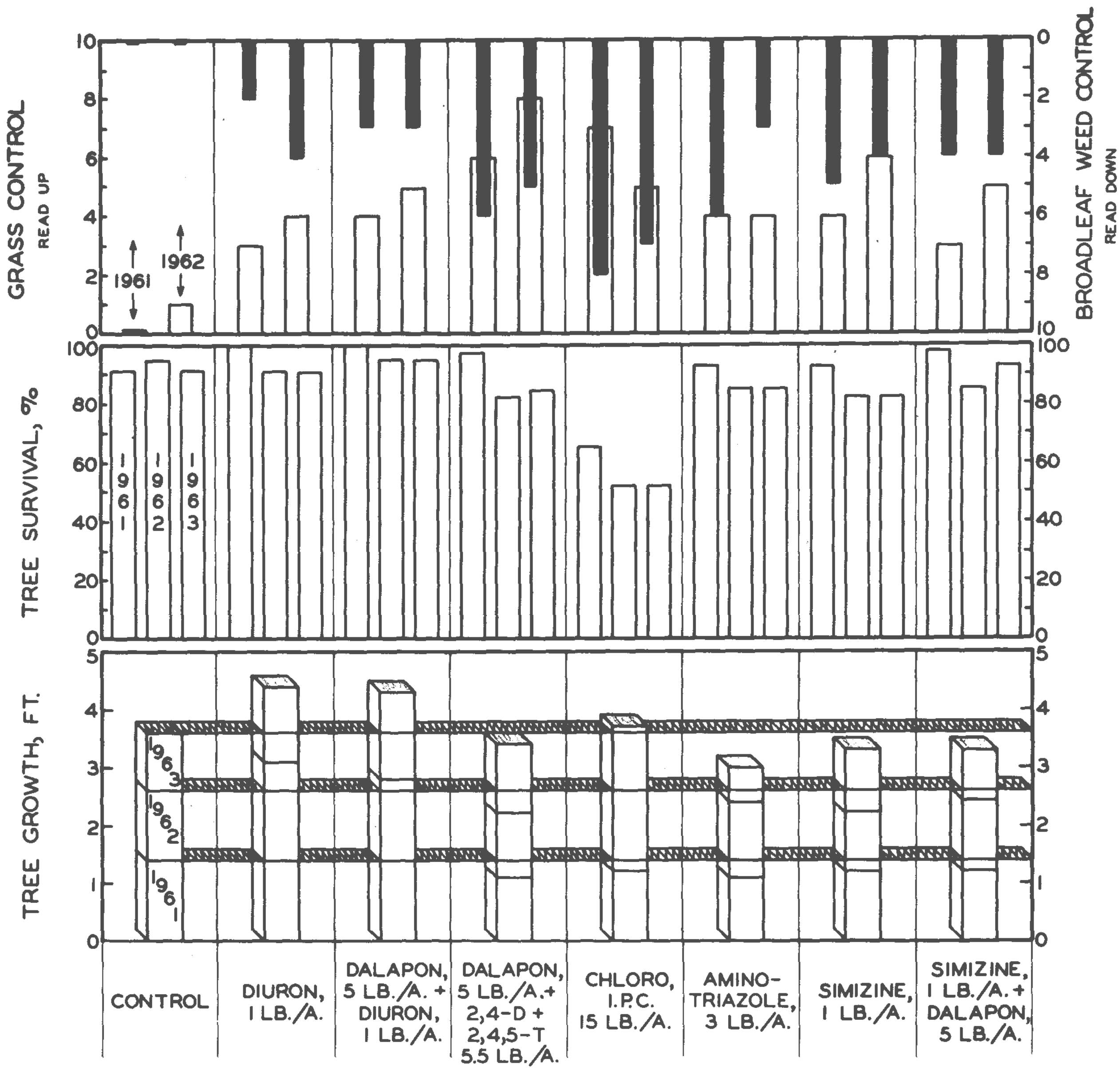

Figure 1.--In the top graph weed control is rated from 0 to 10 (no control to complete control). The broadleaved weeds are represented by the black bars and are read from the top down, while the grass control is shown by the white bars and is read from the bottom up. Tree survival is shown in the middle graph, and tree control is shown in the bottom graph.

for judging the usefulness of the various weed control chemicals.

Literature Cited

(1) Anderson, Harry W. 1963. A system for evaluating effective weed control in forest nurseries. Tree Planters' Notes 61: 19-23.

(2) Benson, M. K., and Einspahr, D. W. 1962. Improved methods for nursery production of quaking aspen seedlings. Tree Planters' Notes 53: 11-13.