CHEMICAL WEED CONTROL IN WINDBARRIERS

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Adequate cultivation is necessary to obtain good tree survival and growth in the Great Plains. Weed control immediately adjacent to the trees requires special effort and special equipment. Survival and growth are better if the tree rows are free of weeds during most of the growing season. Soil sterilant herbicides may help solve this problem.

Farmer cooperation permitted herbicide trials on tree plantings to be extended beyond the experiment station in 1959. New plantings as well as one- and two-year-old plantings were selected. Soil textures ranged from silty clay loam to sandy loam. Rainfall varied generally from 9 inches in western Nebraska to 26 inches in the eastern part during the growing season.

Treatments consisted of diuron (4 lb/A), simazin (4 lb/A), and atrazine (2 lb/A). EPTC was tried, but it could not be worked into the soil in a satisfactory manner. This treatment was dropped. The controls in all but two plantings consisted of observations on plots which received no cultivation in the tree row. Many weed species had commenced growth when herbicides were applied during the third week in May 1959.

Results

Weed control with diuron, simazin, and atrazine was adequate at all locations for the entire growing season. Differences between the three herbicides were not significant except at Horning State Farm, Cass County, where volunteer grain sorghum was a weed. The sorghum thrived in the simazin (fig. 1) and atrazine plots which indicates that these

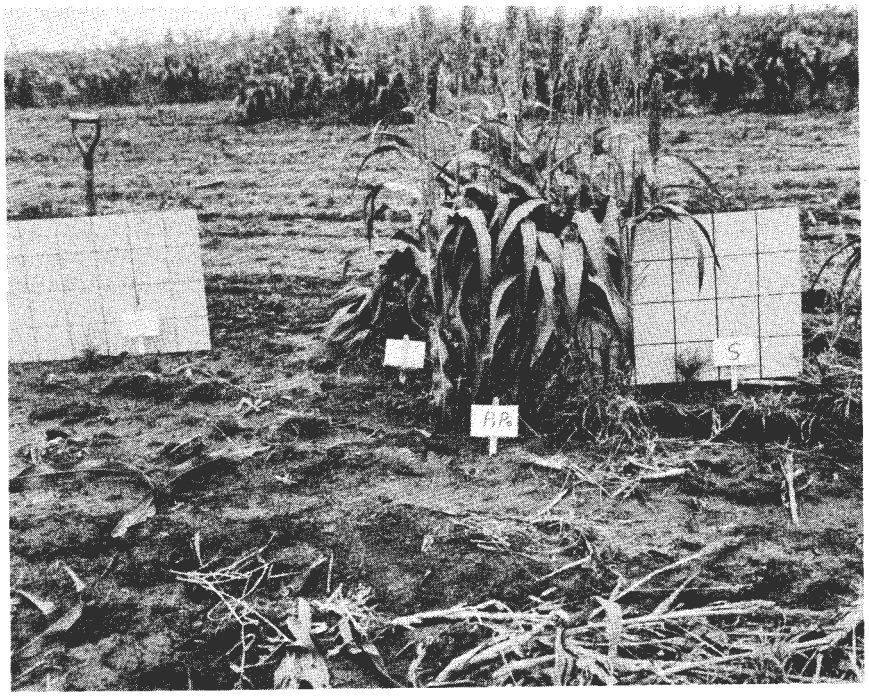

Figure 1.--A 1959 planting of ponderosa pine with control and simazin treated plots, Cass County. No injury to this species was observed during the first growing season.

chemicals acted as pre-emergence herbicides. Weedy grasses, barnyard grass (Echinochloa chloa crusgalli), bristlegrass (Setaria sp.), and crabgrass (Digitaria sanguinalis), encroached upon the treated areas in the simazinand atrazine plots in late July and early August. This was less noticeable in the diuron plots. Rainfall in Cass County approached 26 inches during the period May through August.

Chemical injury to trees was not apparent in 1 -year or older plantings, with the exception of the Alda (Hall County) plantation on a sandy loam soil. Survival of eastern redcedar (Juniperus virginiana) in this planting was lower than the controls in the diuron and simazin plots. Site-predisposed, chlorotic condition was intensified by diuron. Green ash (Fraxinus pennsylvanica), Siberian elm (Ulmus pumila), and Russian-olive (Eleagnus angustifolia) did not reveal herbicide injury and no mortality resulted. In comparison with others the latter two species were found to be quite susceptible to diuron in previous tests when it was applied immediately after planting.[1]

The 1959 tree plantings escaped serious chemical injury, with the exception of the Cass and Lancaster County plantings. High rainfall for the season, including 5 inches during June, caused deeper infiltration of the chemicals into the soil at these two locations in spite of a silty clay loam texture. As a result, considerably injury was noted in the diuron treatments of five species at Horning State Farm (table 1).

TABLE 1.--Effects of chemical weed control on the survival of new plantings at the Horning State Farm in 1959

Species	Cultivated	Diuron	Simizan	Atrazine
	Percent	*Percent*	*Percent*	*Percent*
Ponderosa pine (Pinus ponderosa).....	95	80	97	97
Austrian pine (Pinus nigra).....	95	60	83	93
Scotch pine (Pinus sylvestris).....	90	[1] 60	83	83
White pine (Pinus strobus).....	79	50	83	77
Red pine (Pinus resinosa).....	73	[1] 20	50	60
Blue spruce (Picea pungens).....	62	57	57	83
White fir (Abies concolor).....	50	67	57	73
Balsam fir (Abies balsamea).....	62	30	83	63
Douglas-fir (Pseudotsuga menziesii).....	87	77	70	87
Eastern redcedar (Juniperus virginiana).	84	70	73	77

[1] Significant at 5 percent level.

The most serious chemical injury appeared on Pinus resinosa in diuron-treated plots. The reason may have been the small, shallow-rooted planting stock rather than differences in tolerance between species. Simazin and atrazine caused less injury.

In the Lancaster County planting, diuron, simazin, and atrazine caused early chlorosis on Rosa sp., Manchu (Nanking) cherry (Prunus tomentosa) and Tatarian honeysuckle (Lonicera Tatarica). With one exception all these treatments recovered and made excellent growth (figure 2). The injury to Lonicera by atrazine resulted in heavy mortality. This substantiates other evidence[2] that some plants either tolerate more or absorb less of a herbicide than others.

1 Bagley, W. T. and Loerch, Karl A. Diuron for weed control in new windbreak plantings. NCWCC. 13th ann. meeting. Proc. 13: 66-67. 1956. (Also in Tree Planters' Notes 33. June 1958.)

2 Ries, S. K., Grigsby. B. H., and Davidson, H. Evaluation of herbicides for several species of ornamentals. Weeds, 7: 409-417. 1959.

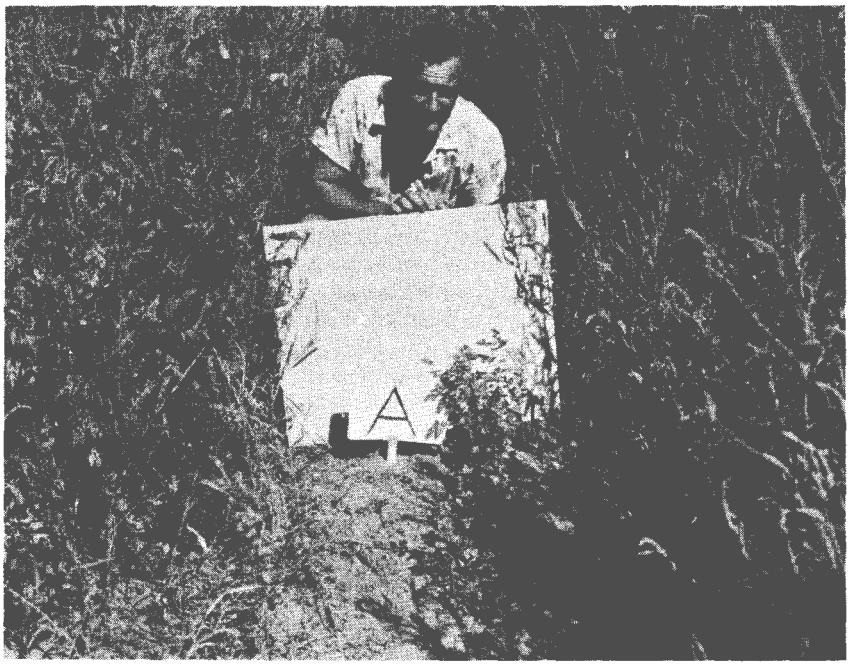

Figure 2.--Atrazine provided excellent weed control with a little early chlorosis on a shrub species in a 1959 wildlife planting, Lancaster County.

A comparison of the control plots and chemical treatments of three 1959 plantings in central Nebraska illustrates the value of weed control. Although the plantings received some machine cultivation, no attempt was made to hoe the tree row. Trees in control plots were soon overtopped by weeds. Vigor and growth were impaired. Survival was generally lower in the control plots than in herbicide treatments. It can be assumed from this that weed competition was more serious in most instances than injury by herbicides.

In many cases, any loss of trees due to herbicides will be offset by a reduction in mechanical injury and death caused by cultivation equipment. This type of injury is very difficult to avoid when trees become obscured by weeds before cultivation is attempted. Soil moisture, often a limiting factor in the growth in the Great Plains, can be conserved by controlling weeds. This is probably the greatest single reason why interest will continue in the use of herbicides in tree plantings.