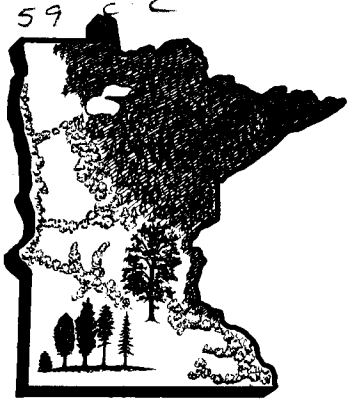

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SOME EFFECTS OF MONURON ON EASTERN WHITE PINE (PINUS STROBUS) REGENERATION

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While 2,4-D and other growth auxin herbicides have been widely used in silvicultural operations, relatively little study has been made of the possibility of using such materials as 3-(p-chlorophenyl)-1, 1-dimethylurea, (monuron), and other "soil sterilants," except in connection with control of vegetation on firelanes and in killing oak trees to prevent spread of the oak wilt disease. The high cost and non-selective phytotoxicity of these chemicals has made them of limited value for use where release of conifers from hardwood competition is the objective.

However, such materials might have possible use in connection with killing vegetation either to encourage natural coniferous regeneration or to establish stand openings in which direct seeding might be successful. Accordingly, a number of field trials were started using monuron to test its effectiveness in killing the various components of a forest stand and its possible stimulus to pine regeneration.

All field work was conducted at Itasca State Park in a stand in which old-growth white pine was scattered rather uniformly as an overstory to mature quaking aspen (Populus tremuloides), paper birch (Betula papyrifera) and a few balsam fir (Abies balsamea). A moderately dense understory was present averaging about 19,000 stems per acre of beaked hazelnut (Corylus cornuta) plus about 1,000 stems per acre of arrowwood (Viburnum rafinesquianum var. affine), panicled dogwood (Cornus racemosa), pagoda dogwood (Cornus alternifolia), mountain maple (Acer spicatum), red maple (Acer rubrum), American plum (Prunus americana), choke cherry (Prunus virginiana) and American red raspberry (Rubus strigosus). Herbaceous cover was primarily large-leaved aster (Aster macrophyllus), sedge, (Carex pennsylvanica), bracken (Pteridium aquilinum) and other species in minor abundance.

Square rod plots were located within the stand on areas selected to give as uniform conditions as possible by inspection of aspect, slope, density of brush, distribution of white pine seed trees, and other stand characteristics. Specific treatments were assigned at random to these various plots. The monuron was applied as a general spray at rates of 16, 32, and 48 pounds per acre in 160 gallons of water with 3 plot replicates of each treatment. For purposes of comparison, untreated control plots were established in the same area.

All spraying was done on August 12, 1954, by back pack pump after a complete stem count of woody plants and estimates of herbaceous ground cover abundance had been made. Similar counts were made on September 24, 1956, to evaluate treatment effects.

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White pine regeneration two seasons following treatment with various concentrations of monuron.

Treatment	Number of one-year seedlings plot 1	plot 2	plot 3	ave.
none	160	640	1280	690
16 lb. per acre	5440	6080	7360	6290
32 lb. per acre	3520	3840	25760	11040
48 lb. per acre	3680	8320	16640	9550

Results:

The more important results of these tests are summarized in the table. However, it is recognized that sufficient time has not elapsed for final evaluation. Monuron has a long lasting residual toxicity in some soils, and it is too early to determine to what extent the newly germinated white pine seedlings will survive. While the plots given the heaviest treatment still show almost complete control of vegetation, it is too early to determine the total duration of the treatment effectiveness.

All monuron treatments were followed by an initial "catch" of an abundance of white pine seedlings as shown in the table. Although the data have not been subjected to a statistical analysis, it is felt that since the seedling germination on the poorest of the monuron-treated plots is five times as great as that on the best untreated plot the results are meaningful in terms of the effectiveness of the treatments in stimulating the initial establishment of white pine regeneration.

Both the 32 and 48 pound per acre treatments resulted in killing aspen within about 10 feet of the plot boundaries. The 48 pound per acre treatment killed all hazel brush, but a substantial amount (45 per cent) still remained on the 16 pound per acre plots.

These results suggest that the non-selective herbicides might be used to advantage in creating seed spots in which natural regeneration might be stimulated to establish or in which artificial seeding might be done more effectively.

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