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Effectiveness of the Herbicides Silvex and  
PBA in Controlling Deciduous Trees and Shrubs

by  
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Aerial herbicide sprays of 2,4-D have proven moderately effective in eliminating many Michigan broad-leaved trees, but maple, oak and ash are notably resistant. Recently developed chemicals are reported capable of controlling maple. This paper reports tests of the effectiveness of 2 of these -- silvex and PBA -- in various concentrations, on deciduous trees, especially sugar maple.

METHODS

The study area was at Williams Crossing, in Section 21, T47N R17W, Alger County. This is a logged-off, burned-over opening typical of many parts of the Upper Peninsula, recently grown up to scattered, stunted deciduous trees and shrubs. The later growth has gradually encroached on formerly excellent sharp-tailed grouse habitat until these birds have become scarce in the vicinity. Control of this cover is necessary if we are to maintain sharptails in anything like their former numbers. One of the problems in this area, as in many other sections of northern Michigan, is effective control of sugar maple. This tree has not yielded satisfactorily to most brush control agents, but after preliminary tests, we felt silvex or PBA might do the job.

First we set up eight 1/8-acre plots, each containing quantities of sugar maple as well as other deciduous trees, largely under 3 inches dbh and in tight clumps. Just before application of the herbicide, we identified, counted, and noted the size of the woody stems on each plot and recorded relative abundance of the major herbaceous plants. We applied the chemicals, silvex and PBA, from the ground at rates of 1, 2, 4, and 8 pounds per acre, using a John Bean sprayer loaned by our Field Administration Division. We diluted the chemical with water to give the desired concentration, and applied it as evenly as possible over each 1/8-acre plot, regardless of the cover, on August 9, 1957. Spraying conditions were ideal -- bright sun, little wind, moderate temperature, with no rain until 4 days after the application. We visited the treated areas 1 and 2 years later to determine effectiveness of the sprays.

RESULTS

Silvex, even at the lowest concentrations, produced better kills of vegetation than any of the PBA tests. The best kill by silvex occurred at 8 pounds per acre, and the best kill with PBA at 4 pounds per acre. The normal vertical effective range of the ground sprayer was not over 25 feet in most instances. A summary of the effectiveness of each chemical on each kind of tree or shrub follows. Concentrations of each chemical tested on a given plant (stated below in pounds per acre in parentheses after the name of the plant) vary, since not all plots contained each species.



### Trees

Sugar Maple: (silvex 1, 2, 4, 8; PBA 1, 2, 4, 8). All concentrations of silvex, except 1 pound per acre, produced a good kill, but in each case prolific root collar suckering occurred. Apparently the 1-pound application was too light to kill maple. Results of the 2-pound mixture, while good, were not nearly as complete as the heavier dosages. PBA killed a few small stems of sugar maple at the highest concentrations, but could not be considered successful. A poor leaf-out occurred the first year after the spray, but by the second growing season most of the trees appeared nearly normal.

Cherry: (silvex 1, 2, 4, 8; PBA 1, 2, 4, 8). Generally both chemicals produced excellent kills at most concentrations and no reproduction was found after 2 growing seasons. It is not known why, but 8 pounds per acre of PBA and 2 pounds of silvex failed to successfully kill cherry.

Trembling Aspen: (silvex 1, 4, 8; PBA 1, 2, 4, 8). Silvex gave the best results, but also the most prolific sprouting. All concentrations were effective. PBA killed aspen only at the higher concentrations and then not as completely as silvex. Suckering was less pronounced.

American Elm: (silvex 2, 8; PBA 1, 2, 8). All elm on the sprayed plots was of a low prostrate reproduction easily covered by the ground application. Both chemicals killed the original growth, but abundant sprouting occurred in each instance.

Basswood: (silvex 1, 2; PBA 2). A good kill with 2 pounds per acre of silvex. Some defoliation at the other 2 applications.

Willow: (silvex 1, 2; PBA 4, 8). Both chemicals produced fair to good kills, especially at the higher concentrations. Heavy reproduction followed in all instances.

Red Maple: (PBA 1, 8). Some defoliation at 1 pound and little change at 8 pounds per acre of PBA.

Beech: (silvex 1, 4). Killed by 4 pounds of silvex, but not affected by 1 pound. No reproduction followed.

Apple: (PBA 4). Not affected by 4 pounds of PBA.

### Shrubs

Beaked Hazel: (silvex 1, 4; PBA 2, 4). Both chemicals killed mature hazel on the plots where it occurred, but excellent reproduction followed each test.

Juneberry: (silvex 1, 4, 8; PBA 1, 8). Only 8 pounds per acre application of silvex affected this shrub. Even this concentration did not kill completely.

### Herbaceous Plants

Neither silvex nor PBA completely eliminated any major component of the ground cover. Silvex failed to change noticeably any of the following: grasses, bracken fern, orange hawkweed, goat's beard, bedstraw, spreading dogbane, St. Johns wort, everlasting, or club moss. Red raspberry, fireweed, and ox-eye daisy appeared to decrease somewhat in abundance.



In the PBA tests strawberry, red raspberry, bracken fern, ox-eye daisy, grasses, foamflower, goldenrod, everlasting, and yarrow remained unchanged. Only fireweed seemed less abundant.

### CONCLUSIONS

Silvex produced a better kill of sugar maple and most other woody species than PBA. The best results were at the higher concentrations -- 4 pounds of PBA and 8 pounds of silvex per acre. Apparently 1 pound per acre of silvex was too light to give the desired kill. Regeneration in most species was prolific, regardless of concentration. Juneberry, a good wildlife food plant, withstood mixtures of up to 4 pounds per acre of silvex.

An aerial application of 2.4 pounds of silvex per acre in fuel oil and water, in Dickinson County (Game Div. Report No. 2257), was somewhat more effective on maple than the lower concentrations on our experimental plots, but was still not considered adequate. We recommend a mixture of 4 pounds per acre of silvex to control sugar maple. Dense stands will probably require a second application to completely defoliate larger trees and kill reproduction under this canopy.

PBA, in concentrations up to 8 pounds per acre, will not control sugar maple. Silvex can handle as well, if not better, all other species eliminated by PBA. Little reproduction occurred after the lower concentrations of PBA, but probably this resulted from light injury rather than a kill.

### APPENDIX

Scientific names of herbaceous plants referred to in this report are:

Bracken fern (Pteridium aquilinum)  
Orange hawkweed (Hieracium aurantiacum)  
Goat's beard (Tragapogon sp.)  
Bedstraw (Galium sp.)  
Spreading dogbane (Apocynum androsaemifolium)  
St. Johns wort (Hypericum sp.)  
Everlasting (Anaphalis margaritacea)  
Club Moss (Lycopodium sp.)  
Red raspberry (Rubus idaeus)  
Fireweed (Epilobium angustifolium)  
Ox-eye daisy (Chrysanthemum Leucanthemum)  
Strawberry (Fragaria sp.)  
Foamflower (Tiarella cordifolia)  
Goldenrod (Solidago sp.)  
Yarrow (Achillea Millefolium)

