

MICHIGAN DEPARTMENT OF CONSERVATION
Game Section

Report No. 2453
March 23, 1964

Weed Control in Tree and Shrub Plantings

by
Earl J. Gordinier

Dessication is the only important cause of mortality and retarded growth of woody transplants planted to improve wildlife habitat in southern Michigan State Game Areas. The best way to avoid loss of moisture in tree and shrub plantings is through good weed control. Chemical weed control, so regulated that damage to the plants is negligible, is preferable to hand-hoeing or tractor-powered cultivation because it rarely damages root systems, and is less expensive.

We now have excellent herbicides to help us establish trees and shrubs. Except for pines or spruces planted where sod is weak or non-existent, herbicides should be used in all tree and shrub plantings. We can weaken or eliminate sod with a single application of amitrole T or dalapon, and we can keep weeds down with simazine. If weeds become established, a combination spray of amitrole T and simazine will control grasses and keep broad-leaved herbaceous weeds from germinating.

Since we can do a much better job of establishing woody plants than previously, I suggest that the establishment of food-producing trees be given increased attention.

Useful Herbicides

Amitrole and Amitrole T

Amitrole has been called amino triazole, but amitrole is the favored common name at present. It is a 50 per cent wettable powder. Amitrole T, a liquid formulation contains ammonium thiocyanate. This additive increases the translocation of amitrole in plants and makes amitrole T a more effective herbicide.

A gallon of amitrole T contains two pounds of active amitrole and costs \$9.35 per gallon, while a four pound bag of amitrole also contains two pounds of active amitrole and costs \$7.60. Either formulation kills grasses and other herbaceous plants, working best when weeds are growing actively. Amitrole has a short life in the soil, and tree planting need be postponed for only 14 days (perhaps less) after treating. These herbicides kill by destroying the plants' ability to make chlorophyll.

This is a contribution of Federal Aid in Wildlife Restoration Project, Michigan W-40-R, Region III, Game Research.

Dalapon

This material, also a grass killer, has given good results when used in the fall, or applied 4 weeks ahead of tree planting in the spring. It has long soil residual; does not break down as readily as amitrole T. When applied to grass for chemical scalping, it should be used at a rate of 15 pounds of actual dalapon per acre.

Simazine

When applied to weed-free ground this relatively insoluble pre-emergent herbicide produces a thin toxic layer on the soil surface and kills weeds as they germinate. It has excellent residual and is inexpensive because it is active at low rates.

Amizine

This product, a combination of amitrole and simazine, can be formulated at less cost by mixing on your own. Ten pounds of amizine contains $1\frac{1}{2}$ pounds of active amitrole and $4\frac{1}{2}$ pounds of active simazine. It is recommended for weed control in nursery stock, ornamental plantings, apple orchards, and forest plantings.

Used as a "directed" spray from a hand sprayer, the amitrole is active against grasses and other herbaceous weeds when they are growing well, and the simazine will protect against weeds germinating subsequent to the treatment.

Discussion

In any attempt to control weeds it is extremely important to make a good beginning. One of the best ways to prepare a site for shrub planting is to fit the soil by plowing, disking, and by harrowing if sod persists. This is also the time-proven method of seeding corn, and still, corn has been grown satisfactorily by substituting herbicides (dalapon, simazine, or atrazine) for fitting. This spring we will test herbicide applications in lieu of soil fitting for shrub planting although tests of this kind were made at Rose Lake several years ago. Results were favorable, but in most instances additional herbicide treatments were needed in order to equal results achieved by adequate cultivation following planting in fitted soil. Soil fitting is not necessary prior to tree planting, but if the site is in sod, chemical treatment should be the first operation.

Amitrole T and simazine, used separately or in combination, should be valuable to our tree and shrub planting operations. Amitrole T controls grasses and broad-leaved weeds by foliage applications, while simazine applied to the ground controls weeds as they germinate.

Dalapon should be applied in the fall; if used in the spring we could not plant with safety for several weeks. Late plantings usually suffer from hot dry weather in late May and June. It is somewhat more expensive than

amitrole T, but if chemical scalping is not completed before grasses become dormant in the fall one must turn to dalapon, or wait until grasses begin to grow again in the spring before resuming amitrole T treatments.

After woody plants have leafed out, combination treatments of amitrole and simazine must be directed carefully so the spray does not reach the tree or shrub foliage. Amitrole will damage any foliage it touches. It will probably be necessary to put these treatments on with a hand-operated compression sprayer, but if organized properly one man can treat a lot of shrubs or trees in one day, even with manually operated equipment. Herbicide costs are summarized in Table 1.

Herbicides, used properly, should control weeds in woody plantings with less damage than mechanical control. Even careful hand-hoeing will cause some damage to shrub roots, and cultivation brings multitudes of weed seeds into germinating position, while controlling existing weeds. This maintains a heavy weed population. Two or three chemical treatments reduce weed populations to a low level.

Tests in 1961 and 1962 showed that sod-bound shrubs can be renovated by light directed liquid applications of amitrole and simazine. Treatments were made on May 17 each year. Comparison with control plots receiving no treatments indicated improved growth of Siberian crab and multiflora rose. Granular simazine applied to shrubs several years after planting also weakened sod and appeared to cause improved shrub growth.

After shrubs or trees have been transplanted a year or longer there is very little danger of damage from the herbicides mentioned. However, it is immediately after transplanting that good weed control is most important to success. Rates must be figured carefully, with less herbicide on sandy soils than on loam or clay soils. If you put on twice the recommended amount of simazine you cause serious damage. Pines, spruces, and tap-rooted hardwood trees are tolerant to normal rates of simazine, and if used properly no damage will result when simazine is applied at the time of planting.

Simazine does damage certain shrub species when used at normal rates within 6 or 8 weeks after transplanting. Others are tolerant, and present no problem during the first season. Experiments, starting in 1959, have shown that damage was proportional to the amount of simazine leaching into the root zone. This damage could be reduced by using light rates after the heavy spring rains have subsided. Granular simazine caused less damage than wettable powder simazine. If shrubs are planted so that tolerant and sensitive species do not occupy adjacent rows, we can treat tolerant shrubs with granular simazine spread with a hand-operated seeder which will treat two rows at one pass. Weeds can be controlled during the first season among sensitive shrubs by mechanical means, or possibly by pre-emergence herbicides other than simazine. If another material is found that will control weeds for 4 to 6 weeks at reasonable cost and without damage, we can apply it the day of transplanting and treat with granular simazine in mid-June. We might also omit simazine entirely the first season and depend on cleaning out encroaching weeds in April or May of the second season with an application of amitrole and simazine.

We have not screened all woody species for sensitivity to simazine, but have learned that Autumn olive and honeysuckles are sensitive; Siberian crab, gray dogwood, white oak, pines, and spruces are tolerant; multiflora rose, and western sandcherry are intermediate in sensitivity.

Recommendations for Using Herbicides

Shrub Planting

- (1) Fit soil thoroughly. Summer fallow, if necessary, to prepare a weed-free site.
- (2) Plant in weed-free sites with a tree planter. Keep simazine-sensitive species separated from tolerant ones.
- (3) Treat tolerant shrubs with granular simazine with a hand-operated "cyclone" seeder. Apply 1 to $1\frac{1}{2}$ pounds of active simazine per acre on sandy soils; 2 pounds on loam and clay soils. Hand seeders will cover 2 rows at a single pass. Cultivate sensitive shrubs through the first growing season.
- (4) Apply directed applications of amitrole and simazine with a hand-operated sprayer at 1 and 2 pounds, respectively, of active material per acre in spring of the second growing season.
- (5) Repeat the combination treatment at the start of the third growing season.

Pine and Spruce Planting

- (1) Omit herbicide treatments if the site is in weak sod or on bare ground.
- (2) Treat sod with powered sprayer by closing certain nozzles along the boom (Fig. 1). Apply a combination treatment of amitrole T and simazine at 1 and 2 pounds respectively, of active material per acre.
- (3) Plant.
- (4) Use the same combination treatment at the start of the second season, but with a directed spray using hand-operated equipment. This treatment may not be needed.

Hardwood Tree Planting

- (1) Prepare chemical scalps using amitrole T at 2 pounds (active) per acre as soon as grass is growing actively, or make fall treatments using dalapon at 15 pounds (active) per acre.
- (2) Wait two weeks after herbicide treatments, then plant.

(3) Apply simazine in a directed spray within a week of planting, at 1 pound (active) per acre in sandy soil, or twice that amount in heavier soils.

(4) At the start of the second growing season apply a directed spray of amitrole T and simazine at 1 and 2 pounds (active) respectively, per acre.

(5) Apply this combination treatment in a directed spray whenever needed, but only when grasses and broad-leaved weeds are growing actively.

In late-summer many weeds are quite resistant to herbicides; even 2,4-D.

Rates recommended here may be on the light side, especially for treatments during the second and subsequent growing seasons; and on heavier soils.

If experience shows this to be the case rates can be increased as we learn more about using these useful herbicides.

FIGURE 1. SPRAYING STRIPS FOR VARYING ROW SPACING WITH 13-NOZZLE BOOM

(Close all nozzles where spray is not indicated in diagram below)

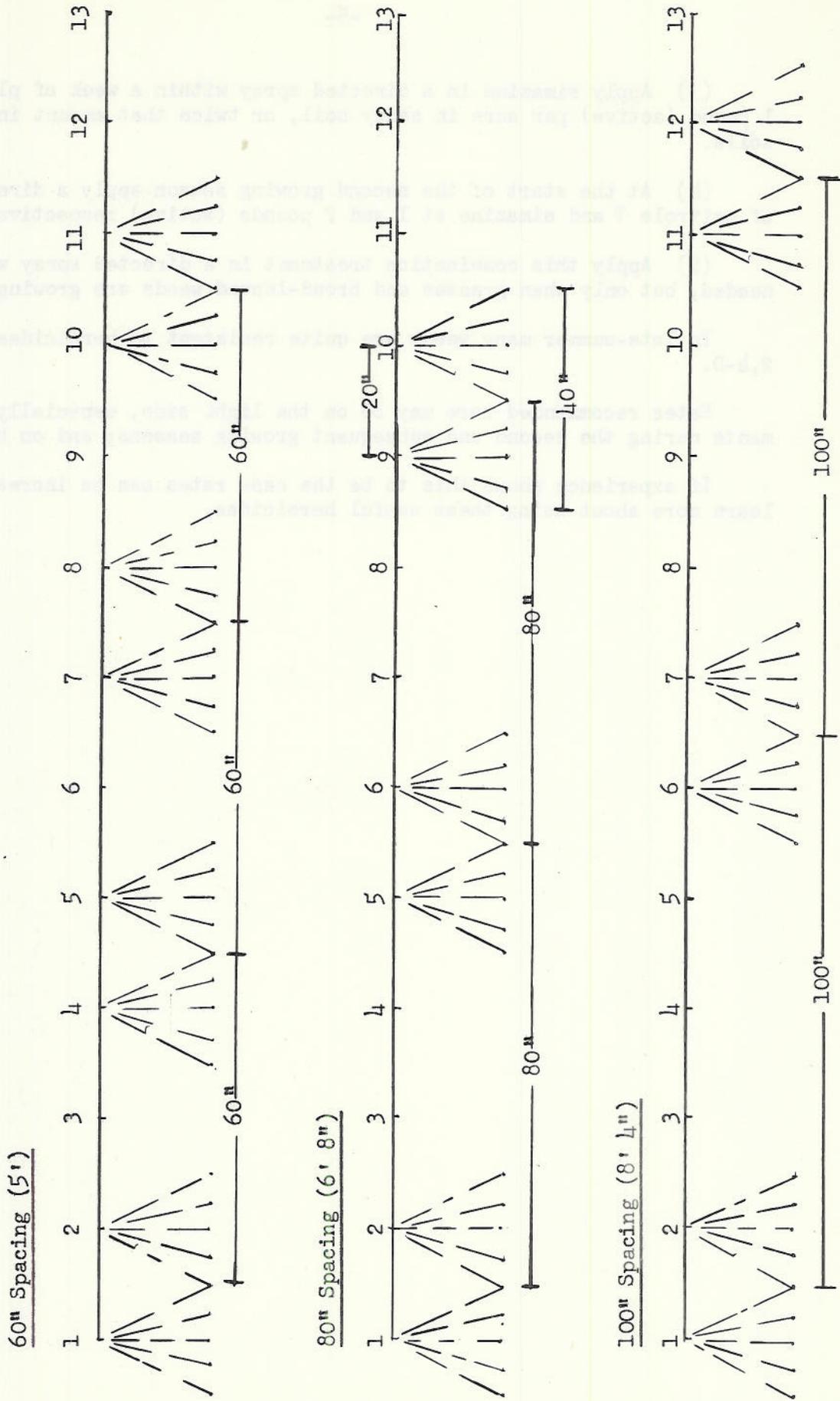


Table 1
Costs of Amitrole T, Dalapon and Simazine

Herbicide	Chemical designation	Cost per			Costs to treat 1,000 transplants				
		lb. or gal.	lb. or active material per acre	Rate per acre	Spray circular scalp, 2 ft. diam.	Spray circular scalp, 4 ft. diam.	Spray strips, 40 in. wide, spacing 6x8-1/3 ft. 4x4 ft.		
Amitrole T. 2 lbs. per gal.	3 amino-1,2,4-triazole with ammonium thiocyanate	\$9.35	\$4.68	2 lbs.	\$9.35	\$0.68	\$2.70	\$4.36	\$3.43
Simazine (80% wet powder)	2-chloro-4, 6-bis (ethylamino) -s-triazine	\$2.45	\$3.06	2 lbs.	\$6.12	\$0.44	\$1.78	\$2.81	\$2.25
Simazine (4% granule)	2-chloro-4, 6-bis (ethylamino) -s-triazine	\$0.27	\$6.75	2 lbs.	\$13.50	\$0.98	\$3.90	\$6.32	\$4.96
Dalapon (74% acid equivalent)	2,2-dichloro-propionic acid	\$0.92	\$1.24	15 lbs.	\$18.60	\$1.34	\$5.37	\$8.71	\$6.83
Amitrole T. (2 lbs. per gal.) and simazine (80% wet powder)	3 amino-1,2,4-triazole with ammonium thiocyanate and 2-chloro-4, 6-bis (ethylamino) -s-triazine	\$9.35 and \$2.45	\$4.68 and \$3.06	1 lb. and 2 lbs.	\$10.80	\$0.78	\$3.13	\$4.95	\$3.97

