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TECHNIQUES INVOLVED IN THE USE OF CHEMICALS FOR ESTABLISHING WILDLIFE CLEARINGS [1]

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Wildlife clearings and/or food patches are essential management tools for a number of game bird and animal species. Such areas are valuable from several standpoints, i.e., attractiveness, simply as an open area or "playground," to provide more "edge" or shrubby growth, and those planted to agricultural crops as a source of supplementary foods.

Bulldozing and hand labor are the foremost methods of establishing and maintaining such wildlife clearings. Although these methods have been quite successful, they are also costly; the two main categories of cost are labor and equipment, with a number of factors contributing to each one.

A number of herbicides had been used successfuly in the past and were considered worthy for further experimental work in the establishment of wildlife clearings. After preliminary experiments at V. P. I. in 1956 and 1957, the use of new herbicides appeared to be economically feasible. Monuron pellets applied in June or October resulted in good control of woody plants. In June, an average kill of 81% was obtained on major tree species on three replications of a monuron treatment. The same experiment conducted in October showed a 70% kill. A December treatment applied at a rate of 5 gms./clump of brush showed good promise. There was no root sprouting in this experiment. Earlier work by Darrow [3] showed that large trees could be killed by as low as 10 lbs.

PROCEDURE

Two field experiments were set up on U. S. Forest Service and Virginia Commission of Game and Inland Fisheries lands to make the following evaluations:

1 Virginia Cooperative Wildlife Research Unit Release No. 60-4. These studies were supported in part by grants from the duPont Company and Amchem Products, Inc.

2 District Game Biologist, Virginia Commission of Game and Inland Fisheries; and Plant Physiologist, Virginia Agricultural Experiment Station, Research conducted with the senior author was graduate fellow with the Virginia Cooperative Wildlife Unit, V. P. I., Blacksburg, Virginia.

3 Darrow, Robert A. and Wayne G. McCully. Proceedings of the Tenth Annual Meeting of the Southern Weed Conference, pp. 24-28, 1957.

(active) monuron per acre.

1. The effectiveness of herbicidal treatments as a method of establishing wildlife clearings.
2. Comparison of cost of herbicidal methods to bulldozing and manual labor.

CRAIG COUNTY EXPERIMENT

The area selected was one of approximately 2,000 acres adjoining a series of four (4) study areas equally as large and of approximately the same ecological composition. These areas or compartments were designed to study the response of game species to various methods of habitat manipulation such as agricultural food plots and timber management practices. Clearings had been established in two of these compartments by bulldozer and were planted to various agricultural crops such as clovers, grasses and small grains.

The topography of the experimental area varies from relatively level areas to those that are quite steep; bounded on the southeast by a very prominent mountain range. Predominant tree species are red oak, white oak, chestnut oak, red maple, sourwood, table mt. pine, and black gum. The chestnut oaks and pines occur on the higher and drier slopes along with several shrub species, i.e., mountain laurel, blueberries and huckleberries. Stem sizes vary from seedlings to trees with a d.b.h. of 18 inches.

Ten approximately one-acre areas were selected with the same criteria used in selecting the sites in the adjoining compartments. Plot boundaries were established and each clearing was divided into quarters (Figure 1). Each quarter of each clearing was treated with a different herbicide. The selection of quarters to receive a particular treatment was randomized. The four herbicides chosen were: (1) monuron on a vermiculite carrier, (2) fenuron clay pellets, (3) ammonium sulfamate, and (4) 2, 4, 5-T ester. Control areas one chain square were established at each clearing.

2	3
1	4

Fig. 1. Design of wildlife clearings, Broad Run Project..

Monuron and fenuron were applied in June (first application June 5) to two quarters of each clearing at the rate of 5 to 10 gms./stem. Stems 5 in. d.b.h. and under were treated with 5 gms. and those above 5 in. were treated with 10 gms. Applications were fairly evenly distributed around the base of each stem at a distance of several inches from the stem.

Ammate and 2, 4, 5-T were used to frill treatments which began August 4, 1958, and were completed that month. In the use of Ammate, overlapping axe cuts were made at waist height around all tree species 1 in. d.b.h. and above (shrubs and tree species under 1 in. d.b.h. were not treated). A solution of 7 lbs. per 2 gal. water was applied to these cuts by Knap Sack sprayers.

It was decided to vary the frill somewhat with the use of 2, 4, 5-T from the one used in the Ammate treatment. Axe cuts were made at approximately 4-in. intervals on stems 4 in. d.b.h. and above. Those from 1 to 4 in. d.b.h. were cut on two sides. All frills were made at approximately waist height. Tree species under 1 in. d.b.h. were stem-foliage sprayed. 2, 4, 5-T at a rate of 12 lbs. per 100 gal. oil (# 2 fuel oil) was applied with the same sprayers used in the Ammate treatment.

OBSERVATIONS

Three weeks after applying fenuron, it was observed that an over-all "brown out" had developed and on July 30, 1958, eight weeks after application, all species were defoliated and dead in appearance. On this date a browning effect was noted on areas treated with monuron, but few leaves had been shed pre-

maturely. There was a general browning effect on areas treated with ammate but no change was indicated where 2, 4, 5-T was used.

RESULTS

A second stem count was made on July 19, 1959, after one growing season, on all situations.

TABLE I

AVERAGE PERCENTAGE OF KILL ON 10 REPLICATIONS OF EACH HERBICIDE ON THE BROAD RUN PROJECT

	Fenuron† *% Kill*	*Monuron % Kill*	*Ammate % Kill*	*2,4,5-T % Kill*
Red Oak	97	90	90	2
White Oak	99	87	93	4
Chestnut Oak	95	90	90	1
Chestnut	..	100	100	35*
Sassafras	82	52	87	15*
Black Gum	82	60	96	21*
Dogwood	78	91	92	27*
Black Locust	..	..	100	0
Red Maple	86	61	89	29*
Hickory	84	76	82	3
Sumac	100	100	63	7
Pine	100	99	..	..
Cherry	..	100	..	..
Thornapple	100	..	..	..
Serviceberry	86	31	87	53*
Sourwood	67	80	88	3
Witchhazel	78	53	97	17*
Red Cedar	..	100	..	..

* Small stems—axe cuts may have killed stems.

† 25% active.

It can be noted in the tables that fenuron is highly toxic to practically all species treated. Results were equally as good on other experimental areas. Living stems were determined by the presence of foliage, but this appeared to be severely affected. The leaves that were present were either quite small (approximately one-fifth normal size) or turning brown. A stem count after another growing season would probably indicate a higher percentage of kill.

Although monuron shows a lower percentage of kill than fenuron, there is good indication that it will be about as effective. A greater amount of foliage was present than in areas treated with fenuron, but this too was not normal either in size or shape and showed a dying effect. A test plot established in 1955 on a utility right-of-way in Bath County, Virginia, showed a dying effect after two complete growing seasons.

A good top-kill was obtained on the Ammate frill-treatment areas. Table Mt. Pine (*Pinus pungens*) was least affected by this treatment. In six of the ten treated areas the percentage of kill on this species range from 53 to 77 per cent. The author believed this was due to shallow axe cuts in the thick, rough bark which is characteristic of this species. These areas are characterized by prolific sprouting, particularly among the oaks, red maple and sourwoods. The succulent sprouts attained a height of as much as five feet.

In the 2, 4, 5-T frill-treatment practically no top-kill was obtained except where stems were less than two inches in diameter. The percentage of kill was below 50 per cent in most plots. Apparently the limiting factor in this treatment was the spaced axe cuts, which were about four inches apart. The stem-foliage treatment of stems under one (1) inch d.b.h. was very successful and these areas are practically devoid of any undergrowth.

ROANOKE COUNTY EXPERIMENT

An additional field experiment was set up on a tract of State forest land on Fort Lewis Mountain, Roanoke County, Virginia, to evaluate different levels of concentration (1, 2, and 4 gms./stem) of fenuron. Two applications of each concentration were made on areas approximately 1-chain square. Treatments were made July 24 and 25, 1958.

Part of this area was heavily burned in October, 1953. Although there are a number of stems on each plot ranging in size from 4 to 18 inches d.b.h., a majority is a low growth 5 years old. Except for buffalo nut (*Pyrularia pubera*), which is parasitic, the variation in species is slight from those on the Broad Run Project Area.

OBSERVATIONS AND RESULTS

By October 4, 1958, all species except Table Mountain Pine had been defoliated. Although the pines had not shed their needles, they were completely brown. The plots treated with 1 gm. contained a large number of buffalo nut which had been defoliated but showed a rebudding tendency. The results of a stem count after one growing season are shown in Table II.

TABLE II

AVERARE PERCENTAGE OF KILL ON AREAS TREATED WITH 1, 2 AND 4 GMS./STEM OF FENURON (2 REPLICATIONS EACH)

	1 Gms. *% Kill*	*2 Gms.* *% Kill*	*4 Gms.* *% Kill*
Red Oak	89	91	98
White Oak	95	97	99
Chestnut Oak	91	95	96
Chestnut	..	..	100
Sassafras	..	98	96
Black Gum	91	88	86
Dogwood	40	100	100
Black Locust	97	96	97
Red Maple	70	88	91
Hickory	85	100	100
Pine	100	100	100
Cherry	..	..	100
Yellow Poplar	..	100	..
Serviceberry	85	70	95
Sourwood	34	65	87
Witchhazel	100	80	83
Buffalo Nut	55	100	..

The cost of each bulldozed clearing on the adjoining compartments was approximately $90.00. This is an approximation due to the fact nine and one-fourth (9¼) miles of access road were constructed in the same operation.

The cost shown in Table III for fenuron is quite misleading since it was shown that the same species can be killed with 1 gm./stem of fenuron. Had a one-gram treatment been used, the cost per acre would have been about $21.00 for fenuron.

A number of factors must be considered in selecting a herbicide (s) for establishing clearings.

1. Accessibility of areas.
2. Density and size of vegetation.
3. Species present.
4. Equipment used in application.
5. Cost of herbicides.

TABLE III

COST COMPARISON PER ACRE OF THE FOUR HERBICIDES USED ON THE BROAD RIVER PROJECT

	Ammate	*2, 4, 5-T*	*Fenuron**	*Monuron†*	*Bulldozing*
Labor	$17.70	$17.10	$ 11.50	$....	$....
Chemical	22.50	9.66	95.00	....	....
Oil	....	9.78	....	....	....
Dozer and Operator	....	....	....	....	90.00‡
TOTALS	$40.20	$36.54	$106.50	$....	$90.00

* Based on 5-10 active per stem.
† Cost not available.
‡ Does not include time spent by resident game manager on hand clean-up work necessary to condition areas for tilling.

SUMMARY

It is apparent that fenuron and monuron are the most effective herbicides for killing a greater proportion of the tree species; fenuron being more desirable because quicker results are obtained. Both of these herbicides can be easily transported into inaccessible areas in knap sacks and no other equipment is necessary. Areas treated with these chemicals could be left until the stems have partially decayed then remove them or leave undisturbed for their value as an open area. A considerable number of annual and perennial plants invaded these areas during the first growing season after treatment. Oak and sassafras seedlings were present in limited numbers.

Due to the great number of sprouts produced by the use of Ammate, this method of treatment might be used to produce browse in areas where it is desired, but because the original stems must be frilled and treated or cut and stump treated (not carried out in this experiment) and equipment necessary, Ammate would probably be used on a limited scale.

The use of 2, 4, 5-T in spaced ax-cut frills is not a satisfactory method of creating an opening such as might be used for a wildlife clearing or removing undesirable tree species. Perhaps a frill consisting of overlapping axe cuts would be more effective.

Herbicides as a wildlife management tool shows great promise for creating wildlife clearings and controlling undesirable tree and shrub species. It is improbable that they will replace bulldozing as a method of creating clearings; what is to be accomplished and accessibility of areas will be the determining factors.

WILDLIFE HABITAT MANAGEMENT IN FLORIDA NATIONAL FORESTS

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INTRODUCTION

The signing of a cooperative wildlife agreement on 20 December 1937 between the U. S. Forest Service and the Florida Game and Fresh Water Fish Commission paved the way for a united effort to properly manage the wildlife on Florida National Forests. This agreement has been revised and brought up-to-date on several occasions in order to meet changing wildlife needs in our forest lands. The cooperative agreement spells out in detail the responsibilities of each agency toward a united wildilfe program.

Throughout the State of Florida the Game and Fresh Water Fish Commission operates 31 wildlife management areas, four of which are located on National Forest lands. A special $5.00 fee entitles hunters to participate in 27 of these managed hunts. The cooperative agreement, previously mentioned, provides that