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FIELD TEST OF TETRAMINE TREATED DOUGLAS FIR SEED

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ABSTRACT

This study was undertaken to provide more information concerning the effectiveness of tetramine-treated Douglas fir seed. Although previous tests had indicated favorable results, it was deemed advisable to repeat the testing under controlled conditions before extensive operational projects should be encouraged.

The experimental project consisted of four ten-acre plots, broadcast with a cyclone seeder at the rate of one-half pound of Douglas fir seed per acre. Two of the plots were seeded with tetramine-treated seed and two with untreated seed, for comparison. The plots were located near ridge tops so that all exposures were represented. The areas were typical of the Tillamook Burn.

The Douglas fir seed was treated by soaking in a 1.0% tetramine-acetone solution for one hour.

A study of the small mammals on the four plots selected was begun prior to seeding in late 1953, and was continued until October of the following year. The reduction in numbers of the white footed deer mouse *Peromyscus maniculatus var.*, of which special study was made, on the plots was small. These reductions could not be directly related to the treated seed and were assumed to be due to natural causes.

In October, 1954 an examination of each plot was made. One hundred one-milacre sample plots per experimental plot indicated a stocking of 58.5 per cent by milacre plots on the treated areas and 5.5 per cent on the control areas. On the treated plots this high percentage represents the germination and subsequent survival of one-tenth of the seed sown, ten months after broadcasting.

INTRODUCTION

In 1951 the first field trials of tetramine (Tetramethyl Disulpho Tetramine) were initiated. These trials were a part of a continuing search for a substance which, when applied directly to the seed, would control the depredations of the small seed-eating mammals. Tetramine was one of the candidate materials selected as promising by the United States Fish & Wildlife Service, Wildlife Research Laboratory, Denver, Colorado. Because tetramine is not phytotoxic, it can be applied directly to the seed, thus eliminating pre-baiting before seeding and eliminating the need of a baited buffer strip. Field trials of tetramine-treated Douglas fir seed in 1951-1952 provided very favorable results. Indications were that more than 700 trees per acre resulted from an application of one-half pound of treated seed per acre.

However, the spring of 1952 was unusually favorable for germination and seedling establishment. Also the small mammal populations were less than normal on adjoining areas, as well as on the field trial plot. For this reason it was felt that further experiments should be conducted under more precisely controlled field conditions before tetramine was used on an operational basis. This note reports the results of these further field tests.

EXPERIMENTAL PROCEDURE

Plot Selection Description

Four experimental plots were established in June, 1953. Two of the plots were used for the application of treated seed, and two plots were used for controls. The latter were seeded with untreated seed. The plots are designated in this report as "Archer," "Smith," "Jordan," and "Lyda." The Archer and Smith plots are tetramine treated plots. The Jordan and Lyda plots are untreated (control) plots. Ten acres was chosen as the size of a plot.

The four plots were located in the Tillamook Burn on areas that had been logged since the last fire of 1945. The plots were at an elevation of about 2,000 feet. They were situated on a ridge, from which the drainage was into the South Fork of the Wilson River and into Jordan Creek. Each plot was established as a square 10 chains by 10 chains. Two of the plots (Archer and Smith) were on areas that had been cleared of snags over 5 feet high for firebreaks (Plates 1 and 2). The other two plots (Jordan and Lyda) (Plates 3 and 4) still contained scattered snags. Except for the actual firebreak areas, which had been bulldozed to mineral soil for a width of several chains, all four plots contained much debris on the ground.

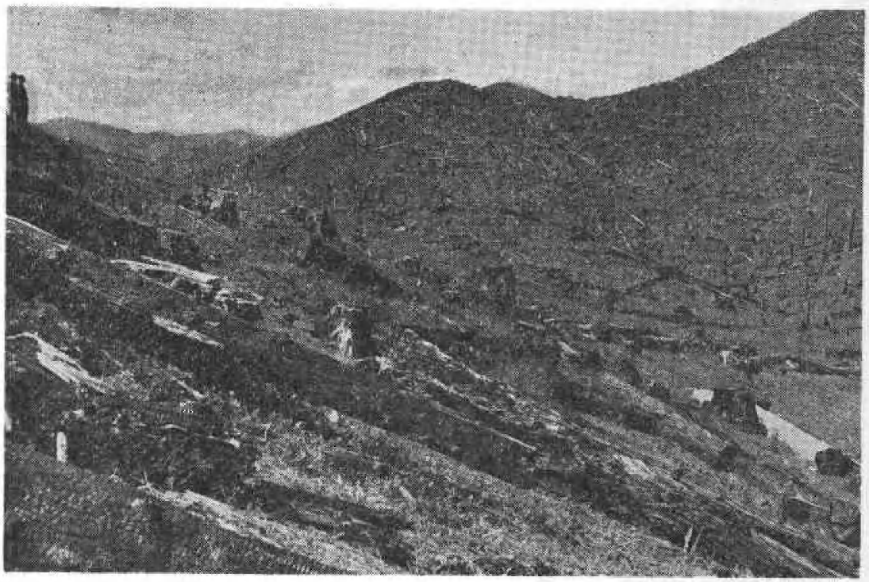

Plate 1. Archer Plot

The vegetative cover consisted principally of bracken *(Pteridium aquilinum)*, blackberry *(Rubus macropetalus)*, pearly everlasting

Plate 2. Smith Plot

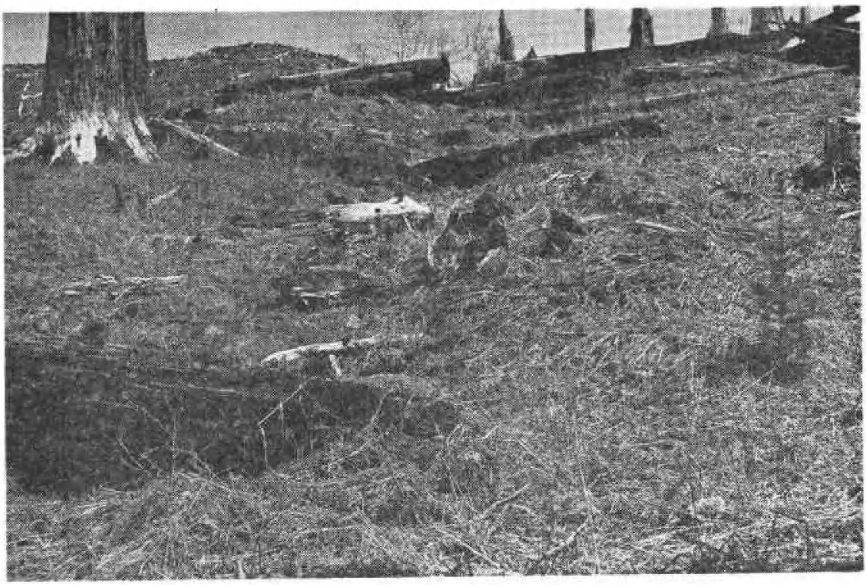

Plate 3. Jordan Plot

(Anaphalis margaritacea), lupine *(Lupinus polyphyllus)*, Oregon grape *(Mahonia nervosa)*, fireweed *(Epilobium angustifolium)*, huckleberry *(Vaccinum parifolium)*, alder *(Alnus rubra)*, and wil-

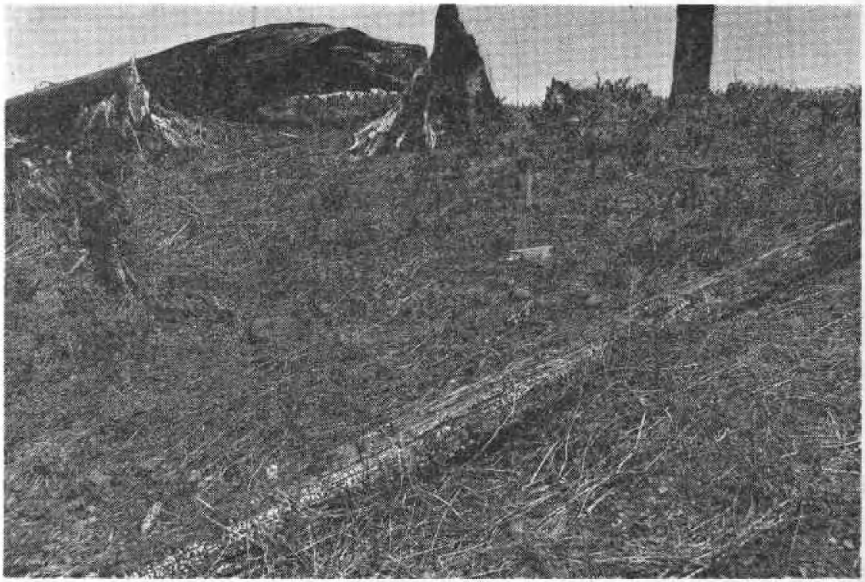

Plate 4. Lyda Plot

low *(Salix, spp.)*. Bracken was the major herbaceous plant. It was universal and generally heavy on all the plots, except for a short period in the spring. The vines of the trailing blackberry were present throughout the year and in spots were very dense. Lupine was also thick in spots, occurring in scattered clumps in some areas. Oregon grape was spotty in occurrence, as was fireweed. Fireweed and pearly everlasting were well scattered throughout all the areas wherever the fern was sparse or absent and bare soil was exposed. Alder and willow occurred as a few isolated plants, except on the Jordan plot, where, because of continuous stream flow, some scattered alder and a small alder thicket on one edge of the plot were present.

Seed Source and Treatment

The seed was collected between 1200 and 1500 feet, in Benton County, Oregon, in 1951. It was stored at 0° F. until November, 1953, when it was removed to a refrigerator and held at approximately 40° F. until treated and placed in the field.

In the second week of November, 1953, Nelson Kverno, of the United States Fish & Wildlife Service, treated eleven pounds of the seed with an acetone solution of tetramethyl disulpho tetramine (tetramine). The treatment consisted of:

1. A five-minute acetone wash.

2. A one-hour soak in a 1% acetone solution of tetramine (tetramine used was 100% pure).
3. A twenty-hour air drying.

Seeding Method

Seeding was started on December 2, 1953. The seed was applied by a cyclone hand broadcast seeder. The Jordan plot and about 20% of the Lyda plot were seeded before the work was halted by adverse weather. Seeding was finished on the Lyda plot on December 15, 1953, and on the Archer and Smith plots the following day.

Directly after seeding 300 screen caps were set out for comparison of germination between the treated and the untreated seed. Ten seeds were placed under each screen. Cedar stakes were set out one chain apart, 100 per plot. These were used as reference points for the one-milacre plots and as markers for the live traps used for observations of small mammal populations.

Stocking Surveys

Stocking was determined by the results derived from examination of 100 one-milacre sample plots on each plot. This examination was made in October, 1954.

Small Mammal Census

The small mammal census was taken prior to seeding, and periodically, at monthly intervals, after seeding unless too much snow interferred with the working of the traps. Sherman live traps were used, spaced one chain apart, and placed to take advantage of any protection or shelter offered by logs or stumps. Any mammal trapped was tagged in the ear and released at the point of capture. A record of sex, trap number, species, and apparent age was kept.

RESULTS

The census results shown in Table I are the number of individual mice taken in each group of 100 traps per 3-day trapping period. The figures in the table demonstrate the relatively equal number of rodents on the various plots, both before and subsequent to seeding. It also shows that there was no substantial reduction in the mouse population on the treated plots after the application of the tetramine-treated seed.

Table I

PEROMYSCUS CAUGHT PER 3 TRAP-NIGHTS

	Treated		*Control*	
	Smith Plot	*Archer Plot*	*Jordan Plot*	*Lyda Plot*
Nov. 1953	31	32	55	33
Jan. 1954	24	27	53	15

The stocking survey results shown in Table II demonstrate the very significant difference in number of seedlings between treated and untreated (control) plots. The 58 and 59 milacre stocking per cents shown on the Smith and Archer plots, respectively, represents an adequate level of stocking.

Table II

STOCKING BY 100 ONE-MILACRE PLOTS PER EXPERIMENTAL PLOT

	Treated		*Control*	
	Smith Plot	*Archer Plot*	*Jordan Plot*	*Lyda Plot*
October, 1954				
Number of Trees	224	192	0	14
Milacres Stocked	58	59	0	11

DISCUSSION

Predicting results from direct seeding is limited by the wide variability of climatic and soil conditions from area to area. With tetramine used as a protectant of Douglas fir seed against the seed eaters, a higher degree of success seems assured. The plots broadcast with treated seed produced approximately 2,080 trees per acre, in contrast to the little or nothing on the two plots broadcast with untreated seed.

On the plots sown with treated seed the reduction in numbers of mice was small and could have been from natural causes. However, as evidenced by the difference in stocking, it appears that where tetramine-treated seed is accepted in sub-lethal doses an aversion may be created so that the treated seed is no longer accepted. That this appears to be the case is readily observable in Plate 5, where seedlings can be seen around a trap that was frequently visited by mice. This trap was sprung 23 times out of a possible 36, and caught 12 different mice.

During the interval between germination and the time at which the stocking survey is made some 30-60% mortality of new germinants can be expected. This mortality is caused by such factors as heat lesions, damping off, drought, and other adverse conditions of the microsite. It appears, therefore, that those seedlings found after this loss has occurred are well established and that there should be only a minor additional loss the second year after seeding.

Plate 5. Each white card marks the location of one healthy Douglas fir seedling resulting from a tetramine treated seed.

BIBLIOGRAPHY

FINNIS, T. M. The use of tetramine in the direct seeding of Douglas fir in coastal British Columbia. 1955. (British Columbia Forest Service, Victoria, B.C. Research Note No. 31.)

GARTZ, JACK F. Stratified Douglas fir seed sown in April, May and June. January, 1955. (Oregon State Board of Forestry. Research Note No. 19.)

HOOVEN, EDWARD F. A field test of tetramine treated Douglas fir seed. January, 1955. (Oregon State Board of Forestry. Research Note No. 21.)

_____ Some experiments in baiting forest lands for the control of small seed eating mammals. February, 1953. (Oregon State Board of Forestry. Research Bulletin No. 8.)

HUNT, LEE O. and LYLE D. CALVIN. Evaluation of factors affecting Douglas fir regeneration by direct seeding. 1954. (U. S. Department of the Interior, Bureau of Land Management.)

SHAW, ELMER W. Effects of tetramine used for rodent control in direct seeding of Douglas fir. August, 1953. (U. S. Department of Agriculture, Forest Service. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. Research Note No. 89.)