

EXPERIMENTS WITH WEED-KILLERS AGAINST SALT MARSH PLANTS WHICH HINDER MOSQUITO CONTROL OPERATIONS*

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Mosquito control on the New Jersey salt marsh has long been hampered by dense vegetation growing along ditches or over the entire marsh. This is particularly true in the northeastern part of the state where the tall foxtail grass, *Phragmites communis*, grows to a height of 10 to 15 feet. Another troublesome plant which is more abundant further south in the state is the salt marsh elder, *Iva oraria*. When this plant invades a salt marsh it is first found along ditches and from there may spread over the entire marsh.

In September 1945 experiments were undertaken with weed-killers to destroy these plants or inhibit their growth. The weed-killer known commonly as 2,4-D † (2,4-dichlorophenoxyacetic acid) was tested in these experiments along with several other materials. The initial experiments were promising. Though the foxtail was not killed, severe injury resulted from the use of 2,4-D and "Ammate" (ammonium sulfamate). Ammonium sulfate and a material containing dinitro-ortho-cyclo-hexyl-phenol were not effective. On the salt marsh elder, dilutions of 25 and 50 grams of a 2,4-D powder in 2½ gallons of water applied to the leaves of the plants growing on 1000 square feet of area killed the plants, though at the lower dilution a few plants at one end of the plot survived. Probably these were not sprayed completely. In 1946 a few

new plants, apparently from seeds, appeared in the treated area.

The success of these tests led to more extensive experiments in 1946, which are summarized briefly. These tests were conducted with the cooperation of several of the New Jersey Mosquito Extermination Commissions.

TREATMENTS OF SALT MARSH ELDER

Tests of 2,4-D were made against the salt marsh elder on the Cheesequake Meadow in Middlesex County. Materials used included (1) the sodium salt containing 70 per cent 2,4-D; (2) the alkanol amine salt containing 20 per cent 2,4-D; and (3) a miscible oil preparation containing 12 per cent of the methyl ester of 2,4-D. These materials were applied to the plants at concentrations of 500, 1000, and 2000 ppm of 2,4-D on May 20. A second set of plots were sprayed at concentrations of 250 and 500 ppm on June 28. Applications were made with a knapsack sprayer. The leaves were wet thoroughly with a fine mist. In both cases the day was warm and rain did not occur for more than four hours after treatment. All treatments on both dates killed the salt marsh elder except in a few places where single plants were apparently sprayed poorly. Death of the plants occurred one to three weeks after treatment, preceded by the characteristic curling and twisting of leaves and twigs. In August new growth was not appearing on any of the plants, and it is believed that roots as well as aerial portions of the plant were killed, even at the low dosage of 250 ppm of 2,4-D. The usual concentration recommended on weeds is 1000 ppm.

Tests in Atlantic County against the salt marsh elder, produced similar results.

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† 2,4-D materials used in these tests were furnished by the Dow Chemical Company, Midland, Michigan, and the Ammate was furnished by E. I. du Pont de Nemours & Company, Wilmington, Delaware.

TREATMENTS OF FOXTAIL GRASS

Tests of 2,4-D on foxtail grass were made at Seidler's Beach in Middlesex County. Materials used were the same as those applied on salt marsh elder. One-quarter acre plots were sprayed on May 23 with the three materials at 500, 1000, and 2000 ppm. A power sprayer developing 200 pounds pressure was used in making applications, and spray was applied at the rate of 100 gallons per acre. At the time of spraying the grass had already reached a height of 4 to 6 feet.

No appreciable damage resulted from the application of either the sodium or alkanol amine salts of 2,4-D. However, the miscible oil preparation containing 12 per cent of the methyl ester of 2,4-D had marked effects on the plants. At 500 ppm this material stopped growth of the grass by killing the growing tips. A month after spraying, the plants were shorter than when they were sprayed. The reduction in height was due to the dying of the tips of the plants. Severe injury to the whole plant resulted when 1000 and 2000 ppm were used. Leaves turned brown, stems were weakened, and lodging of the grass resulted. Injury appeared more quickly and was more severe when the 2000 ppm concentration was used.

Additional plots were treated on June 27 with the miscible oil preparation. At this time one-eighth acre plots were sprayed with 500, 1000, and 2000 ppm of the miscible oil preparation and one half of each of the original plots was resprayed with the same concentration used on May 23. Ten days later plants were showing injury. At 500 ppm, growing tips of nearly every plant were dead; at 1000 ppm, leaves were dead or severely injured; at 2000 ppm, the entire plant had turned brown. On the areas which were sprayed a second time new injury was evident in all plots. However, there

was no sharp line of demarkation between the halves of the plots which had received one and two spray applications.

"Ammate" was applied on June 27 using 1 pound and 1/2 pound of the material per gallon of spray. Applications were made at the rate of 100 gallons per acre. Immediate burning of foliage resulted but plants were not killed.

Applications of 2,4-D mixtures to small plots in Atlantic County showed effects comparable to those obtained in Middlesex County.

Further observations are necessary to determine whether or not foxtail was killed by the 2,4-D applications. However, it is evident that the foxtail grass is severely injured by an application of a miscible oil preparation containing 2,4-D. Possibly an early season application of the material would kill the plant or prevent it from growing more than one or two feet high.

SUMMARY

Studies were made of the effect of 2,4-D (2,4-dichlorophenoxyacetic acid) on the salt marsh elder (*Iva oraria*) and foxtail grass (*Phragmites communis*). Materials used were as follows: (1) the sodium salt containing 70 per cent 2,4-D; (2) the alkanol amine salt containing 20 per cent 2,4-D; and (3) a miscible oil preparation containing 12 per cent of the methyl ester of 2,4-D. The materials were sprayed on foliage as a fine mist at the rate of about 100 gallons per acre. Salt marsh elder was killed by all of these materials when used at 250, 500, 1000, or 2000 ppm. The miscible oil preparation severely injured foxtail grass. Growing tips of the grass were killed by 500 ppm of the material, and more severe injury resulted from 1000 and 2000 ppm. Further observations will be necessary to determine whether or not these plants have been killed.