PREPLANTING, pre-emergence and postemergence applications of isopropyl N-phenylcarbamate (IPC) and isopropyl-N-(3-chlorophenyl) carbamate (CIPC) for control of wild oats and other weeds in flax and small grains have been unsuccessful for many investigators (1, 2, 3, 5, 7), because concentrations high enough to control wild oats severely injured the crops.

Because Everson and Dunham (4) had previously shown that dormant seeds permeable to water were killed by 2,4-D, it was speculated that fall applications of IPC and CIPC might kill wild oats and be dissipated in the spring before small grains are normally sown.

METHODS AND MATERIALS

In order to test this possibility, two field trials and a laboratory study were conducted. The field trials were started on fall plowed land in 1951, at University Farm, Saint Paul, Minn., and at the Northwest School and Station, Crookston, Minn. The soil at University Farm was Waukegan silt loam in which wild oats had been sown the previous spring. The experimental design was a split plot with three replications. The main plot treatments were three dates of application: Aug. 21, Sept. 11 and Sept. 28, and the subplot treatments were IPC and CIPC at 0, 5, 10, and 15 pounds per acre.

The chemicals were sprayed on each 11 by 15 foot plot at the rate of 40 gallons of water per acre and immediately tandem-disked three times to insure thorough mixing with the soil. The plots were disked again on May 1 and three rows of Mindo oats were sown across each plot with a “Planet Jr.” hand planter. Injury to the oats was determined by counting the normal seedlings in 6 feet of row. The effect of the chemical on wild oats was evaluated by counting the stand of wild oat plants in 2 square yards per plot.

The Crookston trial was conducted on Fargo silt loam which had a heavy natural infestation of wild oats. The experimental design was a duplicated randomized block of IPC and CIPC at 5, 10, and 15 pounds per acre and a control. The chemicals were applied Oct. 6, 1951, using the same methods employed at University Farm. The plots were 15 by 43 feet. Square yard counts of wild oats seedlings were taken in the spring prior to disking the land for a seedbed. Redwing flax, Mars barley, and Minhybrid 800 corn were then sown to determine if the herbicides were still toxic to these crops. Drothowing following sowing made the stand of barley and flax so poor that only visual notes were taken. The corn was given normal cultivation, and injury was determined by counting the number of plants in 15 feet of row. The effect of the herbicides on the soil seed population was determined by taking two samples 1-foot square from each of the two check plots and from each of the plots treated with 15 pounds of CIPC at depths of 0 to 2 inches, 2 to 4 inches, 4 to 6 inches, 6 to 9 inches, and 9 to 12 inches. One of the samples was taken from a weed-free portion of the plot where corn was being cultivated and the other was taken from the uncultivated part of the plot where barley was sown. Unfortunately, some of the wild oats in the barley had shattered seeds at the time of sampling. The wild oat seeds were removed from the soil with water over a series of screens. This is described in detail by Robinson (6).

In the field trials, shown below, fall applications of CIPC reduced the number of wild oat seeds and the number of seeds in the soil the next spring. In an attempt to understand the cause for these reductions, a study was conducted to determine if soaking with CIPC solutions affects the amount of wild oat dormancy or the viability of dormant seeds. Samples of 1000 seeds from two seed lots were soaked for 1, 2, 4, 8, 12, 24, 48, and 72 hours in water solutions containing 0, 0.4 and 2 percent CIPC. After soaking, samples were presoaked in water for 8 and 24 hours, respectively. The experimental design was a split plot with two sub-plots of wild oats the main plots, periods of soaking the sub-plots, and concentrations of CIPC the sub-sub-plots. The seeds were tied into small pieces of cotton cloth for soaking in bottles containing either a concentration of CIPC or water. After the soaking period was over, the seeds were germinated in germinators in which the temperature was 65 ± 2°F and were germinated 12 days to determine the percentage of dormancy. The dormant seeds were then removed from the germinator and dried. Dormancy was broken on the other seeds by removing the lemma and palea and scratching the seed near the embryo of each seed with the sharp point of a needle. After the dormancy was broken, the seeds were planted in blotters in the germinator. One week later, the normal and injured seeds were recorded.

RESULTS

It was apparent in the University Farm trial that IPC and CIPC could not be used in the fall for control of wild oats on land that is to be sown to oats in the spring. The data are shown in Table 1. All rates of chemicals reduced the stand of wild oats at all dates except for 10 pounds of IPC applications which gave complete control. These applications practically eliminated the cultivated oats also. That there was an increase of wild oats in the fall is indicated by a comparison of the total number of wild oat seeds in a cubic foot of soil that had been sprayed with 15 pounds of CIPC per acre the previous fall versus unsprayed soil shows a marked reduction as a result of treatment. A comparison of the total number of wild oat seeds in a cubic foot of soil with 15 pounds of CIPC reduced the number of wild oat seeds producing plants significantly.

Fall applications of IPC and CIPC at Crookston reduced wild oats in small grains or corn (see Table 1). A stand of wild oats, corn, and flax appeared most reduced with the 15 pound treatment of CIPC. The more severely injured, the stand being reduced from 34% to 68% by the 10-pound rate and eliminated with the 15-pound rate. The stand of wild oats in the fall is indicated by a comparison of the total number of wild oat seeds in a cubic foot of soil that had been sprayed with 15 pounds of CIPC per acre the previous fall versus unsprayed soil shows a marked reduction as a result of treatment. A comparison of the total number of wild oat seeds in a cubic foot of soil with 15 pounds of CIPC reduced the number of wild oat seeds producing plants significantly.

Published August, 1954

Fall Applications of IPC and CIPC for Killing Wild Oats (Avena fatua) Prior to Sowing Oats

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