The Response of Flax to Rates and Formulations of 2,4-Dichlorophenoxyacetic Acid

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Among the selective herbicides now available, 2,4-dichlorophenoxyacetic acid (2,4-D) offers the distinct advantages that it is one of the most effective, is safe to handle, is relatively low in cost, and may be used with low volume of water. Despite extended research and field trials of 2,4-D, several questions pertaining to its use still remain unanswered. It still remains to be ascertained to what extent the quality of a crop is impaired and its quantity reduced under such treatment, whether there is differential response among varieties, whether one formulation has an advantage over others, and finally what relation exists among the rates, the dates of application, and the damage done to the crop.

The problem of weeds is more serious in flax than in cereals since the flax offers little competition to the weeds and production is largely limited by the weed factor. It is also a more difficult problem to solve since flax is less tolerant of herbicides than the cereals.

Blackman and Holly (2) have indicated that in the control of weeds in flax it is not only necessary to have the right compound in the proper concentrations but it is also essential that the application should be made at the "right" time. The flax plants should not be less than 3 inches or more than 12 inches in height. Viehmeyer (9), Olson and Zalik (8), Leggett (7), Ficht (5), Bakke (1), and Dunham (4) reported on the various aspects of 2,4-D application to flax at the North Central Weed Control Conference held at Topeka, Kansas, in December, 1947. In these studies, however, not all the important responses were considered nor were varietal differences adequately determined. Morphological abnormalities which sometimes accompany herbicidal treatment have also not been noted in the literature.

The studies reported in this paper were designed to evaluate the various crop responses in seven commonly grown varieties of flax treated with different rates and formulations of 2,4-D. The treatments were made at that stage of flax found to be relatively safe from crop damage by the herbicide and at the same time for killing susceptible weeds.

Materials and Methods

The experiment was conducted in 1947 at University Farm, St. Paul, Minn. The soil was a well drained, moderate silt loam about 12 inches deep with a pH of 6.1. The surface was a yellowish brown heavy silt loam underlaid at a depth of 36 to 40 inches with sand and gravel. The land was level but water did not accumulate. The preceding crop was corn and it was plowed in the fall after the harvest.

The experiment was laid out in a split plot design with two replications as shown in Fig. 1. Each plot consisted of a variety planted in three rows 18 feet long and sown 1 foot apart. The experimental area was 30 feet from the central row was used for determination of yield of grain and straw.

Seven varieties of flax used in this study were grown in this area: Crystal, Dakota, Koto, Minerva, Redwing, Sheyenne, and B5128. A 16-foot length from the check was used for determination of yield of grain and straw.

Spraying was done 1 month from the date of sowing flax varied in height from 4 to 7 inches. The salt and the ester of 2,4-D were applied at the rate of 0, 4, 8, 16 ounces of acid equivalent per acre. Zero rate of application refers to spraying the plots with water only, a procedure which serves as a check.

Fig. 1.—The plan of layout of the experiment (2 replications).