There is widespread interest in the use of 2,4-dichlorophenoxyacetic acid (2,4-D) for the control of broad-leaved weeds growing in grain in South Dakota, where about one-half of the cultivated acreage is devoted to the production of small grains. These crops, in general, are relatively tolerant; but varying degrees of injury have been observed, especially when the more toxic formulations were used and when certain varieties were treated at certain stages of growth. The purpose of this study was to determine the differential responses in yield, components of yield, and seed viability of several economically important barley varieties when treated with three 2,4-D formulations at four stages of growth.

REVIEW OF LITERATURE

Albrecht (1) reported in 1945 that some strains of creeping bentgrass were more tolerant to 2,4-D than others. Since that time numerous investigators have studied the differential response of varieties of several agronomic crops.

Rossman and Staniforth (17) showed that some varieties of corn were more susceptible to 2,4-D than others at the 6- to 8-leaf stage. Staniforth (3) demonstrated that was true of single cross hybrids. Elder et al. (7) reported differential response in sorghum varieties, and Dunham et al. (5, 6), Friesen (11), and Tandon (23) have demonstrated that flax varieties are slightly more tolerant to 2,4-D.

Foster (9), Olson et al. (13), Robinson et al. (18) reported differential responses in yield while Pedersen et al. (14) found no differences among varieties they studied. Shaw et al. (19) reported that in response in winter wheat varieties, but Slife et al. (15), and Woestemeyer (25) reported that the treatment was the same for all varieties studied; however, found a differential response to stage of growth. Bohmont (3), Foster (10), Olson et al. (13) reported slight differences in the varietal response, while Helgeson (12) found no differences.

Foster (8) treated 14 barley varieties with 2,4-D at the 3- to 5-leaf stage of growth. He found that Warrior, O.A.C. 21, and Compana were the most tolerant, while Trebi, Prospect, and Vantage were the most susceptible. Olson et al. (13) treated three varieties when 11 inches tall and concluded that Vantage was more tolerant than Montcalm or O.A.C. Pedersen et al. (14) found no differences among six varieties.

Numerous workers have tested the germination of grain harvested from plants treated with 2,4-D and have found no impairment. The viability of flax (5, 6), wheat (2, 15, 21), barley (2, 4, 18), and oats (16) was not decreased. However, Shaw and Willard (18, 20) and Andersen and Hermansen (2) found that the viability of oats was greatly decreased when yield and quality of grain were reduced by treatment with 2,4-D.