Yield and Winter Survival of Winter Barley Varieties as Affected by Date and Rate of Planting

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Although considerable information has accumulated on date and rate of planting winter wheat (Triticum aestivum L.), little is available for winter barley (Hordeum vulgare L.). Much Great Plains barley acreage recently has been shifted from spring to winter varieties. Currently in Kansas, approximately 95% of the barley acreage is comprised of winter varieties, even though winterkilling is a major problem.

Hughes et al. (2) and Leonard and Martin (4) have reviewed the literature on time of planting winter wheat. Suneon and Kiesselbach (5) have shown that varieties may respond differentially to planting date. Other studies (3, 6) have shown that stage of development of winter wheat seedlings can greatly influence winter survival. Both excessively large (early planted) and small (late planted) seedlings are winter damaged more than seedlings of intermediate size and development.

EXPERIMENTAL PROCEDURE

Field plantings were established at the Kansas State University Agronomy Farm near Manhattan, Kansas, in the fall of 1960, 1961, and 1962, in silt loam tentatively correlated as Geary. The area was fertilized with 40–22–0 (N–P–K) prior to planting.

The variables factorially evaluated were planting dates of September 1, September 15, October 1, October 15, and November 1; and planting rates of 1, 2, and 3 viable seeds per inch of row in 12-inch rows (12, 24, and 36 per foot). Varieties employed were 'Dicktoo' (relatively hardy), 'Reno' (intermediate), and 'Rogers' (relatively nonhardy).

The experimental design was a split-split plot replicated 4 times. Dates were whole plots, varieties were subplots, and seeding rates were sub-subplots. Plots were four 12-inch rows, 15 feet long. Yields were taken from a 12-foot portion of the 2 center rows. Planting was with a modified Planter Junior 300-A seeder. Excellent fall stands were obtained. Winter survival percentage was estimated for all plots in late March 1961, 1962, and 1963.

Plants were brought from the field into the laboratory and washed thoroughly rinsed with distilled water and excess surface water removed by blotting with paper toweling. Hardiness measurements of the crowns were made by the specific conductance method outlined by Dexter et al. (1). Four samples of 5 grams each of fresh crown tissue were frozen 4 hours at −10° C. and thawed 16 hours in 50 ml. water at 5° C. Resistance readings were made of the solutions at 20° and converted to specific conductances.

RESULTS AND DISCUSSION

Figure 1 shows influence of planting date on mean winter survival of the three varieties. In each year, analysis of variance showed significant (.05 level) variety and date effects. Variety × date interaction was significant only in 1962. Rate of planting did not influence winter survival. Note in Figure 1 that winter barley planted either October 1 or October 15 exhibited considerably greater survival than that planted either earlier or later. This agrees with previous findings (3, 6) with winter wheat.

As shown in Figure 2, winter barley planted October 15 exhibited the highest degree of hardiness, as measured by the conductivity method (1). Hardiness values for October 15, however, were not always significantly higher than for October 1. Plants from the November 1 plantings were not sampled because of their extremely small size and lack of crown development.

In each year, a date-of-planting study with winter wheat was located adjacent to the winter barley trials. Planting dates were identical with those in the barley study. In no instance was winter damage obvious in the wheat. In each year all wheat plots were rated from 80 to 100 percent winter survival. Although direct comparisons are not justified, these observations, together with winter survival percentages for winter barley and the conductivity data, suggest that date of planting at Manhattan, Kansas, is more critical with winter barley than with winter wheat measured by maximum winter survival.

Figure 1. Winter survival of 3 winter barley varieties as influenced by date of planting, D = Dicktoo, RN = Reno, RG = Rogers.