EFFECT OF BARLEY STRIPE, HELMINTHOSPORIUM GRAMINEUM RAB., ON YIELD

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Stripe is potentially one of the most destructive diseases of barley in California. Surveys for three years, 1943-45, show that seed treatment and the growing of resistant varieties are rather effectively controlling it; for only 1 field in 25 has had more than 10% stripe, although 20% of the fields showed a trace or more. With such dispersal of inoculum, however, it is vital that interest in seed treatment and in resistant varieties be maintained. Toward that end, specific comparisons to determine the effect of stripe on yield were undertaken. The development of a technic for producing and evaluating F₁ hybrids for yield and the demonstration of a wide genetic basis for expression of the stripe disease in barley made such a study feasible.

MATERIALS AND METHODS

To obtain a cheap and effectual floral inoculation with spores of the stripe fungus, a susceptible male-sterile strain of barley was used as the female parent. The open flowers of this male sterile permit mass dusting with pollen and with spores. Range in expression of the disease was effected by using six known genetically diverse pollen parents. Comparable seed stocks of each hybrid with and without stripe were produced. All stripe-inoculated florets produced seeds darkened by mycelial growth, whereas all seeds not inoculated with stripe were bright. The same strain of H. gramineum as previously reported was used in all inoculations.

The tests were conducted in paired, three-row nursery plots 16 feet long and spaced 12 inches between rows, with 65 seeds per row. From these plots the center rows were harvested for yield. Except for pairing of diseased and healthy counterparts, all planting sequences were random.

RESULTS

Stripe development reported in Table 1 was according to genetic expectancy, although the 1944 season was less favorable for stripe expression than 1945. Under the conditions of these tests no grain was matured on plants with stripe, though symptoms with sudden cessation of growth were generally not apparent until heading. The aggregate yield reduction from stripe appears to be of the general order of 3/4% yield reduction for each 1% stripe. Yields of rows of nondiseased plants in these studies were equal to those in other barley tests wherein planting rates were 5 to 8 times greater. The distribution of plants with stripe in a row materially affects yield.

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