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UNIFORM bunt nurseries have been grown annually since 1932 in connection with the Cooperative Hard Red Winter Wheat (Triticum aestivum L.) Improvement Program. State agricultural experiment stations of the hard red winter wheat growing area and the Cereal Crops Research Branch, CRD,ARS, USDA, have participated in the cooperative program.

Summary reports of the results of the bunt investigations have been prepared at irregular intervals, 1932–37 (4), 1938–42 (3), 1943–47 (1), and 1948–54 (2). This report summarizes the data recorded during the period 1955–62 inclusive. Varieties and experimental strains totaling 376 have been evaluated since initiation of the nursery in 1932. During the period covered by this report 163 entries, comprising 29 named varieties, 5 selections from named varieties, and 129 unnamed selections from crosses were studied.

MATERIALS AND METHODS

The varieties grown in the uniform bunt nursery each year were chosen by the cooperating plant breeders and plant pathologists at the experiment stations in the region. They consisted of new or unusual varieties and selections, promising lines from crosses that were nearing distribution, or were of special interest, and lines from crosses in which one or more of the parents was resistant to bunt in earlier tests. These wheats were evaluated for varying numbers of years depending on their reaction to bunt or the interest of the nominator. Susceptible lines (40% or more bunt) usually were removed after a 1-year test. Some resistant selections (0–10% bunt) were removed by the nominator after the first year. Many of the more resistant lines remained in the nursery 2 to 3 years. In addition to the material supplied by cooperators, check rows of the resistant varieties 'Hussar', 'Oro', 'Relief', 'Ridit', and 'Wasatch' and of the susceptible varieties 'Cheyenne', 'Kharkof', and 'RedChief' were included each year.

Seed of the entries proposed by each cooperator was sent to Lincoln, Nebr., where it was packeted, arranged in order, the checks added, and returned to the cooperators for sowing.

Upon receipt of seed for the nursery from Lincoln each cooperator inoculated it with bunt spores and sowed it at the proper time in duplicate 8-foot rows. The inoculum which consisted of spores of Tilletia avenae (Wallr.) Liro at all stations except Bozeman, Montana, where a composite of important races of both T. foetida and T. caries (D.C.) Tul, was used was made up from a composite of spore collections made within each state.

Uniform common bunt nurseries were sown at Denton, Tex., Stillwater, Okla., Manhattan, Kans., Lincoln, Nebr., North Platte, Nebr., Fort Collins, Colo., and Bozeman, Mont. A nursery also was grown at Spring Hill, Mont., in 1958. In 1962 the Texas nursery was grown at Bushland instead of Denton. Station data were obtained in all years except 1957 and 1959 at Denton, Tex.; 1957 at Stillwater, Okla.; 1956, 1959, 1960, and 1962 at North Platte, Nebr.; 1959, 1961, and 1962 at Ft. Collins, Colo.; and 1964 and 1962 at Bozeman, Mont.

The number of entries in the uniform bunt nurseries each year varied from 26 in 1960 to as many as 48 in 1958.

RESULTS WITH COMMON BUNT

The results obtained with common bunt are summarized in Table 1. A total of 163 strains were tested but only those varieties with average infections of 10% or less are listed. No bunt developed in Nebred X C.I. 12250 (N522123) grown in 1955 and (Yogo X Wasatch–3) X Cheyenne (M56–3) shown in 1959. Only a trace of infection was recorded for 5 other selections from crosses all but one of which were tested only 1 year. A total of 27 entries had infections lower than 0.8%, the average for Wasatch, the most resistant check. All of these except 'Columbia' (C.I. 12928) from Oregon–Washington and 'Kharkof Sel. (Mt17–7)' from Montana, were unnamed selections from crosses. Hard red winter wheats with bunt infection lower than 5.0% usually are considered highly resistant. A total of 59 entries in Table 1 fall into that category. These include the resistant checks Wasatch and Ridit, the varieties Columbia and 'Tendoy', Kharkof Sel. (Mt17–7), and 54 unnamed selections from crosses. Among these C.I. 12230, a selection of [(Turkey X Florence) X (Fortyfold X Federation)] X [(Oro X (Turkey–Florence) X (Oro X Fortyfold–Federation)] appears many times as a parent. Apparently this selection carries high resistance to the races of bunt used in these experiments and transmits it readily to progenies of crosses in which it is a parent. The varieties Oro, 'Comanche', and 'Yogo' and selections of Oro X Turkey–Florence also appear to be important sources of resistance.

The upper limit of good resistance of wheats to common bunt usually is placed at 10% infection. If that measure is used all 85 entries appearing in Table 1 fall into the resistant group. It includes the resistant check varieties Relief and Oro as well as those mentioned earlier. The average infection of 9.9% for Oro is at the upper limit of good resistance. Aside from the resistant check varieties the only named varieties with good resistance were Columbia, Tendoy, and 'Improved Triumph' (C.I. 13667). The latter is the only one of 3 strains of Triumph grown in 1962 that exhibited any resistance to common bunt.

The results recorded for the period 1955 to 1962 inclusive show that 85 entries of the wheats tested had good to excellent resistance to the common bunt races present in the hard red winter wheat areas of Texas, Oklahoma, Kansas, Nebraska, Colorado, and Montana. Thus, there is a large reservoir of resistance to common bunt in the various wheat breeding programs of these hard red winter wheat areas.

In addition to the resistant selections, 43 entries were intermediate in reaction to common bunt with infections ranging between 10 and 40%. Of these 20 had infections below 20%. The varieties 'Rodco', Hussar, 'Kaw', 'Omaha', and 'Concho Sel. (0 53651)' all had less than 20% infection. However, 'Bison', which is usually considered resistant in Kansas and Nebraska, had an average infection of 24.3%.