

could generally be correlated with smaller numbers of primary lesions and later or less severe development of stem rust on particular plant parts.

Two-square foot areas of 11 spring wheats were artificially inoculated with 2.25 and 57.45 million urediospores of race 15B in 1955. Inoculum was subjected to unfavorable conditions for 4 days after inoculation before infection occurred. The number of primary lesions which developed per culm on individual varieties agreed well with the relative severity of stem rust attack on the same varieties exposed to inoculum of race 15B present in nature. Fewer lesions developed on tolerant varieties such as Lee (4.3 lesions) and Rushmore (7.3 lesions) than on the non-tolerant varieties Mida (10.0 lesions) and Marquis (23.5 lesions) when exposed to 57.45 million urediospores. Results were similar with both concentrations of inoculum.

Differences in infectibility among certain rust-susceptible spring wheats appears to be a factor contributing to the ability of these wheats to tolerate severe attacks of race 15B and produce relatively high yields. The usefulness of this phenomenon depends on the number of physiologic races against which it is effective; its mode of inheritance; and the development of techniques suitable for determining the presence of this characteristic in breeding lines.

Sec. 2 -8C

Field Resistance and Tolerance of Certain Varieties to Stem Rust and the Difficulties of Adequately Evaluating this very Useful Type of Resistance.

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Two Mexican varieties namely Kentana 54 and the "Criollo" ("native") variety Barrigón Yaqui exhibit very unusual field responses to stem rust.

Kentana 54, which was derived from a cross of Kentana 48 x Río Negro is susceptible in the greenhouse in the seedling stage to races 29, 48, 49 and 139. When adult plants are inoculated in the greenhouse they also exhibit moderate to complete susceptibility to these same races. Nevertheless when this variety has been grown commercially at high elevations under low temperature conditions in areas where these races are prevalent it has never suffered appreciable reduction in yield or in grain test weight despite the fact that it often exhibits from 60 to 80% infection of a moderately susceptible reaction. When this variety is grown adjacent to fields of Kentana 48 or other varieties that are highly susceptible to this group of races, it rusts more heavily than when it is isolated by some distance from large amounts of inoculum. When grown under isolated conditions where

the effect of inblown inoculum is reduced to a minimum, the rate of buildup of the epidemic seems to be delayed. Normally we think of this type of resistance as one which would be entirely unsatisfactory at higher temperatures. Nevertheless in the recent rust nursery report from the tests conducted in the Virgin Islands and Porto Rico by Theis and Rodenheiser, this variety remained virtually free from rust in nurseries where these same races were present and where rust infection was severe on adjacent rows of susceptible varieties.

Barrigón Yaqui is a "Criollo" ("native") variety of unknown origin belonging to the species T. turgidum. This variety was formerly grown very extensively in Sonora because of its resistance to stem rust. It is susceptible in the seedling stage under greenhouse conditions to all of the common Mexican stem rust races. Greenhouse inoculation tests with adult plants have shown that it is moderately resistant to all races except 15B, to which it is moderately susceptible. Nevertheless, under Sonora field conditions this variety has never rusted with race 15B even though fields have been located adjacent to heavily infected fields of Gabo or Yaqui. Nevertheless, when Barrigón Yaqui is grown at Chapingo or Mexe during the summer, under conditions of lower temperature and higher humidity, it is not unusual for it to develop from 20 to 40 percent of rust infection of the moderately susceptible type. The rate of lignification of the culms of this variety appear to progress much more rapidly under the high temperature conditions on the Coast of Sonora than it does under the low temperatures of Chapingo or Mexe. This difference in rate of lignification appears to be correlated with the difference in rust reaction under the two conditions.

The different reactions of these two varieties illustrates clearly the difficulty of obtaining a true evaluation of the merits of certain types of adult plant field resistance.

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WHEAT CYTOGENETICS RESEARCH AT THE UNIVERSITY OF MINNESOTA*

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Major research emphasis at present is being placed on the development of chromosome substitution lines, and studies on the inheritance of available qualitative characters, mostly resistance to various stem and leaf rust races.

The donor varieties on which primary emphasis is being placed in the chromosome substitution program are Marquis, Mida, and Kenya

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