

Major Strange: Are the facilities now available, adequate?

E. C. Stakman: If any investigator has 10% of the facilities or help he needs, he is lucky!

K. W. Neatby: Plant growth chambers cost about 10 times as much as greenhouse space.

Major Strange: It is important that those who are charged with voting funds should be made aware of the complexity of the problem, and of what is needed to do a proper job.

D. G. Fletcher: I do not think that the people of Canada and the United States have any conception of what is needed. The Congress of the United States does not understand fully. Scientists have been too much immersed in their own work. People have been told about accomplishments, not need.

E. C. Stakman: It is hard to appreciate the complexity of the problem until you have worked with it. Much basic genetical work has to be done. A new system for differentiating races has to be worked out. The differentials available were fairly adequate until 1950; they are still useful for historical purposes, but they are no longer adequate to determine the races attacking the new hybrid wheats.

THE RAPID INCREASE AND DISTRIBUTION OF STEM RUST RACE 49 FURTHER COMPLICATES THE PROGRAM OF DEVELOPING STEM RUST RESISTANT WHEATS FOR MEXICO.

Norman E. Borlaug(1), Ignacio Narvaez (2), and Teodoro Enciso(2)

When the wheat breeding program of the Oficina de Estudios Especiales(3) began in 1944 all the commercial Mexican bread wheats were susceptible to the prevalent races of stem rust, 17, 19, 38, 56, and 59. The improved varieties Supremo 211, Yaqui, Chapingo, Mayo, Kentana, Lerma, and Supremo 51, released by the office from 1946-51, were resistant to stem rust under field conditions until the summer of 1951 when race 15B appeared in Mexico. Of these varieties only Kentana, Lerma, and Supremo 51 are resistant to race 15B. Currently more than 50% of the entire wheat acreage of the republic is grown to these varieties. During June and July of 1951, race 49, (and related race 139), built up on late plantings of Kenya 324 in the state of Coahuila but there was no commercial damage so the outbreak was not reported to our office. However, by May 1952, 3,000 acres of Kenya 321 and 324 were killed by this race. By August, infection centers began to appear in many other areas on Lerma, Supremo 51, and on some of the Kentana reselections. Race 49 is particularly virulent on many of the Kenya wheats, Egypt Na 101, McMurachy and their derivatives. Hope, Timstein, Thatcher, Gabo, the Brazilian varieties and their derivatives are in general, resistant. Kenya 338 Ac.2.E.2 is one of the few Kenya wheats resistant to both race 15B and 49.

There is evidence that some lines of Kentana are moderately resistant

(1) Rockefeller Foundation.

(2) Mexican Dept. of Agriculture.

(3) Joint Dependency of Mexican Dept. of Agriculture and Rockefeller Foundation

to race 49, however, this resistance is considered inadequate. Consequently several lines from 3 different crosses combining resistance to 15B, 49, and the common races are being increased for commercial release. The crosses are:

- (1) II-2156 (Egypt Nal01 x Timstein) x Mayo 48
- (2) II-2254, II-2587, II-2589 Kentana x Yaqui 48
- (3) II-1922 Kenya x (Mentana² x Supremo 211)

The rapid shifts in the populations of races of stem rust of wheat in the past few years indicates that there is a critical need for more adequate greenhouse testing of breeding materials against a larger number of individual races. Field testing alone is inadequate even though it is done on an interhemisphere basis. Better techniques must be developed for storing viable spores for long periods of time, if more extensive greenhouse testing is to be practical, since most programs are greatly limited in testing by a shortage of greenhouse space. Moreover, because of the magnitude of the problem, far more rapid progress can be made if cooperative arrangements can be made whereby different institutions will assume the responsibility of testing against a certain group of races and other institutions would test against a different group of races. The breeding materials which would be evaluated in such a procedure would of course include advanced generation lines from all of the North American programs. These data would supplement the field reactions of the materials which are now being evaluated in the Cooperative Inter-American Nurseries. The data which have been obtained from the Cooperative Inter-American Nurseries during the past three years have been very valuable and represents a very important advancement in wheat improvement methods. However, if additional greenhouse data can be obtained for a large number of races, faster and more reliable progress in the breeding programs will be assured.

Discussion:

G. S. Smith: Is there any evidence of genetic linkage between 15B resistance and susceptibility to 49?

N. E. Borlaug: We do not have enough data yet to be definite. We feel the linkage is fairly strong, but we can recover resistance to both races in crosses with H-44 and Hope, and the Kenya type of resistance.