

Bean Rust in the United States in 1989
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Disease losses from bean rust, caused by *Uromyces appendiculatus*, were slightly greater in 1989 than in 1988 (2), but severe losses occurred nowhere in the United States. The occurrence of a relatively dry and hot growing season in many areas where rust is sometimes epidemic, following the extremely dry and nearly rust free 1988 growing season, gave generally unfavorable conditions for development of rust epidemics in 1989. Some rust occurred in Colorado, Florida, Michigan, Nebraska, New Jersey, Tennessee, Virginia, and other places. In several areas where teliospores carry the fungus through the winter, nonproduction season, more primary inoculum could be present for 1990 than there was in 1989.

Withdrawal of manganese-zinc ethylene bis-dithiocarbamate fungicides from use on beans seems likely to make fungicidal control of rust more expensive and may make it less effective in the future. The demand for rust resistant cultivars already appears to be increasing.

To assess resistance in breeding lines that are potential new cultivars, a Uniform Snap Bean Rust Nursery (USBRN) was grown at five locations in 1989. This nursery contained up to 111 entries and checks from two public and nine private breeders. Some of the entries were grown in only one or two locations. In Homestead, Florida (Bob McMillan, Cooperator), the nursery was grown in mid spring and contained 87 of the entries. This nursery was inoculated with urediniospores from nearby pole and bush snap beans. Late summer to early fall nurseries were grown at the other four locations. Urediniospores of historically prevalent (1,4) race 38 were used to inoculate spreader rows at Bridgeton, New Jersey (Joe Steinke, Cooperator) and Painter, Virginia (Bob Baldwin and Ricky Sterrett, Cooperators). Races 38, 39, 40, 41, and 43 (1) were inoculated at Beltsville. Natural infection was depended upon at Crossville, TN (Jim Hilty and Charles Mullins, Cooperators). A slight, late epidemic developed at Crossville, but severe epidemics developed at all other locations.

A Uniform Dry Bean Rust Nursery (UDBRN) with 27 entries and checks from one private and six public breeders was grown at Beltsville; Saginaw, Michigan (Fred Saettler and Lucia Asanador, Cooperators); and Fargo, North Dakota (Ken Grafton, Cooperator). Spreader rows were inoculated with urediniospores of locally occurring races at Beltsville, Saginaw, North Platte, and Fargo. Severe epidemics developed at Beltsville and Saginaw and a light to moderate late epidemic developed at North Platte. Insufficient rust developed in North Dakota for assessing reactions. Mobile nursery tests (2) at Beltsville confirmed the presence of races 38, 39, 40, 41 and 43, but no others. Aurora was susceptible at Beltsville and hypersensitively resistant (HR) or immune (I) at Saginaw and North Platte. Mountaineer White Half Runner (1) was HR at Saginaw and susceptible (S) at Beltsville and North Platte.

Rust reactions were scored and converted as previously described (3) to: I, HR, R (resistant), MR (moderate resistant), MS (moderate susceptible), or S.

From the USERN and UDBRN 18 entries that were tested at more than one location were I, HR, or R at all locations. Among these were all ten of the rust resistant (RR) germplasm lines that were included from those released jointly by USDA, ARS and state experiment stations. Also in this group were the PI 181996 and B190 checks and 8-7251, 8-10,684, 8-10,708, 8-10,685, TARS 89I 1-4, and TARS 89I 1-14. Greenhouse tests with races not present in the field nurseries indicated that the two TARS lines are susceptible to a few races but that all of the other lines have the resistance of BARC-RR releases. Line 8-10,708 proved not to be homozygous for resistance but the remaining listed lines were homozygous. The field tests confirmed in the greenhouse that most plants of 8-7251 and MSX65 have BARC-RR, but that both lines contained some susceptible plants.

The following lines and cultivars had MS or more resistant reactions at all field locations: 887132, BE205-1-4-2, NX-007, Blackhawk, Sierra, and Mayflower. In the greenhouse tests, all except the first two were susceptible to some or many races.

Since completion of the manuscript for the last publication on pathogenic variability in the bean rust fungus (4), several additional races have been isolated in the United States. The most significant virulences of these isolates on the 19 differential cultivars are given here. A 1987 isolate from Colorado (tentative race 71) has full virulence only for Olathe, Pinto 650, and US3, and moderate virulence for Golden Gate Wax and Kentucky Wonder 765. A 1988 isolate from French Horticultural in Dade County, Florida (tentative race 72) is virulent only on Early Gallatin, Brown Beauty, and Pinto 650, but is the first of the available races virulent on both Early Gallatin and Pinto 650. In 1989, an isolate was obtained from J. R. Steadman (tentative race 73) that is virulent on Mexico 235, Mexico 309, AXS37 and several other differential cultivars. A collection obtained from Sierra pinto in Michigan in 1989 appears to contain another additional race.

References

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4. Stavely, J. R., Steadman, J. R. and McMillan, R. T., Jr. 1989. New pathogenic variability in Uromyces appendiculatus in North America. *Plant Dis.* 73: 428-432.