

## BEAN RUST IN THE UNITED STATES IN 1986

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Bean Rust, caused by Uromyces appendiculatus (U. phaseoli) was somewhat more severe in 1986 than in 1985. Severe epidemics occurred on snap beans in southern Florida in late winter and early spring and in Tennessee in late summer and early fall. Light to moderate epidemics developed on snap beans in New Jersey and dry beans in eastern Colorado-western Nebraska and North Dakota-Minnesota late in the growing season.

A Uniform Snap Bean Rust Nursery (USBRN) with 66 entries and checks from one public and six private breeders was grown at four locations in the late summer to early fall. An additional early spring nursery was grown at Homestead, Florida (Bob McMillan, Cooperator) that contained 36 fewer entries than the other four locations. Locally collected urediniospores of Race 38(1) were used to inoculate spreader rows at two of the locations, Bridgeton, New Jersey (Joe Steinke, Cooperator) and Painter, Virginia (Ricky Sterrett and Bob Baldwin, Cooperators). Races 38, 39, 40, 41 and 43 (1) were inoculated at Beltsville. Severe epidemics developed at the last three locations. Moderate to severe natural epidemics developed at the fourth location, Crossville, Tennessee (Charles Mullins and Jim Hilty, Cooperators), and at Homestead. Race 38 was the predominant race causing rust at Bridgeton and Painter and was present, but not necessarily predominant, at the other three locations. Epidemics at Crossville, Homestead, and Beltsville were caused by several races.

Rust reactions were scored as previously described (2,3). Numerical reaction grades (3) were converted to the following designations: Immune (I) for no visible symptoms; highly or hypersensitively resistant (HR) for necrotic spots without sporulation; resistant (R) for uredinia (sporulating pustules), predominantly less than 0.3 mm in diameter; moderately resistant (MR) for uredinia predominantly larger than 0.3 mm but not larger than 0.5 mm; moderately susceptible (MS) for uredinia up to, but not larger than 0.8 mm; susceptible (S) for uredinia predominantly smaller than 0.8mm, with some larger than 0.8 mm; and very susceptible (VS) for uredinia predominately larger than 0.8 mm. Infection intensity was also recorded using the modified Cobb scale (2).

Many entries in the USBRN were less than fully susceptible at some locations. Accord, Earlybird, Evergreen, Resisto, and BX216-8-2-2 were MS or more resistant at all locations. Two BE205 lines, a BE217 line, line 284, and Disco were S at Crossville, but MS or more resistant at the other locations. Roma II was S at Beltsville and MS or R at other locations. Lines in the H630, H491, and H531 series were VS at no locations, S at only one or two locations, and MS or R at the remaining locations. FM 223 had a low intensity of S or VS uredinia at four locations due to resistance to a portion of the races and it was immune in Florida.

A Uniform Dry Bean Rust Nursery (UDBRN) with 40 entries and checks from one private and four public breeders was grown at Beltsville, Maryland; North Platte, Nebraska (Jim Steadman, Cooperator); Fargo, North Dakota (Ken Grafton); Saginaw, Michigan (Fred Saettler); and Holyoak, Colorado (Howard Schwartz). No rust developed in Colorado before most the entries were mature. Moderate to severe epidemics occurred in the other four locations where spreader rows had been inoculated with urediniospores of local races. Entries HR or I at all locations were PR-5W-372-8241 and -8428. Entries R, HR, or I at all locations were BARC-4-844 and PR-8428-6, -8428-42, and -8440-249-1. PR-A493 and D83075 were MS or more resistant at all locations. Greenhouse tests on the above dry bean lines with the 31 races available at Beltsville proved PR-8428-42, a brown seeded type, to have the broadest resistance. It was HR or R to all of the races and apparently homozygous for the genes conditioning the R reaction.

Among the checks, B-190 was R, HR or I at all locations of both nurseries. Compuesto Negro Chimaltenango, which was included only in the USBRN was MS in Florida, but otherwise R or I. V3249-13-1C, a check in the UDBRN, was HR or I at all locations.

Urediniospore collections were obtained from several states in 1986, but no new pathogenic races were identified. However, a collection obtained by Howard Schwartz in Nebraska, close the the Colorado line, contained race 54(1). This is the first identification of a race to which Olathe is susceptible from the Colorado vicinity.

In the North Platte, Nebraska UDBRN, Dr. Steadman also obtained a good index of common blight reaction and the relative maturity of all entries.

#### References:

1. Stavely, J. R. 1984. Pathogenic specialization in Uromyces phaseoli in the United States and rust resistance in beans. Plant Dis. 68:95-99.
2. Stavely, J. R. 1985. The modified Cobb scale for estimating bean rust intensity. Ann. Rep. Bean Improvement Coop. 28:31-32.
3. Stavely, J. R., Freytag, G. F., Steadman, J. R., and Schwartz, H. F. 1983. The 1983 bean rust workshop. Ann. Rep. Bean Improvement Coop. 26:iv-vi.