Royal Red, a Curly Top- and Mosaic-Resistant Red Kidney Bean

D. W. Burke, V. E. Wilson, and W. J. Zaumeyer
U.S.D.A.; A.R.S.

Royal Red, a new dark red kidney bean variety, was released April 9, 1968. This variety was developed jointly by Crops Research Division, ARS, USDA, and Washington State University College of Agriculture.

Royal Red originated from a cross between a curly top-resistant type and Dark Red Kidney backcrossed to Dark Red Kidney. The new variety is the first of its type with near immunity to the curly top virus. It also has resistance (dominant type) to both the original and N.Y. #15 strains of the common bean mosiac virus. Royal Red is, therefore, adaptable to the Northwest where production of kidney beans has been severely limited by these viruses. Limited testing indicates that it is also adaptable to production in Colorado and Michigan.

Royal Red is similar to other commercial dark red kidney varieties, except for a slightly lighter seed color, a more uniform seed size, shape, and color, and its virus resistance. Its maturity is similar to that of California Dark Red Kidney, about 90 days from planting to harvest. Commercial tests and evaluations indicated that Royal Red is satisfactory for both canning and dry packaging.

In the presence of curly top, Royal Red greatly outyields all other commercial red kidney varieties. In the absence of curly top, Royal Red has equaled or exceeded in yield the best of the other red kidney varieties.

Requests for seed should be sent to the Washington State Crop Improvement Association, P. O. Box 617, Yakima, Washington 98901.

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Hard Soil and Fusarium Root Rot of Beans

D. W. Burke
U.S.D.A.; A.R.S., Prosser, Washington

Bean roots are predisposed to Fusarium root rot when growth is impeded. Recent studies at Prosser, Washington, indicate that hard soil may be an important root impediment and contribute to the root rot problem in many fields. Penetrometer mreasurements showed that soil in most fields was much harder below than within the plowed layers. Furthermore, in Fusarium-infested fields, many bean roots were confined to the heavily infested plowed layer by a hard subsoil. The Fusarium population also was found to be confined largely to the plowed layers.

To aid root extension out of the heavily infested plowed layer into the subsoil, subsoiler chisels were employed to break the soil to a depth of 39 to 51 cm. Subsoiler chisels were spaced 56 cm apart, to match the planter spacing and rip the soil almost directly below bean rows, or spaced 112 cm apart, to rip the middle of alternate spaces between rows. Where the letter chisel

spacing was used, irrigations were applied only to inter-row spaces not chiseled. In the first experiments, where chisels were used after seedbed preparation and followed only by a light roller packer operation before seeding, pronounced reductions in root rot were obtained. However, in later experiments, subsoiling done previous to plowing and other seedbed preparations was ineffective.

Indications are that bean varieties differ in root vigor and ability to penetrate hard soils and that such differences are related to relative field tolerance to Fusarium root rot.

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Incidences of Pythium Wilt in Colorado

Ben F. Counter and Nagayoshi Oshima
Fort Lupton Canning Company, and Colorado State University, Colorado

Because of high summer temperature in 1968, snap beans in northern Colorado suffered losses from Pythium wilt. The disease was frequently found in heavily irrigated fields or in a poorly drained portion of a field. Many bean plants at the flowering stage were infected. The diseased plant showed only slight wilting at first, but within a week the entire plant wilted, turned brown and died. White fungal mycelium was frequently found on the stems of the infected beans, especially near the ground line.

Isolation studies from wilted plants revealed that not only Pythium butleri as previously reported (Phytopath. 2:991-994, 1931; Pl. Dis. Rept. 52:542-544, 1968; USDA Tech. Bull. No. 868, 1957), but also a species of Phytophthora was involved in this disease. These fungi were isolated even from the upper portions of the stems.

Snap bean varieties planted at Fort Lupton, Colorado, showed different degrees of susceptibility. Varieties Encore and Lakette were most susceptible, and prevalence of the wilt was 15 to 20 and 5 to 7 per cent, respectively, in these two varieties. A trace of infection was also found in the variety Cascade.

These observations on Pythium wilt gave us some lead for future studies. There are, however, many unanswered questions. In the isolation study, systemic infection of bean plants with Pythium butleri was consistently found, Pythium was isolated even from the upper stem. This is unusual for Pythium the presence of which is usually confined to the roots and lower stems. Although the disease is favored by high temperature and humidity (see reference above), under just what environmental conditions Pythium can spread so extensively in the plant is not clearly understood.

A species of Phytophthora was consistently found in wilted beans. But the role of Phytophthora in the wilt syndrome is not yet known.

Difference of susceptibility to Pythium wilt among snap bean varieties was observed. The reaction of these varieties should be more carefully tested both in the greenhouse and in the field. It is thought that the older