Registration of USWA-48 and USWA-50
Virus-Resistant Navy Dry Bean Germplasms

Navy dry bean (Phaseolus vulgaris L.) USWA-48 (Reg. no. GP-181, PI 601987) and USWA-50 (Reg. no. GP-182, PI 601988) breeding lines with resistance to all strains of bean common mosaic virus (BCMV) and curly top virus (CTV) were jointly released in November 1996 by the USDA-ARS and the Agricultural Research Center of Washington State University, the Agricultural Experiment Stations of University of Idaho, and Oregon State University. Complete resistance to all strains of BCMV and CTV is needed in the bean seed production areas of the arid Western states. Both lines carry the dominant / gene for resistance to BCMV and have stable resistance to CTV.

USWA-48 is an F1-derived F2 population from the cross NYS-161-WA55. NYS-161-W is a cold-tolerant, bush-type, white-seeded breeding line from M. Dickson of the New York State Agricultural Experiment Station at Geneva. A55 is an upright II-A (CIAT classification), black-seeded line developed by S. Singh (CIAT, Columbia) with root rot tolerance, a high tolerance to CTV, and dominant / resistance to BCMV. The most outstanding characteristic of USWA-48 is the very upright, narrow profile (Type I), similar to a soybean plant habit. Maturity of USWA-48 was 4 d later than 'Norstar' (106 d, compared with 102 d). USWA-48 yield averaged 3685 kg ha\(^{-1}\), compared with 3517 kg ha\(^{-1}\) for Norstar in 3-yr preliminary trials at Prosser (1993) and Othello (1994 and 1995) in Washington. Seed size of USWA-48 is slightly larger than Norstar (21 g 100 seed\(^{-1}\)), compared with 19 for Norstar. The tall and narrow profile with high-borne pods may lend itself to high-density culture (28-cm rows) or solid planting for direct mechanical harvest. Under high-density conditions, yields should be very competitive.

USWA-50 is an F2-derived F3 population from the cross GH-11/Pearl1. GH-11 is a navy bean breeding line developed by D.W. Burke (USDA-ARS, Prosser, WA) with the dominant / gene for resistance to BCMV and complete CTV resistance. GH-11 did not have an acceptable seed color for commercialization so was used as a breeding line. Pearl is an upright Type I navy bean, released by the Gentec Seed Company, that is susceptible to BCMV. USWA-50 is an upright indeterminate plant, with medium to long runners and a tendency to lodge. USWA-50 (also tested as 93 LB-1803 in 1994 and as 94 LB-4813 in 1995) yielded well in the National Cooperative Dry Bean Nursery (CDBN) grown across 25 locations in the USA and Canada in 1994 and 1995 (1,2). USWA-50 combines high yield potential (2800 to 4040 kg ha\(^{-1}\)) with early maturity (93 d, compared with 100 d for Vista). Dull white seeds, with a slightly oblong shape, are relatively small (17 g 100 seed\(^{-1}\)), compared with 19 for Norstar. It is highly unusual for an early bean line to also have a high yield.

These lines were field-screened for four years for BCMV and CTV in our virus screening nurseries, where susceptible control cultivars are routinely 50 to 100% infected. In addition, BCMV greenhouse tests were conducted at least twice to identify the resistance genes of the host. One or more isolates from each of the seven known BCMV pathogroups were included. Known control cultivars were also included to authenticate the virus strain reactions. In addition to the dominant / gene for resistance to BCMV and complete CTV resistance, USWA-50 expressed resistance to rust [caused by Uromyces appendiculatus (Pers.:Pers.) Unger] in the 1994 and 1995 CDBN trials at North Platte, NE, and Hatton, ND. USWA-50 has been the most tolerant navy bean to the field root rot complex (caused by Fusarium solani (Mart.) Sacc., Pythium ultimum Trow, and Rhizoctonia solani Kühn) in our root rot tests at Prosser for several years.

A limited quantity of seed of USWA-8 and USWA-50 is available for research purposes from Phillip N. Miklas, Vegetable and Forage Crop Production Research Unit, USDA-ARS, 24106 N. Bunn Rd., Prosser, WA 99350-9687. It is requested that appropriate recognition be given if these germplasms contribute to the development of a new breeding line or cultivar. Genetic material of USWA-48 and USWA-50 will be deposited in the National Plant Germplasm System, where it will be available for research purposes, including development and commercialization of new cultivars.

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References and Notes
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Registration of PR9357-107
Small Red Dry Bean Germplasm Resistant to BCMV, BCMNV, and Rust

PR9357-107 small red dry bean (Phaseolus vulgaris L.) (Reg. no. GP-180, PI 599429) was developed and released in 1997 by the USDA-ARS Puerto Rico, Nebraska, and Michigan Agricultural Experiment Stations, the USDA-ARS, and the Escuela Agrícola Panamericana, Honduras, as a multiple-disease-resistant germplasm. PR9357-107 has resistance to BCMV, caused by Uromyces appendiculatus (Pers.:Pers.) Unger var. appendiculatus [syn. U. phaseoli (Pers.) G. Wint.], and it has the bc-3 gene, which confers resistance to bean common mosaic virus (BCMV) and bean common mosaic necrosis virus (BCMNV).

PR9357-107 was derived from a bulk of individual F2 plant selections from the backcross 'Desarrtal 1'/T1033/Desarrtal 1. Crosses, field selections, and evaluations were made at the Isabela Substation in Puerto Rico. Desarrtal 1 from CIAT has the dominant / gene for resistance to BCMV. A navy bean from the Michigan State University dry bean breeding program, 'T1033', was used as the source of the recessive bc-3 resistance to BCMV and BCMNV. The original cross was made in 1987, and the backcross was performed in 1988. High-yielding BC,F2 progenies with small red bean seed types were selected in 1990 and evaluated again in 1991 as BC,F2 lines. Seed samples of the BC,F2 lines were sent to Michigan State University to identify BCMV resistant progeny. High-yielding BC,F2 lines with immunity to the NL 3 strain of BCMV were evaluated for field reaction to rust and common bacterial blight [caused by Xanthomonas campestris pv. phaseoli (Smith) Dye] as BC,F2 lines in a nursery planted in 1993. Individual F2 plants from rust resistant row 107 of experiment 9357 were screened with the NL 3 strain of BCMV at the USDA-ARS Tropical Agricultural Research Station (TARS), Mayaguez, PR, during the summer of 1993.