Registration of Common Bacterial Blight Resistant White Kidney Bean Germplasm Line

USWK-CBB-17

White kidney bean (Phaseolus vulgaris L.) germplasm line USWK-CBB-17 (Reg. no. GP-261, PI 642447) was developed by USDA-ARS in cooperation with the Idaho Agricultural Experiment Station and released in 2006. This line was bred with a high level of resistance to common bacterial blight (Xap) caused by Xanthomonas axonopodis pv. phaseoli Starr & Garces 1950 emend. (Vauterin et al., 1995) = X. campestris pv. phaseoli (Smith) Dye. Common bacterial blight is a major seedborne disease endemic to the U.S. bean production regions east of the continental divide and problematic in Colorado, Michigan, Minnesota, Nebraska, New York, North Dakota, and Wisconsin. USDK-CBB-17 possesses two major QTL that confer a high level of resistance to Xap. Marker-assisted selection using the SAP6 sequenced characterized amplified region (SCAR) marker tightly linked with a QTL derived from great northern landrace cultivar Montana No. 5 (Miklas et al., 2000, 2003) and SU91 SCAR marker with a QTL from breeding line XAN 159 (Pedraza et al., 1997) facilitated the development of USWK-CBB-17.

USWK-CBB-17 (previously tested as PS99–499–3–2–B–2) is an F3–derived line derived from the cross 98MSU-837///I9566–21–4–2/USLK-2. 98MSU-837 is an advanced white kidney breeding line from Michigan State University with high yield potential. USLK-2 is a light red kidney breeding line released by USDA-ARS (Miklas et al., 2002) that possesses I and be-3 genes for resistance to Bean common mosaic virus (BCMV) and Bean common mosaic necrosis virus (BCMNV). I9566–21–4–2 is an F3–derived line from the cross ‘Montcalm’/XAN 159 selected for the presence of SAP6 and SU91 markers and resistance to common bacterial blight in greenhouse leaf inoculation assays. XAN 159, with the pedigree ‘UI-114’/PI319441/PI319443/3/‘Masterpiece,’ is an advanced breeding line from CIAT with resistance to common bacterial blight derived via interspecific hybridization with tepary bean (Phaseolus acutifolius A. Gray var. latifolius) (Thomas and Waines, 1984). XAN 159 is the source of a major resistance QTL linked with the SU91 SCAR marker (Pedraza et al., 1997). Montcalm with the pedigree GN No.1/’Dark Red Kidney’ is a dark red kidney cultivar from Michigan State University with moderate resistance to common bacterial blight conferred by a major QTL linked with the SAP6 SCAR marker (Miklas et al., 2000) that was derived from Montana No. 5 via ‘Great Northern No. 1’ (Miklas et al., 2003).

Marker-assisted selection was used to identify an F1 plant (PS99–499B) from the last cross with the presence of SAP6 and SU91 markers and advanced to F2. The F2 was planted in the field at the Washington State University, Irrigated Agriculture Research and Extension Center, Roza Unit, at Prosser, WA, and screened for plant and seed type. An F3 progeny from an F2 single-plant selection (PS99–499B-3) was tested for resistance to common bacterial blight in leaf inoculation tests conducted at the USDA-ARS Tropical Agriculture Research Station at Mayaguez, Puerto Rico. An individual F3 plant (PS99–499B-3–2–B–2) with high level resistance and confirmed to possess SAP6 and SU91 markers was selected to produce USWK-CBB-17 that was sub-

USWK-CBB-17, in a greenhouse leaf inoculation test conducted at Kimberly, ID, in December 2004, had a disease score of 4.8 based on a 1-to-9 scale, where 9 is complete plant mortality. Common bacterial blight and 9 is complete plant mortality. In comparison, the dark red kidney bean Montcalm had a disease score of 8.7. In a repeated test in December 2005, USWK-CBB-17 scored 3.9 compared to 8.0 for Montcalm and 7.7 for ‘Beluga’ white alubia (Kelly et al., 2003). USWK-CBB-17 possesses both the SAP6 and SU91 markers with major QTL for resistance derived from ‘Montcalm’ (via Montcalm) and tepary bean (via XAN 159). USWK-CBB-17 exhibits a much higher level of common bacterial blight than commercially acceptable white kidney bean cultivars.

USWK-CBB-17 will be most useful for resistance to common bacterial blight into the white kidney market class but also into other large-seeded market classes, such as Andean origin as well. Seed was produced by USDA-ARS at Prosser, WA, and provided on written request. We ask that appropriate source be given when this germplasm contributes to the development of a new cultivar or germplasm line.

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References