UNITED STATES DEPARTMENT OF AGRICULTURE
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NOTICE OF RELEASE OF SOYBEAN LINE DB04-10836 WITH HIGH YIELD POTENTIAL AND RESISTANCE TO SOYBEAN CYST NEMATODE

The Agricultural Research Service, U.S. Department of Agriculture, announces the release of soybean [Glycine max (L.) Merr.] DB04-10836, a germplasm line with high yield potential and resistance to soybean cyst nematode (SCN) (Heterodera glycines Ichinohe HG Type 0 (race 3)) populations, moderate resistance to southern root-knot nematode (Meloidogyne incognita), and resistance to southern stem canker (Diaporthe phaseolorum (Cooke & Ellis) Sacc. var meridionalis Fernández. Scientists participating in the development of DB04-10836 were Anne M. Gillen (USDA-ARS-CGRU, Stoneville, MS), Robert Paris, Prakash R. Arelli (USDA-ARS-CGRU, Jackson, TN worksite), James R. Smith (USDA-ARS-CGRU, Stoneville, MS), Alemu Mengistu (USDA-ARS-CGRU, Jackson, TN worksite), and Patricia Donald (USDA-ARS-CGRU, Jackson, TN worksite). DB04-10836 can also be used as a high-yielding conventional cultivar for soybean producers in the Mid-south area.

DB04-10836 (previously tested as DB04-10836) originated from a single F5 plant, derived from a cross of DT99-16788 x J00-2. DT99-16788 was a selection from 'S59-60' x 'Bolivar'. S59-60 is commercial cultivar. Bolivar originated from a cross of 'A5979' x 'DP3589'. A5979 was selected from the cross 'Young' × 'A5474'. DP 3589 is a sib of 'DP3588'. J00-2 is a line derived from 'Manokin' x 'Fowler'. The cross between DT99-16788 and J00-2 was performed in the field in 2001. The F1 seed were sent to the USDA-ARS-TARS in Isabella, Puerto Rico and planted in December 2001 in a nursery with artificial light to extend the length of the day and delay flowering. The F1 plants were individually harvested, threshed and sent to Stoneville, MS. The F2 population was grown in the summer of 2002 and advanced to the F3 generation by the single pod bulk method, which is similar to the single-seed descent method except that a single pod, rather than a single seed per plant, was advanced with each generation of inbreeding. The F3 population was grown in the winter of 2002-2003 in a greenhouse in Stoneville, MS and advanced without selection for two generations to the F5 generation by bulk harvesting. In 2003, the F5 seed was harvested and then bulk planted in a nursery in Stoneville, MS. Individual plants were selected based on agronomics. One hundred ten F5:6 progeny rows were evaluated in 2004 in Stoneville, MS, using non-replicated, single rows that were 3.0 m long. Plant row number 10836 was selected for it agronomic appearance and harvested in bulk. This seed was designated as line DB04-10836 for testing in subsequent trials. All seed used for testing was produced at Stoneville, MS.

DB04-10836 was first tested together with other selected breeding lines in 2005 in a two replicate test in Stoneville, MS. Maturity, plant height, lodging, and stand data were recorded. During the years 2006 and 2007, DB04-10836 was tested along with other selected lines in replicated, multi-location yield trials. A randomized complete block design experiment with three replications was planted in five environments in Mississippi. Seed yield data was collected for all environments. Visual rating for agronomic performance, height, lodging, maturity date,

and disease were taken in the early and late planting date trials at Stoneville, MS. DB04-10836 was entered into the USDA Uniform Soybean Tests- Southern States. Based on analysis of data from the Uniform Soybean Tests – Southern States Uniform Maturity Group V trial, over 64 trials in 23 locations in 2009-2011 for only lines which were in all tests, DB04-10836 produced a seed yield of 51.5 bushels/acre (bu/a) or 3464 kilograms/hectare (kg/ha) and ranked number one for yield. This was not significantly different from the check cultivars Osage (49.4 bu/a) (3323 kg/ha) and 5002T (48.1 bu/a) (3235 kg/ha). However, neither of the high–yielding checks have SCN Race 3 resistance. Over the same 3-year period, seed of DB04-10836 averaged 39.8 percent protein, which was the same as seed of 5002T but significantly less than seed of Osage which averaged 41.7 percent protein. Over three years in the Uniform Tests, seed of DB04-10836 averaged 19.8 percent oil, which was not significantly different than seed of Osage which averaged 19.9 percent oil, but was lower than seed of 5002T which averaged 21.1 percent oil. DB04-10836 was two days later in maturity than Osage and 5 days later than 5002T. Seed of DB04-10836 averaged 13.3 grams/100 seed (g/100), which was slightly larger than seed of Osage (13.1 g/100), and smaller than that of 5002T (15.1 g/100). DB04-10836 had a plant lodging score of 2.1 (where 1 = all plants upright and 5 = all plants prostrate), was significantly higher than that of Osage (1.6), but was not significantly different from that of 5002T (1.8). DB04-10836 had a seed quality score of 1.8 (where 1 = excellent and 5 = poor), which was the same as that of Osage (1.8), but was significantly higher than that of 5002T (2.4). Over the 3-year period, DB04-10836 ranked the highest for yield overall, and at Pine Tree, AR, Portageville, MO(A)[silt loam location], Starkville, MS and Stoneville, MS. DB04-10836,with a seed yield of 68.6 bu/a (4614 kg/ha), was significantly higher yielding than Osage (51.4 bu/a (3457 kg/ha)) and 5002T (48.5 bu/a (3262 kg/ha)) at Pine Tree, AR. DB04-10836 ranked the highest, but was not significantly different from Osage or 5002T at Portageville, MO(A), Starkville, MS and Stoneville, MS.

In 2009-2011, Mississippi State Variety Trials – Maturity Group V Conventional were grown in four locations. Analysis of the data from cultivars and experimental lines that were in the tests for all three years indicated that DB04-10836, with an average seed yield of 54.4 bu/ac (3659 kg/ha), was overall the highest yielding line. DB04-10836 was significantly higher in seed yield than two commercial varieties and one public release. DB04-10836 ranked highest in seed yield (49.2 bu/a (3309 kg/ha)) across three clay soil locations - Brooksville, MS; Longwood, MS, and Stoneville, MS; and ranked number 2 (53.9 bu/a (3625 kg/ha)) across the two Delta locations (Longwood and Stoneville). Seed yield of Osage and DB04-10836 was not significantly different, but over the three–year average, seed yield of DB04-10836 was 3.7 (249 kg/ha), 2.8 (188 kg/ha) and 2.1 bu/a (141 kg/ha) higher than that of Osage, across all clay locations and across the Delta locations, respectively.

DB04-10836 is resistant to SCN Race 3 corresponding to HG Types 0 (2011) and 5.7 (2008, 2009 and 2010) based on three years of greenhouse tests in Jackson, TN, with a mean three- year gall rating of 1.0 (Gillen and Paris 2008, 2009, 2010 and 2011). Molecular marker phenotyping by the USDA-ARS in Jackson, TN confirmed that the resistance to SCN race 3 in this line has the same marker phenotype as resistance derived from the cultivar 'Hartwig' (P. Arelli and L. Fritz, personal communication). In tests conducted in connection with the Uniform Soybean Tests in 2008, 2009, 2010 and 2011, the release was moderately resistant to Meloidogyne incognita (Southern root-knot nematode) with a mean gall index of 2.0, susceptible to

Meloidogyne arenaria (Peanut root-knot nematode), resistant to southern stem canker [caused by Diaporthe phaseolorum (Cooke & Ellis) Sacc. var meridionalis Fernández], resistant to Soybean mosaic virus (strain G1)(one year of data), and susceptible to sudden death syndrome [caused by Fusarium solani (Mart.) Sacc. f. sp. glycines] (Gillen and Shelton 2008, 2009, 2010 and 2011). Three years of tests (2009-2011) in the Arkansas State variety trials indicated that DB04-10836 is moderately susceptible to frogeye leaf spot (caused by Cercospora sojina K. Hara) and similar results were obtained in one year of testing by USDA-ARS in Jackson, TN (A. Mengistu, personal communication). DB04-10836 has purple flowers, tawny pubescence, tan pod wall, and a determinate growth habit. Seeds are yellow with black hila.

A limited quantity of seed is available from Anne M. Gillen (USDA-ARS-Mid South Area, Crop Genetics Research Unit, Stoneville, MS). She can be contacted at Anne.Gillen@ars.usda.gov. Seed of this release, DB04-10836, will be deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. It is requested that appropriate recognition be made if this germplasm line contributes to the development of new germplasm or cultivars.

Signature:

K Simmons — 2/8/14

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Date