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Germplasm

Pearl Millet Parental Lines 842A and 842B

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Pearl millet (*Pennisetum glaucum* (L.) R. Br.) parental line 842B is the inbred maintainer of cytoplasmic-nuclear male-sterile line 842A. Original seed stocks of these two lines, initially developed and designated as BKM 2221 and AKM 2221 by W D Stegmeier at the Fort Hays Branch Experiment Station, Kansas State University, USA, were introduced to SAT-Patancheru in 1980 by D J Andrews. Their reselected versions, named at ICRISAT as 1CMB 3 and ICMA 3, have been widely disseminated by ICRISAT since 1984 as 842B and 842A, respectively.

BKM 2221 was developed by eight generations of pedigree selection in a population derived from the second backcross of Tift 23D₂B₁ to P1 185642- Tift 23D₂B₁ is the maintainer line of Tift 23D₂A₁, developed at the Coastal Plain Experiment Station, Georgia, USA (Burton

1969). PI 185642, collected in 1949 from a market in Kumasi, Ghana, was supplied by the Southern Region, Plant Introduction Experiment Station, Georgia, in 1971. The BC₂-derived line was crossed onto Tift 23D₂A₁, and during the course of developing BKM 2221 four successive generations of it were concurrently backcrossed into the sterile cytoplasm of Tift 23D₂A₁ to develop AKM 2221. At this stage, AKM 2221 and BKM 2221 were introduced to India by ICRISAT-Patancheru. When grown in a pearl millet downy mildew [caused by *Sclerospora graminicola* (Sacc.) J. Schror.] disease nursery at Patancheru, seed stocks of these lines displayed variability for reaction to this most devastating disease of pearl millet in India. Two generations of pedigree selection for downy mildew resistance in BKM 2221 and concurrent plant x plant backcrossing onto disease-free plants of AKM 2221 produced 842A and 842B, which had only 3% downy mildew incidence compared to 31% in the originally introduced stocks of AKM 2221 and BKM 2221 (and 55% in the susceptible control NHB 3). While 842A and 842B had improved levels of resistance to downy mildew, their phenotypic characteristics remained similar to those of AKM 2221 and BKM 2221.

Male-sterile line 842A has stable male sterility across seasons and sites, but is otherwise phenotypically similar to its maintainer line 842B. Both lines have excellent seedset under open pollination. However, 842B has poor seedset under selfing (generally <10%), apparently due to some combination of long protogyny and short stigma receptivity periods, although it is a prolific pollen producer. Both lines are genetically *d₂* dwarf of medium height and medium early maturity, averaging plant heights of 115 cm and 47 days to reach 50% flowering across locations in India during the rainy season. They have erect growth habits, produce 15 cm long candle-shaped panicles, have excellent panicle exertion, and stiff stalks that are moderately susceptible to breakage at the nodes. Plants of these lines generally produce 2-3 panicles plant⁻¹, large grains (10-11 g 1000⁻¹) of hexagonal-globular shape and light grey color, and have dark green foliage until maturity. Further, these lines have dominantly inherited nonhairy leaf sheaths and leaf blades; dominantly inherited dark reddish plant base, node (when exposed to the sun), and glume tip pigmentation; and recessively inherited nonhairy leaf margins and nodes.

Male-sterile line 842A is the seed parent of public-sector hybrid HHB 68, developed by CCS Haryana Agricultural University and released in 1993 for cultivation in all pearl millet growing zones of India. This line is

2. In memoriam of Dr W D Stegmeier, deceased 25 July 1998,

also the seed parent of several private sector hybrids, including at least one dwarf hybrid, produced and marked by private seed companies in India. From 1993 to 1998, ICRISAT supplied 358 kg of 842A breeder seed and 135 kg of 842B breeder seed to public- and private-sector seed producing agencies in India. Seed stocks of 842A and 842B will continue to be maintained and distributed in germplasm amounts by ICRISAT, under the terms and conditions of the relevant ICRISAT Breeding Material Transfer Agreement.

Reference

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Pearl Millet Parental Lines 843A and 843B

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Pearl millet (*Pennisetum glaucum* (L.) R. Br.) parental line 843B is the inbred maintainer of cytoplasmic-nuclear male-sterile line 843A. Original seed stocks of these two lines, initially developed and designated as BKM 2068 and AKM 2068 by WD Stegmeier at the Fort Hays Branch Experiment Station, Kansas State University, USA, were introduced to ICRISAT-Patancheru in 1980 by D J Andrews. Their reselected versions, named at ICRISAT as ICMB 2 and ICMA 2, have been widely disseminated by ICRISAT since 1984 as 843 B and 843A, respectively.

BKM 2068 was developed by nine generations of pedigree selection in a population derived from the first backcross of Tift 23D₂B₁ to PI 185642. Tift-23D₂B₁ is a maintainer line of Tift 23D₂A₁, developed at Coastal Plain Experiment Station, Georgia, USA (Burton 1969), PI 185642, collected in 1949 from a market in Kumasi,

Ghana, was supplied by the Southern Region, Plant Introduction Experiment Station, Georgia, in 1971. The BC₁-derived line was crossed onto Tift 23D₂A₁, and during the course of developing BKM 2068 seven successive generations were concurrently backcrossed into the sterile cytoplasm of Tift 23D₂A₁ to develop AKM 2068. At this stage, AKM 2068 and BKM 2068 were introduced to India by ICRISAT-Patancheru. When grown in a pearl millet downy mildew [caused by *Sclerospora graminicola* (Sacc.) J Schrot.] disease nursery at Patancheru, seed stocks of these lines displayed variability for reaction to this most devastating disease of pearl millet in India. Two generations of pedigree selection for downy mildew resistance in BKM 2068 and concurrent plant x plant backcrossing onto disease-free plants of AKM 2068 produced 843A and 843B, which had 2% disease incidence compared to 10% in AKM 2068 and BKM 2068 (and 55% in susceptible control NHB 3). While 843A and 843B had improved levels of pearl millet downy mildew resistance, their other phenotypic characteristics remained similar to those of AKM 2068 and BKM 2068.

Male-sterile line 843 A has stable male sterility across seasons and sites, and is otherwise phenotypically similar to 843B. Both lines have fairly good open-pollinated seedset, but this is seldom complete. Maintainer line 843B is a prolific pollen producer and has average-to-good seedset under selfing. Panicles of both 843A and 843B have small female-sterile sectors but this trait is not expressed in their hybrids. These short-statured *d*₂ dwarf lines are the earliest commercial seed parents of pearl millet hybrids produced so far anywhere in the world, averaging plant heights of 95 cm and 42 days to reach 50% flowering across locations in India during the rainy season. They have a semispreading growth habit, produce 12 cm long candle-shaped panicles with naked pinkish tips, and have excellent panicle exertion. Plants generally produce 3-4 panicles plant⁻¹, with large grains (11-12 g 1000⁻¹) of globular shape and light grey color. Further, these lines have dominantly inherited nonhairy leaf sheaths and leaf blades; dominantly inherited light reddish plant base and node (when it is exposed to sunlight) pigmentation; and recessively inherited nonhairy leaf margins and nodes.

Male-sterile line 843 A is the seed parent of the earliest maturing (65-70 days to maturity) public-sector hybrid (HHB 67) released to date in India (Kapoor et al. 1989). HHB 67 was developed by CCS Haryana Agricultural University and released in 1990 for cultivation in all pearl millet growing zones of India. This hybrid is especially popular in the arid to semi-arid margins of the

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