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Registration of NPM-4, a Dwarf White Grain Pearl Millet Germplasm

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Dwarf grain pearl millet [*Pennisetum glucum* (L.) R. Br.] germplasm NPM-4 (Reg. no. GP-37, PI 634545) was released in September 2003 by the Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln, NE.

NPM-4 was derived from open-pollinated outcrosses of white grain inbred line $57028R_1$w grown in a 1998 Puerto Vallarta winter nursery. The source of the outcross pollen was from primarily genetically diverse, dwarf, early maturing, gray seeded lines being developed as parents for grain yield. Line $57028R_1$w was derived from $89C57028R_1$/3*90PV0121. Line $89C57028R_1$ is gray-seeded, and line 90PV0121 has white seed. Line 90PV0121, an F_5 was derived from the cross 85C53005/ZW10. Line $89C57028R_1$ was an A_1 (Burton, 1958) cytoplasmic nuclear male-sterility (cms) restorer S_5 selection out of row 84M:17101-1 of segregating germplasm obtained in the late 1970s from Dr. A.J. Casady, Kansas State University, that had undergone random mating and selection for at least 3 cycles before 1984. Line 85C53005 was an A_1 maintainer S2 selection (84H:14014) also from the segregating Casady germplasm. The line ZW10 was a white seeded introduction from Zambia obtained in 1988. The 1998 winter nursery outcrosses of $57028R_1$w were grown in isolation at the Department of Agronomy Farm at the University of Nebraska's Agricultural Research and Development Center (ARDC), Mead, NE, in 1998 and productive dwarf white seeded plants were selected for harvest and bulked together. The harvested bulk was grown in 1999 at Mead and plants were selfed and selected for all white seed on panicles. The white seeded selfs were grown in isolation in 2000. Nineteen open-pollinated white grain selections were made and random mated in isolation in 2001. Open pollinated seed of the best six white grain families was combined to form the bulk for seed release. Final selection was for panicle size, kernel size, and lodging resistance. Topcrosses of NPM-4 with cms lines $NE68A_1$, $NE59043A_1$, and $KS1163A_1$ (a CMS A_1–line from W.D. Stegmeier, Kansas State University-Hays) in 2002 indicated that NPM-4 was a good restorer of A_1 cms with good combining ability for grain yield.

NPM-4 is a medium maturity, dwarf, tillering germplasm that averages between 85 and 100 cm in height at maturity. It flowers between 55 and 72 d after early June to early July plantings (Mead ARDC) and grain yields from 1370 to 2170 kg ha^{-1} have been recorded. Yields of NPM-4 topcross hybrids on three seed parents averaged 89, 85, and 115% higher than NPM-4 in early, normal and late planting, respectively. Seed of NPM-4 is white to cream in color, and has obovate, hexagonal, and spherical shapes with a size range of 6.9-17.3 g 1000^{-1} measured on individual panicles. NPM-4 has compact candle-shaped panicles with a range in size of 17 to 28 cm in length (21.7-cm mean length) and 2.1 to 3.5 cm in diameter and good panicle exertion. Anthers are yellow in color and shed pollen profusely. Insect and disease reaction of NPM-4 have not been determined. NPM-4 produces 1-2 tillers per plant, which are upright in habit at high and low planting densities. NPM-4 has value for direct use as an open-pollinated white grain germplasm for food grain production and as an A1 restorer germplasm for producing medium to medium-early maturing white grain hybrids. White to cream colored grain is preferred for producing more appealing food products. Limited yield performance tests of NPM-4 topcross hybrids indicate NPM-4 has good combining ability for grain yield with early to medium maturity white grain seed parents.

Seeds of NPM-4 are available for research purposes from the Department of Agronomy, University of Nebraska, Lincoln, NE 68583.

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Registration of NPM-8, a Dwarf Grain Pearl Millet Germplasm with Long Panicles

NPM-8 pearl millet [*Pennisetum glaucum* (L.) R. Br.] (Reg. no. GP-38, PI 634549), a dwarf grain germplasm with long panicles containing restorer genes for the A_1 (Burton, 1958) and A_4 (Hanna, 1989) cytoplasmic-nuclear male sterile (cms) cytoplasm systems, was released in January 2004 by the Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln, NE.

NPM-8 was derived from the Nigerian Dwarf Composite (NCD2) germplasm (Rai et al., 1995) by selection of dwarf phenotypes adapted to eastern Nebraska conditions and primarily represents pooled diversity from Nigerian and West African long panicle landraces converted to a dwarf plant background. NCD2 grown in Nebraska produces predominately very late, medium tall (120–180 cm) phenotypes with significant panicle lodging. A 1990 isolation of NCD2 grown at Mead, NE, was selected for maturity and medium dwarf plants. Open pollinated selections of five plants were bulked and grown at Lincoln in 1991. Twenty-nine medium dwarf self pollinated S_1 selections from Lincoln nursery were advanced for random mating with equal maternal representation at Mead in 1992. Ten S_1 families were selected with less than 40% lodging, 135 cm height or less, and medium to long head length. The open pollinated bulks of the ten families were random mated with equal maternal representation at Mead from 1993 to 1995 with continued selection for dwarf plants, panicle length, and lodging resistance. In the 1996 isolation, the best two individual dwarf plants of the 10 families were self-pollinated. The progeny from these selections were random mated in 1997 with equal maternal representation. Open-pollinated selection for dwarf plants, long panicle, and lodging resistance was continued in 1998 through 2001 isolations. Final selections were made in 2001, and harvested seed was bulked for release.

NPM-8 topcrosses were obtained by planting male sterile lines in the 2001 isolation plot. NPM-8 and its topcrosses were planted on 1 June, 15 June, and 2 July 2002. Male fertility (pollen shedding) counts showed averages of 56 to 73% restoration of two A_1 cms lines and 3 to 11% restoration of an A_4 cms line. Pollen shedding counts of NPM-8 indicated all plants were male fertile.

NPM-8 is a dwarf, medium maturing, tillering germplasm that averages between 98-123 cm height at maturity. It flowers between 57 and 66 d after early June to early July plantings

at Mead and has a 5- to 10-d range between first plants flowering and average flowering dates for the germplasm. Grain yields from 1620 to 2910 kg ha^{-1} have been recorded. Hybrids with three seed parents exhibited heterosis levels of 40 to 158% among three planting dates, with a best hybrid yield of 4709 kg ha^{-1}. Seed of NPM-8 is gray in color, variable in shape with a size range of 4.8 to 11.3 g/1000. Panicles vary from 24- to 45-cm length and 1.7- to 2.5-cm diameter and have good exertion. When grown at Mead, the mean panicle length of NPM-8, 31.0 cm, was significantly longer than the mean length of NPM-1, NPM-2 (Andrews et al., 1995), and NPM-3 (Andrews and Rajewski, 1995), 19.6, 18.7, and 23.0 cm, respectively, across three planting dates. Insect and disease reaction of NPM-8 have not been determined.

NPM-8 provides an adapted germplasm source of predominantly West African background from which dwarf lines with long panicles can be derived for use in the A_1 and $A_{4\,cms}$ systems as R_1–lines (male parents) or A_4–lines (seed parents) for producing medium maturing dwarf grain hybrids. Limited yield performance tests of NPM-8 topcross hybrids indicates that the germplasm has good combining ability for grain yield with medium and early maturity seed parents.

Seeds of NPM-8 are available for research purposes from the Department of Agronomy, University of Nebraska, Lincoln, NE 68583

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