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ICRISAT Asia Center
Inter-Office Memorandum

To Dr KN Rao, GED
From Editorial Unit, RDD Secretariat
Subject Reprints
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Title: Registration of NCD₂ Pearl Millet
Germplasm

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MFN 2470

Registration of NCD₂ Pearl Millet Germplasm

NCD₂ (Reg. no. GP-34, PI 583797) is a *d*₂ dwarf population of pearl millet [*Pennisetum glaucum* (L.) R. Br.] developed by the Genetic Enhancement Division, Asia Center, of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh, India. NCD₂ was released by ICRISAT in June 1994.

NCD₂ was derived from the Nigerian Composite (NC) by a system of limited backcrossing (4). The NC is tall (>2 m), with long panicles (>30 cm). The NC was developed at Samaru, Nigeria, by random-mating 200 S₄ progenies derived from landraces of Nigeria and other Western African countries (2). The NC was improved for grain yield at ICRISAT Asia Center by two cycles of S₁ and S₂ selection, resulting in the production of C₁ and C₂ bulks, respectively. During the 1975 rainy season, the C₀ bulk of NC was crossed onto GAM 73, a *d*₂ dwarf (1 m height) population from Senegal with long panicles (31 cm). The C₁ bulk of NC was backcrossed onto dwarf F₂ plants derived from GAM 73 × NC to produce the BC₁F₁ population. The C₂ bulk of NC was backcrossed onto dwarf F₃ progenies derived from BC₁F₁ population to generate BC₂F₁ population, which, in turn, was backcrossed with the C₂ bulk of NC to produce the BC₃F₁ population. Forty-one dwarf F₃ progenies selected for high grain yield by bulk pedigree breeding in the BC₃F₁ population were random mated for two generations to develop NCD₂. For the initial cross (GAM 73 × NC), as well as for the three subsequent backcrosses, bulk pollen of >200 plants was used to represent the recurrent population. The dwarf plants used as females in crosses were selected visually for high grain yield potential, long panicles, and maturity characteristics typical of the recurrent population.

A yield trial was conducted in 1982 and 1984 at ICRISAT Asia Center and Bhavanisagar in southern India (4). NCD₂ had mean grain yield of 2.86 t ha⁻¹, which was 19% greater than NC and 33% greater than GAM 73. NCD₂ had a mean plant height of 1.2 m (61% of NC), a mean panicle length of 34 cm (3 cm > NC and GAM 73), and took 51 d to 50% flowering (2 d more than NC and 6 d more than GAM 73). NCD₂ had a 1000-seed mass of 7.3 g, compared with 7.8 g for NC and 7.0 g for GAM 73.

In a field study involving 21 diverse populations and hybrids, including landraces from the hot and dry areas of western Rajasthan (India) and Niger, NCD₂ had the highest seedling

emergence (77.5%). It also ranked fourth for seedling thermo-tolerance index (0.77) at soil surface temperatures up to 64°C (3).

The NCD₂ population has a high level of resistance to downy mildew [caused by *Sclerospora graminicola* (Sacc.) J. Schröt.]. In a greenhouse inoculation test at ICRISAT Asia Center, NCD₂ had 12% disease incidence, compared with 16% for the D₂ Composite, an advanced population, and 99% in the susceptible hybrid, NHB 3.

Results from 392 testcrosses developed by crossing S₀ plants of NCD₂ onto 81A_m, a male-sterile line based on the A_m source of cytoplasmic-nuclear male sterility (1), indicated that 21.9% of the crosses shed pollen and were male fertile, 36.2% did not shed pollen and were male sterile, and 41.8% segregated for both pollen shed and male sterility. Very few restorers of A_m cytoplasm are available in agronomically elite backgrounds. NCD₂ provides a useful source from which both restorers and maintainers of the A_m cytoplasm could be developed.

Seed of NCD₂ will be maintained and distributed upon request in germplasm quantities by the Genetic Enhancement Division, ICRISAT Asia Center, Patancheru, Andhra Pradesh, India.

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References and Notes

- Hanna, W.W. 1989. Characteristics and stability of a new cytoplasmic-nuclear male-sterile source in pearl millet. *Crop Sci.* 29:1457-1459.
- Khadr, F.H. 1977. Recurrent selection in pearl millet *Pennisetum typhoides* in northern Nigeria. *Z. Pflanzenzüchtg.* 79:145-153.
- Peacock, J.M., P. Soman, R. Jayachandran, A.U. Rani, C.J. Howarth, and A. Thomas. 1993. Effects of high soil surface temperature on seedling survival in pearl millet. *Exp. Agric.* 29:215-225.
- Rai, K.N. 1990. Development of high-yielding dwarf composites of pearl millet. *Crop Improv.* 17:96-103.
- K.N. Rai and A.S. Rao, Genetic Enhancement Division, ICRISAT Asia Center, Patancheru, AP 502 324, India; D.J. Andrews, Dep. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583-0915. Approved as Journal Article no. 1710 by ICRISAT. Registration by CSSA. Accepted 31 Dec. 1994. *Corresponding author.

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