

Registration of ICPL 87154, a Partially Cleistogamous Pigeonpea Breeding Line with Low Natural Out-crossing

ICPL 87154 (Reg. no. GS-8, PI 597941), a pigeonpea [*Cajanus cajan* (L.) Millsp.] breeding line, was developed at ICRISAT Asia Center, Patancheru, AP, India. This line was released by the ICRISAT Plant Materials Identification Committee in 1993.

The primary gene pool of pigeonpea has typical leguminous flowers, which on average permit about 20% insect-aided natural out-crossing (1). At ICRISAT, a true-breeding mutant (FSL-1) having partially cleistogamous flowers was identified from a breeding line derived from an interspecific cross between pigeonpea (cv. T. 21) and *Cajanus lineatus* van der Maesen (syn. *Atylosia lineata* W. & A.) (2). This mutant restricts natural out-crossing to less than 1% but has agronomically undesirable plants and highly shriveled seeds. In 1981, the mutant was crossed to a short-duration cultivar 'Pragati'. In the F₂ generation, 56 partially cleistogamous segregants with agronomically desirable seed and plant type were identified for pedigree selection. In 1986, an F₅ progeny with selection number ICPX 81513-19-3-B was bulked. In the yield trials conducted at Patancheru from 1987 to 1988, ICPL 87154 produced 1.38 t ha⁻¹ grains, compared with 2.16 t ha⁻¹ for the control, 'Pragati'.

ICPL 87154 is highly stable for floral morphology and low out-crossing over diverse environments (3). In the 1990-1991 season in Sri Lanka, at Maha Illuppallama and Pallekelle, natural out-crossing of ICPL 87154 was less than 1%, compared with 13.3 to 19.6% in the control, 'Prabhat'. At Patancheru, 0.4% natural out-crossing was recorded in ICPL 87154, compared with 42.1% in 'Prabhat' during 1989. At Patancheru, ICPL 87154 flowers in 80 d and 75% maturity is achieved in 126 d. It has a determinate growth habit, green stems, and large leaves, and averages 130 cm tall. Green pods with brown streaks are borne in clusters. On average, each pod contains 3.9 seeds, which are brown, round, and plump; however, some seeds exhibit mild shriveling on their surfaces. The 100-seed weight is 7.8 g.

Seed of ICPL 87154 is being maintained by the Genetic Enhancement Division, ICRISAT Asia Center, Patancheru, India, and small quantities are available upon request.

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References and Notes

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Registration of Pearl Millet Cytoplasmic-Nuclear Male-Sterile Line ICMA-5

ICMA-5 cytoplasmic-nuclear male-sterile (CMS) line (Reg. no. GS-3, PI 597783) of pearl millet [*Pennisetum glaucum* (L.) R. Br.] has a new cytoplasm (A₅) for male sterility. This line was released in 1997 by the Genetic Enhancement Division, ICRISAT Asia Center, Patancheru, AP, India. ICMA-5 was tested as 81A₅.

The A₅ cytoplasm of ICMA-5 traces to male-sterile plant No. 66 identified in a bulk planting of the Large Seeded genepool during the 1989 dry season at ICRISAT Asia Center (1). Seven generations of backcrossing of ICMB-1 (81 B) into this male-sterility-inducing cytoplasm led to the development of ICMA-5. The Large Seeded genepool was developed at ICRISAT Asia Center by random-mating more than 1000 germplasm accessions from the world collection that had 1000-seed mass > 10 g. ICMB-1 is the maintainer line of the A₁-system male-sterile line ICMA-1 (81A₁), which was developed by mutation breeding at ICRISAT Asia Center as a version of Tift 23D₂B (2) resistant to downy mildew [caused by *Sclerospora graminicola* (Sacc.) J. Schröt.].

Among all the CMS systems reported prior to the discovery of the A₅ cytoplasm, A-lines with the A₄ cytoplasm were found to have the most stable male sterility and produced highest frequencies of male-sterile hybrids (3,4). Seven diverse restorers of 81A₄ produced only sterile hybrids when crossed onto ICMA-5 (1). Similarly, four diverse composites that produced varying frequencies of fertile plants when crossed onto 81A₄ produced only sterile plants when crossed onto ICMA-5. This indicates that the A₅ CMS system has highly stable male sterility, but can be used only in breeding A-lines of forage hybrids. However, one or more restorer genes of this new CMS system have been found in several genepools and *P. glaucum* subsp. *monodii* accessions (K.N. Rai, unpublished data). Male-fertile plants in the background of A₅ cytoplasm from the Large Seeded and High Tillering genepools have been advanced to the F₃ stage. During inbreeding and line development, they have retained their profuse pollen production and excellent selfed seedset characteristics.

Preliminary evaluation of >1200 plants grown in isolation over a dry and a rainy season at ICRISAT Asia Center shows that male sterility of ICMA-5 is highly stable and similar to the stability of 81A₄. No pollen shedders have been detected in either of these two lines, compared with 1% pollen shedders in ICMA-1. Also, no plants of either ICMA-5 or 81A₄ set any seed when selfed, whereas 1.4% of the plants of ICMA-1 had 1 to 5% selfed seedset and 0.1% had 11 to 20% seedset. Since ICMA-5 is near-isonuclear to ICMA-1, the morphological characteristics of ICMA-5 are similar to those of ICMA-1 (2).

Seed of ICMA-5 will be maintained by the Genetic Enhancement Division of ICRISAT Asia Center. Small quantities of seed of this genetic stock are available upon request.

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