

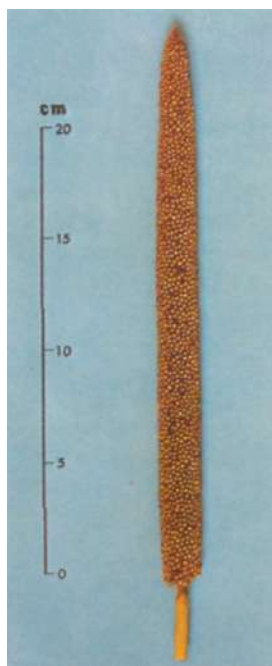
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# Pearl Millet

## Male-Sterile Line ICMA 1

### and its Maintainer Line ICMB 1

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- A  $d_2$  gene dwarf (0.8-0.9 m)
- Matures late (ca 60 days to flowering)
- Tolerates downy mildew disease well
- Has good general combining ability
- Has compact heads
- Can be used to produce short and tall hybrids



ICRISAT

#### Plant Material Description no. 4

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## Purpose of Description

Male-sterile line ICMA 1, and its maintainer line ICMB 1, were recommended by the All India Coordinated Millets Improvement Project (as 81A and 81B) in 1981 for the large-scale distribution and utilization in the production of experimental hybrids.

## Origin and Development

ICMA 1 and ICMB 1 were developed by irradiating dry seeds of Tift 23DB, a maintainer line highly susceptible to downy mildew, with 30 kR of gamma rays from a  $^{60}\text{Co}$  source.  $M_0$  generation plants were selfed and grown head-to-row in a downy mildew disease nursery. Dwarf, vigorous, and disease-free plants were both selfed and crossed with Tift 23DA (an A, system male-sterile line with proven high general combining ability). For those Tift 23DB selections that completely maintained sterility on Tift 23DA, the process of selection and backcrossing into A, cytoplasm was repeated twice a year for six generations in the downy mildew disease nursery at ICRISAT Center. The ICMA 1 and ICMB 1 pair was chosen on the basis of phenotypic similarity, vigor, seed-set, and downy mildew resistance, and the results of preliminary combining ability tests.

Synonyms. 81A/81B.

## Performance

**Parental lines.** The expression of male-sterility of ICMA 1 has remained stable over sites and seasons with good seed-set under open pollination. ICMB 1 is a profuse pollen shedder. About 1% downy mildew has been observed in ICMA 1 and ICMB 1 (as compared with 60-80% in NHB 3, a highly susceptible hybrid check, and up to 100% in Tift 23DB) in the downy mildew nursery at ICRISAT Center. It is as susceptible to ergot as the released and widely used male-sterile lines 5141A and 111A, and it is slightly more susceptible to smut.

**Hybrids.** In two preliminary yield trials of hybrids made with common pollinators on ICMA 1 and 5141A, the hybrids on ICMA 1 yielded significantly more than those made on 5141A (Table 1). In general, the hybrids on ICMA 1 were slightly taller and later in maturity, with less tillering but longer heads and larger seeds. Also, hybrids on ICMA 1 tended to lodge less than those on 5141A. Being a  $d_2$  gene dwarf, ICMA 1 provides an opportunity for breeders to produce hybrids with a wide height range.

An advantage of ICMA 1, over other male-sterile lines for hybrid breeding programs, is the higher rate at which new maintainers on the A, sterile cytoplasm can be discovered by using it as a tester. The discovery rate of complete and stable maintainers in over 2000 testcrosses was nearly four times the rate obtained (0.63%) when 5054A or 5141A was used.

**Table 1. Grain yields (kg ha<sup>-1</sup>) of hybrids on ICMA 1 and 5141 A, rainy season 1983.**

Hybrid group	Trial I <sup>1</sup>		Trial IP	
	ICRISAT		ICRISAT	
	Center	Bhavanisagar	Center	Bhavanisagar
ICMA 1 hybrids	3820	4730	3450	4175
5141A hybrids	3400	3510	3280	3409

1. Based on 52 pollinators crossed onto each male-sterile line.

2. Based on 48 pollinators crossed onto each male-sterile line.

**Table 2. Morphological characters of male-sterile line ICMA 1, ICRISAT Center, dry (summer) season 1984.**

Character	5141A (check)	ICMA 1
Time to 50% bloom (d)	51	61
Plant height (cm)	85	75
Head length (cm)	15	20
Head girth (cm)	5.2	5.2
Effective tillers/plant	4.0	2.3
1000-grain mass (g)	6.3	7.6

## Plant Characters

ICMA 1 and ICMB 1 are spreading types at the seedling stage but assume a semierect posture by flowering time. The flowering is nonsynchronous, with 7-10 days difference between emergence of the main head and tiller heads.

The stem is thin and sturdy. These lines are near isogenic. The A line flowers in about 60 days (Table 2), which is 3-5 days earlier than the B line—this difference being a character of many A and B lines in pearl millet. ICMA 1 and ICMB 1 are d<sub>2</sub> gene dwarfs, 80-90 cm tall with moderate tillering (<3 effective tillers/plant). Heads are well exerted, thin and compact, with an average length of about 20 cm. ICMA 1 and ICMB 1 are sensitive to micronutrient deficiency, which leads to slow growth and yellowing.

## Seed Characters

The grain is light gray, obovate-globular, and has a mass of about 7 g 1000<sup>-1</sup>.

### Plant Material Descriptions from ICRISAT

Leaflets in this series provide brief descriptions of crop genotypes identified or developed by ICRISAT, including:

- germplasm accessions with important agronomic or resistance attributes;
- breeding materials, both segregating and stabilized, with unique character combinations; and
- cultivars that have been released for cultivation.

These descriptions announce the availability of plant material, primarily for the benefit of the Institute's cooperators. Their purpose is to facilitate the identification of cultivars and lines and promote their wide utilization. Requests should be addressed to the Director General, ICRISAT, or to appropriate seed suppliers. Stocks for research use issued by ICRISAT are sent to cooperators and other users free of charge.

ICRISAT is a nonprofit scientific educational institute receiving support from donors through the Consultative Group on International Agricultural Research. Its major mandate is to serve as a world center for the improvement of grain yield and quality of sorghum, millet, chickpea, pigeonpea, and groundnut, and to act as a world repository for the genetic resources of these crops. The plant materials announced in these leaflets are end-products of this work, which is aimed at enhancing the agricultural productivity of resource-poor farmers throughout the semi-arid tropics.