

Developing Pearl Millet Seed Parents Adapted to Arid Regions of North-Western India

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Abstract: Rajasthan contributes about 50% to area and 42% to the production of pearl millet in the country. Despite release of large number of hybrids in the country, area under high yielding cultivars in the arid western Rajasthan is about 25%. For hybrids to be successful in the arid region, it is important that the hybrids are developed using parents that are downy mildew resistant and adapted to the harsh climatic conditions of this region. CAZRI has a strong restorer (male parents) development program, but lacked in development of male sterile lines. Hence a targeted program was initiated in 2002 for the development of B lines (maintainer lines) adapted to arid conditions. Twenty B lines of identified promising A lines were crossed in a diallel fashion. A composite was constituted from these crosses and progenies were selected and advanced by selection. Similarly from eighteen promising crosses, segregating populations were developed. Promising plants were self selected from these populations to develop B lines. These B lines were crossed with male sterile lines ICMA 95111 and ICMA 94555 having A₁ cytoplasm and ICMA 97555 having A₄ cytoplasm. The F₁s were backcrossed with the recurrent parents up to BC₆ to develop sixteen male sterile lines in the year 2010. Evaluation of new ms lines revealed presence of sufficient variability for various agronomic traits. Crossing new ms lines with inbred restorers has given promising hybrids that have been contributed to the coordinated trials.

Key words: Pearl millet, *Pennisetum glaucum*, ms lines, arid region.

Pearl millet (*Pennisetum glaucum* (L.) R. Br.), traditionally a dryland crop, is cultivated mostly in marginal environments of the arid and semi-arid regions, characterized by low rainfall, sandy soils with low fertility, where other coarse cereals such as sorghum and maize fail to produce assured yields. This crop is primarily cultivated for grain purpose, but is also valued for its stover and fodder. The crop residue/stover forms an important source of fodder (particularly in low rainfall regions) accounting for 40-50% of the dry matter intake and is often the only source of feed in dry months. India is the largest producer of pearl millet, both in terms of area (9.3 Mha) and production (7.97 Mt), with an average productivity of 856 kg ha⁻¹. This crop contributes 7.8% to the total food grain area of the country and 3.9% to the total food grain production. Rajasthan constitutes about 50% area and 42% of production of pearl millet in the country. Other principle pearl millet

growing states are Maharashtra (16% area, 13% production), Gujarat (8% area and 7% production) and Haryana (6.6% area and 13% production). The average productivity of A zone (north-western states) is 685 kg ha⁻¹. Within this zone, parts of Rajasthan, Haryana and Gujarat receiving less than 400 mm of rainfall are grouped into a sub-zone i.e. A1 zone. This sub-zone is highly drought prone with average annual rainfall below 400 mm, light sandy soils, and high temperatures. Average productivity of the A1 zone (Rajasthan state) is about 410 kg ha⁻¹.

The first hybrid in pearl millet was released in India in the year 1965 (Athwal 1965, 1966). Since then more than 125 hybrids have been released for cultivation. Development of hybrids of pearl millet in the last forty five years has led to its increased productivity and stability largely in the regions with relatively better environments, while regions like western Rajasthan with poor environments still suffer from low productivity of about 470 kg ha⁻¹. This is because most of the hybrids recommended for this region were developed elsewhere and lacked the desired adaptability and

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