Registration of a Drought-Resistant Chickpea Germplasm

ICC 4958 is a desi chickpea (Cicer arietinum L.) germplasm line collected from Madhya Pradesh, India (1). It has been identified as drought resistant (Reg. no. GP-113, PI 439824) by the scientific staff of the Legumes Program, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). It was subsequently identified for release by the ICRISAT Plant Material Identification Committee (PMIC) in 1992.

ICC 4958 was one of more than 1500 diverse germplasm lines screened for drought resistance under field conditions between 1978 and 1983 at ICRISAT Center and was one of the most drought-resistant entries evaluated (2). In spring plantings in western Asia, ICC 4958 also proved to be the most drought-resistant entry in trials conducted in the terminal drought environments at the International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria (3). Drought resistance of ICC 4958 was also validated in recent multilocational trials in India (4). Mean yield of ICC 4958 and Annigeri was 0.6 and 0.4 t ha\(^{-1}\), respectively. The yield of ICC 4958 was 120% of that of the mean yield of all entries in the stress environments (0.5 t ha\(^{-1}\)) (5); in 1 yr, ICC 4958 yield relative to Annigeri reached as high as 157%. When the mean yield of stress environments was 0.8 g ha\(^{-1}\), the yield advantage of ICC 4958 ranged from 102 to 117%.

Characteristic features of ICC 4958, as observed in the warmwinter, short-duration, terminal-drought environment represented by ICRISAT Center in peninsular India (6), are described below.

ICC 4958 is a brown-seeded desi type of chickpea. As in other desi types, it has the characteristic presence of the anthocyanin pigmentation in the foliage and stems. All comparisons of this drought-resistant germplasm are made with Annigeri, the best adapted variety for the peninsular Indian region. ICC 4958 is adapted to short duration, progressively increasing, terminal drought environments, such as at ICRISAT Center. It is semi-spreading and has a terminal branching growth habit. Branches are few (15 ± 1.8 in ICC 4958; 22 ± 4.3 in Annigeri) but the canopy height is similar to that of Annigeri (37 ± 8.0 cm). The compound leaves have 13 to 14 pinnules, as in Annigeri, but the areas of individual leaves of ICC 4958 are 77 and 113% larger in nonirrigated and irrigated treatments, respectively, because of larger pinnule size. Although the leaf size is large, the fewer nodes in ICC 4958 (149 ± 26, compared to 196 ± 42 in Annigeri) negatively compensate for the larger leaf size and, as a result, leaf area index is similar for the two genotypes.

The root system of ICC 4958, measured as root length and volume at flowering and pod-set-initiation stage, is 30% greater than that in Annigeri. Nodule mass, nodule activity (determined by acetylene reduction method), and the nitrate reductase activity are similar for ICC 4958 and Annigeri.

Flowering in ICC 4958 begins around 39 d after sowing, and the pods mature after 88 and 103 d after planting under nonirrigated and irrigated conditions, respectively. Flowers are large and have the pinkish-purple color characteristic of desi types. The seed size is large for a desi types with a mean 100-seed mass of 30 ± 0.3 g compared to 19 ± 0.4 g in Annigeri. For environments of longer duration, ICC 4958 can be used as a donor parent to introgress the desirable trait of a larger root system into an adapted background. Seed yield advantage of ICC 4958 ranged from 102 to 117%.

This germplasm line can be introduced for relatively higher and stable yields in terminal environments of 90 to 95 d duration, with a mean yield of 0.5–0.7 t ha\(^{-1}\). For environments of 90 to 95 d duration, yield advantage of ICC 4958 ranged from 0.5 to 0.7 t ha\(^{-1}\). For environments of 90 to 95 d duration, yield advantage of ICC 4958 ranged from 102 to 117%.

AG-S4 (Reg. no. GP-7, PI 566818) autogamous birdsfoot trefoil (Lotus corniculatus L.) germplasm was developed and released 10 December 1992 by the Agricultural Research Service, in cooperation with the Oregon, Idaho, and Washington Agricultural Experiment Stations.

AG-S4 originated from a single autogamous parent in the broad-based MU-81 germplasm, as a result of self-incompatibility that was produced in 1988 by the Oregon Agricultural Experiment Station. AG-S4 originated from a single autogamous parent in the broad-based MU-81 germplasm, as a result of self-incompatibility that was produced in 1988 by the Oregon Agricultural Experiment Station.

References and Notes