Notification of crop varieties and registration of germplasm

Indian Mustard

Variety CS 60

Indian mustard [Brassica juncea (L.) Czern and Coss] is an important oil-seed crop that occupies a third place for source of vegetable oil in the world due to its considerable economic and nutritional value and is grown in more than 50 countries across the globe. This is grown extensively in the arid and semi-arid regions of the world which often experiences saline stress as well. Therefore it is of great need to develop salt tolerant genotypes of Indian mustard. In this quest, a new variety of Indian mustard, CS 60 not only performed better in the All India Salinity Alkalinity Tolerant Variety Trials (AISATVT) in different salinity and alkalinity stress locations in the states of Haryana, Punjab and Uttar Pradesh, but was also adopted by farmers in salt affected areas of the country.

Two genotypes CS 330-1-1 and CS 609-B10 were selected as parents that contributed to the breeding of the new cultivar of Indian mustard variety CS 60 (earlier denominated as CS 2800-1-2-3-5-1). CS 330-1-1 is a highly salt tolerant and more resistant to diseases and pests than other cultivars of Indian mustard and CS 609-B10 is a high yielding (seed and oil) genotype. The genotype CS 330-1-1 was crossed with CS 609-B10. One hundred F₁ lines were space planted and harvested in bulk. F₂ to F₅ generations were planted at commercial seed rate and spacing and harvested in bulk. During these generations the population size was 20 thousand plants grown in each generation. About 20 thousand plants were space planted in F₅ generation. Out of this, only 2000 plants with disease (Alternaria blight, white rust, powdery mildew, downy mildew and Sclerotinia rot) and pest (mustard aphid) resistance, higher primary and secondary branches, high main shoot length and higher number of siliqua on main shoot under salinity (ECₑ 12 dS m⁻¹) and alkalinity (pH 9.4) were selected and their seeds harvested separately. After repeated screening for disease and pest resistance, and salt tolerance, individual plant progenies were grown in multi row plots. Weak and inferior progenies were rejected and only 300 individual homozygous plant progenies with desirable characters were selected and harvested in bulk.

Preliminary yield trial was conducted at ICAR-CSSRI experimental farms for two years along with national check varieties CS 54, Kranti and Giriraj for agronomic traits and for disease and mustard aphid infestation; Cultivars Rohini, YSB 9, PHR 2, EC 399301, EC 399299, EC 399000, DLSC-1, and Varuna were used as checks. The screening and evaluation of CS 60 along with other entries of Indian mustard were carried out under replicated yield trials (salinity/alkalinity breeding) for three years during 2014-15 to 2016-17 of rabi (winter) season by a team of the multi-disciplinary scientists at 5 locations per year in varying saline and alkaline environmental conditions (soil salinity ECₑ 9-11 dS m⁻¹, irrigation water salinity: ECᵢᵣ 10-12 dS m⁻¹ and alkalinity pH 9-9.4) in salt affected soils of various states using standard national check varieties CS 54, RH 749, RH 406, NRCHB 101, DRMRRI 31, Giriraj and Kranti under AICRPRM trials.

Any entry/genotype recording 10% higher seed and oil yield along with superiority for disease and pest resistance compared to the standard checks under saline and alkaline conditions was identified and released as a new variety for pre-identified suitable areas of the country. On the basis of three year (2014-15 to 2016-17) trials conducted in the saline and alkaline conditions in All India coordinated research project on rapeseed-mustard (AICRPRM), genotype CS 60 provided mean seed yield of 1792 kg ha⁻¹ under saline and alkaline conditions which was 15% higher than the best check CS 54 (1530 kg ha⁻¹) and 21% higher than seed yields of two national checks, Kranti (1458 kg ha⁻¹) and Giriraj (1467 kg ha⁻¹). Further, genotype CS 60 also provided 14% higher oil yield (707 kg ha⁻¹) than best check CS 54 and 24% higher oil yield than high yielding cultivars Kranti (563 kg ha⁻¹) and Giriraj (576 kg ha⁻¹). This variety matures, on an average, in 134 days and takes 58 days to flower. This strain attains the height of approximately 187 cm; main shoot length of 77 cm and 1000 seed weight of 5g. Cultivar CS 60 responded favorably to the additional doses of fertilizer (N:P:K) up to 150% of recommended dose of fertilizer (RDF) and 100% RDF (80:40:40; N:P:K, respectively) was found suitable from economic point of view, for this genotype.

Genotype CS 60 also showed higher resistance to Alternaria blight under natural conditions compared to high yielding checks Rohini, YSB 9, PT 303 and RTM 314. Alternaria blight severity in pods was at par with checks. Further, it also showed much lesser incidence of white rust, powdery mildew, downy mildew
and Sclerotinia rot compared to high yielding checks Rohini, YSB 9, PT 303 and EC 399299. Similar performance was recorded under artificial conditions also. Against mustard aphid, data of 24 trails showed lesser average Aphid infestation index (AAI) compared to checks Kranti and Rohini. Looking to its higher seed and oil yields and disease resistance under salinity (ECe 9-12 dS m\(^{-1}\)) and alkalinity (pH 9.0-9.4), genotype CS 60 was released for Haryana, Punjab, Uttar Pradesh and Rajasthan States and notified by central sub-committee on “Crop standards, notification and release of varieties” vide gazette notification number S.O. 1379 (E), dated 27\(^{th}\) March, 2018), under Department of Agriculture and Cooperation, Ministry of Agriculture and Farmers Welfare, Government of India. CS 60 was recommended for salt affected soils and saline irrigation waters of the country to increase productivity potential of these areas vis-a-vis, enhancing the adaptive capacity and improving livelihoods of resource poor farmers against salt stress by intervening and up-scaling suitable varieties of mustard to improve their livelihoods. ICAR-CSSRI is the developer and maintainer of cultivar, and produces its genetic seeds.

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