

Identification of temperature tolerant sunflower (*Helianthus annuus* L.) inbreds

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ABSTRACT

47 lines including CMS and R lines with 4 hybrids DRSH-1, KBSH-44, CO-2 and CSFH-12205 were evaluated for temperature tolerance under field conditions by taking two sowing dates one normal and delayed sowing to expose the crop to high temperatures. Six lines were found tolerant with <15% yield reduction for a mean temperature rise of 6.1°C during the crop growth period.

Sunflower is predominantly grown as a rainfed crop. Although, this crop shows wide adaptability due to its photoinsensitivity, yield is destabilized by both biotic and abiotic stresses. The plant grows well within a temperature range of 20-25°C. High temperatures may cause stomatal closure, a rise in respiration rate, leaf temperature, cell membrane injuries, disruption of the photosynthetic apparatus and the induction of stress specific growth regulators which decrease the total growth period due to changes in crop phenology, biomass, fruiting sites, gamete sterility, seed size and quality (Moriondo *et al.*, 2011). Temperatures over 26 °C were supra-optimal for pollen production in sunflower, even under well-watered conditions (Astiz & Hernandez 2013). Constant high temperature decreases final grain weight and oil yield. Therefore, improvement for high temperature tolerance in sunflower is vital to stabilize the yield. Keeping this in view, an experiment was planned to screen the sunflower genotypes to high temperature stress.

MATERIALS AND METHODS

Field experiments were conducted by taking two sowings (normal at Feb 1st, 2019 and delayed sowing at Mar 1st 2019) with 47 lines in three replications laid out in split plot design at IIOR-Narkhoda farm, Rajendranagar during summer season, 2019. Fertilizers were applied as per the recommended dose. All recommended package of practices were followed to raise the crop. Not to subject the crop to water stress, crop was irrigated whenever necessary. Seed yield per plant was recorded on 5 plants and converted to g. plant⁻¹.

RESULTS AND DISCUSSION

Days to flowering and days to harvest were reduced for delayed sowing when compared to the normal sowing. Mean maximum and minimum temperatures recorded from sowing to flowering in normal sowing were 34.5°C, 17.4°C and in delayed sowing were 37.5 °C, 20 °C. The same from sowing to harvest were was 36.4°C, 19.1°C and 42°C, 25.6 °C in normal and delayed sowing respectively. Six best performing entries AKO-AKSF-6-3B, BLR-CMS 59B, BLR-CMS-135B, BLR-CMS144B, BLR-CMS127B, BLR-CMS107B showed tolerance to high temperature with <15% reduction in yield. Temperature stress advanced days to flowering by 4 days and days to harvest by 9 days. The selected entries for temperature tolerance can be utilized in breeding programme for the development of thermo-tolerant sunflower hybrids.

References

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