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IMPROVING SUSTAINABLE COTTON PRODUCTION THROUGH ENHANCED RESILIENCE TO CLIMATE CHANGE USING MUTATION BREEDING

Cotton being a leading commercial fibre crop is grown on 20.5 million hectares in three major cotton producing countries i.e. China, India and Pakistan. Wide difference in yield per hectare exist among these countries and is being aggravated by the changing climate conditions i.e. higher temperature and important seasonal and regional fluctuation in rainfalls. Pakistan is one of the most affected countries. The disastrous effects of extreme period of heat stress in cotton were very prominent in Pakistan during the growing seasons 2013-14 (40-50 % fruit abortion) and 2016-17 (33 % shortfall) with its alarming threat to the cotton based economy of Pakistan. Poor resilience of main grown cotton varieties against extreme periods of heat stress are considered as main factors for this drastic downfall in cotton production in Pakistan. Using the approach of induced mutation breeding, NIAB Faisalabad, Pakistan has demonstrated its capabilities in developing cotton mutants that can withstand the changing climatic conditions and help in sustaining the excellent cotton yield. The results of thermo-tolerant cotton mutants (i.e. NIAB-878, NIAB-545, NIAB-1048, NIAB-444, NIAB-1089, NIAB-1064, NIAB-1042 in comparison with FH-142 and FH-Lalazar for their phenological & physiological traits conferring heat tolerance will be presented. NIAB-878 excelled in heat tolerance by maintaining the highest anther dehiscence (82 %) and minimum cell injury percentage (39 %) along with illustrating of maximum stomatal conductance (27.7 mmol CO2 m-2s-1), transpiration rate (6.89 µmol H2O m-2s-1), net photosynthetic rate (44.6 mmol CO2 m-2s-1) and physiological water use efficiency (6.81 mmol CO2/ µmol H2O) under prevailing high temperature. The author would also like to report the adaptation results of cotton mutants (i.e. NIAB-KIRAN & NIAB-414) shared with MS counterpart (CP) in countries under the RAS Project 5075.

Country or International Organization

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