

Strategies to Improve Heat Stress Tolerance in Chickpea and Dissecting the Cross Talk Mechanism

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Abstract : In northern India, chickpea (*Cicer arietinum* L.) come across with terminal high-temperature stress during reproductive stage which leads to reduced yield. Hence, stable production of chickpea will depend on the development of new methods like 'priming' which allow improved adaptation to the drought and heat stress. In the present experiment, 11-day chickpea seedling was primed with mild drought stress and put on recovery stage by irrigating and finally 30-day seedlings were exposed to heat stress 38°C (4 hours), 35°C (8 hours) and 32°C (12 hours). To study the effect of combinatorial stress, heat and drought stress was applied simultaneously. Analyses of various physiological parameters like membrane damage assay, photosynthetic pigments, antioxidative enzyme, total sugars were estimated at all stages. To study the effect of heat stress on the metabolites of the plants, GC-MS and HPLC were performed, while at transcriptional level Real-Time PCR of predicted heat stress-related genes was done. It was concluded that the heat stress significantly affected the chickpea plant at physiological and molecular level in all the five varieties. Results also show less damaging effect in primed plants by increasing the activity of antioxidative enzymes and increased expression of heat shock proteins and heat shock factors.

Keywords : chickpea, combinatorial stress, heat stress, oxidative stress, priming, RT-PCR

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