

Response of Cotton Genotypes to Drought Mitigation Practices

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Abstract: A field experiment was conducted during kharif season 2004 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to study the effect of drought management practices on yield and physio-biochemical traits in cotton genotypes. The experiment was laid out in split plot design, with four genotypes *viz.*, Jayadhar, RaHS-14, Abadhita and LRA-5166 and five drought management treatments: glycine betaine foliar spray @ 0.3%, proline seed treatment @ 0.1%, CaCl₂ seed treatment @ 2%, integrated drought management (IDM) practice and control. The IDM treatment consisted of FYM application 2 t/ha, seed hardening treatment with CaCl₂ @ 2%, wide row spacing (90-20), mulching, 0.3%, KCl foliar spray and kaoline foliar spray @ 1.25%. The results revealed that the genotype Jayadhar recorded significantly higher yield (721.2 kg/ha) and the magnitude of yield increase was 45 per cent higher than the lowest yielding genotype Abadhita (390.0 kg/ha). Similarly, Jayadhar recorded significantly higher specific leaf weight (771.9 mg/dm²), relative water content (67.78%), leaf water potential (-17.5 bar), chlorophyll fluorescence (0.221 P/O), total chlorophyll content (1.65 mg/g), chlorophyll stability index (65.36%) and proline content (0.091 mg/g). Among the treatments, integrated drought management recorded significantly higher yield (639.89 kg/ha) and it was 27.5 per cent higher over control. IDM recorded higher values of specific leaf weight (747.3 mg/dm²), relative water content (66.86%), leaf water potential (-19.83 bar), chlorophyll fluorescence (0.202 P/O), total chlorophyll content (1.55 mg/g), chlorophyll stability index (71.12%) and proline content (0.082 mg/g).

Key words: Cotton • Drought management • Relative water content • Glycine betaine • Proline

INTRODUCTION

Cotton, the king of fibre crops is also known as white gold and is the main raw material for textile industry. It is the most important global cash crop and controls economy of many nations. Cotton provides gainful employment to several million people in cultivation, trade, processing, manufacturing and marketing, sustaining directly or indirectly about 10 per cent of the population of India. Like most major agricultural crops, cotton production and productivity is negatively influenced by moisture stress. Nearly, 60 per cent cotton growing area falls under rainfed conditions and is characterized by scarcity of soil moisture. Depending upon the extent of residual soil profile moisture and the scarce winter rains, cotton suffers to varying degree due to mounting moisture stress and consequently the productivity declines. To combat such adverse soil moisture scarcity conditions, matching integrated drought

management practices need to be evolved for various agro-ecological regions. Several such practices *viz.*, pre-sowing seed treatments to induce seed hardening [1], foliar spray of osmolytes [2, 3, 4], fertilizer solutions [5] and mulching [6] have been reported to increase productivity of cotton.

The research work with respect to the possibilities of overcoming stresses, imposed by environmental factor is limited. It is important to understand how best the stress effect can be minimized by adopting different strategies and to elucidate the impact of such strategies in enhancing productivity potential of cotton under water limited conditions. For this, a better understanding of yield, physiological and biochemical parameters that influence crop yields would provide valuable information for exploiting genetic variability. In this direction, investigation was carried out to know the effect of drought management practices on yield and physio-biochemical parameters in cotton genotypes.