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Temperature stress mediated oxidative and antioxidant defense in *Withania somnifera* L. Dunal

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Withania somnifera, a multipurpose medicinal plant of the Himalayan region possesses antioxidant, antitumor, anti-inflammatory, antistress, immunomodulatory, hematopoetic, anti-ageing, anxiolytic, anti-depressive rejuvenating properties and influence various neurotransmitter receptors in the central nervous system. Withanolides, secondary metabolites present in *W. somnifera*, have neuron regenerative property. In order to evaluate heat stress mediated morphological, physiochemical, oxidative stress and antioxidant defence in the *Withania somnifera*, plant was subjected to varied temperature conditions. For temperature treatments the seedlings were exposed to five temperature conditions (8˚C, 18˚C, 38 ˚C, 48˚C and 58˚C). Seedlings grown at 22˚C were treated as control plants. Temperature treatments caused significant decrease in stem length, root length, fresh weight and dry weight in all the treatments. Changes in leaf area, membrane stability and relative water content were also observed and these protein, carotenoids, tocopherol, ascorbic acid and alkaloids decreased. The antioxidant enzymes like superoxide dismutase, catalase, peroxidase, ascorbate peroxidase, glutathione–S-transferase, DPPH (1, 1-diphenyl-2-picrylhydrazyl) and ABTS (2,2'-azino-bis-3ethyl benzthiazoline-6-sulphonic acid) enhanced due to stress treatments. Withanolides were found to be higher in high temperature treated plants. *W. somnifera* was found to have protective mechanism against oxidative damage by maintaining higher enzymatic and non-enzymatic antioxidants.

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Physio-morphological stability under stress (drought) responses for maize inbred lines

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Maize occupies the most important position among food grain crops and is grown under diverse agro-climatic conditions. Drought is the major abiotic stress which reduces the crop yield by disturbing the normal physiological activities of maize crop. Maize inbred lines 25 in numbers having diverse genetic back ground were used for assessment of stability against drought stress at seedling and maturity stages. Two separate experiments were conducted; one normal (without stress) & controlled (drought stress at seedling and maturity stages). Two inbred lines SS9 and SS11 showed less deviation in grain yield and considered stable. These two lines (SS9 and SS11) also performed better at seedling stage and in the Anthasis Silking Interval (ASI). Similarly, minimum reduction in other physiological parameters like chlorophyll a, chlorophyll b, leaf carotenoids and turgor potential was observed in these inbred lines. Maximum increase in proline content and reduction in osmotic potential was shown by PS4 and was also considered stable. The better stability and osmotic adjustment of these inbred lines suggested their use for development of drought tolerant hybrids which can improve grain yield under stress environment.

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