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Melatonin Mediated Nitric Oxide Improves Tolerance to Drought Stress by Reducing the Oxidative Stress in Soybean Plant

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[Introduction]

Drought stress is widely reported to counteract plant growth and development leading to reduction in plant productivity. However the involvement of Melatonin (MT) and Nitric oxide (NO) as signaling molecules in drought stress mitigation has potential role. Current study was carried out to investigate the role of MT and NO to combat drought stress by scavenging ROS potential, Antioxidant enzyme activity.

[Materials and Methods]

In current study we use the soybean plant, a complete randomized experiment design was carried out, Normal condition and Drought treated (Control, Control+Drought, SNP, MT, MT+SNP, L-NAME, cPTIO) to investigate the drought stress mitigating role of nitric oxide and melatonin. Growth attributes Shoot and Root length, fresh dry, weight and chlorophyll contents were recorded after completion of stress periods. Endogenous ABA was examined by using GCMS (Gas Chromatograph, Agilent Technologies, Palo Alto, CA, USA), RNA isolation and quantitative- real-time PCR was preform.

[Results and Discussion]

The result revealed that exogenous Nitric oxide and Melatonin decrease the H₂O₂, and increases the SOD production, PPO, POD, and CAT in response to drought stress. L-NAME and scavenger cPTIO, completely reverse the MT and NO enhance the drought stress tolerance in soybean seedling. Melatonin does not alter the ABA level, while the SNP enhance the ABA production, Genetic evidence reveals that melatonin and nitric oxide-induced drought stress tolerance by up-regulation of drought response TFs (*GmNCED3*, *GmbZIP*, and *GmWRKY27* and *GmMYB174* interact with each other suppress the *GmNAC26* expression). Conclusively, the above physiological, molecular, and genetic data conclude that NO operates downstream of melatonin promoting drought stress tolerance.

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