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Heat-stress overview in vegetable plants

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Human eat vegetables because they cannot find another food group that is as perfectly matched to our everyday human needs as vegetables, vegetables fit us like glove. From so many different perspectives, the nature of vegetables and nature of human health are matched up in way that simply cannot be duplicated by other food groups, legumes, nuts, and seed, grains, seafoods or poultry. As temperature of the world is rising day by day due to climate change, the physiological behavior of crops is also changing and tolerance for heat is getting minimized. Stress is considered as a change in any environmental factor affecting the plant for affecting its biological and physiological response to such changes and may occasionally lead to damage. Abiotic stresses are a major concern for agriculture in the era with ever increasing food demands. Among these, heat stress is perhaps the most disturbing one. Heat stress created the alarming situation for southern Asian agriculture and causes several physiological and anatomical distortions in fruits and vegetables. Heat stress during seed germination may slow down or completely inhibit the germination and in later stages of development heat stress adversely affect photosynthesis, water relation, carbon dioxide exchange rate and the level of hormones and metabolites. Moreover throughout the plant life cycle the enhanced expression of different reactive oxygen species (ROS) and stress related proteins constitute major response of heat stress. To handle the heat stress plants use different mechanisms, production of anti-oxidants, induction of mitogen-activated proteins kinase (MAPK) and calcium dependent proteins kinase (CDPK), most significantly chaperone signaling and transpirational activation. All these mechanism adopted at molecular level enables plants to survive under heat-stress condition. In addition to genetic approaches, heat stress tolerance can be enhanced by preconditioning of plants under the variety of environmental stresses.

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Influence of VAM (Vesicular Arbuscular Mycorrhiza) on the growth of soybean plants and phytochemical, antioxidant activities

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Soybean (*Glycine max.*) is a highly valued source of protein and vegetable oil and grown extensively in India and other parts of the world. It is gaining importance as a source of nutraceutical. The objective was to study the influence of VAM on growth, phenolic compound and antioxidant activity to enhance nutraceutical value of soybean. Soybean (*Glycine max*) seeds, variety JS-335 were germinated in association with VAM fungi *G. fasciculatum* (GF) and *G. mosseae* (GM). They were grown in pots containing sand-soil mixture (1:1) with respective VAM inoculants. The controls were devoid of VAM inoculums. Plants were grown for nine weeks with weekly observations and data was recorded with respective fresh weight of each plant, corresponding dry weight; pods weight (fresh and dry weight); and weight of seeds per plants. The control and treated plants also were analyzed for phenolic compound, flavonoids and antioxidant activities. Treatment of VAM (GF and GM) resulted in increasing fresh weight (approximately 2.5 fold) and dry weight of 0.8 to 2.2 folds under VAM treatments. Similar increase in seed weight per plant was obtained under VAM treatment. flavonoid levels, folic acid and phenolic contents were higher in the VAM treatments in comparison to control. Soybean extract showed great ability to scavenge free radicals and inhibited antioxidant activities.

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