



DROUGHT TOLERANT MICROORGANISMS TO PROMOTE THE GROWTH OF *Sorghum bicolor* UNDER DROUGHT CONDITIONS

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Abstract

Sorghum (*Sorghum bicolor*) is an important food crop mostly grown as a rain fed crop in semi-arid and arid regions of Sri Lanka under adverse soil and climatic conditions like nutrient deficiency and drought. Although drought is identified as the major abiotic stress that leads to growth reductions and yield loss, sorghum performs better compared to other cereal crops under extreme environmental conditions such as inadequate soil moisture levels. Plant growth-promoting rhizobacteria and fungal species show beneficial effects towards plant growth and stress defences of crop plants. The objective of the study was to investigate whether enhancement of growth of sorghum can be achieved under drought conditions by inoculating with microbial consortia prepared from characterized drought tolerant, Indole Acetic Acid (IAA)-producing, phosphate-dissolving and nitrogen-fixing rhizosphere bacterial and fungal species. Rhizosphere inhabiting bacteria and fungi were isolated from sorghum plants growing in the dry zone of Sri Lanka. Their Plant growth-promoting abilities were investigated by screening for drought tolerance, nitrogen-fixing, phosphate-solubilizing and IAA-producing ability *in vitro*. Rhizosphere of sorghum plants were inoculated with prepared bacterial and fungal consortia. One phosphate-solubilizing *Penicillium* sp., three IAA-producing drought tolerant *Rhizopus* spp. and seven nitrogen-fixing drought tolerant bacterial species were isolated from the rhizosphere of drought tolerant sorghum plants. Under soil moisture deficit conditions, inoculation of rhizosphere of sorghum plants with drought tolerant plant growth-promoting bacterial and fungal consortia resulted in increased average shoot height, shoot thickness, flag leaf width, root length, number of green leaves per plant and early inflorescence compared to the non-inoculated control sorghum plants. The results suggest the beneficial effects of inoculating fungal and bacterial consortia towards drought tolerance in sorghum plants.

Keywords: Drought stress, Growth, Microbial consortia, Rhizosphere, Sorghum