**(112)**

# Drought Tolerant Microorganisms to Promote the Growth of Finger Millet (*Eleusine coracana*) under Drought Conditions

**Dharmarathne H.N.Y.[1], Undugoda L.J.S.[1,2], Hennayake H.M.K.N.K.[2], Mapa M.H.M.M.N.[2], Imtiaz I.R.[2], Kodithuwakku K.V.A.T.[2], Wimalasekera R.[1*]**

*[1]Department of Botany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
*[2]Sara Bhumi Lanka Bio Products (Pvt) Ltd., Dambarawa Estate, Kandy, Sri Lanka*
**rinukshi@sci.sjp.ac.lk*

## Abstract

Finger millet (*Eleusine coracana* (L.) Gaertn) is an important food crop mostly grown in semi-arid and arid regions of Sri Lanka under adverse soil and climatic conditions as rain fed crops. Although, finger millet performs better under extreme environmental conditions such as inadequate soil moisture levels, drought is identified as the major abiotic stress that leads to growth reductions and yield loss. Plant growth-promoting rhizobacteria and fungi are able to promote the growth of plants under stress conditions through the stress defensing capabilities. Therefore, this attempt was to introduce efficient microbial consortia with drought tolerant, Indole Acetic Acid (IAA)-producing, phosphate-dissolving and nitrogen-fixing capabilities which can enhance the growth and yield of finger millet cultivation under drought conditions. Plant growth-promoting bacteria and fungi were isolated from rhizospheres of finger millet plants growing in intermediate zone of Sri Lanka. The isolates were screened for their drought tolerance, nitrogen-fixing ability, phosphate-solubilising ability and IAA-producing ability in vitro. A phosphate-solubilising *Penicillium* sp., a phosphate-solubilising *Rhizomucor* sp., an IAA-producing *Rhizopus* sp., two IAA-producing *Rhizomucor* spp. and seven nitrogen-fixing bacterial species (unidentified) were isolated from the rhizosphere of drought tolerant finger millet plant samples. Rhizosphere of finger millet plants were inoculated with isolated drought tolerant plant growth-promoting bacteria and fungi under artificially created soil moisture deficit conditions. Inoculation of rhizosphere of finger millet plants with isolated crop specific beneficial microorganisms resulted in increased average shoot height, flag leaf width, root length, number of green leaves per plant and early inflorescence compared to the non-inoculated control finger millet plants. Treated 55% of finger millet plants bore panicles after 39 days of the first microbial application while only 25% of the non-treated finger millet plants bore panicles. The results suggest the beneficial effects of inoculating bacterial and fungal consortia towards drought tolerance in finger millet plants.

***Keywords:*** Drought stress, Microbial consortia, Rhizosphere, Finger millet, Growth