

Alleviating Drought Stress in Wheat Using *Variovorax paradoxus* RAA3: An Efficient Biofertilizer

In order to boost crop production under water scarce conditions, it is necessary to develop efficient crop management strategies which are cost effective, eco-friendly and protect the crops from drought stress. Microorganisms play a substantial role in this aspect; however, we need to be better exploit their unique attributes of tolerance to extremities, their genetic diversity, their ubiquity, and their cooperation with crop plants, and to develop methods for their successful implementation in agricultural production. Plant growth promoting bacteria (PGPB) containing 1-aminocyclopropane-1-carboxylate (ACC) deaminase has been reported to play an important role in abiotic stress tolerance in plants, particularly drought.

Plants when exposed to abiotic stress events go through a number of biochemical reactions which result in abnormal or impaired growth and reduced productivity. For example, similar to many abiotic factors, drought induces accelerated ethylene production in plant tissues which leads to abnormal growth of a plant. The association of plants with PGPB possessing ACC deaminase activity can have a significant positive effect on mitigating plant growth inhibition resulting from build-up of stress ethylene. Under drought stress condition, much of the ACC exudes out from plant roots where ACC deaminase producing bacteria can sequester and degrade ACC to α -ketobutyrate and ammonia, thus, decreasing the building up of stress ethylene in all higher plants. A novel strain of higher ACC deaminase producing bacteria *V. paradoxus* strain RAA3 was isolated from rainfed field soil of central Himalaya, Uttarakhand, India and evaluated for their plant growth promoting ability through seed inoculation into different varieties of wheat under rainfed conditions.

Advantages:

1. Provide protection against abiotic stress particularly drought.
2. Stimulate plant growth.
3. Activate soil biologically.
4. Helping make plant nutrients more available to the plants.
5. Restore natural soil fertility.
6. Supplement of fertilizers.
7. Eco-friendly and guard the particular ecosystem in opposition to pollution.
8. Reduce the costs towards fertilizers use especially nitrogen.