

JOINT EVENT

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Engineering cyanobacterial nitrogen bio-fertilizer for rice cultivation in stressful environment**Shree Kumar Apte**

Bhabha Atomic Research Centre, India

As a naturally abundant, photosynthetic, nitrogen-fixing microbe, the cyanobacterium *Anabaena* contributes significantly to the nitrogen and carbon economy of tropical soils, especially in cultivation of rice paddy. However, its nitrogen bio-fertilizer potential is adversely affected by common abiotic stresses. Engineering enhanced nitrogen fixation and stress tolerance capabilities in this microbe through genetic manipulation is seriously limited due to the unavailability of appropriate tools and techniques and knowledge of suitable candidate genes. In recent years, our laboratory has devised an electroporation protocol for genetic transformation that achieves high frequency gene transfer and overcomes problems associated with the current practice of tri-parental conjugation between *E. coli* strains and *Anabaena*. We have also constructed (a) a suitable vector for new gene discoveries, and (b) a novel integrative expression vector pFPN, placing desired genes at a defined locus in *Anabaena* genome and facilitates their high level expression from an eco-friendly light-inducible promoter. Using these tools we have identified several genes responsible for enhanced heterocyst formation and nitrogen fixation (hetR), chaperones (groESL, cpn60) for protein folding and homeostasis, and several oxidative stress tolerance genes (superoxide dismutases, catalases and peroxiredoxins) which confer superior stress tolerance to *Anabaena*. The approach has proved very useful for constructing recombinant *Anabaena* strains capable of nitrogen fixation in stressful environments.

Biography

Shree Kumar Apte obtained his Master's in Botany from Jiwaji University, Gwalior, India with a Gold Medal in Science Faculty in 1972. He researched at the Bhabha Atomic Research Centre (BARC), Mumbai, India for 42 year, before retiring in 2014 as a distinguished Scientist and Director of the Bioscience Group, BARC. He is an elected fellow of all three National Science Academies and the National Agriculture Science Academy in India. Currently he serves as Emeritus Professor, Homi Bhabha National Institute, J C Bose National Fellow (DST) and Raja Ramanna Fellow (DAE) at BARC, Mumbai.

aptesk@barc.gov.in

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