Enhancement of germination in maize (Zea mays variety: Ganga safed) by magnetic field signal transduction

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Maize (Zea mays variety: Ganga safed) seeds treated with static magnetic field (SMF) strength of 200 mT showed enhanced germination and seedling vigor. This stimulation leads to better growth of plants and improves the yield of the plant under field conditions. The initial biochemical events soon after treatment of seeds with SMF have been analyzed. SMF treatment induces production of reactive oxygen species (ROS) and nitric oxide (NO) besides enhancing the activity of amylase enzyme. Inhibitors of NO like sodium tungstate (ST) and N-nitro-L-arginine methyl ester hydrochloride (L-NAME) inhibit the promotion of seedling growth by SMF. Similarly diphenyleneiodonium (DPI), an inhibitor of NADPH-oxidase enzyme which generates ROS, also inhibits SMF promoted seedling growth. On the contrary, sodium nitroprusside (SNP), a donor of NO, promotes SMF stimulated growth. The biochemical signal transduction of SMF for the promotion of germination and seedling growth is through the production of ROS and NO. ROS can directly degrade the stored food materials like starch in the seeds. NO is a known germination stimulator and an activator of amylase enzyme. The receptors of the magnetic field in the seeds which stimulate the production of these radicals are yet to be ascertained.

Recent Publications


Biography

K N Guruprasad is a Director of Shri Vaishnav Institute of Science, SVVV, Indore, Madhya Pradesh, India. He has worked in the area of photobiology and magneto-biology for over 30 years and has published over 85 research papers in journals of international repute. His work on improvement of crop yields by magnetic field treatment is gaining importance in the field of agriculture as a non-invasive physical method that can enhance the performance of crop plants.

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