GM rice to reduce phosphorus fertilizer usage

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New Delhi: The scientists at National Institute of Plant Genome Research (NIPGR) have developed the genetically modified (GM) rice to improve uptake of natural Phosphorus from the soil, cutting down the use of artificial phosphorus fertilizers.

This GM rice has been produced by introducing a gene called *OsPAP21b* taken out from a traditional rice genotype called Dular, found in states like West Bengal, Bihar and Assam.

Supported by the Department of Biotechnology (DBT), the study showed that OsPAP21b plays important role in improving growth on organic phosphorus substrate through better phosphate uptake and utilization.

The paper published in Plant Biotechnology Journal demonstrated that introduction of the gene produces an enzyme, which when secreted into the soil through the roots of the rice plant helps in absorption of organic phosphorus available in the soil.

This enzyme increases organic phosphorus absorption by ~50% under controlled experimental conditions and hence can help reduce the cost of fertilizer use for the farmer.

The team led by Dr. Jitender Giri and consisting of Ph.D. students, Poonam Mehra and Bipin K. Pandey has proposed OsPAP21b as a useful candidate for improving phosphate acquisition and utilization in rice.

Deficiency of plant available phosphorus is a limiting factor for cultivation of rice crops in various kind of soil on

earth. Application of phosphatic fertilizers can compensate soil phosphorus deficiency but it is hazardous both to our environment and health.

Phosphorus is an important mineral in the metabolism, growth and development of plants in general and rice in particular. About 20 mha of upland area under rice cultivation is phosphate deficient. In major rice producing areas like India, more than 60% soils suffer from low to medium phosphate availability. This is compensated by application of phosphatic fertilizers.

Unfortunately, the source of such fertilizers, rock phosphate is finite, rapidly depleting and concentrated only in few regions worldwide. India imports almost 90% of its phosphate fertilizer requirement. Further, applied phosphate is quickly fixed into insoluble inorganic or organic forms due to its high reactivity and microbial action.

Since rice is a major consumer of such fertilizers it is pertinent to increase the absorption efficiency of phosphate in rice varieties. The study is a significant move towards that end.