Research Illustrates How Plants Control Nitrogen Use in the Environment

12 April, Tokyo [Japan] (ANI): Soichi Kojima, a plant biochemist at Tohoku University, and colleagues recently published research on how gene and protein control mechanisms that regulate the use of nitrogen by plant roots could aid in the development of crops that use less nitrogenous fertilizers to produce yields. They also detailed their findings and future goals in the paper.

Since nitrogen is such an important nutrient for plants, enormous amounts of nitrogen-containing fertilizers are applied to farmlands all over the world. Most of the nitrogen in these fertilizers is present as ammonium ions (NH_4^+), the chemical form of nitrogen that plants' roots can most easily absorb. Algal blooms that deoxygenate water and kill fish and other aquatic life are among the catastrophic ecological imbalances brought on by too much nitrogen in the soil and in drainage runoff into lakes and rivers.

One of the main objectives of contemporary agricultural research, according to Kojima, is to create crops that can grow healthily without needing to be supplemented with a lot of nitrogen. He continues by pointing out the strong economic and environmental motivations for achieving this goal, saying: "Energy from enormous amounts of fossil fuels are currently required to convert nitrogen in the air into ammonium for fertilizers."

The little flowering plant thale cress (Arabidopsis thaliana), a typical species utilized for laboratory investigations in plant science, was the subject of the study.

Together, our findings show that when plants use nitrogenous fertilizers in their roots, regulatory mechanisms are operating at the genetic level, according to Kojima.

The team's next task is to ascertain whether the processes they have discovered in Arabidopsis are also present in other plant species, particularly important agricultural plants like rice and other cereals. If it is proven, plant breeders and geneticists may have a chance to develop crops that require considerably less fertilizer while still providing the yields required to feed the globe. The secret to success might lie in increasing the production or activity of the enzymes that produce amino acids. (ANI)

Research Published by**: Frontiers in Plant Science**