

Nitric oxide regulates plants as well as people

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Nitric oxide has emerged as an important signaling molecule in plants - as in mammals including people. In studies of a tropical medicinal herb as a model plant, researchers have found that nitric oxide targets a number of proteins and enzymes in plants.

In collaborative work with the research group of Renu Deswal, a faculty member, and her doctoral student at the Botany Department, University of Delhi, India, Agricultural Research Service (ARS) scientist Autar Mattoo has identified 19 such targeted proteins and enzymes in *Kalanchoe pinnata*, also known as "miracle leaf."

These proteins and enzymes are involved in regulating processes from seed germination to cell development to plant death. Notably, they also regulate many other important processes including photosynthesis, sugar metabolism, disease- and stress tolerance in plants.

Mattoo is a plant physiologist with the ARS Sustainable Agricultural Systems Laboratory at Beltsville, Md.

The collaborative research suggests that the effects of nitric oxide, a sometimes toxic byproduct of nitrogen oxidation in soil, may have broader implications in plant processes than realized. Its modification of proteins, a process called S-nitrosylation, is increasingly recognized as an ubiquitous regulatory reaction in plants and mammals.

Mattoo and Deswal have shown for the first time that nitric oxide inactivates Rubisco, a major enzyme involved in carbon dioxide fixation

and photosynthesis in plants.

Kalanchoe represents plants that have a unique method of carbon dioxide fixation that is shared by succulent plants. Kalanchoe has diverse possible medicinal benefits suggesting the presence of interesting processes at work. Mattoo hopes to do similar studies with major crops grown in different production systems, with an eye toward improving both crop yields and quality, including nutritional benefits.

Other scientists have studied nitric oxide targets in the most common model plant, Arabidopsis. Mattoo and collaborators found that Kalanchoe had some nitric oxide targets in common with Arabidopsis, such as Rubisco and drought-protective proteins. They also found new protein targets in Kalanchoe that have not been reported previously.

Source: Blackwell

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