Team studies diversity among nitrogen-fixing plants

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Researchers at Chapman University and Columbia University have published a study in *Nature Plants* this month, called "Diversity of nitrogen fixation strategies in Mediterranean legumes." The recently published research focuses on a question that has intrigued scientists for decades—are plants able to regulate their relationships with nitrogen-fixing bacteria?

Some groups of plants have mutually beneficial relationships with soil bacteria that convert atmospheric nitrogen into a form that plants can use. In exchange for nitrogen, an essential element for plant growth, the plant provides the bacteria with sugar. Because the nitrogen comes at a cost to plants, maintaining relationships with bacteria may not be economical under conditions of high soil nitrogen availability.

"This is the first time anyone has critically evaluated the types of strategies that nitrogen-fixing plant species have," said Jennifer Funk, Ph.D., associate professor at Chapman University.

The researchers used eight plant species in their research to look for plants' ability to "turn off" - or regulate - their ability for nitrogen-fixing. What they found was tremendous diversity—plants behave differently.

Plants were grown across a gradient of nitrogen availability and the degree to which plants acquired nitrogen from the soil or from nitrogen-fixing bacteria was measured. Some species were found to regulate nitrogen fixation at high soil nitrogen availability, but others showed no

regulation at all.

Nitrogen-fixing plants provide nitrogen that drives global agricultural production and ecosystem carbon storage, but it can also exacerbate enriching an environment with nutrients, as well as emissions of greenhouse gases and atmospheric pollutants. The balance of these beneficial and detrimental effects hinges on the degree to which plants self-regulate nitrogen-fixation to meet their needs. However, scientists know very little about what regulatory strategies exist.

"This is just the tip of the iceberg," Dr. Funk said. "Understanding how and why different species regulate nitrogen fixation will help unravel latitudinal patterns of species as well as predict how plant communities will respond to human disturbances that enhance soil nitrogen availability."

More information: The study was published in *Nature Plants*.

Provided by Chapman University