USDA Grant Supports UNH Research on How Plants Recognize Friends and Foes

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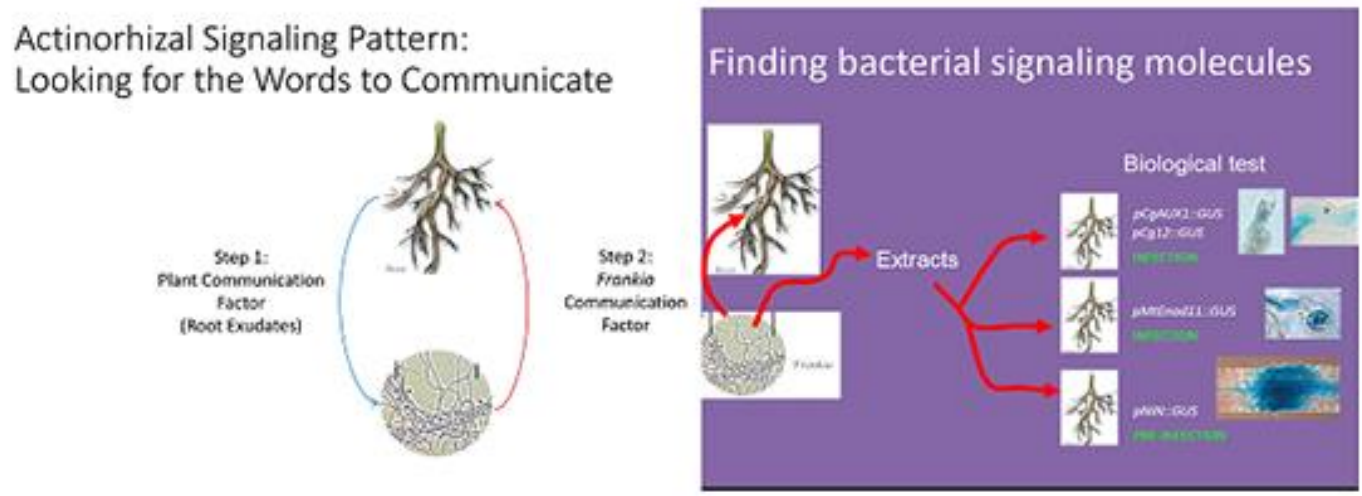

Researchers have lacked the genetic tools to understand the biological processes that support this symbiosis. With this funding, scientists plan to use next-generation sequencing tools to address the question of how the signal is produced in Frankia.

Researchers at the University of New Hampshire have received a near $400,000 grant from the USDA to investigate the chemical processes that allow certain plants and bacteria to signal each other that they are friends, not foes, and thus work together in an ecologically mutual partnership.

 *Louis S. Tisa, professor of microbiology and genetics*

The project focuses on the chemical signals between the bacteria *Frankia* and actinorhizal plants. *Frankia* live in the root nodules of actinorhizal plants, which are a diverse group of woody species found in forests worldwide and include alder, bayberry, and sweet fern.Louis S. Tisa, professor of microbiology and genetics, and Feixia Chu, assistant professor of biochemistry, have received a grant from the USDA for nearly $400,000 to support research on photosynthetic and nutrient utilization. The project is a collaborative effort between UNH and the Institut de Recherche pour le Développement (IRD) in Montpellier, France. Previous Hatch grants awarded by the NH Agricultural Experiment Station at the UNH College of Life Sciences and Agriculture, and a USDA National Institutes of Food and Agriculture (NIFA) grant laid the ground work for the project.

“We have been investigating how a beneficial bacterial symbiont recognizes and communicates with its host plant. How does the plant recognize a friend from a foe? Our system is the *Frankia*-actinorhizal symbiosis, which allows these plants to colonize in harsh environments, usually by providing a nitrogen source through biological nitrogen fixation,” Tisa said.

Because *Frankia* can supply the nitrogen needs for actinorhizal plants, these plants can thrive in low-nitrogen soils and thus play an important part of the nitrogen budget of the planet. The plants are economically significant with respect to land reclamation, reforestation, bioremediation of contaminated environmental sites, pollution reduction, soil stabilization, fuel, and as a food source for animals.

However, researchers have lacked the genetic tools to understand the biological processes that support this symbiosis. With this funding, scientists plan to use next-generation sequencing tools to address the question of how the signal is produced in *Frankia*. “The use and development of this beneficial symbiosis has broad impact on agricultural system and could be applied to other crops,” Tisa said.

Tisa was among several researchers who were awarded grants totaling $6.5 million by the USDA under the Agricultural and Food Research Initiatives (AFRI) Foundational Program priority areas of plant breeding for agricultural production, as well as photosynthetic efficiency and nutrient utilization in agricultural plants. The funded plant breeding projects focus on improving crop yield, efficiency, quality, and adaptation to diverse agricultural systems. Photosynthetic and nutrient utilization projects focus on increasing plant productivity and improving nutrient uptake, assimilation, accumulation, and utilization.

“As the world’s population increases, plants play a vital role in the success of the national and global economy,” said Sonny Ramaswamy, NIFA director. “It is imperative that we study plant breeding and nutrient utilization in order to have a safe and secure food supply in the future.”

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NH AGRICULTURAL EXPERIMENT STATION

University of New Hampshire

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