Media Relations

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UNH Scientist Discovers New Approach to Managing Parasitic Roundworms

Nematodes Cause Billions in Global Crop Damage Annually

DURHAM, N.H. – Roundworms that feed on plants cause approximately $100 billion in annual global crop damage. But a new way of disrupting the motility and reproduction of these plant parasitic nematodes discovered by a University of New Hampshire scientist may one day provide farmers with a new way to safely manage these agricultural pests.

UNH has filed a patent for the discovery made by NH Agricultural Experiment Station researcher Rick Cote, professor and chair of the department of molecular, cellular, and biomedical sciences. Cote found that the phosphodiesterase enzyme (PDE) is a promising target to combat roundworm infestations in agricultural crops such as corn, cotton, wheat, soybean, rice, and potato.

For the past 30 years, Cote has studied a PDE present in the human retina that, when defective, can cause retinitis pigmentosa, a leading inherited cause of vision loss and blindness. Five years ago, Cote was funded by the NH Agricultural Experiment Station to initiate a research project examining the physiological role of PDEs in nematodes. He discovered that PDEs present in nematodes control the signaling pathways responsible for nematode motility and reproduction.

“Our research supports the idea that chemical compounds that inhibit nematode PDEs may serve as ‘next generation’ nematicides for the purposes of managing plant parasitic nematodes,” Cote said.

Cote has focused attention on root-knot nematodes. Members of the *Meloidogynes* genus, these parasitic roundworms can infect about 2,000 species of plants and are one of the most damaging group of parasitic nematodes to agricultural crops worldwide. Traditional approaches such as applying chemical pesticides have been partially successful in reducing plant parasitic nematode damage to crops. Furthermore, current chemical control agents are toxic to wildlife and humans, and their use is highly restricted.

“When we take a compound that inhibits a specific member of the PDE enzyme family and apply it to nonparasitic nematodes, the chemical can slow down their locomotion and impair their ability to sense food in their environment. In the case of the harmful root-knot nematode, these PDE inhibitors can prevent them from infecting plant roots,” Cote said.

The PDE inhibitor compound could be applied to a plant via spraying, dusting and dipping or to the environment of the plant such as soil, water, fertilizer, and pots. The compound also could be applied at any stage of development of the parasitic nematode, from embryonic stage to adult stage. However, much basic and applied research remains to be done before a PDE inhibitor for parasitic nematodes can be developed and used by farmers.

"Our research team is well positioned to identify which PDEs are the best targets for pharmacological disruption of the nematode lifecycle.
What we currently lack are the drug-discovery resources of a large pharmaceutical or agrichemical company. We are optimistic that the ecological, public health, and economic benefits will drive this work to the successful development of new compounds that precisely target plant parasitic nematodes without adverse effects on the agricultural ecosystem: farmers, crops, and wildlife," he said.

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 0226645. Founded in 1887, the NH Agricultural Experiment Station at the UNH College of Life Sciences and Agriculture is UNH's original research center and an elemental component of New Hampshire's land-grant university heritage and mission. We steward federal and state funding, including support from the USDA National Institute of Food and Agriculture, to provide unbiased and objective research concerning diverse aspects of sustainable agriculture and foods, aquaculture, forest management, and related wildlife, natural resources and rural community topics. We maintain the Woodman and Kingman agronomy and horticultural farms, the Macfarlane Greenhouses, the Fairchild Dairy Teaching and Research Center, and the Organic Dairy Research Farm. Additional properties also provide forage, forests and woodlands in direct support to research, teaching, and outreach.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 13,000 undergraduate and 2,500 graduate students.

PHOTOS

https://colsa.unh.edu/sites/colsa.unh.edu/files/rickcote.jpg
UNH has patented the discovery made by NH Agricultural Experiment Station researcher Rick Cote, professor and chair of the Department of Molecular, Cellular, and Biomedical Sciences.

https://colsa.unh.edu/sites/colsa.unh.edu/files/rootknotnematode.jpg
The root-knot nematode is a parasitic roundworm that can infect about 2,000 plants and is one of the three most damaging parasitic nematodes to agricultural crops worldwide.

https://colsa.unh.edu/sites/colsa.unh.edu/files/rootknotnematodedamage.jpg
Roots of a tomato plant infected by the root-knot nematode.

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