Possible new hope for crops battling parasitic infection

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Scientists from Ghent University and VIB (The Flemisch Institute for Biotechnology) have demonstrated how nematodes, also known as roundworms, manipulate the transport of the plant hormone auxin in order to force the plant to produce food for them. Their findings, published January 16 in the open-access journal *PLoS Pathogens*, could open up new possibilities for the development of nematode-resistant plants.

Typical symptoms of a nematode infection in plants are withering, seriously retarded growth, and impaired development of flower and fruit; severely infected plants often do not survive the damage. Each year, plant-parasitic roundworms cause more than 80 billion euro in agricultural losses worldwide.

Some nematodes have developed an ingenious way of making a plant feed them. They penetrate the plant's roots and make their way to their host's vascular bundles, which are part of the plant's transport system for nutrients and water. The roundworms inject a protein cocktail into a single plant cell of the vascular bundle system, causing the plant cell to merge with neighboring cells and start producing food for the worm. This plant cell – which can become as large as 200 normal plant cells – is called the "nematode feeding site."

In this study, Wim Grunewald and his colleagues demonstrate that roundworms mislead the plant by disrupting its hormonal regulation. The plant hormone auxin, important for most plant developmental processes,

accumulates at the site of infection. Later, when the feeding site needs to grow, auxin accumulates in the neighboring plant cells. Until now, scientists have not known how nematodes manipulate the transport of auxin. Grunewald's team studied the role of plant PIN proteins, which enable auxin transport, and show that nematodes knock out certain PIN proteins and activate others in order to establish and develop the nematode feeding sites.

This discovery advances our understanding of how nematodes feed themselves through plants, and it may lead to ways to thwart these worms in crops – such as by locally counteracting the nematodes' manipulation of auxin transport.

Citation: Grunewald W, Cannoot B, Friml J, Gheysen G (2009) Parasitic Nematodes Modulate PIN-Mediated Auxin Transport to Facilitate Infection. PLoS Pathog 5(1): e1000266. doi:10.1371/journal.ppat.1000266, dx.plos.org/10.1371/journal.ppat.1000266

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