NP215 Pasture, Forage and Rangeland Systems

Improved Identification and Diagnostics of Plant Nematodes for Sustainable Grass and Forage Production Systems

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Nematode identifications and diagnostics

Current goals:

- Identify and characterize new nematode populations, confirm and report new state/country records
- Refine nematode species boundaries as determined through phylogenetic analysis.
- Develop diagnostics to facilitate rapid identification for species of quarantine/agronomic concern.

Recent targets:

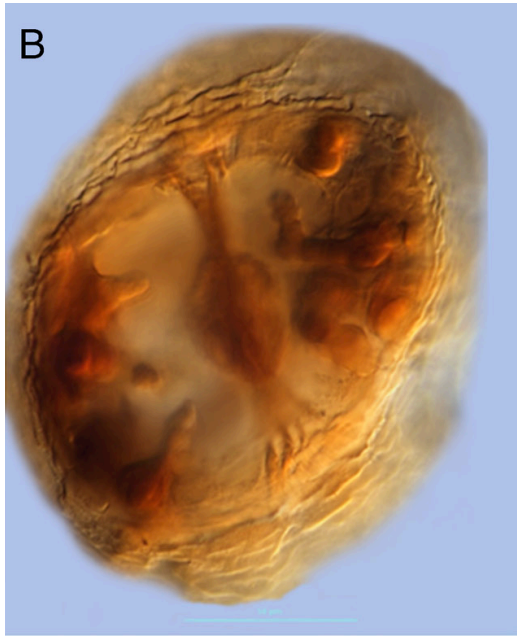
- *Cactodera* spp.: *Cactodera cacti*, *C. milleri*, *C. weissi*
- *Punctodera* spp.: *Punctodera stonei* (we are currently confirming the identity of a population from Oregon with one from Canada); *P. matadorensis*; *P. punctata*
- *Heterodera* spp. (*H. medicaginis*)
- *Meloidogyne* spp. (*M. enterolobii*, *M. fallax*, etc.)

Alfalfa cyst nematode: *Heterodera medicaginis*

This nematode was previously known only to occur in Russia.

Since 2018,we've identified this nematode from alfalfa fields along the Arkansas River in Kansas and have confirmed these were identical to a 2006 CAPS survey specimen from Montana. A new isolate from Utah has just been confirmed.

The extent of distribution of this nematode is currently unknown, including whether it extends into Canada alfalfa-growing areas.

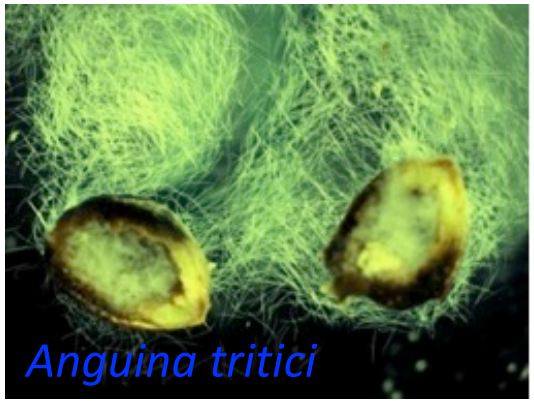


Powers, T., Skantar, A., Harris, T., Higgins, R., Mullin, P., Hafez, S., Handoo, Z., Todd, T., and Powers, K. DNA barcoding evidence for the North American presence of alfalfa cyst nematode, *Heterodera medicaginis.* Journal of Nematology e2019-16|Vol. 51. DOI: 10.21307/jofnem-2019-016

Seed gall nematode molecular diagnostics

healthy grass seed (left)
Anguina funesta (center)
Rathayibacter toxicus (right)

Annual ryegrass toxicity

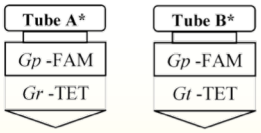


A. tritici infected seed (right)

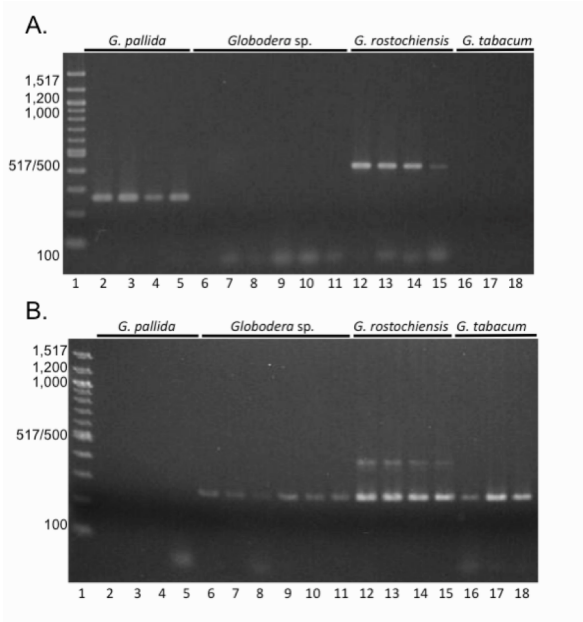
Real-time PCR for Detection and Identification of *Anguina funesta*, *A. agrostis*, *A. tritici*, and *A. pacificae* Plant Disease (with APHIS)

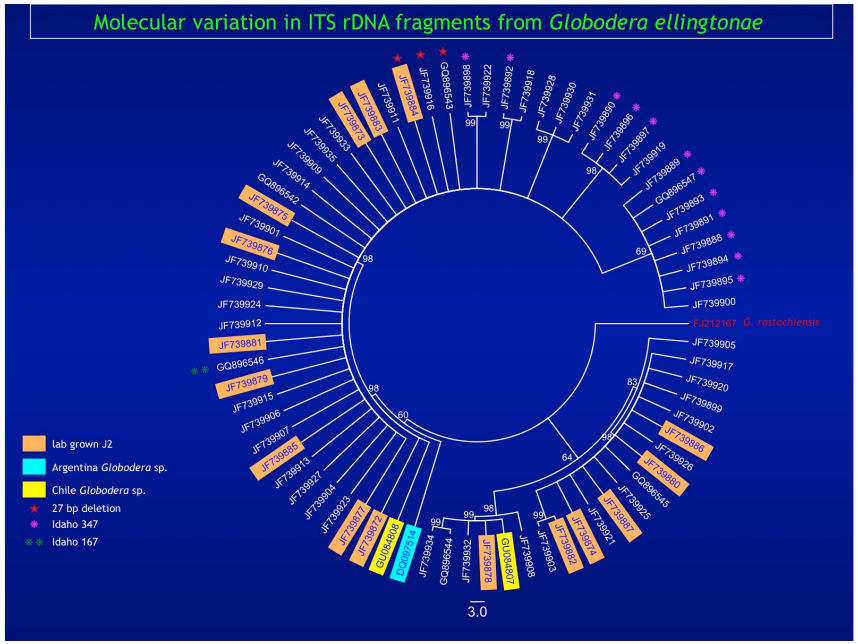
International Plant Protection Congress: Diagnostic Protocol for *Anguina* spp. (International collaboration: France, UK; document under development)

Potato cyst nematode molecular diagnostics



Tube A Reaction	Tube B Reaction	Results Interpretation
FAM + & TET -	FAM + & TET -	*G. pallida*
FAM - & TET +	FAM - & TET -	*G. rostochiensis*
FAM - & TET -	FAM - & TET +	*G. tabacum*





Morphological and molecular identification of *Globodera pallida* associated with potato in Idaho. *Journal of Nematology* (with NL)

Multiplex Real-Time PCR Assays for the Identification of the Potato Cyst and Tobacco Cyst Nematodes. *Plant Disease* (with APHIS)

Morphological and Molecular Characterization of *Globodera* Populations from Oregon and Idaho. *Phytopathology* (with NL, I. Zasada, ARS-Corvallis and OSU)

Description of *Globodera ellingtonae* n. sp. (Nematoda: Heteroderidae) from Oregon. *Journal of Nematology* (with NL, I. Zasada, ARS-Corvallis and OSU)

A new chorismate mutase gene identified from *Globodera ellintonae* and its utility as a molecular diagnostic marker. *European J. Plant Pathology* (with X. Wang, ARS Ithaca)