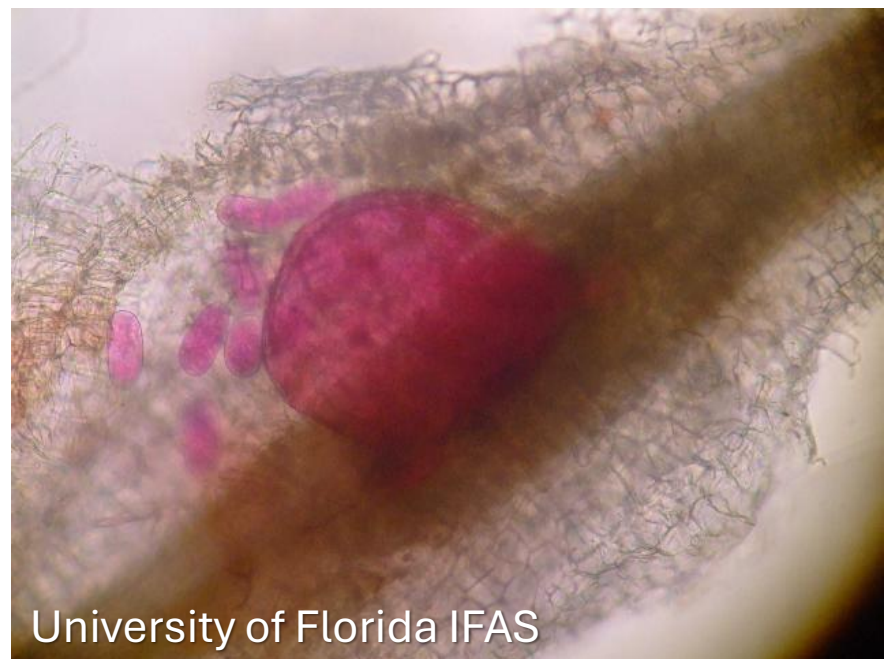


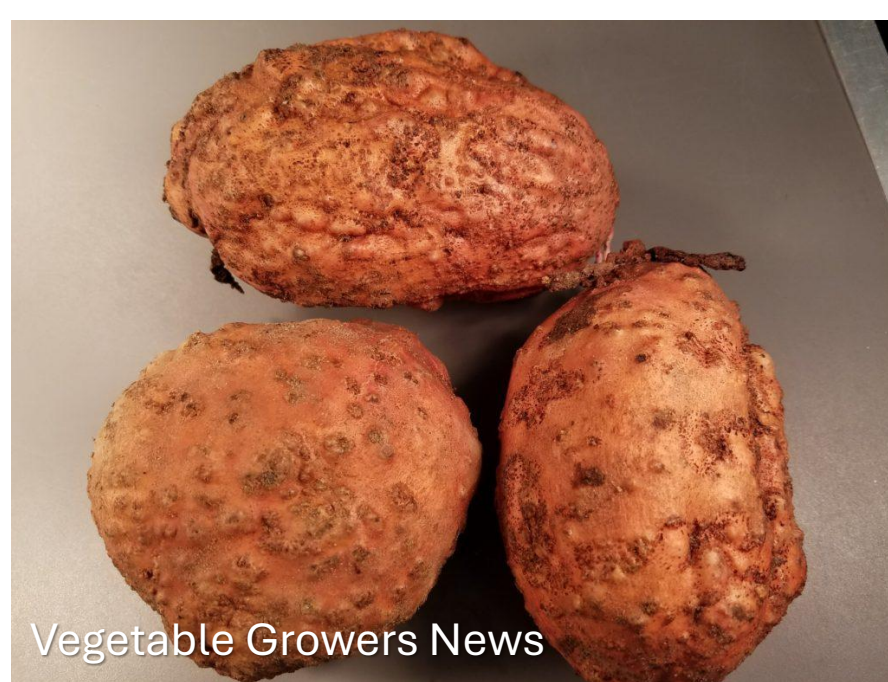
## Root-Knot Nematode



Root-knot galls on potato roots



University of Florida IFAS  
Stained female with eggs inside root



Vegetable Growers News  
Root-knot damage on tubers



Juvenile



Root-knot galls on potato roots

### Symptoms

- Symptoms include crop stunting and yellowing
- Field damage occurs in patches
- Nematode makes knots (galls) on roots, damaging plant vasculature
- Can cause tuber deformation

### Host Range

- Broad host range includes all cultivated crops
- Average yield loss 10-20%
- Overwinter as eggs in soil
- Spreads by infected soil and tissue

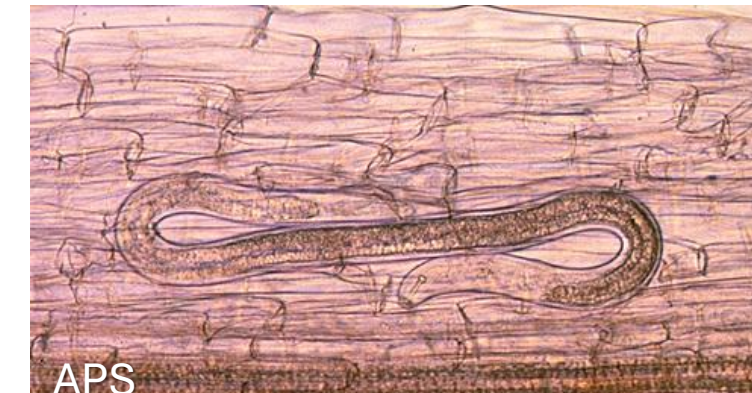
### Identification

- Galls on the roots are indicative of Root-Knot nematode

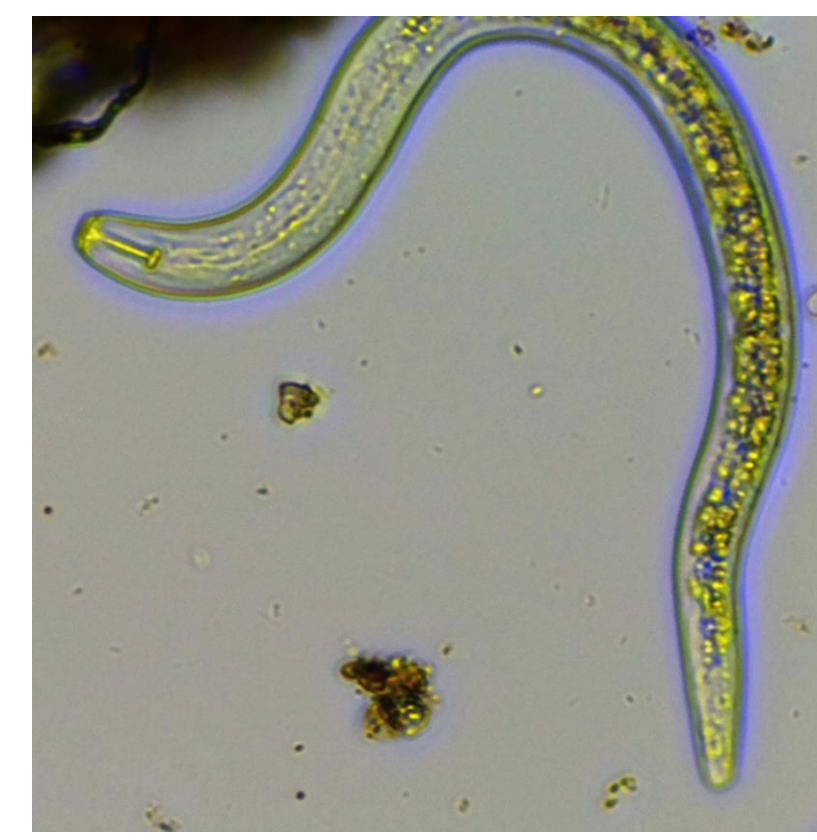
## Root-Lesion Nematode



Bayer Crop Science US  
Feeding on a root



APS  
Nematode inside a root



Root Lesion Nematode

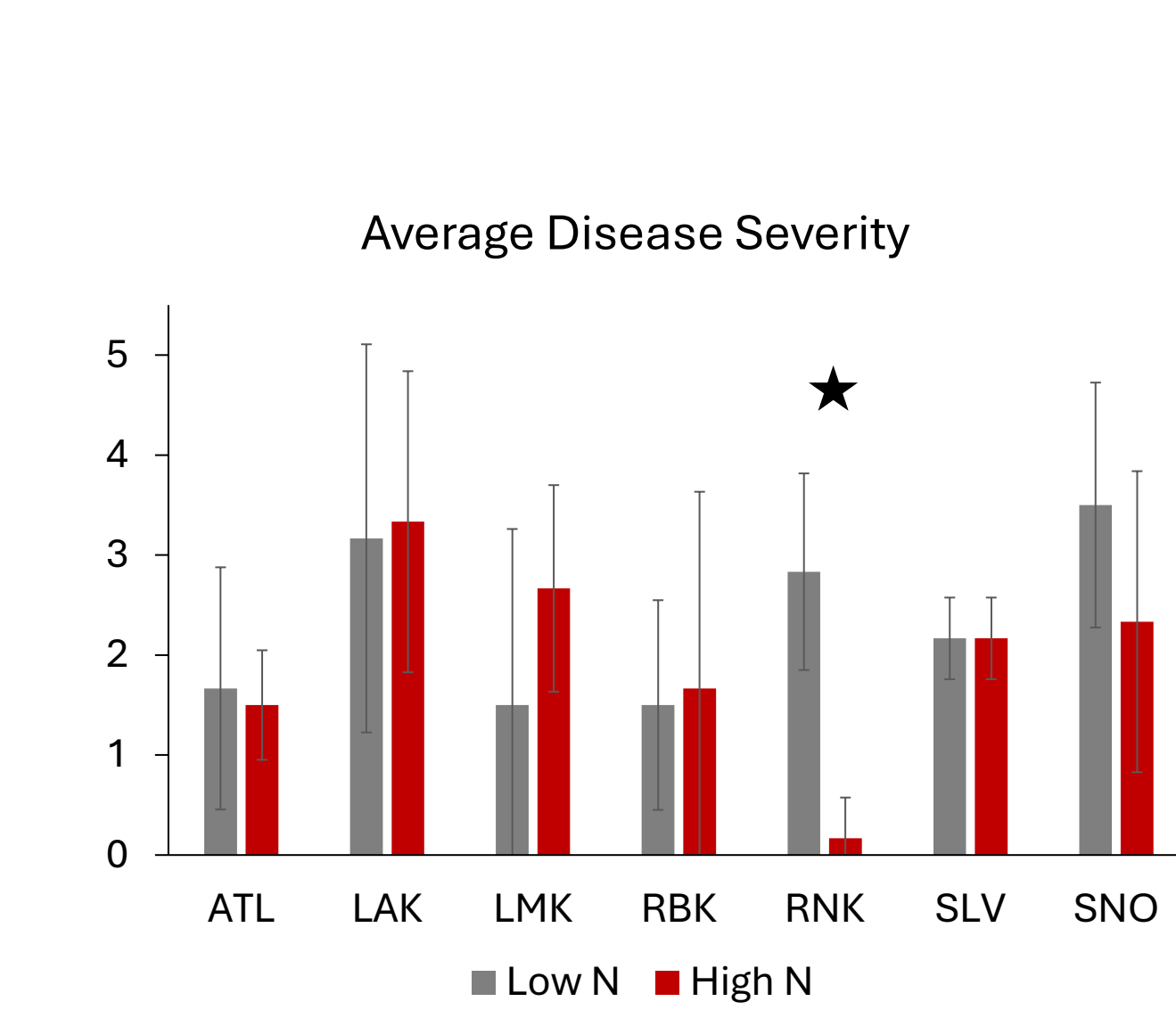


A. Gorny, NC State University  
Lesion on a tuber

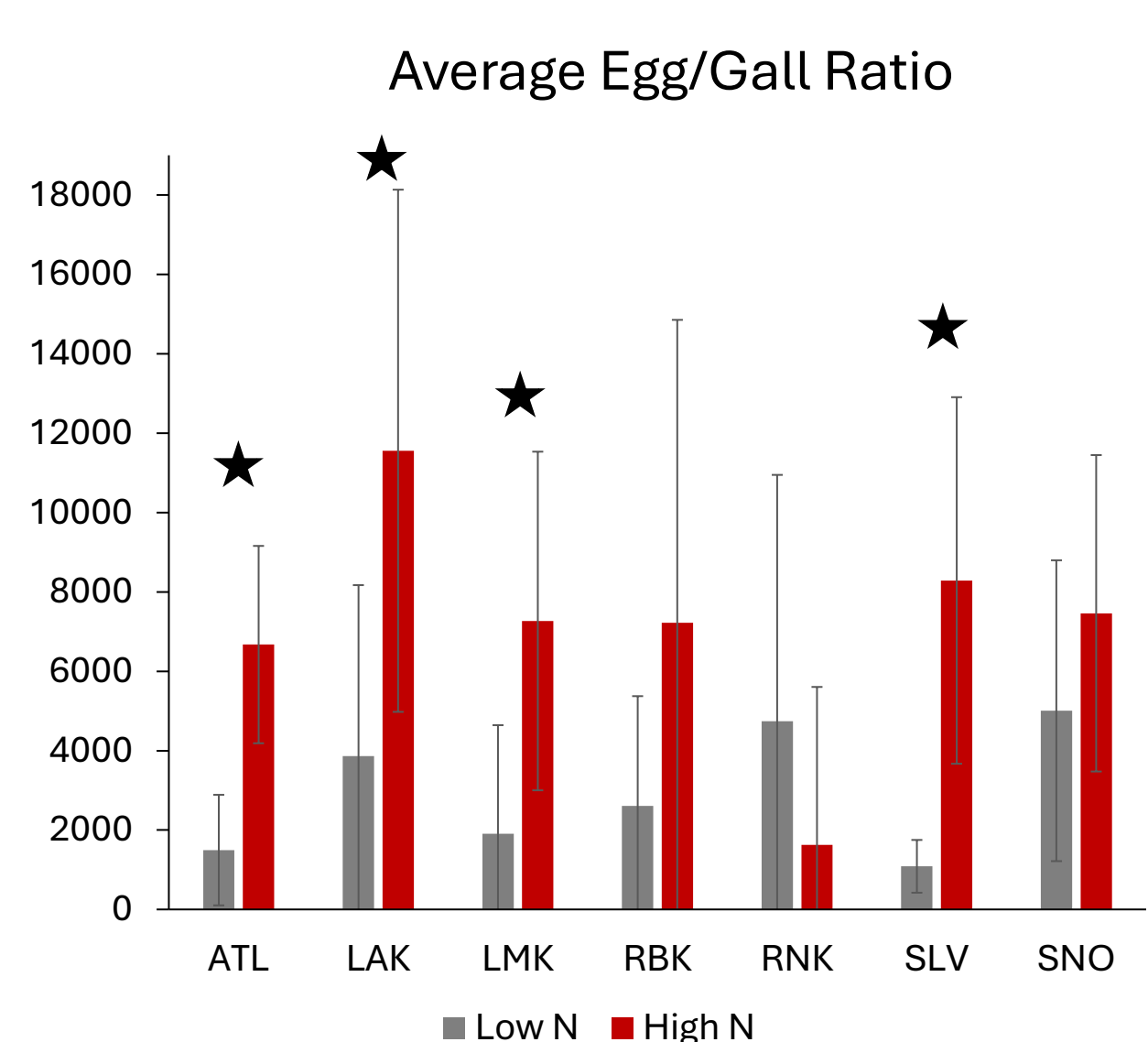
### Symptoms

- Move outside and inside of roots, while making lesions on roots and tubers
  - Stunts crops and causes chlorosis with a patchy field distribution
  - Hard to diagnose as symptoms are easily mistaken with other diseases/abiotic stressors
  - Lesions can serve as entrance to opportunistic pathogens
- ### Host Range/Biology
- Broad host range, infecting over 400 species of plants worldwide
  - Lays 1-2 eggs daily throughout life cycle, which lasts 4-8 weeks
  - Overwinters in soil or root tissue at any life stage
  - Identified from soil and root extractions

## Nitrogen Inputs and Cultivar Selection



Screening 2 Nitrogen Levels and 7 Potato Cultivars



### Need

- Cultivar choice and N input could be used to control nematode field pressure

### Results

- Many cultivars show increase in Root-Knot egg production per nematode upon high Nitrogen input
- Nitrogen input drives nematode reproduction
- Cultivar choice drives nematode reproduction

## Nematodes and Potato Early Die



Potato News



Al-Mughrabi, et al., 2025



Al-Mughrabi, et al., 2025  
PED symptoms in a potato field

### Need

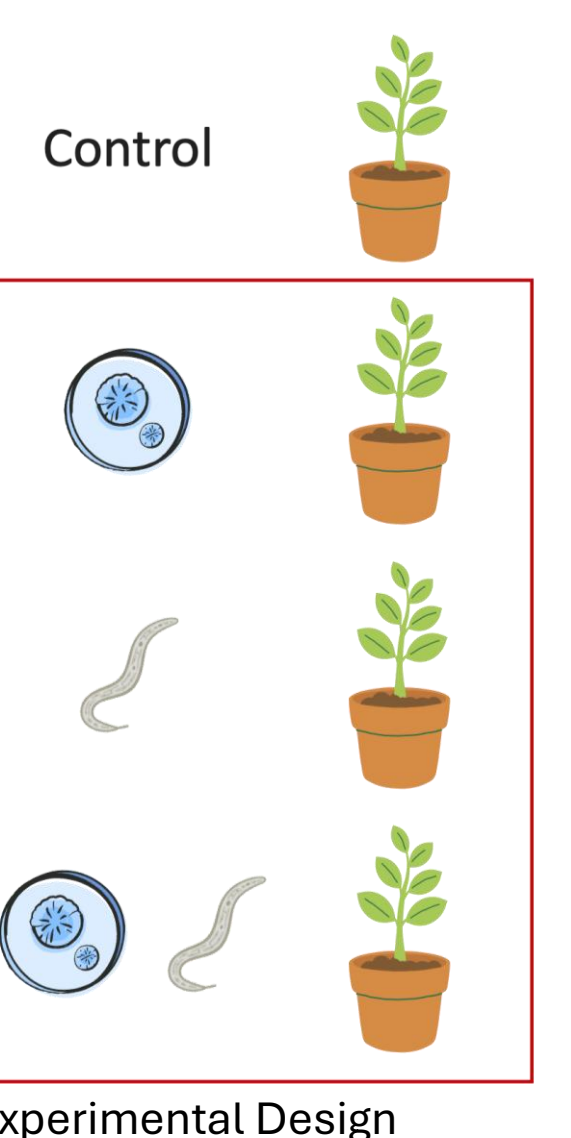
- Decrease fumigation reliance when battling PED in the field

### Description

- Caused primarily by the soilborne fungus *Verticillium dahliae*
- Presence of *P. penetrans* increases severity of symptoms
- Specific only to *P. penetrans*!
- Cause wilting, chlorosis, flagging, and premature vine death
- Yield losses up to 50%!

### Unravelling interactions between PED pathogens

- Genetic screen will elucidate genes important for potatoes tolerance against the PED pathogens
- Tolerant and Susceptible cultivars of potato will be screened under different pathogen pressures
- Effects of cultivars on pathogen reproduction will be analyzed



## Nematode Diagnostics and AI

### Improved Nematode Diagnostics

#### Need

- Development of tools for species level identification is needed to enhance accuracy of PED and nematode management recommendations and reduce fumigation inputs.
- Currently available for *M. chitwoodi* identification.

#### Description

- Loop-mediated Isothermal Amplification assay (LAMP).
- Quick and easy molecular species identification.
- Requires minimal materials, is kept at constant temperature, and is not labor-intensive.



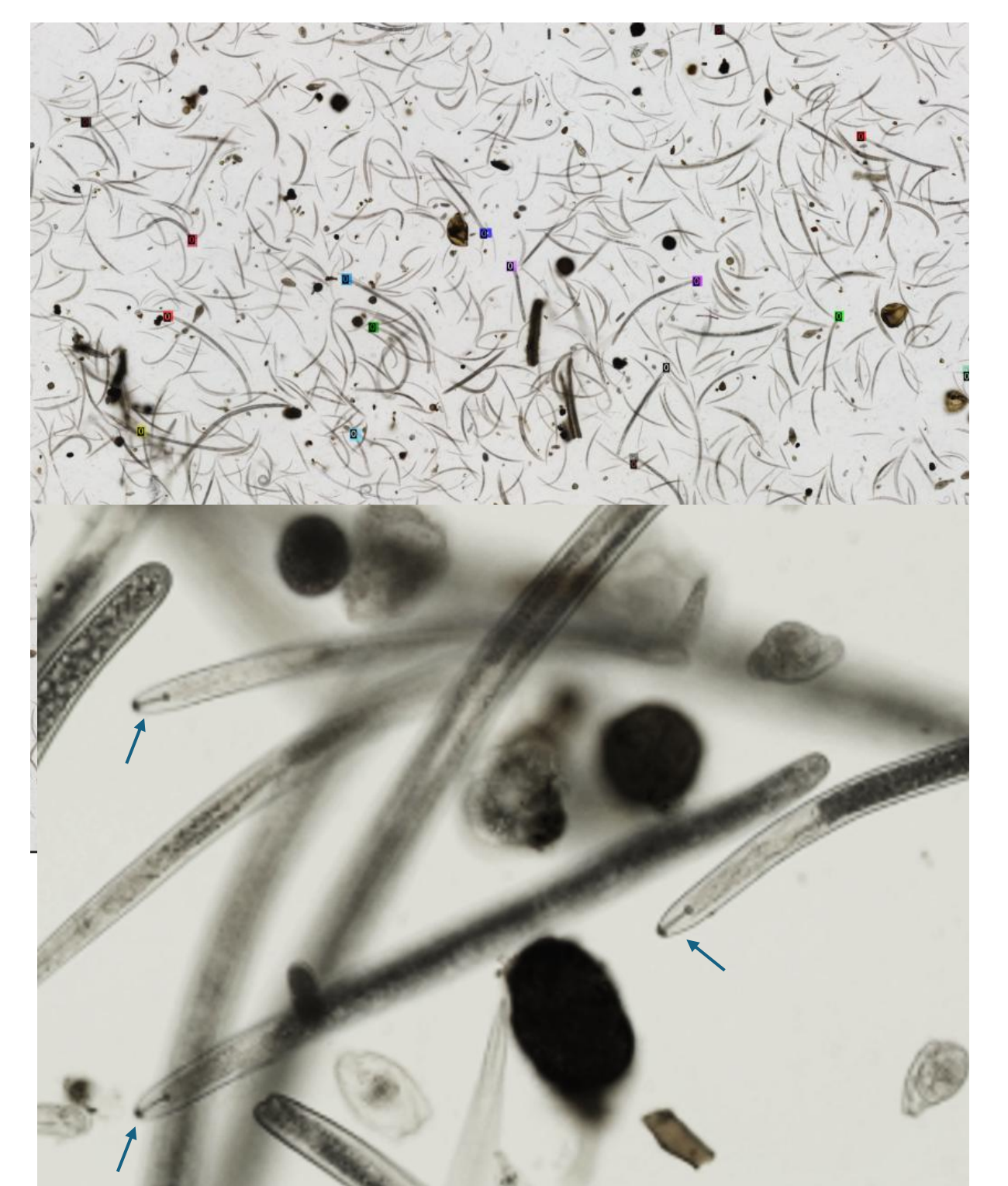
### Nematode Diagnostics with AI

#### Need

- Quick, inexpensive nematode diagnostics that are accessible to even un-trained pathologists

#### Description

- Nation-wide effort
- Thousands of nematode images are annotated to genus and species level
- Initial models predict plant pathogenic nematodes by the presence of a stylet
- Additional models identify nematodes to species and genus level
- Includes nematode abundance and uses meta-data to help improve risk assessments



Stylets of Lance Nematode (*Hoploaimus galeatus*), a major pest of turf grass in Florida