NC-1197: Practical Management of Nematodes on Corn, Soybeans, and other Crops of Regional Importance.

Albuquerque, NM, Hyatt Regency Hotel, July 26-27, 2018

Attendees:

Greg Tylka - Iowa State University (Chair)

Jill Cornelis - Administration of Iowa Soybean Center

Ann MacGuidwin – University of Wisconsin

Kanan Kutsuwa - Student

Marisol Quintanilla - Michigan State University

Kaitlyn Bissonnette - University of Missouri

Guiping Yan – North Dakota State University

Nathan Schroeder – University of Illinois

Chris Taylor – The Ohio State University (meeting minutes taker vice-chair)

Tim Frey - Student

Tom Welacky - Ontario

Timothy Todd – Kanas State University

Bill Ravilin – Michigan State University

Bob Robbins - Arkansas University of Arkansas, Fayetteville

Haddish Melakeberhan – Michigan State University

Start: 8:00am

Bill Ravlin: Introductions

Funding concerns.

Meeting Minutes due 30 days after meeting – August 28.

Annual Report due 60 days after meeting - September 28.

Midterm (summary of extramural funding, includes 2017 and 2018).

Organize by Federal, State, Industry, Other.

Key Elements (forms to be sent).

Arkansas: Bob Robbins

* Working on resistance mainly in soybean for Reniform and Southern Root-Knot Nematode (*M. incognita*) which is presently the major nematode pest on soybean in Arkansas.
* We have molecularly identified it and 4 other root-knot species in Arkansas *(M. haplanaria, M. hapla, M. marylandi, and M. partityla, no M. javanica* o*r M. arenaria).*
* Hybrid corn is an excellent host for root-knot nematode, do no use in rotations.
* SCN is present but not a big pest at present. Since it is in about 75% of our soybean acreage it could be a big problem in the right conditions. We have not had severe drought recently.
* 418 Plant Introductions with SCN resistance tested, 50 with good resistance to Reniform.
* Problem with corn as a rotation due to Southern Root-Knot Nematode since it is a good host. Answered above.
* Working with Missouri to determine soybean genotypes of root-knot and cyst nematode resistance.
* Questions:
  + Is there a plan for diversifying cropping seasons?  Rice is not affected significantly from nematodes? No! there is little to grow in the winter! Rice, Corn, Cotton and soybean are all grown at the same time.
  + Why are there no good NBS-LRR type resistance genes for SCN??

Illinois: Nathan Schroeder

* Lack of funding from Illinois corn and soybean grower groups.
* Reducing nitrogen runoff. Use of bioreactors at the end of drainage tiles. Do bioreactors impact nematode communities?
  + Lots of Copepods.
* Evaluating N effects on soil health.
  + Examining levels of AM fungi, Nematodes (bacterivores and parasitic), Arthropods
* Development of an online anatomical atlas of SCN. In collaboration with Dave Hall and help from Lynn Carta. Rescuing of Burt Endo's work from Beltsville, MD.

Wisconsin: Ann MacGuidwin

* *Pratylenchus* *penetrans* damage on soybean. Develop, evaluate, improve and integrate management techniques for plant-parasitic nematodes in the north-central region to increase grower profitability.
* Developing statistical models (meta-analysis) to determine damage caused by nematodes. Model suggest 3.2% yield list with an initial population starting with 200 nematodes.
* Free SCN testing up to 4 samples per grower each year. Samples sent out and positive samples sent to Wisconsin for Hg-type test using Lee 74 as the standard susceptible. 10 years – 378 Hg-type evaluations have been run. Mostly 95% are Hg-type 2.5.7.
* Identification of *Pratylenchus* species with males. 8 of 45 species with described males have been reported. Evaluation of morphological characteristics for identification. 26 populations evaluated. *P. penetrans* found in 91% of the samples tested (representing 55 samples). Majority from sand and silt containing loam.
* Predicting hot spots of *P. penetrans* in fields. Analysis include elevation, texture, pH, C, N, micronutrients, heavy metals, electrical conductivity (surface and subsoil).

Tom Welacky: Ontario Canada

* Agronomic performance and SCN measurements of soybean varieties were compiled and results reported.
* Most varieties are SCN resistant except for food grade varieties. SCN resistance is being developed for non-GMO food type soybeans. Cultivars and germplasm with improved yield and pest resistance for domestic and export markets. Focus on maturity 000 to 1 groups.
* Identify and validate new sources of resistance that will be resistant to the SCN population.
* Continue structured surveys of SCN reactions. (Hg-type). Shift toward Hg-type 2.5.7.
* Changes in diapause rates of SCN have been observed.
* Examining corn/soybean rotations.
* Determining interactions with other pathogens and pests.
* Hg-type evaluation ongoing. Some Hg-type 4 (2) populations have been identified.
* Sudden Death Syndrome identified in SW Ontario and spreading. Usually in lighter sandy soils and associated with cyst nematodes. Unclear on impact of yield at this time

Lunch: 12:00pm

Start: 1:30pm

Kansas: Timothy Todd

* Soybean, 16% of fields infected with SCN.
* Performance test: 127 soybean varieties tested. Most varieties are moderately resistant to a Hg-type 7 population but not to a Hg-type 1.2.3.5.6.7 population.
* Corn Survey: *Pratylenchus*, *Tylenchorhynchus*, *Helicotylenchus* are prevalent and may be a levels that could cause some damage. *P. neglectus*, *P. scribneri* and *P. alleni* common on corn.
* Wheat Survey: *Pratylenchus*, *Telotylenchinae* and *Helicotylenchus*. *P. neglectus* common on wheat. *P. scribneri* not very common on wheat. Suggested recommendations is to conduct rotations.
* Cover Crops appear to support some level of lesion nematode, however it varies by species of nematode and plant species used. Alfalfa and radish appears to be the most resistant.
* Long term (30 year) ecological sampling of belowground plot sampling of prairie grass system. Treatments include nitrogen, burning, mowing and other treatments.

Missouri: Kaitlyn Bissonnette

* Wide spread adoption of cover crops. Trying to figure out the effects these cover crops can have on nematode populations.
* SCN Coalition campaign. Just starting. 25 States are involved. Creating a unified message about SCN and other problem nematode management.
* Seed treatment plots are ongoing.

Iowa: Greg Tylka

* Evaluation of soybean lines for yield and effects on SCN populations. Results are mailed directly to >50K growers in Iowa.
* Evaluation of nematicidal seed treatments for management of SCN. Small plot and on farm testing. Aveo, Nemastrike and Trunemco in field this year.
  + Aveo – No effects on SCN populations.
  + Clariva – No effects on SCN populations.
  + Ilevo - Reduced SCN in 2 of 9 experiments.
  + Nemastrike - No effects on SCN populations.
* Compiled list of SCN-resistant soybean varieties. Nearly 97% marketed SCN resistant varieties contain SCN resistance from PI88788.

North Dakota: Guiping Yan

* 131 samples analyzed and 34 were positive for SCN. Most were Hg-type 7. But Hg-type 2.5.7 and 1.2.5.7 are beginning to show up.
* 37 varieties were screened for resistance to Hg-type 2.5.7. 5 only showed some measurable resistance to this population.
* 46 varieties are being screened for resistance to Hg-type 0.
* Seed treatments being evaluated.
* A variety of cover crops are being tested for activity against SCN.
* Evaluation of stubby root.
* qPCR methods being developed to identify and quantify *Pratylenchus* *penetrans* and *Paratrichodorus allius*.
* Investigated the interactions between SCN and *Fusarium solani* and *F. tricinctum*. Data was inconclusive at this time.
* Identifying resistance to *P. neglectus* in wheat. Working on developing a mapping population (resistance by susceptible).
* Evaluate host range of *P. penetrans* (potato and crops in rotation with potato).

Michigan: Marisol Quintanilla

* 7 commodity groups.
* Soybean Testing (Resistant varieties, manures, industry products and SCN coalition). Peking appears to increase root lesion nematodes when used. SCN Coalition work included providing management strategies. Workshop connected with MI farmers.
* Potato Early Die Back – Big nematicidal trial underway. Compost and Nimitz (chemical) did reduce nematode numbers.
* Sugar Beets – Seed treatments being tested. Nimitz has phytotoxicity.
* Carrots – Seed treatments being tested. Vydate treatment was best for yield improvement.

Adjourn (5:15pm).

Begin: 8:00am (picture and begin meeting).

Michigan: Marisol Quintanilla (cont.)

* Corn – Survey to evaluate nematode damage on corn. Greenhouse assays.
* Vegetable survey.
* Working on soil solarization, manure and Sunn hemp cover crop trials. Sunn Hemp is a good host for root lesion and root-knot nematode.
* Ornamentals: Northern root-knot nematode problem. Treatment with Vellum and hot water dip (41CoC) best for production of daylilies and lower recovery of RKN.
* Extension efforts underway.

Michigan: Haddish Melakeberhan

* Integrated soil health management.
* Nematode community, nutrient cycling and ecosystems changes.
* Till vs. no till.
* Cycling in turnover and disturbance affected by season.
* Establishing demonstration plots in Africa (Malawi). Five region test sites. Vegetable crops and fruit crops lack soil diversity. Study includes onion, tomato, chili, potato, mango, citrus and guava. Data collected on Nematode community and soil physiochemistry (pH, C, N, etc.).
* Assisting small holder farmers in adopting integrated nematode-soil health management in Guatemala. Focus on potato cyst nematode. Using composted chicken manure and *Puprpureum* and *Bacillus* mix. Two region rest sites (high altitude). Data collected on Nematode community and soil physiochemistry (pH, C, N, etc.).

Ohio: Chris Taylor

* Maize lines differ in their ability to alter available SCN numbers in corn/soybean rotation.
* Amino acids can act as attractant and repellents.
* Bacterial produced volatiles can affect nematode activity.

Business Meeting (11:00am):

* Email Greg Tylka if you want a copy of the group photo.
* Selection of officers for 2018-19.
  + Chair: Christopher Taylor – The Ohio State University – Unanimous.
  + Secretary: Nate Schroeder – University of Illinois – With the proviso that he does not have to be chair in 2019-20. – Unanimous.
* Selection of 2019 Meeting site.
  + Motion: Raleigh, NC July 25-26; local arrangements, Haddish, - 7 votes.
  + Motion: Wooster, OH August 1-2; local arrangements, Chris, - 9 votes.
    - Tim moved, Tom seconded: Can vote for none, either or both choices.
    - **Top vote choice: Wooster, OH Meeting time August 1-2 at OARDC, Wooster Campus.**
* Annual Reports – due September 25, 2018.
* Meeting Minutes – due August 28, 2018.
  + Should include: Send to Greg Tylka.
    - Accomplishments
    - Impacts
    - Publications
    - External Funding (should include total $ for grant).
      * Industry
      * Federal
      * Local
      * Commodity
* Adjourned (12:00pm): Moved (Tom) and seconded (Guiping) – Unanimous