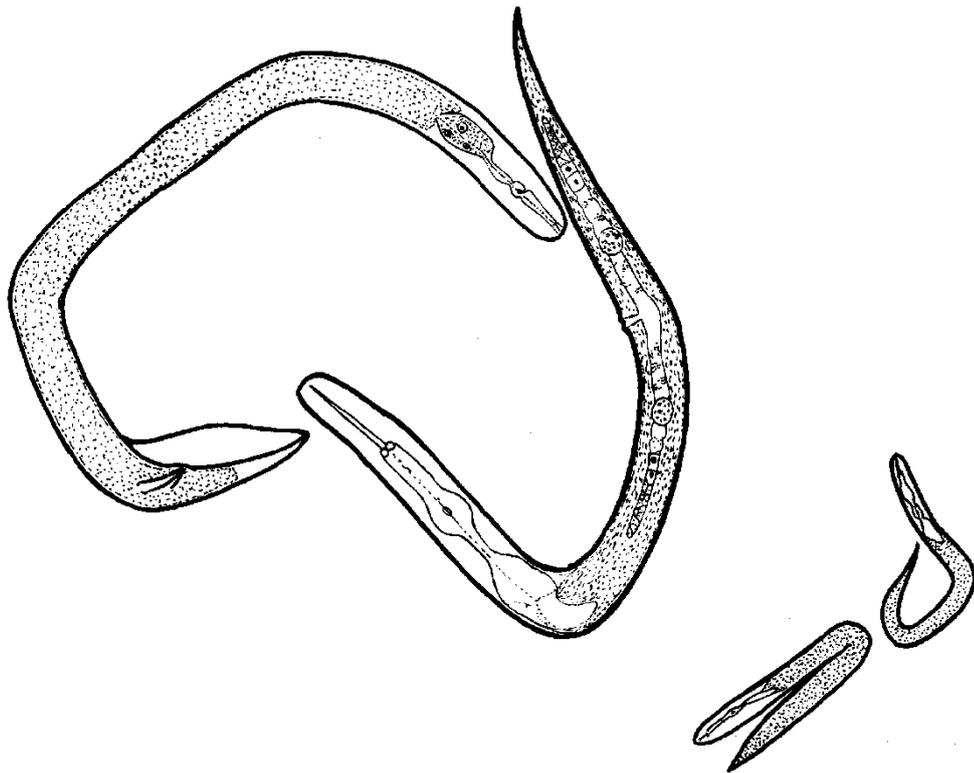


# AUSTRALASIAN NEMATODOLOGY NEWSLETTER



**Published by:**

**Australasian  
Association of  
Nematologists**

**VOLUME 31 NO. 1**

**JANUARY 2020**

# From the Editor

Thank you to all contributors for sharing your latest news and research outcomes in this issue of the Newsletter.

Articles on regional news, recent publications, announcements of new research projects, colleagues, visitors, students etc., research reports, conference or workshop reports, abstracts of recently submitted/accepted PhD theses, conference or workshop announcements and photos are welcome for publication in the AAN Newsletter. Contributions will be accepted at any time throughout the year so please forward articles and reports to me as they occur, with the deadline for the next issue in July 2020.

I look forward to receiving your contributions for future issues and keeping you up to date with the regional news of our AAN members.

*Rebecca Zwart*

## Contacts

Dr Mike Hodda

President, Australasian Association of Nematologists  
CSIRO Ecosystem Science  
GPO Box 1700  
Canberra ACT 2601

Tel: (02) 6246 4371  
Fax: (02) 6246 4000  
Email: [mike.hodda@csiro.au](mailto:mike.hodda@csiro.au)

Dr Sarah Collins

Secretary, Australasian Association of Nematologists  
Department of Agriculture and Food  
Locked bag 4  
Bentley Delivery Centre WA 6983

Tel: (08) 9368 3333  
Fax: (08) 9474 2840  
Email: [sarah.collins@agric.wa.gov.au](mailto:sarah.collins@agric.wa.gov.au)

Dr Kathrine Linsell

Joint Treasurer, Australasian Association of Nematologists  
SARDI Plant Health and Biosecurity  
Plant Research Centre, Hartley Grove  
Urrbrae SA 5064

Tel: (08) 8303 9437  
Fax: (08) 8303 9393  
Email: [katherine.linsell@sa.gov.au](mailto:katherine.linsell@sa.gov.au)

Ms Sue Pederick

Joint Treasurer, Australasian Association of Nematologists  
SARDI Plant Health and Biosecurity  
Plant Research Centre, Hartley Grove  
Urrbrae SA 5064

Tel: (08) 8303 9585  
Fax: (08) 8303 9393  
Email: [sue.pederick@sa.gov.au](mailto:sue.pederick@sa.gov.au)

Dr Rebecca Zwart

Editor, Australasian Nematology Newsletter  
Centre for Crop Health  
University of Southern Queensland  
Toowoomba QLD 4350

Tel: (07) 4631 1544  
Email: [rebecca.zwart@usq.edu.au](mailto:rebecca.zwart@usq.edu.au)

# Association News

## FROM THE PRESIDENT

Hello Nematologists. I hope everyone is reading this with the minimal possible disruption from the fire and weather events of the last month. I'm sure people have plenty on, so here is my subjective take on what you need to know regarding Australian nematology and AAN.

The biennial APPS meeting in Melbourne was attended by a number of AAN members, but, as far as I know, there was no informal meeting as has become traditional. We will have to do better at the next APPS meeting (2021) or ASDS meeting (Cairns 2020).

The 15<sup>th</sup> January 2020 is the deadline for registrations and abstracts for the 7<sup>th</sup> International Congress of Nematology. It is not too late to register after that, but it is substantially more expensive.

This year we have had 3 applications to the Australian Nematology support fund to attend 7ICN, the most ever. This has meant that we have had to try to maximise the impact of our money, balancing our funds against the sponsorship available from 7ICN and the students' university. We won't know how this balance will be achieved until after the 7ICN bursaries are announced, but may mean that all applicants get only about 25% funding of the total cost from AAN because the rest can be made up from other sources, or else only some applicants get a much larger proportion of the funds needed (up to 75%) because other funds are very limited. It is good to see this much interest, and to be able to offer quite substantial monetary support for students. It is not so good that the funds are not greater.

December saw another biennial nematology workshop at the University of Adelaide. This one was the most international yet, with participants from Myanmar, Fiji and Florida, as well as Queensland, SA, WA, NSW, Victoria and the ACT. This course marked 20 years since the first iteration in 1999. The course content has changed dramatically in that time, partially because of our evolving understanding of nematodes, partially because of different nematological issues being prominent at the time, and partly because of different interests of participants.

The course also marked Kerrie Davies' final(?) retirement from Adelaide University. Kerrie has been associated with the university for many years, interrupted by family commitments, and has achieved a tremendous amount without any fanfare or fuss. She has taught undergraduate nematology, supervised numerous postgraduate students (many of whom continue in nematology), co-presented the biennial nematodes in cropping systems workshop, clarified the evolution and systematics of several taxonomic groups of nematodes, described more Australian nematode species than just about anyone else, contributed to our knowledge of nematode-insect-plant interactions, working with many prominent nematologists including Harry Wallace, John Fisher, Robin Giblin Davis, Kelley Thomas, Natsumi Kanzaki, and many others. Personally, I have enjoyed immensely working with Kerrie for the last 20+ years.

I'm afraid I have to relate an anecdote related to Kerrie's retirement. For many years, Kerrie has been saying that various things were "things to do when she retired". Kerrie officially retired in about 1999. So she was already officially "retired" when making these statements, except that she was still working incredibly hard and achieving a colossal amount in retirement. This of course was her most annoying characteristic: achieving so much in retirement free from the administrative load associated with paid employment, which showed up many of the rest of us.

Before her retirement, Kerrie and "Fred" Bartholomaeus carefully curated and packed the Waite Nematode Collection and arranged for its transfer to ANIC in Canberra. In ANIC it will be in

temperature- and humidity-controlled storage, which should mean less curation will be required. It was electronically databased as it arrived, and work is continuing on consolidating all the data into a single national species list.

*Mike Hodda*

## **FROM THE TREASURERS**

Fees for the AAN (Australasian Association of Nematologists) are due annually 1<sup>st</sup> July through to 30<sup>th</sup> June. The \$15 annual fee covers newsletter articles and information regarding nematology opportunities including specialised workshops.

If you are outstanding with your fees you will be contacted shortly for the previous year.

You can no longer pay through the APPS web site when registering your membership, all now come through the AAN bank account. We have had support for many years with APPS but they are no longer able to assist with this service due to logistics.

### ONLY Payment Method

ANZ

Account Name: Australasian Association of Nematologists

BSB: 012-950

Account # 5180-07506

Looking forward to your continued support and the camaraderie the Nematology group brings.

Kind Regards

*Katherine Linsell and Sue Pederick (Joint Treasurers AAN)*

## **NEW MEMBERS**

Welcome to the newest member of AAN, Dr Deepthi Amarasena, Research Officer, Entomology and Nematology Division, Tea Research Institute of Sri Lanka, Talawakele.

## **AAN BURSARY AWARDEES**

The Executive Committee of AAN is pleased to award two student bursaries to assist students to attend the upcoming 7<sup>th</sup> International Congress of Nematology. Congratulations to PhD students Sonal Channale and Elaine Gough, University of Southern Queensland. At the congress, Sonal will present her work on transcriptomics analysis of resistance to root-lesion nematode *Pratylenchus thornei* in chickpea (*Cicer arietinum*), while Elaine will present her work on the multipartite interaction between *P. thornei*, arbuscular mycorrhizal fungi, rhizobia and nutrients in mungbean.

# Regional News

## NEWS FROM QUEENSLAND

### University of Southern Queensland

The Crop Nematology team at University of Southern Queensland (USQ) have endured a very dry winter season but were able to complete experiments because we used land that had been in long fallow for 18 months at our *Pratylenchus thornei* site at Formartin, Queensland. The survival of *P. thornei*, despite the long-fallow was remarkable. For example, at the site in winter 2017, wheat varieties were grown to establish a range of *P. thornei* population densities in a Grains Research and Development Corporation (GRDC)-funded project (DAW00245). In November 2017, after harvesting the wheat varieties, average population densities of *P. thornei* at 0–30 cm soil depth were 43/g soil. After the 18-month bare fallow, the average population densities were 40/g soil.

Kirsty Owen is part of a new national GRDC-funded project investigating Soilborne disease interactions in Australian farming systems (DJP1907-002RMX); the project is led by Dr Grant Hollaway, Agriculture Victoria. In winter 2019, we established several experiments to set up different population densities of *P. thornei* to test, in 2020, the interaction of (i) *P. thornei* and crown rot, (ii) *P. thornei* and arbuscular mycorrhizal fungi and (iii) *P. thornei* and nitrogen levels on the yield of wheat. Martin Fiske has joined the project in place of Tim Clewett who retired in late December 2019 after a very enjoyable period of long service leave in 2019. Kirsty is also part of another GRDC project, Northern Integrated Disease Management (USQ1907-001RTX) which is led by Dr Dante Adorada from USQ. She is working with Lisa Kelly (Queensland Department of Agriculture and Fisheries) to investigate the interaction of *P. thornei* and Fusarium wilt (caused by *F. solani* and *F. oxysporum*) in mungbean following a suggestion of worsening symptoms of wilt in the fields where *P. thornei* was also present. There were some large effects of treatments on plant growth in a glasshouse experiment and final results are expected soon.

Ros Reen and Hannah Rostad have finished harvesting experiments and processing is under way in the GRDC-funded Wild *Cicer* project (USQ00017). Last year 200 entries from south eastern Turkey were screened for resistance to *P. thornei* and *P. neglectus*. These are the first trials with wild accessions collected in 2014. The project aims to determine if there are higher levels of resistance to *P. thornei* and *P. neglectus* than currently available in Australian chickpea cultivars. It is hoped that increasing resistance, whilst also widening genetic diversity within chickpea germplasm, will allow development of improved cultivars. New methods for glasshouse screening of resistance of chickpea to *P. neglectus* are also underway. We are testing the effect on reproduction of *P. neglectus* in different soil types and the addition of arbuscular mycorrhizal fungi.

In 2019, several new crops were added to the GRDC-funded National Variety tests (USQ1907-002SAX) to screen for resistance and/ or tolerance to *P. thornei* and *P. neglectus*. The new crops for resistance screening are faba beans, chickpea, field pea and oats, and for tolerance screening, chickpea is the latest crop added. As with previous years, wheat and barley continue to be tested for both resistance and tolerance. Varieties and advanced breeding lines within each of these crops are tested for resistance and tolerance by Jason Sheedy (project leader), Hannah Rostad, Michelle Thompson and Neil Robinson. This year, was the first year that all resistance experiments were conducted in the new glasshouse facilities at USQ, while our dedicated *P. thornei* field site at Formartin proved successful again to screen for tolerance, despite the very limited in-crop rain. Results of repeated experiments are used to produce ratings of tolerance and resistance so that growers can choose the best varieties to limit yield loss and reduce nematode population densities in their farming systems.

PhD student Sonal Channale had a very productive four months at the International Crops Research Institute of the Semi-Arid Topics (ICRISAT) in Hyderabad, India, as a recipient of a Crawford-In-Qld Student Award. Sonal's study has given us the first insights into candidate resistance genes in chickpea (*Cicer arietinum*) against root-lesion nematode (*Pratylenchus thornei*). Collaboration between USQ and the chickpea genomics group at ICRISAT to understand root-lesion nematode resistance in chickpea will continue with Rebecca Zwart awarded a Australia-India Strategic Research Fund Early- and Mid- Career Fellowship 2020 to travel to ICRISAT in April.

Congratulations to our PhD student, Elaine Gough (previously Tabah) who was awarded second place in the student poster competition at the Australasian Plant Pathology conference for her research on "Interactions of root-lesion nematodes, arbuscular mycorrhizal fungi and rhizobium in mung bean". Our team flew the nematode flag at the conference (conference papers are listed below) with attendance by Neil Robinson, Jing Lin, Jason Sheedy, Md Motiur Rahaman, Elaine Gough and Kirsty Owen. Kirsty and Jason also each chaired a session.

We will have several team members (Jason, Sonal, Elaine and Kirsty) attending the International Congress of Nematology in May in Antibes, France. Congratulations to Sonal and Elaine, recipients of AAN bursaries to supplement their travel to 7ICN. Sonal was also awarded a bursary from the International Federation of Nematology Societies (IFNS) to attend the conference. In other good news, Elaine was awarded a GRDC-PhD top up scholarship which she will use in the final year of her research to finalise the last of her results and to supplement her travel to 7ICN. At 7ICN Kirsty will present a review of the interaction of soilborne fungi in cereals in Australian grain crops at a workshop on the interactions of nematodes and fungi, organised by Prof. Richard Sikora. In the workshop, we are looking forward to generating discussions about where research gaps lie and where more research is needed.

New publications from the USQ Crop Nematology team are below.

#### **Journal and book chapters:**

Gupta, V.V.S.R., Roper, M.M., & Thompson, J.P. (2019) Harnessing the benefits of soil biology in conservation agriculture. In: J. Pratley and J. Kirkegaard (Eds), *Australian Agriculture in 2020: From Conservation to Automation*. Agronomy Australia and Charles Sturt University: Wagga Wagga. pp. 241-258.

Owen, K.J., Clewett, T.G., Bell, K.L., & Thompson, J.P. (2018) Lost opportunity: Mungbeans (*Vigna radiata*) in wheat cropping systems favour *Pratylenchus thornei*. *Journal of Nematology* 50:4, 650.

Page, K.L., Dang, Y.P., Dalal, R.C., Reeves, S., Thomas, G.A., Wang, W., & Thompson, J.P. (2019) Changes in soil water storage with no-tillage and crop residue retention on a Vertisol: Impact on productivity and profitability over a 50 year period. *Soil and Tillage Research* 194, 104319. doi: 10.1016/j.still.2019.104319

Seymour, N.P., Edwards, D.G., & Thompson, J.P. (2019) A dual rescaled Mitscherlich model of the simultaneous savings in phosphorus and zinc fertiliser from arbuscular mycorrhizal fungal colonisation of linseed (*Linum usitatissimum* L.). *Plant and Soil* 440, 97–118 doi: 10.1007/s11104-019-04065-2

Thompson, J.P., Sheedy, J.G., & Robinson, N.A. (2019) Resistance of wheat genotypes to root-lesion nematode (*Pratylenchus thornei*) can be used to predict final nematode population densities, crop greenness and grain yield in the field. *Phytopathology*. doi: 10.1094/PHYTO-06-19-0203-R

Zwart, R.S., Thudi, M., Channale, S., Manchikatla, P., Varshney, R.K., & Thompson, J.P. (2019) Resistance to plant-parasitic nematodes in chickpea: Current status and future perspectives. *Frontiers in Plant Science* 10, 966. doi: 10.3389/fpls.2019.00966

#### **Conference proceedings:**

Hollaway, G., Brennan, J., Murray, G., Fanning, J., McKay, A., Linsell, K., Owen, K., Collins, S., Wilkinson, C., Forknall, C., Reeves, K., & Simpfendorfer, S. (2019) Economic impact of root lesion nematodes (*Pratylenchus* spp.) on Australian wheat production. In: U. Rao, A.A. Dababat, V.S.

- Somvanshi, T.K. Dutta, R. Pervez, Z. Maafi (Eds), *Abstract Book of the 7<sup>th</sup> International Cereal Nematodes Symposium*, (p. 20) New Delhi, India.
- Owen, K., Clewett, T., Plant, E., & Thompson, J. (2019) Strong indication of susceptibility of faba bean (*Vicia faba*) genotypes to the root-lesion nematode *Pratylenchus thornei*, under field conditions. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 224) Melbourne, Victoria.
- Rahaman, M., Thompson, J., Zwart, R., & Seneweera, S. (2019) Wheat root histopathology and defensive biochemistry against root-lesion nematode *Pratylenchus thornei*. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 141) Melbourne, Victoria.
- Robinson, N., Sheedy J., Macdonald, B., Owen, K., & Thompson, J. (2019) Visual scores and normalised difference vegetation index can be used to screen wheat cultivars for tolerance to *Pratylenchus thornei*. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 201) Melbourne, Victoria.
- Rognoni, B., Sheedy, J., Valeria, P., Forknall, C., Robinson, N., & Thompson, J. (2019) Modelling *Pratylenchus thornei* field populations over multiple soil depth intervals and trials to rank wheat genotypes for resistance in the northern Australian grains region. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 140) Melbourne, Victoria.
- Rognoni, B., Sheedy, J., Paccapelo, V., Forknall, C., Robinson, N., Thompson, J., & Kelly, A. (2019) An evaluation of separable variance structures for highly genetically correlated environments. In: *Biometrics by the Botanical Gardens, International Biometric Society – Australasian Regional Conference*, (p. 48) Adelaide, South Australia.
- Sheedy, J., Paccapelo, V., & Thompson, J. (2019) Iranian landrace wheats are a valuable source of dual resistance to the root-lesion nematodes *Pratylenchus neglectus* and *P. thornei*. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 202) Melbourne, Victoria.
- Sheedy, J.G., Pasam, R.K., Hayden, M.J., Forrest, K.L., Paccapelo, M.V., & Thompson, J.P. (2019) Novel resistance to root-lesion nematode (*Pratylenchus thornei*) identified in a genome-wide association study of Iranian landrace wheats. In: *Wheat Breeding Assembly 2019, Science with Impact*, (p. 73) Adelaide, South Australia.
- Tabah, E., Thompson, J., Owen, K., Zwart, R., & Marchuck, A. (2019) Arbuscular mycorrhizal fungi drive nodulation by rhizobia and yield of mungbean. In: *2019 Australian Summer Grains Conference, Enduring Farm Profitability*. Gold Coast, Queensland.
- Tabah, E., Owen, K., Zwart, R., Marchuk, A., & Thompson, J. (2019) Arbuscular mycorrhizal fungi drive nodulation by rhizobia and yield of mungbean despite infestation with *Pratylenchus thornei*. In: *Australasian Plant Pathology Society Conference Handbook, Strong Foundations, Future Innovations*, (p. 238) Melbourne, Victoria.
- Thompson, J.P., Sheedy, J.G., Robinson, N.A., & Kelly, A.M. (2019) Value of glasshouse testing of wheat genotypes for resistance to root-lesion nematode (*Pratylenchus thornei*) for wheat breeding and growers' varietal selection. In: *Wheat Breeding Assembly 2019, Science with Impact*, (p. 43) Adelaide, South Australia.
- Zwart, R.S., Sheedy, J.G., Khoo, K., Chalmers, K., Taylor, J., Mather, D., & Thompson, J.P. (2019) Exploring the genetic diversity of resistance to root-lesion nematodes (*Pratylenchus thornei* and *P. neglectus*) in wheat. In: *7<sup>th</sup> International Cereal Nematodes Symposium*, (p. 29) New Delhi, India.
- Zwart, R.S., Reen, R.A., & Thompson, J.P. (2019) Association mapping of root-lesion nematode *Pratylenchus thornei* resistance in *Cicer reticulatum*, the wild progenitor of chickpea. In: *Australian Pulse Conference, Taste and Technology*. Horsham, Victoria.

Kirsty Owen

## NEWS FROM VICTORIA

### Agriculture Victoria, Horsham

In Agriculture Victoria in Horsham, I'd first like to acknowledge some new staff members that started within the last few months. We welcome Glenn Sluggett who brings a wealth of experience to our field team; and Dr Hari Dadu, who has been brought on as a research scientist to support our oat pathology projects. Dr Winnie Liu Heang, who managed our soil-borne disease surveillance program, is unfortunately set to leave us. She has proven herself invaluable to our team and is going to be very difficult to replace.

Harvest for the 2019 season is finally done and we are now looking at the last data for the state nematology project, due to finish in 2020, and the first for the new soilborne disease project, which started last year. Grain yields have been solid across the Victorian trials and initial results are looking promising for both projects. National Variety Trial resistance ratings for cereal cyst nematode and the root lesion nematodes, *Pratylenchus thornei* and *P. neglectus*, have been submitted and will be published in disease guides for 2020.

With the Victorian state nematology project due to finish in 2020, Dr Joshua Fanning has led authorship of a paper to be published in *Phytopathology*. The paper covers four years of work in the project on the relationship between pre-sowing nematode density and yield loss in wheat and barley.

The national nematode epidemiology and management program came to an end in 2019 and the final report has been prepared and accepted.

The National Nematology project was six years of work that resulted in

- updates to fact sheets on both Root Lesion and Cereal Cyst nematodes,
- large amounts of data collection on yield losses across pulse, oilseed and cereal crops,
- an economic report on yield losses associated with Root Lesion Nematodes,
- revision of the PreDicta B risk categories,
- identifying that varieties ranked similarly in east and west Australia for their resistance to *P. neglectus*, and
- several training events and field tours held across the country.

In November of 2019, Dr Grant Hollaway also had the opportunity to travel to New Delhi, India for the 7<sup>th</sup> International Cereal Nematodes Symposium, giving a presentation on the Economic Impact of Root Lesion Nematodes (*Pratylenchus spp.*) on Australian Wheat Production.

### Publications:

Fanning, J.P., Reeves, K., Forknall, C., McKay, A.C., Hollaway, G.J. (2019) *Pratylenchus thornei*: The relationship between pre-sowing nematode density and yield loss in wheat and barley. *Phytopathology* doi: 10.1094/PHYTO-08-19-0320-R

Hollaway, G., Brennan, J., Murray, G., Fanning, J., McKay, A., Linsell, K., Owen, K., Collins, S., Wilkinson, C., Forknall, C., Reeves, K. & Simpfendorfer, S. (2019) Economic impact of root lesion nematodes (*Pratylenchus spp.*) on Australian wheat production. In: 7<sup>th</sup> *International Cereal Nematodes Symposium*, (p. 20) New Delhi, India.

*Jonathan Baker and Joshua Fanning*

## NEWS FROM WESTERN AUSTRALIA

### Murdoch University

The Plant Nematology section of the Plant Biotechnology Research Group continues to be active in research on the molecular basis of nematode-plant interactions and new methods of nematode control.

One interesting recent joint publication with DPIRD (Farhana Begum, John Fosu-Nyarko, Shashi Sharma, Bill Macleod, Sarah Collins and Michael G. K. Jones, see recent publications below and abstract on page 10) was on the identification of *Pratylenchus curvicauda* in the WA grainbelt. The original aim of this PhD project undertaken by Farhana Begum was to study the biology of *Pratylenchus quasiterioides* in more detail, but the RLNs studied were identified as *Pratylenchus curvicauda*.

### PhD research:

Jebin Akther has recently been awarded her PhD for research on the stability of RNAi-based transgenic resistance to root-knot (*Meloidogyne incognita*) and cyst-nematodes (*Heterodera schachtii*). See abstract on page 11). She also attended the ESN Conference in Ghent.

The aim of Maria Maqsood's PhD project (Towards understanding common mechanisms of nematode and aphid effectors for plant parasitism) is to study effectors used by plant parasitic nematodes and aphids (Green Peach Aphid) to enable them to parasitise plants, to find common effectors. Effectors are usually secreted peptides or proteins which are vital for successful parasitism. Effector expression can be down-regulated using RNAi technology and so confer host resistance. Maria is looking for common effectors to determine whether both nematode and aphid resistance in transgenic plants could be conferred by a suitably selected single RNAi hairpin construct.

Maria has recently had a baby daughter, but is now back in the lab working to complete her project.

### Other activities:

Mike was invited by the Government of Mauritius to review agricultural R&D and to provide detailed plans for establishing the Mauritius Biotechnology Institute, Stage 1 Agricultural Technologies. This involved a series of visits, discussions with the Steering Group (Chaired by the Chancellor of the University of Mauritius), the Director of the Mauritius Sugar Industry Research Institute, the Minister of Agro-Industries and Food Security, the Prime Minister and the Australian High Commissioner, amongst many others. He has also been appointed to two Commonwealth Government Committees. John Fosu-Nyarko continues to work hard in the lab on a range of projects and provides invaluable support and leadership to PhD students and other researchers.

### Recent Relevant Publications:

Begum, F., Fosu-Nyarko, J., Sharma, S., MacLeod, B., Collins, S. & Jones, M.G.K. (2019) Serendipitous identification of *Pratylenchus curvicauda* from the grainbelt of Western Australia. *Journal of Nematology*, 51, 1-15. doi: 10.21307/jofnem-2019-046

Harikrishna, J.A., Othman, R.Y., Mispan, M.S., Iqbal, S., Han, Y. & Jones, M.G.K. (2019) Mini review: Biosafety of RNA silencing and genome editing technologies in crop plants: Malaysian and Australian research perspectives *Asia Pacific Journal of Molecular Biology & Biotechnology* 27, 64-69.

Iqbal, S and Jones, MGK (2019). Chapter 14. Developments in diagnostic techniques for cereal pathogens. In: R. Oliver (Ed) *Integrated disease management of wheat and barley*. Burleigh Dodds Science Publishing: Cambridge UK. Pp. 271-288.

*Mike Jones, John Fosu-Nyarko and colleagues*

## NEWS FROM SOUTH AUSTRALIA

### University of Adelaide

Together with Mike Hodda (CSIRO) and Dorota Porazinska (Uni. of Florida), Kerrie Davies has just run what she expects to be her last short course in Plant and Soil Nematology. When she and Mike first ran one of these back in the late 1990's, they wondered if there would be any more. Since then, there have been 12 short courses and one Master's level course. So there was a need – and this will probably continue given that no Australian university now includes a solid nematological block in their teaching. Kerrie hopes that someone will come forward to help Mike keep the courses going.

Kerrie retires (from her voluntary position) at the end of 2019. She will continue to wander in and out of the Waite, and as a University 'Visitor' will keep her email and access to the Barr-Smith Library, and hopes that people will send her manuscripts for review or (in the case of overseas students) help with scientific English. She plans one more visit, about mid-2020, to Florida – for the retirement of Robin Giblin-Davis – and is looking forward to catching up with various collaborators at that time.

Kerrie considers that she has been remarkably lucky. She has worked with many interesting and friendly nematologists and entomologists; has travelled extensively within Australia and overseas in pursuit of nematodes; been able to fund most of her research (she thanks GRDC, RIRDC and ABRS); enjoyed the challenges of undergraduate and postgraduate teaching; made wonderful friends; and as a volunteer been able to avoid most administrative trivia. For roughly 20 years, the University of Adelaide supported her with a lab, access to Library and IT; thus enabling her to carry on her work.

Finally, Kerrie sends best wishes for 2020 to all her nematological colleagues, and hopes they have interesting projects and good results.

*Kerrie Davies*

# Abstract

## SERENDIPITOUS IDENTIFICATION OF *PRATYLENCHUS CURVICAUDA* FROM THE GRAINBELT OF WESTERN AUSTRALIA

Farhana Begum <sup>1</sup>, John Fosu-Nyarko <sup>1</sup>, Shashi Sharma <sup>2</sup>, Bill Macleod <sup>2</sup>, Sarah Collins <sup>2</sup>  
and Michael G. K. Jones <sup>1</sup>

<sup>1</sup> Plant Biotechnology Research Group, WA State Agricultural Biotechnology Centre, Murdoch University

<sup>2</sup> Department of Primary Industries and Regional Development, WA

A *Pratylenchus* species identified during a survey of *Pratylenchus quasitereoides* incidence at four locations of the grainbelt of Western Australia is described. Morphological and morphometric features indicated the previously undescribed morphotypes in nematode mixtures encountered were conspecific to *P. curvicauda*, and were clearly distinguishable from nine common *Pratylenchus* spp. Typical features of *P. curvicauda* were its body length (415–540 µm), which was curved to a c-shaped with a maximum body diameter of 20 µm, and the nature of its tail; 34 µm long, 2.8 µm wide at the anus and a typical ventrally arcuate with a round terminus. Sequenced for the first time, the sequences of the partial 18S-ITS1-5.8S-ITS2-partial 28S (80 clones, 14 individual nematodes) and the 28S-D3 (17 clones) regions of the rDNA of *P. curvicauda* had overall mean distances of 0.013 and 0.085, respectively. Phylogenetic analyses with sequences of both segments of the rDNA clearly showed the *P. curvicauda* isolates as monophyletic, distinct from ca. 40 *Pratylenchus* species. Notably, it was distinct from *Pratylenchus* species present in Australia including *P. quasitereoides* and a Western Australia isolate of *P. thornei*. Further research into the biology of *P. curvicauda* is needed to facilitate development of strategies for its management, if it is an important pest.

(Full paper published in *Journal of Nematology*, 51, 1-15)

# Abstract

## STABILITY AND HERITABILITY OF RNAi IN GENERATIONS OF TRANSGENIC PLANTS AND NEMATODES

*Jebin Akther, PhD student  
Murdoch University*

RNA interference (gene silencing) technology is a potential alternative genetic approach for nematode control. A challenge of an RNAi-based transgene approach ('Host-Induced Gene Silencing') is to generate plants that express nematode control transgenes stably over many generations. Various factors can influence transgene stability (e.g. the target selected, insertion site, transgene copy number, promoter methylation, sequence similarity). In this project, the inheritance and effectiveness of RNAi in plants conferring resistance to PPNs and effects on PPNs themselves were studied to underpin knowledge of the application of RNAi as a strategy to confer nematode resistance in crop plants.

In a range of transgenic events studied, three were confirmed as single copy over three generations both by ddPCR and qPCR. Infection assays of *M. incognita* showed significantly fewer (80%) galls and egg masses on the roots of infected transgenic plants than on wild type plants. Infection with *H. schachtii* resulted in significantly fewer (93 %) cysts compared with controls.

Interestingly, nematodes that survived after feeding on transgenic plants had reduced egg hatching compared to nematodes fed on control plants. An additional infection assay was conducted to evaluate progeny nematodes for the maintenance of reproductive suppression. The results indicated that progeny were also impaired in their ability to reproduce successfully, as demonstrated by a 50% reduction in the cyst (*H. schachtii*) and 60% reduction in galls (*M. incognita*) when inoculated to wild type plants.

The outcomes of this study will help optimise and support an RNAi-based nematode control strategy for field application since stability in RNAi-based traits is vital for this strategy to be used to reduce the economic losses caused by PPNs.

# Symposium Report

## 7<sup>th</sup> INTERNATIONAL CEREAL NEMATODES SYMPOSIUM AT NEW DELHI, INDIA TO COMBAT NEMATODE PROBLEMS IN CEREAL CROPS

Fifty delegates from across the globe recently gathered at the 7<sup>th</sup> International Cereal Nematode Symposium in New Delhi, India to discuss the spread of cereal nematodes, strategies to lessen their impact on crops and ways to boost international collaboration on research.

Nematodes, microscopic plant parasites that include the *Heterodera* species of cereal cyst nematode and the *Pratylenchus* species of root lesion nematodes, are widespread in wheat production systems throughout West Asia, North Africa, parts of Central Asia, northern India, and China, and pose a grave economic problem for wheat production systems globally.

The International Maize and Wheat Improvement Center (CIMMYT) and the Turkish Ministry of Agriculture and Forestry have been working over the last 12 years -- in collaboration with the International Center for Agriculture in the Dry Areas (ICARDA), national program partners, and research institutions in Australia and Europe - to understand the importance and distribution of these species of cereal nematodes, as part of the ICARDA-CIMMYT Wheat Improvement Program (ICWIP).

“Because cereals are the staple food for the majority of the world’s population, cereal nematodes pose an enormous threat to global food security,” said Abdelfattah Dababat, leader of CIMMYT’s Soil Borne Pathogens Program.

“The symposium allows scientists from around the world to share their findings, lessons and strategies to combat this threat.”



*Participants of the 7th International Cereal Nematodes Symposium at New Delhi, India.*

The symposium, organized by ICWIP and hosted by the Division of Nematology at the ICAR- Indian Agricultural Research Institute (IARI) (<https://www.iari.res.in/>), was held November 3-6 at New Delhi's National Agricultural Science Complex. The conference was inaugurated by Dr Trilochan Mohapatra, Director General of ICAR & Secretary DARE, Government of India. It included sessions on the global status and distribution of cereal nematodes, their economic importance and population dynamics, management strategies both with and without using host resistance, the genomes and parasitism genes of cereal nematodes, and the use of molecular tools for cereal nematode research.

Among the notable global developments shared, highlights included the following.

- Scientists from Turkey, Syria, Iran and Israel described the distribution and management status of *Heterodera* spp. in their region
- Hendrika Fourie from South Africa's North West University, and colleagues, discussed the nematode problems in South Africa.
- Rebecca Zwart from the University of Southern Queensland and Grant Hollaway from Agriculture Victoria, Australia, presented findings on the *Pratylenchus* menace in wheat in Australia.
- Uma Rao, a co-organizer of the symposium from IARI, and colleagues, discussed the deployment of molecular tools to manage the problem of the *Meloidogyne graminicola* nematode in rice-wheat cropping systems.
- Richard Sikora, from the University of Bonn, Germany, summarized the current challenges in nematology, especially pertaining to wheat and maize, and reiterated the need for new technologies and management approaches for the small- and medium-sized farms of the future. He also highlighted the role of remote sensing in detecting nematode diseases.
- A.K. Singh, Joint Director of Research at IARI gave a formal presentation on molecular breeding of Basmati rice.

Trilochan Mohapatra, Director General of ICAR & Secretary Dare, and Arun K. Joshi from CIMMYT's India office were among the other distinguished speakers.

Following the symposium, participants observed nematode-related research work underway at IARI's Division of Nematology, the largest nematology center in India. They also visited the IARI museum and the institute's Division of Entomology.

Symposium supporters include CIMMYT, the CGIAR Research Program on Wheat, the Indian Council of Agricultural Research (ICAR), the Borlaug Institute for South Asia (BISA), the Indian Agricultural Research Institute (IARI), the Republic of Turkey's Ministry of Food, Agriculture and Livestock, Corteva, and Syngenta, Plant Breeders Union of Turkey (BISAB). Previous symposiums have been held in Turkey, Austria, China and Morocco.

*Uma Rao, Tushar Dutta, Vishal Somvanshi and Abdelfattah Dababat*

# Book

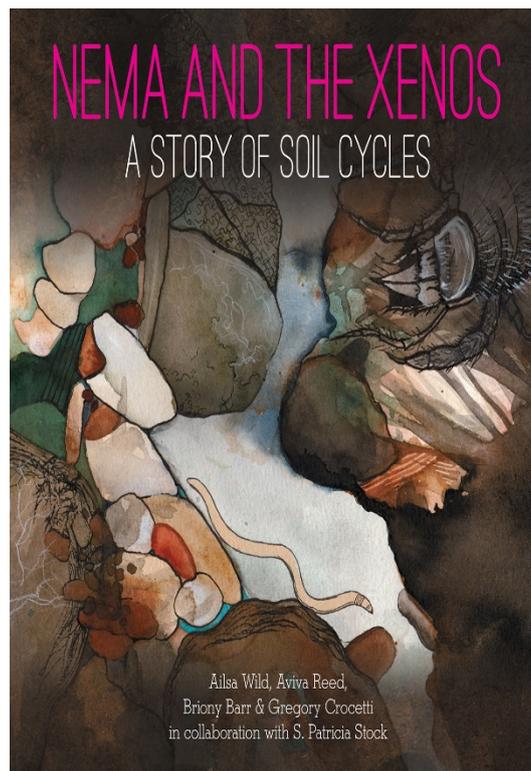
## NEMA AND THE XENOS – A STORY OF SOIL CYCLES

*Ailsa Wild, Aviva Reed, Briony Barr, Gregory Crocetti, S. Patricia Stock*

The tale of a tiny worm, the bacteria that live inside her, and a tree being munched on by a grub, is now available from CSIRO Publishing at <https://www.publish.csiro.au/book/7908/#details>.

This is a story about tiny creatures that live in the darkness of the soil.

When a tree cries out in pain, some unexpected heroes come to the rescue. Nema and her gang of young nematodes (tiny worms) embark on a dangerous journey underground. The Xenos, a group of wise but deadly bacteria, hitch a ride. The story of how they help the tree is full of action, life-or-death challenges and microscopic warfare. It is a story of co-operation and ancient partnership, about events happening all over the Earth, in the hidden worlds beneath our feet.



*Front cover of Nema and the Xenos.*

# 2020 Nematology Conferences

## 7<sup>TH</sup> INTERNATIONAL CONGRESS OF NEMATOLOGY



**Date:** 3-8<sup>th</sup> May 2020

**Venue:** Antibes Juan-les-Pins, France

**Website:** <https://www.alphavisa.com/icn/2020/index.php>

## 11<sup>TH</sup> AUSTRALASIAN SOILBORNE DISEASES SYMPOSIUM



**Date:** 24-27<sup>th</sup> November 2020

**Venue:** Hilton, Cairns

**Website:** <http://asds2020.w.yrd.currinda.com/>

# Survey

## INTERNATIONAL FEDERATION OF NEMATOLOGY SOCIETIES

Members of AAN are invited to participate in a 5 minute survey for IFNS to know your opinion and ideas for improving the IFNS functions. The results will be presented at 7ICN as input for discussion in the future of the Federation. The link to the survey can be found on the IFNS website ([www.ifns.org](http://www.ifns.org)) and below:

[IFNS survey](#)