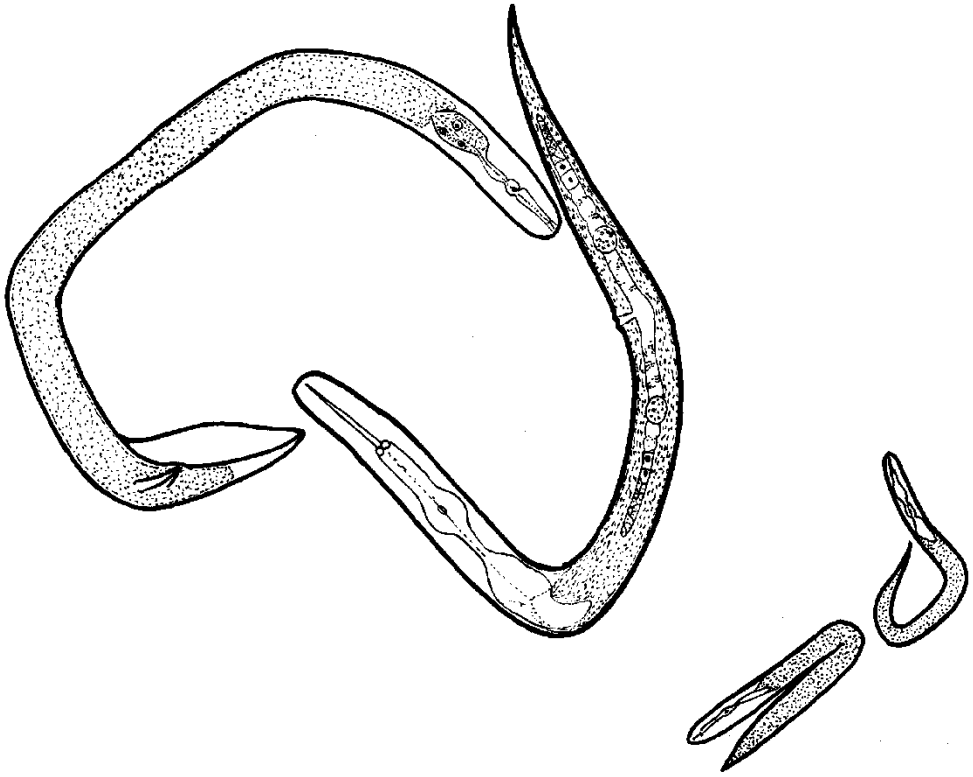
ISSN 2208-4312

AUSTRALASIAN NEMATOLOGY NEWSLETTER



Published by: Australasian Association of Nematologists

VOLUME 34 NO. 1 JANUARY 2023

From the Editor

A big thank you to all contributors for sharing your latest news and interesting research outcomes in this issue of the AAN 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 June 2023.

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 — Tel: (02) 6246 4371
GPO Box 1700 — Fax: (02) 6246 4000
Canberra ACT 2601 — Email: mike.hodda@csiro.au

Dr Sarah Collins
Secretary, Australasian Association of Nematologists
Department of Agriculture and Food — Tel: (08) 9368 3333
Locked bag 4 — Fax: (08) 9474 2840
Bentley Delivery Centre WA 6983 — Email: sarah.collins@agric.wa.gov.au

Dr Kathrine Linsell
Joint Treasurer, Australasian Association of Nematologists
SARDI Plant Health and Biosecurity — Tel: (08) 8429 2232
Plant Research Centre, Hartley Grove — Fax: (08) 8303 9393
Urrbrae SA 5064 — Email: katherine.linsell@sa.gov.au

Ms Sue Pederick
Joint Treasurer, Australasian Association of Nematologists
SARDI Plant Health and Biosecurity — Tel: (08) 8429 2214
Plant Research Centre, Hartley Grove — Fax: (08) 8303 9393
Urrbrae SA 5064 — Email: sue.pederick@sa.gov.au

Dr Rebecca Zwart
Editor, Australasian Nematology Newsletter
Centre for Crop Health — Tel: (07) 4631 1544
University of Southern Queensland
Toowoomba QLD 4350 — Email: rebecca.zwart@usq.edu.au

Association News

FROM THE PRESIDENT

Welcome to another year of nematology.

So what is a nematode year? "Dog years" are often reckoned to be about 7 human years (based on the calculation that a dog living the average of about 12 years is equivalent to a human living the average of just over 80 years). By this sort of calculation, a Rhabditid nematode year would be almost 15,000 human years (based on a life cycle of about 2 days), and a Dorylaimid nematode year may be more like 40 human years (based on a maximum life cycle of about 2 years). Based on these sorts of (wildly speculative) calculations, I wonder if I have found the secret for why all the nematologists I know seem to be so busy—we are trying to pack too many nematode years into our all-too-human years!

That is a long and roundabout way of introducing a statement that I hope everyone has had a good break ahead of what will undoubtedly be another busy year for everyone. The nematodes just keep on going at a furious pace almost regardless of what we do to manage them.

As you may be able to glean from the above rather tangential opening, I was distinctly lacking inspiration for this piece. So I looked at the recent messages from the Presidents of other nematology societies like SON and ESN seeking inspiration for what to write about. What I saw from these esteemed individuals was a request for nematologists to work together despite the tensions created by the war in Ukraine, (including a now-censored post from Russian scientists opposing the war), and a request to get involved in the society and the organization of the next meeting.

This is a nice segue into a message about the next nematology meeting. This year we should be able to have a face-to face meeting—reintroduced travel restrictions related to CoVID notwithstanding. After a small meeting at Cairns in August last year, I hope that more people will be able to come to the meeting in Adelaide later this year (20 to 24 November). In addition to catching up with colleagues at a scientific meeting, there will be a free informal dinner get together as well, which is always a highlight.

Nematology workshops pre-CoVID were always popular, and covered a range of topics, generally around a unifying theme. Myself and Sue Pederick will be organizing the Adelaide workshop, and we welcome suggestions for themes, but as a starter, I wonder whether interactions between parasitic nematodes and host plants may be a good theme. Recently, we have seen a number of new nematodes recognized which seem to have different relationships with their hosts than closely-related species, which raise taxonomic, diagnostic and crop management issues of interest to a wide range of people.

Any ideas for different topics or suggestions for talks within the topic suggested are welcome. If anyone would like to be involved as a speaker, organizer or chairperson, please let me or Sue know.

And students should remember that we have the Olga Goss Nematology Support Fund to financially support their attendance at nematology workshops like the one in Adelaide. It is ultra-easy to apply and report.

Finally, thanks to everyone involved in keeping AAN going. (This was another theme of the SON President's message, which made me realise that I do not do this frequently enough.) We really couldn't get by without the dedicated team who run the show. Thanks Sue & Katherine (Treasurers), Sarah (Secretary), Rebecca (Newsletter editor) and Ian (Web Master) for another year of support. Also thanks to Sarah Collins and the rest of the Organizing Committee for organizing and running a great workshop at the ASDS meeting in Cairns.

Mike Hodda

FROM THE TREASURERS

Fees for the AAN (Australasian Association of Nematologists) are due annually 1st July through to 30th June. The $15 + GST 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

Please include your name in the reference field so that your payment can be identified.

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

Katherine Linsell and Sue Pederick (Joint Treasurers AAN)

Abstract

INFLUENCE OF SUSCEPTIBLE AND RESISTANT POTATO CULTIVARS ON THE POPULATION OF THE POTATO CYST NEMATODE *GLOBODERA ROSTOCHIENSIS* Ro1 AND ON POTATO YIELDS IN A HIGHLY INFESTED FIELD IN AUSTRALIA

Rudolf F. de Boer[1], John Wainer[1], Sorn Norng[1], David V. Beardsell[2], Nigel S. Crump[3] William S. Washington[2], Alan Yen[1]

[1]Agriculture Victoria, AgriBio, La Trobe University, Bundoora, Victoria, Australia
[2]Agriculture Victoria, Biosecurity and Agriculture Services, Attwood, Victoria, Australia
[3]Australian Seed Potato Industry Certification Authority, Toolangi, Victoria, Australia

The potato cyst nematode, *Globodera rostochiensis*, is a quarantine pest in Australia affecting a relatively small number of properties in three different production areas in the State of Victoria. The effects of susceptible (Trent, Sebago and Coliban) and *H1*-resistant potato cultivars (Atlantic, Crop 13 and Nicola) on nematode populations were compared in two trials in a naturally infested field in the 2008/09 season (Trial 1) and in the 2009/10 season (Trial 2). The latter included a bare fallow treatment. The reproduction factor *Pf/Pi* (final compared with initial nematode population) was used to determine treatment effects. Initial population density was very high, averaging 111 and 119 eggs/g soil in Trial 1 and 2, respectively. The *Pf/Pi* of population density (eggs/g soil) was greater after growing susceptible cultivars (average 1.74 and 2.92 in Trials 1 and 2, respectively) than after growing resistant cultivars (average 0.72 and 0.61 in Trials 1 and 2, respectively), or after a bare fallow (1.09) in Trial 2. This correlated with higher *Pf/Pi* values of cysts 500/g soil and eggs/cyst for susceptible cultivars than for resistant cultivars. Average *Pf/Pi* values greater than one in both trials are consistent with more cysts and an increased population density after growing susceptible cultivars. There was a trend of population decline, that is, *Pf/Pi* < 1, after growing resistant cultivars (average *Pf/Pi* values of eggs/cyst of 0.77 and 0.35 and of eggs/g soil of 0.72 and 0.61, for Trials 1 and 2, respectively). However, Trial 2 showed that these *Pf/Pi* values were not significantly less than those for the bare fallow (0.68 eggs/cyst and 1.09 eggs/g soil). The susceptible cultivars Trent and Sebago produced lower yields than the resistant cultivars in both trials. In contrast, the susceptible Coliban yielded as well as the resistant cultivars, suggesting a high level of tolerance of this cultivar to infestation by the nematode. The resistant cultivar Crop 13 produced 34% and 36% greater total yields in Trials 1 and 2, respectively, than the once popular, but susceptible cultivar Sebago. This is the first report of the effects of potato cultivars on a population of the potato cyst nematode in an Australian field. The use of *H1*-resistant potato cultivars can feasibly reduce populations of *G. rostochiensis* Ro1 on infested land and reduce PCN risk on land regulated as "linked" with infested land.

Read the full article in Annals of Applied Biology, 181(2), 224. doi:10.1111/aab.12769

PhD Thesis Update

DEVELOPMENT OF MOLECULAR DIAGNOSTIC TESTS TO DETECT KEY PLANT PARASITIC CYST NEMATODES IN SOIL AND IN PLANTA THAT IMPACT AUSTRALIAN AGRICULTURAL PRODUCTION AND RESTRICT MARKET ACCESS

Akshita Jain[1, 2], John Wainer[1], Ross Mann[1], Jacky Edwards[1, 2], Brendan Rodoni[1, 2] and Tim Sawbridge[1, 2]

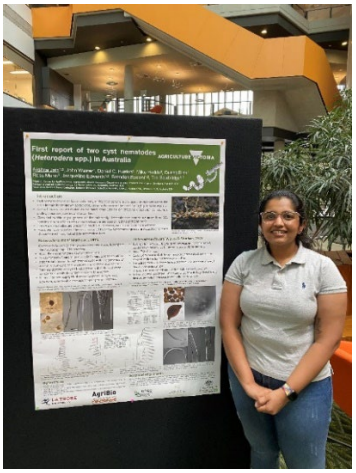
[1]AgriBio, Centre for AgriBioscience, Agriculture Victoria Research, Department of Jobs, Precincts and Regions, Bundoora, VIC, Australia 3083
[2]School of Applied Systems Biology, La Trobe University, Bundoora, VIC, Australia 3083

The objectives of the project are:

1. To build capability in cyst nematode taxonomy
2. To utilise suitable genomic approaches to identify suitable molecular markers for species identification using high-throughput sequencing
3. To develop diagnostic tests such as LAMP that can detect key cyst nematodes in soil and *in planta* for diagnostics and molecular epidemiology

Cyst nematodes are an important group of sedentary plant-parasitic nematodes, affecting a range of economically important crops. There are several species identified as biosecurity threats such as the exotic pale potato cyst nematode (*Globodera pallida*), exotic cereal cyst nematodes (*H. filipjevi, H. latipons*), exotic chickpea cyst nematode (*H. ciceri*), and exotic soybean cyst nematode (*H. glycines*). Therefore, there is an urgent requirement to develop reliable diagnostic methods to test for exotic cyst nematodes to ensure better control and management strategies.

During the first year of my PhD, we identified and reported the presence of two previously unknown *Heterodera* species in Australia, *H. mani* (ryegrass cyst nematode) and *H. daverti,* described prior from Europe, North America and Asia. These first reports are published as two separate research articles in Plant Disease and Australasian Plant Disease Notes and were also presented as a poster at the 10-year celebration of AgriBio, Centre for AgriBioscience, Melbourne. We also reported the geographic range extension of the hop cyst nematode, *H. humuli*, from Tasmania to the Australian mainland and provided the first molecular gene sequences for the same. This manuscript is currently under review.



Akshita during her poster presentation at 10-year celebration of AgriBio, Melbourne.

We are also trying to achieve whole genome sequencing of cyst nematodes endemic to Australia. We have optimised a DNA extraction protocol to extract DNA from an individual J2 juvenile and are currently in the process of optimising a whole genome assembly and annotation pipeline for a pool of 50 cysts or less.

We are also seeking collaborators for collecting soil samples or cyst specimens to facilitate better acquisition of whole genome sequencing data in Australia. If you think you may be able to share specimens with us, please get in contact at akshita.jain@agriculture.vic.gov.au

Akshita Jain and Dr. John Wainer collecting soil samples from a Barley field in Wimmera region

Publications

Jain A, Wainer J, Huston DC, Hodda M, Dinh Q, Mann R, Rodoni B, Edwards J (2022) First report of ryegrass cyst nematode, *Heterodera mani*, in Tasmania, Australia. *Plant Disease,* doi: 10.1094/pdis-05-22-1129-pdn

Jain A, Wainer J, Huston DC, Hodda M, Hayes O, Whittock S, Mann R, Edwards J, Rodoni B, Sawbridge T (2022) First report of a cyst nematode, *Heterodera daverti*, from Australia. *Australasian Plant Disease Notes* **17**: 35, doi: 10.1007/s13314-022-00483-x

Acknowledgments

This work is supported by a La Trobe University Full-Fee Research Scholarship for Akshita Jain. Akshita is also a recipient of the Department of Jobs, Precincts and Regions (DJPR), Agriculture Victoria Research Scholarship. The Boosting Diagnostic project is supported by Grains Research and Development Corporation (GRDC), through funding from the Australian Government Department of Agriculture, Fisheries and Forestry as part of its Rural R&D for Profit program and along with Cotton Research and Development Corporation, Hort Innovation Australia, Wine Australia, Sugar Research Australia and Forest and Wood Products Australia.

Master Class Review

MASTER CLASSES IN NEMATOLOGY, SOIL BIOLOGY AND SOIL HEALTH

Graham Stirling

Biological Crop Protection Pty. Ltd.

As mentioned in the July edition of the newsletter, Marcelle and I have been running a series of Master Classes in the hope that they will stimulate interest in nematodes and other soil organisms that are largely ignored by the tertiary education sector in Australia. The 2022 program has been completed and a total of 126 people attended the classes (see table below).

Topic	**Location**	**No. of attendees**
Identification and quantification of plant-parasitic nematodes for diagnostic purposes	University of Sydney	22
Nematode pests of turfgrass	University of Melbourne	24
Improving the health of vegetable-growing soils and reducing losses from nematode pests	University of Melbourne	20
Nematodes: an important component of the soil biological community	University of Melbourne	18
The soil biological community and its role in improving the health of agricultural soils	University of Queensland	14
Natural enemies of nematodes: their ecology and role as biological control agents	University of Queensland	10
Morphological and molecular identification of plant-parasitic and free-living nematodes	University of Queensland	18

The attendees at the turf class were superintendents of golf clubs and sports venues who were struggling to manage southern sting nematode (*Ibipora lolii*). Those who came to the other classes had a wide range of roles, skills, and interests: lecturers, researchers, and technical staff at universities; agricultural consultants; staff of state Departments of Agriculture; undergraduate and postgraduate students; and professional staff from chemical companies. One encouraging sign was that people were prepared to travel long distances to attend. In fact, the nematode identification class had attendees from Indonesia, New Zealand, Victoria, NSW, and WA, with overseas and interstate visitors outnumbering the Queenslanders.

One pleasing aspect was that three universities were prepared to provide excellent laboratory facilities free of charge. This meant that attendees had access to microscopes and all the equipment required to work with nematodes and other soil organisms.

A big thank you to those who helped arrange the classes at each location

- Sophia Callaghan, Andrew Daly, Tatjana Matic and David Guest in Sydney
- Helen Hayden, Simone Staples, Bruce MacPhee, Zali Mahoney and Danielle Park in Melbourne
- Gurion Ang and Lois Eden in Brisbane

Zarmeen Hassan AUSVEG National Manager, Engagement and Extension, Vegetable Class at the University of Melbourne.

The nematode diagnostic class at the University of Sydney

Attendees at the nematode identification class at the University of Queensland

Also, many thanks to those who contributed to the classes in other ways

- Nigel Crump for discussing biosecurity measures for Potato Cyst Nematode in Melbourne
- Neil Wilson for running the practical sessions on molecular identification in Brisbane
- Jenny Cobon and Lois Eden for contributing their nematological skills at the Brisbane class
- Marcelle Stirling for her help and support before and during the classes

The classes to be held in 2023 are now being organised and the final program should be available by the end of February. If you would like to help arrange a class or attend one of them, please contact me by phone (0412 083 489) or email: graham.stirling@biolcrop.com.au

Workshop Review

FOCUSING THE FUTURE WITH PLANT AND SOIL NEMATODES

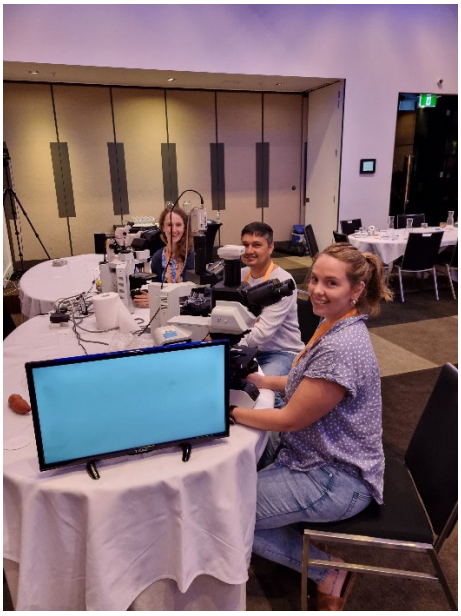
Nematology workshop at the 11th Australasian Soilborne Disease Symposium, Cairns 2022.

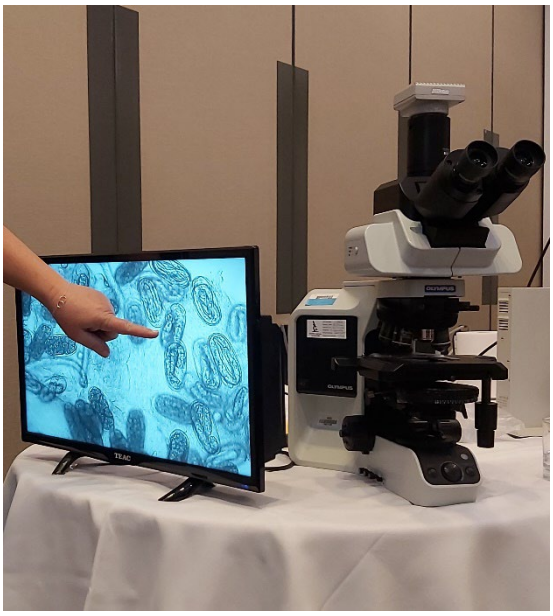
As members of Australia's small but passionate nematology community it was great to take the opportunity at 11th Australasian Soilborne Disease Symposium 2022 (ASDS 2022) to have a workshop bringing together both new and experienced researchers.

The workshop had a great mix of the new (Samantha Bond on her recent collections of nematodes in the NT), with the experienced (Jenny Cobon & Mike Hodda on identification tricks), the far-flung (Sarah Collins on WA nematodes) with the local (Wayne O'Neill & Rob Magarey on tropical Queensland nematodes), and government or industry perspectives (Mike with his Subcommittee for Plant Health Diagnostics hat on, & Rob with his Sugar Research Australia hat on). All the attendees contributed to the day with discussion ranging across many areas of nematology, including nematodes common to the tropics, soil health and its measurement, and management strategies to mitigate plant parasitic nematode impacts in crops. All of which undoubtedly helped build knowledge of nematodes.

Practical sessions gave participants the opportunity to learn about extraction techniques and morphological characteristics for nematode identification.

Mike Hodda discusses nematode identification.





Learning the tricks of nematode morphology; Identification of stages of nematode egg development.

These opportunities don't come along very often, and we think they are instrumental for knowledge transfer and stimulus of connections between researchers from different agencies and geographical areas.

We look forward to the next nematology workshop at APPS 2023 .

Regards from ASDS Nematology workshop committee,

Sarah Collins, Jenny Cobon, Mike Hodda, Katherine Linsell, Sue Pederick