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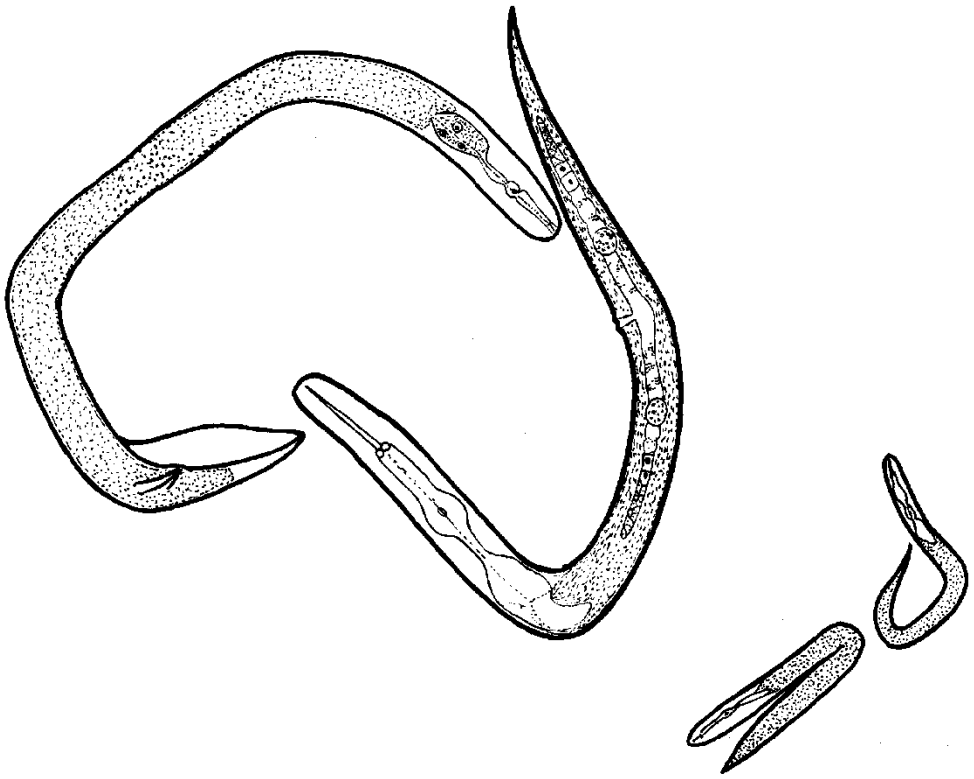
AUSTRALASIAN NEMATOLOGY NEWSLETTER



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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 2022.

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

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Association News

FROM THE PRESIDENT

First, congratulations to Rhys Copeland from Murdoch University for his 2nd place in the recent 3-minute thesis competition held by the International Federation of Nematology Societies. The standard of the best entries was very high, so this is especially praiseworthy. Being able to get across your studies concisely and clearly in a short period with minimal visual aids is a very good skill to develop. Check out the talk, and that of the other finalists at: https://www.ifns.org/ifns-3-minute-thesis-advances-to-final-round

Elsewhere in this issue you will see the announcement that the delayed International Congress of Nematology is finally going ahead two years after the original scheduled date. Currently, the programme is being re-planned. Originally, the intention was that this would be a hybrid conference, with attendance both in person and on-line. At the time of writing, this seems to have changed to be a mainly personal attendance event, with a single pre-recorded talk allowed for each session for someone not attending personally. It is not clear what the level of interaction on-line will be.

Personally, I was hoping that on-line attendance would work. I have been to large (100 people) meetings with smaller breakout sessions of 3 to 5 people which have worked well, so it must be possible. To be fair, this was on the super-fast CSIRO internal network, so there were no time lags or drop outs, and this maybe could not be guaranteed amongst many people from all over the world. Hence, I am trying to lobby for more on-line access. I think this would be great for Australasian nematologists facing not only long travel times and costs, but also potential quarantine and employer restrictions on official travel. Does anyone else have similar issues?

On a better note, it seems that at least three nematology workshops are being prepared in Australia, in Queensland and South Australia, in the coming years, so this is a good sign locally.

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

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

Katherine Linsell and Sue Pederick (Joint Treasurers AAN)

Regional News

NEWS FROM QUEENSLAND

University of Southern Queensland (USQ)

The Crop Nematology team at the Centre for Crop Health, USQ farewelled Roslyn Reen, who retired in late December 2021 and she has never looked happier (see photo below).

Roslyn Reen's last day at work, December 2021 with the USQ Crop Nematology team. We will all miss Ros's wealth of knowledge about all things nematology.

Rebecca Zwart gave the following speech on Ros's last day…

"Ros's research career began in 1974, when she moved from Charleville to Brisbane where she worked as a laboratory technician at the Plant Pathology Indooroopilly Research Laboratories for the then Queensland Department of Primary Industries. Ros studied a Diploma in Biological Techniques at Queensland Institute of Technology, now QUT, which she completed in 1982, while continuing to work in various aspects of fungal, bacterial and viral pathogens as well as nematology in horticultural crops. In 1987, she took a break in her career to raise her three sons. Ros returned to science in 1995 when she joined Department of Agriculture and Fisheries at the Leslie Research Centre (LRC) in Toowoomba and started work with John Thompson in the Soil Microbiology team. Ros carved her niche in the nematology group becoming the expert in root-lesion nematodes in chickpea, working on the Australian co-ordinated chickpea improvement program developing methods to evaluate root-lesion nematode resistance and tolerance in chickpea in glasshouse and field trials. As well as in her most recent project accessing the resistance of wild relatives of chickpea from Turkey to root-lesion nematodes. Ros is a diligent and dedicated researcher and not only questioned why, but was keen to explore answers and improve methodology by setting up her 'small' side experiments.

While working at LRC, Ros completed a Graduate Certificate in Rural Science with Distinction at the University of New England in 2005. In 2014, Ros joined USQ, when the nematology team from DAF merged with USQ to form the Centre for Crop Health. Ros completed her Masters of Science in Advanced Research last year, studying part-time and working full time. As well as her thesis, Ros has published three first author journal articles. When writing Ros would usually start her day at the coffee shop pouring over dog-eared journal articles before coming to work.

Ros, thank you for being a wonderful colleague and sharing your expertise. Thank-you for the fun moments that we have had travelling together to conferences and projects meetings in Adelaide and Perth and our overseas trips to Turkey and India. Ros has contributed so much to the Crop Nematology team and will be

greatly missed by all. Ros, we will miss your elaborate colour schemes on your graphs and conference posters and hope in retirement that you are able to unleash your artistic talents. We wish you all the very best and a very happy and healthy retirement."

The Crop Nematology team are very proud to have another of our PhD students graduate, Dr Elaine Gough. See page 8 of this newsletter for the abstract from Elaine's thesis and a fun poem on Elaine's PhD journey penned by Prof. John Thompson. Elaine is now working as a research fellow with Dr Bree Wilson at the USQ Centre for Crop Health exploring mycorrhizal interactions and biopesticides.

Congratulation to Dr Elaine Gough (third from left) who graduated with her PhD in December 2021. Her very proud supervisors (L-R: Kirsty Owen, John Thompson and Rebecca Zwart) also enjoyed getting out to join the celebration.

Congratulations to Hannah Rostad, who was awarded a prize for her ePoster in the student competition at the Australasian Plant Pathology Conference in November 2021. The title of Hannah's poster was "Wild chickpea, the basis for genetic improvement to root-lesion nematode (*Pratylenchus neglectus*)". The research is part of her Masters of Advanced Research which she is completing while working on a GRDC-funded project with Rebecca Zwart and Ros Reen looking at resistance of wild relatives (*Cicer reticulatum* and *C. echinospermum*) of chickpea (*C. arietinum*) to root-lesion nematodes (*Pratylenchus thornei* and *P. neglectus*).

Following several years of drought, the 2021 field season was a contrast with nearly constant rain and a mice plague. Nevertheless, the GRDC-funded field experiments on tolerance of wheat, barley and chickpea to *Pratylenchus thornei* and *P. neglectus* were completed. A tornado at the *P. neglectus* site at Kindon (170 km south-west of Toowoomba) spectacularly destroyed machinery sheds, but the field experiments were untouched. The rain recommenced at harvest time, causing delays at both of the *P. thornei* and *P. neglectus* sites. The more tolerant wheat varieties utilised the wetter than normal conditions favourably, exceeding 5 t/ha grain yield in a *P. thornei* tolerance trial. The 2021 winter was one of the most difficult seasons for trials that we've experienced! This season, did however, present opportunities for us to assess different sensory platforms that potentially measure tolerance to *P. thornei*, with a view to reducing the need to be completely reliant on obtaining grain yields. A USQ Capacity Building grant was awarded to Neil Robinson in 2021 to support this research, and forms part of his recently commenced PhD, entitled, "Investigation into the use of sensory platforms to phenotype wheat cultivars for tolerance to the root-lesion nematode *Pratylenchus thornei*".

PhD student, Sonal Channale, attended and presented an e-poster at the Advances in Nematology 2021 (event link : https://cvent.me/D5Gx4G). It was a one day hybrid event hosted by Association of Applied Biologists Nematology Specialist Group at the historic The Linnean Society, Central London. The title of Sonal's poster was "Transcriptome analysis of chickpea-*Pratylenchus thornei* interaction reveals candidate genes for resistance." It was a great pleasure for Sonal to learn more about different nematodes affecting different parts of the world and to meet the nematologists working on them.

We welcome Begita Adhikari to the CCH Crop Nematology team. Begita is starting her PhD this semester and will be investigating the genetics of *P. thornei* resistance in mungbean (*Vigna radiata*) in a project funded by the Broadacre Cropping Initiative, a partnership between USQ and the Queensland Department of Agriculture and Fisheries.

Recent Publications

Channale S, Kalavikatte D, Thompson JP, Kudapa H, Bajaj P, Varshney RK, Zwart RS, Thudi M (2021) Transcriptome analysis reveals key genes associated with root-lesion nematode *Pratylenchus thornei* resistance in chickpea. *Scientific Reports* 11: 17491. https://www.nature.com/articles/s41598-021-96906-3

Gough EC, Owen KJ, Zwart RS, Thompson JP (2022) The role of nutrients underlying interactions among root-nodule bacteria (*Bradyrhizobium* sp.), arbuscular mycorrhizal fungi (*Funneliformis mosseae*) and root-lesion nematodes (*Pratylenchus thornei*) in nitrogen fixation and growth of mung bean (*Vigna radiata*). *Plant and Soil*. https://doi.org/10.1007/s11104-021-05254-8

Khoo KHP, Sheedy JG, Taylor JD, Croser JS, Hayes JE, Sutton T, Thompson JP, Mather DE (2021) A QTL on chromosome Ca7 of chickpea affects resistance to the root-lesion nematode *Pratylenchus thornei. Molecular Breeding* 41: 78. https://doi.org/10.1007/s11032-021-01271-8

Owen, KJ (2022) *A triumph of tolerance: managing the threat to wheat production by the root lesion nematode* Pratylenchus thornei *in the subtropical grain region of eastern Australia.* In: Integrated nematode management: state-of-the-art and visions for the future. CABI, Boston, United States, pp. 13-19. ISBN 9781789247541. https://www.cabi.org/bookshop/book/9781789247541/

Kirsty Owen and Rebecca Zwart

Biological Crop Protection Pty. Ltd.

Graham Stirling will be running a series of Master Classes in the next two years. See page 11 for the Class details. Although they are not targeted at nematologists, members of AAN are most welcome to attend. Also, if you would like to organise a particular class in your region, please contact me and I will try to make it happen. Hopefully COVID won't throw a spanner in the works!

Graham Stirling

NEWS FROM WESTERN AUSTRALIA

Murdoch University

PhD students (plant nematology)

Sasha Somashakaran – Spray-induced gene silencing

Supervisors Dr John Fosu-Nyarko, Dr Eddie Poinern, Prof. Michael Jones

As part of the State Government's New Industries Fund (JTSI) the new Science Industry PhD Fellowships program supports PhD candidates to collaborate with an industry partner in a high growth area. Under the program, PhD candidates undertake a PhD research project on a topic agreed to by a company, the candidate and the host university. The nominated company will host the PhD candidate for a period agreed to by the candidate, host institution and company.

Sasha was awarded a JTSI grant and is working on the development next -generation RNAi-based biopesticides, as a possible means to control root-knot and root-lesion nematodes, and aphids. This work involves generating dsRNA targeting vital genes, and its delivery (Spray-Induced Gene Silencing, SIGS) and systemic movement in plants. She is targeting movement-related genes in RLNs and RKNs, and is now assessing the translocation of fluorescent dsRNA in plant tissues

Rhys Copeland - Determining the spatial distribution of *P. quasitereiodes/P. curvicauda* in the WA wheatbelt, and understanding how they find their host roots (GRDC Postgraduate Studentship)

Supervisors Dr John Fosu-Nyarko, Dr Sarah Collins, Prof. Michael Jones

Rhys has been re-assessing the prevalence of *P. quasitereiodes* and *P. curvicauda* in the WA wheatbelt, and is also studying how RLNs are attracted to host roots. He has used molecular methods to identify RLNs in 6 field sites, and has found four RLN species, present in varying ratios at different sites. These species are *P. curvicauda, P. penetrans*, P. *quasitereiodes* and *P.neglectus.* At Darkan, *P. curvicauda* was the dominant species, at Mjimup, Katanning and Duranillin, *P. penetrans* was dominant, at Cancanning and Kenmare, *P. quasitereiodes* was the dominant species. In some fields three species of RLN were present at the same time.

In terms of root attraction, Rhys has developed root chemotaxis assays, and is now analysing compounds released from roots and how they affect RLN root interactions.

Saiful Islam – Functional analysis of putative parasitism effector genes of RLNs: developing resistant potatoes using RNAi (Murdoch Postgraduate Studentship)

Supervisors: Dr Sadia Iqbal, Prof. Michael Jones, Dr Steve Milroy

After screening potato fields for RLNs, Saiful has been identifying, cloning and sequencing new parasitism effector genes from *P. penetrans* and *P. neglectus.* He is using these to develop an RNAi approach to confer host resistance. He has developed a very effective way of separating eggs, juveniles and adults by gradient centrifugation to determine when effectors are expressed.

On a related project, Iqbal Hussain has been analysing nematodes present in potato crops in WA, and looking for natural fumigant compounds which inhibit nematodes.

Other activities

Mike Jones and M. Adeel have been running a series of international workshops on the regulation of gene-editing technology in Australia and SE Asia – let us know if you would like more information.

John Fosu-Nyarko and Sadia Iqbal, together with three PhD students, have been developing gene-edited wheat and potato plants for improved human health and tolerance to abiotic stresses.

Recent publications on plant nematology:

Begum F, Jones MGK and Fosu-Nyarko J. (2020). Assessment of the pest status of *Pratylenchus curvicauda* and ultrastructural changes in roots of infected wheat and barley. *Plant Pathology* 69(8), pp. 1574-1588

Iqbal S, Fosu-Nyarko J and Jones MGK (2020). Attempt to Silence Genes of the RNAi Pathways of the Root-Knot Nematode, Meloidogyne incognita Results in Diverse Responses Including Increase and No Change in Expression of Some Genes. *Frontiers in Plant Science* 11,328

Iqbal S, Jones MGK, Fosu-Nyarko J (2021). RNA interference of an orthologue of Dicer of *Meloidogyne incognita* alludes to the gene's importance in nematode development. *Scientific Reports* 11(1),11156

Philip SM, Fosu-Nyarko J, Iqbal S, Wang Z and Jones, MGK. (2021). In-plant activation of root-specific expression of a cytotoxic gene disrupts the development of the root-knot nematode, *Meloidogyne javanica*. *Plant Pathology*, https://doi.org/10.1111/ppa.13497

Michael Jones

Death of Nematologist Wim Wouts

WOUTS (WILHELMUS

Passed away peacefully at home on 10.12.2021. Loving husband to Alice for 57 years. Father of Wim Jr (San Francisco), Gerald, Rob and their families. Opa to Emily, Lucas, Casey and Rosalie. Wim was a mentor, scientist and Von Humboldt Fellow and always ready to serve others. Sadly missed by family, friends and colleagues far and wide.

Obituary to follow in next AAN newsletter.

PhD Thesis Abstract

THE INTERACTION BETWEEN ARBUSCULAR MYCORRHIZAL FUNGI, RHIZOBIA AND ROOT-LESION NEMATODES (*PRATYLENCHUS THORNEI*) IN MUNG BEAN (*VIGNA RADIATA*)

Elaine Gough

University of Southern Queensland

There are a limited number of reports on interactions between the beneficial microsymbionts arbuscular mycorrhizal fungi (AMF) and rhizobia which co-occur with the root-lesion nematode *Pratylenchus* sp. within the roots of legumes. Mung bean (*Vigna radiata*) is an important summer legume in the sub-tropical grain region of eastern Australia. It is a host of AMF, *Pratylenchus thornei* and nitrogen (N) fixing *Bradyrhizobium* bacteria. These microorganisms are dependent on mung bean for photosynthates and their interactions influence host production and nutrition. Nodulation failure in mung bean reduces plant production, nutrition and N budgets in soils and could be explained by a lack of mycorrhizal inoculum in the soil and/or by infestation with *P. thornei*. Furthermore, AMF colonisation of the roots may alter the population densities of *P. thornei* in mung bean.

Initially, in this thesis, a systematic review was carried out to clarify the effect of interactions between AMF and *Pratylenchus* spp., which showed that their interactions depended on the taxonomic order and genus of AMF, along with host plant functional groupings. With this specificity in mind, the interaction of AMF, rhizobia and *P. thornei* was investigated for mung bean cv. Jade-AU grown in a vertisol with a full factorial of these biological treatments in glasshouse experiments.

In the first study, AMF and rhizobia acted synergistically, increasing nodulation, biological N fixation, nutrition, growth and seed yield. These positive effects were complicated by *P. thornei*. Nodulation was reduced by *P. thornei* infestation which negatively impacted N fixation efficiency. However, mycorrhizal colonisation conferred tolerance to *P. thornei* which was indicated by maintained plant biomass. Unexpectedly, the population density of *P. thornei* increased in mycorrhizal mung bean, and the population density was positively correlated with concentrations of phosphorus (P), zinc (Zn) and copper (Cu) in the mung bean shoot. Therefore, investigations were undertaken to elucidate the role of nutrients behind (i) improved nodulation and biological nitrogen fixation when mung bean was co-inoculated with AMF and rhizobia and (ii) increased population densities of *P. thornei* in mycorrhizal mung bean. A full factorial experiment included treatments of AMF, rhizobia, and *P. thornei*, with N, P and Zn fertilisers. It was shown that AMF increased (i) nodulation and N fixation to a level equal to or greater than the application of fertiliser P, (ii) concentrations of P and Zn in the shoot, greater than the application of fertiliser alone and, (iii) the concentration of Cu in the shoot. Rhizobia and/or AMF conferred improvements greater than the addition of fertiliser N, including increased nodulation, shoot N concentration, biomass and yield greater than when rhizobia alone was added; and increased biomass and yield when AMF and rhizobia were both added. Increased population densities of *P. thornei* in mycorrhizal mung bean was again demonstrated but the application of fertilisers N, P and Zn decreased *P. thornei*. This result suggested the role of other mechanisms of increased susceptibility, such as AMF may decrease concentrations of defensive compounds against *P. thornei* in the roots or that AMF colonised roots may provide organic compounds that nutritionally stimulate *P. thornei* reproduction.

The research presented in this thesis contributes to understanding the complex multipartite interactions that occur between microorganisms in the roots mung bean and their impacts on N fixation, nutrition, biomass and yield. The conservation of AMF within farming systems is strongly advocated to promote and protect their valuable role in increasing biological nodulation and N fixation efficiency by rhizobia, and in improved crop nutrition and yield, while reducing fertiliser inputs. However, it is also crucial to understand that AMF may increase population densities of *P. thornei*. Agronomic practices and plant breeding to promote the synergism between AMF and rhizobia for mung bean yield, while limiting population densities of *P. thornei* will benefit mung bean production and subsequent crops in long-term sustainable farming systems.

Published papers

Gough EC, Owen KJ, Zwart RS and Thompson JP (2020) A systematic review of the effects of arbuscular mycorrhizal fungi on root-lesion nematodes, *Pratylenchus* spp. *Frontiers in Plant Science* 11, 923. http://doi.org/10.3389/fpls.2020.00923

Gough EC, Owen KJ, Zwart RS and Thompson JP (2021) Arbuscular mycorrhizal fungi acted synergistically with *Bradyrhizobium* sp. to improve nodulation, nitrogen fixation, plant growth and seed yield of mung bean (*Vigna radiata*) but increased the population density of the root-lesion nematode *Pratylenchus thornei*. *Plant and Soil.* https://doi.org/10.1007/s11104-021-05007-7

Gough EC, Owen KJ, Zwart RS and Thompson JP (2022) The role of nutrients underlying interactions among root-nodule bacteria (*Bradyrhizobium* sp.), arbuscular mycorrhizal fungi (*Funneliformis mosseae*) and root-lesion nematodes (*Pratylenchus thornei*) in nitrogen fixation and growth of mung bean (*Vigna radiata*). *Plant and Soil*. https://doi.org/10.1007/s11104-021-05254-8

Poem

Explanatory Foreword

'House of Mung' refers to mungbean, which is the most important summer pulse crop for grain growers in Queensland and NSW.

Rover #1. *Mike O'Rhiza* refers to 'mycorrhiza' a plant root colonised by a beneficial (symbiotic) soil fungus that helps uptake of nutrients from the soil, particularly phosphorus (P) and zinc. The fungus depends on sugars from the plant.

Rover #2. *Rhiz O'Bium* refers to the bacteria (genus Rhizobium) that form nodules on the roots of pulse (legume) crops where they fix nitrogen from the atmosphere reducing the need for expensive fertiliser.

Rover #3. *Prat O'Lenchus* refers to root-lesion nematodes (genus *Pratylenchus*) that attack roots of mungbean and other grain crops resulting in poor uptake of water and nutrients from the soil and yield loss

Elaine Gough is a PhD student at University of Southern Queensland who is studying the interactions between mycorrhiza, rhizobia and *P. thornei* in the roots of mung bean. Her research has shown that mycorrhiza stimulates nitrogen fixation by rhizobium resulting in four-fold yield increases, but results in greater final populations of *P. thornei.*

THREE IRISH ROVERS IN THE HOUSE OF MUNG

by John Thompson

I'll sing you a song that must be sung
About three Irish rovers
Their story begins at the 'House of Mung'
And goes until it's over.

Mike O'Rhiza said, 'I'm long and thin and need a drink
Make it long, make it strong, and make it sweet I think.
I am fine and I am true and you'll be paid with P and zinc.'

Rhiz O'Bium said, 'I am small and quite bacterial
I seek a home of plant material
I don't mind either custom or module
I'll be happy inside my nodule.
If I stay I will pay
I cannot sing or do tricks
But its nitrogen I will fix.'

Prat O'Lenchus said, 'I'm a worm, I don't care
Here I am, so you beware
I come to eat, I come to drink
And destroy your house, in a blink.
I do my work underground
So no-one knows I'm around.'

'Enough is enough', said Elaine Gough
'Underground investigation is really tough
But I am here to do the job
And shine a light on what goes on
Whose behaviour is symbiotic, and whose is idiotic?
Prat O'Lenchus, I call you out
You behave just like a lout
Mike O'Rhiza and Rhiz O'Bium work together, and it is fun
Restoring mung will soon be done.'

Master Classes

MASTER CLASSES IN NEMATOLOGY, SOIL BIOLOGY AND SOIL HEALTH

Master Classes to be offered in 2022 and 2023 are listed below. The classes are designed to cater for people who would like to learn more about the fascinating world beneath our feet. All soil organisms are covered but nematodes are the focus because in addition to being important pests, they play a major role in maintaining the health of our soils.

Course	Topic	Content	No. days
MC 01	Nematode pests of grain crops and pastures	Key nematode pests of cereals, legumes, oilseeds, and pastures; monitoring nematode populations; crop rotation as a control measure; cultivar resistance; other management practices	2*
MC 02	Improving the health of vegetable-growing soils and reducing losses from nematode pests	Root-knot nematode and other important nematode pests; monitoring nematode populations; nematicides; tactics to enhance sustainability; integrated nematode management	2*
MC 03	Nematode pests in perennial horticulture	Key nematode pests of grapes, apples, stone-fruit, banana, pineapple and other perennials; the role of nematodes in replant problems; nematode-resistant rootstocks; other management options	2*
MC 04	Best practice farming systems to reduce losses from plant-parasitic nematodes in sugarcane	Key nematode pests; monitoring nematode populations; best-practice farming systems to enhance nematode-suppressive services, improve soil health and reduce losses from nematodes	2*
MC 05	Turfgrass nematodes	Key nematode pests; symptoms; monitoring; management	1
MC 06	Biosecurity issues associated with nematodes	Soybean cyst nematode; *Meloidogyne enterolobii*; Potato cyst nematode; Pinewood nematode; Southern sting nematode; *Rotylenchulus reniformis*; biotypes of common species	1
MC 07	Morphological and molecular identification of plant-parasitic and free-living nematodes	Identification of commonly occurring plant parasites to species level and free-living nematodes to levels suitable for ecological studies; nematode community analysis	5
MC 08	The soil biological community and its role in improving the health of agricultural soils	Constituents of the soil food web; key functions of soil organisms; assessing a soil's biological status; the impact of management on the soil biology; improving the health of agricultural soils	2
MC 09	Integrated nematode management	Quarantine; fallowing; tillage; crop rotation; cover cropping; trap cropping; adjustment of planting and harvest dates; solarisation; biofumigation; organic amendments; biological control; nematicides. Options to enhance soil biological diversity and improve soil health. Development of an action plan to enhance sustainability and reduce losses from nematodes	3
MC 10	Natural enemies of nematodes: their ecology and role as biological control agents	Nematode-trapping fungi; egg parasites; *Pasteuria*; predatory nematodes; microarthropods. Methods to enhance the suppressive services provided by natural enemies; biological products for nematode control	3

* In situations where most participants are farmers or consultants with limited time, classes can be reduced to one day.

Potential participants

The classes will address the needs of a wide range of prospective clients:

- Consultants who provide professional advice in various areas of agriculture
- People who are working with nematicides or evaluating other nematode control methods
- Farmers who would like to learn how to reduce losses caused by nematodes or use nematode analyses to assess the health of their soil
- Technical staff in state government departments and other organisations who need to improve their nematological knowledge
- People who may be interested in commencing a research project on nematodes. This includes graduates with an interest in a particular aspect of nematology who may wish to find a find a university willing to allow them to undertake postgraduate training as an external student.

Instructors

The classes will be conducted by Dr Graham Stirling and Dr Marcelle Stirling, two professionals who established their own research and diagnostics company (Biological Crop Protection) in 1995. Graham has more than 50 years' experience as a nematologist/plant pathologist/soil biologist, and has worked on a variety of crops, including wheat, rice, lucerne, clover and other pasture species, sugarcane, grapes, stone-fruit, apples, citrus, pineapples, bananas, papaya, turf, ginger, tomato, capsicum, potato and sweetpotato. He has produced more than 140 peer-reviewed research papers, numerous extension publications and two books: `*Biological Control of Plant-Parasitic Nematodes'* and '*Soil health, Soil biology, Soilborne diseases and Sustainable agriculture, A guide*'. His wife Marcelle operated a nematode diagnostic service for 25 years and is one of the few people with the taxonomic skills needed to identify free-living nematodes. A local nematologist or a professional with specific areas of expertise may contribute to some of the classes.

Proposed locations

The plan is to run the classes in capital cities and major regional centres throughout Australia. The locations chosen will depend on suitable laboratory or classroom facilities being available. However, the intention is to choose locations where there is local demand for a particular class, as this will minimise travel and accommodation costs for participants.

Timetable

There is some flexibility regarding the dates of each class. As most classes will be held at university venues, they are likely to be held in semester breaks (i.e. February, June/July, September, and November). If there is sufficient demand, some of classes could be run consecutively to minimise travel and accommodation costs for participants.

Number of participants

Classes will be limited to a maximum of 15 participants, as this will ensure that each person gets an appropriate level of attention during the laboratory sessions. Classes will only be held if there are at least five enrolments.

Costs

There will be no fee for the classes. Graham and Marcelle Stirling are providing the classes as a philanthropic venture, in the hope that they will stimulate interest in an important group of soil organisms that have largely been ignored by the tertiary education sector in Australia.

Are you interested?

If you would like to help arrange a class in a particular region and can suggest a suitable location, please email Dr. Stirling (graham.stirling@biolcrop.com.au**).** If you would like to attend specific classes, please email Graham Stirling and tell him why you are interested and what you would like to learn. Also, please indicate the capital city or regional locations that would be the best options for you, and the times of the year that would be most suitable. As the number of participants will be limited, places will be allocated to first responders and those who provide convincing reasons why they should attend.

Classes in 2022

The following classes will be held at the University of Queensland, St. Lucia campus. If you are interested in attending, please email Dr. Stirling and indicate why you would like to come.

- MC 08 (21-22 July) and MC 10 (July 25-27)
- MC 07 (21-25 November)

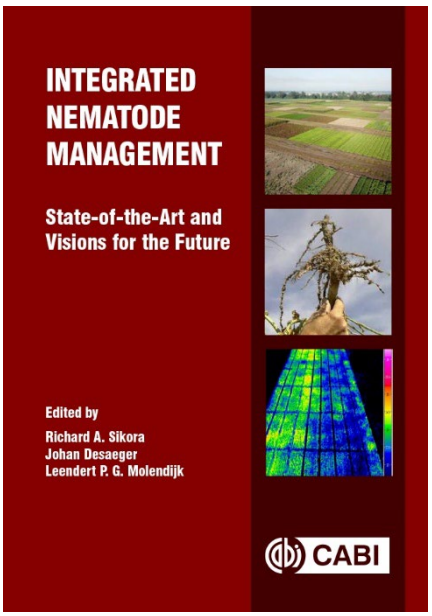
Other classes will depend on demand, but a final list will be prepared before the end of February 2022.

New Book

INTEGRATED NEMATODE MANAGEMENT

In December 2021, CABI Publishers have released the book titled 'Integrated Nematode Management', edited by Richard Sikora, Professor Emeritus, University of Bonn, Germany, Johan Desaeger, University of Florida, USA, and Leendert P. G. Molendijk, Wageningen University, The Netherlands.

Members can use the code CCAAN25 for 25% off individual (non-trade) orders of the print book, up to a maximum of 10 copies per customer. This offer is available for orders placed on the CABI Bookshop only.



Plant parasitic nematodes are costly burdens of crop production, causing an estimated US$80 - 118 billion per year in damage to crops. They are associated with nearly every important agricultural crop, and are a significant constraint on global food security. Regulations on the use of chemical pesticides have resulted in growing interest in alternative methods of nematode control. Future changes in climate, cropping systems, food habits, as well as social and environmental factors also affect the options for nematode control.

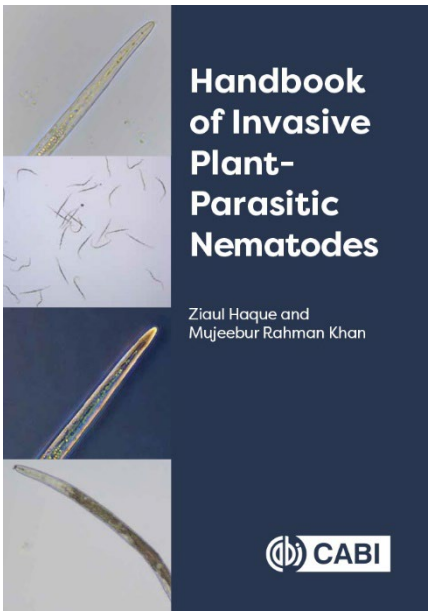
Taking a systematic crop by crop approach, this book:

- Outlines the economic importance of specific plant parasitic nematode problems on the major food and industrial crops.
- Presents the state-of-the-art management strategies that have been developed to reduce specific nematode impacts, and outlines their limitations.
- Contains case studies to illustrate impact in the field.
- Aims to anticipate future changes in nematode disease pressure that might develop as a result of climate change, and new cropping systems.

New Book

HANDBOOK OF INVASIVE PLANT-PARASITIC NEMATODES

CABI has recently published a compendium of invasive plant-parasitic nematodes, Handbook of Invasive Plant-parasitic Nematodes, written by Ziaul Haque and Mujeebur Rahman Khan, Aligarh Muslim University, India.



Plant parasitic nematodes are major pests of agricultural crops and cause huge monetary losses. There is a very high risk of spread of plant-parasitic nematodes from one country to another, with the movement of plants and planting materials such as seeds, bulbs, corms, suckers, tubers, rhizomes, rooted plants, nursery stock and cut flowers. In view of the large quantities and the wide variety of materials being imported and exported, it is important to assess the status of invasive nematodes and their quarantine importance in relation to agricultural trade.

This book contains information on around 100 invasive nematodes and their potential threat in different countries. Each nematode entry includes information on authentic identification, geographical distribution, risk of introduction, host ranges, symptoms, biology, ecology, planting material liable to carry the nematode(s), nematode vectors, chance of establishment, likely impact, and phytosanitary measures. There are detailed accounts of diagnosis procedures including sampling, isolation, detection and identification of nematodes based on morphological and molecular characters. The book offers a global perspective on invasive plant-parasitic nematodes and useful for practitioners, professionals, scientists, researchers, students, and government officials working in plant quarantine and biosecurity.

Available at the CABI bookshop: https://www.cabi.org/bookshop/book/9781789247374/

International Federation of Nematology Societies Update

Despite a pandemic that refused to go away last year, IFNS initiated some very successful virtual activities to compensate somewhat for a dearth of meetings. The EPN Symposium and the graduate student 3-Minute Thesis are both hosted on the IFNS website. And we begin this year with bated breath, but high hopes for the Seventh International Congress of Nematology. Below are some items to wrap up 2021 and welcome 2022.

IFNS 3-MINUTE THESIS WINNERS!

Nine of the 22 contestants in the IFNS 3-Minute Thesis contest advanced to a second round of judging before three winners were selected by a panel of 6 nematologists and 3 'non-experts' from other areas of plant science. Winners received bursaries to ICN 2022.

Congratulations to:
Alison Coomer, First Place
Rhys Copeland, Second Place
Laura Sheehy, Third Place

Congratulations to all the students who put together some amazing talks!
A big Thank You to the judges and to Eric Grenier who initiated the competition!
The 9 finalist talks can be viewed at https://www.ifns.org/ifns-3-minute-thesis-advances-to-final-round.

7ICN REORGANIZATION

The 7th International Congress of Nematology will be the first global in-person gathering of nematologists in more than two years! It will be a true celebration of the opportunity to present data, discuss ideas, plan new collaborations, and socialize normally again.

ICN 2022 reopened in early November 2021 and the early bird rates will apply throughout February. The organizing company (Alpha Visa Congres) is actively revising the status of the pre-pandemic registrations. Please be sure to respond to their messages as soon as possible to regulate your revised plans.

Because the Covid-19 pandemic will prevent some colleagues from attending ICN 2022, provisions for virtual participation have been arranged for those who wish to do so. This was strongly supported by the IFNS councilors, with the proviso that it be affordable for the organizing committee.

Virtual participants will be able to submit abstracts for display in a virtual poster session and will be able to attend all paper sessions, workshops, and plenary talks in real time or as recordings to accommodate time differences. Note that the session organizers will give strong preference to speakers attending the meeting but may occasionally select a virtual (to be prerecorded) oral presentation. Cost of registration is €150 for virtual delegates from middle & low-income countries and €300 for those from high income countries. Paid registrations for ICN 2020 can be applied toward the reduced cost of a virtual registration for ICN 2022.

Visit https://www.alphavisa.com/icn/2020/index.php for complete information!

Nematology Conferences

7TH INTERNATIONAL CONGRESS OF NEMATOLOGY

Date: 1-6th May 2022
Venue: Antibes Juan-les-Pins, France
Website: https://www.alphavisa.com/icn/2020/index.php

11TH AUSTRALASIAN SOILBORNE DISEASES SYMPOSIUM

Date: 1-5 August 2022
Venue: Hilton, Cairns
Website: http://asds2022.w.yrd.currinda.com/

8TH INTERNATIONAL CEREAL NEMATODES SYMPOSIUM

Date: 26-29 September 2022
Venue: Abant, Turkey
Website: https://www.cimmyt.org/events/8th-international-cereal-nematodes-symposium-icns/