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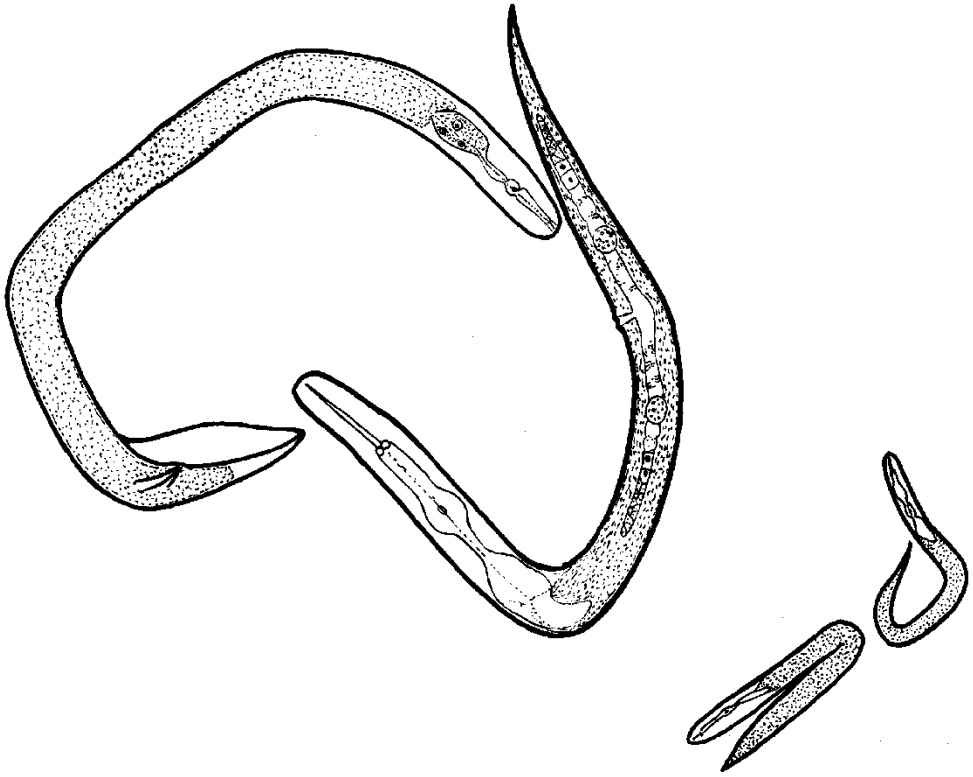
AUSTRALASIAN NEMATOLOGY NEWSLETTER



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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 January 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

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Association News

FROM THE PRESIDENT

In this report I was hoping to report on a triumphant conclusion to the 7th International Congress in France, but that was not to be. At this stage the congress is scheduled for May 2021, but even that is uncertain.

On a local note, the AAN has not had much of a coordinated personal get together for some time, and so a priority should be to have a special nematology session (and AGM over dinner!) at the next ASDS or APPS meeting. I have organized a number of these, and I think they have been generally well received and supported. But the last few meetings I have not organized anything in the hope of someone else stepping in with some independent ideas for themes and structures, that are different from mine. Unfortunately that does not seem to have happened, so I will attempt to organize something for the next Australian meeting where most of us are likely to be able to travel. If you have any ideas, please contact me. Otherwise you may be approached!

Elsewhere in this issue you will see a note about recruitment of a Post-Doctoral Fellow in nematode taxonomy and diagnostics (see page 15). The AAN was formed in response to concerns about training and succession, so this is a real positive development. That it is being supported by industry and government is even better.

On the negative side is concern about the dearth of people with interests in nematology, taxonomy and diagnostics coming through because we will have to recruit locally because of COVID-19 travel restrictions.

Here's hoping everyone is well, and that there is not too much damage from the possible research funding squeeze coming up.

Mike Hodda

FROM THE TREASURERS

Fees for the AAN (Australasian Association of Nematologists) are due annually 1st July through to 30th 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.

<u>ONLY Payment Method</u>

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

Careful planning of work rosters and adhering to social distancing restrictions within laboratory spaces has enabled members of the Crop Nematology team at University of Southern Queensland (USQ), to continue to deliver on project milestones during the COVID-19 restrictions. Planting of field and glasshouse experiments are underway.

Roslyn Reen presented her Master's thesis research at the Grains Research and Development Corporation (GRDC) Grains Research Update in Goondiwindi in early March, titled Can wild species of chickpea from Turkey help with resistance to root-lesion nematode (*Pratylenchus thornei*)? In other good news, Roslyn was recently awarded a USQ Publication Excellence Award for her paper in Phytopathology. In August, with the GRDC Grains Research Updates new online format, PhD student Elaine Gough will present her research on exploring interactions of arbuscular mycorrhizal fungi (AMF), rhizobia and root-lesion nematode (*Pratylenchus thornei*) - Could a lack of AMF be a cause of nodulation failure in mungbean?

Rebecca Zwart's plans to travel to the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) in April as an Australia-India Strategic Research Fund Early- and Mid-Career Fellowship recipient were put on hold until the global pandemic gets under control and international travel resumes.

The USQ Nematologists have featured in the local media recently with Kirsty Owen talking about the importance of soil biology for growing delicious veggies at home during isolation; on the local TV news, Rebecca and Roslyn explained the fascinating journey of discovering wild chickpea relatives to find new sources of resistance to root-lesion nematodes. Congratulations to Neil Robinson and his wife Pippa on the birth of their second daughter, Lydia, in April.

Publications:

Reen, R.A., Mumford, M.H., & Thompson, J.P. (2019). Novel sources of resistance to root-lesion nematode (*Pratylenchus thornei*) in a new collection of wild *Cicer* species (*C. reticulatum* and *C. echinospermum*) to improve resistance in cultivated chickpea *(C. arietinum*). *Phytopathology* 109: 1270-1279. doi: 10.1094/PHYTO-02-19-0047-R

Gough, E.C., Owen, K.J., Zwart, R.S., & Thompson, J.P. (2020) A systematic review of the effects of arbuscular mycorrhizal fungi on root-lesion nematodes, *Pratylenchus* spp.. *Frontiers in Plant Science*. doi: 10.3389/fpls.2020.00923

Rahaman, M.M., Zwart, R.S., & Thompson, J.P. (2020) Constitutive and induced expression of total phenol and phenol oxidases in wheat genotypes ranging in resistance/susceptibility to the root-lesion nematode *Pratylenchus thornei*. *Plants* 9: 485. doi: 10.3390/plants9040485

Reeves, K.L., Forknall, C.R., Kelly, A.M., Owen, K.J., Fanning, J., Hollaway, G.J., & Loughman R (2020) A novel approach to the design and analysis of field experiments to study variation in the tolerance and resistance of cultivars to root lesion nematode (*Pratylenchus* spp.). *Phytopathology*. doi: 10.1094/PHYTO-03-20-0077-R

Thompson, J.P., Sheedy, J.G., & Robinson, N.A. (2020) 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* 110: 505-516. doi.org/10.1094/PHYTO-06-19-0203-R

Rebecca Zwart and 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 Rajandeep Singh in a technical role and Bhanu Khalia as a research scientist. They each bring a breadth of experience and will support the Plant Pathology team in delivering milestones across a range of projects.

Based on work from the State Nematology Project that finished in 2019, Dr. Joshua Fanning led authorship of a paper published in Phytopathology in 2020. The paper explores the relationship between pre-sowing nematode density and yield loss in wheat and barley.

Final reports are now submitted for the National Nematology Project, which was the culmination of six years of work. Resistance screening from that project will continue in the National Variety Trials (NVT) project, which is now in its first of five years. We will continue to screen a variety of pulse cultivars to *P. neglectus* and *P. thornei* and continue publishing these in NVT Disease Guides.

We have now moved into the second year of the Soilborne Disease Project after some promising results from the 2019 trials saw yield losses from *P. thornei* and crown rot of up to 0.5 t/ha. We have now proceeded with the second year of our two-year trials after a successful setup year for *P. neglectus* and *P. thornei* and all trials are now in the ground. Despite challenges from COVID-19, we were able to sow all trials earlier than usual this year, with the last of our trials sown in May.

Publication:

Fanning, J.P., Reeves, K., Forknall, C., McKay, A.C., Hollaway, G.J. (2020) *Pratylenchus thornei*: The relationship between pre-sowing nematode density and yield loss in wheat and barley. *Phytopathology* 110(*3):*674-683. doi: 10.1094/PHYTO-08-19-0320-R

Jonathan Baker

NEWS FROM WESTERN AUSTRALIA

Department of Primary Industries and Regional Development (DPIRD)

2020 research for our WA research group started with the usual flurry of activity followed quickly by the screaming roadblock called COVID-19. For us, positives from the experience so far have been support and flexibility offered by DPIRD, our research collaborators and funding bodies. We have the pleasure of continuing a varied research program that has us working in unchartered experimental territory for WA as well as building on research foundations from previous local and national research. Our 2020 experiments include nematicide trials, continuing investigations on the relationship between nitrogen and root lesion nematode (RLN), suitable crop choices where RLN and Rhizoctonia bare patch occur together, influence of deep soil amelioration on nematode pests and soilborne diseases, and experiments for *Pratylenchus quasitereoides* in National Variety trials for wheat and barley.

In this newsletter we have two experimental summaries from the current range of research priorities in WA. The first research summary is part of a new collaborative research project that brings expertise from DPIRD's weeds, soil science and soilborne disease and nematology groups together (see page 7). See https://www.agric.wa.gov.au/news/media-releases/science-week-2019-soils-project-unearth-secrets-sustaining-amelioration-0 for more information. The research funding comes from DPIRD and GRDC as research partners. The full article is published in WA Liebe Group's 'Local research and development results. Results from the 2019 season' at https://www.liebegroup.org.au/copy-of-projects-1

The second experimental summary is from a trial series currently underway in WA where we are examining the potential of different nitrogen application strategies to mitigate yield loss due to RLN in cereal crops (see page 12).

Sarah Collins

Murdoch University

Re-organisations

Our group is now in the College of SHEE (Science, Health, Engineering, and Education) for academic aspects, in the Centre for Crop and Food Innovation, Food Futures Institute, based in the labs of the WA State Agricultural Biotechnology Centre (SABC).

COVID-19

Murdoch University instituted a lockdown from the end of March as a result of the COVID-19 pandemic, so all lab-based work was put on hold. With COVID-19 now (hopefully) essentially under control, selected researchers are being invited back to the SABC labs in a phased manner, with all our group back by June 1st. We are now just trying to pick up the pieces and get back to full productivity. At least it gave PhD students a chance to catch up on some thesis writing!

Maria Maqsood obtained funds to attend the ICN 2020 meeting in Antibes, now delayed as a result of COVID-19 to 2021. Unfortunately, three students in our group are still stranded in their home countries (Pakistan and India) as a result of the pandemic.

Science Diplomacy to enable translation and acceptance of new ways of controlling nematodes

Although indirectly related to nematology, we have a number of projects using genome editing for crop improvement. One of these involves the development of 'Science Diplomacy' and harmonisation of international regulations in relation to the products of 'New Breeding Technologies'. PhD student M. Adeel has developed a package called the 'Biotech Game', which provides training in international negotiations related to regulations and acceptance of GM/New Breeding Technologies. Our interest is preparing for biotech applications to control plant-parasitic nematodes. Adeel won the national "Education Initiative of the Year" award at the 2019 Annual Meeting of the Council of Australian Postgraduate Associations (CAPA), held in Melbourne. Adeel (and MJ) have run this event at Melbourne University, ANU and Murdoch.

Participants of the 2019 Annual Meeting of the Council of Australian Postgraduate Associations, Melbourne. Adeel is centre front, with tie.

PhD Projects and Awards for R&D in plant nematology

Murdoch University International Postgraduate Studentship Awards

- Maria Maqsood: *Towards understanding common mechanisms of nematode and insect effectors for plant parasitism.*
- Saiful Islam: *Functional analysis of putative parasitism effector genes of Root-lesion Nematodes (Pratylenchus spp.): developing potato (Solanum tuberosum) resistant to these nematodes using RNA interference.*
- Iqbal Hussein: *Biofumigant crops to suppress plant pathogenic nematodes in potato farming systems of WA*
- Jyoti Rana: *Understanding the molecular mechanisms of root-lesion nematode interactions with its host*

Grants

WA State Government Jobs, Tourism Science and Innovation Postgraduate Award (JITSI):

- Sasha Anne Somashakaram: *Biological control of crop pests using next-generation biopesticides for horticultural and broadacre crops*

GRDC Postgraduate Scholarship:

- Rhys Copeland: *Determining the spatial distribution of P. quasitereoides/P. curvicauda in the WA wheatbelt, and understanding how these nematodes find host roots as a means to developing new methods of control*.

Publications

We are slowly working our way through a backlog of thesis publications, here is the latest (with others in the pipeline):

Iqbal, S., Fosu-Nyarko, J. and Jones, M.G.K. (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. doi: 10.3389/fpls.2020.00328

Other recent grants awarded:

- Confederation of Grain Growers Organisations (COGGO) $200K - wheat
- AgrifuturesAustralia ~$600k – Quinoa

Mike Jones

Research Report

SOIL AMELIORATION: INFLUENCE ON DISEASE, WEEDS AND YIELD IN BARLY, YERECOIN 2019

Sarah Collins, Stephen Davies, Christine Zaicou-Kunesch, Carla Wilkinson, Daniel Huberli, Catherine Borger, Sean Kelly, Melanie Kupsch, Chad Reynolds and Andrew van Burgel

Department of Primary Industries and Regional Development (DPIRD), WA

Aims

- Compare impacts of mechanical amelioration treatments with un-ameliorated controls on prevalence and distribution of nematode pests and soilborne pathogens.
- Determine if lime addition and subsequent effects on soil pH following three types of mechanical amelioration practices influence distribution and levels of pathogen inoculum and nematode pests.
- Determine how weed seeds are distributed through the soil profile following mechanical amelioration, and investigate how changes to soil properties following soil amelioration affect weed density, biomass and seed production in crop.

Background

Major soilborne pathogens and nematode pests impacting crops in WA, as well as the weed seedbank, are mainly found in the top 10cm of the soil profile. Mechanical amelioration methods have different impacts on soil mixing which may influence soilborne pathogen, nematode and weed seed distribution in the soil. The re-distribution of these pathogens and pests to different depths in the soil profile could reduce their impact on crops, particularly early in the season. Re-distribution could also impact survival and proliferation of the soilborne pathogens and nematode pests over time. Further, changes to soil properties following amelioration may improve crop growth, changing the interaction of the crop with these pest species.

This investigation assesses changes and potential interactions in soil biology, chemistry and the physical properties of the soil profile during the 'transition period' for two growing seasons after different amelioration treatments were imposed. This report details outcomes in 2019 (year 1) where amelioration treatments were imposed prior to sowing a barley crop over the site.

The Yerecoin experimental site was chosen because it had a range of biological, physical and chemical constraints. The site has representative characteristics of the district in terms of soil type, cropping history, physical and chemical soil constraints. It also has a history of impacts from common nematode pests and soilborne disease; cereal cyst nematode (CCN; *Heterodera avenae*), rhizoctonia bare patch (*Rhizoctonia solani* AG8) and root lesion nematode (RLN (*Pratylenchus neglectus*)). PredictaB tests prior to renovation (April 2019) classified the paddock as a high risk of yield loss if a susceptible wheat was grown due to the combined risk levels of these biological constraints.

Methods

Implements used for the amelioration treatments included: a 2m wide Agroplow deep ripper capable of working to a depth of 45cm, an Imants 4m wide rotary spader for deep mixing and a 3-furrow Kverneland mouldboard plough for soil inversion. The deep mixing plots were deep ripped prior to spading. Soil profile moisture conditions at the time the amelioration treatments were applied were ideal so the tillage

implements could work to their maximum operating depth. Lime in the form of coastal limes was spread by hand at a rate of 2 t/ha after amelioration in order to assess the value of treating acidic soil brought to the surface by the tillage treatments.

Pogo (0-10cm) and core (10-20, 20-30 and 30-40cm) soil samples were collected immediately after sowing and at post-harvest from all plots. Soil samples were sent to SARDI for PredictaB testing for *P. neglectus* numbers, CCN eggs, and *R. solani* DNA levels.

Results

Physical and chemical soil modifications - Year 1

The soil had a hardpan at 15-50cm, defined as the point where the penetration resistance exceeds 2.5MPa (Figure 1). The amelioration implements loosened the soil to their depth of working with deep ripping most effective (measured on the rip line) removing the compacted layer to 50cm, while the deep mixing and inversion treatments effectively loosened the soil to 35cm (Figure 1).
In addition to a physical hardpan the soil also had a chemical hardpan in the form of subsoil acidity, with soil pH $_{CaCl2}$ at 4.2 from 20-40cm. The topsoil (0-10cm) pH was 6.0 so the deep mixing and inversion treatments will have incorporated this topsoil into the top 35cm of this soil profile.

Soil water repellence at the site was low but was completely overcome by the deep soil mixing and soil inversion (data not shown).

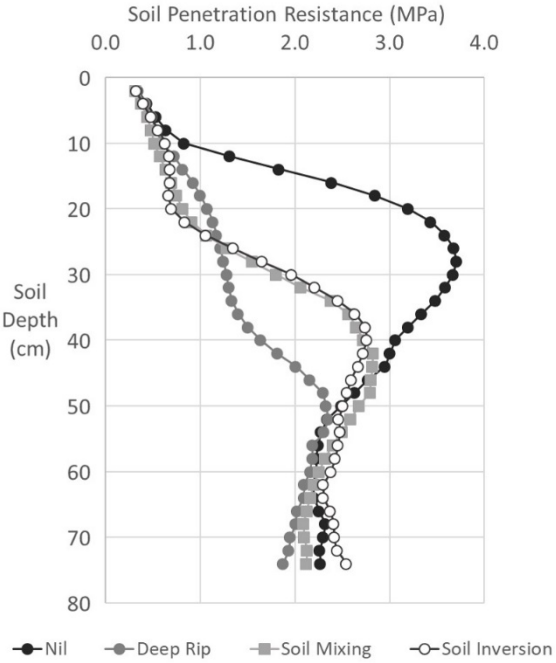

Fig. 1. Soil penetration resistance (MPa) measured when the soil was wet using a digital recording cone penetrometer showing the impact of amelioration methods on soil strength down the profile of a deep sandy earth at Yerecoin, WA.

Biological characteristics of soils post amelioration - Year 1

Soil inversion and deep mixing were both effective in reduction ($p<0.05$) of *R. solani* and *P. neglectus* (RLN) in the topsoil (0-10cm depth) compared to the nil plots (Figure 2a & 2c). *R. solani* multiplication over the growing season was also lower after soil inversion and deep mixing particularly at 0-10cm (Figure 2d). Conversely, soil inversion and deep mixing treatments increased levels of all three biological constraints at 10-30cm depth (Figure 2a-c).

Lime had no effect on *R. solani*, CCN or RLN at 0-10cm (data not shown).

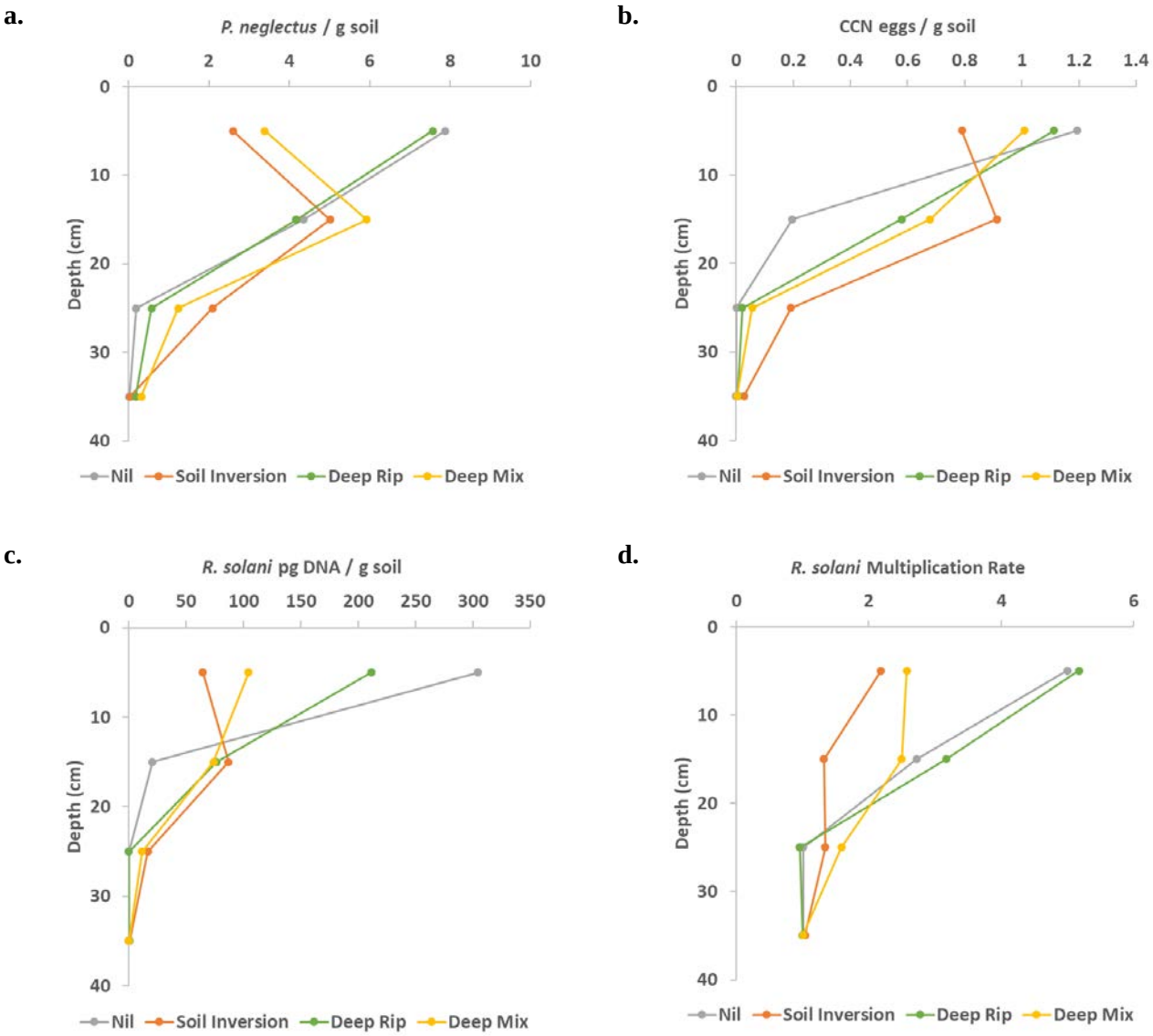

Fig. 2. Year 1 end of season inoculum and nematode pest DNA levels in the soil post amelioration (nil, soil inversion, deep rip and deep mix) at Yerecoin, WA for a) RLN (P. neglectus), b) CCN (H. avenae), c) R. solani AG8 and d) R. solani multiplication. Nematode and pathogen levels were measured at four depths; 0-10cm, 10-20cm, 20-30cm and 30-40cm.

Weed characteristics post amelioration – Year 1

Soil amelioration affects weed density. Grass weed numbers declined by over 60% from 88 plants/m^2 in the control to 32 plants/m^2 in the deep mixing treatment when assessed three weeks after seeding. There was a 100% reduction in grass weeds in the soil inversion treatments.

Discussion

Physical and chemical soil modifications – Year 1

Soil compaction at the site was extreme, greater than 3.5 MPa at 22-34cm (Fig. 1), at which point the soil is so hard that wheat roots can only grow through pre-existing root channels and fractures. The soil amelioration treatments were effective at reducing the soil strength to below 2.5 MPa to their depth of working, 35cm for the deep mixing and inversion treatments and 50cm for the deep ripping. Reducing the compaction increases root growth rates into the soil profile, which can increase water use. This is generally an advantage in most seasons but can be problematic in dry seasons if the crop runs out of water faster.

The soil strength will be monitored again over the 2020 season while the site is still in 'transition phase' post amelioration.

Assessment of the soil pH profile will commence in summer 2020. It is expected that inclusion of higher pH topsoil and associated organic matter through soil mixing and inversion will improve the conditions for root growth.

Biological characteristics of soils post amelioration – Year 1

Soil inversion and deep mixing were both effective in reducing *R. solani* and *P. neglectus* (RLN) in the topsoil (0-10cm depth). These treatments also reduced multiplication of *R. solani* over the season. This is the area of the soil profile where these biological constraints commonly affect crops early in the growing season. Conversely, these amelioration treatments increased levels of all three biological constraints compared to the control (*R. solani*, RLN and cereal cyst nematode (CCN)) at 10-30cm depth where these plant parasitic nematodes and rhizoctonia soilborne disease inoculum are not usually found at these levels in un-ameliorated soil in WA. The longevity of changes in the distribution and levels of the nematode pests and soilborne pathogen and potential positive or negative impacts on plant growth and yields are not yet understood. Continued assessment of the soil biology in the modified soil profile in the 2nd cropping season post amelioration will provide more information regarding the effectiveness of different amelioration practices for management of the biological disease constraints present.

In 2019, plots treated with lime post amelioration had no effect on the plant parasitic nematode or *R. solani* levels or multiplication over the season in the topsoil (0-10cm). Lime was applied to all treatments by hand after the amelioration practices had been applied so the only mixing of the lime into the soil occurred at sowing. Potential effects of this style of liming practice may become identifiable once the lime influences have had time to mediate soil pH to greater depths.

Weed characteristics post amelioration – Year 1

Weeds were significantly reduced in the soil inversion treatments, indicating that this treatment buried weed seed at a depth sufficient to prevent emergence. Burial of weed seeds reduces weed density in the subsequent year, but many of these seeds will remain dormant. A full inversion buries weed seeds to a sufficient depth that they are not returned to the surface. However, a deep mixing treatment may distribute weed seeds throughout the soil profile. Some of these dormant seeds may be returned to the surface to germinate in following years when seeding mixes the top 10cm of soil.

While the first seasons results are preliminary they do demonstrate the potential advantages of amelioration practices that can address multiple biological, physical and biological constraints. The experiment will continue to be monitored to assess longer-term impact of the practices on soil and biological constraints and crop performance.

Acknowledgements

The research team are very appreciative of Todd Duggan for his support and interest in the research, and access to his property to conduct the experiment. Thanks to Richard Field for undertaking rotary spading at the experimental sties. Thanks also for DPIRD's field services team lead by Steve Cosh and including Shari Dougall, Bruce Thorpe, Larry Prosser, Trevor Bell and Lucas Cooke for the implementation and management of the research site. DPIRD's research and technical team including Jo Walker, Jono Baulch, Miriam Connor, Kris Gajda and Helen Hunter, provide excellence in field research and data management. Their achievements are highly regarded, and appreciated.

DPIRD officers Christine Zaicou-Kunesch (left), Steve Cosh, Chad Reynolds, Carla Wilkinsin, Dr Sarah Collins, Dr Steve Davies and Jo Walker are working on a project co-funded by GRDC, to increase and sustain the benefits of soil amelioration on crop production. (©2019 DPIRD)

Research Report

EFFECT OF NITROGEN RATE ON ROOT LESION NEMATODE, *PRATYLENCHUS QUASITEREOIDES* IN THE HIGH RAINFALL ZONE OF WESTERN AUSTRALIA"S GRAIN-BELT

Carla Wilkinson, Sarah Collins, Jeremy Lemon and Karen Reeves

Department of Primary Industries and Regional Development(DPIRD), WA

Aim

- To determine the impact of increasing nitrogen on root lesion nematode levels, yield and grain quality of cereals.

Background

Agronomists and growers have noted that if they apply higher rates of nitrogen at seeding the symptoms of root lesion nematodes (RLN) may not be as severe. It is thought that good crop nutrition will decrease the plant root damage caused by RLNs.

A DPIRD/GRDC nitrogen x nematode trial in 2017 found that increasing nitrogen increased wheat root growth, *P. quasitereoides* multiplication, and wheat grain yield and grain protein. Thus applying extra nitrogen to lessen potential crop losses in *P. quasitereoides* infested paddocks may also increase root lesion nematode levels due to a larger food source from increased root production. Higher levels of RLN at the end of season may negatively impact yield and growth of subsequent crops. This experiment needs to be repeated with *P. quasitereoides* and *P. neglectus,* WA's most commonly found RLNs in broadacre cropping to confirm results.

Methods

In 2018, a field trial was established on a grower's property in Frankland River which started with medium levels of *P. quasitereoides* (14 RLN/g soil) and low levels of other soil borne pathogens. Wheat varieties Yenda (MRMS) and Calingiri (S) were sown to establish differential RLN levels for a 2019 RLN x nitrogen trial.

Prior to seeding in 2019, deep soil cores were divided into four increments (0-10, 10-40, 40-70 and 70-100cm) and tested for nitrate (mg/kg) and ammonium nitrogen (CSBP labs). At seeding super CZM (80 kg/ha, 9.1P, 10.1S, 0.6Cu, 0.3Zn, 0.06Mo) and muriate of potash (100 kg/ha, 50K,1.75S) was applied across the trial and nitrogen (as urea) was applied at following rates (a) Nil (b) 40:40, (c) 40:80, (d) 80 and (e) 120 kgN/ha. For split applications, 40 kg/ha was supplied at seeding and the extra supplied by hand at late tillering (9 WAS).

The trial design in 2019 was a spilt plot with 6 replicates of the following treatments (a) two barley varieties, La Trobe (MSS) and Planet (not rated), (b) 5 N rates and (c) two RLN levels giving a total of 120 plots. The barley varieties and nitrogen rates were randomly applied to the 2018 Calingiri and Yenda blocks. Multiple soil cores, to 10 cm depth, were taken from each plot at seeding and at harvest and *P. quasitereoides*/g soil was determined with qPCR (SARDI).

Results

The wheat variety grown in 2018 to set-up the differential RLN levels had no effect on mineral soil nitrogen at the beginning of the 2019 season with an average mineral nitrogen at 0-10cm of 34 kg/ha, 10-40 cm of 28 kg/ha and 40-70 cm of 25 kg/ha to give a total available soil mineral N prior to urea application, of 87 kg/ha. The topsoil pH was 5.2 in $CaCl_2$.

Effect of nitrogen rate on P. quasitereoides *levels*

The differential level of nematodes achieved by growing different wheat varieties in 2018 was still present after growing barley in 2019 with twice as many nematodes in the Calingiri plots than the Yenda plots, 36 and 17 RLN/g respectively. This demonstrates a two-year benefit of growing varieties that are more resistant. Planet barley was more resistant than La Trobe to *P. quasitereoides*.

Growing Calingiri (34 RLN/g soil) and Yenda (10 RLN/g soil) in 2018 successfully set-up different levels of *P. quasitereoides* ($p<0.001$) for 2019. In the 2019 barley crops, when no N was applied *P. quasitereoides* end of season levels were significantly lower than if N was applied and 120 kg/ha of N applied upfront resulted in more nematodes than the 80 kg/ha applied as a split application (Fig. 1). There was a trend for split application of N resulting in lower nematode levels than all N applied upfront but this difference was not significant.

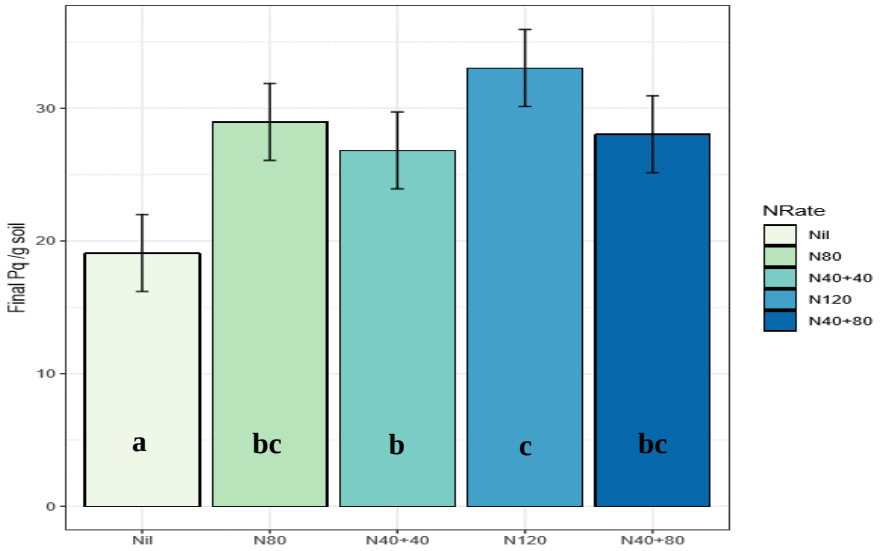

Fig. 1. Effect of nitrogen rates (kg/ha) on *P. quasitereoides* end of season levels (/g soil) in two barley varieties, Frankland River 2019. Treatments with two rates of N received a split application at seeding and 9 weeks after sowing. Letters indicate a significant difference between treatments ($p<0.05$)

Effect of N and P. quasitereoides *levels on yield*

There was approximately a 0.8 t/ha gain in barley yield by adding nitrogen versus no applied nitrogen but increasing nitrogen rates from 80 to 120 kg/ha did not increase yield (Fig. 2). Planet barley yielded more grain than La Trobe with yields of 3.6 t/ha and 3.8 t/ha, respectively. There was no difference in the tolerance of these varieties to *P. quasitereoides.*

There was a significant ($p=0.002$) reduction of yield by beginning of season *P. quasitereoides* levels (Fig. 3). The rate of yield loss was the same for all N treatments including the nil treatment. The average yield loss in this trial was 0.12 t/ha per 10 RLN/ g soil. Grain quality is still to be assessed.

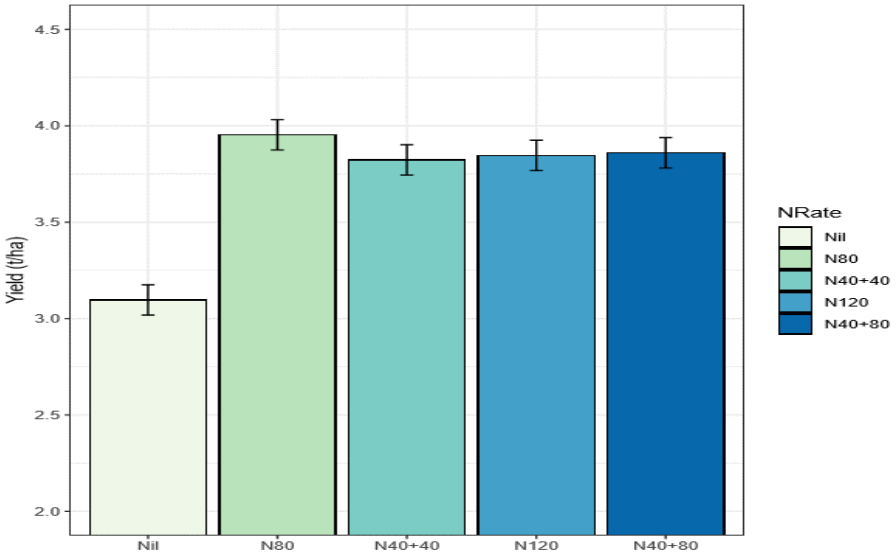

Fig. 2. Effect of nitrogen rate on yield of barley varieties La Trobe and Planet in a trial testing the effect of root lesion nematodes, *P. quasitereoides*, and nitrogen rates on yield, Frankland River 2019.

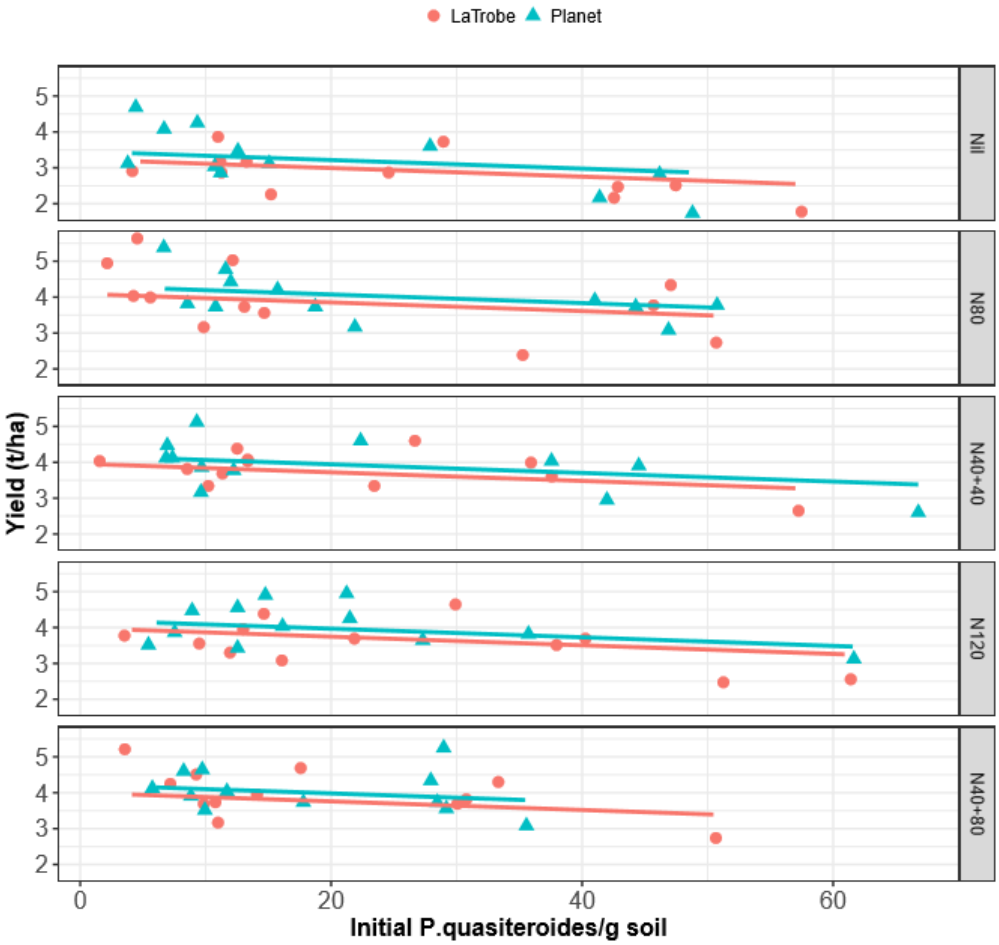

Fig. 3. Effect of *Pratylenchus quasitereoides* beginning of season levels and N (nitrogen) rates on yields of La Trobe and Planet barley, Frankland River 2019.

Post-doctoral Position

POST-DOCTORAL FELLOW IN NEMATODE TAXONOMY AND DIAGNOSTICS

CSIRO will be recruiting a Post-Doctoral Fellow in Nematode Taxonomy and Diagnostics for biosecurity-related species in mid-July. This will be based in Canberra and restricted to Australian and New Zealand Citizens and permanent residents, plus Australian temporary residents currently residing in Australia. If you know of anyone who would be interested, please encourage them to keep an eye on the CSIRO recruitment hub at the address below. This position should be one of many PDF's advertised at the same time, so the first test may be to find the advertisement (which is not live at the time of writing).

https://jobs.csiro.au/

PhD Position

GENETICS OF ROOT-LESION NEMATODE *PRATYLENCHUS THORNEI* RESISTANCE IN MUNGBEAN (*VIGNA RADIATA*)

A PhD position is available at the University of Southern Queensland (USQ), Centre for Crop Health for a motivated PhD student to investigate the genetics of the root-lesion nematode *Pratylenchus thornei* in mungbean (*Vigna radiata*). Mungbean is Queensland's most important summer-grown broadacre pulse crop. The susceptibility of mungbean crops to *P. thornei* counteracts their benefits (such as nitrogen fixation and fungal disease breaks) when grown in rotation with wheat. The PhD project will access mungbean germplasm collections and genomic resources to identify sources of genetic resistance, develop molecular markers for selection of *P. thornei* resistance and provide insights into the mechanisms of disease resistance. The project will provide opportunities for industry linkages, including Queensland's Department of Agriculture and Fisheries (DAF) National Mungbean Improvement Program.

Applicants must fulfil the PhD admission criteria for USQ, including English language requirements and demonstrated potential for research excellence. The successful applicant will receive an annual stipend of $30,000 for three years funded by the Broadacre Cropping Initiative, a partnership between the Queensland Department of Agriculture and Fisheries and USQ.

Interested applicants should contact Dr Rebecca Zwart, Senior Research Fellow (Crop Nematology), at USQ (rebecca.zwart@usq.edu.au) for further information.

Nematology Conferences

7TH INTERNATIONAL CONGRESS OF NEMATOLOGY

Date: 25-30th April 2021
Venue: Antibes Juan-les-Pins, France
Website: https://www.alphavisa.com/icn/2020/index.php

Important information: ICN 2020 To meet in 2021

The Seventh International Congress of Nematology meeting dates have again been rescheduled due to the coronavirus situation. The ICN 2020 will be held 25-30 April 2021 at the Palais des Congrès in Antibes Juan-Les-Pins (France).

This decision was made by the meeting organizers in consultation with the European Society of Nematologists. Uncertainty about when travel and meeting restrictions will end, and when most people will decide it is again safe to travel, made the change advisable. Other autumn conferences are similarly rescheduling to next year and alternative meeting dates will soon be unavailable. Increasing the interval until the congress to a full year provides more certainty that we shall be able to meet and gives ample time for delegates to make their plans and arrangements.

The scientific program is complete (https://www.icn2020antibes.com/) and will be maintained as nearly as possible in its current form, but with revised dates. If necessary, authors will have the opportunity to revise their original abstracts. We kindly ask authors not to contact us at this time as conference arrangements are being adjusted, more information will be sent in due course.

In the meantime, we advise you to make the appropriate changes regarding travel and, if you made your own booking (not with Alpha Visa Congrès), hotel reservations. Participant's registration fees will be transferred automatically and hotel reservations arranged by Alpha Visa Congrès will be rescheduled to the new dates which you will be able to modify according to new travel plans.

Registration for the Seventh International Congress of Nematology is currently eight hundred and four nematologists from 60 countries, including 100 student and early career scientist bursary recipients. The scientific program comprises 32 concurrent sessions comprising 288 oral presentations, 12 workshops, 12 keynote speakers, and two large poster sessions with more than 350 presentations. The mid-meeting excursions will provide outstanding opportunities to explore the splendid nature and the amazing culture of the French Riviera.

Few, if any nematology meetings will have occurred in the entirety of 2020. The Congress is an important opportunity to come together again to renew our work among friends, colleagues and students. We look forward to welcoming you in Antibes next year, where we shall celebrate an end to the crisis at a truly memorable scientific meeting.

Pierre Abad, 7th ICN Chair
Ernesto San-Blas, Scientific Program Chair
Larry Duncan, IFNS President

11TH AUSTRALASIAN SOILBORNE DISEASES SYMPOSIUM

Date: Postponed to 2022
Venue: Hilton, Cairns
Website: http://asds2020.w.yrd.currinda.com/

The ASDS organising committee has made the difficult decision to postpone the 11th Australasian Soilborne Diseases Symposium until mid to late 2022. We have a duty of care to our speakers, sponsors, and delegates and the wider community, to minimise the risk of further spread of the COVID-19. Collectively the committee felt it was also in the best interests of our delegates to arrive at this decision now to prevent the potential loss of investment people may make in order to attend the meeting.

The new date will be announced in the coming months. All enquiries regarding the postponement should be directed to Kate and Jenny, our conference managers via email at asds@yrd.com.au.

Tony Pattison and Rob Magary