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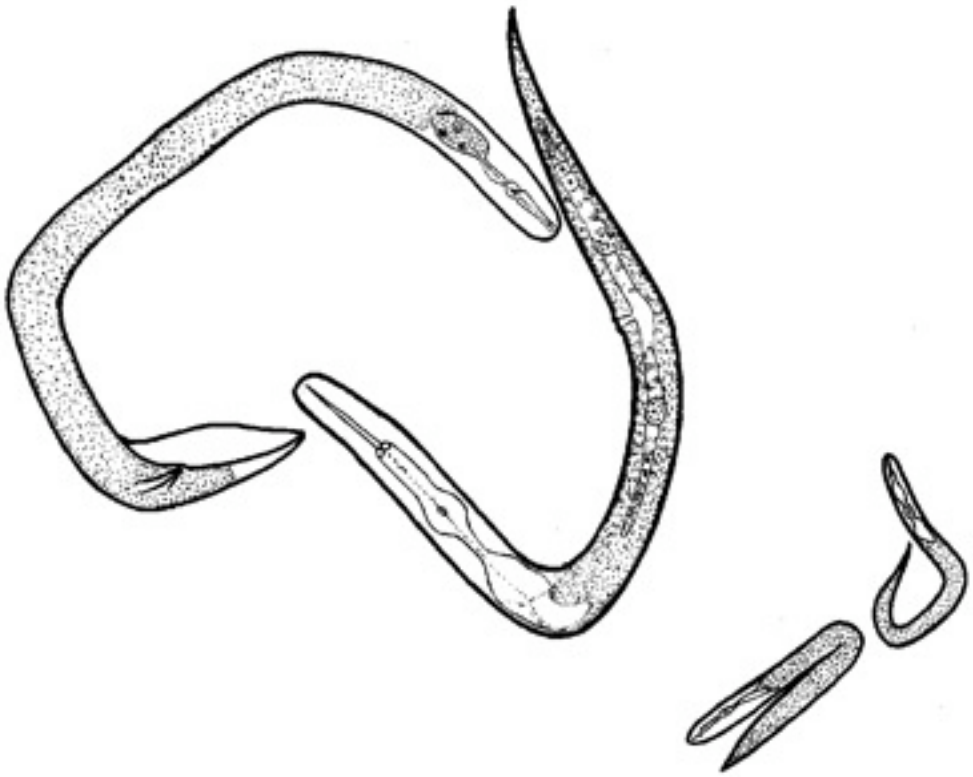
AUSTRALASIAN NEMATOLOGY NEWSLETTER



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From the Editor

Thank you to all those who prepared contributions for this newsletter.

January Issue

The deadline for the January issue will be late December 2009. I will notify you a month in advance so please have your material ready once again.

Kerrie Davies

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Association News

FROM THE PRESIDENT

5ICN will soon be over. No, that is not a misprint; the wrapping up has been going on long after the event finished. A few weeks ago I finally managed to complete all the finances for 5ICN. All that remains is to decide what to do with the proceeds. Yes, we finished up with a surplus, thanks to a shift in currency values which actually favoured us, and some great work by Sally Brown in efficiently allocating resources.

I should admit that we did not aim to make a profit, and when the conference was actually running, no-one could actually say whether we were going to finish in the red or black. We knew roughly where we were, but some things cost more than budgeted, and some cost less. The final numbers were not known until people actually came in the door because quite a few overseas people paid when they arrived. All the bills finally came in months afterwards (the tax man was last). And the last of the sponsorship we were promised took even longer to arrive.

Anyway, now that all the money is in, the suppliers and tax paid, we have a surplus. A small portion of this was used to provide an *ex gratia* payment to Sally for all the extra work she did. This was approved unanimously by the Executive.

This leaves the question of what to do with the money left over. Under the constitution of 5ICN, if 5ICN is wound up, then the money is to be transferred to either AAN or a special account of APPS set up for the benefit of AAN or some other non-profit body as approved by a general meeting of 5ICN. I have called a general meeting of 5ICN for Monday 28 September at Newcastle. Note that this is a meeting of 5ICN, which is (at present) separate from AAN.

At the moment the money is sitting in a high interest bank account, where it is earning interest.

My preferred option is to:

- Use the interest to fund travel by students to nematology workshops, conferences and other nematological activities, as well as sponsoring activities by AAN. This will mean that the money will be a continuing source of support for nematology, albeit a small one.

Other options follow, but these are less desirable in my opinion.

- Use the interest plus a certain amount of capital for similar activities as listed above. This will mean that the money will be a larger, but decreasing source of support for nematology.
- Put the money in AAN's bank account and use it to run AAN. This option would mean that yearly membership could drop to zero if desired, while still sponsoring the traditional dinner get together. This option could occur with the 2 options above if there were no other uses for the interest in any particular period.
- We could do nothing. In this case the money would continue to accrue and 5ICN could do with it as it wished.
- We could spend it all. Party anyone? Big statue of a nematode somewhere? The big nematode? Sponsor a book?

After deciding what to do with the money, there is then the issue of how to do it. I suggest:

- Change the name and constitution of 5ICN to become something like the Cobb Foundation which is run by SON.

Other options are:

- To transfer the money to AAN;
- To transfer the money to some other official non-profit body; or
- Any other suggestions.

Because many AAN members are not going to APPS in Newcastle, I think it is important to canvas this issue as widely as possible. Please, if you have any opinion at all contact me (preferably by email). Even if you don't care please contact me, so that a decision can be taken knowing that people do not feel strongly. It is important that we achieve the best outcome with this because it is unlikely that nematology in Australasia will get this sort of boost again soon (unless there is a bid for 6ICN, which won't be from me!)

On a lighter note, if we are going to use the money to support nematology, I have some suggestions for a name for the organisation. How about the following?

- Australasian Nematology Support Foundation (Australasian NSF: hopefully we won't be confused with the US National Science Foundation)
- The NEMA Foundation: Nematology Endowment Money Australasia
- The "Cobb (he started in nematology in Australia first) Foundation", although Jena in Germany might claim him before us. There might be issues with SON over this option.
- TODES: Threadworm Organisation for Development and Endowment Support
- WORMS: Worms Organisational Resource for Monetary Support
- WORM POOP: Wriggly-thing Organisation for Really Magnificent Parties and Other Outrageous Pursuits. Would anyone admit to getting the WORM POOP Award?

Better stop now. This is getting silly!

Mike Hodda

FROM THE TREASURER AND SECRETARY

Membership of the AAN currently stands at 66.

Welcome to these six new members:

- Kazmi Munawar – IPM Program, Pakistan Agricultural Research Council, Islamabad
- Jacqueline Nieuwenhuis – Enza Zaden Australia Pty Ltd, Narromine, New South Wales
- Michelle Russ – SARDI, Plant Research Centre, Adelaide, South Australia
- Matthew Ayres – SARDI, Plant Research Centre, Adelaide, South Australia
- Sarah Dunstan – Plant Disease Diagnostic Unit, Royal Botanic Gardens, Sydney, NSW
- Andrew Li – School of Veterinary and Biomedical Sciences, Murdoch University, WA

There has been a reduction in the membership of 71 that was reported in the previous Newsletter. Some have left the fold due to job changes, but most of the disappearances are due to my inability to track down those members who had been un-financial for a number of years.

I am happy to report that currently only four members are outstanding in their payments, all of them long-standing members who will soon be ruthlessly bombarded with emails soliciting money (including for arrears payments!).

Mike Hodda and I will be attempting in the future to make payments to AAN easier for members. Currently we are only able to accept payment by cheque or money order. However, if you contact me when an email arrives requesting payment, we can make alternative arrangements.

I would also like to remind members who pay their AAN subscription through APPS to continue to do so. If leaving APPS, please remember to pay your AAN separately if you wish to remain a member.

On reviewing the membership records, there are some gaps in the details of members' nematological interests. I will be emailing membership forms at some stage so that members can complete and/or update these details.

Vivien Vanstone

Regional News

NEWS FROM SOUTH AUSTRALIA

The University of Adelaide

Kerrie Davies spent a week in the ABCL lab. at CSIRO Indooroopilly in March, helping Dr Dorota Porazinski (Uni. of Florida) set up experiments on the nematodes associated with soil around the roots of *Melaleuca quinquenervia*. She was also able to collect *Fergusobia* galls and to see Graham Stirling and Jenny Cobon. Since then she has continued the peripatetic thing, and recently visited Dr Zeng Qi Zhao (Landcare, Auckland), Prof. Robin Giblin-Davis (Uni. of Florida), Dr Adrian Evans (Imperial College, London) and Dr Julie Nicol (CIMMYT, Turkey) on a round-world trip. In Florida, she worked on manuscripts and drew more *Schistonchus* for a morphometric analysis she is working on with Ian Riley. In Turkey, the Anatolian Plateau had had good rains, and field trials looked great, except where a freak hailstorm had literally shredded the crops. Kerrie was also able to catch up with Dr Suzanne Charwat and Dr Andreas Hensel in Germany, both of whom studied and worked at the Waite Institute and will be remembered by colleagues here. When not travelling, Kerrie is writing up *ca* 15 years of work – better late than never, she says.

Katherine Linsell continues her PhD on 'Genetic and physiological characterisation of resistance to root lesion nematode *Pratylenchus* sp. in wheat'. She has won a Society of Nematology NA Cobb Travel Award to enable her to attend the SON meeting in Vermont in July 2009. Well done Katherine!

Kerrie Davies with Robin Giblin-Davis and bonsai *Ficus* in Florida, May 2009. No *Schistonchus* on this specimen!

Julie Nicol with colleagues in field at Eskeshir, Turkey. Amer Dababat, Julie's new post-doc., is on her right in this photograph. He previously worked with Richard Sikora in Bonn.

Double haploid wheat lines from Australia growing in field trial at Eskeshir, Turkey.

Ian Riley returned to China in May to participate in the fourth national workshop on cereal cyst nematode (CCN), this time held in Zhengzhou, Henan. Julie Nicol (CIMMYT, Turkey) and he provided an international perspective as the Chinese researchers reviewed research progress and plans. The most impressive report was of a survey conducted by agricultural agencies in Henan during 2007 and 2008. Eight thousand fields were sampled in 18 counties, involving the training and participation of thousands of people. The scale of this was beyond the wildest imaginings of Australasian nematologists. The upshot was that CCN was found in 16 counties, in about 27% of fields, which equates to over a million hectares of infested agricultural land in the whole province. It is estimated that about a tenth of this area has CCN populations at densities likely to cause significant yield loss. Some commonly grown wheat cultivars are highly intolerant to CCN. After the meeting, Ian went to Beijing to work with Prof. Peng Deiang, nematologist with the China Academy of Agricultural Sciences. One of Ian's tasks while in China was to collect data for a report to the ATSE Crawford Fund on the impact of the 2005 Master Class on Soil Borne Pathogens of Wheat, which was also held in Zhengzhou.

SARDI

Milanka Matik recently retired from SARDI. She will be missed by the CCN team at SARDI and her friends on the Waite Campus. Happy retirement, Milanka, and we hope to see you again soon.

NEWS FROM NEW ZEALAND

Over 38 years after joining DSIR Soil Bureau **Gregor Yeates** has recently retired. Since beginning his PhD in 1966 Gregor has made significant contributions to soil biology and is particularly known for his work on the contribution of nematodes to soil processes. Aspects of his work are covered in the forthcoming chapter "Role of nematodes in ecosystems" which he co-authored with Howard Ferris, Tom Moens and Wim van der Putten and which will appear in the CABI volume in "Nematodes as Environmental Bioindicators" in June. Through his cooperative, inter-disciplinary studies understanding has progressed from the earlier works of Seidenschwarz (1923) and CO Nielson (1949). Other forthcoming papers include a confirmation of the effect of elevated carbon dioxide on soil nematodes in a sandy soil and an account of reproductive activity in bacterial-feeding nematodes at Cape Hallett, Antarctica – a return to the continent where he first collected nematodes in 1965.

In addition to his work on soil processes Gregor has been active in systematics, proposing over 100 nematode species from many Orders, lifestyles and habitats. He was instrumental in demonstrating the effects and economic impact of clover root nematodes (*Heterodera* and *Meloidogyne*) on white clover growth and symbiotic nitrogen fixation in pastures, increased understanding of the functional morphology of nematodes in relation to their biology, and undertook extensive environmental impact assessment of the use of a nematode-trapping fungus (*Duddingtonia flagrans*) for biological control of gastro-intestinal nematodes of grazing animals.

Gregor has contributed to the activities of many national and international societies, and served on the editorial boards of seven journals. Three societies (New Zealand Society of Soil Science, Royal Society of New Zealand, Society of Nematologists) have conferred fellowships on him. No longer having an extraction room, microscopes or an office with walls lined with useful literature means he has limited ability to contribute further to nematology and soil biology. He continues to serve on various editorial boards and has many science-related activities to occupy him. Gregor and Judy plan to continue living in Palmerston North. His new e-mail address is gregor.yeates@gmail.com.

Research

BANANA NEMATODE SURVEY CARNARVON WESTERN AUSTRALIA 2009

Sarah Collins and Vivien Vanstone
Department of Agriculture and Food Western Australia

Background

Since the 1950's it has been recognised that nematodes have the potential to significantly impact banana yields in Carnarvon plantations. In 1955, Senior Nematologist Olga Goss described heavy infestations of *Meloidogyne*, *Pratylenchus*, *Radopholus* and *Helicotylenchus*, and subsequent research trials were conducted to control nematodes using nematicide (Goss 1958; Goss and Hawson). In recent years, *AGWEST* Plant Laboratories diagnostic results indicated that the nematodes of concern to bananas for Western Australia are Root Knot (*Meloidogyne*), Spiral (*Helicotylenchus*), Root Lesion (*Pratylenchus*) and Stubby Root (*Paratrichodorus*) Nematodes.

Worldwide, about 146 nematode species are reported from banana roots but only *Radopholus similis* and several species each of *Meloidogyne*, *Helicotylenchus*, *Pratylenchus* and *Rotylenchulus* cause significant losses (Ritzinger *et al.* 2007).

This survey aimed to identify whether Carnarvon's Banana industry was at risk from any Emergency Plant Pests (EPP's) and also to assess nematode populations that had the potential to limit production. Burrowing Nematode (*Radopholus similis*) was of particular interest in the survey as it is considered a significant nematode threat to banana production in Australia (Pattison *et al.* 2000) but has rarely been identified in Western Australia. Since its identification by Goss in the 1950's, *R. similis* has only been identified once from Western Australia: in a 2002 baseline survey a low population was identified in one sample from Carnarvon (N. Eyres, DAFWA South Perth and M. Hodda, CSIRO Canberra).

Methods

From each property, soil and roots were collected from ten trees using methods adapted from Pattison *et al.* (2000). Suitable sample trees (those with bunches near or after bract fall) were chosen randomly within older blocks where nematode numbers were likely to be higher. Two samples were taken, one from either side of the bunching sucker. A spade was used to collect a block of soil and roots from the plant base approximately 175 x 175 x 270 mm, then a sub-sample of approximately 25 per cent of the total soil block was cut to encompass the soil profile from 0-270 mm. A minimum of ten 10 cm length roots were collected from each tree. Soil and root samples were placed into zip lock plastic bags to ensure moisture retention during transport and storage.

All samples were kept shaded after collection and maintained at 20-22°C in the laboratory. Special care was taken to ensure that samples were also maintained at this temperature during transportation and storage prior to processing. All sampling equipment was sterilised between properties.

Soil was rinsed from roots under running tap water, then roots were split longitudinally and examined for symptoms of nematode infestation. The roots from each property were chopped, mixed and distributed between 4 extraction containers. Soil from the two samples from each tree was sub-sampled without mechanical disturbance and a total of 200g distributed between two extraction containers. Nematodes were extracted from roots and soil in a mist chamber over five days. Extracts of nematodes in water were maintained at 20°C and sent to Dr Jackie Nobbs (Nematode Taxonomist, SARDI Adelaide) to be quantified and identified. Soil and roots were dried and weighed, and the nematode population per gram of dry root and per 200g of dry soil calculated.

Results and discussion

No nematodes of quarantine significance were identified

Symptoms of Root Knot Nematode (RKN, *Meloidogyne* spp.) and Spiral Nematode (*Helicotylenchus* sp.) were detected. Typical RKN symptoms (swellings, galling and lumps) were observed on external examination of the roots and clusters of RKN females were observed within the galls. Typical symptoms of purple to black necrosis throughout the root cortex caused by Burrowing Nematode (*Radopholus similis*) were absent.

Following nematode extraction procedures, RKN (*Meloidogyne* sp.) and Spiral Nematode (*Helicotylenchus multicinctus*) were identified from both the roots and soil (Table 1). Burrowing Nematode was not identified from any sample. Spiral Nematode and RKN were present in all samples. Root Lesion Nematode (*Pratylenchus* sp.) was identified from the roots, but not the soil, from only one sample on one property (2.7/g dry root, Property 11).

Burrowing Nematode is sensitive to cold, favouring the warm moist soils found in tropical to sub-tropical climates and its lifecycle is generally completed at 25-30°C (Jackson *et al.* 2003). Optimum temperature for reproduction of Burrowing Nematode is around 30°C (Fallas and Sarah 1995). Conversely, multiplication of this nematode is very low at 21°C, and reproduction ceases at soil temperatures below 16-17°C (Sarah *et al.* 1996). As samples were maintained at 20-22°C during storage and transport to maintain integrity of the nematodes, and large numbers of other nematodes were successfully extracted, the results indicate that Burrowing Nematode would have been identified in these samples if it were present. A survey conducted by an agronomist for Carnarvon Growers Association (November 2008) also indicated that no *R. similis* was present: RKN, Spiral, Ring and Stubby Root Nematode were detected. These results suggest that the climate in Carnarvon, where average minimum temperatures of below 17°C are recorded annually from May to October (Bureau of Meteorology), is not favourable to *R. similis* and its ability to survive and reproduce over time would be restricted.

The nematode species and levels recorded in this survey would not be regarded as a production constraint in tropical areas. In Carnarvon, where plants did not have well developed root systems, it is possible that Spiral and Root Knot Nematode may have a greater impact (T. Pattison, pers. comm., 2009). In tropical areas, Spiral Nematode is usually of secondary importance to Burrowing Nematode. However, in areas such as Carnarvon, where temperature and rainfall conditions are limiting, *R. similis* is often rare, and *H. multicinctus* is the major nematode problem which can cause severe damage and decline in bananas (Ploetz *et al.* 1994). The unique environmental conditions of Carnarvon, as well as its isolation from other banana growing areas, may contribute to this finding. Although Burrowing Nematode (*R. similis*) was not detected, Spiral and Root Knot Nematodes may pose a potential production constraint to bananas in this area.

Damage to some RKN juveniles was observed, and this is believed to be caused by *Pasteuria penetrans*, a bacterium known to infect nematodes, giving the nematode a “warty” appearance. It may provide some natural suppression of the nematode population. Research internationally has shown that *Pasteuria* can reduce RKN infection of roots, suppress development of root galls, limit nematode reproduction, and reduce the nematode population in the soil (Jonathan and Rajendran 2000; Devrajan *et al.* 2003). This requires further investigation. Soil has been retained for further study, but this investigation would require additional funding.

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Table 1 Spiral and Root Knot Nematode (RKN) densities extracted from roots and soil.

		Nematodes/g dry root		Nematodes/200g dry soil	
Lab ID No.	**Property**	**Spiral**	**RKN**	**Spiral**	**RKN**
8044	1	473.0	25.9	533.1	58.2
8045	2	0	56.6	8.5	357.6
8046	3	162.2	67.4	183.7	164.4
8047	4	142.9	32.0	1418.9	54.2
8048	5	638.9	9.7	892.4	29.6
8052	6	530.4	83.1	236.5	19.4
8053	7	254.8	22.8	245.6	18.9
8054	8	149.5	39.0	571.6	89.1
8055	9	458.1	21.7	577.2	25.5
8056	10	344.5	22.1	1141.9	26.8
8057	11	38.4	279.9	59.4	80.2
8058	12	675.5	1.3	640.6	7.7
8059	13	415.0	188.3	404.7	11.4
8060	14	433.8	3.8	450.1	8.4
8061	15	12.5	200.9	0	167.3

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The DAFWA Carnarvon Banana HortGuard® Committee and the APC Carnarvon Banana Producers' Committee supported and funded this work.

D. Parr, consultant for Carnarvon Banana Producers' Committee and S. Lawson from DAFWA, Carnarvon assisted with the survey.

The following staff from DAFWA South Perth are gratefully acknowledged for their contributions: H. Hunter, X. Zhang, L. De Brincat, C. Wang, and M. You.

J. Nobbs (SARDI Plant and Soil Health, Adelaide) counted and identified the nematodes.

Thank you also to the Carnarvon Banana growers who participated in this survey.

POTATO CYST NEMATODE: UPDATE ON AREA OF FREEDOM WORK IN WESTERN AUSTRALIA

Sarah Collins and Vivien Vanstone
Department of Agriculture and Food Western Australia

Potato Cyst Nematode (PCN, *Globodera rostochiensis*) was detected on six properties in the Perth Metropolitan area between 1986 and 1989. An eradication campaign was established and strict Quarantine protocols put in place. Despite continued testing and monitoring, PCN has not been detected in Western Australia again. Although it is now 20 years since PCN was last detected in WA, restricted access to national and international markets continues. To now establish Area Freedom from PCN for WA, work funded by Horticulture Australia Ltd and the Potato Growers' Association of WA will provide the data necessary to prove Area Freedom. This project will be completed by March 2010.

The project has focused on 3 main areas of study:

1. State-wide survey

Sampling of all WA potato-growing areas was completed in December 2007. Potato fields were sampled on a 5 x 5 m grid, taking soil cores of approx. 50 g each to a depth of 15 cm. This equates to 400 sub-samples per hectare, creating bulk soil samples of approx. 20 kg/ha. Entire samples have been processed without sub-sampling (i.e. total organic matter has been extracted from 20 kg/ha). This sampling scheme is more rigorous than the statutory guidelines of any country, and provides a 96.4% statistical likelihood of detecting PCN if present.

From the 156.5 ha sampled, 61,400 soil cores were collected, and 3.1 t of soil processed to extract total organic matter.

With microscopic examination of organic matter samples, no PCN was detected in the survey samples from any WA potato growing area. This strongly indicates that PCN did not spread to other growing areas from the initial sites of infestation.

A Large Fenwick Can has been implemented for this project to allow large soil samples to be processed. Cyst extraction (by "seeding" soil samples with CCN) was compared for the Standard (500 g soil samples) and Large (2 kg soil samples) Fenwick Cans. The Standard Fenwick had lower extraction efficiency than the Large Fenwick: 76.0% versus 87.5%. Furthermore, extraction efficiency for the Standard Fenwick decreased as the number of cysts decreased: for 100, 50 and 10 cysts efficiencies were, respectively, 89.0, 80.8 and 58.3%. Efficiency for the Large Fenwick was maintained at 87.5% irrespective of the number of cysts added to the test sample. These results suggest the Large Fenwick is an effective tool for extraction of organic matter from large soil samples.

2. Bioassay

A 2-year PCN bioassay was completed in February 2008. Organic matter extracted from 83 kg of soil collected from each of the sites of the original WA PCN infestation was used to "seed" pots of soil sown to a susceptible potato cultivar over two growing seasons (2006/07 and 2007/08). Potatoes and roots were harvested and visually assessed for cysts after each crop. No PCN was detected. In 2008, total organic matter was extracted from each of the 60 30L pots and assessed microscopically for cysts. No PCN was detected, indicating that the eradication and quarantine program implemented in 1986 was successful.

3. Collation of historical records

All available records since 1991 (when the testing regimes and quarantine exclusion zones were implemented in WA) have been collated. Combined data from soil tests, fork tests and machinery and bin inspections from all production zones indicate there were no positive detections of PCN from 6,122 samples dating back to 1991. Current test records are yet to be added to these data, and some "missing" records are being located.

Quarantine Issues

FIRST REPORT OF *MELOIDOGYNE CHITWOODI* IN TURKEY

Source: EPPO Reporting Service No. 4 Paris, 1 April 2009, 2009/063

In September 2006, *Meloidogyne chitwoodi* (EPPO A2 List) was identified from potatoes (*Solanum tuberosum*) collected from the Niğde Province in Turkey (Central Anatolia). The identification was based on the morphological characteristics of the nematode and molecular tests (PCR, RFLP). This is the first report of *M. chitwoodi* in Turkey, and it is suspected that the pest has been introduced with imports of seed potatoes. The distribution of *M. chitwoodi* in potato fields in Turkey still remains to be determined.

The situation of *Meloidogyne chitwoodi* in Turkey can be described as follows: **Present, first found in 2006 on potatoes in the Niğde Province, Central Anatolia.**

Source

Ozarslandan A, Devran Z, Mutlu N, Elekcioglu IH (2009) First report of Columbia root-knot nematode (*Meloidogyne chitwoodi*) in potato in Turkey. *Plant Disease* **93**, 316.

FIRST REPORT OF *GLOBODERA ROSTOCHIENSIS* ON POTATOES IN IRAN

Source: EPPO Reporting Service No. 6 Paris, 1 June 2009, 2009/111

In June 2008, several ware potato (*Solanum tuberosum*) fields in the western part of Iran (Hamadan Province) showed patches (20 to 200 m²) of poor growth. Affected potato plants showed severe stunting, leaf yellowing and wilting. The presence of cyst nematodes could be observed on the roots. Cysts and second stage juveniles were extracted from samples of soil and potato roots and were identified (morphology and molecular tests) as *Globodera rostochiensis* (EPPO A2 List). *G. pallida* was not detected in the tested samples. This is the first report of *G. rostochiensis* in Iran.

The situation of *Globodera rostochiensis* in Iran can be described as follows: **Present, first found in 2008 on potato fields in the western part of Iran (Hamadan Province).**

Source

Gitty M, Tanha Maafi Z (2009) First report of a potato cyst nematode, *Globodera rostochiensis*, on potato, in Iran. *New Disease Reports* **19** (February 2009 to August 2009) http://www.bspp.org.uk/publications/new-disease-reports/ndr.php?id=019038

DITYLENCHUS DESTRUCTOR DOES NOT OCCUR IN NEW JERSEY (US)

Source: EPPO Reporting Service No. 6 Paris, 1 June 2009, 2009/112

For many years, it has been considered that *Ditylenchus destructor* (EU Annexes) was present in New Jersey (US), on the basis of a publication from Thorne (1945) and a single interception made by Canada in 1969 on iris bulbs imported from New Jersey (Sewell, 1970). The latter cannot be taken as a solid basis for establishing the presence of *D. destructor* in New Jersey and when looking more closely at the paper from Thorne, its occurrence in New Jersey was only an assumption which has never been confirmed since: *'A population of* Ditylenchus dipsaci *attacking sweet potatoes in Maryland and New Jersey, and causing injury very similar to that of*

D. destructor *was studied by Kreis (1937). It is believed by the writer that this probably was* D. destructor *but, unfortunately, it has not been possible to secure specimens for comparative studies.'*

In more recent years, it can be noted that *D. destructor* has never been detected during routine diagnostics or soil surveys in New Jersey. Official surveys carried out from 2001 to 2004 did not detect the nematode and there are no records of its presence in New Jersey in any US nematode collections. Therefore, it is now considered that *D. destructor* does not occur in New Jersey.

The situation of *Ditylenchus destructor* in New Jersey can be described as follows: **Absent, all previous records arose from confusion with other *Ditylenchus* species or were erroneous, confirmed by general surveillance.**

Sources

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MORE ON *DITYLENCHUS DESTRUCTOR* IN TASMANIA

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Part A

I refer to the item "*Ditylenchus destructor* does not occur in Australia" in Australasian Nematology Newsletter 20(1):28, January 2009.

The substance, if not the letter, of this item from EPPO Reporting Service in May 2008 came from Biosecurity Australia.

During 29 February 2008 I received an e-mail from Plant Biosecurity Australia questioning the occurrence of *D. destructor* in Tasmania. I replied that day: "Yes, *Ditylenchus destructor* was found, but as far as I'm aware, in only one location… Preserved specimens of the nematode were sent to Thorn *(sic),* who described the species, and he confirmed my identification…"

Biosecurity Australia rejected my first-hand testimony: it was contestable.

Biosecurity Australia adopted the conclusion of some authors, none of whom had contacted me, that records of *D. destructor* in Australia are incorrect and the conclusion that "all previous records arose from taxonomic confusion with other *Ditylenchus* species or were erroneous, confirmed by general surveillance".

I was not confused.

Thorne was not confused: *inter alia* he noted specifically 6 incisures in the lateral fields of the Tasmanian specimens and commented along the lines that this was a distinctive characteristic of *D. destructor*.

If any records of field and laboratory examinations and of correspondence with Thorne and the potato grower remain after almost 50 years they cannot be found easily in the Tasmanian storage in which they may have been placed. It seems that Thorne left no records in USA of this matter.

The EPPO item noted that *D. destructor* has not been found during extensive surveys of potato and carrot crops in Tasmania. **I am convinced that none of these surveys was anywhere near the site where I found *D. destructor.***

During 4 or 5 years after I found *D. destructor* I did not return to the site but I checked other potato crops, mainly in NE and NW Tasmania, during field trips. I found no other occurrences of *D. destructor.* I concluded that the sole occurrence resulted from the use as planting material of infested tubers from the galley of an overseas ship visiting Hobart. Given the long absence of any other reports it seems that the infestation of *D. destructor* has not persisted, **but who has checked?**

Part B

Evans (1968) and Evans and Fisher (1970) worked with *Ditylenchus destructor* from Bismark potato tubers provided by me from Tasmania. Their observations and measurements and other results give the incontrovertible conclusion that the nematode was *Ditylenchus destructor* Thorne 1945. Evans had no doubt of the nematode's identity then and has no doubt now (Evans *pers com*). There are no known remnants of the material with which Evans and Evans and Fisher worked.

A Seed Certification Inspector provided P J Sampson, then Plant Pathologist, later Senior Plant Pathologist, in the Tasmanian Department of Agriculture, with a sample of potato tubers showing textbook symptoms of Potato Tuber Nematode, probably during autumn-early winter 1960. Nematodes readily were found associated with the lesions but were not identified. The occurrence was logged in the Specimen Book kept in the Plant Pathology Division (Sampson *pers com*). Soon thereafter I joined the Division and continued the investigation.

Sampson accepted the validity of my statement that Thorne, who had described the species only 16 or so years earlier, identified the nematode as *Ditylenchus destructor* but Sampson did not sight the correspondence. Sampson's acceptance is demonstrated by the record of the occurrence in Sampson and Walker (1982). G Thorne (Madison, USA) is listed in the introduction as a person deserving particular thanks for help with specific problems. The record remains unaltered in the spreadsheet maintained by Diagnostic Services, Tasmanian Department of Primary Industries, Water and Environment and used in preparation of the 1982 publication and to update it. The record has the notation det. Gerald Thorne 1961 but had been considered to be unauthenticated (Metcalf *pers com*).

Hodda and Nobbs (2008) stated “Reported records of *D. destructor* in Australia are incorrect”; they provided no comment or analysis to justify this statement, however.

Biosecurity Australia endorsed the view that “all previous records arose from taxonomic confusion with other *Ditylenchus* species or were erroneous, confirmed by general surveillance” and adopted the “scientific view… supported by the relevant state departments” that my statements about the occurrence of the nematode in Tasmania and Thorne's identification of it as *Ditylenchus destructor* were contestable. Biosecurity Australia would take additional information into account. Biosecurity Australia document 2008-06, the source of the EPPO notification that “*Ditylenchus destructor* does not occur in Australia”, contains confidential information and cannot be released to the public (Grant *pers com*). I am intrigued that Biosecurity Australia document 2008-06 (June 2008) post-dates the EPPO notification (May 2008).

Vanstone (2008) noted acceptance that early records arose from taxonomic confusion and are erroneous, but allowed the possibility that *D. destructor* no longer occurs in the areas from which it was reported.

Hodda and Nobbs (2008), Biosecurity Australia (Grant *pers com*), and Vanstone (2008) made no mention of the work of Evans (1968) and Evans and Fisher (1970).

Biosecurity Australia (Grant *pers com*) and Vanstone (2008) referred to the importance of valid records of pest status to international trade. In my view, **Biosecurity Australia promptly must**

up-date its notification to EPPO, CABI and its international counterparts and the status of *D. destructor* in Tasmania must be reassessed by intensive investigation at the site of the original occurrence. It has been a long time since that first, and only, reported occurrence but I subscribe to Carl Sagan's dictum **"absence of evidence is not evidence of absence".**

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A COMMENT ON THE *DITYLENCHUS DESTRUCTOR* ISSUE

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This newsletter exists to encourage discussion of issues of interest to nematologists. Clearly, the identity of the specimens found in Tasmania many years ago (before I was born in fact), is one such issue. I think it is healthy that issues like this can still evoke a considerable response and it is appropriate to discuss these issues in the light of what we currently know. In my opinion, it is important that we also recognise that what we can do with current data is limited, but that a way of resolving issues like this is always to collect additional data.

It is pleasing that the skills that we nematologists have, to actually find and identify our little beasts, can be important. It also shows the importance of actually sampling nematodes regularly and identifying them properly.

For what it is worth, my opinion on the issue is that we cannot be sure that the identity of the nematodes found all those years ago was *Ditylenchus destructor.* The reason is that the systematics of the genus—indeed of nematodes as a whole—has advanced a lot since the 1960's.

For example, Figure 1 shows the number of species in the genus *Ditylenchus* currently recognised as valid or *species inquirenda* which were known in the various decades of the second half of the 20th century. What this shows is that in 1960, less than 20% of the currently recognised species had been described, and that there were a large number of species which were, by modern standards, inadequately characterised.

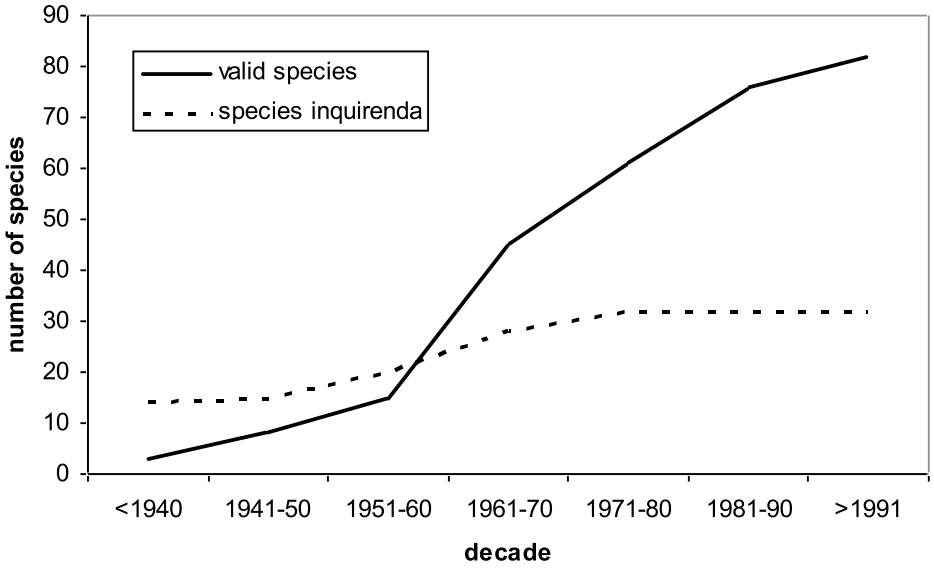

Figure 1. Species of *Ditylenchus* recognised

Some of the species subsequently described are very similar to *Ditylenchus destructor*. For example, *Ditylenchus australiae* Brzeski 1984, *D. dryadis* Anderson and Mulvey 1980, *D. convallariae* Surhan and Friedman 1965, and *D. longicauda* Choi and Geraert 1988 are all very similar, with 6 lateral lines. Many have similarly rounded tail tips, and length of stylet and PUS. Indeed, *D. convallariae* has a tail tip described as variable. *D. australiae* was described from southern NSW. Can we really be sure under these circumstances that what was seen all that time ago was not really one of these species? Indeed, how sure are we that these species really are valid if some are separated by the shape of the tail tip, but that this character may be variable in at least some species?

Fortunately in science, there are clear means of objectively answering this question. If we had voucher specimens, we could check them. But against what species descriptions and diagnostic characters? If we had a recent revision of the genus we would have criteria to judge. If we had sequences of all of the species in the genus even better. Of course, even with all of this, the species recognised in the genus and their diagnoses may change as more information becomes available. And we could go back and sample the original location with sufficient intensity to have a good chance of finding the species if it was there. All this would give us a clear scientific justification for our answer: it may not be the final answer, but it could be the best possible at the time. Biosecurity decisions should be science-based.

None of this is criticism of the people involved or the things done in earlier times. Much of what was done with less-developed equipment and resources, together with a much smaller base of knowledge, is really remarkable. But since then, more information has become available, and taxonomic concepts have evolved. All the nematologists involved were very experienced and authoritative, and their opinions should not be taken lightly. Gerald Thorne contributed, either alone or with others, no less than 15 species to the genus *Ditylenchus*, and many are still considered valid. Being a very experienced nematologist, one hopes that Thorne would recognise that the considerable challenges of nematology mean that few concepts do not require continual modification and improvement as more knowledge becomes available.

So, should anyone—Biosecurity Australia, nematologists, exporters or importers—be satisfied with the current situation? No. It is not an impossible job to make a considerable advance on where we currently are, and we should do so. With the assistance of Biosecurity Australia, we should go back and sample the original site. We should make sure we keep voucher specimens in a secure collection this time. We should revise the genus. And we nematologists should communicate what we find to the policy makers so that they can do their job in protecting Australia's agriculture, exports and imports, so that everyone has achieved their goals.

Announcements

NEW TEACHING MODEL AVAILABLE

Mactode Publications announces the availability of a three-dimensional model of a lesion nematode feeding inside a cortical root cell (approximately 8,000 magnifications).

Please visit www.mactode.com for more details and, while there, check out the Free Download section for additional teaching resources.

NEMATOLOGY WORKSHOP BEFORE APPS CONFERENCE

Newcastle, Monday 28 September 2009

This year the "traditional" workshop before APPS will be an informal nematology slide 'show and tell'. Bring your electronic or traditional photographs of nematodes you would like everyone to see, and we will project them and see what everyone can make of them. Bring pictures of all those nematodes you love, all those nematodes you hate, and all those nematodes whose identity you are completely bewildered by. Plant-parsites, free-livers and entomophilics. Mike and Vivien via Sarah will bring a selection of the images of the wierdest and most unusual nematodes they have, so we can all be reminded of the diversity of nematodes. If we run out of nematodes (is this possible?), a discussion on non-parasitic nematodes in soils, trophic groups, maturity indices and soil health will be held. If you cannot come in person, you can come electronically by forwarding your images to mike.hodda@csiro.au

A general meeting of 5ICN, AAN, and the nematology dinner will follow.

NEMATODE IDENTIFICATION AND TECHNIQUES COURSE

Canberra, 2 - 6 October 2009

The next course is scheduled for Canberra from 2 October to 6 October 2009, just after the Australasian Plant Pathology Conference. If you are interested, please submit a non-binding expression of interest to Mike Hodda at CSIRO Entomology (address below).

As in previous presentations of this course, Kerrie Davies and I, the co-convenors, have tried to tailor the course to suit the needs of participants. We envisage the following.

The workshop will suit researchers and professionals working in agriculture, quarantine, green keeping, and soil biology, who need to understand the principles and practice of handling soil, plant and insect nematodes. It will provide hands-on experience in sampling, extraction, specimen preparation, culturing, diagnosis, and identification (including molecular techniques). There will be opportunity for interaction with experts in the field. Participants should have a degree which includes biology, agriculture, or soil science or have appropriate work experience to undertake the workshop. Less experienced participants can be supplied with recommended reading material prior to the workshop.

Nematodes to be considered:

Meloidogyne	*Tylenchulus*	*Heterodera*	*Tylenchorhynchus*
Pratylenchus	*Morulaimus*	*Ditylenchus*	*Radopholus*
Anguina	*Bursaphelenchus*	*Scutellonema*	*Hemicycliophora*
Paratrichodorus	*Filenchus*	*Xiphinema*	*Tylodorus*
Aphelenchoides	*Heterorhabditis*	*Helicotylenchus*	*Steinernema*
Rhabditida	Mononchida	Dorylaimida	Areolaimida

Anticipated course cost is $1500+GST. This includes all materials and a printed course manual.

Details of course content can be varied to suit the interests of the participants. Please contact the co-ordinators to discuss any specific needs or topics desired for inclusion.

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PhD Opportunity in New Zealand

AgResearch Grasslands and Massey University, Palmerston North, New Zealand

Genetics of Nematode Resistance in White Clover

This fully funded PhD studentship offers you the opportunity to launch your career in plant genetics and pathology at an internationally recognised centre for applied plant and pastoral science research. Parasitic nematodes, including the widespread genus *Meloidogyne*, provide a dynamic plant-pathogen interaction for fundamental and applied research of substantial relevance for food security and agricultural economies. *Meloidogyne trifoliophila* constrains the legume component of pasture in New Zealand, decreasing productivity and sustainability by lowering feed quality and the capacity to fix atmospheric nitrogen. The project builds on a strong research base including a well-characterised plant-pathogen interaction, and established gene mapping resources.

AgResearch is a government-controlled Crown Research Institute with campuses on the North and the South Islands, including AgResearch Grasslands in Palmerston North. Your work will be in the wider context of the legume genomics and plant breeding teams at AgResearch, a world-leading site for pastoral research and development.

Adjacent to AgResearch is Massey University, one of New Zealand's largest with almost 35,000 students. Massey has a core competency in pastoral agriculture. Their Institute of Molecular BioSciences, part of the College of Sciences has a strong publishing record from their plant biologists.

New Zealand leads the world in many social and economic standards and is an acknowledged innovator in sustainable pastoral agriculture. Within three hour's drive of Palmerston North are forests, beaches, ski fields, vineyards and the capital city of Wellington.

The successful candidate will investigate white clover with quantitative resistance to nematodes using association and linkage-based genetics to define the genetic bases of the resistance mechanism. The primary focus will be complemented by studies of pathotype diversity and characterisation of the effect of genetic background on resistance expression.

The successful candidate will demonstrate enthusiasm and motivation to join our team. We offer a supportive, stimulating environment where the focus is on success in plant breeding, underpinned by basic science excellence. The successful applicant will receive a three year PhD stipend of NZ$25,000 per annum plus tuition fees and research expenses.

Enquires are welcomed from students whose academic performance qualifies them for admission into PhD study. To be eligible for these PhD positions you must qualify for a New Zealand Work Visa.

Applications will be considered until the position is filled.

Application form at: http://www.agresearch.co.nz/careers/vacancydetail.aspx?id=360933

Recruitment Contact: For a position description contact Marti Robinson
marti.robinson@agresearch.co.nz