

IAN T. RILEY  
NEMATOLOGY  
WAITE CAMPUS  
UNIVERSITY OF ADELAIDE

# AUSTRALASIAN NEMATOLOGY NEWSLETTER



Published by:

Australasian  
Association of  
Nematologists

VOLUME 5 NO.1 JANUARY 1994

## From The Editor(s)

Your new AAN editorial team is a threesome of nematology enthusiasts here at the Plant Pathology Unit. Terry (Bertozzi) has set up all the directories, mail lists, membership lists, and makes disks which arrive in strange languages readable (almost always), Sharyn (Taylor) was busy photocopying and creating the front page and organising the articles, while I (Maria Scurrah) am just sitting back reading (and enjoying) all the news items and taking time to thank you all for your contributions making this another successful AAN newsletter .

The editors would like to present the following awards in lieu of the APPS conference:

Kodak Award:	Russell Eastwood for his poster photo "Russell and Friend"
Thunderbirds are Go Award:	Brenden Blair for his impression of Virgil Tracy
Sherlock Holmes Award:	Michelle O'Reilly for "I'm sure the hotel is just around the next corner"
Frosty the Snowman Award:	Julie Nicol for the best interception of a snowball
The Vegas Award:	Peter Georgaras for "17 black" and "split Aces"

## Directory of Members 1994

A complete list of current members, addresses, phone and fax numbers and interests has been included with this issue. Please let us know if you spot any mistakes.

# Association News

## MINUTES OF AAN GENERAL MEETING Hobart, 8th July 1993

The meeting was opened at 9.05 am with 32 members attending.

Apologies: T. Bertozzi

Minutes of previous meeting: Accepted (Scurrah/Eastwood)

### Business arising from the minutes:

1. The preparation of a *Pratylenchus* booklet was discussed.
2. The best distribution for the cyst nematode and root-knot nematode booklets was discussed.
3. A notice had been put in the newsletter and copies were sent to those who could use them.

### Correspondence:

Our participation in the International Federation of Nematology Societies (IFNS) was discussed. AAN has put the view that we supported the current loose association between societies but we are being kept informed of the progress of formation of IFNS. It was thought that most AAN members were also members of one of the larger societies but in fact there is minority membership. Further comments should go to the new executive.

President's Report: Accepted (Wachtel/Scurrah)

G. Walker thanked the executive for work done during its term.

Treasurer's Report: Accepted (Walker/Thompson)

Unfinancial members would no longer receive the newsletter. Lynette West issued a new membership list. Any changes should go to the new executive.

### Election of officers:

There being no other nominations, the following members were elected:

President	-John Curran
Secretary	-Nora Galway
Treasurer	-Diana Hartley
Newsletter Editor	-Maria Scurrah
Committee Member	-Rob Brown

## General Business:

### 1) Accreditation of diagnostic services.

With the use of IPM strategies, we need better and more diagnostic services. AAN could take a training role or could test extraction and identification services. (Graham Stirling)

There is also a problem with sampling techniques. (Greg Walker)

There is a lack of local nematology training opportunities in WA. International standards exist for seed and chemical testing and this could form the basis for nematode diagnostic services. (Ian Riley)

It was decided that the new executive would form a working group to investigate the problem and possible solutions.

### 2) Nematology component of 1995 APPS Conference.

Including PCN would help funding and travel approval although a wider scope (especially cyst nematodes) would also be useful. It was decided that the new executive would liaise with NZ nematologists.

### 3) Nematology in universities.

Julie Nicol raised the problem of the lack of academic nematology when John Fisher retires. This position would be replaced but as a molecular entomologist/nematologist. Also Frances Reay has been made redundant. Phasing out of undergraduate nematology reduces progression to postgraduate studies especially without a nematology supervisor.

CSIRO now has nematology components in Dryland Farming and Soil Biology and CSIRO Soils has strengthened nematology. (John Curran)

It was resolved that AAN would make a case to the University of Adelaide to retain John Fisher's position as a traditional nematologist.

### 4) Wheat Breeding Conference.

Gil Hollamby announced that the conference in September next year in Adelaide would contain a nematology component including CCN and *Pratylenchus*. A full day country tour includes nematology field trials. Members should contact Gil to be included on the mailing list.

### 5) Nematology collections

Graham Stirling explained the history of the decision to house the National collection in the Queensland museum. This collection now has 2,000 good slides from Bob Colbran's collection. He suggested that taxonomically significant items from other working collection should be deposited in the Queensland museum.

The meeting was closed at 10.00 am.

## Notes From The President

### Association News

A well attended General Meeting of the AAN held in Hobart on 8 July 1993 expressed its appreciation and thanks for a job well done to the out going executive. The following members were elected to serve the association from 1993-1995.

President	John Curran	(06) 246 4294	johnc@ento.csiro.au
Secretary	Nora Galway	(06) 246 4296	norag@ento.csiro.au
Treasurer	Diana Hartley	(06) 246 4297	dianah@ento.csiro.au
Newsletter Editors	Maria Scurrah Sharyn Taylor Terry Bertozzi	(08) 303 7400 (08) 303 7400 (08) 303 7400	scurrah.maria@statemail.sa.gov.au bertozzi.terry@statemail.sa.gov.au
Committee Member	Rob Brown	(03) 377 6311	

The following issues arose from the General Meeting:

In response to concerns raised about the future of nematology in Australian Universities , I wrote to Prof. Woolhouse presenting the AAN's view of the valuable contributions the Waite Institute has made to nematology in Australia and seeking his views on the directions nematology might take in the future. He wrote a lengthy and positive reply that, with his permission, I hope to publish in full in the next newsletter.

After the tremendous success of the Pratylenchus Workshop in Hobart, planning has commenced for Cyst Nematode Workshop to be held in conjunction with the 1995 APPS meeting in New Zealand. John Marshall has agreed to act as local co-ordinator and I hope we will hear more of his plans in the new future.

Several members contributed to discussions on the accreditation of diagnostic services and it was agreed that a working group be formed by the executive. Are there any members keen to participate in this group?

*(John Curran, CSIRO Division of Entomology, Canberra)*

## Travel and Meetings

### NEMATODE NEWS FROM U.K. CANADA, U.S.A AND THE INTERNATIONAL PLANT PATHOLOGY CONGRESS

With financial support from RIRDC, CSIRO and the Congress organisers I was able to attend the 6th International Congress of Plant Pathology, Montreal and visit nematology laboratories in the UK, Canada and the USA during July and August 1993. I learnt much from the congress and visits and the following summarises some highlights of the trip.

#### United Kingdom:

There is a strong research program in the UK focusing on the molecular biology of the interaction of potato-cyst nematode (PCN) with its host. Syncytium specific promoters/genes as well as nematode secretions/receptors are under investigation and are viewed as potential targets for antisense, plantibody and toxin gene technologies. University of Leeds and Rothamsted Experimental Station (as well as Wageningen, Netherlands) are actively pursuing this research with links to Mogen (a Netherlands biotechnology company). All groups have laid a strong foundation for the development of synthetic resistance in potato to cyst nematodes by developing syncytium specific libraries and MAbs to nematode secretions/receptors. All have plant and nematode transformation capabilities and have produced transgenic plants for laboratory testing. Use is also being made of Arabidopsis as a model system with cultures established for *Heterodera glycines*, *H. schachtii* and *Meloidogyne* spp. The need for pathotyping of nematode populations has been identified as a key component of the long term management of natural resistance in crop plants. Progress has been made on diagnostic systems for PCN, with the potential for rapid transfer of this technology to Australia. Significant progress has been made on RAPD profiling of PCN pathotypes and both Rothamsted Experimental Station and Wageningen have MAbs for the species specific quantification of both species of PCN direct from soil.

The bulk of the entomopathogenic nematode group at Imperial College has now moved to the CABI International Institute of Parasitology at St. Albans. It is the intention of the new Director, Dr W.M. (Bill) Hominick, to develop a strong entomopathogenic nematode research program within the Institute - he has proposals to form an international reference collection of living entomopathogenic nematodes and establish a classical and molecular based taxonomy unit.

The nematode *Phasmarhabditis hermaphrodita*, a biocontrol agent for slugs (and with less effectiveness, snails) is being commercially developed by Axis Genetics (formerly Agricultural Genetics Company, UK) and it is hoped it will be available in 1994.

## **Canada: Institute of Molecular Biology, Simon Fraser University**

This visit provided the opportunity to catch up on recent developments in *C. elegans* research. David Baillie has provided me with on-line access to in-house databases containing the most recent sequence and gene data. Discussions on nematode transformation technologies confirmed the impression I gained from Ian Hope (University of Leeds) that the systems developed for *C. elegans* may be immediately applicable as research tools for work on economically important nematodes.

## **USA: University of California, Riverside**

I spent a valuable two days at Riverside with fruitful discussions with David Bird, Ed Platzer and Nancy Beckage. Jim Baldwin expressed considerable interest in our work on the molecular taxonomy of the Pratylenchidae in Australia, and noted that there was increasing interest in the economic importance of these nematodes. He was attempting to develop a proposal for a taxonomic study of Pratylenchidae of the Pacific Rim Region. Subsequent to this trip the Regents of the University of California, Riverside have provided funding support. I have accepted the invitation to participate in this project which aims to develop a germplasm and database bank of nematode isolates. This bank (located at UCR) will be used in the first instance to establish a firm taxonomy for the Pratylenchidae and form the basis for future development of control strategies using primarily host resistance. The project will involve researchers from USA, Peru, Mexico, Japan and Australia and will provide valuable reference material for the identification of Pratylenchidae in Australia.

## **6th International Congress of Plant Pathology, Montreal**

Approximately 1500 posters/presentations covering the full range of plant pathology given at the congress. I have the abstracts available for anyone interested but the following summarises, all too briefly, what I viewed as the most significant advances in nematology.

Brian Kerry summarised "New strategies for the control of plant parasitic nematodes" emphasising use of host resistance and the potential for biological control and use of transgenic (synthetic) resistance. Excellent presentations on the current state of knowledge re-nematode-plant interactions were given by Dick Hussey (Plant cell modifications and nutrient acquisition by parasitic nematodes) and Urs Wyss (Recognition and specificity in root-nematode relationships with remarks on microbial interactions). Fred Gommers et al. summarised work on the genetic interaction of PCN and its host in a paper entitled "The gene pool similarity concept: a realistic alternative for pathotyping potato cyst nematodes?". I presented a paper on "Identification and quantification of economically important nematodes" focusing on recent progress using monoclonal antibody and PCR based techniques.

Perhaps the most stimulating session was the symposium on "New Dimensions in Nematode Control". Here Rolo Perry exposed some interesting ideas on the development of nematode control based on disruption of host or mate finding behaviour and Bakker et. al. described the potential use of plantibody technology in transgenic plants to suppress plant parasitic nematodes. Phil Roberts gave a valuable overview of the implications of different control strategies with a focus on their likely impact on the population genetics of pest nematodes,

particularly in relation to development of resistance to control measures by nematodes. Unfortunately Charlie Opperman was unable to attend the meeting but his colleague and co-author Dr M. Conkling (North Carolina) reported on what must be regarded as the most significant advance to date in the development of synthetic resistance genes for nematode control. The construction of a transgenic line of tobacco incorporating a root apical zone specific 0.3 kb promoter region (of the *tobRB7* gene) which is only turned on by root-knot nematode invasion has been achieved. This has been linked to a barnase insert and when root-knot nematodes initiate giant-cell formation RNase production specifically kills the developing giant cell leaving surrounding cells unaffected. Laboratory tests indicate that this transgenic line can be used to suppress development of all major species of root knot nematode (but not the cyst nematode *Globodera tabacum*). This construct is also expressed in transgenic potato. Monsanto has taken up this technology and transgenic tobacco is being field tested this season (1993).

Finally, a number of workshops were held in association with the symposia noted above. A wide range of topics and issues were canvassed with some lively discussions! (One of the conference staff commented that the nematologists were the most volatile and voluble group). At the workshops, there were a number of presentations directed at the biological control of nematodes in soil and the role of organic amendments and cultural practice in suppressing nematode populations. Although a number of promising control options were reported, no clear picture emerged with most researchers highlighting the need for more effective means of estimating population levels if the effects of particular management practices are to be determined.

*(John Curran, CSIRO Division of Entomology and the Plant Science Centre, Canberra)*

#### A.S.P. MEETING ON HERON ISLAND

This meeting, which was held from the 28th September to the 1st of October, 1993, was a great meeting and, of course, it was held on a wonderful site.

The Australian Society for Parasitology (A.S.P.), which has had links with Australian plant nematologists since its inception in 1964, is one of the success stories of Australian scientific communities.

In 1971 in agreement with Pergamon Press (now Elsevier) it formally sponsored and now runs (Editor and scientific staff now all Australian) the International Journal for Parasitology, a truly international journal produced bimonthly that has helped make this society one of the wealthiest of Australian scientific societies. Many students, including one from New Zealand, received financial support that enabled them to attend the meeting on Heron Island and there are numerous student awards.

The meeting this year was made up of two symposia:

- I. Molecular Genetics and the Parasite Genome
- II. Ecology of Parasites in the Tropical Environment.



In the fashion of most meetings, there were major symposium speakers and contributed papers. My paper, which came into this latter category, was entitled "Feeding and distribution of *Acrobeloides nanus* (Nematoda)". I described work that I had done in cooperation with Maarten Ryder on this most resilient of nematodes.

In the process of tearing up old correspondence etc. when clearing out my office in CSIRO I came across a letter from Cliff Blake written in 1964 when he was a lecturer in plant pathology at Sydney University. In it he describes an A.S.P. meeting to be held in Sydney in February 1965, lists symposia and mentions that each symposium would have speakers from the animal, human and plant fields.

This relationship between parasitologists and plant nematologists remains to this day and I have no doubt that the society would welcome any plant nematologists, who are not already members, should they wish to broaden their interests a little. Of course, lack of membership does not preclude submission of manuscripts to the Society's International Journal.

The program and abstracts for the Heron Island meeting are on the Soils Division library shelves in Adelaide.

*(Alan Bird, CSIRO Adelaide)*

## SON MEETING AND TRIPPING AROUND THE USA

In November 1993, I was fortunate enough to secure funding from RIRDC and the CRC for Tropical Plant Pathology to attend the combined APS/SON meeting in Nashville and to visit the laboratories of two other researchers with interest in the molecular biology of *Meloidogyne*.

### Visit to University of Nebraska

Nebraska's agriculture essentially consists of soybeans along the eastern border, where soybean cyst nematode (*Heterodera glycines*) is a problem, corn in the midlands, with *Longidorus* and *Belonolaimus* the main nematode pests and sugar beet in the west with sugar beet cyst nematode (*H. schachtii*) being the main problem.

Most of the three days was spent with Dr Tom Powers who is also researching molecular variation between populations of root-knot nematode even though this nematode is not a problem in Nebraska. Their group is now concentrating on resolving the systematics of meiotic parthenogenetic species of *Meloidogyne* rather than on diagnostics. He is currently collaborating with Dr Jim Noe, Georgia to study changes in the structure of mixed populations of *Meloidogyne* on various hosts. This is an area which we will also study in developing sustainable strategies for control of root-knot nematode. Because this project is concerned only with *M. incognita* and *M. arenaria* race 1, he only needs to be able to distinguish these.

Tom Powers also described some unpublished work with RAPD's (random amplification of polymorphic DNA) which showed that this approach is unreliable. Different patterns were found in J2's and adult females and also depended on the concentration of DNA of a single J2.

During my stay, I was also able to meet Dr Tim Harris, who is involved with the molecular work on root-knot nematode, and Dr Colin Fleming who is a visiting scientist from The Queen's University of Belfast. He is working towards molecular diagnostics of potato cyst nematode.

I also gave an impromptu lecture on cereal cyst nematode to Tom's Plant Pathology class. Apparently he had promised them someone with a strange accent so I couldn't let them down.

### Visit to University of Utah

I spent a day with Drs David Wolstenholme and Ron Okimoto who have sequenced the entire mitochondrial genome of *M. javanica*. The Utah group is now discontinuing its work on *Meloidogyne*. They are more interested in genetic novelties no matter which taxonomic group.

### APS/SON Conference

The conference was held in the Opryland Hotel which was more overdecorated for Xmas than you could possibly imagine. It has 1500 rooms, is a tourist attraction and had several conferences running at the same time (including the Association of Bridal Consultants and the International Carwash Association! - any excuse!) so it was as relaxing as living in the main street.

There about 1500 delegates with 48 nematology papers and 78 posters. As usual, the conference was more interesting for its out-of-session discussions rather than the papers themselves. However, some of the more exciting developments were related to nematode resistance and to events leading up to parasitism. Dr Valerie Williamson (University of California, Davis) talked about the early molecular events in nematode infection of plants. They have found that infection of resistant and susceptible plants was accompanied by increases in concentration of different compounds. They have found a RAPD marker for the *Mi* gene so are well on the way to cloning the gene. When that is completed, work will commence on producing transgenic plants with resistance to *Meloidogyne*.

Dr Charlie Opperman (North Carolina State University) presented his work on efforts to produce resistant plants by introducing genes which disrupt giant cell formation which is essential for nematode reproduction. Transformants with a BARNase gene have been produced which prevent development of *Meloidogyne* juveniles and females. A field experiment is underway.

Several sessions outlined the potential of various organisms for biocontrol of plant-parasitic nematodes. Dr J Kloepper (Auburn University) presented an hypothesis that plant growth promoting rhizobacteria can induce systemic resistance in host plants against a wide range of pathogens including fungi, bacteria, viruses and nematodes. Dr R Sikora (Germany)

described the potential for use of endophytic non-pathogenic *Fusarium oxysporum* to control a range of nematodes on various crops including *Radopholus similis* on bananas.

Dr B Hyman (University of California, Riverside) described his work on tandem repeated sequences in mitochondrial DNA of *Meloidogyne*. He is aiming to use this to describe population substructure. Further discussions with him revealed that his major aim is not to develop diagnostics for *Meloidogyne* species and races.

*(Julie Stanton, Queensland Department of Primary Industries, Indooroopilly)*

### **PRATYLENCHUS WORKSHOP**

The *Pratylenchus* Workshop was held over two days in July 1993, in conjunction with the 9th Biennial Conference of the Australasian Plant Pathology Society in Hobart. Thirty-six delegates participated in this workshop.

Topics discussed included: culturing and inoculation techniques, sampling and modelling field populations, control measures (resistance, tolerance, crop rotation, chemicals and tillage practices), damage assessment, and species identification (both traditional and molecular methods). Species of root lesion nematode economically important in Australia (*P. thornei*, *P. neglectus*, *P. brachyurus*, *P. zaeae* and *P. penetrans*) were covered, over a range of agricultural and horticultural crops.

A Proceedings was produced, containing the 25 papers presented at the workshop. This Proceedings documents the current state of *Pratylenchus* research in Australia. The amount of information presented and the number of delegates attending the workshop reflect the current upsurge of interest in, and recognition of the importance of, root lesion nematode research in Australia.

There are no longer copies of the Proceeding available, although more will be printed if there is sufficient interest. Price will be in the order of \$10. Please contact us if you would like a copy of the Proceeding of the *Pratylenchus* Workshop.

Finally, we would like to thank all those who participated and made this a successful, illuminating and entertaining workshop.

*(Vivien Vanstone, Department of Plant Science)*  
*(Sharyn Taylor, SARDI, Field Crops Pathology Unit)*  
*(Julie Nicol, Department of Crop Protection)*  
*(Waite Agricultural Research Institute, PMB 1, Glen Osmond SA 5064)*

# Regional News

## NEWS FROM NEW ZEALAND

In June I visited the British Antarctic Survey to continue my collaboration with Dr. Bill Block on the cold tolerance mechanisms of Antarctic nematodes. In particular we are using GLC to look for potential antifreeze compounds in nematodes and comparing life history strategies of nematodes from the maritime Antarctic and the continental east Antarctic. This was followed by a week with Dr. Hans Ramløv at the Chemical Institute of the University of Copenhagen, Denmark using Differential Scanning Calorimetry to examine freezing and melting events in the cysts of *Globodera rostochiensis*. The final week of my trip was spent at the 5th International Symposium on Invertebrate and Plant Cold Hardiness, held in Arnhem, Holland. I am currently writing a review on nematode cold tolerance mechanisms and continuing research on various aspects of nematode cold tolerance.

Ian Brown has been awarded a PhD for his study on "The Influence of Low Temperature on the Antarctic Nematode *Panagrolaimus davidi*". He presently holds a Postdoc at Rutgers University, USA working with Randy Gaugler's group on insect parasitic nematodes.

Mike Surrey of Industrial Research Ltd, Lower Hutt has recently commenced a PhD study aimed at improving methods for the storage and transport of insect parasitic nematodes used for biological control.

In August Robert Poulin and I organised the 22nd Annual Meeting of the NZ Society for Parasitology, held at Knox College, Dunedin. A symposium was held on "Parasites of Economic Importance in New Zealand" which included reviews on nematode parasites of sheep, plant parasitic nematodes, cattle parasites, deer parasites, and fish parasites. The proceedings of the symposium will be published in the March 1994 issue of the *New Zealand Journal of Zoology*.

*(David Wharton, Department of Zoology, University of Otago, Dunedin, NZ)*

## NEWS FROM QUEENSLAND

### Seminar at Nambour

Our nematology group recently took the opportunity to publicise its research program by presenting a seminar at Nambour during October. The theme of the day was integrated management of nematode pests in horticultural crops and in the morning session, we presented results of new work on strategic decision making, molecular identification of root-knot nematode, crop rotation, cultivar resistance, organic amendments and biological control. During the afternoon we discussed some of the practical problems which have occurred with

IPM programs for insect pests and considered whether we could learn anything which would help implementation of IPM for nematodes.

### Staff Movements

Lois Eden, who has worked on our biological control project for the last three years has decided to go back to University and become a post-graduate student. However, we have not lost her completely, because she will still be working in the general area of biological control. Her project involves the use of molecular technologies to monitor fungal biocontrol agents following their introduction to soil.

We are fortunate to have obtained a grant from HRDC and RIRDC to screen a range of germplasm for resistance to the most important species of *Meloidogyne* in Australia. Lynette West will be transferring from our biological control project to take on this new project which will commence in January 1994. She will be ably assisted by Jenny Fanton.

Another new project, funded by HRDC and QFVG, based at South Johnstone Research Station aims to develop sustainable management systems for burrowing nematode on bananas. Tony Pattison has recently moved up from Narrabri to take up the nematologist position on this project. He will be studying the population dynamics of the nematode on banana and testing various control strategies to reduce nematode numbers.

We also have further funding from CRC for Tropical Plant Pathology and RIRDC to continue our work in developing molecular diagnostics for *Meloidogyne*. This allows Andrew Hugall to continue as Research Assistant doing most of the molecular work. We have a new part-time Technical Assistant, Vishnja Steele, who will help to develop the diagnostic strategy for routine use with field samples. Meanwhile, Bill O'Donnell continues the never-ending task of determining host ranges of our root-knot collection.

*(Graham Stirling and Julie Stanton, Queensland Department of Primary Industries, Indooroopilly)*

### NEW NEMATODES, OLD NEMATODES AND A VOLUNTARY NEMATOLOGIST

During the last 8 months, taxonomic studies have concentrated on Australian criconematids, particularly those such as *Pateracephalanema* and *Ogma*, which are ornamented with scales along the entire body of the female. A number of descriptions of new species have been prepared, along with studies of known species. Due to the amount of material, and time limitations, it is likely that the final publication will be in two parts.

Revision of George Khairs 'List of plant parasitic nematodes of Australia' by Rod McLeod and myself is continuing. New records can still be included, but must be received by Rod or myself by **31st March 1994 at the very latest**.

As many nematologists are aware, I was made redundant by the University of Adelaide last year, and ceased employment in July. This was a University rather than Departmental decision, and since then I have been working one day a week on a voluntary basis - usually Wednesdays, if anyone wishes to get in contact with me.

*(Frances Reay, Department of Crop Protection, Waite Campus, University of Adelaide, South Australia. (Tel: 08 3037321))*

## AN ASPIC UPDATE

The Queensland Museum is now the official repository of Australia's National Plant-Parasitic Nematode Collections (ANN 4(2): 2 July 1993). ASPIC is the national database collections being built at the Queensland Museum after an initiative of the Australian Society of Parasitology: it incorporates data of free-living and plant parasitic nematodes. Nematologists interested in plant parasites and those interested in animal parasites have had little professional contact over the years. This seems undesirable and many privately express disquiet about it. In developing ASPIC there has been a conscious decision to not recognise these artificial distinctions: worms can be addressed taxonomically or by host or by habitat. The Museum collections, of course, are based upon taxonomic groups - not on their ecological predilections.

The Queensland Museum recently demonstrated its commitment to the provision of a taxonomic database of parasites, i.e. ASPIC when it supported me on a visit to several of the major collections of parasitic worms (of plants and animals) in Europe in June and July this year. I was able to make personal contact with, and compare, collections, data acquisition and management and curation in Stockholm, St Petersburg, Moscow, Berlin, Amsterdam, Gent, London, St Albans and Rothampstead. There are few major collections in Europe that have not been visited. I learnt that the significant plant parasite nematode collections at Wageningen in the Netherlands are likely to be transferred to Brussels as are those from Gent. These are two of the most significant plant parasite nematode collections in Europe. It seems the Belgian Government and the EEC have agreed that the Museum in Brussels will now be given a boost and will become a major, if not the major, taxonomic centre for free-living and plant parasitic nematodes in continental Europe.

Only in St Petersburg were collections computerised. Without doubt ASPIC is innovative and because of the relatively small size of our collections we can hope to remain in the forefront of curation. We are currently incorporating data from Burnley (courtesy of Dr J. Hinch) and expect type specimens to be donated.

*(L. Cannon, Queensland Museum  
PO Box 3300, South Brisbane, Q 4104  
Fax: (07) 846 1918  
E-Mail: qmcannon@brolga.cc.uq.edu.au)*

# Research

## *ACROBELOIDES NANUS*: THE UBIQUITOUS SURVIVOR

In some recent studies with Maarten Ryder and others we have isolated, identified and cultured, from six year old dry soil, this most resilient nematode.

It seems to crop up wherever we look be they agricultural soils, native soils, arid soils, moist soils, islands, continents and so on.

It has been described by others in Canada and Europe and identified in Australia.

We have described it and studied its distribution, its feeding habits, its effect on a bacterium used in the biocontrol of "take all" and aspects of its reproductive physiology and ultra structure.

This information is available as reprints of the references listed below.

Cultures of *A nanus* growing on *P corrugata* have been supplied to CSIRO Division of Entomology, Canberra (from where it has been supplied to the ANU) and to the Waite Institute and, of course, within the Division of Soils itself.

This nematode may be the most cosmopolitan and prolific animal in the soils generally - wow!! I sense that I am about to be deluged by those who would kindly (?) put me back on the rails - there you go!

However its ease of culture and proven ability to undergo anhydrobiosis and to survive in arid conditions make it a strong candidate for studies on its possible role in nutrient cycling and increased plant growth as a result of inundative application.

(Alan Bird, CSIRO - Adelaide)

### References

- Bird, A.F. and Ryder, M.H. (1993). Feeding of the nematode *Acrobeloides nanus* on bacteria. *Journal of Nematology* 25:493-499.
- Bird, A.F., De Ley, P. and Bird, J. (1993). Morphology, Oviposition and Embryogeneses in an Australian population of *Acrobeloides nanus*. *Journal of Nematology* 24:606-614.
- Ryder, M.H. and Bird, A.F. (1993). Effect of *Acrobeloides nanus* (Nematoda: Cephalobidae) upon the survival of *Pseudomonas corrugata* (Eubacteria) in pasteurized soil from Kapunda, South Australia. *Trans. Roy Soc. S. Aust.* 117:179-182.

Yeates, G.W. and Bird, A.F. (1994). Some observations on the influence of agricultural practices on the nematode faunae of some South Australian soils. *Fundam. appl. Nematol.* 17:(in press).

### NEMATODES ASSOCIATED WITH AUSTRALIAN FIG WASPS

Examination of sycones from Moreton Bay fig trees (*Ficus macrophylla*) collected from Adelaide and Sydney have revealed two new species of *Schistonchus* (Aphelenchidae) nematodes. The Adelaide species is characterized by a long post-valval sac (other species have short sacs); the Sydney species has the excretory pore opening just behind the lips (other *Schistonchus* have it at about the level of the metacarpus). Both are associated with Agaonid wasps which feed on the fig pollen, and ensure pollination.

Work on the biology of the Adelaide species of *Schistonchus* suggests that only young inseminated females enter wasps. These are the only nematodes (from 1 to 8 per wasp; average 3.2) seen in female wasps (always in the abdomen). Nematodes do not seem to be carried on the cuticle of the wasps. Pupae have not been isolated from the woody sycones, so it is not known which wasp stage the nematodes invade. Again, it is not known how the nematodes leave the wasps. Nematodes do not seem to lay eggs in the wasps. About 25% of female wasps dissected contained nematodes, but this varied from 8 - 55% in different collections.

Figure 1 illustrates what is currently known of the changes in the nematode population within the developing sycone. When a wasp invades a young sycone, female *Schistonchus* emerge and begin egg-laying. The wasp also lays eggs, and the hatched larvae form a "gall" in a female floret and begin their growth. At this stage, a few female nematodes and juveniles are found. With time and further development of the sycone, the nematode population increases, and males are seen. Brown lesions, apparently caused by nematode feeding, appear in the sycone. By the time that the sycone contains both male and female florets, the numbers of *Schistonchus* have increased to several hundred, and the sex ratio has changed (females outnumber males by about 2 : 1). With further development, female wasps mature and begin emerging, and up to 900 nematodes have been recovered from such sycones. These were mostly adults, with a sex ratio of 3 females to 1 male nematode. Male wasps are wingless, do not leave the fig, and no nematodes have been recovered from them. We suggest that the female wasps invade new, young sycones, and that the cycle continues. In Adelaide, fruit is found on fig trees at all times of the year, with a spring and summer peak.

Wasps have been sent overseas for identification. It is possible that, as with the fig wasps and diplogasterids (Poinar and Herre, 1991), *Schistonchus* is species - specific for the Agaonid wasps.

(Kerrie Davies and Janine Lloyd, Department of Crop Protection, Waite Campus, University of Adelaide)

**Note added in press:** Wasps from both Sydney and Adelaide have been identified by Dr Z. Bouček as *Pleistodontes froggatti*. So, these nematodes are not species specific with the wasps.



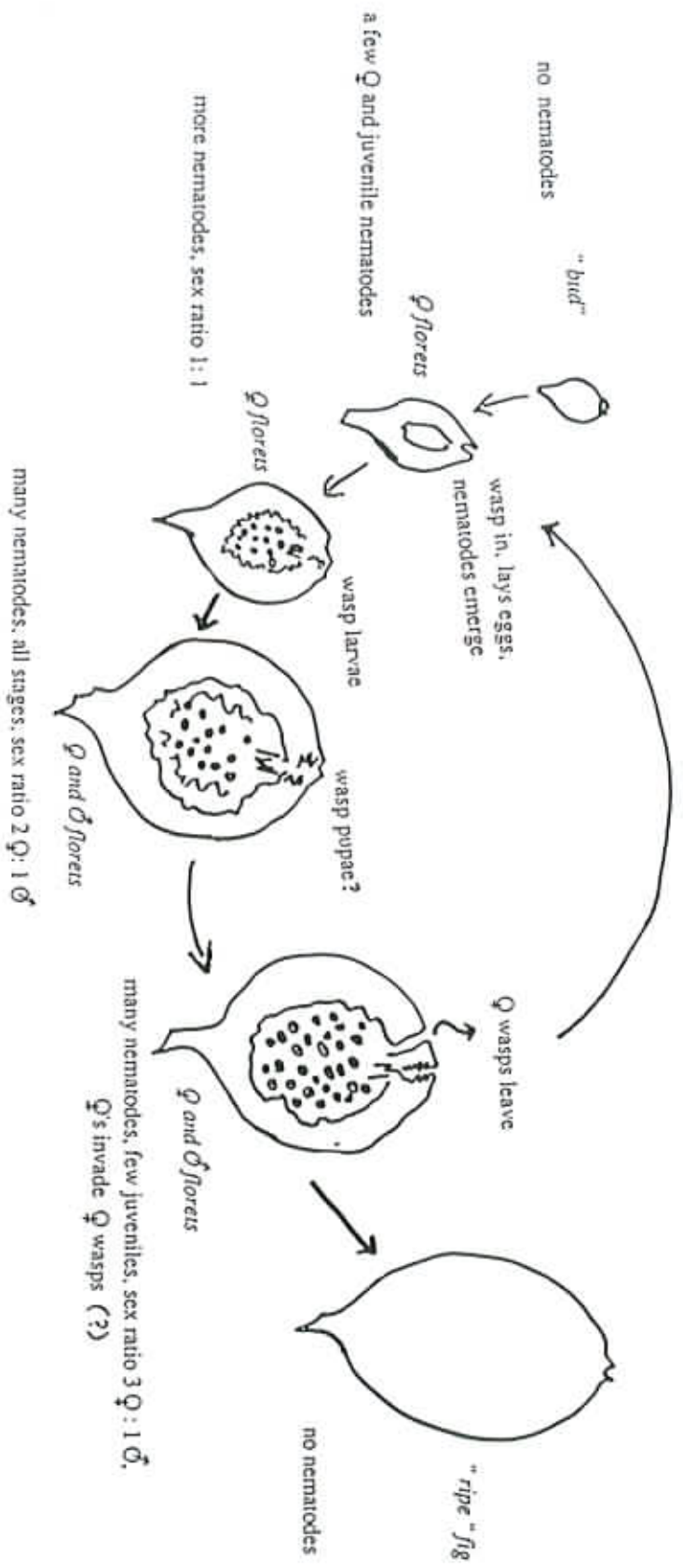


Fig. 1. Relations between *Ficus macrophylla*, wasp and *Schistocnema* : based on observations of material collected in Adelaide.

## NEMATICIDE TRIALS WITH RUGBY 100ME AND MARSHAL 250EC

Nematodes can be a severe pest problem for turfgrass. In Australia, chemical control for nematodes in turf has only been available in the form of one registered product (Nemacur with the active ingredient, Fenamiphos). In recent years enhanced biodegradation problems have developed with this chemical in areas where there has been a long history of its use. New nematicides are needed for areas where enhanced biodegradation of fenamiphos is a problem.

The Australian Turfgrass Research Institute (AFRI) was commissioned by FMC International A.G. to evaluate the efficacy of two nematicides. Rugby 100ME is an organophosphate (active ingredient is cadusafos) and Marshal 250EC is a carbamate (active ingredient is cabosulfan). The sites for the experiment were The Lakes Golf Club (Sydney, NSW) and Nelson Bay Bowling Club (Central Coast, NSW).

### Trial Design

Ten treatments were used in the trial; 4 rates of both Marshal 250EC and Rugby 100ME, 1 rate of the industry standard Nemacur and an untreated control. The treatments were reapplied 6 weeks after the first treatment application. Treatments were replicated 4 times. Soil samples were collected prior to the first treatment application and at 5, 8 and 12 weeks after the first treatment application. The soil samples were analysed for the nematode species present and their abundance. Roots in the soil samples were scored on their appearance. At the 5, 8 and 12 weeks sampling the plots were visually evaluated for colour.

## RESULTS AND DISCUSSION

### The Lakes Golf Club

The higher rates of Rugby 100ME, all levels of Marshall 250EC and Nemacur had significant effect at all post-treatment samplings on the population of one of the nematode species (*Paratrichodorus spp.*). The other species found at the Lakes site (*Xiphenema spp.* and *Helicotylenchus spp.*) were only slightly or not affected at all. At The Lakes Golf Club there was no response in turf growth (measured by root and colour scores) to the nematicides. From these results it would appear that the nematodes present were not in large enough numbers to affect the growth of the grass.

### Nelson Bay Bowling Club

Initially, all levels of Rugby 100ME and Marshall 250EC had significant effects on the dominant nematode species (*Ibipora iolii*). As the trial progressed it was only the higher rates which gave significant control. At the final sampling (week 12) only the highest rates of Rugby 100ME and Marshall 250EC had significant effect on the *Ibipora iolii* population (Figure 1).

The other two nematode species present at the Nelson Bay site were in relatively low numbers. Statistically no significant response was achieved for *Criconemella spp.* by any of

the treatments at any samplings. Response by *Xiphenema* spp. to some of the treatments was found.

Nemacur had no significant effect on any of the nematode species at any of the samplings.

At the second evaluation significant turf growth response to the nematicides was measured in root score condition when compared to the untreated control. At all post treatment evaluations of turf colour all nematicide treatments showed significant improvement in colour when compared to the untreated control.

At Nelson Bay, the two new nematicides provided significantly better control of the species *Ibipora Iolii* when compared to the industry standard and the untreated control. The species *Ibipora Iolii* was the dominant species and because of the improvements achieved in grass colour on the plots it appears that the population of this species was large enough to effect grass growth.

FMC International is proceeding with further investigation of Rugby 100ME and Marshal 250EC in the hope that the chemicals can provide alternatives for turf managers in nematode control.

(Jyri Kaapro, Australian Turfgrass Research Institute, Concord west, NSW)

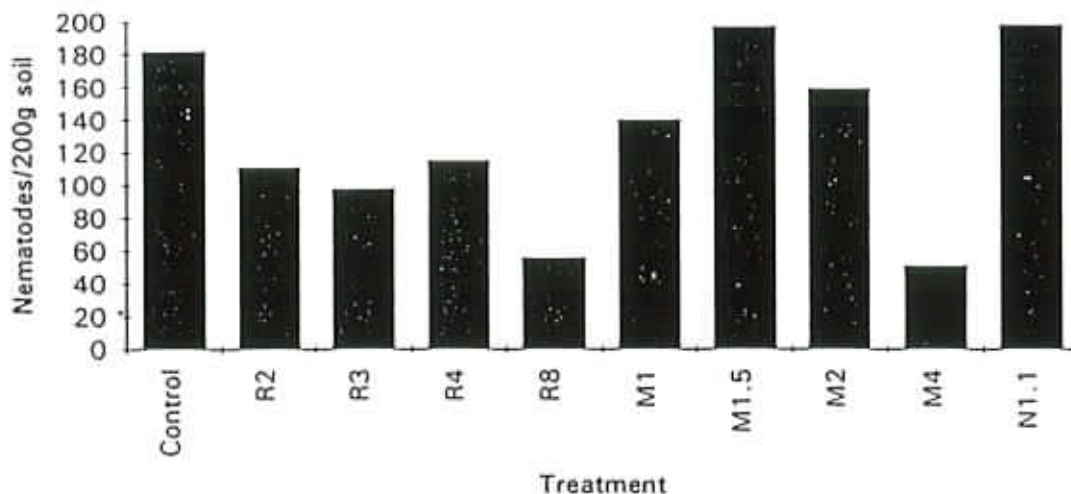


Fig 1: *Ibipora Iolii* population at Nelson Bay Bowling Club at Week 12. Nematicide application occurred at Week 0 and at Week 6. ( R represents the Rugby 100ME treatments with R8 the highest rate; M represents the Marshal 250EC treatments with M4 the highest rate and N represents the Nemacur treatment)

## MORE ABOUT *PRATYLENCHUS*

Root lesion nematodes (*Pratylenchus* spp) cause yield reduction by damaging the feeder roots thereby affecting the host's nutrient uptake and water absorption. During the past two years a series of experiments were conducted in the glasshouse and field with three varieties of wheat (Molineux, Spear and Janz). Soil treatments included control (with nematode), and Temik\* (aldicarb), freezing or heating to kill the nematodes with addition of N, P, K, Mg fertilisers in all possible combinations.

In all experiments presence of the nematode significantly decreased the concentration of Mg and Mn in shoots. All measurements of controlling the nematode increased the top growth and yield except in one site, where Take-all was present, where application of Temik significantly reduced the yield and plants had more damaged roots in Temik treated plots. The concentration of all elements measured in these experiments increased due to application of Temik and other measurements of controlling the nematode where no fertiliser was used.

Application of N and N+P increased the yield about two fold and concentrations of some other elements. The N or N+P treatments with or without nematodes gave inconsistent relative differences in top growth and nutrient concentrations. In some circumstances the application of N or N+P alone was adequate to compensate for the nematode damage. Yellow leaf symptoms which is caused by nematode damage due to effects on water absorption, thereby nutrient uptake and translocation was removed by nitrogen application.

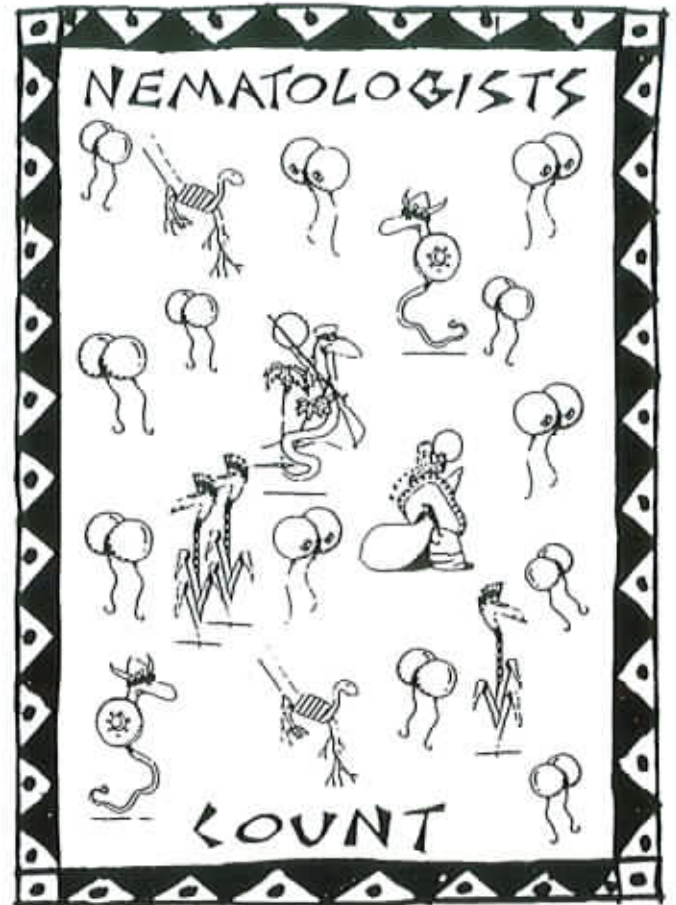
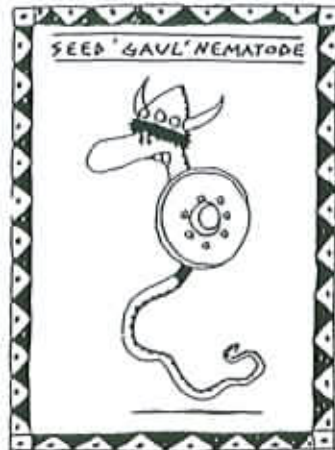
Appropriate fertiliser application depending on soil conditions and plant can compensate for yield reduction caused by the nematode to some extent.

*(Mohammad Farsi, Plant Science Department, Waite Campus)*

# FOR SALE - Nematology T-Shirts

Front

Back



**OPTIONS:**

T-shirt colour      Marle Grey  
 Border colour      Red or Green  
 Sleeves              Short or Long  
 Size                  Medium, Large or Extra Large

**COST:**

Short Sleeved: \$26  
 Long Sleeved : \$31

Send Order Form to:

Franky Green, Field Crops Pathology, SARDI, PMB1 Glen Osmond, SA 5064

ORDER FORM : Nematology T-Shirt

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

T-Shirt specifications: (Please circle choices)

1. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL
2. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL
3. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL
4. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL
5. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL
6. COLOUR: Red/Green	SLEEVES: Short/Long	SIZE: M/L/XL

TOTAL:

\_\_\_\_\_ short sleeved T-shirts @ \$26 each = \$\_\_\_\_\_

\_\_\_\_\_ long sleeved T-shirts @ \$31 each = \$\_\_\_\_\_

\$\_\_\_\_\_ Enclosed

## Directory of Members 1994

Mr Grant B. Baldwin  
 Incitec Ltd  
 Development Manager (Southern)  
 PO Box 566  
 BLAIR ATHOL SA 5084  
 Telephone: (08) 258 2233  
 Facsimile: (08) 281 3697

Cereal cyst nematode,  
 chemical control.

Ms Leanne Barnes  
 ICI Australia  
 Merrindale Research Centre  
 Newsom Street  
 ASCOT VALE VIC 3032  
 Telephone: (03) 377 6305  
 Facsimile: (03) 370 2395

Chemical control, taxonomy,  
 biological control, host ranges  
 and nematode disease complexes.

Mr Gary Baxter  
 Department of Agriculture  
 Ovens Research Station  
 PO Box 235  
 MYRTLEFORD VIC 3737  
 Telephone: (057) 511 311  
 Facsimile: (057) 511 702

Meloidogyne sp.  
 Pratylenchus penetrans  
 Paratrichodorus sp.

Dr Robin Bedding  
 entomopathogenic  
 CSIRO Div of Entomology  
 GPO Box 1700  
 CANBERRA ACT 2601  
 Telephone: (06) 246 4292  
 Facsimile: (06) 246 4000

Insect parasitic and  
 nematodes

Mr Terry Bertozzi  
 South Australian Research and  
 Development Institute  
 Field Crop Pathology Unit  
 PMB 1  
 GLEN OSMOND SA 5064  
 Telephone: (08) 303 7400  
 Facsimile: (08) 379 0871

Anguina spp.

Dr Alan F. Bird  
CSIRO Division of Soils  
Private Bag No. 2  
GLEN OSMOND SA 5064  
Telephone: (08) 303 8400  
Facsimile: (08) 303 8550

Nematode structure and  
physiology.

Mr Brenden L. Blair  
BSES  
PO Box 566  
TULLY QLD 4854  
Telephone: (070) 681 488  
Facsimile: (070) 681 907

Nematodes on sugarcane.

Mr Peter G. Brisbane  
CSIRO Division of Soil  
Private Bag No. 2  
GLEN OSMOND SA 5064  
Telephone: (08) 303 8400  
Facsimile: (08) 303 8550

*Pasteuria penetrans* as a biocontrol  
agent for root-knot nematodes

Dr Rob. H. Brown  
2 Howqua Court  
VERMONT VIC 3133  
administration.  
Telephone: (03) 377 6311  
Facsimile: (03) 370 2395

General nematology.  
Synthesis and development of new  
nematicides. Research

Dr Lester R.G. Cannon  
Queensland Museum  
PO Box 3300  
SOUTH BRISBANE Q 4101  
Telephone: (07) 840 7724  
Facsimile: (07) 846 1918

Curator in charge of nematode  
collection - a taxonomic  
repository with many type  
specimens.

Mr Keith J. Chandler  
BSES  
PO Box 122  
GORDONVALE Q 4865  
Telephone: (070) 561 255  
Facsimile: (070) 562 405

Nematodes on sugarcane.

Miss Franky M. Charman-Green  
South Australian Research and  
Development Institute  
Field Crop Pathology Unit  
PMB 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7412  
Facsimile: (08) 379 0871

Cereal cyst nematode.

Ms Suzanne Charwat  
Department of Crop Protection  
Waite Agricultural Research Institute  
PMB 1  
GLEN OSMOND SA 5064

Telephone: (08) 303 7268  
Facsimile: (08) 379 4095

Dr John Curran  
CSIRO Division of Entomology  
GPO Box 1700  
CANBERRA ACT 2601  
Telephone: (06) 246 4294  
Facsimile: (06) 246 4000

Dr Kerrie A. Davies  
Department of Crop Protection  
University of Adelaide  
Waite Agricultural Research Institute  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7255  
Facsimile: (08) 379 4095

Mr John L. Dockray  
Grow Force Australia Ltd  
1808 Ipswich Road  
ROCKLEA Q 4106  
Telephone: (07) 277 3755  
Facsimile: (07) 875 1660

Mr Shane R. Dullahide  
Granite Belt Horticultural  
Research Station  
PO Box 501  
STANTHORPE Q 4380  
Telephone: (076) 811 255  
Facsimile: (076) 811 769

Mr Russell F. Eastwood  
Victorian Institute for Dryland Agriculture  
Private Bag 260  
HORSHAM VIC 3401  
Telephone: (053) 622 111  
Facsimile: (053) 822 063

Mrs Lois M. Eden  
Division of Plant Protection  
Department of Primary Industries  
80 Meiers Road  
INDOOROOPILLY QLD 4068  
Telephone: (07) 877 9590  
Facsimile: (07) 371 0866

Survival mechanisms -  
plant parasitic nematodes.

Entomopathogenic nematodes,  
molecular taxonomy

Growth and Development of  
nematodes.  
Entomophilic nematodes.

Chemical control.

Chemical and biocontrol of  
parasitic nematodes of  
deciduous fruit and  
vegetables.

Cereal cyst nematode.

Biological control.



Ms Megan E. Edwards  
Department of Agriculture and  
Rural Affairs  
PO Box 905  
MILDURA VIC 3500  
Telephone: (050) 245 603  
Facsimile: (050) 246 561

Diagnostic nematology in  
horticultural crops.

Ir Han Eerens  
AgResearch  
Gore Research Centre  
Private Bag 50022  
GORE  
NEW ZEALAND  
Telephone: (03) 208 9015  
Facsimile: (03) 208 9017

Plant interactions (pastoral)  
Endophyte relation

Mr Mohammad Farsi  
Plant Science  
Waite Campus  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7318  
Facsimile: (08) 379 9138

Resistance to *Pratylenchus* spp.  
Genetic variation in  
cereals.

Ms Nora Galway  
plant-parasitic  
Plant Science Centre  
CSIRO Division of Entomology  
GPO Box 1700  
CANBERRA ACT 2601  
Telephone: (06) 246 4296  
Facsimilie: (06) 346 4000

Molecular taxonomy of  
nematodes (*Pratylenchus* spp)

Mr Peter Georgaras  
SA Department of Primary Industries  
Northfield Research Laboratories  
GPO Box 1671  
ADELAIDE SA 5001  
Telephone: (08) 266 8333  
Facsimile: (08) 261 4688

Nematode pathogens of  
lucerne.

Mr. John L. Grant  
AgResearch Grasslands  
Private Bag 11008  
PALMERSTON NORTH  
NEW ZEALAND  
Telephone: (646) 356 8019  
Facsimile: (646) 356 7399

Resistance in white clover  
and other clovers  
*M. hapla* and *H. trifolii*

Ms Maria Guerrero  
Australian Turfgrass Research  
Institute  
PO Box 190  
CONCORD WEST NSW 2138  
Telephone: (02) 736 1233  
Facsimile: (02) 743 6348

Nematode problems on turf.

Mrs Monica I. Haak  
Department of Primary Industries  
Queensland Wheat Research Industries  
Holberton Street  
TOOWOOMBA Q 4350  
Telephone: (076) 34 6644  
Facsimile: (076) 33 1943

*Pratylenchus thornei* -  
effects of fallow management  
strategies

Ms Diana Hartley  
CSIRO Division of Entomology  
GPO Box 1700  
CANBERRA ACT 2601  
Telephone: (06) 246 4297  
Facsimile: (06) 246 4000

Entomopathogenic nematodes

Dr Jillian M. Hinch  
Department of Agriculture and  
Rural Affairs  
Plant Research Institute  
Swan Street  
BURNLEY VIC 3121  
Telephone: (03) 810 1548  
Facsimile: (03) 819 5653

Cell surfaces of nematodes.  
Molecular biology of  
nematodes.  
Host recognition by nematodes  
Parasites of Australian  
native plants.

Mr Ross Holding  
CIBA-GEIGY Australia  
PO Box 332  
THOMASTOWN VIC 3074  
Telephone: (03) 463 9633  
Facsimile: (03) 465 9070

Development of products for  
nematode control.

Mr Gil J. Hollamby  
Roseworthy Campus  
University of Adelaide  
Telephone: (08) 303 7834  
Facsimile: (08) 303 7962

Breeding for cereal cyst nematode  
resistance and tolerance in wheat.  
Root lesion nematode tolerance  
breeding.

Dr Ian D. Kaehne  
S.A. Dept. of Agriculture  
Northfield Laboratories  
GPO Box 1671  
ADELAIDE SA 5001  
Telephone: (08) 266 8333  
Facsimile: (08) 261 4688

Resistance and tolerance breeding.  
Mechanisms of resistance/tolerance.  
Legumes, Cereals.

Mr John Lewis  
South Australian Research and  
Development Institute  
Field Crops Pathology Group  
Waite Institute  
PMB 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7343  
Facsimilie: (08) 379 0871

Cereal cyst nematode -  
control and resistance

Ms Janine Lloyd  
Dept of Crop Protection  
University of Adelaide  
Waite Campus  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7255  
Facsimilie: (08) 379 4095

Entomophilic nematodes

Mr Mel Lowe  
Managing Director  
Box 321  
BARMERA SA 5345  
Telephone: (085) 882 228  
Facsimilie: (085) 882 211

Advice/sales and application  
of nematicides.

Dr John W. Marshall  
NZ Institute for Crop & Food  
Research Limited  
Private Bag 4704  
CHRISTCHURCH  
NEW ZEALAND  
Telephone: (03) 252 511  
Facsimilie: (03) 252 074

Biology and management of  
nematodes in temperate crops.  
Molecular biology of nematodes

Mrs Milanka Matic  
South Australian Research and  
Development Institute  
Field Crops Pathology Group  
Waite Institute  
PMB 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7343  
Facsimilie:

Cereal cyst nematode  
Resistance

(08) 379 0871

Mr David J. McDonald  
Agrisearch Services Pty Ltd  
PO Box 1387  
23 Keppel Street  
SHEPPARTON VIC 3630  
Telephone: (058) 21 2021  
Facsimilie: (058) 31 1592

Nematode counting and diagnosis  
for research trials

Dr Alan McKay  
South Australian Research and  
Development Institute  
Field Crops Pathology Group  
Private Mail Bag 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7339  
Facsimile: (08) 379 0871

Annual rye grass toxicity.

Mr Roderick W. McLeod  
NSW Department of Agriculture  
PMB 10  
RYDALMERE NSW 2116  
Telephone: (02) 622 6322  
Facsimile: (02) 831 2995

Diagnosis, information systems  
control strategies

Mr Christopher F. Mercer  
AgResearch  
Private Bag 11008  
PALMERSTON NORTH  
NEW ZEALAND  
Telephone: (063) 68 019  
Facsimile: (063) 62 635

Resistance in white clover to  
*M. hapla* and *H. trifolii*.  
Resistance in clover hybrids.  
Effect of grass endophytes on  
nematodes.

Mrs Lila Nambiar  
Department of Agriculture  
Institute of Plant Sciences  
Swan Street  
BURNLEY VIC 3121  
Telephone: (03) 810 1546  
Facsimile: (03) 819 5653

Diagnostic work  
Control measures  
Safe use of nematicides  
Potato cyst nematodes

Ms J M Nicol  
Waite Agricultural Research Institute  
Dept Crop Protection  
Private Mail Bag 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7268  
Facsimile: (08) 379 4095

Significance of *P. thornei* on wheat  
productivity in South Australia

Dr Aruna Parihar  
Assistant Professor  
Department of Nematology  
Rajasthan College of Agriculture  
UDAIPUR 313001  
INDIA

Mrs Janet Patterson  
Welsharp Pty Ltd  
"Trevanna Downs"  
GOONDIWINDI Q 4390  
Telephone: (076) 761 284  
Facsimile: (076) 761 120

General interest in nematology  
and biological control.

Mr Tony Pattison  
NARS  
Myal Vale Mail Run  
NARRABRI NSW 2390

Mrs Frances Reay  
University of Adelaide  
Waite Agricultural Research  
Institute  
Crop Protection Department  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7321  
Facsimile: (08) 379 4095

Dr Ian T. Riley  
Plant Protection Branch  
WA Department of Agriculture  
SOUTH PERTH WA 6151  
Telephone: (091) 681 166  
Facsimile: (091) 681 632

Dr Maria I. Scurrah  
South Australian Research and  
Development Institute  
Field Crop Pathology Unit  
Waite Campus Private Mail Bag 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7400  
Facsimile: (08) 379 0871

Dr Julie M. Stanton  
Division of Plant Protection  
Department of Primary Industries  
abiotic  
80 Meiers Road  
INDOOROPILLY Q 4068  
Telephone: (07) 877 9574  
Facsimile: (07) 371 0866

Dr Graham R. Stirling  
Division of Plant Protection  
Department of Primary Industries  
80 Meiers Road  
INDOOROPILLY Q 4068  
Telephone: (07) 877 9392  
Facsimile: (07) 371 0866

Ms Kate Strachan  
Penfolds Wine Group  
Tanunda Road  
NURIOOTPA SA 5355  
Telephone: (085) 620 269  
Facsimile: (085) 620 424

*Pratylenchus thornei* in wheat

Taxonomy of plant parasitic  
nematodes.  
Nematode distribution in native  
vegetation.  
Taxonomy of Dorylaimidia

*Anguina/Clavibacter* associations

*Pratylenchus neglectus*  
Does it damage wheat?  
*Ditylenchus dipsaci*  
Resistance in oats, beans,  
peas, lucerne. Ex-interest: PCN:-  
races and breeding.

Annual rye grass toxicity, CCN  
Computer simulation  
Interactions between biotic and  
factors involved in host-nematode  
relationships.

General plant nematology.  
Biological control.

*M. javanica*  
Nematode ecology,  
distribution, management  
Effects on grape vines.

Mr Abdulhossein Taheri  
Department of Plant Science  
Waite Institute  
University of Adelaide  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7318

Pratylenchus sp.  
Meloidogyne sp.  
CCN

Ms Sharyn P. Taylor  
South Australian Research and  
Development Institute  
Field Crop Pathology Unit  
Waite Campus  
PMB 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7400  
Facsimilie: (08) 379 0871

Pratylenchus sp. Cereals.  
Grain legumes.

Dr Barrie Thistlethwayte  
32 Golf Circuit  
TURA BEACH NSW 2548  
Telephone: (064) 95 9110

Dr John P. Thompson  
Department of Primary Industries  
Queensland Wheat Research Institute  
PO Box 2282  
TOOWOOMBA Q 4350  
Telephone: (076) 346 644  
Facsimile: (076) 331 943

Pratylenchus thornei and  
Merlinius brevidens.  
Identification of nematodes.  
Control methods, especially through  
resistance breeding.

G.R. Tucker  
INICITEC Ltd  
PO Box 140  
MORNINGSIDE QLD 4170

Dr Vivien A. Vanstone  
Department of Plant Science  
Waite Institute  
Private Mail Bag 1  
GLEN OSMOND SA 5064  
Telephone: (08) 303 7456  
Facsimile: (08) 379 9138

Pratylenchus neglectus, biology  
control, crop rotations  
cereals and legumes

Mr Malcolm Wachtel  
SA Department of Agriculture  
Loxton Research Centre  
PO Box 411  
LOXTON SA 5333  
Telephone: (085) 84 7315  
Facsimile: (085) 84 6354

Nematode problems in horticultural  
crops.  
Biocontrol - rootknot.  
Chemical control.

Dr Gregory E. Walker  
SA Department of Agriculture  
Loxton Research Centre  
PO Box 411  
LOXTON SA 5333  
Telephone: ~~(085) 847 315~~  
Facsimile: (085) 846 354

Plant nematology, especially in  
horticulture.  
Control. Interactions  
Diagnostic services and extension  
Ecology

Prof. Harry Wallace  
1/2 Dunluce Avenue  
BRIGHTON SA 5048  
Telephone: (08) 296 6947

Ecology.  
Behaviour.  
Aetiology.

Mr. Richard N. Watson  
NZ Pastoral Agriculture Research  
Institute Ltd  
Ruakura Agricultural Centre  
Private Bag nematology, Biological,  
HAMILTON  
NEW ZEALAND  
Telephone: (071) 38 531  
Facsimile: (071) 38 5073

Pasture nematology; white clover  
tolerance, demography,  
rhizosphere ecology  
Kiwifruit  
chemical, managerial control.

Ms Lynette M. West  
Division of Plant Protection  
Department of Primary Industries  
80 Meiers Road  
INDOOROOPILLY Q 4068  
Telephone: (07) 877 9892  
Facsimile: (07) 371 0866

Biological control.

Dr David A Wharton  
Department of Zoology  
University of Otago  
P O Box 56  
DUNÉDIN  
NEW ZEALAND  
Telephone: (064 3) 479 7963  
Facsimile: (064 3) 479 7584

Environmental physiology  
of nematodes - cold tolerance  
and anhydrobiosis.  
Nematode ultrastructure.

Dr Gregor W. Yeates  
Landcare Research  
Private Bag 31902  
LOWER HUTT  
NEW ZEALAND  
Telephone: (04) 567 3119  
Facsimile: (04) 567 3114

Ecology, taxonomy.