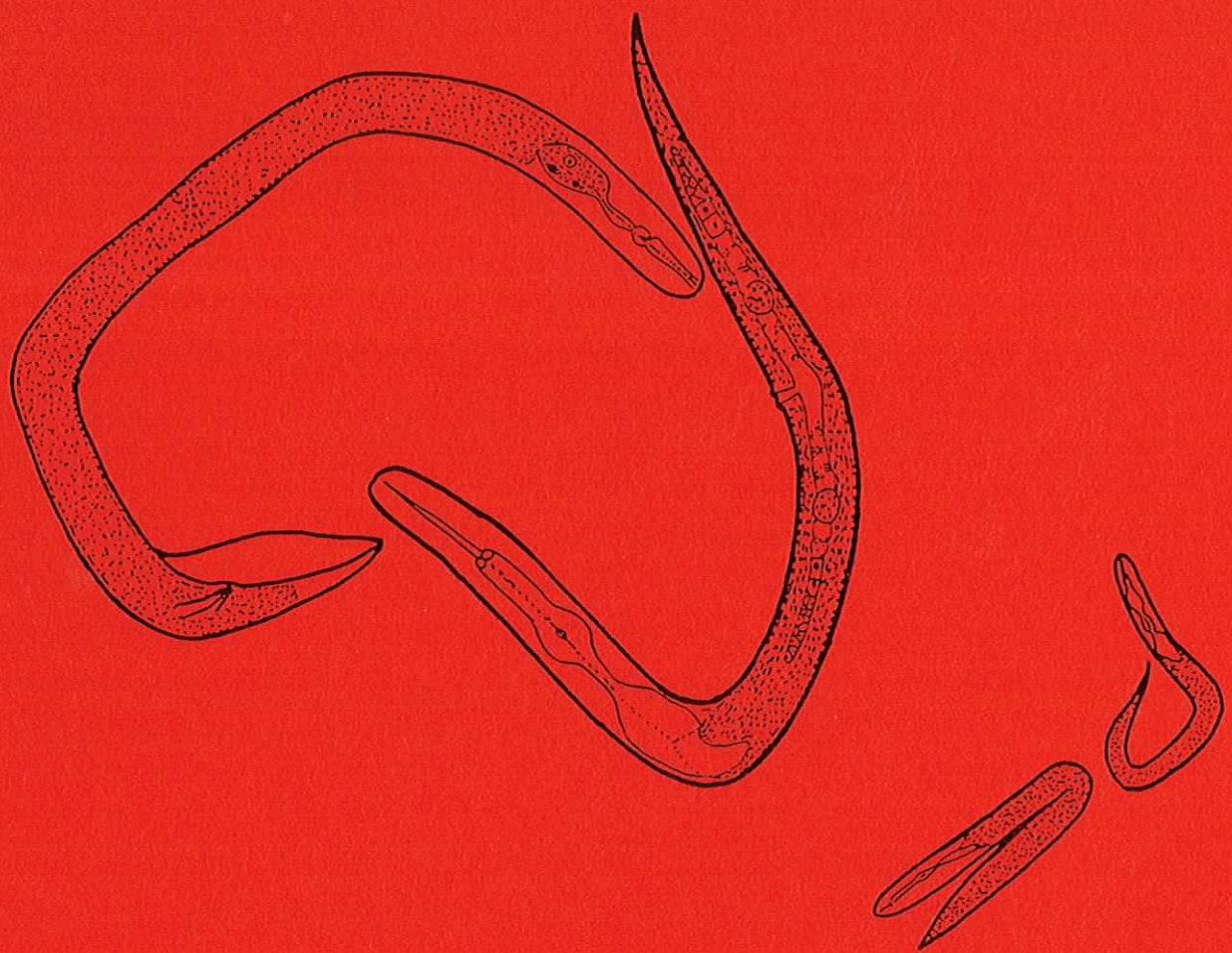
AUSTRALASIAN NEMATOLOGY NEWSLETTER



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FROM THE EDITOR

Many thanks to all those who have contributed articles for this the seventh edition of ANN. As you will discover from Alan Bird's historical note, this is not the first ANN. I am sure there are a lot of interesting articles in the previous ANN if you want to chase it up.

Some contributors have asked whether articles on nematodes other than plant-parasitic nematodes are accepted. I certainly am pleased to accept such articles and believe that ANN should reflect the interests of AAN members whether they be plant-parasitic, insect parasitic, animal parasitic, free living, marine or even Kiwinematidae (whatever that is!).

Again it is encouraging to see new members in our association, welcome.

Best wishes to Alan Bird who retires early 1993.

The deadline for the next ANN will be June 11, 1993, this should allow time to get the newsletter out before the APPS conference in Hobart. I look forward to seeing you all there.

Send articles to:

Russell Eastwood
Victorian Institute for Dryland Agriculture
Private Bag 260
Horsham Vic. 3400
Australia.

ASSOCIATION NEWS

PROMOTION OF NEMATOLOGY

One of the goals we set ourselves when we formed AAN was to promote nematology and create an awareness of the importance of nematodes. The recent paper in APP on the importance of plant-parasitic nematodes in Australian and New Zealand agriculture is part of that process. You should have received a copy with this newsletter. Please photocopy it (or obtain further reprints from me) and pass it on to those administrators who make decisions on the level of funding received by nematologists.

Our pamphlet on root-knot nematodes has been completed and some of you will already have received a copy. If you would like more copies, please contact me. Again, it can be used to create awareness of one of our most important nematodes. The pamphlet on cyst nematodes is now also complete and copies are available from Russell Eastwood.

I have seen some evidence that our efforts to promote nematology are starting to bear fruit. I cannot comment on the situation in New Zealand, but in Australia funding bodies such as GRDC, HRDC and RIRDC are thinking about nematodes and CSIRO is considering whether it should make a contribution to plant nematology. Hopefully all this discussion and reviewing will eventually lead to a decision to commit additional resources to nematology. However recent decisions to reduce nematology at the Waite Institute provide a warning that we will have to continue to fight hard for our cause.

Those of you who are members of SON will be aware that Americans are having similar concerns about the decline in funding for nematology. I sometimes wonder whether some of their problems are due to the fact that when SON was formed 25 years ago, nematologists became too inward looking and lost contact with those who are interested in broader issues. We should remember that the administrators who make decisions about funding for nematology are rarely nematologists and we must therefore continue to argue our case in wider forums. Societies such as AAN and SON can cater for our specialist needs, but we must continue to promote nematology to people with an interest in broader issues such as agriculture, horticulture, crop protection and pest management.

ELECTION OF A NEW EXECUTIVE

It is time to start thinking about electing a new Executive Committee to take office in July 1993. I am a firm believer in changing office bearers every two years as this ensures a continual influx of new ideas and enthusiasm. It also means that people can take a position knowing that they will not be left with it for the rest of their careers.
If you are interested in serving as either President, Secretary, Treasurer, Newsletter Editor or as a committee member, please contact Julie Stanton by April 30. If an election is necessary, we will conduct a postal ballot in May/June so that the new Executive can take over following the APPS meeting in Hobart. We will also hold a general meeting of AAN in Hobart, probably around lunchtime on Thursday July 8 after the APPS conference finishes and before our lesion nematode workshop commences.

(Graham Stirling, Department of Primary Industries, Brisbane)

PRATYLENCHUS WORKSHOP
APPS Conference - Hobart - July 1993

A workshop on *Pratylenchus* will be held in conjunction with the 1993 APPS Conference in Hobart. A one and a half day program, to be held at the conclusion of the conference (Thursday afternoon and all day Friday), is proposed. Anticipated workshop attendance is in the order of twenty people.

The main objectives of the workshop are to:

a) Familiarise those working on *Pratylenchus* with current research (and researchers) in Australia.
b) Foster collaboration between the researchers.
c) Generate discussion between those working on *Pratylenchus*.

Each participant will be asked to submit an outline of their work, by **May 15, 1993.** Within a maximum of one A4 page, you should:

a) Summarise current and future research aims.
b) State approximate percent of time spent on *Pratylenchus* work.
c) Mention collaborative arrangements with other researchers.
d) Raise any topics for discussion that you feel are particularly relevant.

These will be distributed to participants prior to the workshop.

On the Thursday afternoon, each participant will give a five minute, informal introduction of themselves and their work. Approximately one and a half hours (including tea break) will be allowed for questions and discussion. A dinner will be arranged for Thursday evening.

The following topics are suggested for discussion during the Friday session:

1. Culturing and inoculation techniques.
2. Sampling and modelling field populations.
3. Control measures
   a) breeding and screening for resistance/tolerance.
   b) other methods.
4. Nematode-fungus interactions.
5. Species identification - molecular techniques.
6. Species identification - traditional methods.

We request "volunteers" to prepare 15 minute presentations for the above topics. Expressions of interest for specific topics should reach us by **February 15, 1993.** A 45 minute question/discussion period will be allocated to each topic. Demonstrations may be possible for topics 5 & 6. Collaboration between researchers in preparing these presentations is very strongly encouraged. Written papers (maximum length 5 single-spaced, A4 pages) should be submitted by **May 15, 1993.**

Please contact us for further information or comments:
Sharyn Taylor, Field crops Pathology Unit, SA Department of Primary Industries,
Vivian Vanstone, Department of Plant Science,
Julie Nicol, Dept of Crop Protection,
All at: Waite Agricultural Research Institute, Glen Osmond SA 5064
Telephone: (08) 372 2444 *Fax: (08) 338 1757*

INTERNATIONAL FEDERATION OF NEMATOLOGY SOCIETIES (IFNS)

This is to let you know the progress of IFNS. You may recall that in Vol 3(1) of this newsletter, I asked for opinions on whether AAN should join IFNS. We received only one reply! (which fortunately agreed with our own!).

Our subsequent reply to the Ad Hoc committee, which is organising the formation of IFNS, was that we agreed that nematology has lost ground in recent years and needs revitalisation but that IFNS is unlikely to prevent the decline as its main aim is to improve communication among nematologists. We feel that the only way to reverse the decline is to become less insular. We need to develop better links with societies concerned with agriculture, plant pathology, entomology, parasitology, etc. so that we can convince people in broader fields that nematology is worth supporting. AAN has links with the Australasian Plant Pathology Society, which in turn is intending to link with the Australian Institute of Agricultural Science and the New Zealand Institute of Agricultural Science. We believe that nematology would make more progress at an international level if nematology societies re-established relationships with their sister societies rather than going their own way.

There is a need for a mechanism for organisation of international conferences but this can be, and has been, done without IFNS. Most AAN members are also members of at least one other nematology society and we participate in conferences via those links. We see nothing wrong with rotating responsibility for international conferences between the largest societies; SON, ESN and ONTA. If we were ever interested in organising a conference in Australia or New Zealand, we would be prepared to argue our case within one of those societies.

Many of the proposed functions of IFNS, such as public relations, fund raising, support for students, are best done at a national or regional level to ensure that the activity is relevant to the country or region concerned.

Although AAN is not convinced of the need for IFNS, they have agreed to keep us informed about its progress. The only other group to respond negatively to the proposal is the Polish Academy of Science Nematology Group. Those who responded positively are the Afro-Asian Society of Nematologists, ESN (with some reservations), Japanese Nematological Group (supportive but not fully), Nematological Society of South Africa, ONTA, Pakistan Society of Nematologists, Sociedad Brasileira de Nematologia and SON. Other societies have yet to respond.

(Julie M. Stanton, Division of Plant Protection QDPI, Meiers Road, Indooroopilly QLD 4068)

NEW MEMBERS

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. halpa and *H. trifolii*

Ms Julie M Nicol
Waite Agricultural Research Institute
Department of Crop Protection
Private Mail Bag 1
Glen Osmond SA 5064
Telephone: (08) 372 2268
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
Udiapur 313001
India

Dr David A Wharton
Department of Zoology
University of Otago
PO Box 56
Dunedin
New Zealand
Telephone: (064) 3 479 7963
Facsimile: (064) 3 479 7584

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

CURRENT RESEARCH

REVISION OF GEORGE KHAIR'S LIST OF PLANT PARASITIC NEMATODES OF AUSTRALIA

As explained in the July issue of this newsletter, revision of the plant nematode list has been commenced by Rod McLeod and Frances Reay.

Information from George Khair's list is now on disc, and work is progressing on editing it prior to adding new information.

Response to our request for suggestions, comments or corrections has been nil. Also there has not been any response to the proposal to include a key to Australian plant nematodes, therefore it will not be included. On the positive side we have received many new records of plant nematodes from Western Australia - thank you!

Please let us know if you have new records, published or not, for inclusion in the list. The type of information required is given below.

Information required for each new record:

Nematode - genus, and species where known
Host plant, including cultivar if applicable
Locality
Place (if any) where fixed or mounted material is held
Publication (if applicable)

Please send details to:

Rod McLeod
Biological & Chemical Research Inst.
Private Mail Bag No 10
Rydalmere
NSW 2116

or

Frances Reay
Crop Protection Dept
Waite Campus
University of Adelaide
Glen Osmond SA 5064

The closing date for new records is 30th April 1993

AUSTRALIAN ENTOMOPHILIC NEMATODES

I am working with Kerrie Davies on an ABRS funded survey of entomophilic nematodes in Australia. The main tasks are

i) Collecting, identifying and describing new species.
ii) Recording the locations of type specimens and collections of entomophilic nematodes.

We have 20 rhabditid nematodes (predominantly *Steinernema* and *Heterorhabditis*) fixed and in culture from Western Australian soil samples. They were obtained using Robin Bedding's *Galleria* trap technique. We are currently processing soils collected from various places in the Northern

Territory. Locations include Kakadu National Park, sites near Alice Springs and near Uluru National Park. Fortunately just prior to collecting in some areas of central Australia, there had been rain for the first time in 3 years.

If you are aware of any collections of entomophilic nematodes we would be grateful for details.

Please contact:

Ms J Lloyd or Dr K A Davies
Department of Crop Protection
Waite Agricultural Research Institute
Private Mail Bag 1
Glen Osmond SA 5064
Telephone: (08) 372 2255
Facsimile: (08) 379 4095

ABSTRACTS FROM SON MEETING, AUGUST 1992

Gregor Yeates has supplied three abstracts from the SON meeting, August 1992. They are reproduced for the benefit of members as they cover Australasian work. If members feel this is useful it could be done following each major nematode meeting (even meetings on marine nematodes!).

Abstract 1

YEATES G W[1], D W FRECKMAN[2], and T BONGERS[3]. *A guide to nematode feeding habits for soil ecologists*

Soil ecologists concerned with the role of nematodes in soil processes need a sound basis for allocating nematodes to trophic groups. This paper describes problems of interpretation and defines eight feeding types: plant feeding, hyphal feeding, bacterial feeding, substrate ingestion, predation on animals, unicellular eucaryote feeding, dispersal-infective stages of parasites of animals, omnivory. Under a scheme of nominal orders and families the feeding habits of representative genera are given. There are major gaps in information for Dorylaimidae, Belondiridae, etc. While we believe that identification to these nominal families can lead to standard interpretation of trophic habits, it is still important for authors to indicate the overall generic composition of their nematode faunas to allow for subsequent advances in knowledge.

[1] *DSIR Land Resources, Private Bag lower Hutt, New Zealand,* [2] *Department of Nematology, University of California, Riverside,CA 92521 and* [3] *Department of Nematology, Agricultural University, Postbus 8123, 6700 ES Wageningen, The Netherlands.*

Abstract 2

YEATES G W[1] and PCD Newton[2] *Response of pasture nematode populations to elevated carbon dioxide and temperature - A climate chamber experiment.*

To stimulate climate change scenarios turves 1 x 0.5 x 0.4 were collected from a grazed ryegrass-clover pasture and subjected to i) ambient CO_2 (350ppm) and basal C, ii) 700 ppm CO_2 and basal C, iii) 700ppm CO_2 and basal + 6C in climate chambers; six replicate turves were used and after 4-week acclimatisation periods there were 6-week "winter", "spring" and "summer" periods. Interpretation of results must acknowledge the sudden impact of the conditions and the lack of possible immigration; the results show changes in competitive advantage under experimental

conditions. Preliminary results on an areal basis show significant (t-test) increases in total vermiform nematodes to treatment iii in winter and to ii and iii in spring; at the genus level *Cephalenchus, Cephalobus, and Heterocephalobus* showed changes; root infestation of *Meloidogyne halpa* and *Heterodera trifolii* differed between treatments but interpretation of such differences is dependant on completion of the whole "annual cycle". [1]*DSIR land Resources, Private Bag, Lower Hutt, New Zealand, and* [2]*MAF Technology, Flock House Agricultural Centre, Private Bag, Bulls, New Zealand.*

Abstract 3

MERCER C F and J L GRANT *Aggressiveness of population of Meloidogyne halpa and Heterodera trifolii on white clover.*

Colonies of populations of *M. halpa* and *H. trifolii* were collected from sites from around New Zealand and established on white clover. Seed of two lines of white clover showing some resistance and of two lines known to be susceptible were sown singly in 6.5cm-d pots. The experimental design for each nematode species was eight populations x four white clover lines x 11 replications. A suspension of eggs from each colony was added to the root zone. After 50 days, *H. trifolii* cysts and females were washed from soil and roots by elutriation and counted. Mean counts of *H. trifolii* cysts were lower on resistant lines than on one or both susceptible lines at six sites. Overall, the counts on resistant lines were 46% of the counts on susceptible lines. The indication is that there is intraspecific variation among *H. trifolii* populations. The resistance screening program should test future, improved resistant lines against several populations. After 70 days, *M. halpa* galls were counted on washed roots. Mean gall counts were lower on the resistant lines that on susceptible ones at each site. Overall, the counts on resistant lines were 28% of the counts on susceptible lines. The indication is that there is no important intraspecific variation among *M. halpa* populations and that the breeding program can continue using one population as inoculum. *National Pastoral Research Institute, Private Bag, Palmerston North, New Zealand.*

FERTILISERS FOR ROOT NEMATODE EXPERIMENTS WITH WHITE CLOVER

A recent experiment may be of interest to people conducting glasshouse experiments with soil nematodes. Our work includes screening white clover, *Trifolium repens*, for resistance to the northern root - knot nematode *Meloidogyne hapla* and clover cyst nematode *Heterodera trifolii*. Plants are grown in a pasteurised 50:50 topsoil:sand mix and nematode eggs are pipetted near the roots. One problem has been to find a fertiliser policy that provides adequate nutrients for plant growth but is not toxic to nematodes. Inorganic fertiliser recipes dedicated to white clover have been developed but are designed for peat-lite mixes and are time consuming to weigh out, mix and apply.

Two fertilisers readily available and easy to apply are "Thrive" (Yates) and "Phostrogen" (Watkins). In June this year we set up an experiment to test their effect on plant growth and *H. trifolii* development. Treatments were as follows:-

Thrive full-strength or half-strength, weekly or fortnightly applications; Phostrogen full or double-strength at the same frequencies; control, receiving water only. "Full-strength" refers to the concentration recommended by the manufacturer.

Three germinated seeds of "Huia" white clover were planted in each 6cm pot of soil mix. Five pots were allocated to each treatment. After three weeks the smallest seedling in each pot was

removed and after 4 weeks 2500 *H. trifolii* eggs were injected into a hole equidistant from the two plants in each pot. The five pots in each treatment were placed in a steel tray into which one litre of the fertiliser solutions was poured each week or fortnight. Surplus fertiliser was removed after two hours. Water was applied as necessary between fertiliser applications. Six weeks after inoculation cysts were collected by elutriation and counted. Roots and tops were dried and weighed.

Plants receiving Phostrogen supported similar cyst numbers to the control plants. They grew bigger than the controls but needed double strength weekly application to reach the size of the smallest "Thrive" plants. Control plants were smaller than all other treatments but supported high numbers of cysts. While these plants did not show visible nutrient deficiency symptoms other than size, applying no fertiliser in a screening may lead to loss of less vigorous plants.

Good results were obtained by applying half-strength Thrive once per fortnight. This treatment did not reduce cyst numbers compared with the control but resulted in much larger plants. It was pleasing to find that the fertiliser option giving the best combination of plant growth and cyst development required little labour input. Applying Thrive at greater concentration or more frequently did not increase plant dry weights but did result in fewer cysts. Plants treated with full-strength Thrive supported so few nematodes that it would make it impossible to identify resistant plants when screening. These plants wilted on sunny days and the plants receiving weekly application suffered top weight suppression.

We plan to repeat the trial in the summer when plants need more frequent watering than in the above work in the autumn. More frequent summer watering would flush out nutrients perhaps reducing growth in the more dilute nutrient treatments and reducing the apparent toxicity.

(John Grant & Chris Mercer, AgResearch Grasslands, Private Bag 11008, Palmerston North New Zealand)

NEMATODE RESEARCH IN LUCERNE IMPROVEMENT

A project is currently being conducted as part of the National Lucerne Improvement Programme to breed nematode resistant lucerne for use in pastures. The project is led by South Australian Department of Primary Industries lucerne breeder Dr. Ian Kaehne and nematologist Peter Georgaras based at the Department's Northfield Research Laboratories. With Dr John Fisher of the Waite Campus of the University of Adelaide and nationwide co-operation the team aims to identify major pathogenic nematodes of Australian lucerne.

As part of the project a survey is currently underway to assess the distribution of plant pathogenic nematodes in Australian lucerne fields. Samples for the survey have been supplied by Kevin Lowe, Graham Harris, Jim Kernot (Qld), Stuart Smith (Tas) and Pedro Evans (WA). The next phase of the project involves pathogenicity testing of the nematodes encountered. Cultures of nematodes have been developed and have been made possible by the contributions and advice of Julie Nicol, Vivien Vanstone, Maria Scurrah, Sharyn Taylor, Terry Bertozzi (Waite), Graham Stirling and Julie Stanton (Qld).

The preliminary results of the survey were presented at the 33rd North American Alfalfa Improvement Conference in June, 1992.

A nematode survey of the occurrence of plant parasitic nematodes associated with lucerne is being conducted in Australia. The presence of the nematodes *Ditylenchus dipsaci* and *Meloidogyne* spp. and fifteen other genera has been recorded in Australian lucerne previously from a limited number

of samples (Khair, 1987). The wide range of species reported in other countries (Griffin, 1984) and their presence on other agricultural crops in Australia suggest that a wide range of plant parasitic nematodes may be associated also with lucerne in Australia. This is the first systematic national survey of lucerne fields in Australia.

Lucerne samples, consisting of soil as well as plant material (roots and shoots) were taken as cores from major lucerne producing areas of Australia. The samples covered areas ranging from the tropical areas of Queensland through to the temperate areas of Tasmania. Each sample of soil was mixed by gentle stirring and 200 g were placed onto a Whitehead tray. Plant material was finely chopped prior to placement onto Whitehead trays. Nematodes were concentrated with a bank of sieves (38 μm) and observed microscopically.

Ten genera of nematodes were detected in thirty-five samples analysed to the present (Table 1).

Pratylenchus spp. and *Ditylenchus dipsaci* were the most common nematodes in the survey (46% and 37%, respectively, of samples observed). Although *Paratylenchus* sp. was present at various sites across Australia it was not observed in a recent survey of South African lucerne fields which detected 18 genera (Marais, 1990). All other genera in this survey were also recorded in South Africa.

Aphelenchoides ritzemabosi was also detected at a number of sites. Although the presence of *A. ritzemabosi* on lucerne was reported 30 years ago (Grundbacher and Stanford, 1962) only recently has its potential as a pathogen of lucerne been seriously considered (Williams *et al.*, 1992).

Assessment of pathogenicity of each species, including *Aphelenchoides ritzemabosi*, will determine which nematode resistance/tolerance genes are to be screened for and eventually integrated into new or existing breeding programs.

References

Griffin, G.D. (1984) Nematode parasites of alfalfa, cereals and grasses. **In:** *Plant and Insect Nematodes* (W.R. Nickle, ed.) Marcel Dekker, New York. pp. 243-321

Grundbacher, F. J. and Stanford, E. H. (1962) Genetic factors conditioning resistance in alfalfa to the stem nematode. *Crop Science* **2**: 211-217

Khair, G. T. (1987) *List of plant parasitic nematodes of Australia.* 3rd Edition. Australian Government Publishing Service

Marais, M. (1990) Plant-parasitic nematodes in lucerne fields in South Africa. *Phytophylactica* **22**: 449-452

Williams, J. L., Gray, F. A. and Griffin, G. D. (1992) Biology of *Aphelenchoides ritzemabosi* and its association with *Ditylenchus dipsaci* in irrigated alfalfa in western U.S. [Abstract] *Journal of Nematology* **24**: 555

(P A Georgaras, I D Keahne, Dept Primary Industries, Northfield Research Labs., GPO Box 1671, Adelaide SA 5001; J M Fisher, Dept of Crop Protection, Waite Campus, University of Adelaide, Glen Osmond SA 5064; Lowe K F, Dept of Primary Industries, Ipswich QLD 4305 and Smith R S, Dept of Primary Industry, Kings Meadow TAS 7249)

TABLE 1. OCCURRENCE OF PLANT-PARASITIC NEMATODES IN AUSTRALIAN LUCERNE FIELDS

	LOCALITIES																			
	Innot Hot Spring	Biloela	Monto	Booubyjan	Muckapilly Rs	Tamworth	Aberdeen	Muswell-brook	Wellington	Mudgee	Cowra	Nambrok	Bealiba	Rokewood	Langhorne Ck	Meningie	Longford	Campbell-town	Ross	Swanson
No of Samples	1	2	3	2	2	1	2	1	1	1	1	1	1	1	4	4	1	2	1	3
Pratylenchus	0	2	1	0	0	1	2	1	1	1	1	0	0	1	0	0	1	2	1	1
Meloidogyne	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
Criconemella	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paratylenchus	0	0	0	1	1	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0
Ditylenchus dipsaci	0	0	0	0	1	0	1	1	0	1	1	0	1	1	4	1	0	1	0	1
Scutellonema	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Tylenchorchynchus	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	1	0	3
Tylenchus	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	1	1	1	3
Paratrichodorus	1	1	0	2	1	0	0	0	0	0	0	0	0	0	2	3	0	1	0	0
Xiphinema	1	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

PRATYLENCHUS THORNEI POPULATION BUILD UP ON A DARLING DOWNS VERTISOL AFTER A LONG FALLOW

In 1990 a project was begun to determine the effects of conservation tillage practices and fallow stubble management on the survival of beneficial vesicular-arbuscular mycorrhizal fungi and plant-parasitic nematodes. The project is funded by the Land and Water Resources Research and Development Corporation.

A major part of the project was to establish a new tillage trail on Vertisol at Wellcamp (near Toowoomba). The design for this field trial is a factorial combination of three tillage (zero, reduced or frequent) by two stubble (burnt or retained) by four fertiliser (nil, zinc, phosphorus or zinc and phosphorus) treatments. Nitrogen and sulphur were applied across all plots.

The site for this tillage trial had been clean fallowed for 8 years, but the root lesion nematode *Pratylenchus thornei* survived in moderate populations during this time. Successive wheat crops cv. Suneca were grown across all plots with soil sampled to a depth of 150cm prior to each planting (1990,1991,1992). Samples were also collected after the first year's harvest. The nematode population had increased quite dramatically with just one wheat crop (Figure 1). During the summer fallow nematode numbers declined. Nematode population as well as soil moisture assessments were done for each soil sampling. At each sampling, significant nematode population differences occurred at depth intervals throughout the soil profile. *Pratylenchus thornei* numbers were substantially increased with successive crops. (Figure 2). The population increase occurred down to depth in the soil profile, being particularly obvious between depths of 15 and 90cm.

After two seasons of different fallow management practices, nematode populations differed significantly due to treatment. The retention of stubble throughout the fallow periods significantly increased the nematode population through the soil profile (Figure 3). It is difficult to see how stubble retention at the soil surface should affect the nematode population at depth. However, the increased soil moisture under stubble retention could mean better root growth and more nematodes. Aggressive tillage decreased nematode numbers to significantly less than reduced tillage populations. Zero tillage and reduced tillage were not significantly different in nematode numbers (Figure 4).

Next season an intolerant wheat variety will be sown to test the effects on growth and yield of these different nematode populations.

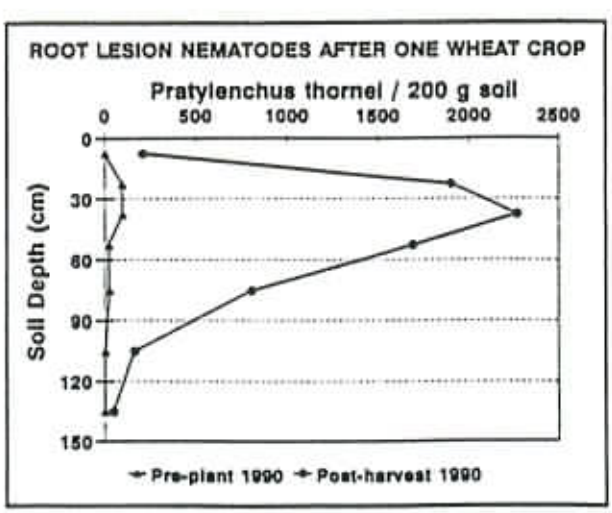

Figure 1

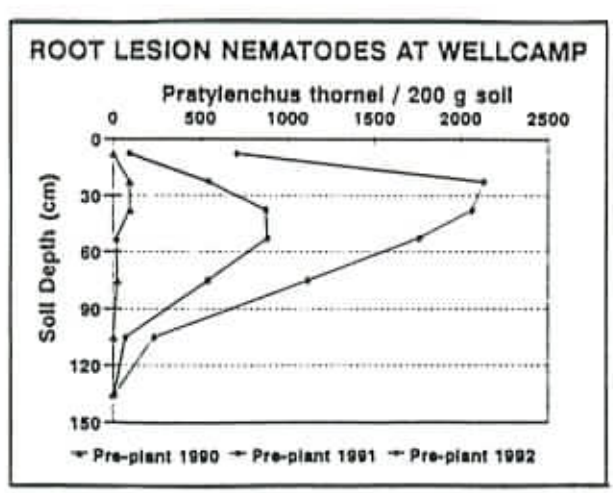

Figure 2

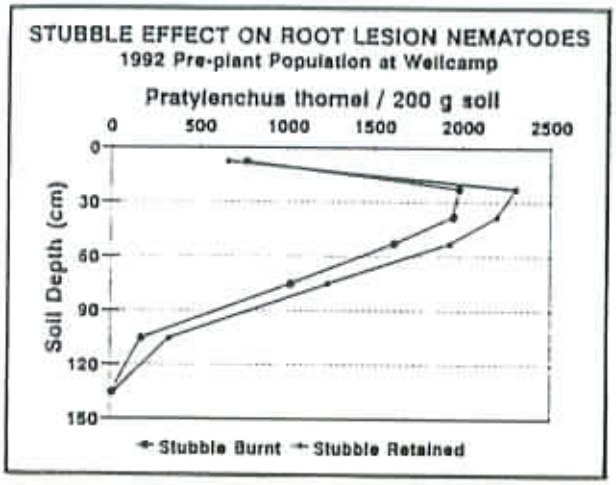

Figure 3

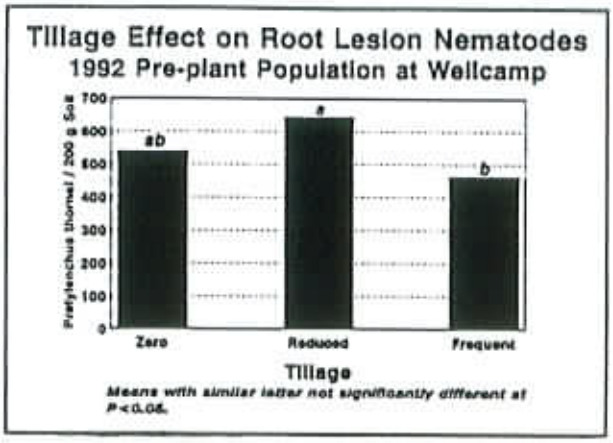

Figure 4

(Monica Haak, David Peck. & John Thompson, Queensland Wheat Research Institute, Toowoomba)

REGIONAL NEWS

NEWS FROM INDIA

Seventh Biennial Group Meeting of All India Co-ordinated research Project on Plant Parasitic Nematodes with Integrated Approach for Their Control funded by Indian Council of Agricultural Research, New Delhi was held at Gujarat Agricultural University, Anand, Gujarat on October 21-23, 1991. From 15 different centres of the project, there were 55 scientists participated in the said meet. Research work on nematodes attacking cereals, vegetables, pulses, oil seeds & fibre crops and plantation crops undertaken by various centres during 1989-90 and 1990-91 was discussed and planning of research for another two years ie 1991-92 & 1992-93 was done. The important salient features are:

1. Survey indicated that white tip nematode was widely prevalent in states of Tamil Nadu and Orissa with 100 and 87% frequency of occurance. The Ufra nematode has been encountered in all the area surveyed in Assam and Orissa. The seriousness of this nematode on rice crops demands well planned survey for its occurance, spread and its management. Maize cyst nematodes from Bihat, U.P. & H.P. states; pulse cyst nematode from Tamil Nadu, U.P., Karnataka, Maharashtra and Bihar and sorgham nematode from U.P. were recorded with varying densities on the concerned host crops and this needs attention in view of their widespread occurance and high population. The random survey of temperature fruits in H.P. showed high population densities of pin nematode (*Paratylenchus curvitatus*); lesion nematode (*Pratylenchus pratensis*); root-knot nematode (*M. incognita*). Citrus nematode was the predominant nematode infesting citrus orchards in H.P. Reniform nematode (*R. reniformis*) and root-knot (*M. incognita/M. halpa*) and lesion nematode (*P. thornei*) on medicinal aromatic crops in Kerala, Tamil Nadu, H.P.states and *R. reniformis* on ornamental crops in Orissa, Kerala and Tamil Nadu were the main nematode species encountered.

2. The percentage yield losses due to various nematodes on different crops as worked out by the participating centres is shown in table 1.

Table 1

CROP	NEMATODE	% YIELD LOSS
Tomato & Brinjal	Root-Knot nematode	29.0 - 35.6
Okra	Root-Knot nematode	6.2 - 23.5
Bottlegourd	Root-Knot nematode	44.5 - 47.2
Mung	Root-Knot nematode	8.6 - 38.3
Mung	Reniform nematode	10.6 - 21.5
Cowpea	Root-Knot nematode	5.4 - 46.4
Cowpea	Reniform nematode	18.6 - 22.7
Gram	Root-Knot nematode	13.3 - 43.4
Pigeonpea	Pulse Cyst nematode	10.1 - 90.0
Groundnut	Root-Knot nematode	6.0 - 33.3
Sesame	Pulse Cyst nematode	85.0 - 90.4
Jute	Root-Knot nematode	12.9 - 59.8
Castor	Reniform nematode	19.6 - 38.0
Ginger & Tumeric	Root-Knot/lesion nematode	31.3 - 43.5

3. Screening of crop germplasm revealed that tomato var. like PAU-1, PAU-2, PAU-3, PAU-4 & PAU-5, Pb NR-7, NT-3, NT-8, NT-12, BT-1 & SL-120 of tomato; Ghatikia white and Marroo Marvel of brinjal and SL-1, SL-2, LGP-9E, LGP-15E, LGP-18E, LGP-21E, LG-3 and Musalwadi of chilli were constantly resistant to root-knot nematodes.

4. **Nematode Management**

a) The use of overnight seed soaking of rice seeds in 0.1% of carbosulfone (30 EC), Triazophos (40 EC), Monocrotophos (40 EC)and Phosalone (35 EC) significantly reduced the root-knot galls and formation of egg-masses of root-knot nematode (*M. graminicola*) at the various centres.

b) The rice cyst nematode (*H. oryzicola*) can be effectively checked with the field application of carbofuran or Diazinon each @ 1 kg a.i./ha. The percentage increased yield of 44.7 and 16.5 respectively over control was recorded

c) The bare root dip of tomato/brinjal seedlings in 0.05 and 0.1% of carbosulfone, monocrotophos phosolone for 6 hours during hot sunny day just prior to their transplanting in the main field protected the crop significantly in having lower root-knot gall-index at the different centres. As a result, the yield was significantly more than control.

d) The solarization of soil (exposed/covered by polythene) for 2 weeks and use of treated nursery with carbofuran @ 0.3 g a.i./m^2 of both susceptible or resistant crop varieties gave maximum yield in comparison to non-solarisated and untreated nursery treatment at Kanopur, Bhubaneswar, Coimbatore and Pusa Centres.

e) The application of carbofuram (Marshal 25 ST) at 3% W/W reduced the root-knot disease on groundnut at Ananad and Junagadh centres. Additional field application of carbofuran or phorate @ 2 kg a.i./ha at sowing time were observed to be the best in controlling the root-knot disease under the field conditions.

f) The seed treatment with carbofuran 2% W/W coupled with soil application of either carbofuran/phorate/phenamiphos each @ 1 kg a.i./ha protected the cotton crop upto 30 days after germination from reniform nematodes.

g) The application of carbofuran or phenamiphos @ 1 kg a.i./ha checked the reniform nematode and increased castor yield upto 85% over control was recorded.

h) Neem cake @ 2.5 ton/ha was observed to be as effective as carbofuran @ 6 kg a.i./ha for control of root-knot nematodes in papaya.

i) Paring and hot water treatment at 55°C for 20 minutes and neem cake and carbofuran was significantly superior in reducing the nematode population on banana.

j) Treating the ginger rhizomes in hot water at 45°C for 3 hours denematised them and then gave 80-100% more yield over untreated ones.

Moreover in Gujarat, pigeonpea cyst nematode, *Heterodera cajani*, was recorded for the first time in Vadodara. Bharuch and Surat districts. Systematic survey indicated that there was 69% infection of *H. cajani* and 70% infection of *Rotylenchulus reniformis* in Vadidara and Bharuch districts while 29% infection of root-knot nematodes *M. javanica* (Pathotype 2) was noticed in Kheda district only concentrating in Kapadvanj area.

(D J Patel, Prof.& Head, Department of Nematology, Gujarat Agril. University)

GENERAL ARTICLES

"N" FOR NEMATOLOGY ?

Three recent publications sponsored by AAN (the root-knot nematode booklet, the letter and article in *Australasian Plant Pathology*) have correctly stressed the economic importance of plant parasitic nematodes and those responsible have done AAN a service. However, when I joined AAN I believed that I was joining a group of *nematologists* be they plant pathologists, soil biologists, zoologists, animal parasitologists etc.; the objectives in *ANN Newsletter 1 (1)* mention nematology without the 'plant' qualification.

Yes, I am concerned that there is less plant nematology being done and fewer graduates trained. However, how are *nematodes* fairing in stock health, biological control, DNA sequencing, plant breeding and environmental monitoring work? Possibly not too badly. Nematodes are but one class (or phylum, if you prefer) of animals and my feeling is that those who come together in AAN are first and foremost interested in *nematodes*.

If I wish to deal with nematodes in ecological studies I may turn to an ecological society, for parasites (does the kingdom of the host matter?) to a parasitology or plant pathology society, and for ultrastructure to an electron microscopy society. However, AAN, in my view and by its objectives, should cater primarily for *nematodes* and serve to bring together workers scattered across so-called disciplines and output-related institutes.

Nematologists working in the Australian environment have produced a surprising number of books (Rogers, 1962; Bird, 1971; Bird and Bird, 1991; Wallace, 1973; Nicholas, 1975, 1984; Stirling, 1991; Brown and Kerry, 1987) with two of them running to second editions. Members of AAN should acknowledge this and be concerned to see the *continued inclusion of nematodes* across a wide range of scientific activity.

Societies communicate to their members through newsletters, the contents reflect the strength and unity, diversity and division among members. I believe that if AAN is to advance the study of *nematodes* in Australasia it is the duty of members to ensure the newsletter regularly contains articles, notes, comments and opinions on everything from *C. elegans* to potato cyst nematode, marine nematodes to Kiwinematidae!

(Gregor Yeates, Landcare Research, Private Bag 31902, Lower Hutt, New Zealand)

P.S. I had a very enjoyable 10 weeks working alongside Alan Bird in Adelaide in September-December and hope to be able to provide a note on our work for the next issue of the newsletter.

P.P.S. Kiwinematidae was proposed in *Systematic Parasitology* **15**: 75-79 (1990)

HISTORICAL NOTE

I noticed in the July 1992 issue of ANN (2) that Graham Stirling was concerned that Russell Eastwood has had to resort to telephoning people for articles. May I assure him and future editors of ANN (2) that unless this is done, the newsletter will not survive. I speak from experience because I was responsible for the compilation and distribution of ANN (1) for five years prior to Warwick Nicholas who ran it for a further three years before apathy from readers resulted in its demise. I know that some of your younger readers are unaware that ANN (1) ever existed and they might like to know something of its history. It started in 1981 as a result of a meeting of Australian nematologists at a workshop on nematode taxonomy convened by the Bureau of Flora and Fauna in Canberra. It was agreed by all present that a newsletter would be of help in improving communications between Australian nematologists of widely diverse interests. I drew the short straw and, thanks to the generosity of CSIRO and later ANU, ANN (1) was posted free twice yearly to more than forty members for five years and annually for a further three years. ANN (1) contained articles by virtually all early Australian nematologists, at least two of whom have since died (Grant Inglis and Winoto Suatmadji), and most have retired. Some of the keys for plant parasitic nematodes, although perhaps a little dated, may still interest ANN (2) readers. I have left my complete collection of ANN (1) with the CSIRO Soils Division Library from where it may be borrowed should anyone be interested. In conclusion, I wish ANN (2) longevity and hope future editors will continue to accept articles from nematologists working on free-living and animal parasitic nematodes as well as plant parasitic ones.

(Alan F. Bird, CSIRO Adelaide)

A METHOD OF USING THE MICROSCOPE

From the Agricultural Gazette of New South Wales, March 1897

I must ask the forbearance of the purely agricultural readers of the *Gazette* while I devote a page or two to the description of a piece of apparatus which has enabled me thousands of times to give them advice about the treatment of their crops, either by letter or through these pages. I refer to the microscope. The *Agricultural Gazette* is chosen as the medium for my communication because it has a circulation extending over the whole world, and more particularly because it reaches agricultural experts wherever located.

The apparatus I have to describe has been so very useful to me that I cannot but think it will be also useful to others in this and other countries, engaged as I am on the various scientific problems presented by agriculture, and if it turns out useful to them even the farmer who looks upon this technical article as of no service to him will, whether he knows it or not, be indirectly benefited.

This method of mounting and using a microscope is one that has been gradually perfected through almost daily use since 1888. I have frequently been asked to publish the details, and have so far refrained from doing so only because I found that on each new microscope mounted I was enabled to make a number of improvements, and so long as this was the case any description would soon be antiquated and so become, to me at least, only a source of annoyance. On no less than ten separate occasions has this device been remodelled to suit differing circumstances, and it now stands in five laboratories under my supervision, viz., Sydney, Moss Vale, Wagga, Bathurst, and Pymble.

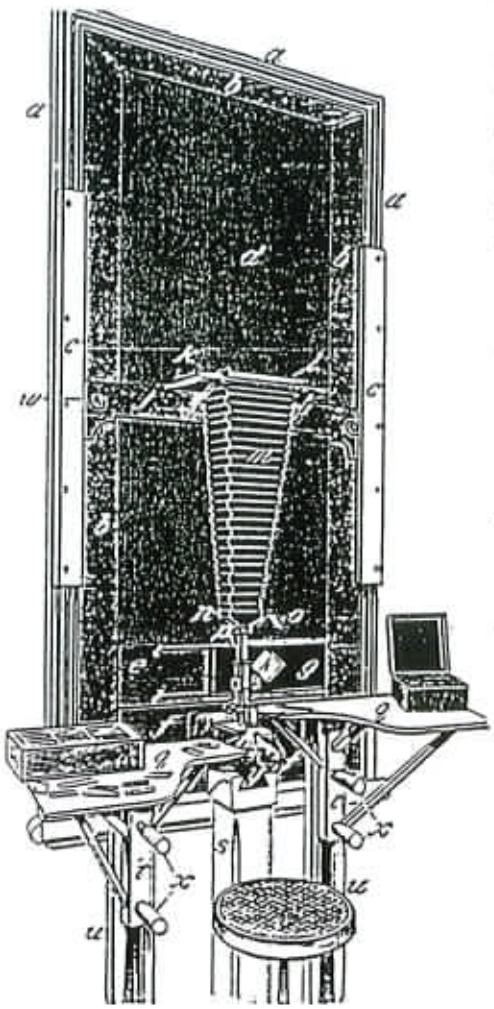

Fig. 1. - Perspective view of microscope mounted for purposes of investigation by daylight. Dimensions may be gauged by the diameter of the top of the stool, v, which is 1 foot.

The following is a key to the illustration (Fig. 1):-
aaa, architrave of a window facing the sun.
bbb, ¼-inch runners, 4 inches wide, in which the blind, *d*, slides.
cc, runners for the arm, *j*, which carries the camera, *m*.
d, perfectly opaque blind, made of American leather or enamelled cloth, running on a spring roller at the top of the window. By raising this blind the whole apparatus may be flooded with sunlight if necessary.
e, a ¼-inch board, 8 inches wide, hanging in an inch deep slot in the board, *f*, and riveted to the blind, *d*, and hence rising and lowering with the blind. This board, *e*, slides in the runners, *bbb*.
ff, an inch board, 8 inches wide, fitter to the side of the window and receiving the board, *e*, into a median slot ¼ inch wide, and 1 inch deep in its upper edge.
g, two sliding pieces of thin ebonite, placed one behind the other, each with a diamond-shaped opening cut out on the middle. By sliding these ebonite shutters the opening, *h*, can be made of various sizes.
ii, the runners in which the two ebonites, *g*, slide. Behind the ebonites an elongated opening is cut in the board, *e*, and this opening has a ground glass sliding over it in rummers similar to *ii*, but fastened to the back side of *e*. All these latter appliances are for the purpose of varying the amount and character of the light coming through the diamond-shaped opening, *h*.

(By N.A. Cobb)

This is part of an article that emerged from the depths of a filing cabinet some time ago - and we think we are hard done by with our equipment!! Julie Stanton.

AFRO-ASIAN JOURNAL OF NEMATOLOGY

Duplicate copies of Volume 1 - issues 1 and 2 of this journal were recently sent to me in error by the Afro-Asian Society of Nematologists. They have advised that they would prefer to sell the journals rather than returning them to UK. The journals arrived in good condition , and contain 240 pages of articles about plant and soil nematodes. These are available for $80 Aus, which is about $20 less than they would cost from the UK. There is no obligation to subscribe to following issues. If you are interested, please contact Francis Reay, Crop Protection Department, Waite Campus, University of Adelaide, Glen Osmond, SA 5064. Tel (08) 372 2444 or 372 2321

THE CURRENT STATUS OF NEMATICIDES IN THE USA

During a recent visit to Hawaii to attend the First International Symposium on Pineapple, I was able to obtain some information on the status of nematicides which may be of interest to AAN members.

1. All the nematicides currently used in the USA have been available for many years. The soil fumigants were developed following World War II while the organophosphate and carbamates came onto the market in the late 1960's. Since all pesticides that were first registered prior to 1984 must now pass through a re-registration process, the information available on all nematicides is currently being re-evaluated. Data collected prior to 1970 is invalid and much of the more recent work will also have to be repeated using modern methods. Many additional tests are also required by US EPA.

2. The current status of the re-registration process is as follows:

   a) Mocap, Vydate, Nemacur - likely to be re-registered with some amendments to the label. These label amendments will probably involve more restricted re-entry requirements, reductions in application rates or restrictions on use in areas with shallow water tables.

   b) Methyl bromide - status uncertain, but likely to be phased from use within the next few years.

   c) Vapam - status unknown because the re-registration process has just commenced.

3. a) The status of Telone II and Telone C17 differs from that of other nematicides.

      - Telone is undergoing re-registration and is also being examined through the 'special review' process within US EPA.

      - In 1991, Telone was suspended in California because unacceptably high concentrations of 1,3D were found in the air above several recently fumigated fields. Data is therefore being collected in an attempt to reinstate its use in California.

   b) Because of these registration problems, Dow Elanco are currently involved in the most comprehensive study ever undertaken with a nematicide. More than $4 million per year is being spent to obtain data on the environmental fate of 1,3D and the factors which affect its efficacy. Dow Elanco now have a contract with US EPA which commits the company to supplying certain data by a specific date. In turn, US EPA are committed to completing their review by a specific date. Dow Elanco hope to complete most of its studies by June 1993.

   c) Dow Elanco remain confident that they can meet environmental and worker exposure requirements and obtain registration. 1,3D has a short half-life (2-10 days) and is most unlikely to contaminate ground water. However, because low concentrations of 1,3D have been found in shallow wells in 10/36000 samples, the label will have to contain a warning statement about the potential for ground water contamination. A label for a wide range of horticultural crops is expected and the maximum application rate allowable is likely to be about 42 gal/acre (410 L/ha).

   d) The suspension of Telone in California occurred because of poor application practice. The fumigant was applied to dry soil (so that large amounts of the fumigant volatilised and immediately escaped from the soil). Also, insufficient attention was paid to spillage on the soil surface when tynes were removed from soil at the end of each row. Dow Elanco is not prepared to jeopardise its product again and is designing dry disconnectors for handling equipment, check valves and purge systems for fumigation rigs (to prevent end-row spillage), and appropriate protective clothing for applicators. The company also plans to

train and licence applicators, so that the product will only be applied by competent operators who have a knowledge of how and under what conditions the fumigant should be applied.

e) Dow Elanco's attitude is commendable, as Telone is likely to be the last soil fumigant left on the market, and this may be our last chance to retain a product that is useful to many horticultural industries. Dow Elanco also stress that if Telone is re-registered, industries must take a responsible attitude towards its use to ensure that it will continue to be available in the long-term.

4. The registration process in the USA obviously has implications for horticultural industries in Australia and New Zealand. When EDB is removed from the Australasian market, Telone II should prove to be a satisfactory replacement, provided it survives the current re-registration process and the manufacturer is willing to import it into Australia and New Zealand. More is known about Telone than probably any other nematicide, so that if and when it is introduced the manufacturer should be able to provide growers with reliable information on how it should be used. Soil moisture affects the efficacy of Telone more than EDB and so more care will have to be taken to fumigate under optimum soil moisture conditions. The decision by Dow Elanco to licence applicators will reduce grower's flexibility and may therefore reduce their capacity to meet this requirement.

   Present evidence suggests that methyl bromide will be phased from use in the next few years and therefore is not likely to be available as a replacement for EDB.

(G R Stirling, Queensland Department of Primary Industries Brisbane)

TRANSFER OF THE QDPI NEMATODE COLLECTION TO THE QUEENSLAND MUSEUM

In the last newsletter we mentioned that, with the help of a donation from RIRDC, the Queensland Department of Primary Industries nematode collection was being restored and transferred to the Queensland Museum. We are now pleased to report that the task has been completed.

The collection now consists of the following:

347 type slides, mainly of species described by Dr Bob Colbran
2714 other slides of nematodes from various hosts and localities in Australia
17 vials containing some of Colbran's paratypes in fixative
192 mass unsorted habitat collections in fixative from various locations in Australia

All the material is now in good condition. We are grateful to Dr Wim Wouts, who carefully restored all the type slides. The rest of the slides contain representatives of all nematodes in the original collection. Slides were retained if they were in good condition and in cases where all slides had dried out, some representatives were restored. Mrs Frances Reay provided advice on restoration and we gratefully acknowledge her help.

Every slide or vial now has a registration number and all information pertaining to the specimen has been entered on a database. Examples of some typical records are provided below. Since the data base has been integrated into ASPIC (Australian Society for Parasitology Information on Collections), information on the material is available Australia-wide. It can be readily searched by nematode name, host or locality.

Anyone wishing to borrow material from the collection should contact:

Dr L. Cannon, Senior Curator (Worms)
Queensland Museum
P O Box 3300
SOUTH BRISBANE QLD 4101

(Lester Cannon, Graham Stirling and Elaine Lobley)

Since the above article was written, I have been notified by the Secretary of Plant Health Committee (PHC) of Standing Committee on Agriculture that it supports the formation of a National Collection of Plant Parasitic Nematodes in two parts:

a) a collection of taxonomically significant material to be housed in the Queensland Museum, and;
b) working collections housed in other institutions as appropriate.

This decision largely supports the recommendations made by AAN about 12 months ago. However, it differs in one respect, as AAN's recommendation was that taxonomically significant material be housed at either the Queensland or South Australian Museums. Apparently PHC was concerned about the funding situation at the S.A. Museum and considered that the Queensland Museum had a greater long-term commitment to the collection.

Examples of records from the ASPIC data base:

Nematoda Secernentea Tylenchida Criconematidae
G 200883 OGMA 0 AUSTRALE
Orig Name:
Host: Loc: soil Field No:
OHost:
Locality: Dirranbandi Qld Australia
Lat/Long: 28.35.S; 148.14.E (AGAZ) Collected By: Ward A
Date/Period collected: 16/Sept/1969 Mean Depth: Altitude: Range (+/-)
Type: Id By: Colbran R C Year Id:
Type Reference: Ref No:
Storage: Slide Holding Institution: Queensland Museum, Brisbane
Remarks: Wholemount 1 slide, 1 Female. Amal. Chemicals

Nematoda Secerentea Tylechida Pratylenchidae
G 200902 PRATYLENCHUS BRACHYURUS
Orig Name:
Host: MANGIFERA INDICA Loc: soil around Field No:
OHost:MANGO
Locality: Bowen Qld Australia
Lat/Long: 20.01.S; 148.15.E (AGAZ) Collected By: Scott D F
Date/Period collected: August/1969 Mean Depth: Altitude: Range (+/-)
Type: Id By: Colbran R C Year Id:
Type Reference: Ref No:
Storage: Slide Holding Institution: Queensland Museum, Brisbane
Remarks: Wholemount 1 slide, 2 Female. Also on slide 1 unidentified juvenile. Poor specimens.

(G R Stirling, Queensland Department of Primary Industries Brisbane)