AUSTRALASIAN NEMATOLOGY NEWSLETTER

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FROM THE EDITOR

Again thanks to those members who have contributed articles for this edition of the newsletter. Maria Scurrah (& colleagues) will be editing the newsletter after the ANN general meeting in Hobart. Please give her your support by submitting articles,
I am sure she will do a good job.

Send articles to:

Maria Scurrah
Editor, Australasian Nematology Newsletter
Field Crops Pathology Unit
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I look forward to seeing many of you in Hobart.

(Russell Eastwood, Victorian Institute for Dryland Agriculture, Horsham Victoria)

ASSOCIATION NEWS

AUSTRALASIAN ASSOCIATION OF NEMATOLOGISTS

PRESIDENT'S REPORT 1991-1993

When AAN was formed in 1989, there was some doubt as to whether nematology in Australian and New Zealand was strong enough to justify formalising the informal nematology network that had existed previously. I am pleased to report that those fears have proved groundless, as the Association has survived its formative years and is now playing an important role in promoting nematology and facilitating communication amongst nematologists. As the rest of this report shows, there has been a high level of achievement during the last two years and I am sure that this has helped to raise the profile of nematology in our region.

Membership and Finance

AAN grew rapidly in the two years following its formation. That growth has continued, membership increasing from 48 in June 1991 to 61 in May 1993. Continued growth in membership and prudent financial management has meant that AAN is now in a comfortable financial position, with a bank balance of $2,141.71 as at May 31, 1993.

Publicity

During the last two years, AAN made a major effort to promote nematology to a wider audience. A paper entitled "The importance of plant parasitic nematodes in Australian and New Zealand Agriculture" was published in Australasian Plant Pathology, and pamphlets on root-knot and cyst nematodes were produced and distributed to research administrators, funding bodies and industry groups.

Submissions to reviews

Submissions were made to an RIRDC sponsored review on the status of plant nematology in Australia, and to a study by the Horticultural Policy Council on the impact of potato cyst nematode on Australian horticultural industries. This interaction with Australia's major agricultural funding agencies appears to have had an effect, as nematodes are now high on the priority list of GRDC, HRDC and RIRDC.

Communication amongst members

Australasian Nematologists Newsletter continued to be well supported by members, with the two issues produced each year containing a wide range of articles. AAN also played a crucial role in organising a *Pratylenchus* workshop, to be held in conjunction with the 1993 APPS Conference.

National collection of plant-parasitic nematodes

The Agricultural and Resource Management Council of Australia and New Zealand (Standing Committee on Agriculture and Resource Management) accepted AAN's recommendation that Australia's National Collection of Plant Parasitic Nematodes be housed at the Queensland Museum, where it will be integrated with existing collections of other nematodes.

Host List of plant-parasitic nematodes in Australia

The current list (Khair, 1986) is now out of date and an updated list is now being complied by Mrs F. Reay and Mr R. McLeod. The publication is expected to be available early in 1994.

International Federation of Nematology Societies (IFNS)

AAN has contributed to discussion on the need for and role of IFNS. A decision has not yet been made, but AAN has indicated that it favours a loose network of independent societies rather than a formal federation.

Present and incoming Executive Committees

	1991-1993	1993-1995
President	G. Stirling	J. Curran
Secretary	J. Stanton	D. Hartley
Treasurer	L. West	D. Hartley
Newsletter Editor	R. Eastwood	M. Scurrah
Committee member	J. Marshall	R. Brown

The present committee has functioned efficiently and effectively over the last two years and I would like to thank committee members for their contributions. AAN is now firmly established and hopefully the new committee can build on the foundation which has been laid during the last four years. At a time when the future of science and scientists is uncertain, AAN has an important role to play in fostering the development of nematology.

(G R Stirling 3.6.93, Department of Primary Industries, Brisbane)

TREASURERS' REPORT 1991-93

Account Balance at 1.6.91			$1 015.28
Income	Interest	98.23	
	Subscriptions	1 360.00	
	TOTAL	1 458.23	
Expenditure	Root-knot Booklet	326.50	
	Stamp Duty	5.00	
	TOTAL	331.50	
Account Balance at 31.5.93			$2 141.71

(L.M. West 3.6.93, Department of Primary Industries, Brisbane)

AUSTRALASIAN ASSOCIATION OF NEMATOLOGISTS
GENERAL MEETING

The general meeting of AAN will be held in the Green Room, Wrest Point convention Centre, Hobart on Thursday 8 July 1993.

AGENDA

Opening - Chairman

Apologies

Minutes of the previous meeting

Business arising form the minutes

Election of officers

Correspondence - In
- Out

General business

Closing - Chairman

Looking forward to seeing you at the meeting.

Julie Stanton
Secretary

TO AAN MEMBERS WHO ARE NOT MEMBERS OF APPS

This is an invitation to join the Australasian Plant Pathology Society (APPS). Membership is open to anyone interested in the study of plant diseases and their casual organisms.

The objectives of APPS are the advancement and dissemination of the knowledge of plant pathology and its practice, particularly, but not exclusively, in relation to Australia and neighbouring countries.

APPS publishes a quarterly journal *Australian Plant Pathology* and a quarterly newsletter which are distributed to all members.

The journal is a citable publication which is abstracted internationally. It contains research papers, short research notes, reports of new diseases and general articles that contribute to the understanding of some aspect of plant pathology relevant to the Australasian region.

The newsletter is a less formal publication designed to keep members informed of the activities of the Society and to provide a forum for discussion.

Included in this AAN newsletter is an application form for the membership of APPS which you should complete and return with payment to either of the addresses at the bottom of the form.

We look forward to welcoming you to APPS.

(Julie Stanton, Queensland Regional Councillor, APPS.)

A P P S

AUSTRALASIAN PLANT PATHOLOGY SOCIETY

President: Dr Chris Hayward, Department of Microbiology, The University of Queensland, St Lucia 4067
Phone: (07) 3653448 Facsimile: (07) 3651566

APPLICATION FOR MEMBERSHIP

Subscriptions:

Rates for 1992/93

Full Member	$A60	Libraries	$A60
Student Member	$A30	Sustaining Member	$A250
Retired Member	$A30		

Subscriptions paid after 1st January entitle new members to receive back copies of the APPS newsletter for that year.

SURNAME: ..... FIRST NAME: ..... TITLE. . . .

ADDRESS .....

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.....

INSTITUTION .....

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TELEPHONE ..... FACSIMILE .....

SPECIFIC INTERESTS (Describe Briefly)

.....

.....

I wish to apply for . . . . . membership of the APPS and enclose cheque/money order for $A . . . . . .

Return to

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CURRENT RESEARCH

OCCURRENCE OF *P. thornei* IN NORTHERN NEW SOUTH WALES.

Tony Pattison, NSW Agriculture, Narrabri Agricultural Research Station, Narrabri NSW 2390

INTRODUCTION

Pratylenchus thornei can cause significant reductions in the yield of wheat crops grown on heavy clay soils in northern NSW. Florini *et al.* (1987) noted that the crop grown in the previous year influenced the population densities of *Pratylenchus* species in the following year. Broadacre farming in northern NSW most commonly features wheat in rotation with other winter crops; barley, chickpea, canola and summer crops; sorghum, sunflower and cotton.

The objective of the survey described was to identify rotation practices which predisposed the fields to high levels of *P. thornei* and to determine the distribution and abundance of the nematode in wheat fields in northern NSW.

MATERIALS AND METHODS

In 1991, twenty seven fields were surveyed from fifteen properties over a wide area of the wheat growing region of northern NSW, from Dubbo in the south to Boggabilla in the north. In each field surveyed 3 soil cores (50 mm diameter and 300 mm deep) were taken at five different locations. The soil samples at each location were divided into 2 sub-samples (250 g each) and nematodes extracted, so that mean *P. thornei* populations for each field were estimated from 10 sub-samples. Each field was surveyed on two occasions, the first at the time of wheat sowing to determine the initial nematode population, and the second at harvest to determine the final nematode population. Fields were classified into three groups according to the initial *P. thornei* population; less than 500 nematodes / 200 g OD soil, between 500 and 1000 and greater than 1000 nematodes / 200 g OD soil. The precision of estimating nematode populations was calculated using the coefficient of variation (CV) for each field for initial and final populations. The cropping histories of the fields were recorded to determine the occurrence of susceptible crops.

RESULTS AND DISCUSSION

NEMATODE POPULATIONS AND SAMPLING ERRORS

The fields sampled had a range of cropping histories, although most had been cropped for more than 20 years. Of the 27 fields sampled, nine had a nematode problem which would reduce wheat yields (> 1000 nematodes/200 g OD soil), four had a nematode problem which could become damaging to wheat yields (500-1000 nematodes/200 g OD soil), a further nine had a potential nematode problem (100-500 nematodes/200 g OD soil) and only five fields could be regarded as not having a nematode problem at present with soil populations at sowing and harvest below 100 nematodes per 200 g OD soil (Table 1).

The variation of *P. thornei* in the field as indicated by the CV, was high when the initial nematode population was below 500 nematodes per 200 g OD soil (Table 1). However, fields sampled with high populations (greater than 500 nematodes per 200 g OD soil) had acceptable CV around 50 percent. Schmitt *et al.* (1990) sampling plant-parasitic nematodes in wheat found a range of CV up to 97 percent, but was able to reduce the variation by taking more soil cores. Many of the fields with high CV were observed to be non-uniform in edaphic features such as soil type and topography. This needs to be considered when sampling fields to reduce variation from the field mean.

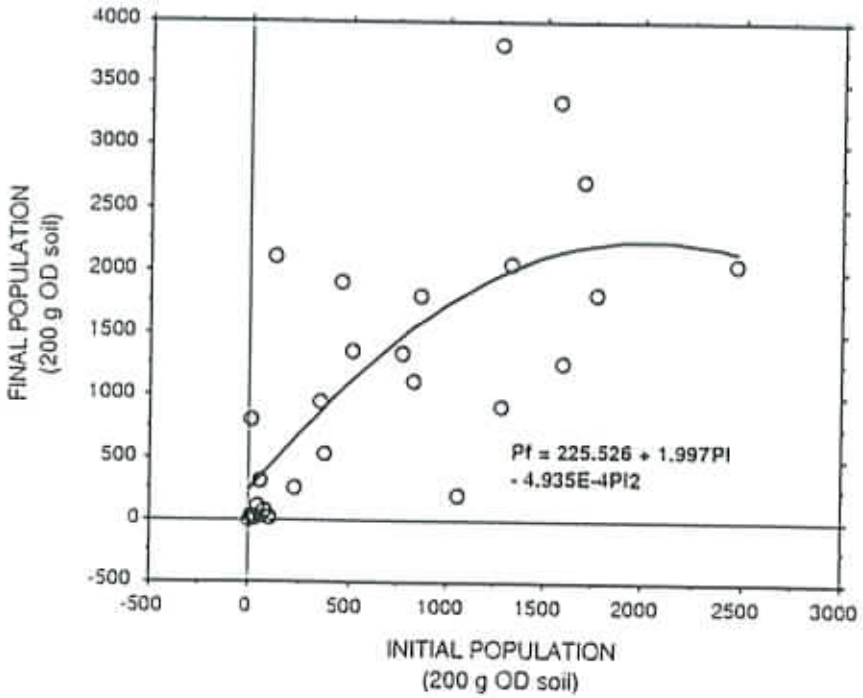
Table 1: Mean populations of *P. thornei* for twenty-seven fields sampled in northern NSW in 1991 and the associated errors for each population category.

	Population Category (/200 g OD Soil)		
	< 500	500-1000	>1000
Mean *P. thornei* population at sowing	134	746	1556
CV at sowing	91.8	41.5	52.0
Mean *P. thornei* population at harvest	524	1650	2023
CV at Harvest	70.1	43.4	67.8
Population difference (harvest-sowing)	390	904	467

Poor growing conditions in 1991 due to low soil moisture, were reflected in low multiplication of *P. thornei* in some fields producing a significant ($p<0.05$) polynomial regression equation describing the initial and final nematode populations (Figure 1). It could be conjectured that in fields where nematode populations decreased or had low multiplication, the nematode population approached an equilibrium density for that field, for the environmental conditions experienced in 1991. Conditions which are unfavourable to the host crop, can indirectly reduce both the maximum rate of multiplication and the equilibrium density of the nematode compared to those under favourable conditions (Nusbaum and Ferris, 1973). From Figure 1 the equilibrium density for initial soil nematode population at the time of sowing of wheat was approximately 2000 nematodes per 200 g OD soil. Populations greater than 2000 nematodes produced a decline in nematodes present in the soil at harvest. Dropkin (1980) suggests that the value for the equilibrium density will depend on the nematode and the host association, and on the environment.

Figure 1: Polynomial regression ($r^2=0.5$) of initial (Pi) *P. thornei* soil populations at sowing and the final (Pf) soil populations at harvest for twenty seven fields in northern NSW.

Figure 1: Polynomial regression (r^2=0.5) of initial (Pi) *P. thornei* soil populations at sowing and the final (Pf) soil populations at harvest for twenty seven fields in northern NSW.



CROPPING HISTORY

Crop rotations are an important factor in determining the levels of *P. thornei* in the field. Both the long term and short term cropping histories must be considered when a high population of *P. thornei* (>1000 nematodes per 200 g OD soil) and subsequent damage to wheat yields are suspected. Eighty-eight % of the fields with greater than 1000 nematodes per 200 g of OD soil had been sown to a susceptible crop (wheat, chickpea or legume based pasture) the previous year (Table 2). Fifty-five % of fields with populations greater than 1000 had 3 susceptible crops during the previous 5 years, compared to 50.0 % of the fields with populations between 500 and 1000 and 35.7 % of the fields with less than 500 nematodes per 200 g OD soil having 3 susceptible crops in the last 5 years (Table 2).

Table 2: Cropping history of fields sampled for *P. thornei* in 1991 in relation to the number of susceptible crops and nematode populations at sowing.

Nematode population at sowing 1991 (200g OD soil)	Fields with a susceptible crop in 1990 (%)	Fields with more than 2 susceptible crops in 3 years (%)	Fields with more than 3 susceptible crops in 5 years (%)	Number of fields sampled
<500	50.0	35.5	35.7	9
500-1000	75.0	50.0	50.0	4
>1000	88.8	66.6	55.5	14

Oostenbrink *et. al.* (1956) found that regular crop rotation prevented or restricted the development of nematode populations and helped maintain crop yields. They showed that continually cultivating wheat in fields selectively increased *P. thornei* populations. Van

Gundy *et al.* (1974) investigating *P. thornei* in Mexico found that the lowest numbers of nematodes were in rotations which had not grown wheat for more than two consecutive years. Thompson *et al.* (1980) suggest that wheat should not be grown where *P. thornei* is a problem more than once every three or four years, rotating wheat with resistant alternative crops such as sorghum and barley. Oostenbrink *et al.* (1956) suggested that populations of *Pratylenchus* appeared to be increased by wheat, less by oats and barley and least by rye. They also found that non-cereals such as, flax, peas, potatoes and beets seem to reduce *Pratylenchus* populations whereas red clover promoted populations.

CONCLUSION

P. thornei is endemic on many of the heavy clay soils found in northern NSW. High populations of the nematode, which may be damaging to wheat crops are found where susceptible crops such as wheat, chickpeas and legume based pastures have been continually grown. However, continually growing susceptible crops does not necessarily create a *P. thornei* problem but increases the potential risk of high *P. thornei* populations reducing wheat yields.

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REGIONAL NEWS

NEWS FROM QUEENSLAND

The Nematology group at QDIP has been fortunate enough to secure funding for several new projects starting in 1993/94.

1. For the past three years, RIRDC has funded a project to develop molecular diagnostics for species and races of *Meloidogyne*. This has achieved several objectives and the work will continue for another three years with joint funding by the RIRDC and Co-operative Research Centre for Tropical Plant Pathology (CRCTPP). Molecular diagnostics will allow rapid detection and identification of species and races and will predict host range. This will facilitate non-chemical control strategies such as the use of non-host rotation crops and resistant cultivars.

2. Another project will allow us to develop a database of the resistance of a wide range of plant species and cultivars to *Meloidogyne* species and races. This project is funded by RIRDC, HRDC and QFVG (Queensland Fruit and Vegetable Growers). Once we can identify a *Meloidogyne* population and its hosts we will be in a position to make recommendations to growers. This project will also include a small amount of work on the use of organic amendments to reduce *Meloidogyne* populations.

3. A third project funded by HRDC and QFVG is aimed at sustainable management of *Radopholus similis* on bananas in north Queensland. We will study the population dynamics of *R. similis* under various management systems to determine its economic threshold. Field trials will assess the potential of various cover crops and mulches to reduce nematode numbers below the economic threshold and the length of the break required between crops.

Added to our existing projects, it looks as though we'll be busy for a while!!

(Julie Stanton, QDPI, Indooroopilly)

NEWS FROM VICTORIA

Pratylenchus project

Pratylenchus research has received a boost this year with the Grains Research and Development Corporation funding a collaborative project between the South Australian Research Institute in Adelaide (Sharyn Taylor/Alan McKay) and the Victorian Department of Agriculture VIDA Horsham, (Russell Eastwood). The Victorian trials aim to determine the extent of any yield loss caused by *P. thornei* in our field crops and we hope to quantity the relationship with soil populations. Despite a late and dry start to the season the trials are all in the ground so lets hope it keeps raining.

Russell Eastwood, Victorian Institute for Dryland Agriculture, Horsham, Victoria)

PCN Update

We have now detected 14 potato properties infested with PCN. The properties have been fumigated. In the case of market gardens alternate non-host crops are sown and in areas such as Gembrook (6 properties) these areas are or will be sown to pastures.

Quarantine soil surveys are no longer required. The only soil surveys apart from certified seed potato soil will be those which facilitate export or interstate trade. Each year for the last 2 years we have surveyed 25% of the 13,200 ha of the Victorian potato growing land.

Biochemical analyses of the Victorian populations of PCN detected last year indicate that only *G. rostochiensis* is present. Our tests can distinguish between the 3 *G. pallida* pathotypes of the cultivar screening conducted by Ken Evans at Rothansted using tubers obtaining H1 and H2 resistance genes indicated that RO_1 is present in Wandin. Morphological characteristics of some cysts from the Gembrook area appeared to fall in to the *G. pallida* range based on Granek's ratio and ridge numbers (this was supported by Dr J Nobbs CAB). To date the presence of *G. pallida* is not confirmed by our biochemical work. However, it is only with time that we will build up an accurate assessment of the situation as more populations are examined.

Nematode collection

Agreement has been reaches on the establishment of the National Collection of the Plant Parasitic Nematodes with the Queensland Museum. Specimens from the collection at Burnley which are type specimens will be deposited with the Museum and specimens which are not taxonomically significant will remain in our working collection. This collection of some 2,000 entries is now on a computer data base and information such as host genus, location and collector are catalogued.

New project.

In collaboration with Gordon Berg (pasture entomologist) we have been funded by DRDC to examine the effect of nematodes on white clover.

Restructured again!!!!!

Just when you thought you had come to grips with the Victorians we have changed our name, logo, mission and some of our institutes names. Burnley is to be sold, staff are to move to Knoxfield which will be known as the Institute for Horticultural Development and as many staff as can be shed in the process will be. For the time being Jill Hinch and Lila Nambiar can still be reached at Burnley.

(Jill Hinch, Burnley Gardens, Burnley, Victoria)

GENERAL ARTICLES

FOUNDER OF AUSTRALASIAN NEMATOLOGY - N. A. COBB (1859-1932)

The previous issue of this newsletter reproduced "A method of using the microscope" published in the *Agricultural Gazette of New South Wales* by N.A. Cobb in 1897. The article was but one of 93 published as a direct result of Cobb's time in Australia (see bibliography in Blanchard 1957), before he embarked on his very productive period as 'the father of nematology in the United States' (reviewed in Huettel & Golden 1991).

N.A. Cobb left the S.S. Iberia in Adelaide and travelled overland to Sydney where he met the rest of his family on 7 March 1889. His supportive family were a key to Cobb's prodigious scientific output. He spent about a year working for an importer combined with other jobs - including six months part-time as Consulting Pathologist to the newly formed N.S.W. Department of Agriculture. This led to his appointment as the senior scientist in the Department, a position which he held until he departed for Hawaii (and ultimately Washington) in 1905. N.A. Cobb was greatly valued by the Department and rather than accept his resignation in 1898 a two-and-a-half year leave of absence was arranged. His American appointments were arranged when, early in 1905, he used four months accumulated leave to visit U.S.A.

The Australian Dictionary of Biography comments that N.A. Cobb's **Universal Nomenclature of Wheat** (1901-04) attracted world-wide attention and Callaghan (1987) report his advocacy of the **bulk handling of wheat** long before it became accepted practice. A full bibliography of his publications up to 1916 is given in Blanchard (1957) and shows he applied his scientific expertise to topics as diverse as maize, wheat, sugar-cane, smuts and rusts, crows, animal parasites, instrumentation as well as to **nematology.**

Over 19 contributions to Australasian nematology prior to 1906 make N.A. Cobb the founder of Australasian nematology, and this was before he began his work with U.S.D.A.! Many of the contributions in the area of plant health were important initial building blocks but have been surpassed by new techniques and greater knowledge. However, accurate identification is the basis of all nematode studies and while in Australia Cobb produced several papers (2 in 1891, 2 in 1893, 1894, 1898, 1904) which must be considered of significance. Perhaps the two most cited are those published just 100 years ago-

1. Cobb, N.A. 1893: Nematodes, mostly Australian and Fijian. *Macleay Memorial Volume, Linnean Society of New South Wales:* 252-308, plates 36-42.

   This work described 82 nematodes about half of them new. Among the new species the following may be familiar to current workers in various aspects of nematology-

Mononchus digiturus Cobb, 1893	= *Miconchus digiturus*
Mononchus gymnolaimus Cobb, 1893	= *Iotonchus gymnolaimus*
Tylencholaimus ensiculiferus Cobb, 1893	= *Xiphinema ensiculiferum*
Tylenchus similis Cobb, 1893	= *Radopholus similis*
Tylenchus multicinctus Cobb, 1893	= *Helicotylenchus multicinctus*

2. "Plant disease and their remedies. III. Nematode worms found attacking sugar-cane" *Agricultural Gazette of New South Wales 4 (10):* 808-833. Descriptions included-

Tylenchus setiferus Cobb, 1893	= *Eutylenchus setifera*
Tylenchus emarginatus Cobb, 1893	= *Cephalenchus emarginatus*
Tylenchus dihystera Cobb, 1893	= *Helicotylenchus dihystera*
Plectus cephalatus Cobb, 1893	= *Wilsonema cephalatum*

To these two publications can be added-

3. "Australian free-living martine nematodes" *Proceedings of the Linnean Society of New South Wales 23 (3):* 383-407 (1898) [19 species proposed],

4. "Free-living fresh-water New Zealand nematodes" *Proceedings of the Cambridge Philosophical Society 12 (5):* 363-374 (1904) [4 species proposed], and

5. "Antarctic marine free-living nematodes of the Shackleton Expedition" *Contributions to a Science of Nematology (1):* 3-33 (1914) [25 species proposed from McMurdo Sound, Ross Dependency].

Present nematologists should be aware of how their discipline has developed. They should have no doubt that N.A. Cobb was the founder of nematology in Australasia and described a range of plant feeding, bacterial feeding, predacious and marine nematodes.

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