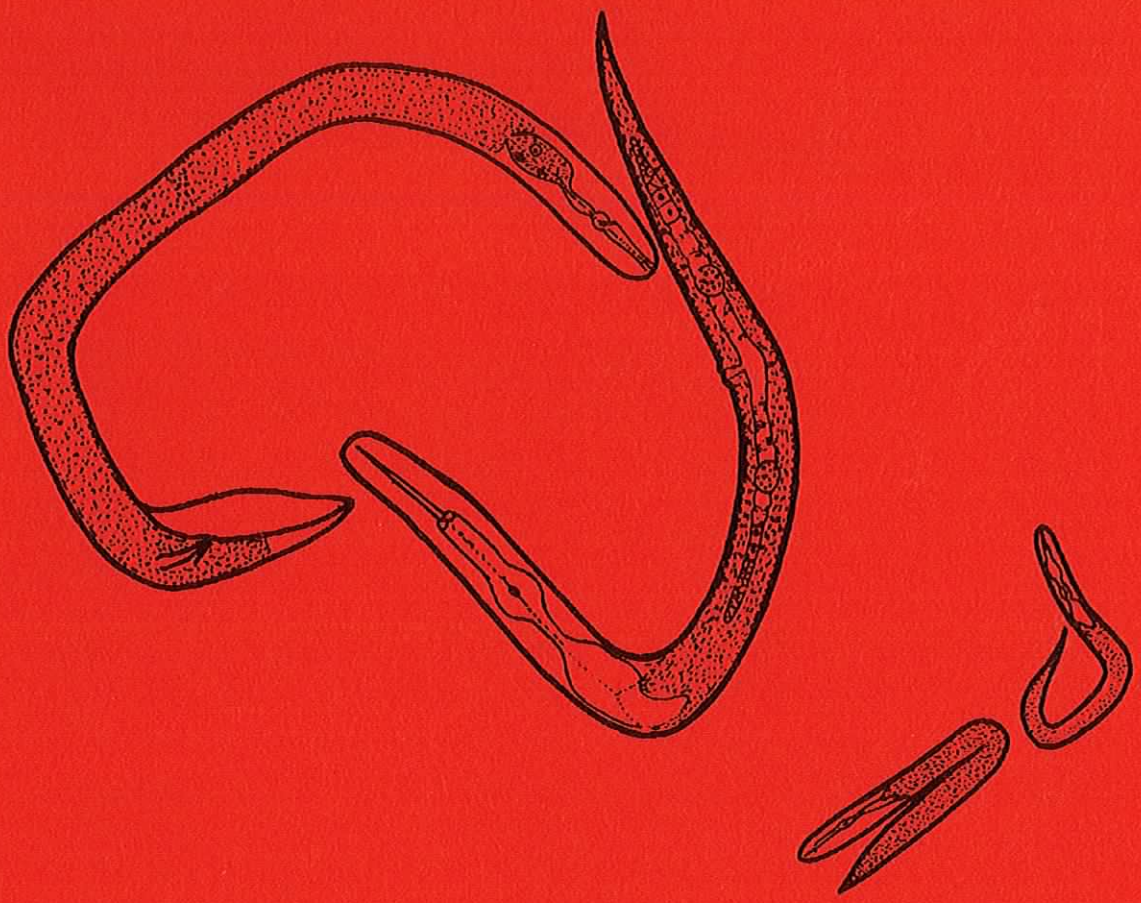
ISSN 1327-2101

AUSTRALASIAN NEMATOLOGY NEWSLETTER



Published by: **Australasian Association of Nematologists**

VOLUME 6 NO. 2 **JULY 1995**

Association News

FROM THE PRESIDENT

Arrangements for the Nematology Workshop to be held in conjunction with the APPS Conference are well advanced. This is due to the tremendous efforts of John Marshall and the generous support of our two main sponsors, NZ Institute for Crop and Food and the Rural Industries Research and Development Corporation.

I hope that we will be able to hold a short meeting of the Association during the Nematode Workshop. Prior to the New Zealand meeting, I invite all members to notify me of any issues they wish to raise so that they can be included as agenda items. Issues notified to date include:

- the scope and nature of the nematode workshop to be held with the 1997 APPS meeting in Perth (Ian Riley)
- accreditation of nematology advisory services (Graham Stirling)
- the establishment of a WWW site to provide electronic information on nematology in Australasia via Internet (John Curran).

On behalf of the Treasurer and Secretary, I'll also report on finances (healthy!) and membership (growing!).

Two years have now past since the election of the current executive of the Association and I invite nominations or expressions of interest for the following positions:

	(Current Executive)
President	*(John Curran)*
Secretary	*(Nora Galway)*
Treasurer	*(Diana Hartley)*
Newsletter Editor	*(Maria Scurrah/Sharyn Taylor/Terry Bertozzi)*
Committee Member	*(Rob Brown)*
Committee Member	*(John Marshall)*

Nominations will be presented at the meeting in Christchurch, and if necessary a subsequent postal ballot of all members will be held.

PLANT NEMATODES OF AUSTRALIA LISTED BY PLANT AND BY GENUS

We can now distribute the finished product.

If your require a copy (or copies) please complete the slip and return it to Mrs Jill Smyth, NSW Agriculture, Biological and Chemical Research Institute, PMB 10, Rydalmere NSW 2116, Australia.

There is no charge for the publication but

- Stamps to cover the postage are requested
- An address label will save us work.

Approximate postal charges for 1 copy (1 copy is 560 g) are from Rydalmere to:

Adelaide $6.25
Brisbane $6.00
Melbourne $6.00
Perth $7.50
New Zealand $17.00

Postage for multiple copies is much cheaper, for 2 or 3 copies the rates are to:

Adelaide $6.95
Brisbane $6.45
Melbourne $6.45
Perth $9.45

Postage cost depends on your post code and ours (Rydalmere 2116). So please check with your local post office.

.....

Please send me ..... copies of nematode list.

Name: .....

Address: .....

.....

.....

(If you print clearly we can use this to address your consignment).
I have enclosed stamps to the value of .....

IMPROVING, UPDATING CORRECTING

PLANT NEMATODES OF AUSTRALIA

A lot of tedious work has gone into producing the 1994 version.
The material is on disc so we feel that it would be not too difficult to produce another version in about 2 years time. Before we decide definitely to do this we would like

- Feedback as to whether you think such a project is worthwhile.
- Suggestions as to how the format or information might be improved. remembering that the formate is established and drastic change would be difficult.

To update we require notice of new information. We have set out a trial notice form. Comments or suggestions re this are invited.

This form could also be used to notify us of corrections of errors you detect in the 1994 list.

In completing the form it is very important that the information be typed or clearly printed in capitals. Equally important, all information including geographic names. should be checked in appropriate references.

R. McLeod
J. Smyth
NSW Agriculture
Biological and Chemical Research Institute
PMB 10
Rydalmere NSW 2116

F. Reay
SARDI
Plant Research Centre
Field Crops Pathology
GPO Box 397
Adelaide SA 5001

Email:reay.frances@pi.sa.gov.au

Information for entry into 1996 listing of Australian Plant Nematodes

This is: New Entry ☐ Correction ☐ (Please tick)

Nematode

Genus:.....Species:.....

Author (including year) .....
(Please check spelling in appropriate taxonomic reference)

Host

Genus:.....Species:.....

Common name(s): .....
.....

Location(s)

Locality name(s): .....
.....

State: ..... (one only on this page)

Sender: .....

Address: .....
.....
.....
.....

If published information

Author(s): ..... Year .....

Publication details (e.g. *Nematologia* **19**, 40-60)

Send to: Mrs Jill Smyth
Biological and Chemical Research Institute
RMB 10
Rydalmere NSW 2116
or Frances Reay
Email: reay,frances@pi.sa.gov.au

The Nematode Collection at the ANIC: a brief introduction

Mike Hodda[1]

CSIRO with support from GRDC are committed to the continued development and maintenance of a plant-parasitic nematode reference collection for Australia that is housed at the CSIRO Division of Entomology, Canberra. This collection will eventually cover all plant-parasitic nematode groups. It is managed and maintained within the Australian National Insect Collection (ANIC) and has links to collections within Australia as well overseas institutions such as Riverside, Wageningen, Rothamsted and the International Institute of Parasitology. It consists of:

-permanent slide mounts
-formaldehyde fixed specimens
-selected cryopreserved, living specimens
-computer database
-relevant literature, including species descriptions

It is important to emphasise that this collection will be actively studied and the information will be accessible to all researchers across Australia. This collection is curated and databased by Frances FitzGibbon while I have responsibility for identifications and overall development of the collection.

The collection has synergy with John Curran's Plant Science Centre project on molecular diagnostics with both Nora Galway and Felice Driver continuing parallel studies on genetic variation and cryopreservation of plant-parasitic nematodes.

This collection is rapidly growing and to maintain this momentum I seek further material and specimens from AAN members. If possible, the material should be in culture (so that it can be processed in identical fashion and intra-culture variation can be assessed). Original host and location records are also important to the value of the collection (see Fig.1). Species identity is a plus, but if an unknown I can identify it for you. Please feel free to contact either Frances or myself to arrange shipment of material - we can be contacted on (06) 246 4371 (Telephone) or (06) 246 4000 (Facsimile), Email mikeh@ento.csiro.au.

In addition to this plant-parasitic nematode collection, in July 1995 I commenced RIRDC commissioned research on the free-living nematode fauna of agricultural soils in Australia. The initial focus of this research is on the impact of cropping history and cultural practice on the diversity and abundance of nematodes in soils from the southern wheat belt. Many species of free-living and plant-parasitic nematode will be extracted from these soils, and many of the former will be new to science. The nematodes obtained from these studies will be identified, preserved and databased, and will become an integral part of the Nematode Collection.

From the brief introduction you can hopefully see that the Nematode Collection is rapidly expanding in both size and scope. It is available to all bona fide users and like its successful parent the ANIC it can offer additional services such as a facility for housing voucher material, as well as a home for material orphaned or no longer studied, and entire collections. There are many different arrangements under which such material can be

deposited or donated (including some that offer taxation benefits) - please contact me for further information.

I and CSIRO are committed to the further development and long-term maintenance of the ANIC Nematode Collection for the benefit of Australia. I hope you will be able to contribute to its development and avail yourself of its services.

Figure 1. Sample of Fields for the Specimen Database.

Collector	[Nicol, J.]
Date1 [03] [12] [1990]	Date2 [20] [12] [1990]
Collection Method	[bulk soil sample]
Storage Medium	[4] slide mounted
Whether Reared	[Y]
Comments	[< 100 females as founders]
Microhabitat	[clover]
Macrohabitat	[red-brown earth]
Miscellaneous Remarks	[Permanent rotation area of WARI. Cleared late 19th century. Cereal/medic rotation since 1950's. Clover planted since 1990. Extracted by Whitehead tray. P. thornei selected by J. Fisher.]

Locality	[Waite Campus]			
State/Territory/Island	[SA]	South Australia		
Country	[Australia]			
	deg	min	sec	dir
Latitude [34]	[56]	[ ]	[S]	
Longitude	[138]	[36]	[ ]	[E]
Nearest named place	[Adelaide]			
Altitude	metres:	[100.00]		
	feet:	[328.00]		
Host Data:				
Common Name	[clover]			
Genus (on label)	[ ]			
Species (on label)	[ ]			
Genus (on census)	[ ]			
Species (on census)	[ ]			
Remarks	[Reared on aseptic carrots]			

Input data is enclosed in square brackets. The most desirable information is in bold type, however any additional information is appreciated.

[1]*For those that do not know me, the following is a brief personal introduction. I studied nematology under Warwick Nicholas (ANU), concentrating on the ecology of free-living estuarine and coastal nematodes (B.Sc. and M.Sc.). I then studied terrestrial soil ecology (termites and land management) completing my Ph.D. in 1991 before moving to the British Museum to lead their work on free-living and plant-parasitic terrestrial and aquatic nematodes. There I conducted biosystematic studies of grasslands, temperate and tropical aquatic habitats, tropical forests and a sub-polar island! I returned recently to Australia, taking up my current position with CSIRO in February 1995.*

Regional News

NEWS FROM SOUTH AUSTRALIA

Change of address

Peter Georgaras has moved from Northfield to temporary labs in the new Plant Research Centre on the Waite Campus, with the Lucerne and Medic Breedinn Program. He is continuing his work on Root Knot, Stem and Root Lesion nematodes on Lucerne.

Greg Walker has moved from Loxton to the Plant Research Centre. After some years as Soils Pathologist with the Riverland horticulture group at Loxton he has joined the Field Crops Pathology Unit. The move is expected to lead to a reduced role in diagnostic plant pathology and increased opportunities for research in a range of crops. Greg can be contacted at: SARDI, Plant Research Centre, Field Crops Pathology Unit, GPO Box 397, ADELAIDE SA 5001. Phone (08) 303 9355, fax (08) 303 9393.

Research

Fergusobia/Fergusonina Galls on *Eucalyptus*

Kerrie Davies, Janine Lloyd and Gary Taylor

Department of Crop Protection, Waite Campus, The University of Adelaide.

Currie (1937; *Linn. Soc. NSW Proc.* **62**: 147) first described the relationship between the agromyzid fly *Fergusonina* and the semi-obese tylenchid nematode *Fergusobia*, which induce galls on Myrtaceae species (usually *Eucalyptus*, but also recorded on *Angophora*, *Syzigium* and *Allium*, from Australia, India and Indonesia). Fisher and Nickle (1968; *Helminth. Soc. Wash.* **35**: 40) further elucidated the life cycle of the nematode and showed it had two generations - (1) parthenogenetic females, which laid eggs in the plant gall, which gave rise to (2) male and female nematodes. After mating in the gall, the females penetrated (only) female flies, where the stylet and gut degenerated and the nematodes became sausage-shaped 'bags' of eggs. These eggs were laid in the abdomen of the fly, hatched, and were deposited with the fly eggs in the plant tissue as J2's. It seems that the nematodes use the flies as vectors for dispersal from the parent gall, and it may be that the nematodes induce the formation of the galls in which the developing fly larvae subsequently feed and develop. Outbreaks of the galls occurred in the 1930's in forests in NSW and Victoria, in such numbers that their weight caused branches to break, and they were considered a threat to the honey industry.

Our interest in this unusual nematode/fly association was stimulated when Janine Lloyd collected *Fergusobia* (probably a new species) from leaf galls on *E. leucoxylon* in 1993. Since February this year we have collected leaf and bud galls with various morphologies (large and spongy leaf galls with many cavities containing both fly larvae and nematodes, or simple thickenings of leaves, or tiny leaf bud galls with 3-5 cavities, or large leaf bud galls with in excess of 200 cavities), from 7 different species of *Eucalyptus* at 13 sites in South Australia (Table 1). The galls contained 6 species of *Fergusonina* (including one new species), and probably 5 new species of *Fergusobia*. The nematodes are small, and it will not be easy to separate the species. However, there are differences in the relaxed form of the parthenogenetic females after fixation, tail length, 'a' ratio, spicule shape, size of the parasitic females, colour etc. Males from one collection have flagellate spermatozoa, but in all other collections these were amoeboid. Nematodes are in glycerol on slides stored in the Waite Institute Nematode Collection.

We have found that galls form very rapidly in response to egg-laying by the flies, or the presence of nematodes (possibly a plant response to the nematode saliva), or both. We have dissected young galls containing fly eggs, juvenile and some parthenogenetic female nematodes, but no fly larvae. These hatch later and apparently burrow into and form cavities within the developing gall. The fly larvae are unusual in that they have a curiously shaped dorsal shield which, depending upon species, varies from a number of raised ridges or spicules to a broad plate with prominent, forward projecting spines. The purpose of these is unclear but they may be used as 'scrapers' to enlarge the gall cavity or perhaps to 'anchor' the fly larva in the gall while feeding. These shields are also present

on the dorsum of the pupae allowing identification even at this stage. Furthermore, the pupae are anchored within the interior by an adhesive substance at its posterior. In leaf bud galls the adult fly generally emerges from a tunnel cut from the gall cavity to just under the gall surface. In flower bud galls, fly emergence is apparently synchronised with the dehiscence of the operculum. The adult flies are yellow-brown sometimes with brown markings and have colourful iridescent eyes.

The *Fergusobia/Fergusonina* galls provide food and shelter for a wide range of insect parasitoids and several herbivorous inquilines. These are currently being investigated. We have also found that lorikeets feed on flower bud galls by breaking open the gall and removing the fly larvae. In February, we expected these *Fergusobia/Fergusonina* galls to be rare - now we think it's a matter of knowing where and what to look for, particularly on young foliage. Given that this is usually high up in older trees, and that few of us have access to cherry-pickers, this probably explains why we don't find these galls more often.

Table 1. Data on collections from *Fergusobia/Fergusonina* galls.

WINC	Site	*Fergusobia* stages collected and numbers mounted on slides				*Fergusonina* stages collected						*Eucalyptus* host species
		Parth. female	Male	Pre-paras. female	Paras. female	Gall	Adult	Pupa	Larva	Egg	Species	
937	Black Forest Reserve	3	4			leaf						stringybark
939	Waite arboretum	21	4			leaf	+					*albens*
-	Waite arboretum					flower bud		+			*brimble-combei*	*microcarpa*
940	Erindale	24	26	20		axial leaf bud					Currie (1937) sp. 2	*camaldulensis*
938	Wittunga	12	26	10		leaf					*evansi*	*viminalis*
815	Black Forest (Frost)	12	16	25	20	leaf	+				*evansi*	hybrid of *leucoxylon*
904	Mt Gambier	23	27		44	leaf						? hybrid of *leucoxylon*
483	Waite Road	7	40	2		stem						
905	Black Forest (tram)	5	37			terminal leaf bud						*camaldulensis*
936	Goolwa	14	27	14	16	terminal leaf bud	+	+	+	+	*lockharti*	
945	Waite car park	some				leaf					*?evansi*	
943	Waite arboretum	14	30			flower bud			+		*tillyardi*	*camaldulensis*
-	Snake Lagoon, KI					terminal leaf bud		+			sp. nov.	*cosmophylla*

Nematodes and soil processes

Gregor Yeates is continuing with a range of studies which are linked by trying to interpret, as part of overall soil processes, the effect of different land and soil management regimes on nematode faunae.

The work carried out with Alan Bird in Adelaide in 1992 where soil texture was found to be very important is relevant to nematode faunae in Welsh grasslands. With Roger Cook and Richard Bardgett of the Institute for Grassland and Environmental Research, Aberystwyth it was found there were more larger nematodes in the coarser textured soils and this affected values of the "nematode maturity index", which this seems texture sensitive. On a more positive side, at each of three soil textures grasslands which were managed organically had a greater abundance of fungal-feeding nematodes than conventionally managed grasslands. Having recently been awarded a British Council "Higher Education Link", cooperation on related topics will continue for at least another two years.

After burning of South Island snow-tussock grassland there was a substantial increase in populations of *Paratylenchus*, apparently as a results of both increased root growth and the adaptive advantage of *Paratylenchus* to the greater fluctuation of surface soil conditions after the tussock canopy is removed.

Work on the potential use of Mononchidae as easily identified indicators of "soil health" in a tillage study is drawing to a close. Surprisingly, after many years continuous cultivation for grain the mononchids actually increased in two of the four soils. From a related review it seems that populations of Mononchidae are probably more dependent on bacterial-feeding nematodes (especially Cephalobidae) than on plant-feeding species; their contribution to increased plant growth and crop yield may be more through enhancing nutrient cycling rather than by directly reducing populations of plant-feeding nematodes.

Preliminary analysis of nematode populations from turves subject to a doubling of atmospheric CO_2 shows most increases were in Adenophorea: Enoplea which accords with the doubling of *Alaimus* reported from an earlier experiment. The most marked decrease was in the bacterial-feeding *Rhabditis* (Secernentea).

As usual, each investigation raises or reinforces questions. Current bones to gnaw include texture effects (again), definition of feeding habits (still), reproductive rates (again), possible influences of mycorrhizae not only on feeding types present but also on diversity. The interaction of effective texture, temperature and moisture on the duration of activity of each nematode population is seen as a major domain for advancing understanding of the part nematodes play in soil processes.

Nematode input is continuing to various field studies on various time-scales, with soil ecologists from various other Crown Research Institutes and overseas labs. Several taxonomic studies (Longidoridae, Criconematidae, Drilonematidae, Mononchidae) await spare time.

Landcare research
Private Bag 11 052
Palmerston North, New Zealand

Completion of a Nematode Survey of Australian Lucerne Fields

Peter Georgaras

A survey of nematodes in Australian lucerne fields has recently been completed. The survey was conducted by the Lucerne Breeding Unit of the South Australian Research & Development Institute (SARDI). The results here conclude the work for the project, supplementing those originally reported previously (Georgaras *et al.*, 1992) and includes previously unpublished data from samples from production areas of Western Australia and the Adelaide Hills. The work forms part of a project studying lucerne nematodes in Australia and is funded by the Dairy Research & Development Corporation, as part of the National Lucerne Improvement Program. This project was also made possible with nationwide co-operation of interstate collaborators.

Prior to commencement of this study the plant parasitic nematodes *Ditylenchus dipsaci* and *Meloidogyne* spp. and fifteen other genera had been recorded in Australia (Khair, 1987) from a limited number of samples. The wide distribution of plant-parasitic nematodes known to be present on various agricultural crops suggested that a wide range of plant-parasitic nematodes may be associated with lucerne in Australia. The aim of the survey was to determine the presence and distribution of plant-parasitic nematodes in Australian lucerne fields with this, the first systematic and comprehensive national survey of lucerne fields in Australia.

Lucerne samples, soil cores and plant material, were taken from major lucerne producing areas of Australia. The samples covered all six states, with areas covering the tropical areas of Queensland through to the cool temperate areas of Tasmania. Soils varied through the full spectrum of soil types, from heavy clays through to extremely sandy soils. Nematodes were extracted with the use of Whitehead trays. On extraction, nematodes were concentrated with a bank of sieves (38 μm) and samples observed under a microscope.

Ten genera of plant parasitic nematodes were identified in the 65 samples taken from 40 sites across Australia (see Table for summary of data). *Pratylenchus* spp. and *Tylenchus* spp. were the most commonly occurring nematodes, found in 43 % of all samples, and over 50% of all the sites sampled. *Ditylenchus dipsaci* and *Tylenchorhynchus* spp. were the next most common plant-parasitic nematodes, present in almost 25% of all samples, followed by *Paratrichodorus* spp., *Meloidogyne* spp. and *Paratylenchus* spp. Other nematodes observed included *Criconemella* spp., *Xiphenema* spp. and *Scutellonema* spp. Also observed was the foliar nematode, *Aphelenchoides ritzemabosi*. Though not a recognised pathogen of lucerne, recent work has shown that the symptoms of *A. ritzemabosi* in lucerne are similar to those produced by *D. dipsaci* and that both nematodes may cause damage in lucerne in the coastal regions of central California (Gray *et al.*, 1994).

The widespread distribution of *Pratylenchus* spp., a recognised of lucerne overseas (Griffin, 1984), suggests its potential importance in Australian lucerne. The high frequency of other recognised plant-parasitic nematodes, like *Ditylenchus dipsaci* and *Meloidogyne* spp. indicate that these nematodes may also be significant pathogens in Australian lucerne production systems. Work is currently under way to assess the importance of these three genera of nematodes by conducting field and greenhouse experiments. This work will establish the relative importance

of the nematodes quantitatively and, thus, their relative economic importance in Australian lucerne production systems.

References:

Georgaras, P.A., Kaehne, I.D., Fisher, J.M., Lowe, K.F. and Smith, R.S. (1992) Preliminary results of a survey on the distribution of plant-parasitic nematodes in Australian alfalfa fields. *Report of the 33rd North American Alfalfa Improvement Conference, Atlanta, Georgia, USA* p. 71

Gray, F.A., William, J.L., Griffin, G.D. and Wilson, T.E. (1994) Distribution in the Western United States on alfalfa and cultivar reaction to mixed populations of *Ditylenchus dipsaci* and *Aphelenchoides ritzemabosi*. *Journal of Nematology* **26:** 705-719

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

Khair, G.T. (1987) *List of Plant Parasitic Nematodes of Australia.* 3rd Edition. Australian Government Publishing Service

South Australian research and Development Institue
Plant Research Centre
GPO 397 Adelaide

Australian Lucerne Nematode Survey

Summary of Data

Nematode Genera (See below)

Site	State	Samples	1	2	3	4	5	6	7	8	9	10
			Number of samples containing nematodes									
Innot Hot Springs	Qld	2	1	0	0	0	0	0	0	0	1	2
Biloela	Qld	2	2	0	0	0	0	0	0	0	1	0
Monto	Qld	3	1	2	2	0	0	1	0	0	0	1
Booubyjan	Qld	2	0	0	1	1	0	0	0	0	2	2
Gatton	Qld	1	0	0	0	0	0	0	0	1	0	0
Mudtapilly Res.Stn.	Qld	2	0	0	1	1	1	0	0	0	1	0
Harrisville	Qld	1	0	0	0	0	0	0	1	0	0	0
Tamworth	NSW	1	1	0	0	0	0	0	1	0	0	0
Aberdeen	NSW	1	1	0	0	0	1	0	1	0	0	1
Muswellbrook	NSW	1	1	1	0	1	1	1	1	0	0	0
Mudgee	NSW	1	1	0	0	0	1	0	0	1	0	0
Wellington	NSW	1	1	0	0	1	0	0	1	1	0	0
Cowra	NSW	1	1	0	0	0	1	1	1	0	0	0
Crowther	NSW	1	0	0	0	0	0	0	0	1	0	0
Coolac	NSW	1	0	1	0	0	0	0	0	1	0	0
Nambrok	Vic	1	0	0	0	1	0	0	0	0	0	0
Bealiba	Vic	1	0	0	0	0	1	0	0	1	0	0
Natte Yallock	Vic	1	0	0	0	0	0	0	0	1	0	0
Gumeracha	SA	1	1	0	0	0	0	0	0	1	0	0
Houghton	SA	1	1	0	0	0	0	0	0	0	0	0
Clare	SA	1	0	0	0	1	0	0	0	1	0	0
Ponde	SA	2	2	0	0	0	0	0	0	0	0	0
Mannum	SA	3	3	2	1	0	0	0	0	1	0	0
Mount Gambier	SA	2	2	1	0	0	0	0	0	1	1	0
Naracoorte	SA	2	1	1	0	0	1	0	0	1	0	0
Meningie	SA	5	0	0	0	0	1	0	0	1	3	0
Langhorne Creek	SA	5	1	1	1	2	4	1	0	1	3	0
Wall Flat	SA	2	2	0	0	0	1	0	1	0	0	1
Jacup	WA	2	0	0	0	0	0	0	1	1	0	0
Pingrup	WA	1	0	0	0	0	0	0	0	1	0	0
Broomehill	WA	1	0	0	0	0	0	0	0	1	0	0
Katanning	WA	1	0	0	0	0	0	0	0	1	0	0
Kojonup	WA	1	0	0	0	0	0	0	1	0	0	0
Longford	Tas	1	1	0	0	0	0	0	0	1	0	0
Campbell Town	Tas	3	2	1	1	1	1	0	2	2	1	0
Ross	Tas	1	1	0	0	1	0	0	0	1	0	0
Swansea	Tas	3	0	0	0	0	1	0	3	3	0	0
Apsley	Tas	1	1	0	0	0	1	0	0	1	0	0
Kenilworth	Tas	1	0	0	1	0	0	0	1	1	0	0
Cranbrook	Tas	1	0	0	0	0	0	0	1	1	0	0

1 *Pratylenchus*
2 *Meloidogyne*
3 *Criconemella*
4 *Paratylenchus*
5 *Ditylenchus dipsaci*
6 *Scutellonema*
7 *Tylenchorhychus*
8 *Tylenchus*
9 *Paratrichodorus*
10 *Xiphenema*