

# REPORT ON "LEAF SCORCH" OF COCONUT

By DAVID ROBERTSON

Agricultural Zoology Department,  
North Scotland College of Agriculture,  
Aberdeen, Scotland.

## 1. Events leading up to appointment of Colombo Plan Nematologist.

From the notes prepared by Mr. Kirthisinghe of the Coconut Research Institute, Ceylon on the experimental work carried out by the Crop Protection Department from 1956 to 1965 it was observed that the nematode *Hemicycliophora longicaudata* (now renamed *Caloosia longicaudata*)\* was found associated with the roots of coconut palms showing symptoms of "Leaf Scorch".

Mr. Ekanayake, head of the Crop Protection Department reported his findings in a paper read at the 20th Annual Session of the Ceylon Association for the Advancement of Science, September 1964. In his report he stated that "this nematode has been isolated from the roots of diseased coconut palms in the area, but whether it is the primary cause of the symptoms observed or whether some nutritional disorders are caused by the presence of the nematodes in the roots needs to be studied".

Mr. Rhind of the Ministry of Overseas Development, U.K., on receiving Mr. Ekanayake's report was "inclined to believe that the best line of investigation to pursue would be that of nematology".

I was subsequently appointed Nematologist to be attached to the Coconut Research Institute for a period of 3 months, (8th Jan., to 1st April 1965) and, if necessary, remain in Ceylon for 4 months if the project had not been completed.

## 2. Plan of investigations for Isolation of Nematodes in Soil and Roots of affected and unaffected Palms.

The Gonapinuwela area was visited on 25th—27th January 1965, and samples of soil and roots from affected and unaffected palms were transported to the C.R.I. for examination. Subsequent examination of the roots of affected palms under the dissecting microscope clearly indicated that the nematode *Caloosia longicaudata* was not involved in the condition of "Leaf Scorch" and as the Estates and Experimental Committee of the Coconut Research Board had a meeting at the C.R.I. on 7th February, 1965, I took the opportunity of tentatively stating my findings so that the heads of departments could go ahead with their own researches in the knowledge that nematodes were not involved.

I should mention here that when the examination of the soil and root samples was completed on 24th February, not one specimen of *Caloosia longicaudata* was found in the roots, and only on 5 occasions in the soil.

Having established that "Leaf Scorch" was not due to a nematode it was suggested that I should discuss the problem with those heads of departments who were already engaged on the problem.

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\* NEMATOLOGICA 9 (1963) : 363-377.

I suggested that a useful approach would be to find out to what extent "Leaf Scorch" was present in Ceylon and the areas where it was most prevalent.

This meant calling all the Advisory Field Officers to the C.R.I., and giving them first hand instructions on the recognition of "Leaf Scorch" symptoms. Accordingly all 25 Advisory Field Officers met at the C.R.I. on 11th February and after showing them coloured slides and specimens of affected palms each officer was given a questionnaire, with instructions that it should be completed and returned by the end of April 1965 after a careful survey of 10,000 acres of the area had been made.

### 3. Results of Investigations.

Table I shows the nematode counts from soil near affected and unaffected palms ; Table II from large roots and Table III from small roots of affected and unaffected palms.

The most striking result of the root examinations of affected palms is the complete absence of *Caloosia longicaudata*. In the 18 samples of soil, it appeared 5 times in very small numbers, 4 times in soil from affected palms and once in soil from unaffected palms. It can be concluded, therefore, that *Caloosia longicaudata* is not associated with the condition of "Leaf Scorch".

In regard to the other species of nematodes in 12 mm. and 2 mm. diameter roots, very large numbers of both spear-bearing and saprophytic species were found. Table IV shows a list of these in order of decreasing importance.

TABLE IV

Showing Genera of Spear-bearing and Saprophytic Nematodes found in Coconut Palm Roots.	
<i>Spear-bearing</i>	<i>Saprophytic</i>
<i>Aphelenchus</i> sp. <i>Aphelenchoides</i> sp. <i>Ditylenchus</i> sp. <i>Tylenchus</i> sp.	<i>Rhabditis</i> sp. <i>Acrobeloides</i> sp.

Of the spear-bearing species approximately 90% were *Aphelenchus avenae*\* and *Aphelenchoides Parietinus*\*. Both species are well known fungus feeders and in both cases the majority of the specimens recovered were larvae.

The majority of the saprophytic species recovered belonged to the genus *Rhabditis*.

The large number of fungus feeding nematodes can be explained by the fact that old palms have a considerable portion of their root system in a decaying or decayed condition with several species of fungi present.

The fungus feeding nematodes enter the decaying roots and are able to survive and possibly multiply in view of the higher degree of moisture present. When extracted by the Baermann-Funnel and left in a watch glass for some hours it was interesting to observe the nematodes feeding vigorously on the fungi present.

\* Identification confirmed by Professor Gerald Thorne, U.S.A.

**TABLE I**  
**Nematode Counts**

SOIL										
ESTATE	Sample No.	Near affected palms				Near unaffected palms				
		Spear-bearing	Saprophytic	Predaceous	<i>Caloosia longicaudata</i>	Sample No.	Spear-bearing	Saprophytic	Predaceous	<i>Caloosia longicaudata</i>
Kirimetiya	N 1	8	0	0	4	N 2	16	28	4	0
	N 3	36	16	4	0	N 4	0	8	0	0
	N 5	4	12	0	0	N 6	4	20	0	0
	Total	48	28	4	4	—	20	56	4	0
	Average	16.0	9.3	1.3	1.3	—	6.7	18.7	1.3	0
Fred's Rhue 'C'	N 1	84	84	0	8	N 2	0	4	0	0
	N 3	28	20	0	0	N 4	148	48	0	8
	N 5	100	16	0	0	N 6	68	56	4	0
	Total	212	120	0	8	—	216	108	4	8
	Average	70.7	40.0	0	2.7	—	72.0	36.0	1.3	2.7
Anasigala Farm	N 1	40	40	0	12	N 2	56	0	0	0
	N 3	68	36	0	0	N 4	52	0	0	0
	N 5	36	36	0	8	N 6	16	8	0	0
	Total	144	112	0	20	—	124	8	0	0
	Average	48.0	37.3	0	6.7	—	41.3	2.7	0	0
Total of all samples		404	260	4	32	—	360	172	8	8
Av. of all samples		44.9	28.9	0.4	3.6	—	40.0	21.3	0.9	0.9

**TABLE II**  
**Nematode Counts**

ROOTS—Large approx. 12 mm. diameter										
ESTATE	Sample No.	From affected palms				From Unaffected palms				
		Spear-bearing	Saprophytic	Predaceous	<i>Caloosia longicaudata</i>	Sample No.	Spear-bearing	Saprophytic	Predaceous	<i>Caloosia longicaudata</i>
Kirimetiya	N 1	0	0	0	0	N 2	0	108	0	0
	N 3	52	0	0	0	N 4	40	8	0	0
	N 5	8	0	0	0	N 6	96	28	0	0
	Total	60	0	0	0	—	136	144	0	0
	Average	20.0	0	0	0	—	45.3	48.0	0	0
Fred's Rhue 'C'	N 1	1040	584	0	0	N 2	616	96	0	0
	N 3	144	20	0	0	N 4	1152	360	0	0
	N 5	2100	196	0	0	N 6	356	20	0	0
	Total	3284	800	0	0	—	2124	476	0	0
	Average	1094.6	266.6	0	0	—	708.0	158.6	0	0
Anasigala Farm	N 1	3828	360	0	0	N 2	128	12	0	0
	N 2	1396	108	0	0	N 4	432	20	0	0
	N 5	4464	964	0	0	N 6	728	76	0	0
	Total	9688	1432	0	0	—	1288	108	0	0
	Average	3229.3	477.3	0	0	—	429.3	36.0	0	0
Total of all samples		13032	2232	0	0	—	3548	728	0	0
Av. of all samples		1448.0	248.0	0	0	—	394.2	80.8	0	0

**TABLE III**  
**Nematode Counts**

ROOTS—Small, approx. 2 mm. diameter										
ESTATE	Sample No.	From affected palms				From unaffected palms				
		Spear bearing	Saprophytic	Predaceous	Caloosia longicaudata	Sample No.	Spear-bearing	Saprophytic	Predaceous	Caloosia longicaudata
Kirimetiya	N 1	8	0	0	0	N 2	0	4	0	0
	N 3	56	0	0	0	N 4	36	20	0	0
	N 5	96	16	0	0	N 6	252	60	0	0
	Total	160	16	0	0	—	288	84	0	0
	Average	53.3	5.3	0	0	—	96.0	28.0	0	0
Fred's Rhue 'C'	N 1	1100	404	8	0	N 2	1024	336	0	0
	N 3	236	24	0	0	N 4	324	52	0	0
	N 5	716	100	0	0	N 6	632	72	0	0
	Total	2052	528	8	0	—	1980	460	0	0
	Average	684.0	176.0	2.6	0	—	660.0	153.3	0	0
Anasigala Estate	N 1	1344	68	0	0	N 2	340	24	0	0
	N 3	956	68	0	0	N 4	1448	80	0	0
	N 5	3060	660	0	0	N 6	1180	104	0	0
	Total	5360	796	0	0	—	2968	208	0	0
	Average	1786.6	265.3	0	0	—	989.3	69.3	0	0
Total of all samples		7572	1340	8	0	—	5236	752	0	0
Av. of all samples		841.3	148.8	0.8	0	—	581.7	83.5	0	0

From the soil specimens the following genera were occasionally found :—*Xiphenema* sp., *Radopholus* sp., *Tylenchorhynchus* sp., *Trichodorus* sp., and *Helicotylenchus* sp. None of these, however, was found in the roots of affected or unaffected palms.

#### **4. Visit to Tea Research Institute, St. Coombs, Talawakelle—and training of Messrs Kirthisinghe and Wickramaratne in Mycology and Nematology.**

Since the T.R.I. possesses a plant pathologist who has specialised in Mycology and also a collection of prepared slides of various species of plant parasitic nematodes, it was decided that I should complete my assignment by taking these two officers to the T.R.I., for further instruction. The visit was put on an official basis and I am grateful to Dr. Chenery, the Director, for his kind assistance and to Dr. Allan Kerr, Plant Pathologist for giving so much of his time in supervising their studies.

#### **5. Acknowledgements.**

I should like to express my sincere thanks to the staff of the C.R.I. for their co-operation in my work on " Leaf Scorch ", and to those members of the Board who invited me to visit their estates. I am particularly indebted to Mr. Carl T. Van Geysel, J.P., for the many times he fetched me to see the results of his efforts to increase the yield of coconuts on various estates under his supervision, one of which enjoys probably the highest yield in the world.