Nematol. medit. (1988), *16*: 175-177

Plant Pathology Division, Ministry of Agriculture, Reduit, Mauritius
and
Istituto di Nematologia Agraria C.N.R., 70126 Bari, Italy

LOSSES CAUSED BY CONCOMITANT INFESTATIONS OF *CRICONEMELLA ONOENSIS* AND *HELICOTYLENCHUS DIHYSTERA* ON UPLAND RICE IN MAURITIUS

by
M. Chinappen, F. Lamberti, A. Ciancio and P. Jokhun

Summary. Initial populations of *Criconemella onoensis* as high as 4200 and of *Helicotylenchus dihystera* as high as 1400 nematodes/litre of soil greatly reduced (between 63 and 72%) paddy yield of rice in Mauritius. Populations of *C. onoensis* increased during the experiment, except for the control plots, while those of *H. dihystera* decreased in the same period. There were significant positive correlations between nematode densities at harvest and yields indicating that the nematodes reproduced more on better growing plants.

In 1984, un upland rice field at the Experimental Station of the Ministry of Agriculture at Curepipe, Mauritius, showed symptoms of severe decline i.e. patches of stunted plants with etiolated leaves. Soil sampling showed the presence of *Criconemella onoensis* (Luc) Luc *et* Raski and *Helicotylenchus dihystera* (Cobb) Sher at mean population densities of 200 and 600 nematodes/100 ml soil, respectively; no nematodes were detected in root and stem samples. As both species have been reported to damage rice in different parts of the world (Hollis and Keoboonrueng, 1984; Prasad *et al.*, 1987) an experiment was undertaken in 1985-86 to ascertain the losses caused to rice by these nematodes in field conditions in Mauritius.

Materials and methods

The field in which the experiment was located was a heavy clay soil (40% clay approx). The experimental lay out was a randomised block with 2x2m plots and the following 6 treatments: 1) fumigation with D-D at 250 l/ha, 2) aldicarb, 10 kg a.i./ha, 3) prophos, 20 kg a.i./ha, 4) fenamiphos, 10 kg a.i./ha, 5) carbofuran, 10 kg a.i./ha, 6) untreated control. D-D was applied with a hand injector gun into 30 cm spaced holes on 16 September 1985; other treatments were broadcast and incorporated into the soil to a depth of 10-12 cm on 14 October 1985. All of the plots were then sown at a rate equivalent to 100 kg/ha with the Chinese rice (*Oryza sativa* L.) cv. Kwang ER-1 in rows 25 cm apart. The seed was treated with 0.5 g benlate/kg seed before sowing and the plots were sprayed fortnightly with topsin for the control of blast disease; weeding was done by hand monthly from November 1985 to February 1986.

The density of the populations of nematodes was ascertained before the various treatments had been applied by taking soil samples at random in the experimental area and extracting nematodes from 100 ml aliquots by means of the modified Baermann funnel method. The mean population densities were 4200 *C. onoensis* and 1400 *H. dihystera* per litre of soil. The nematode numbers in each plot were ascertained again by taking twenty soil cores from each plot and extracting the nematodes from five 100 ml aliquots on 7 January when the crop was at the flowering stage, then at 3 months after sowing, and at harvest on 27 February, 1986, when paddy and straw weights also were recorded from the central 2 sq. m of each plot.

Data were analysed and means were compared using Duncan's multiple range test. Coefficients of correlation were calculated for the relationship between nematode population density and yield.

Results and discussion

Paddy yields were increased by all nematicides treatments ($P = 0.01$), but there were no differences between treatments (Table I). Straw production was also increased by the treatments ($P = 0.01$), except fenamiphos. The populations of both species of nematodes had been drastically reduced in all treatments when the plots were sampled in January, but thereafter the numbers of *C. onoensis* increased (except in the control plots) whereas the numbers of *H. dihystera* continued to decline . By the end of the experiment the population densities of *H. dihystera* were

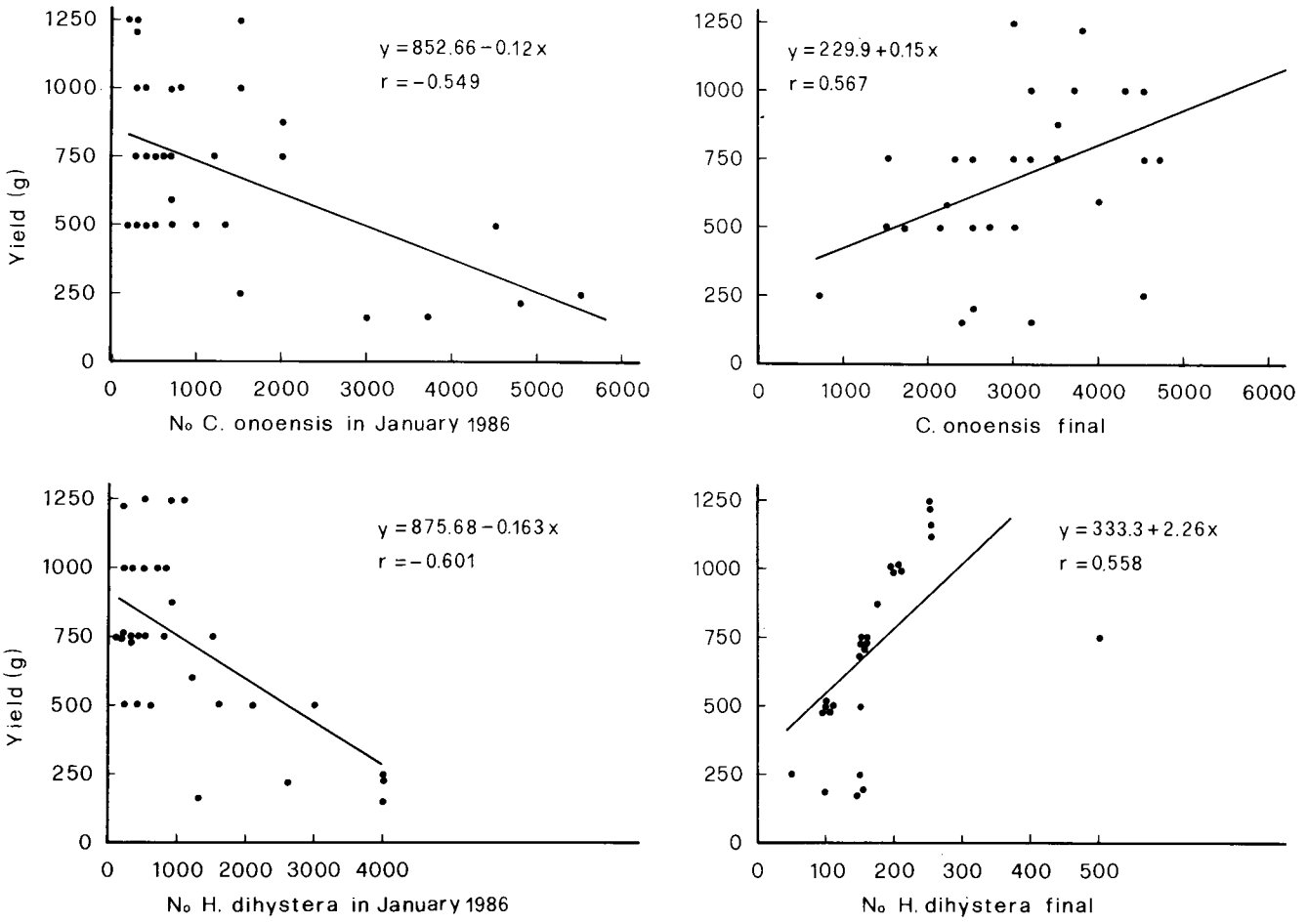

Fig. 1 - *Correlation between populations densities of* Criconemella onoensis *(top) and* Helicotylenchus dihystera *(bottom) and paddy yield; for all r is statistically significant at 0.001 level.*

TABLE I - *Effect of nematicidal treatments on nematode population in the soil and paddy yield.*

Treatment	Doses	Nematodes/litre soil				Yield on 2 sq.m	
		C. onoensis		*H. dihystera*			
		7 Jan 1986	Final population	7 Jan 1986	Final population	Paddy g	Straw kg
D-D	250 l/ha	617A	2917ab	667A	150a	741A	15.8A
Aldicarb	10 kg a.i/ha	250A	3000ab	850A	154a	771A	14.6A
Fenamiphos	10 kg a.i/ha	383A	2517a	283A	192a	667A	9.5B
Prophos	20 kg a.i/ha	733A	3900bc	633A	183a	917A	15.0A
Carbofuran	10 kg a.i/ha	450A	4267c	650A	183a	892A	15.2A
Control		3833	2463a	3133	125a	250	5.6B

N. B.: Data flanked on the columns by the same letters are not statistically different, small letters for P = 0.05; capital letters for P = 0.01.

higher in all of the treatments than in the control plots (Table I). Populations of *C. onoensis* were significantly higher in the prophos and carbofuran treatments than in the other treatments and the control. At first post-treatment sampling in January 1986 the densities of both *C. onoensis* and *H. dihystera* had been much reduced in all treatments, compared with the control, but there were no differences between the treatments (P = 0.01) (Table I). Population densities were negatively correlated with rice yields (Figure 1), indicating the detrimental effect of both nematodes. The effects of the two species cannot be separated on the basis of these data; but it is assumed that since populations of *C. onoensis* remained high throughout the duration of the experiment this species was responsible for most of the yield loss; moreover it occurred in much higher densities than *H. dihystera* which had declined considerably by the end of the trial. Significant positive correlations between final population densities and yield (Fig. 1) indicate that the nematodes reproduced more on better growing plants and this appears especially true for *C. onoensis*.

Literature cited

HOLLIS J.P., Jr. and KEOBOONRUENG S., 1984 - Nematode parasites of rice, pp. 95-146. In *Plant and Insect Nematodes*, (W.R. Nickle, Ed.) New York and Basel: Marcel Dekker.

PRASAD J.S., PANWAR M.S. and RAO Y.S., 1987 - Nematode problems of rice in India. *Tropical Pest Management*, *33*: 127-136.

Accepted for publication on 31 May 1988.