Nematol. medit. (1995), 23: 61-64

Department of Crop Production, University of Ilorin, Nigeria

THE EFFECTS OF TWO CROP RESIDUES ON NEMATODES IN COWPEA CULTIVATION

by
E. E. A. OYEDUNMADE, J. O. BABATOLA and T. I. OLABIYI

Summary. Two years of field trials were carried out to assess the effectiveness of two crop residues (*Parkia clappertoniana* husks and *Cola nitida* pods) in plant-parasitic nematode control. The two rates (0.5 and 1 ton/ha each) of the crop residues gave some measure of nematode control in cowpea and improved the growth and yield of the crop. Treatment with 1 ton/ha of *C. nitida* pods gave the best control of three major nematode pests of cowpea.

The increasing costs of pesticides (particularly in developing countries such as Nigeria) renders it imperative to develop alternative cheaper and effective methods for the control of pests and diseases.

Several investigators have reported a reduction in the population level of plant-pathogenic nematodes following the addition of crop residues to the soil (Babatola, 1986 and 1989; Egunjobi and Olaitan, 1986).

Out of the wide range of crop residues readily available in Nigeria, only a few have been tested for their effectiveness in nematode control (Babatola, 1986, 1989). This study was therefore conducted to evaluate the effectiveness of two crop residues; *Parkia clappertoniana* Keay husks and *Cola nitida* (Vent) Schott Endl. pods in nematode control on cowpea. [*Vigna unguiculata* (L.) Walp.].

Materials and methods

The experiment was conducted for two consecutive years (1989 and 1990) on plant-parasitic nematode infested fields (Table III), measuring 400 m^2 each divided into 5 blocks of 4 plots each according to a randomised complete block design. Alleys measuring 1 m wide were left in between plots to prevent treatment interaction.

Cowpea seeds (cv. TVX 3236) were sown four seeds per stand and two rows per ridge, at a spacing of 20 cm within the row. After the plants were established (three weeks after planting) they were thinned to two healthy seedlings per stand.

Parkia husks and kolanut pods were sun-dried and ground to a fine powder using hammer and attrition mills. Each of the two crop residues were applied at the rates of 0.5 and 1 ton/ha by banding along the ridges five weeks after planting. Control plots were left untreated. The usual agronomic practices of weeding and insect control were carried out on all the plots.

Soil samples from the fields were collected randomly at planting and harvesting. The nematodes in the soil samples were extracted by the modified Baermann's funnel method using 200 ml soil samples. Nematodes in each sample were counted under a stereoscopic microscope.

The following growth and yield parameters were collected from the experimental plants; 50% flowering date, number of pods, number of seeds/pod, weight of unthreshed pods, threshing percentage and grain yield per plot. The roots were assessed for galls using a rating scheme of 0-5 where 0 = no infection, 1 = 1-5% of roots galled, 2 = 6-25% of roots galled, 3 = 26-50% of roots galled, 4 = 50-75% of roots galled and 5 = 76-100% of roots galled.

Analysis of variance was carried out on all the parameters collected and where appropriate the means were separated using Duncan's Multiple Range Test.

Results and discussion

The effects of the different treatments on mean 50% flowering date, mean number of pods/plant and seeds/pod are shown in Table I. The results obtained for the two years followed a similar pattern. Plants treated with 1 ton/ha each of parkia husks or kolanut pods reached 50% flowering earlier than the other plants. 50% flowering was earlier in the treated plants than in the control plants. Number of pods/plant and number of seeds/pod were highest in the plants treated with 1 ton/ha of kolanut pod. All treatments resulted in higher number of pods/plant

TABLE I - *Effects of crop residues on 50% flowering date, pod number/plant and number of seeds/pod.*

Treatment	Mean 50% flowering date (days after sowing)		Mean pod number/plant		Mean number seeds/pod	
	1989	1990	1989	1990	1989	1990
0.5 ton/ha of Parkia husk	51ab	54bc	10.3b	19.3b	10.5b	13a
1 ton/ha of Parkia husk	49a	50a	12.0c	20.8bc	12.0c	13.8ab
0.5 ton/ha of Kolanut pod	51ab	52ab	9.3ab	21.3c	11.3cd	13.6ab
1 ton/ha of Kolanut pod	49a	50a	15.0d	24.8d	12.5d	14.5c
Control	53b	56c	8.3a	18.1a	8.8a	12.6a

N.B.: means followed by different letters in the same column are statistically different (P = 0.05).

TABLE II - *Effects of crop residues on some yield parameters of cowpea plants.*

Treatment	Mean weight of unthreshed pods (kg)		Threshing %		Grain yield per plot (kg)	
	1989	1990	1989	1990	1989	1990
0.5 ton/ha of Parkia husk	3.3b	5.2b	76.9b	69.2b	1.0b	2.3b
1 ton/ha of Parkia husk	3.6bc	5.1b	78.2b	71.2b	1.0b	2.6c
0.5 ton/ha of Kolanut pod	3.5bc	5.7b	74.9b	71.7b	1.1b	2.5bc
1 ton/ha of Kolanut pod	4.0c	7.8c	78.0b	70.4b	1.5c	2.9d
Control	2.7a	3.8a	71.6a	64.3a	0.7a	1.7a

N.B.: means followed by different letters in the same column are statistically different (P = 0.05).

TABLE III - *Nematode population from 200 g of soil at planting (initial population) and at harvest (final population).*

Treatment	*Meloidogyne* sp.				*Helicotylenchus* sp.				*Pratylenchus* sp.			
	Initial Population		Final Population		Initial Population		Final Population		Initial Population		Final Population	
	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990
0.5 ton/ha of Parkia husk	445	121	56ab	156	38	38	84b	66b	30	47	59ab	56
1 ton/ha of Parkia husk	306	197	387ab	164	32	30	71ab	87c	20	32	47b	41
0.5 ton/ha of Kolanut pod	462	119	569ab	183	43	34	97b	69bc	26	29	76b	62
1 ton/ha of Kolanut pod	418	135	296a	152	29	30	51a	46a	25	32	46a	44
Control	462	116	608b	143	42	28	93b	96c	33	34	81b	48
	NS	NS		NS	NS	NS			NS	NS		NS

N.B.: means followed by different letters in the same columns are statistically different (P = 0.05).

than control. Similarly the number of seeds/pod was lowest in the control plants.

In the 1990 trial, weight of unthreshed pods and grain yield of the plants treated with 1 ton/ha of kolanut pods were superior to those recorded for the other treatments (Table II). In the 1989 trial, the differences observed in the weight of unthreshed pods and grain yield were not significant between treated plots though they were higher than what was observed for the control.

The crop residue-treatments did not result in any difference in the shelling percentage among the treatments but treated plants had higher shelling percentages than the control plants.

The genera of nematodes observed were *Meloidogyne*, *Helicotylenchus* and *Pratylenchus*, with *Meloidogyne* sp. being the most numerous (Table III). No significant differences were observed between the nematode populations at planting in either year. Final nematode populations in 1989 differed significantly with the control plots having more nematodes than treated plots, but in 1990, there was no significant difference in the final nematode populations except for *Helicotylenchus* sp.

TABLE IV - *Effects of Crop residues on root galling index.*

Treatment	1989	1990
0.5 ton/ha of Parkia husk	4.2c	1.9c
1 ton/ha of Parkia husk	3.0b	0.8b
0.5 ton/ha of Kolanut pod	4.9c	0.9b
1 ton/ha of Kolanut pod	1.9a	0.4a
Control	5.0c	2.9d

N.B.: means followed by different letters in the same column are statistically different (P = 0.05).

Galling was less severe in 1990 than in 1989 (Table IV). This may be due to the lower initial *Meloidogyne* population during the 1990 trial. Plants treated with 1 ton/ha of kola pods had the least galls while the control plants had the most.

The results indicate that powdered *C. nitida* pods could provide an effective control of plant parasitic nematodes attacking cowpea.

Literature cited

BABATOLA J. O., 1986. Pathogenicity of root-knot nematode *Meloidogyne incognita* on *Capsicum annum* and attempts to field control. Proc. 8th Ann. Conf. of Hortson, Ibadan, Nigeria, 9th - 12th Nov., 1986.

BABATOLA J. O., 1989. Effects of some organic manures on nematodes in tomato cultivation. *Pakistan J. nematol.*, 7: 39-46.

EGUNJOBI A. O. and OLAITAN J. O., 1986. Response of *Meloidogyne incognita* infected cowpea *Vigna unguiculata* (Ife Brown) to some agro waste soil amendments. *Nematropica*, *16*: 33-43.

Accepted for publication on 13 December 1994.