MUCUNA PRURIENS AND OTHER ROTATIONAL CROPS FOR CONTROL OF *MELOIDOGYNE INCOGNITA* AND *ROTYLENCHULUS RENIFORMIS* IN VEGETABLES IN POLYTUNNELS IN MARTINIQUE

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ABSTRACT

Quénéhervé, P., P. Topart, and B. Martiny. 1998. *Mucuna pruriens* and other rotational crops for control of *Meloidogyne incognita* and *Rotylenchulus reniformis* in vegetables in polytunnels in Martinique. Nematropica 28:19-30.

Two experiments were conducted in 1994 in Martinique to compare the efficacy of short-term rotations on the population decline of *Meloidogyne incognita* and *Rotylenchulus reniformis* associated with vegetables and various plants. Tomato, weeds, *Tagetes erecta, Mucuna pruriens* cv. *utilis* or *Brachiaria decumbens* were grown, or soil was left in clean fallow, for a three-month period just before planting a crop of lettuce. For *M. incognita,* the greatest population decline was observed after *M. pruriens* and *T. erecta* (87% for both crops), while *R. reniformis* declined most after *M. pruriens* (86%). The leguminous forage plant, *M. pruriens* exhibited the best vegetative growth, soil coverage and weed competivity. The use of *M. pruriens* cv. *utilis* as a rotation crop may provide a practical and environmentally safe means for growers to suppress population densities of both *M. incognita* and *R. reniformis* prior to the cultivation of susceptible short-term vegetable crops.

Key words: Brachiaria decumbens, leguminous forage crop, Martinique, *Meloidogyne incognita, Mucuna pruriens,* polytunnels, rotation crop, *Rotylenchulus reniformis, Tagetes erecta,* vegetables.

RESUMEN

Quénéhervé, P., P. Topart y B. Martiny.1998. *Mucuna pruriens* y otros cultivos rotacionales, para el control de *Meloidogyne incognita* y *Rotylenchus reniformis* en hortalizas, en polituneles en Martinica. Nematropica 28:19-30.

Dos experimentos fueron realizados durante 1994 en Martinica para comparar la eficiencia de rotaciones a corto plazo, en el declinamiento poblacional de *Meloidogyne incognita* y *Rotylenchus reniformis* asociados con vegetales y otras plantas. En los mismos se emplearon; suelo barbecho antes de plantar un cultivo de lechuga, y tomate, malezas, *Tagetes erecta, Mucuna pruriens* cv. *utilis* o *Brachiaria decumbens,* los que se dejaron crecer por un periodo de tres meses. El mayor declinamiento de la población de *M. incognita,* fue observado después de *M. pruriens* o *T. erecta* (86.7 y 86.6%), lo que ocurrió para *R. reniformis* después de *M. pruriens* (85.9%). La leguminosa forrajera *M. pruriens,* mostró el mejor crecimiento vegetativo, cobertura del suelo y competitividad con malezas. El uso de *M. pruriens* cv. *utilis* como un cultivo rotacional, pudiera proveer a los agricultores con una vía práctica y ambientalmente segura, para deprimir las densidades poblacionales de ambos, *M. incognita* y *R. reniformis* antes del cultivo de hortalizas de corto plazo, susceptibles.

Palabras claves: Brachiaria decumbens, leguminosas forrajeras, Martinica, *Meloidogyne incognita, Mucuna pruriens,* polituneles, rotación de cultivos, *Rotylenchulus reniformis, Tagetes erecta,* hortalizas.

INTRODUCTION

In the Lesser Antilles, particularly in the islands of Martinique and Guadeloupe, farmers increasingly grow fresh vegetables in large plastic polytunnels, due to the continuous market demand and the possibility of heavy rainy seasons and strong winds (Rault, 1988). This new cultural practice results in rapid crop turn-over and permits nearly continuous cropping. However, conditions in polytunnels are highly favorable for the increase of pests and pathogens, including nematodes (Hostachy *et al.*, 1991; 1994). Root-knot nematodes (*Meloidogyne* spp.) and reniform nematodes (*Rotylenchulus reniformis*) are the two prominent genera associated with vegetable crops in Martinique and Guadeloupe, often occurring in mixed populations. These nematodes are highly polyphagic, reproducing on many crops as well as weeds (Anwar *et al.*, 1992; Quénéhervé *et al.*, 1995). Although nematode control is only practiced occasionally in vegetable crops grown in the field, it is becoming a routine requirement in plastic polytunnels.

Because the use of nematicides is becoming restricted and the use of resistant cultivars is not always feasible for controlling nematodes, there is an urgent need for alternative control methods such as the use of rotation crops. There are many examples of nematode management practices that use diverse non-hosts or plants antagonistic to *Meloidogyne* spp. (McSorley *et al.*, 1994; Trivedi and Barker, 1986). In the Caribbean islands, it is often necessary to control both root-knot and reniform nematodes simultaneously. Therefore, we looked for a short-season, rapidly growing, rotation crop (three months maximum) that is compatible with the farmer's technical constraints, and that will reduce both root-knot and reniform nematode populations in soil. In this study, we present preliminary results on the host suitability to *M. incognita* and *R. reniformis* of several plants including *Mucuna pruriens* var. *utilis*, a leguminous forage crop, earlier known by different names [velvetbean, *Styzolobium aterrimum* Piper and Tracy, *Mucuna aterrima* (Piper and Tracy) Holland, *Mucuna deeringiana* (Bort) Merrill., *Stizolobium deeringianum* (Bort)], and the potential use of these plants as rotation crops in Martinique.

MATERIALS AND METHODS

Two experiments were conducted in Martinique to compare the effect of diverse rotation crops on the population densities of *M. incognita* and *R. reniformis* in soil. The first experiment, which followed previous crops of common bean and pepper, was conducted at Bernadette, Morne Vert, in a plastic polytunnel (9 × 45 m) on a hydrandept soil derived from volcanic ash with the following characteristics: pH = 6.2; organic carbon = 7.3%; cation exchange capacity = 10.3 meq/100 g soil; elevation = 500 m; annual rainfall = 3100 mm. The second experiment, which followed a previous crop of tomato, was conducted at Morne Etoile, Lorrain, in a similar plastic polytunnel on a hydrandept soil with the following characteristics: pH = 5.5; organic carbon = 1.0%; cation exchange capacity = 9.6 meq/100g soil; elevation = 180 m; annual rainfall = 2700 mm. At each site, individual plots consisted of various numbers of rows (0.5 or 0.6 m apart and 3 m long) in experiments with treatments replicated four times and arranged in a randomized complete block design.

Each rotation crop tested was grown for three months at each site. The positive controls at sites 1 and 2, included a susceptible tomato cultivar, *Lycopersicum esculentum* Mill. cv. Capitan, planted in four rows

66 cm apart, with plants 50 cm apart in the row (T1), and a weed crop (T2) consisting of any volunteer weeds left unmanaged by the farmer. The other rotation crops at site 1 were: *Brachiaria decumbens* Stapf (T3), a forage crop whose seeds were broadcast and incorporated at a rate of 16 kg/ha); marigold, *Tagetes erecta* L. cv. Calando (T4), whose seeds were broadcast and incorporated at a rate of 13.3 kg/ha; common bean, *Phaseolus vulgaris* L. cv. 2.2.3.V (T5), planted in four rows, 66 cm apart, with two seeds 20 cm apart in the row; and clean fallow (T6), accomplished by manual weeding. The other rotation crops at site 2, were: *Brachiaria decumbens* (T3) and *Tagetes erecta* (T4), both established as at site 1; and velvetbean, *Mucuna pruriens* (L.) DC. var. *utilis* (Wallitch ex Wight) Bak. ex Burck. (T5), planted in four rows, 66 cm apart, with one seed per 30 cm of row. Weed control was by mechanical cultivation before planting and by hand during the crop growth, except for the weed treatments where volunteer weeds were identified and their numbers approximated (Fournet and Hammerton, 1991).

All rotation crops were removed after three months and plant residues were incorporated manually. Within three days, seedlings (ca. 5 cm tall) of the bioassay lettuce crop *Lactuca sativa* L. cv. Minetto were planted into the soil, in four rows 66 cm apart, with one plant 25 cm apart in the row. Plants were grown for 30 days.

Plots were sampled to estimate the nematode population densities in the soil at the beginning of the rotation crop (Pi), at midseason (Pm), at harvest (Pf), after soil plowing (Pi2), and at harvest of the bioassay lettuce crop (Pf2). Soil samples consisted of 12 cores (2 cm-diam. × 20 cm deep) per plot collected in the root zone. The 12 cores from each sample were mixed and nematodes were extracted from a 250 cm^3 subsample by the elutriation-sieving technique (Seinhorst, 1962). Results were expressed as nematode numbers per 100 grams dry soil (105°C, overnight). The multiplication rate (Rm = Pf/Pi) and the reduction rate (Rr = Pi/Pf) of the nematode populations were calculated for each treatment and for each nematode species. Nematode counts were transformed to log (x + 1) values before analyses of variance, and means were separated using the Tukey-Kramer test.

Ninety days after planting the rotation crop, 25 plant root systems were removed from each plot, except for the weed and clean fallow plots, and rated for galling on a 0-10 scale (Zeck, 1971). Nematodes were extracted from a subsample of six combined root systems per plot in a mist chamber (Seinhorst, 1950), and expressed as egg and vermiform stages per gram of root (dried at 60°C). The same procedure was repeated at the end of the lettuce crop. The *Meloidogyne* populations at both sites were confirmed as *M. incognita* by esterase phenotype analysis (Esbenshade and Triantaphyllou, 1985).

RESULTS

Experiment 1 (Bernadette—Morne Vert): At this site, initial nematode populations (Pi) were comprised of 5.9% root-knot nematodes (*Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949), 4.1% reniform nematodes (*Rotylenchulus reniformis* Lindford and Oliveira, 1940), < 0.1% *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961, and 90% free-living species. No differences in nematode numbers existed among plots assigned to different crop treatments (Table 1).

Plots grown to weeds contained 50% *Eleusine indica* (L.) Gaertn, a 20% mixture of *Amaranthus spinosus* L. and *A. viridis* L., 10% *Ageratum conyzoides* L., and a 20% mixture of *Bidens pilosa* L., *Leonotis nepetifolia* (L.) R.Br., and *Commelina diffusa* Burm.

Table 1. Soil infestation[x] by *Meloidogyne incognita, Rotylenchulus reniformis* and free living nematodes during rotation crops and a successive lettuce crop at Site 1 (Morne Vert).

	ROTATION CROPS					LETTUCE			
	Pi	Pm	Pf	Rm	Rr	Pi_2	Pf_2	Rm	Rr
					Meloidogyne incognita				
Tomato	100	235 ab[y]	1 299 a	13.0		1 083 a	113 a		9.6
Weeds	29	75 bc	413 a	14.2		420 abcd	94 ab		4.5
Clean fallow	52	195 ab	69 bcd	1.3		68 d	18 ab		3.8
Bean	123	142 ab	62 cd		2.0	111 bcd	38 ab		2.9
T. erecta	106	19 c	21 d		5.0	35 cd	11 b		3.2
B. decumbens	115	215 ab	76 bc		1.5	263 abcd	80 ab		3.3
ANOVA[z]	ns	HS	HS			HS	S		
					Rotylenchulus reniformis				
Tomato	95	71	212	2.2		135	102		1.3
Weeds	55	6	38		1.4	26	25		1.0
Clean fallow	67	108	38		1.8	36	27		1.3
Bean	68	104	151	2.2		100	97		1.0
T. erecta	57	8	3		19.0	5	5		1.0
B. decumbens	22	3	1		22.0	1	7	7.0	
ANOVA	ns	ns	ns			ns	ns		
					Free living nematodes				
Tomato	1 211	1 231	908 a		1.3	1 785	1 162		1.5
Weeds	736	1 682	1 252 a	1.7		1 601	1 175		1.4
Clean fallow	1 560	1 880	1 298 a		1.2	1 216	1 302	1.1	
Bean	1 618	1 057	761 a		2.1	1 607	842		1.9
T. erecta	1 786	1 065	252 b		7.1	1 532	900		1.7
B. decumbens	1 127	1 550	639 ab		1.8	2 174	1 341		1.6
ANOVA	ns	ns	HS			ns	ns		

[x]Initial population density (Pi), midseason population density (Pm), and final population density (Pf); Multiplication rate (Rm); Reduction rate (Rr).
[y]Means in columns followed by a same letter are not significantly different (NS, $P > 0.05$); S = $P < 0.05$; HS = $P < 0.01$.
[z]Data were transformed to log (n + 1) values before ANOVA and the Tukey-Kramer Test.

By the end of the rotation crop, the population densities of *M. incognita* greatly increased in soil grown to tomato and weeds and declined slightly in soil with other treatments. A root gall index of 5.0 was observed on tomato with a mean root infestation of ca 35 000 eggs and juveniles/g of root (Table 2). Roots of common bean and *B. decumbens* had ca. 1% the number of *M. incognita* in tomato and no visible galls. The *T. erecta* roots were completely free of *M. incognita.*

The population densities of *R. reniformis* declined in soil grown to *T. erecta* and *B. decumbens,* were stable under weed and clean fallow treatments, and increased under tomato and common bean (Table 1). Root infestation of these crops was not detectable except as traces in common bean (Table 2).

The population densities of free living nematodes was significantly decreased in soil grown to *T. erecta.* Soil plowing and crop residue incorporation were associated with an increase of the population densities of *M. incognita* in soil grown to *B. decumbens* while a general increase of the free living nematode population densities was associated with all crops (Table 1).

By the end of the lettuce crop (Pf_2), we observed a general decline of the soil population densities of plant-parasitic nematodes, compared the initial population densities (Pi_2), the lowest level being observed in the *T. erecta* plots (Table 1). Lettuce grown after *T. erecta* had 78% of the roots free of *M. incognita* and an average gall index of 0.3 whereas all of the lettuce roots were infected when grown after tomato and had an average gall index of 2.9. Patterns similar to that for tomato were observed following *B. decumbens* and common bean. The results following clean fallow and weed fallow were very different. The existing weeds at this site were very good hosts to *M. incognita* leading to an average gall index of 3.4 on lettuce with a very uniform distribution (Fig. 1 and Table 2).

Experiment 2: (Morne Etoile—Le Lorrain): At this site, initial soil nematode populations (Pi) were comprised of 20.7% root-

Table 2. Root infection by *Meloidogyne incognita* and *Rotylenchulus reniformis,* occurrence frequencies, and gall indices during the rotation crops and the successive lettuce crop at Site 1 (Mon Vert).

	ROTATION CROPS				LETTUCE	
	Rotylenchulus	*Meloidogyne*			*Meloidogyne*	
	N/g root[x] ± Sd	Freq. (%)	GI	N/g root ± Sd	Freq. (%)	GI
Tomato	0	98.2	5.0	35 053 ± 12 074	100	2.9 a[y]
Weeds	na[z]	na	na	na	72.9	3.4 a
Clean fallow	na	na	na	na	88.2	1.3 ab
Bean	8 ± 16	0	0	351 ± 492	76.0	1.8 ab
T. erecta	0	0	0	0	24.4	0.3 b
B. decumbens	0	0	0	422 ± 671	88.2	1.8 ab
						HS

[x]Juveniles and eggs per gram root (dw).
[y]Means followed by the same letter are not significantly different ($P = 0.05$) according to the Tukey-Kramer Test.
[z]na = not available.

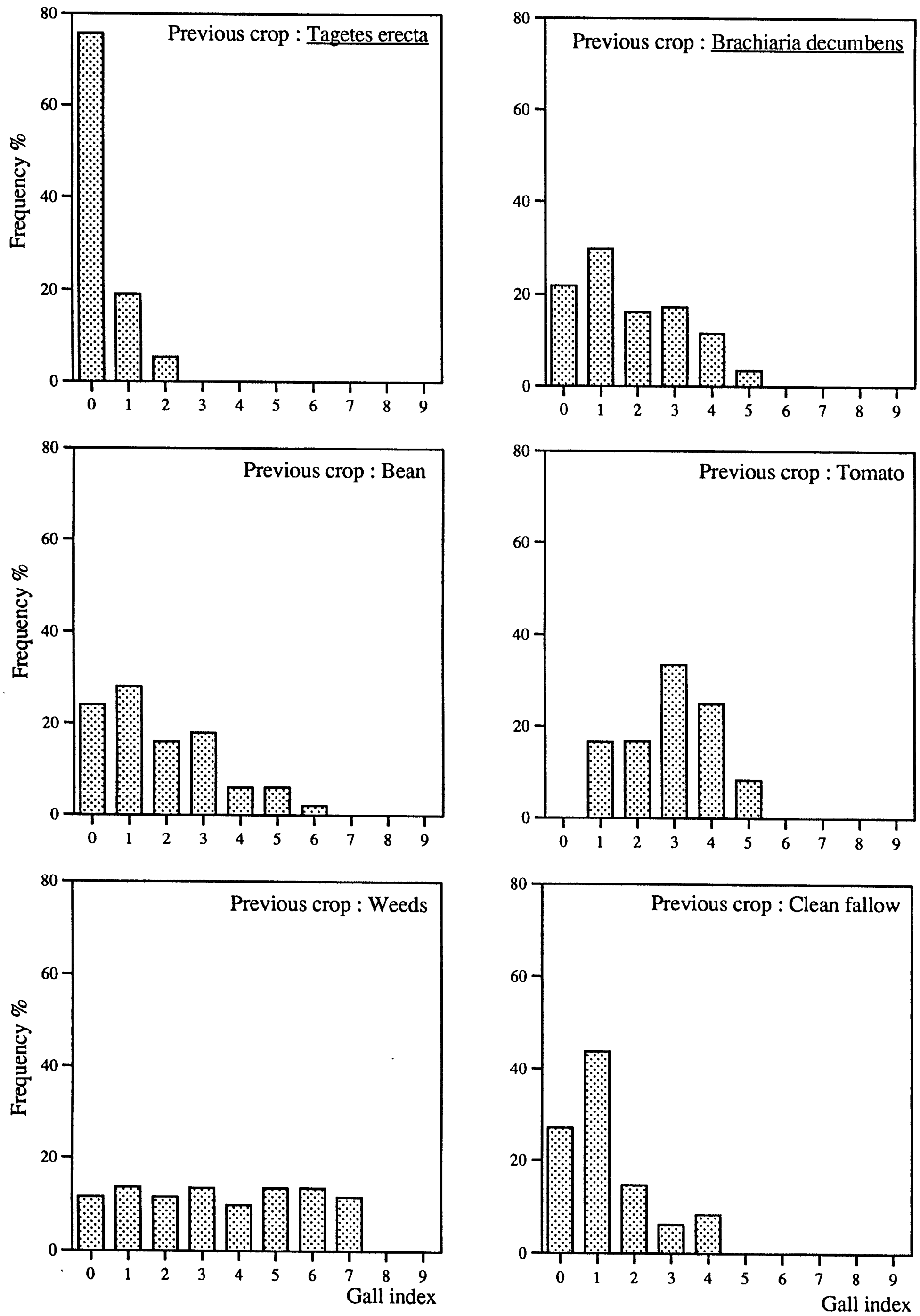

Fig. 1. Frequency distribution of gall indices (Zeck, 1971) due to *Meloidogyne incognita* infection of root systems of lettuce cv. Minetto following various crops at Site 1 (Bernadette, Morne Vert).

knot nematodes *M. incognita*, 29.7% reniform nematodes *R. reniformis*, < 0.1% *H. dihystera*, and 49.6% freeliving species. The plant-parasitic nematode density was very high and no differences in nematode numbers existed among plots assigned to different crop treatment (Table 3).

Plots grown to weeds contained 30% *Eleusine indica* (L.) Gaertn, a 30% mixture of *Amaranthus spinosus* L. and *A. viridis* L., 10% *Leonotis nepetifolia* (L.) R.Br., and a 30% mixture of *Bidens pilosa* L., *Commelina diffusa* Burm., *Euphorbia heterophylla* (L.) R.Br., and *Vernonia cinerea* (L.) Less.

Table 3. Soil infestation[x] by *Meloidogyne incognita, Rotylenchulus reniformis* and free living nematodes during rotation crops and a successive lettuce crop at Site 2 (Le Lorrain).

	ROTATION CROPS					LETTUCE			
	Pi	Pm	Pf	Rm	Rr	Pi_2	Pf_2	Rm	Rr
					Meloidogyne incognita				
Tomato	327	847 a[y]	2 704 a	8.3		2 963 a	193 a		15.4
Weeds	246	227 abc	278 abcd	1.1		380 ab	36 abc		10.6
M. pruriens	280	103 ab	42 d		6.7	34 c	5 c		6.8
T. erecta	456	116 c	49 cd		9.3	64 bc	11 bc		5.8
B. decumbens	499	146 abc	143 bcd		3.5	316 abc	31 abc		10.2
ANOVA[z]	ns	HS	HS			HS	S		
					Rotylenchulus reniformis				
Tomato	413	1 119 a	2 262 a	5.5		1 346 a	938 a		1.4
Weeds	664	1 030 a	614 cd		1.1	1 164 a	664 ab		1.8
M. pruriens	159	153 b	73 d		2.2	95 b	135 b	1.4	
T. erecta	591	390 ab	445 abc		1.3	386 ab	414 ab	1.1	
B. decumbens	765	814 a	406 bc		1.9	862 a	799 a		1.1
ANOVA	ns	HS	HS			HS	S		
					Free living nematodes				
Tomato	822	2 155	1 625	2.0		5 531 a	2 303		2.4
Weeds	967	2 282	2 068	2.1		3 205 ab	1 134		2.8
M. pruriens	531	1 365	1 283	2.4		2 209 bc	975		2.3
T. erecta	911	1 017	1 274	1.4		3 400 ab	1 755		1.9
B. decumbens	1 102	1 356	1 513	1.4		1 366 c	1 154		1.2
ANOVA	ns	ns	ns			HS	ns		

[x]Initial population density (Pi), midseason population density (Pm), and final population density (Pf); Multiplication rate (Rm); Reduction rate (Rr).

[y]Means in columns followed by a same letter are not significantly different (NS, $P > 0.05$); S = $P < 0.05$; HS = $P < 0.01$.

[z]Data were transformed to log (n + 1) values before ANOVA and the Tukey-Kramer Test.

By the end of the rotation crop, pronounced decline in the population densities of *M. incognita* occurred in soil grown to both *M. pruriens* and *T. erecta* (Table 3). The density also declined after growing *B. decumbens* and maintained itself on weeds. The *M. incognita* soil population density increased greatly in soil planted to tomato. There was an average root gall index of 6.4 on tomato and a mean root infestation of ca. 82 000 eggs and juveniles/g of root (Table 4). Roots of *B. decumbens* were also parasitized, with up to 926 eggs and juveniles/g root but no galls were formed.

The population densities of reniform nematode declined in plots with *M. pruriens*, but not in those with *T. erecta*, *B. decumbens* and weeds. The soil population density increased heavily in plots with tomato. The roots of tomato were highly infected and those of *Tagetes erecta* were good hosts for *R. reniformis* with up to 947 individuals/g of root (Tables 3 and 4).

Phytopathogenic population densities were similar among treatment after plowing of soil and crop residue incorporation and there was a general increase of the free living nematode densities, except in plots with *B. decumbens* (Table 3).

By the end of the lettuce crop, there was a general decline of the soil population densities of *M. incognita*, compared to the initial population densities. The lowest numbers of *M. incognita* occurred after *M. pruriens* and *T. erecta*, and the lowest numbers of *R. reniformis* after *M. pruriens* (Table 3).

About 57 to 61% of roots of the lettuce plants grown after *M. pruriens* and *T. erecta* were free of *M. incognita* with a gall index of 1.5 (Table 4). Roots of lettuce from the other plots were often very heavily infested with *M. incognita* and had average gall indices ranging from 4.0 (following weeds) to 5.4 (following tomato). The patterns observed following *T. erecta* and *M. pruriens* were similar to each other, with most of the lettuce root systems uninfected or only slightly infected with *M. incognita*. By comparison, gall indices were highly variable following weeds and *B. decumbens*, and the

Table 4. Root infection by *Meloidogyne incognita* and *Rotylenchulus reniformis*, occurrence frequencies, and gall indices during the rotation crops and the successive lettuce crop at Site 2 (Le Lorrain).

	ROTATION CROPS				LETTUCE	
	Rotylenchulus	*Meloidogyne*			*Meloidogyne*	
	N/g root[x] ± Sd	Freq. (%)	GI	N/g root ± Sd	Freq. (%)	GI
Tomato	4 244 ± 1 115	100	6.4	81 696 ± 61 188	100	5.4 a[y]
Weeds	na[z]	na	na	na	91.7	4.0 ab
M. pruriens	16 ± 11	0	0	15 ± 14	57.0	1.5 b
T. erecta	947 ± 752	0	0	12 ± 8	61.5	1.6 b
B. decumbens	0	0	0	926 ± 1 549	98.7	4.3 ab
Anova						HS

[x]Juveniles and eggs per gram root (dw).
[y]Means followed by the same letter are not significantly different (P = 0.05) according to the Tukey-Kramer Test.
[z]na = not available.

size class distribution of gall indices was uniform (Fig. 2 and Table 4).

DISCUSSION

In the Lesser Antilles, fallow without weed control is the most common intercrop practice for vegetable crops both in fields and in plastic polytunnels. The duration of the intercrop may vary from one week to three months, depending on the season and the market demand for vegetables. This practice is widely recognized as detrimental to the following crop due to the increase of various pest and pathogen populations. Therefore, there is an urgent need to find a rotation crop suitable as a short-term intercrop especially for vegetables growing in plastic polytunnels. Among the different qualities required of suitable rotation crops is that they be antagonistic to, or non-hosts of, both *M. incognita* and *R. reniformis.* Many crops and cultivars have been evaluated against a range of nematode species worldwide, but McSorley and Dickson (1995) have pointed out the danger of using a rotation crop effective against a single species of nematode. Our preliminary evaluation in Martinique has indicated that a *M. pruriens* crop is very effective in preventing the increase or reducing population densities of both *M. incognita* and *R. reniformis.*

For many years *Mucuna* has been known to depress populations of plant-parasitic nematodes, such as *Meloidogyne* spp. in the U.S.A. (Watson, 1922), *R. reniformis* in Ghana (Peacock, 1956) and various plant-parasitic nematodes in Nigeria (Caveness, 1988). It gained recent interest after its use as a rotation crop against *M. incognita* in Puerto Rico (Vicente and Acosta, 1987). Since then, the benefits of its use as a rotation crop in several production systems, mainly in the southern part of the U.S.A. have been demonstrated (Rodriguez-Kabana *et al.*, 1992; McSorley and Gallaher, 1992; McSorley and Dickson, 1995). Antagonistic activity against plant-parasitic nematodes probably is due to the production of phytoalexins by roots (Vargas *et al.*, 1996).

The *T. erecta* crop caused the greatest population decline of *M. incognita*, resulting in protection against root-knot nematodes on the ensuing lettuce crop. However, establishing a crop of *T. erecta* in polytunnels was very difficult due to poor vegetative growth, poor competition with weeds, and susceptibility to insect damage. This plant species was also, under our conditions, a good host of *R. reniformis.*

The antagonistic properties of *Tagetes* spp. to root knot nematodes were first mentioned by Tyler in 1938 and result from the presence of thiophenes (Tang *et al.*, 1986). Numerous studies conducted with at least five different species of *Tagetes* and their cultivars, demonstrated inconsistencies among experiments (Lehman, 1979). One species, *T. patula* was reported as a poor host of *R. reniformis* and should be tested further (Caswell *et al.*, 1991). Good control of *M. incognita* was also obtained in Mexico by incorporating *T. erecta* cv. Local in tomato (Castro *et al.*, 1990) and pepper (Zavaleta-Mejia *et al.*, 1993) crops.

In these studies, bean cv. 2.2.3.V was used as a substitution crop rather than a rotation crop because it was reported as being resistant to *M. incognita* and *M. javanica* (Netscher and Sikora, 1990). However, soil and root analyses showed that this bean cultivar was a host to *M. incognita,* although the root infectation level was only 1% that observed on a susceptible tomato cultivar.

Brachiaria decumbens, commonly used in Martinique as a forage crop, supported high populations of both *M. incognita* and *R. reniformis* in roots and soil. The estab-

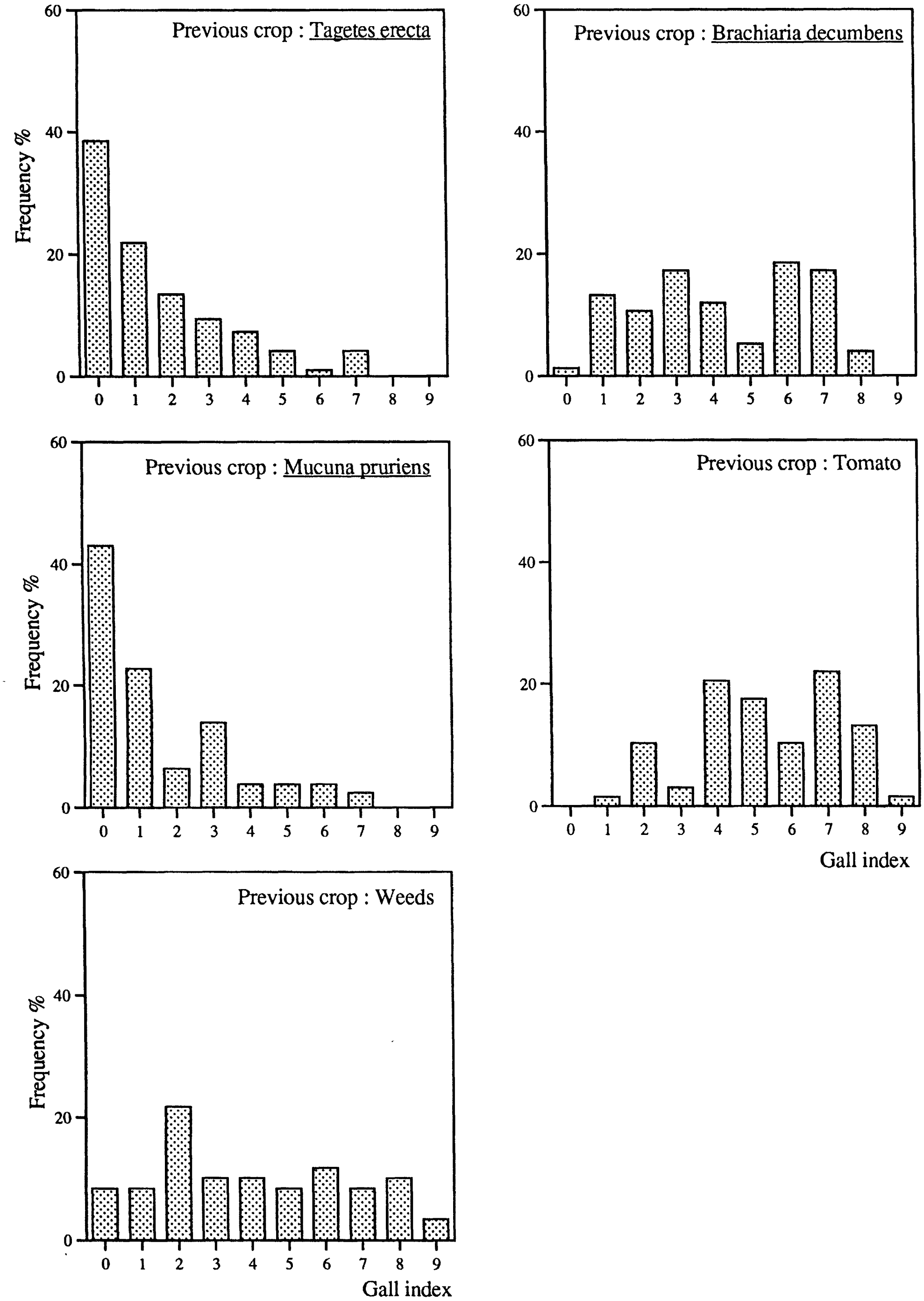

Fig. 2. Frequency distribution of gall indices (Zeck, 1971) due to *Meloidogyne incognita* infection of root systems (lettuce cv. Minettò following various crops at Site 2 (Morne Etoile, Le Lorrain).

lishment of this crop after sowing was very slow and it competed poorly with aggressive weeds such as *E. indica* and *A. conizoides*, both of which are known as good hosts of both nematodes (Quénéhervé *et al.*, 1995). In Brazil, this crop has been recommended for managing *M. javanica* and has controlled nematodes in successive tomato crops in greenhouse pot experiments (Brito and Ferraz, 1987). Based on our results, however, its use as a short-term rotation crop in the polytunnels cannot be recommended, although it might be a good candidate as a crop during long fallow periods in open fields.

In conclusion, this preliminary study has shown that, of the crops tested, *M. pruriens* cv. *utilis* is the only one with the ability to grow rapidly and control populations of both *M. incognita* and *R. reniformis.* As a result, it is used increasingly as a short-term rotation crop in polytunnels in the French Antilles, Martinique, and Guadeloupe.

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