REPRODUCTION AND BIOLOGY OF *SCUTELLONEMA BRADYS* IN ROOTS OF TROPICAL COVER CROPS

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ABSTRACT

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One of the options for the management of *Scutellonema bradys* on yam is the use of non-host cover crops. This study evaluated the ability of *S. bradys* to infect and reproduce in the roots of selected cover crops. Two pot trials were set up to compare infection and reproduction in 10 cover crops to a known susceptible control in a completely randomized design (CRD) with five replicates. Plants were inoculated with 2,000 *S. bradys* 2 wk after planting. Fresh shoot and root weight, number of nematodes in roots and soil, and reproductive factor (RF) of the nematode were taken at 12 wk after planting. A second experiment was set up in a CRD with three replications using the same crops and inoculated with 500 adult *S. bradys*. Plants were harvested daily for 45 d. The roots from each harvested plant were stained in lactogylcerol and observed for stages of nematodes present. *Tagetes erecta*, *Stylosanthes guianensis*, *Centrosema pubescens*, *Pueraria phaseoloides*, *Aeschynomene histrix*, and *Mucuna pruriens* were designated as poor hosts based on significant ($P \leq 0.05$) reduction of *S. bradys* populations in their roots and an RF < 1. Also, these cover crops lengthened or terminated the life cycle of *S. bradys*. *Cajanus cajan* was regarded as a trap crop because it supported initial nematode penetration but hindered reproduction of *S. bradys*. However, *Lablab purpureus*, *Crotalaria ochroleuca*, and *C. juncea* were good hosts and similar to the susceptible *Vigna unguiculata* in their ability to support infection and reproduction of *S. bradys*. Cover crops that negatively affect the development and life cycle of *S. bradys* have the potential to reduce damage from *S. bradys* in yam-based cropping systems.

Key words: *Aeschynomene*, *Mucuna*, nematode life cycle, nematode management, *Puraria*, *Tagetes*, yam nematode.

RESUMEN

Claudius-Cole, A. O., y B. Fawole. 2016. Reproducción y biología de *Scutellonema bradys* en raíces de cultivos de cobertura tropicales. Nematropica 46:22-30.

Una de las opciones para el manejo de *Scutellonema bradys* en cultivos de yuca es el uso de cultivos de cobertura no hospedantes. Este estudio evaluó la capacidad de *S. bradys* de infectar y reproducirse en la raíces de varios cultivos de cobertura seleccionados. Se establecieron dos ensayos en maceta con un diseño completamente al azar (CRD) y cinco repeticiones, para comparar la infección y reproducción del nematodo en 10 cultivos de cobertura en relación a un control susceptible conocido. Las plantas fueron inoculadas con 2,000 *S. bradys* 2 semanas después del trasplante. Se determinaron los pesos de la parte aérea y de las raíces, número de nematodos en raíces y suelo, y el factor de reproducción (RF) del nematodo, 12 semanas después del trasplante. Se estableció un segundo experimento con un diseño CRD y tres repeticiones usando los mismos cultivos e inoculado con 500 adultos de *S. bradys*. Las plantas fueron cosechadas diariamente durante 45 dias. Las raíces de cada planta cosechada fueron teñidas en lactoglicerol y observadas para ver los estadios del nematodo presentes. *Tagetes erecta*, *Stylosanthes guianensis*, *Centrosema pubescens*, *Pueraria phaseoloides*, *Aeschynomene histrix*, y *Mucuna pruriens* fueron designadas como hospedantes pobres basado en una reducción significativa ($P \leq 0.05$) de las poblaciones de *S. bradys* en sus raíces y en un RF < 1. Además, estos cultivos de cobertura alargaron o no permitieron que se completara el ciclo de vida de *S. bradys*. *Cajanus cajan* se considera un cultivo trampa ya que permitió la penetración inicial del nematodo pero impidió la reproducción de *S. bradys*. Sin embargo, *Lablab purpureus*, *Crotalaria ochroleuca*, y *C. juncea* fueron buenos hospedantes y similares a la susceptible *Vigna unguiculata* en su capacidad para permitir la infección y reproducción de *S. bradys*. Los cultivos de cobertura que

afectan negativamente al desarrollo y ciclo de vida de *S. bradys* tienen el potencial de reducir el daño causado por *S. bradys* en sistemas basados en el cultivo de la yuca.

Palabras clave: Aeschynomene, *Mucuna*, ciclo de vida del nematodo, manejo de nematodos, *Puraria*, *Tagetes*, nematodo de la yuca.

INTRODUCTION

Scutellonema bradys (Steiner and Le Hew) Andrassy is a major pest of yams in the yam-growing regions of the world. It causes the dry rot disease of yams (Acosta and Ayala, 1975; Adesiyan, 1977) and can also damage potatoes (Coyne *et al*., 2006). *Scutellonema bradys*, also known as the yam nematode, has been reported to cause field and storage losses of 29% and 44.5%, respectively (Wood *et al*., 1980; Coyne *et al*., 2012). Storage of field-infected tubers can lead to poor health of seed tubers, which are stored for 3 to 6 months before planting. Storage of nematode-infected tubers can lead to losses of up to 68% due to reduced stands and poor plant vigour (Bridge *et al.*, 2005).

A strategy for managing plant diseases is the use of cover crops in crop rotation sequencs, as intercrops, or as green manure. Several cover crops have been used for the management of plant-parasitic nematodes with varying successes. *Crotalaria* spp. have been effective in controlling root-knot (*Meloidogyne* spp.) and reniform (*Rotylenchulus reniformis*) nematodes (Wang *et al*., 2002). *Tagetes* spp. have also been used for the reduction of soil populations of nematodes associated with various crops (Wang *et al*., 2001). *Mucuna deerigiana* (Rodríguez-Kábana *et al*., 1992), *Pueraria phaseoloides*, and *Stylosathes guianensis* (Claudius-Cole *et al*., 2014) are additional species that have been used with some success. The host status of many of these cover crops to *S. bradys* is currently not known and needs to be determined. The nematode is found associated with yams, and there must be an assurance that nematode populations will not increase if cover crops are to be used in the yam-cropping system for their soil-enhancing properties (Snapp *et al*., 2005).

This study evaluated the ability of *S. bradys* to reproduce in roots of some cover crops that could be used in yam-cropping systems. The influence of the cover crops on the biology of *S. bradys* was also studied.

MATERIALS AND METHODS

Inoculum of *S. bradys* was collected from infested yam tubers that had been stored for that purpose. Tubers were peeled to the depth of nematode-induced lesions, and the peels were chopped with a pair of scissors to thin (0.5 × 1.0 cm) pieces. The infected pieces were placed in a single layer on tissue of extraction tray set ups (Coyne *et al.*, 2007) over a 72-hr period with daily decanting of extracts and replacement with clean water. All extracts were collected into one large beaker and concentrated to 500 ml by siphoning off excess water. Nematodes were then counted from 2-ml aliquots with the aid of a counting slide under a stereo microscope (10×). A mixture of all stages of *S. bradys* was used to inoculate the *S. bradys* reproduction experiment. Only adult nematodes were used for the *S. bradys* biology study. Adults were obtained by passing the extracted nematode suspension through a 75-µm sieve that retained adults while allowing other life stages to pass through. The retained adult nematodes were washed out of the sieves into a beaker and counted. Two trials were conducted to evaluate the ability of *S. bradys* to reproduce in roots of cover crops, and one experiment was conducted to determine the biology of the nematode on cover crops.

Reproduction of S. bradys *on cover crops*

The following plant species (listed with accession number; variety names in quotes) were selected for the Screening Experiment; *Tagetes erecta* (marigold) 'Yellow', *Stylosanthes guianensis* (stylo) 'I. 164', *Pueraria phaseoloides* (tropical kudzu) 'I. 156', *Mucuna pruriens* utilis (velvet bean), *Lablab purpureus* (lablab) 'I. 147', *Crotalaria ochroleuca* (rattle box), *C. juncea* (sunn hemp), *Cajanus cajan* (pigeon pea), *Centrosema pubescens* (centro) 'I. 152', and *Aeschynomene histrix* (jointvetch) 'ct. 8907'. These seeds were collected from the Weed Science Unit of the International Institute of Tropical Agriculture (IITA), Ibadan. Nigeria. *Vigna unguiculata* (cowpea) 'Ife Brown' was selected for use as a susceptible control (Olowe, 2007). Two seeds of each plant were sown in sterile soil contained in 3-L plastic pots and irrigated daily in a screen house. Pots were infested with 2,000 individuals (adults and juveniles) of *S. bradys* 2 wk after sowing while control pots were not infested. The experiment was laid out in a completely randomized design (CRD) and replicated five times.

The experiment was terminated 10 weeks after inoculation. Harvesting of the cover crop roots was done when the soil was moist (but not wet) by cutting off the aerial part of the plant, upturning the pot, and shaking the roots free of soil. The roots were then rinsed, allowed to drain over two layers of paper towels, and then weighed. The roots were cut into approximately 2-cm long pieces and thoroughly mixed. Nematodes were extracted from a 5-g sample using a modified Baermann tray extraction method (Coyne *et al*., 2007) for 48 hr, after which, the extracted nematodes were counted. Population density of *S. bradys* from roots was computed using Pr = (number of *S. bradys* in 5 g/5) × (total root weight); where Pr is total number of nematodes in roots. The soil from each pot was thoroughly mixed and a 200-cm^3 subsample was assayed for nematodes using the modified Baermann tray extraction method (Coyne *et al*., 2007). Population density of *S. bradys* from soil was computed from a 200-cm^3 subsample from each pot. The sum of total nematodes from roots (Pr) and soil (Ps) was used to determine the population density per plant. Data were collected on fresh shoot and root weights (summed and presented as fresh plant weight), root damage, nematodes recovered from roots, and number of nematodes recovered from soil. Root lesion index was used to assess root damage on a scale of 1-5 with 1 = no lesion; 2 = 10% (slight) lesion; 3 = 11-30% (moderate) lesion; 4 = 31-60% (severe) lesion; 5 = >60% (very severe) lesion. The reproductive factor (Rf) was calculated using Pf/Pi where Pf was the final nematode population estimated from roots and soil and Pi was the initial amount of inoculum (2000 *S. bradys*). The experiment was repeated with the same treatments and number of replications.

S. bradys *biology on cover crops*

Seeds of the 10 cover crops and cowpea control were planted in 3-liter pots filled with sterilized soil. Each cover crop was planted in 45 separate pots to allow daily root sampling. Two seeds were planted per pot and after 7 d, plant population was adjusted to one plant per pot. The cover crops and the cowpea plants were inoculated with 500 *S. bradys* adults. The experiment was laid out in a completely randomized design with three replicates. Harvesting of roots started one day after inoculation and continued daily for 45 d. Each day, roots of the three replicates were carefully separated from soil and washed under a gentle stream of water. The roots were then allowed to drain between paper towels, weighed, and stained using lactoglycerol (Southey, 1986) for observation of nematode infection. The roots were wrapped in muslin cloth and tied with twine, then dipped into the staining solution. The staining solution was made from equal volumes (333 ml) of glycerol, lactic acid, and distilled water, to which 0.05% acid fuchsin was added. The roots were boiled in the staining solution for 3 min, then washed in water and left for 48 hr in the clearing solution consisting of 5 drops of lactic acid in equal volumes (500 ml) of glycerol and distilled water. Roots were harvested each day, stained, and examined for nematode penetration and stages of development in the roots. Measurements of body length and width were taken on 20 adult females that had emerged from roots of each cover crop.

Data analyses

Nematode counts data were transformed using the square root transformation. Data obtained were processed in MS Excel and submitted for Analysis of Variance (ANOVA). Where significant differences were detected among crops, crop means were further separated using the Least Significant Difference (LSD) at 5% probability using SAS Version 9.2 (SAS Institute, Cary, NC). Where appropriate, standard error was used to determine significant differences among means.

RESULTS

Reproduction of S. bradys *on cover crops*

Plants inoculated with *S. bradys* generally weighed less than uninoculated plants ($P \leq 0.05$), and the roots of inoculated plants sustained nematode populations in both trials (Table 1). The yam nematode, *S. bradys*, was found in roots and soil associated with the cover crops to varying degrees while no nematodes were found in the uninoculated pots. Fresh plant weights (combined root and shoot weight) were reduced ($P \leq 0.05$) in *S. bradys* – inoculated *V. unguiculata*, *L. purpureus*, *C. cajan*, and *C. juncea* (Fig.1), while no differences were observed between inoculated and control plants of the other cover crops. Damage as evidenced by ratings of root lesions induced by *S. bradys* was highest in *V. unguiculata*, *L. purpureus*, *C. cajan*, and *C. ochroleuca* (Fig. 2). Conversely, *A. histrix*, *T. erecta*, and *P. phaseoloides* lesion ratings were lower ($P \leq 0.05$) than damage to roots of *S. guianensis* and comparable to the damage observed in roots of *C. pubescens* and *M. pruriens*.

In the first trial, soil populations of *S. bradys* were higher ($P \leq 0.05$) in the soil associated with *C. ochroleuca* and *V. unguiculata* than for the other plants except *L. purpureus* (Table 2). The soil

Table 1. Whole plant weight and nematode populations in soil and roots of cover crops inoculated with *Scutellonema bradys*.

Treatment	Fresh plant weight (g)	Number of *S. bradys* in 200 cm^3 soil	Number of *S. bradys* in roots	Reproductive factor[y]
S. bradys	133.7[z]	187.55	558.79	0.73
Control	198.4	0.0	0.0	0.0
$LSD_{0.05}$	52.6	37.5	176.7	0.18

[y]Reproductive factor = Pf/Pi where Pf is the final nematode population (root + soil populations) and Pi is the initial nematode population (2000).
[z]Values are means of 5 replicates; LSD ($P \leq 0.05$) separates means within a colunm.

Table 2. Mean number of *Scutellonema bradys* in roots and soil associated with inoculated cover crops and their reproductive factors (RF)[y] in two trials.

	Trial 1			Trial 2		
Crops	No. of nematodes in 200 cm^3 soil	No. of nematodes in roots	RF	No. of nematodes in 200 cm^3 soil	No. of nematodes in roots	RF
Tagetes erecta	1.7 d[z]	0.0 d	0.0 c	53.0 d	14.8 d	0.1 d
Stylosanthes guianensis	15.0 d	50.2 d	0.1 c	148.0 c	90.5 d	0.2 d
Centrosema pubescens	22.0 d	13.0 d	0.1 c	55.0 d	122.4 d	0.2 d
Pueraria phaseoloides	68.1 d	47.0 d	0.2 c	206.0 c	335.9 d	0.5 d
Aeschynomene histrix	75.2 d	0.0 d	0.2 c	7.5 d	16.1 d	0.0 d
Crotalaria juncea	228.0 c	1241.5 b	2.1 b	322.0 b	3264.2 a	3.6 a
Cajanus cajan	579.4 b	699.4 c	2.0 b	47.0 d	335.6 d	0.4 d
Mucna pruriens	303.7 c	178.8 d	1.6 bc	55.0 d	165.3 d	0.2 d
Lablab purpureus	623.5 ab	1559.5 b	2.8 b	307.5 b	1293.6 c	1.6 c
Crotalaria ochroleuca	664.6 a	3588.9 a	8.5 a	510.5 a	2275.8 b	2.8 b
Vigna unguiculata	726.3 a	3189.3 a	7.8 a	307.5 b	2114.9 c	2.4 c
$LSD_{0.05}$	92.3	394.3	0.9	48.4	324.9	0.6

[y]RF is Reproductive factor = Pf/Pi where Pf is the final nematode population (root + soil populations), and Pi is the initial nematode population (2000).
[z]Values are means of 5 replicates per cover crop; Means followed by the same letter in a colunm for each trial are not significantly different ($P \leq 0.05$) using LSD.

population density associated with *L. purpureus* did not differ from that in soil associated with *C. cajan*. The soil populations from pots with *M. pruriens* and *C. juncea* were similar and were intermediate when compared to the range in *S. bradys* soil populations from the experiment. The lowest ($P \leq 0.05$) nematode populations were recorded in soil associated with *A. histrix* , *P. phaseoloides*, *C. pubescens*, *S. guianensis*. and *T. erecta*. The roots of *C. ochroleuca* and *V. unguiculata* contained higher ($P \leq 0.05$) populations of *S. bradys* than the other cover crops. No nematodes were found in the roots of *T. erecta* and *A. histrix*, and the levels found in roots of *C. pubescens*, *P. phaseoloides*, and *S. guianensis* were comparable to them statistically ($P \leq 0.05$) . The reproductive factor (RF) of *S. bradys* was higher for *C. ochroleuca* and *V. unguiculata* than on all other cover crops. An increase in population of over two-fold of *S. bradys* was observed in pots inoculated with *L. purpureus*, *C. juncea*, and *C. cajan*. The RF of *S. bradys* on *T. erecta*, *S. guianensis*, *C. pubescens*, *P. phaseoloides*, and *A. histrix* was < 1, which was lower than on all other cover crops. The trend was similar in the second trial with *C. ochroleuca*, *C. juncea*,

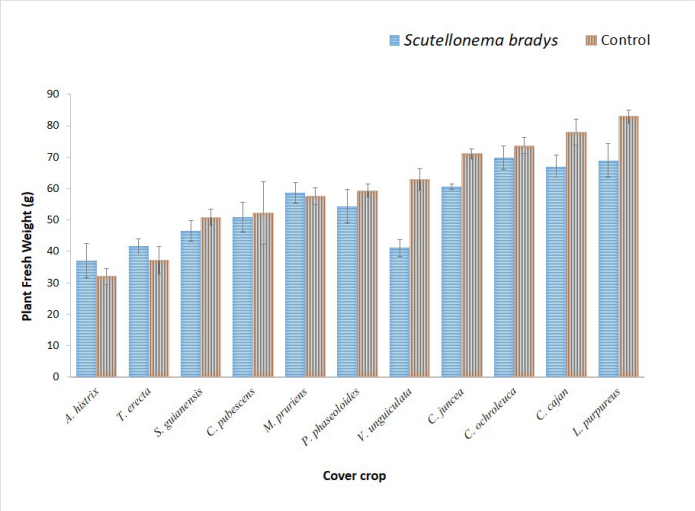

Fig. 1. Fresh weight (g) of plants (root and shoot) inoculated with *Scutellonema bradys* compared to uninoculated control.
A. histrix = *Aeschynomene histrix*, *T. erecta* = *Tagetes erecta*, *S. guianensis* = *Stylosanthes guianensis*, *C. pubescens* = *Centrosema pubescens*, *M. pruriens* = *Mucuna pruriens*, *P. phaseoloides* = *Pueraria phaseoloides*, *V. unguiculata* = *Vigna unguiculata*, *C. juncea* = *Crotalaria juncea*, *C. ochroleuca* = *Crotolaria ochroleuca*, *C. cajan* = *Cajanus cajan*, *L. purpureus* = *Lablab purpureus*.
Error bars = standard error of each mean.

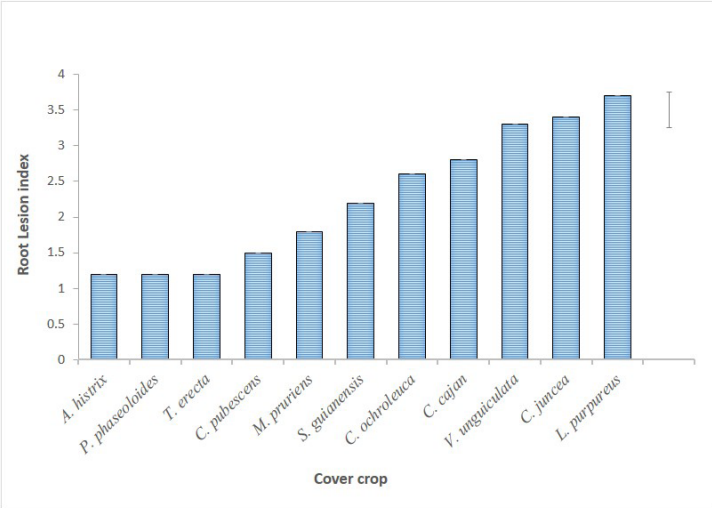

Fig. 2. Root lesion index on roots of cover crops inoculated with *Scutellonema bradys.*
A. histrix = *Aeschynomene histrix*, *T. erecta* = *Tagetes erecta*, *S. guianensis* = *Stylosanthes guianensis*, *C. pubescens* = *Centrosema pubescens*, *M. pruriens* = *Mucuna pruriens*, *P. phaseoloides* = *Pueraria phaseoloides*, *V. unguiculata* = *Vigna unguiculata*, *C. juncea* = *Crotalaria juncea*, *C. ochroleuca* = *Crotolaria ochroleuca*, *C. cajan* = *Cajanus cajan*, *L. purpureus* = *Lablab purpureus*.
Error bar represents LSD ($P \leq 0.05$). LSD value = 0.497.
Root lesion index scored on 1-5 scale: 1 = no lesion; 2 = 10% (slight) lesion; 3 = 11-30% (moderate) lesion; 4 = 31-60% (severe) lesion; 5 = >60% (very severe) lesion

L. purpureus having higher ($P \leq 0.05$) *S. bradys* populations, similar to the control, *V. unguiculata*, compared to all other cover crops, while *T. erecta*, *A. histrix*, *C. pubescens*, and *P. phaseoloides* had the lowest ($P \leq 0.05$) populations associated with them. In the second trial, *M. pruriens* and *C. cajan* had RF < 1 and had lower nematode populations in both soil and roots compared to the first trial.

S. bradys *biology on cover crops*

The mean atmospheric temperature during the experiment was 27 ± 3°C. Inoculated adults were observed first in roots of *C. cajan* 3 d after inoculation (DAI) followed by *C. juncea*, *V. unguiculata*, *A. histrix*, *P. phaseoloides*, *C. ochroleuca*, *M. pruriens*, and *C. pubescens* (Table 3). Nematodes did not penetrate roots of *S. guianensis* and *T. erecta* until the 12th and 17th DAI, respectively. Even though no eggs were observed, juveniles were found in roots of *T. erecta* 28 DAI, then no stages were observed till the end of the experiment. Penetration of roots of *S. guianensis* occurred 12 DAI and eggs were present 7 d later (19 DAI). The second-stage juvenile (J2) emerged after an additional 8 d (27 DAI) and third-stage juvenile (J3) after another 8 d (35 DAI). No nematodes were observed in the roots of *S. guianensis* after 35 DAI until the end of the experiment 45 DAI. Nematodes were seen in roots of *C. cajan* 3 DAI, and eggs were observed 6 d later (9 DAI). The J2 were first observed at 18 DAI, the J3 at 28 DAI, and fourth juvenile stage (J4) at 36 DAI. Emerging adults were not observed in the roots of *C. cajan* by the time the experiment was terminated. Nematodes entered the roots of *C. pubescens* with eggs, J2, J3, and J4 observed 11, 16, 28, and 35 DAI, respectively, while adults emerged 42 DAI. Adults emerged from the roots of *P. phaseoloides*, *A. histrix*, and *M. pruriens*

Table 3. Number of days after inoculation with adults of *Scutellonema bradys* to first appearance of nematode stages in roots of cover crops.

Cover crop	Inoculated adults	Eggs	J2[x]	J3	J4	Emerging adults
Tagetes erecta	17	-	28 (11)[y]	-	-	-
Stylosanthes guianensis	12	19 (7)	27 (8)	35 (8)	-	-
Cajanus cajan	3	9 (6)	18 (9)	28 (10)	36 (8)	-
Centrosema pubescens	8	11 (3)	16 (5)	28 (12)	35 (7)	42 (7)
Aeschynomene. histrix	5	10 (5)	15 (5)	23 (8)	32 (9)	38 (6)
Pueraria phaseoloides	6	9 (3)	15 (6)	20 (5)	29 (9)	37 (8)
Mucuna pruriens	7	12 (5)	16 (4)	26 (10)	32 (6)	38 (6)
Lablab purpureus	3	8 (5)	11 (3)	16 (5)	25 (9)	28 (3)
Crotalaria ochroleuca	6	10 (4)	15 (5)	19 (4)	26 (7)	30 (4)
Crotalaria juncea	4	8 (4)	12 (4)	17 (5)	23 (6)	28 (5)
Vigna unguiculata	5	8 (3)	12 (4)	15 (3)	22 (7)	26 (4)
SE[z]	1.3	1.1	1.8	1.9	2.2	5.2

[x]J2 – J4 = second to fourth juvenile stages.
[y]Values are means of three replicates per day of observation; values in parenthesis represent number of days between stages.
[z]SE is Standard error of means in a colunm.

Table 4. Body length and width of emerged adult females of *S. bradys* from roots of various cover crops.

Cover crop	Body length (µm)[y]	Body width (µm)[y]
Tagetes erecta	950 ± 20 (910 - 1160)	23 ± 3 (19 - 27)
Stylosanthes guianensis	910 ± 30 (890 -1170)	23 ± 3 (20 - 27)
Crotalaria juncea	1000 ± 40 (980 -1010)	28 ± 3 (24 – 30)
Crotalaria ochroleuca	1010 ± 40 (1000 - 1120)	27 ± 3 (23 - 31)
Cajanus cajan	1000 ± 50 (980 - 1120)	28 ± 3 (23 - 30)
Centrosema pubescens	970 ± 40 (920 -1010)	26 ± 2 (22 - 30)
Aeschynomene histrix	910 ± 30 (890 - 1010)	25 ± 2 (21 - 28)
Pueraria phaseoloides	970 ± 30 (920 - 1000)	25 ± 3 (21 - 27)
Lablab pupureus	1030 ± 40 (1000 - 1250)	26 ± 3 (20 - 27)
Mucuna pruriens	930 ± 20 (910 - 1020)	24 ± 3 (19 - 27)
Vigna unguiculata	1050 ± 40 (1000 - 1250)	28 ± 2 (25 - 33)
SE[z]	47.2	1.9

[y]Values are means of three replicates per day of observation; values in parenthesis represent range in measurement.
[z]SE is Standard error of means in a colunm.

37, 38, and 38 DAI, respectively, which was at least 11 d later than the cowpea susceptible control crop. The life cycle of *S. bradys* was completed in 26, 28, 28, and 30 DAI in the cowpeas, *C. juncea*, *L. purpureus*, and *C. ochroleuca*. The longest interval between stages occurred between J2 and J3 in roots of *C. cajan*, *C. pubescens*, *M. pruriens*, while in *A. histrix*, *P. phaseoloides*, *L. purpureus*, *C. ochroleuca*, *C. juncea*, and *V. unguiculata* the longest interval was between the J3 and J4 stages (Table 3).

Body length of adult females of *S. bradys* emerging from roots varied among cover crops (Table 4). The greatest body lengths were observed in nematodes from roots of *V. unguiculata*, *L. purpureus*, and *C. ochroleuca*, while smaller females emerged from roots of *A. histrix*, *S. guianensis*, *M. pruriens*,

T. erecta, *C. pubescens*, and *P. phaseoloides*.

DISCUSSION

This study demonstrated that *S. bradys* can survive and multiply in roots of plants that might be potential cover crops grown in systems that also contain yams. Their parasitic activity caused root lesions and a reduction in plant biomass, which could be a contributor to plant yield. Yam is the main host of *S. bradys*, but the nematode is also parasitic on other crops such as sesame, cowpea, melons (Adesiyan, 1976; Bridge *et al*., 2005), and potatoes (Coyne and Claudius-Cole, 2009). Reduction of plant weight has not been reported in yam plants infested with *S. bradys*, although the nematode contributes to inhibition or delay in sprouting when untreated tubers or setts are planted (Claudius-Cole *et al*., 2004), and can affect tuber yield of some varieties at harvest (Baimey *et al*., 2009). A related species, *S. cavenessi*, has also been linked with reduced shoot and root weight of soybean and peanut (Germani, 1981).

Scutellonema bradys was endoparasitic on the majority of the cover crops in this study. The results from this study suggest that *T. erecta*, *A. histrix*, *C. pubescens*, *P. phaseoloides*, and *M. pruriens* are poor hosts of *S. bradys* based on low root populations and reproductive factors in both trials using the host status rating of Adesiyan (1976). The response of *C. cajan* varied in both trials but fell within the range of a poor to moderate host, which was similar to the finding of Adesiyan (1976). Conversely, *C. ochroleuca*, *C. juncea*, and *L. purpureus* had similar host response to *V. unguiculata*, the susceptible control crop, implying that they are good hosts of *S. bradys*. While there is not much information in the literature on using cover crops for controlling *S. bradys*, Garrido *et al*. (2008) demonstrated effective control of *S. bradys* with *C. cajan* and *C. juncea*. Carmo *et al*. (2014) reported that final populations of *S. brady*s were reduced by *C. cajan* and *C. juncea*, although a high population penetrated into roots.

Tagetes erecta, *S. guianensis*, and *C. cajan* did not permit the completion of the life cycle of *S. bradys* during the 45-d duration of our study. The life cycle of the nematode was lengthened by up to 12 d in roots of *C. pubescens*, *A. histrix*, *M. pruriens*, and *P. phaseoloides* compared to susceptible *V. unguiculata*. This further explains why *S. bradys* was significantly reduced in the roots of some of the cover crops. The life cycle of *S. bradys* in yams is 21 d (Kwoseh *et al*., 2002). The life cycle of *S. bradys* was completed in 26 d in the roots of the susceptible cowpea crop, the shortest time in which the nematode completed its life cycle compared to the other crops. However, the life cycle was not significantly shorter in roots of both *Crotalaria* species and *L. purpureus* than in cowpea.

Various cover crops have been used successfully for the control of plant-parasitic nematodes, and one of the suggested mechanisms of control is the presence of nematostatic and(or) nematotoxic substances (Wang *et al*., 2002; Jourand *et al*., 2004). In addition, some plants are non-hosts because they lack substances required for the nematode to develop or molt to the next stage (Huang, 1985; Silva *et al*., 2013). In this study *C. cajan*, appeared to allow reproduction of *S. bradys* in the host status study, however, in the biology studies, it acted as a trap crop by permitting rapid root penetration but extending, and even truncating, the life cycle of the nematode. This result is in agreement with the findings of Carmo *et al.* (2014) who stated that *C. cajan* behaved as trap plants because large numbers of *S. bradys* penetrated their roots but populations decreased over time.

The body size of *S. bradys* emerging from roots of cover crops in this study was reduced in those crops designated as poor hosts Nutritional factors are important in the development of nematodes, with adult nematodes in less susceptible crops being relatively smaller than those in more susceptible crops (Davide, 1980). This is illustrated by the finding of Yeates (1987), who stated that progenies of a single egg mass of *Meloidogyne* spp., when raised on different plants, show a range in size of both juveniles and females.

Various studies have been conducted on the biology of *S. bradys* with focus on evaluation on the host range and host status of various plants to the nematode (Adesiyan, 1976; Adegbite *et al*., 2005; Kwoseh, 2008; Carmo *et al*., 2014). Recently, *S. bradys* was reported as parasitic on potatoes for the first time (Coyne *et al*., 2011). The pathogenicity of various isolates have been evaluated for aggressiveness (Coyne *et al*., 2012). This study contributes to the information on the biology of *S. bradys* by providing insight into the generation time in various crops, demonstrating how the life cycle can be truncated or lengthened by cover crops, and providing information on cover crops with potential for *S. bradys* management in the yam cropping system.

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