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Short communication

Doruwa (*Parkia biglobosa*) fruit husk and hyptis (*Hyptis spicigera*) leaves for controlling root-knot nematodes (*Meloidogyne incognita*) in tomato (*Lycopersicon esculentum* Mill C.V.)

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Abstract

A pot culture study to determine the efficacy of a mixture of dried and pulverized *Parkia biglobosa* fruit pulp and *Hyptis spicigera* leaves for controlling root-knot nematode in tomato 'Roma King' was carried out at Mubi, Adamawa State (Nigeria) between June to December 2004. Tomato plants inoculated with *Meloidogyne incognita* eggs and grown on media containing 10, 20, 30, 40, and 50 g of the mixture per pot (5 kg soil) had significantly ($p< 0.05$) lower root galls than the control. Taller shoots, more leaves, and greater number flowers and pods were also recorded in the 10 g soil treatment, implying its advantage over other levels.

Keywords: Gall, Nematicides, Plant extracts, Parasites.

Root-knot nematode (*Meloidogyne incognita*) is an important crop pest in Nigeria as elsewhere in the tropics. Babatola and Omotade (1990) estimated a 69% drop in cowpea yield and Wilson (1962) reported approximately 75% reduction in tomato yields because of this pathogen. Among the different methods for plant parasitic nematode control, use of chemical nematicides is perhaps the most effective and reliable (Olabiyi et al., 1992). The high cost, non-availability of the chemical nematicides when needed, and the hazardous nature, besides the requirement of skilled labour for application, however, discourage its use especially by the small farmers who produce more than 70% of the food crops in Nigeria. Plants such as doruwa (*Parkia biglobosa*), hyptis (*Hyptis spicigera)* and the like have been reported to exhibit nematicidal properties (Jesse and Jada, 2004). Hence a study was conducted to evaluate the efficacy of preparations involving mixed fruit pulp (husk) of *P. biglobosa* and leaf powder of *H. spicigera* for nematode control in tomato (*Lycopersicon esculentum* Mill C.V).

The research was carried out in the Teaching and Research farm of Adamawa State University, Mubi (10°16N; 13°17E), Nigeria. Fruits of *P. biglobosa* and leaves of *H. spicigera* were collected from the farm. The *P. biglobosa* fruits are long, narrow pods, which become flattened and turn brown or black on ripening; they also contain black seeds embedded in yellow pulp. After removing the seeds, the pulp and leaves of *H. spicigera* were dried on a concrete floor in an open space for four weeks and ground to form a 1:1 mixture. Seedlings of the hybrid tomato cultivar 'Roma King' were raised in a nursery bed for three weeks and transplanted into plastic pots (dia. 25 cm) filled with 5 kg steam sterilized sandy loam soil. The experimental variables included mixing the 1:1 blend of plant parts with the medium at the rate of 10, 20, 30, 40, and 50 g per pot. Each treatment was replicated five times. The pots were arranged in a completely randomized block design in the screen house at the mean temperature of 27°C and were watered daily. The pots containing tomato seedlings were inoculated

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with 1000 *M. incognita* eggs one week after transplanting. For this, eggs of *M. incognita* were extracted from the root galls of an infected tomato plant, which was cultured to increase the nematode counts. Six weeks after inoculation, shoot lengths were measured, and at 8 weeks after inoculation, the number of leaves, flowers, and pods were recorded. After 10 weeks, 30 plants were uprooted and the dry weight of leaves, shoots, and roots were recorded separately after drying in an oven at 60°C until constant weights. The extent of galling was scored on a scale of 0 to 5 where 0 = no galls, 1=1 to 10 galls, 2 = 11 to 20 galls, 3 = 21 to 30 galls, 4 = 31 to 40 galls, and 5 = more than 100 galls. The data were analyzed using ANOVA and the Duncan's (1955) Multiple Range Test was used for mean separation.

The data presented in Table 1 show that the highest shoot length of 61.8 cm was recorded in the 10 g soil treatment. Surprisingly, the lowest length (41 cm) was recorded in the 50 g treatment, which was even lower than the control (49.6 cm). A similar trend was discernible for other growth and yield parameters too, except that the root weight in control was the least. As regards to the number of nematode galls, however, the control treatment showed the highest number of 223 galls with a gall index of 5 and it decreased as the relative proportion of *P. biglobosa* husk+*H. spicigera* leaf mixture in the medium increased. Despite the low growth rates, no root galls were found in the 50 g treatment. The efficacy of *P. biglobosa* husk+*H. spicigera* leaf mixture in suppressing root-knot nematode infection of tomato as indicated by the reduced root galling, better vegetative growth, and improved fruits number implies the presence of certain chemical inhibitory substances in both plants. Previous workers also reported that *P. biglobosa* husk contains alkaloids, saponins, tannins and cardiac glycosides (Achide, 1987) and hyptis contains pentacyclic triterpene (Chopra et al., 1956); besides its leaves have been reported to control *M. incognita* in tomato (Fatoki and Oyedunmade, 1996). Olabiyi et al. (1992) also reported that *P. biglobosa* may inhibit hatching of the *M. incognita* eggs. Overall, soil application of 10 g 1:1 mixture of *P. biglobosa* fruit husk and *H. spicigera* leaf powder in 5 kg medium is effective in controlling the root-knot nematode infestation of tomato. Yet, there is need for more work to characterize the active principles in the two plants that are nematicidal, on which the information available is rather limited.

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Table 1. Effect of soil treatment of mixture of *Parkia biglobosa* fruit husk and pulp powder with *Hyptis spicigera* leaf powder on growth, biomass yield, and number of root galls in tomato cultivar 'Roma King' inoculated with root-knot nematode in Adamawa, Nigeria.

Quantity per pot with 5 kg soil (g)	Shoot length (cm)	Leaves/ plant	Flowers/ plant	Pods/plant	Dry weight (g)			Galls/plant	Root gall index
					Leaves	Shoots	Roots		
Control (O)	49.6^{ab}	59.2^{ab}	6.6^{b}	3.0^{b}	5.7	6.4	3.3^{a}	223.0^{c}	5
10	61.8^{c}	73.8^{c}	7.2^{b}	3.2^{b}	5.8	5.9	6.4^{ab}	63.4^{b}	4
20	54.2^{b}	52.8^{ab}	6.8^{b}	2.2^{b}	4.0	7.0	5.9^{ab}	53.6^{b}	4
30	48.0^{ab}	61.0^{b}	7.4^{b}	1.0^{ab}	5.8	5.3	6.7^{b}	56.4^{b}	4
40	42.8^{ab}	58.4^{b}	2.4^{a}	0.4^{a}	4.0	3.5	6.7^{b}	9.8^{a}	1
50	41.0^{a}	49.6^{a}	3.8^{ab}	0.8^{a}	2.6	2.7	4.6^{ab}	0.0^{a}	0

Means in the same column followed by different superscripts are statistically different; shoot length was measured at six weeks and other parameters at eight weeks after inoculation

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