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Efficacy of Decomposed Organic Cakes Against *Heterodera cajani* Infecting *Cajanus cajan*

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Abstract : Biopesticidal potential of some organic cakes, viz. neem cake, sesamum cake, mustard cake, cotton cake and castor cake at the dose of 3g and 5g/pot were evaluated for the management of *H. cajani.* These cakes were amended well with soil and allow for decomposition. Such type of amended cakes seeds were found significantly effective in plant growth promotion and reduction in nematode population in the following order: neem cake>sesamum cake >mustard cake>cotton cake>castor cake.

Key words : Neem seed powder, Neem bark, Nematode.

Introduction

Pulses are the principle crops of subsistence farming system of India. They occupy an important position in human diet and prove a good source of vegetable protein in the cereal based diets of the people. There are several constraints for the production of pulses and among these, Nematodes are one of major limiting factors affecting production of pulses. The pigeonpea cyst nematode, *Heterodera cajani koshy* is widely prevalent in all major pigeonpea growing region of India. This nematode species causes significant loss in crop yields (Gupta and Edward, 1974; Devi and Gupta, 1991). Several chemicals tested for their management and indiscriminate use lead to their ill effects such as pollution and development of resistance in the pathogens etc. Some organic cakes like neem cake, sesamum cake, mustard cake, cotton cake and castor cake applied at the dose of 3g and 5g per pot amended well with soil, and after decomposition were further tested against *Heterodera cajani*. During decomposition of Neem product ammonia, formaldehyde, phenol and fatty acid produced might be involved in nematicidal properties (Khan *et al*, 1974). Oil seeds cakes (contains about 5% Nitrogen), increased microbial activity in amended soil is known to bring about increased conversion of nitrogen to nitrate form which ultimately increased metabolic activity of plants and then plant growth (Tiyagi and Ajaz, 2004). These organic additives of plant origin, are not only used as potential bio-fertilizer but also as biocontrol due to their facial bio-degradability, selective toxicity only to target pests and the environment as whole and renewable nature, the botanical pesticides offer alternate strategy to prevalence use of synthetic nematicides. Hence, present study was conducted in order to find out environmentally safe method for maintaining the *H. cajani* population below the damaging levels.

Materials and Methods

The study was conducted at Department of Botany, University of Rajasthan, Jaipur under pot condition.

Decomposed Neem products: Powder

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was made of from some dried organic cakes *viz*., neem cake (*Azadirachata indica*), sesamum cake (*Sesamum indicum*), mustard cake (*Brassica campestris*), cotton cake (*Gossypium* spp.) and castor cake (*Ricinus communis*) at the dose of 3g and 5g/pot and mixed well with autoclaved soil and were allow for decomposition before sowing.

Plant culture: Seeds of pigeonpea cv. UPASS-120 were surface sterilized with 0.1% mercuric chloride for 2 minute followed by washing with distt. water. The organic amended soil treated seeds were sown in 15cm clay pot (2 seeds/pot).

***Heterodera cajani* inoculum:** *H. cajani* was collected from a pigeonpea field and multiplied using, its juveniles from single cyst; such cyst undergoes hatching in root exudates. Freshly hatched juveniles were used as a inoculum for each plant. Approximately one thousand (juveniles) J2/pot was poured to seedling one week after germination. Pots were watered periodically and experiment was terminated after 90days. Control pots were maintained with or without nematode and replicated three times.

Observations were recorded on plant height, weight of shoot and root, number of nodules, number of cyst, number of egg/cyst and per cent reduction in disease incidence. All the data collected were analyzed statistically.

Results and Discussion

The preview of the data presented in Table-1, showed that two different doses 3 g and 5 g of decomposed neem cake, sesamum cake, mustard cake, cotton cake and castor cake were found effective against *H. cajani*. A very significant improvement in length and weight of root was maximum (114.89cm & 80.05g) after control in neem cake at the dose 5 g which were statistically superior to mustard cake, castor cake, sesamum cake and cotton cake treated plants. This improvement in plant growth may be due to better soil nutrition status by neem cake (Kumar and Khanna, 2006). Castor cake and cotton cake were observed ineffective in plant growth promotion than those of other employed neem product. Increment in number of nodules was maximum (52.65) in neem cake and in mustard cake (50.96) treatment respectively. Data on number of cysts was 51.12 in neem cake and 56.48 in sesamum cake respective treatments.

Least proliferation of nematodes in the plots treated with neem cake was reported on account of liberation of fatty acid (Sitaramaiah and Singh, 1978) during decomposition, which is detrimental to nematode.

Per cent reduction in disease incidence being maximum in descending order was 51.77%(NC) > 46.71%SC) > 43.25%(MC) > 39.85%(CC) > 33.50%(RC) respective treatment. The neem cake has been noticed to be highly suppressive for Nematode soil population. Our results have been in accordance to the findings of others. (Khan and Rathi, 2001; Srivastava, 2002). So far as dose is concerned, there was always an increase in growth parameters with an increase in dose but both doses were effective enough in managing *H. cajani*. Javed *et al*. (2007) revealed that Neem cake was effective in preventing development of juvenile by inducing defense mechanism in plant which subsequently delayed the development of nematode. The principle of nematode management by the neem cake products can be attributed to the unfavorable conditions in neem amended soil for *H. cajani* which might have subjected to lesser penetration and later retardation in biological activities of nematodes like feeding or breaking and lengthening the life cycle of nematode. As a result of application of neem cake amendments, plant nutrients are released which accelerates root development and overall plant growth, thereby helping the plants to escape nematode attack and growth of pigeonpea.

Table 1 : Efficacy of decomposed oil cakes against *Heterodera cajani* infecting pigeonpea

S No.	Treatments	Dose (gm/pot)	Length (cm)		Fresh weight		Dry weight		Number of nodule/ root	Number of cysts/ root	No. of eggs/ cysts	% Reduction in disease
			Shoot	Root	Shoot	Root	Shoot	Root				
1	Sesamum cake	3	96.78	67.76	56.25	25.05	11.36	5.28	43.76	58.68	166.3	44.64
	(*Sesamum*	5	98.12	70.44	58	28.16	11.85	5.32	46	56.48	164.45	46.71
2	Mustard cake	3	110.4	68.36	65.58	26.72	13.2	5.35	49.12	62.24	162.86	41.28
	(*Brassica*	5	112	69	66.02	28	13.18	5.6	50.96	60.15	160.55	43.25
3	Cotton cake	3	95.93	58.75	55.6	20.25	11.22	4	37.36	65.44	155.88	38.26
	(*Gossypium*	5	96	60.58	56.05	22.15	11.32	4.45	38.82	63.75	154.08	39.85
4	Neem cake	3	114	75.89	66	32.25	13.26	6.55	50.11	53.14	152	49.86
	(*Azadirachta*	5	114.89	80.05	66.75	35.6	13.82	7	52.65	51.12	150.56	51.77
5	Castor cake	3	100.11	56.54	60.06	20.55	12.02	4.16	46.72	72.36	159.05	31.73
	(*Ricinus*	5	101	58.66	60.24	21.98	12.14	4.76	49.18	70.48	156.44	33.5
6	N alone		50.4	38.2	30.78	9.28	6.18	2.18	30.03	110.22	175.96	-
7	Control		138.4	122.15	82	54.8	16.56	10.84	65	-	-	-
	CD@1%		6.8	6.37	5.38	4.13	2.4	1.52	5.56	8.21	8.14	
	CD@5%		5.02	4.7	3.97	3.04	1.77	1.12	4.1	6.06	6	-
	CV		2.91	4.06	3.87	6.68	8.67	12.26	5.22	5.96	2.43	-

SC=Sesamum cake, MC=Mustard cake, Cotton cake, NC=Neem cake, RC=Ricinus cake.

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