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RESEARCH NOTE

Efficacy of organic amendments against root-knot nematode (*Meloidogyne incognita*) on bell pepper in a naturally ventilated poly-house

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ABSTRACT: Studies were conducted on the effect of organic amendments on plant growth characters and reproduction of *Meloidogyne incognita* in bell pepper. Organic amendments *viz*. vermicompost @ 100g/m^2, 200g/m^2, 300g/m^2, poultry manure @ 100g/m^2, 200g/m^2, 300g/m^2, compost @ 100g/m^2, 200g/m^2, 300g/m^2, and neem cake @ 300g/m^2 were used and suitable control was also maintained for comparison. Observations on plant growth characters (shoot and root length, shoot and root weight) and nematode reproduction factors (number of galls per 5g root, number of egg masses per 5g root, nematode population/200 cc soil) and yield kg/plant were recorded. Neem cake @300g/m^{2}was found to be the best treatment in improving plant growth characters, yield and reducing nematode reproduction on bell pepper.

Keywords: *Meloidogyne incognita*, bell pepper, organic amendment, polyhouse

Bell pepper (*Capsicum annuum* L.) is an important vegetable crop cultivated in several tropical and subtropical regions both for green and ripen dry fruits. Bell pepper is cultivated in open field and recently also being grown in poly-house conditions. The major bell pepper producing states in India are Himachal Pradesh, Andhra Pradesh, Odisha, Maharashtra, West Bengal, Karnataka, Rajasthan and Tamil Nadu (Subbiah and Jaykumar, 2009).In rajasthan area under bell pepper production is around 5.40 thousand hectares with annual production of 9.70 million tones (Anonymous, 2016-17). The major bell pepper providing districts of Rajasthan are Jodhpur, SawaiMadhopur, Ajmer, Tonk, Pali, Udaipur and Nagour (Anonymous, 2013). Root-knot nematode, *Meloidogyne incognita* is a major limiting factor in the polyhouse cultivation of *Capsicum*. Studies were conducted during 2017-18 in the poly-house at Rajasthan College of Agriculture, Udaipur (24°34'N and 73°42'E), India to assess the effect of organic amendments on nematode population as well as plant growth in a polyhouse. The size of the poly-house was 28 m × 32 m (896 m^2) covered with aluminate sheet and stabilized low density polyethylene sheet having 200 micron thickness.

The organic amendments (Vermicompost, poultry manure and compost) were applied as soil application. There were 10 treatments including a control (Table 1) and each treatment was replicated three times. The observations were recorded on the plant growth parameters *viz.*, shoot (length, root length, shoot weight and root weight) and nematode reproduction parameters (number of galls per 5g root, number of egg masses per 5g root, nematode population/200 cc soil).The data were statistically analyzed by using standard procedure for analysis of variance of CRD as described by Panse and Sukhatme (1989). The results on the effect of different treatments on oplant growth parameters are presented below (Table 1).

Shoot length (cm): Data showed that all organic amendments increased the shoot length significantly compared to control. The maximum shoot length was recorded in neem cake @300g/m^2 (120.67 cm) followed by poultry manure @ 300g/m^2 (116.33 cm) and vermicompost @ 300g/m^2 (111.67 cm).

Shoot weight (g): The highest shoot weight was recorded in neem cake @ 300g/m^2 (180.00cm) followed by poultry manure @ 300g/m^2 (175.00 cm) and vermicompost@ 300g/m^2 (168.00cm). While lowest shoot weight (130.00 cm) was recorded in control.

Root length (cm): Organic amendment influenced the root length significantly as compared to control. the maximum root length was recorded in neem cake @ 300g/m^2 (23.33 cm) followed by poultry manure @ 300g/m^2 (22.67 cm) and vermicompost @ 300g/m^2 (21.00 cm).

Root weight (g): The maximum root weight was recorded in neem cake @300g/m^2 (20.00 cm) followed by poultry manure @ 300g/m^2 (19.67 cm) and vermicompost @ 300g/m^2 (18.00 cm) while the minimum root weight (8.00g) was recorded in control.

Nematodes Reproduction

Number of galls/5 g root: Results revealed that the number of galls produced by *M. incognita* on bell pepper was reduced significantly with addition of amendments.

Table 1. Effect of organic amendments against root-knot nematode, *M. incognita* on bell pepper

Treatment	Shoot length* (cm)	Root length* (cm)	Shoot weight* (g)	Root weight* (g)	No. of galls/5g root**	No. of egg masses/5 g root**	Nematode population/ 200 cc soil**	Yield kg/ plant
Vermicompost @ 100 g/m^2	85.00	14.33	142.00	11.33	41.67	38.33	1560.00	1.18
Vermicompost @ 200 g/m^2	97.33	18.00	154.33	14.33	38.00	34.67	1485.00	1.55
Vermicompost @ 300 g/m^2	111.67	21.00	168.00	18.00	30.33	27.33	1390.00	2.30
Poultry manure @ 100 g/m^2	88.00	15.00	146.67	12.33	40.33	37.00	1536.00	1.30
Poultry manure @ 200 g/m^2	106.00	20.33	160.33	17.00	36.67	31.00	1435.00	2.08
Poultry manure @ 300 g/m^2	116.33	22.67	175.00	19.67	27.00	23.00	1365.00	2.46
Compost @ 100 g/m^2	83.67	13.00	138.67	10.55	43.67	39.00	1595.00	1.0
Compost @ 200 g/m^2	92.33	17.67	150.00	13.00	39.00	36.33	1510.00	1.40
Compost @ 300 g/m^2	101.00	19.00	157.47	15.00	37.67	32.67	1455.00	1.80
Neem cake @ 300 gm^2	120.67	23.33	180.00	20.00	25.33	21.00	1320.00	2.55
Control	80.00	9.67	130.00	8.00	46.00	42.00	1653.00	0.98
SEm+	0.955	0.124	1.421	0.145	0.338	0.332	14.554	0.013
CD 5%	2.800	0.363	4.167	0.427	0.990	0.974	42.685	0.039

INP-Initial Nematode Population 620 J_2/ 200 cc Soil
*****Increased Plant Parameter over Control (%), ****** Reduction Nematode Reproduction over Control (%)

Among different organic amendments, minimum number of galls per 5g root observed in neem cake @300g/m^2 (25.33) followed by poultry manure @ 300g/m^2 (27.00) and vermicompost @ 300g/m^2 (30.33).

Number of egg masses per 5 g root: Data revealed that the number of egg masses per 5g root were reduced significantly by neem cake @300g/m^2 (21.00) followed by poultry manure @ 300g/m^2 (23.00) and vermicompost @ 300g/m^2 (27.33) and the maximum number was observed in control (42.00).

Nematode population per 200cc soil: Nematode population significantly low (1320.00/200 cc soil) in neem cake @300g/m^2 followed by poultry manure @ 300g/m^2 (1365.00) and vermicompost @ 300g/m^2 (1390.00).

Yield: Soil application of organic amendments had significant influence on the yield of bell pepper under poly-house condition. Result revealed that highest yield (2.55kg/plant) recorded in Neem cake @300g/m^2 follo wed by poultry manure @ 300g/m^2 (2.46kg/plant) and vermicompost @ 300g/m^2 (2.30 kg/plant) and minimum was recorded in control (0.98kg/plant).

Among organic amendment neem cake @ 300 g/m^2 was found to be the most effective in terms of improving plant growth parameters and reducing nematode population followed by poultry manure @ 300 g/m^2. Similar results were recorded with shoot weight, root weight, root length, yield kg per plant and nematode reproduction. Research finding are in agreement with the results of Seenivasan (2010) who experimented the efficacy of locally available organic amendments such as neem cake, castor cake, pungam cake and vermicompost against *M.*

incognita in medicinal *Coleus* under glasshouse and field conditions found neem cake was significantly superior in reducing the nematode population and increasing growth and yield. Jagadeeswaran and Singh (2011) also reported that soil application of organic amendments significantly reduced nematode population and increased the plant growth compared to inoculated control.

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