plant, pod size with consequent enhancement of karnel yield in groundnut with the application of IAA.

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Table 1 Effect of different plant growth regulators on plant height, yield attributes, yield and economics of linseed

Treatment	Plant height (cm)	Primary branches/plant	Capsules/ Plant	Seed yield (kg/ha)	NMR (Rs/ha)	B:C
Auxin 1.0 ppm	73.37	4.87	29.00	1022	22127	1.18
Auxin 2.0 ppm	74.23	5.00	30.27	1087	26023	1.57
GA 200 ppm	75.73	4.87	33.53	1123	18580	0.75
GA 400 ppm	76.80	4.93	36.60	1297	20553	0.66
Salicylic acid 75 ppm	69.93	4.33	27.60	987	20753	1.11
Tebuconazole 0.1%	71.70	4.60	26.20	1040	21652	1.09
Auxin 1.0 ppm + GA 200 ppm	75.03	4.93	34.80	1214	23447	0.79
Control	71.17	4.33	25.13	953	19797	1.08
CD (P=0.05)	3.88	0.49	2.88	154	-	-

Effect of neem cake in the management of root knot nematode

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ABSTRACT

Neem enrichment extract (NEE) was used at different concentrations *viz*., 0, 2.5, 5 and 10% to check its effect on second stage juveniles of *Meloidogyne* spp. Root knot nematode bio-assay in Petri Plates as well as in pot culture experiments were carried out with NEE.The results indicated that neem cake extracts was effective to control the root knot nematodes due to the presence of biological substance (azadirachtin, salannin, nimbin) and its derivative compounds (triterpenoid, limonoid).

Keywords: Management of nematode, Neem enrichment extract, Root knot nematode

INTRODUCTION

Neem cake is used to enrich the soil, ward off nematodes and control insect pests. Nortriterpenoids and isoprenoids are the nematicidal compounds present in the neem cake, which protect the crops against nematodes and other infections. The best effects are obtained when it is applied during the early crop cycle. Nematode control has traditionally been accomplished with the aid of synthetic or chemical insecticides. However, as we are aware, employing the chemicals repeatedly had a negative impact on our food chain. Chemical pesticides are expensive as well. Neem cakes seem to be one of the most promising organic alternatives to combat nematodes in this regard.

MATERIALS AND METHODS

About 100 g of neem cake was grinded and soaked into 200 ml of 96% alcohol for 4 h and then extracted by filtering the solution 4 times through the sterilized millipore 0.45µm filter, the rest was discarded. All filtrations were mixed up together and vacuum extracted by rotation of the obtaining solution. About 100 ml of neem enrichment extract (NEE) was taken and prepared at

different concentrations *viz*., 0, 2.5, 5 and 10% (Vu Van Do, 2007). Second stage juveniles of *Meloidogyne* spp. were collected from the pure culture maintaining in tomato roots and the juveniles were extracted through modified Baermann funnel method. For the root knot nematode bio-assay, two ml of the different concentrations (2.5, 5 and 10%) of the neem cake extract were separately poured into Petri dishes and to the Petri dish about 2 µl of nematode suspension containing about 100 J_2 / 2 µl were added. All treatments were replicated three times in CRD. The Petri dishes were incubated at room temperature. Per cent mortality was calculated after 12, 24 and 48h of incubation. Mortality data collected were the data were subjected to ANOVA SPSS 16 software. For the pot culture experiment, ground neem cake was thoroughly mixed with sandy clay loam soil (51% sand, 15% silt and 34% clay; pH 7.8 and organic matter of 0.73%) at 2.5, 5 and 10% in 15-cm clay pots. Pots without amendments were kept as control. All pots were arranged in a completely randomized block design on a bench in a greenhouse that averaged 27°C minimum and 32°C maximum temperature. Each treatment was replicated five times. The pots were watered daily to ensure proper decomposition of organic matter. After 2 weeks, 15 day old tomato seedling was transplanted into each pot. The plants were then inoculated with 2,000 J_2 of *M. incognita* after 48 h. The control treatments received sterile distilled water of a volume equal to that of the inoculum suspension. Plants were uprooted 30 days after inoculation of nematodes and the growth parameters of plants were recorded. The number of galls/root system, egg mass/ root system, eggs/egg mass and soil population was also counted.

RESULTS AND DISCUSSION

The effect of neem cake on the J_2 of *Meloidogyne incognita* (Fig. 1) reported the mortality of 90 and 100% after 12 and 24 h of exposure exposed in 5% concentration, respectively. At 2.5% concentration, the mortality of *M. incognita* juveniles was nearly 80% after 48h of incubation. This study proved that the neem cake has a stronger potential to suppress the juveniles of *Meloidogyne incognita* due to the presence of bioactive substances present in them. These substances are regarded as the key elements in nematode management, which can be further explored for the preparation of effective compounds to control nematodes.

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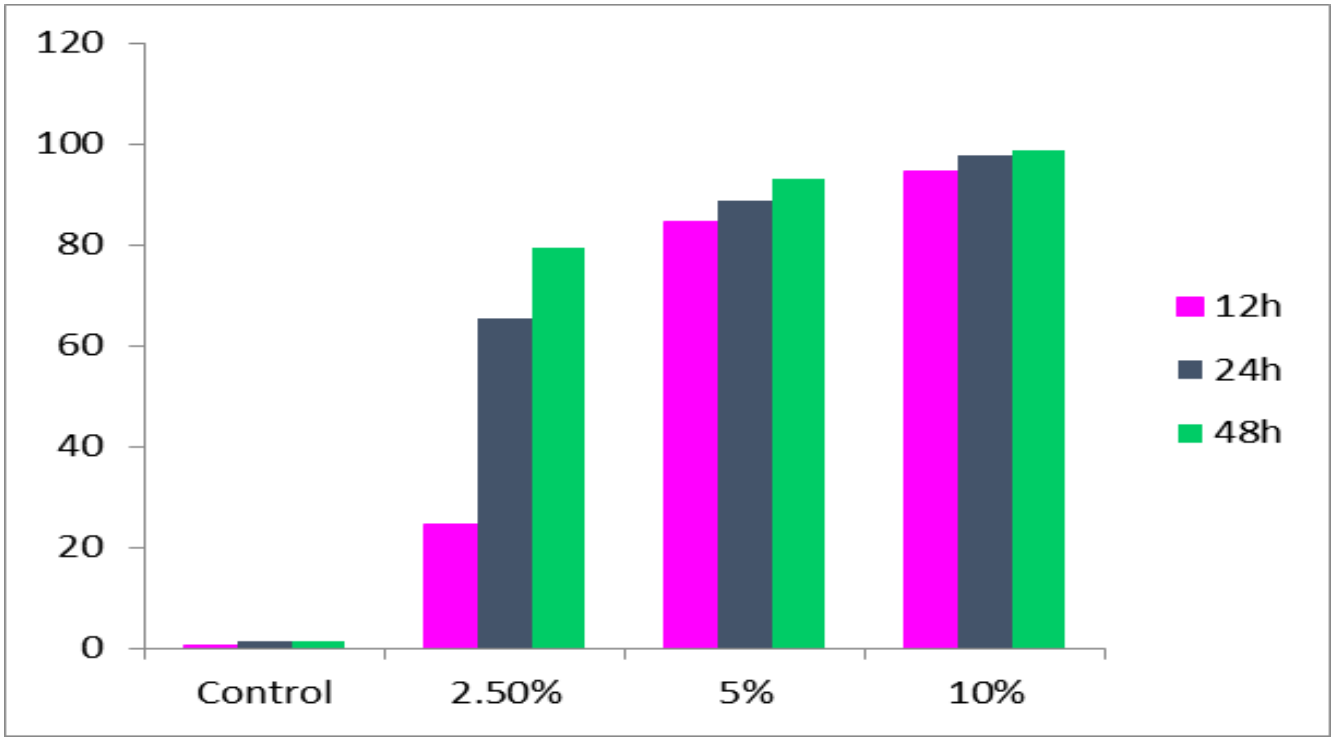

Fig. 1. Per cent juvenile mortality of root knot nematode treated with neem cake

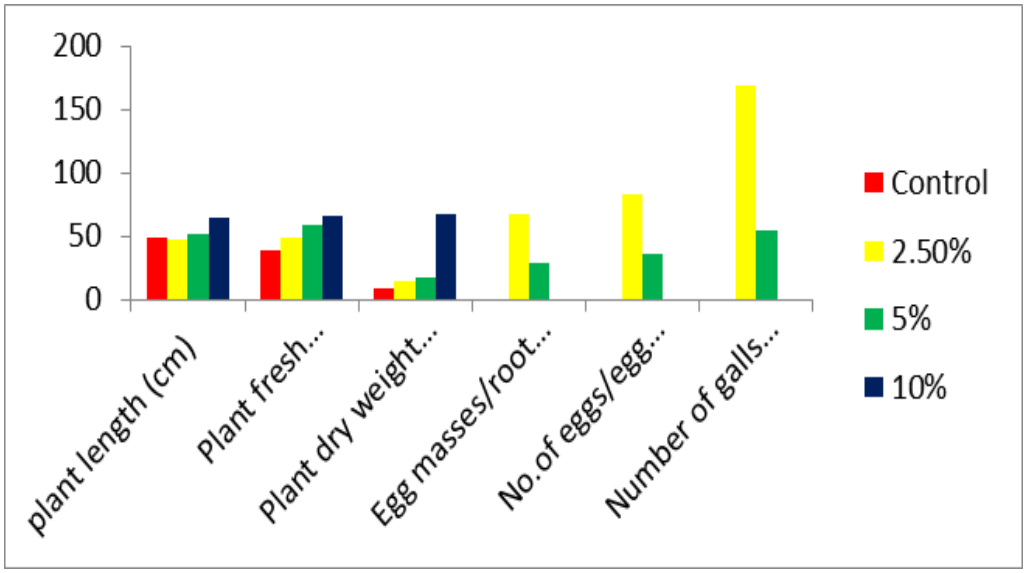

Fig. 2. Effect of neem cake on plant growth parameters and root population of nematode

Field evaluation of *Bt* 127SC formulation for efficacy against Lepidopteran larvae infesting soybean under Manipur conditions

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ABSTRACT

Bt 127 SC formulation supplied by the Indian Institute of Oilseeds Research, Hyderabad was field tested at Imphal (Manipur) during *kharif* 2018 - 2020 against lepidopteran larvae infesting soybean.Two spray applications of *Bt* 127 SC formulation @ 3 ml/litre of water was observed to be less superior to commercial synthetic insecticides but at par with *Bt* commercial delfin in reducing bihar hairy caterpillar (BHC) and bean leaf webber and comparatively similar in efficacy with the synthetic insecticides in reducing tobacco caterpillar.

Keywords: *Bt* 127SC formulation, Bihar hairy caterpillar, Bean leaf webber, Lepidopteran defoliators

Soybean [*Glycine max* (L.) Mirrill] is a unique crop with high nutritional value containing about 40-42 per cent protein and 20-22 per cent oil. About 70% soybean production in Manipur is used for the production of a fermented food item known as *Hawaijar*. The region is a great biodiversity hotspot and the agro climatic conditions are very conducive for the growth and multiplication of many species of insect pests (Azadthakur *et al.*, 1987). Indiscriminate use of pesticides has led to problems of pest outbreak, development of resistance, elimination of natural enemies, risk to human and animal health and environmental pollution. This scenario facilitated the search foralternative tactics to manage the pests.

MATERIALS AND METHODS

Field studies on the efficacy of *Bt* 127SC formulation for efficacy against lepidopteran larvae viz, bihar hairy caterpillar (BHC), bean leaf webber and tobacco caterpillar which are voracious defoliatorof soybean in Manipur was undertaken at Central Agricultural University, Imphal during three consecutive *kharif* season of 2016 – 2018 by raising recommended soybean variety, JS-335. All the recommended agronomic practices were followed to grow the crop. The formulation was compared with *Bt* commercial Delfin along with recommended chemical insecticides viz., Indoxacarb 15.8SC, Quinalphos 25EC and Chlorantraniliprole 18.5SC. Two spray applications of each treatment were given at 30 days and 50 days after sowing and observations on insect population were recorded at pre-treatment, 3 and 7 days after each treatment. Yield data (kg/ha) was recorded at harvest.

RESULT AND CONCLUSION

Based on the results of three years, it can be inferred that 2 spray application of *Bt* 127 SC @ 3 ml/litre was less