

Effect of Neem extracts for controlling flea beetle (*Phyllotretacruciferae*) in radish (*Raphanussativus*)

Extended Abstract

MMS Jayathilaka¹, RDN Debarawatta, SJBA Jayasekera

Background

Radish (*Raphanussativus*) which belongs to family Brassicaceae is a popular root vegetable grown in Sri Lanka throughout the year. It can be successfully grown in both tropical and temperate regions. Radish is rich in vitamin A, B, and C. In Sri Lanka during 2013/2014 Maha season the extent of radish cultivation was 1,122 ha and the production was 10,446 Mt. Flea beetle (*Phyllotretacruciferae*) is the most common and destructive pest of radish (Bohinc and Trdan, 2012). Adult *Phyllotretacruciferae* feeds on cotyledons and developing leaves and stems of seedlings, leading to loss of photosynthetic capability and it leads to plant death (Tangtrakulwanichet *al.*, 2014).

Application of broad spectrum insecticides is one of the control measures of *Phyllotretacruciferae* by farmers. However, there is a chance of consuming the chemical residues within the crop when the inorganic pesticide application is done to control the pest. Therefore application of organic pesticides would be suggested as an important ecofriendly pest management method for radish. Variety of Neem based products are used as insecticides, pesticides, fumigants, and fertilizers etc. Further, neem can be more economically viable pest controlling method for family brassicaceae crops.

Objective

The objective of this study was conducted to investigate the effect of different Neem based pesticides to manage *P. cruciferae* population in *R. sativus*.

Materials and Methods

Experimental Site

The experiment was carried out at the Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka. The experiment was carried out from January to April 2016.

¹ Department of Horticulture and Landscape Gardening, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka

Crop Establishment and Maintenance

Land was ploughed to 30-40 cm depth. Fifteen raised beds (2×2 m) were prepared and before sowing the seeds organic and inorganic fertilizers were incorporated according to the recommendations of the Department of the Agriculture. Thinning out was done twenty days after seed sowing.

Preparation of Neem Pesticides

Neem Seed Extract

Neemseeds (50 g) were taken and seed coat was removed. Seeds were pounded gently without coming the oil to outside. Neem seed powder was gathered in a muslin pouch and soaked three days in 750 mL of water. The pouch was squeezed and the extract was filtered. The filtered was volume up to 1000 mL. Soap was added as an emulsifier. (1 mL of emu. / 1 L of water; Sridhar and Vijayalakshmi, 2002).

Neem Leaf Extract

Neemleaves (200 g) were taken and soaked three days in 750 mL of water. Water soaked leaves were grounded and the extract was filtered and volume up to 1000 mL. Soap water was added as an emulsifier. (1 mL of emu. / 1 L of water; Sridhar and Vijayalakshmi, 2002).

Treatment Application

Two Neem based pesticides with control were applied as treatments at 5 day intervals. Treatments were T₁- Neem Seed Extract, T₂ - Neem Leaf Extract and T₃ - Control (Tap water).

Data Recording and Data Analysis

Before and after applying the Neem pesticides, damage severity was detected in 50 randomly selected plants from each treatment. Further, leaf length, leaf fresh weight, leaf dry weight, tuber length, tuber diameter, tuber fresh weight and tuber dry weight were collected from twenty randomly selected plants from each treatment in each replicate. The data obtained from experiment was statistically analyzed using Minitab 16 software and mean separation was done using turkey t test. The damage severity was statistically analyzed by Kruskal – Wallis test using Minitab 16 software. Cost for Neem extract preparation per hectare was calculated.

Results and Discussion

According to the results, no significant differences were observed between T_1 and T_2 in tuber length, diameter, fresh weight and dry weight while, there was a significant difference T_1 , T_2 with control. Further, the highest tuber fresh weight, dry weight and diameter were recorded in Neem seed extract treated plants (Table 1). Further, there were no significant differences were observed in T_1 and T_2 of leaf length, leaf fresh weight and leaf dry

Cost Analysis

According to the cost analysis, cost for Neem seed extract was higher than the leaf extract (Table 2).

Conclusions

Neem seed extract can be used to manage scales, thrips, whiteflies and mealy bugs organically than the Neem leaf extract. Though both Neemseed and leaf extracts are effective in managing flea beetle

Table 1. Yield parameters of tubers, leaves and damage severity of tested pesticides

TRT	Yield parameters of tubers			
	LEN (cm)	DIA (mm)	FWT (g/plant)	DWT (g/plant)
T 1	12.5 ^a	16.1 ^a	23.2 ^a	1.5 ^a
T 2	11.1 ^{ab}	15.1 ^a	19.1 ^a	1.3 ^a
T 3	9.2 ^b	8.5 ^b	6.8 ^b	0.5 ^b
R-Sq	7.9	16.9	15.9	11.5
P Value	-	-	-	-

Yield parameters of leaves			Damage Severity	
LEN (cm)	FWT (g/plant)	DWT (g/plant)	Median	Average Rank
21.3 ^a	30.6 ^a	3.4 ^a	0.000	52.4
19.8 ^a	26.8 ^a	2.7 ^a	0.000	62.8
13.7 ^b	13.1 ^b	1.0 ^b	1.000	111.3
34.8	17.5	29.5	-	-
-	-	-	0.000	-

Keywords: Neem leaf extract, Neem seed extract, *Phyllotretacruiferae*, *Raphanussativus*

References

Bohinc, T. and Trdan, S. (2012). Trap crops for reducing damage caused by cabbage stink bugs (*Eurydemasp.*) and flea beetles (*Phyllotretasp.*) on white cabbage: fact or fantasy. *Journal of Food, Agriculture & Environment*, 10 (2):1365 - 1370.

weight while, the highest leaf fresh weight and dry weight and length were recorded in Neem seed extract treated plants (Table 1).

Significant difference was observed in damage severity among the treatments ($0.05 > P$). According to the median values both seed extract (T_1) and the leaf extract (T_2) can be used to manage flea beetle population when compared with the control (T_3). But, T_1 recorded the lowest average rank. (Table 1).

in radish, Neem seed extract recorded less damage over Neem leaf extract. Although the cost for preparation of Neem seed extract is higher, it can be used to manage flea beetle successfully. Therefore, farmers are advisable to use Neem seed extract in managing flea beetle in radish as an environmental friendly management method.

Means in a column with same letters are not significantly different at 0.05 level. TRT- Treatment, LEN- Length, DIA- Diameter, FWT- Fresh weight, DWT- Dry weight, T_1 - Neem seed extract, T_2 - Neem leaf extract, T_3 - Control (Tap water), Significantly different at the $p < 0.05$ level.

Table 2. Cost analysis for extracts

Ingredient	Rate (kg/ha)	Cost/ha (Rs.)
Neem seeds	20	4000.00
Neem leaves	30	0000.00

Sridhar, S. and Vijayalakshmi, K. (2002). *Neem: A user's manual*. CIKS, Chennai, 24-25.

Tangtrakulwanchi, K., Reddy, G.V.P., Shaohu, W.U. and Miller, J.H. (2014).

Developing nominal threshold levels for *Phyllotretacruiferae* (Coleoptera : Chrysomelidae) damage on canola in Montana, USA. *Journal of Crop Protection*, 66, 8 – 13.