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Eco friendly management of banana scarring beetle, *Basilepta subcostatum* (Jacoby) in North Bihar

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Abstract:- A field survey was conducted during 2017-18 in North Bihar, to study the status of Banana growers and their cultivation practices. It has been found that the infestation of *Basilepta subcostatum* (Jacoby) beetle is one of the most important beetles damaging the crop in the region. The study indicated that different chemical and biological pesticides are used in the different stage of infestation. The weather condition also plays an important factor in the intensity of the infestation. It has been found the Entomopathogenic fungus (*Beauveria bassiana*) and three neem products, chemical pesticides azadirachtin (5ml/L) were highly effective. The fruit damage, beetle population, number of scars, pulp-skin ratio, TSS and benefit-cost ratio was measured. The findings suggested that an eco- friendly management strategy can be developed by including these products.

Key words: Banana, scarring beetle, *Basilepta subcostatum*, neem

INTRODUCTION

Banana (*Musa sapientum*) is an important fruit crop in India. Bananas are grown in more than 150 countries, producing 105 million tones of fruit per year. The global production of banana is around 10,20,28,17 thousand tons of which India contributes 29.19%. India has been predominantly agrarian economy since time immemorial. Development efforts over the last four decades have doubtless strengthened our industrial base. However, agriculture continues to be mainstay of our economy even today. Agriculture generates around 16 per cent of national income and provides livelihood to over 64.5 per cent of

rural manpower. In agriculture, the production of fruits and vegetables are of so vital importance that it provide three to four time more income than cereals per unit of land.

The fruit crops hold a great promise for accelerating income of the farmers. Realizing the importance of fruit cultivation many farmers are diverting their resources towards plantation of fruit crops. Area under fruit crops is, therefore, increasing day by day. In the scenario of declining land and water resources, climate change and increasing population, the food and livelihood security are the challenge which have received worldwide attention. Among them Banana has emerged as an important versatile Fruit crop providing nourishment to millions of people, source of medicinal value, and generation of livelihood

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through production, processing and marketing. Bihar state has achieved dominance in banana production which has been possible through concerted efforts by the research, farmers and government policies.

In Bihar state, there are two distinct banana growing areas viz. old Vaishali region and new North- Eastern (Kosi) region, both of the regions are endowed with congenial climatic conditions favorable for growth and development of banana. It is an important source of income for small as well as large farmer who produce it either on small or large areas.

Recently, the demand for banana is increasing and area under the crop in the state has undergone large expansion in last 20 years. There are number pests on Bananas have been found associated with banana in India from planting to harvesting.¹ Of these, banana scarring beetle, *Basilepta subcostatum* Jacoby has been considered as the most serious one in different parts of the country. It causes extensive damage to leaves as well as fruits during summer and kharif season.² The extent of damage has been reported to be approximately 30 per cent of the banana

bunches during rainy season in Bihar³⁻⁶ but no systematic efforts have been made to study the efficacy of insecticides and biopesticides applied through foliar and whorl application against this pest on banana in Bihar. Hence, the present investigations were undertaken to find out a suitable eco-friendly measure against this insect.

MATERIALS & METHODS

A field survey was conducted during 2017-18 to study the cultivation practices adopted by the farmers and method to control the scarring beetle, *Basilepta subcostatum* Jacoby. Population of the beetle was recorded before and after application of the pesticides on plants. Similarly number of scars on leaves in treated and untreated plants was also recorded from 5 sq. cm. on youngest leaf at three different locations. Observations pertaining to the number of healthy and infested fingers/bunch data were used for computing the mean (%) finger infestation. The efficiency of different treatments was also recorded in terms of pulp-skin ratio, TSS (°B) and benefit- cost ratio.

RESULTS & DISCUSSION

Table 1. Relative efficacy of biopesticides and neem products against scarring beetle (*Basilepta subcostatum*) on banana

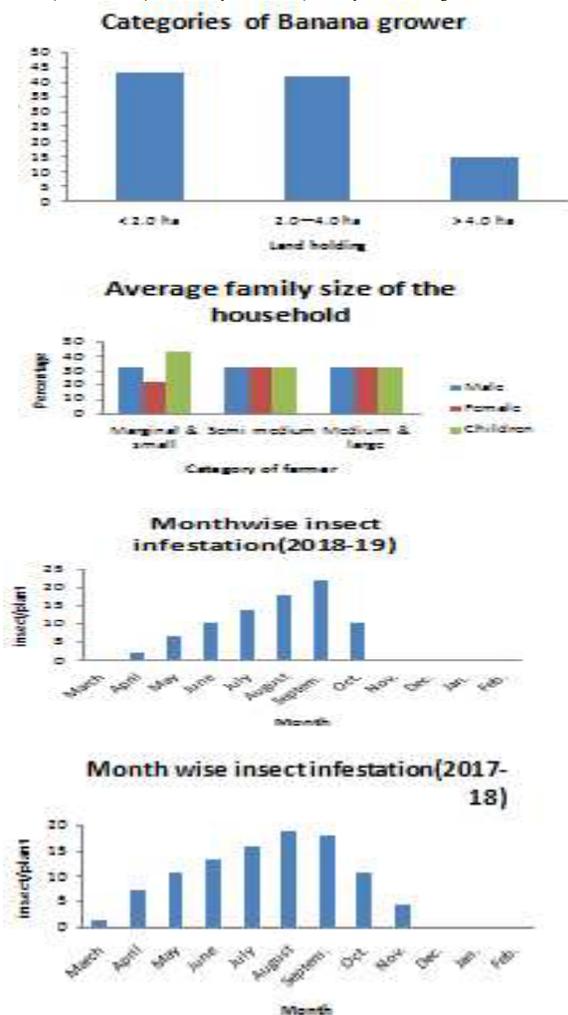
Treatment	No. of scarring beetles / plant	No. of scars/ 5 cm ² leaf surface	Mean fruit infestation (%)	Bunch weight (Kg/ plant)
Azadirachtin (0.15%) @ 5ml per litre of water spray	9.89	11.89	18.58	14.74
Azadirachtin (0.15%) @ 5ml per litre of water whorl application banana heart	10.64	13.56	21.49	14.33
Neem oil (2%) spray	10.44	13.31	21.01	15.54
Neem oil (2%) @ 20ml whorl application per banana heart	11.14	13.67	21.88	13.69
NSKE (5%) spray	12.35	14.81	23.33	13.63
NSKE (10%) spray	11.40	14.56	22.51	14.44
<i>Beauveria bassiana</i> 5g/litre spray	7.44	9.75	14.68	16.40
Carbaryl (0.3%) spray	5.48	7.65	9.71	17.42
Untreated	19.01	21.21	78.67	12.14

Table 2. Influence of different eco-friendly measures on pulp: skin ratio, TSS (°B) and benefit; cost ratio of banana

Treatment	Pulp-Skin ratio	TSS (°B)	Benefit-Cost ratio
Azadirachtin (0.15%) @ 5ml per litre of water spray	3.26	20.85	3.25
Azadirachtin (0.15%) @ 5ml per litre of water whorl application banana heart	3.22	20.15	3.13
Neem oil (2%) spray	3.24	20.21	3.48
Neem oil (2%) @ 20ml whorl application per banana heart	3.19	20.02	2.95
NSKE (5%) spray	3.17	19.74	2.93
NSKE (10%) spray	3.18	19.91	3.17
<i>Beauveria bassiana</i> 5g/litre spray	3.32	21.08	3.73
Carbaryl (0.3%) spray	3.42	22.11	4.02
Untreated	3.06	19.56	2.50

The result have been presented according to size group of banana grower; i.e. marginal & small (with less than 2.0 ha of operational land), semi-medium (with land between 2.0 to 4.0 ha of operational land) and medium & large (with more than 4.0 ha of operational land) because of their distinctly different farm resources and decision making capabilities. Though the farmers have been classified into five categories; viz. marginal (less than 1.0 ha), small (1.0-2.0 ha), semi-medium (2.0-4.0 ha), medium (4.0-10.0 ha) and large (more than 10.0 ha) farmers. The present analysis has been conducted by grouping marginal & small (less than 2.0 ha) and medium & large (more than 4.0 ha) as one group due to similar nature of other resources at their hand and decision making.

The classification of sample banana grower reveals that the sample (60) includes 26 (43.33 per cent) of the marginal and small category of farmers, while semi-medium and medium & large category includes 25 (41.67 per cent) and 9 (15.00 percent) respectively.

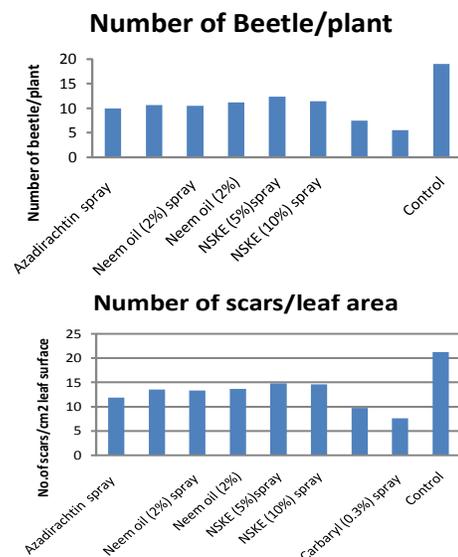


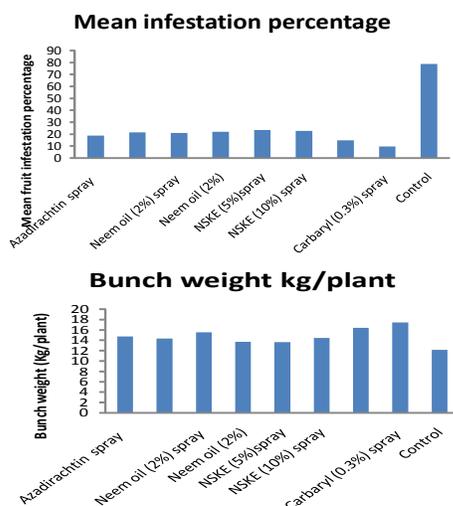
The composition of the farm family and the education level was found that the average size of the family of three categories of farm families was 9, 9 and 12, respectively. In terms of the sex-wise composition of the family, it includes 3 male members, while female and children member included 3 and 4 on an overall basis with a total number of members as 10.

The illiteracy (11.54 per cent) was found in marginal & small category growers only. In terms of graduate & above level of education, medium size growers had highest (33.33 per cent) proportion, while the semi-medium farmers with 24.0 per cent. The higher secondary level was highest (36.0 per cent) under semi-medium category, while high school (38.46 per cent) on marginal and small category.

The operational land holding size ranged between 1.52, 3.14, and 8.55 ha among three categories of farms with overall mean as 3.16 ha. The table reveals that a few marginal & small farmers took land on lease, while semi-medium and medium & large farmers found leasing out their land, with mean value as 0.03 and 0.04 ha, respectively.

The percentage area under banana cultivation and variety/cultivar reveals that marginal & small farmers devoted maximum (76.64 per cent) area under the banana, while semi-medium and medium & large category growers devoted 56.49 and 42.28 per cent area, respectively, while the reverse order was found with respect to the allocation of the area under other crops. This indicates that because of cash needs & labour intensive nature of crop (banana) marginal & small farmers allotted more area under this crop.





The mean number of beetles on banana after treatment varied significantly in different treatments. All the treatments under the survey found significantly lower level of pest population compared to before treatments. Among types of different treatments, spraying with carbaryl (0.3%) and *Beauveria bassiana* (1.15%) were most effective in minimizing the pest population, recording 5.48 and 7.44 adults/plant, respectively. The use of azadirachtin (0.15%), neem oil (2%) (Pouring and spray), neem seed kernel extract (NSKE) (5%) and NSKE (10%) spray were found effective in reducing the beetle population recording 9.89, 10.64, 10.44, 11.14, 12.35 and 11.40/plant, respectively. All the neem products viz., azadirachtin, neem oil, NSKE applied either as spray or poured at their test doses showed more or less similar effect recording between 9.89 to 12.35 plant. The neem products proved superior over untreated and at par with each other.

More or less similar observations were recorded in case of number of scars /5 sq. cm leaf surface areas. It reveals that all the treatments recorded significantly lower number of scars (7.75 to 14.81/5 sq. cm leaf surface) compared to untreated plant (21.21). Spray with carbaryl (0.3%) recorded significantly lower number of scars (7.75/5 sq. cm leaf surface) which was statistically at par with spraying *B.bassiana* (1.15%) recording 9.75/5 sq. cm leaf surface.

Spraying of *B.bassiana* was observed to be the second best treatment with pulp-skin ratio 3.32:1. All the neem products were superior over untreated control. Effect of different treatments on TSS (0B) and benefit-cost ratio followed similar trend with carbaryl (0.3%) giving highest value (22.11 and 4.02:1) followed by *B. bassiana* (21.08 and 3.73:1, respectively). The neem products also gave higher

TSS. The present findings are in agreement with the results of earlier worker.^{7,4,6}

It may be concluded that use of eco- friendly pest management strategies including biopesticides and neem products are quite effective against *B. subcostatum* on banana and are comparable with chemical treatment. Further, the present study has given the possibilities of minimizing the frequency of application of synthetic insecticides and encouraging the use of bio-pesticides and phyto-products in IPM strategies in banana.

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