

Original Research Article

Occurrence of Leaf and Fruit Scarring Beetle, (*Basilepta* sp., *Colaspis* sp.) on Banana in Koshi Region of Bihar, India

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ABSTRACT

Keywords

Banana, Leaf and fruit scarring beetle, *Basilepta* sp., *Colaspis* sp., Seasonality

Periodical observations on pest scenario of banana crop in Koshi region of Bihar revealed that banana scarring beetle, *Basilepta* sp., *Colaspis* sp has emerged as key pest in this region. Almost all banana plants were found infested from vegetative to flowering stage. In 2013-14, the highest population (51.32 adult per plant) and the highest scars (57.08 scars/20cm² area of banana) on leaves and fruits were recorded in second fortnight of September, 2013 and lowest population (7.34 adult per plant) in second fortnight of December. In 2014-15, the highest population (68.0 adult per plant) and the highest scars (68.71 scars/20cm² area of banana) on leaves and fruits were recorded in second fortnight of September, 2014 and lowest population (9.24 adult per plant) in second fortnight of December. Leaf scars produced by the infestation of this pest was noticed throughout the year, irrespective of population density of the beetle/ plant however, maximum scars on the leaf and fruit occurred during the month of September, the most rainy month of the year. The infested fruits lost marketability in case of complete damage and fetched very low market price. Farmers were unaware about this pests and present study highlights the severity, seasonality and behavior of this pest on banana, in Koshi region of Bihar.

Introduction

Banana is fourth most important commodity in the world after rice, wheat and corn. It is cultivated over 130 countries in the tropical and subtropical world (Anonymous, 2000). It is cheapest, plentiful and wonder berry forming staple food for people in the world. Banana is one of the most important fruit crops in India. The fruit is preferred for high nutritive value, year round availability and low price (Robinson, 1996). Banana contains large quantities of energy but without any cholesterol. It contains high carbohydrate, low sodium and high potassium (Chandler, 1995). The ripe

banana fruit is the high source of vitamin A and medium source of Vitamin C, B₁ and B₂, while the unripe banana fruit is rich in minerals mainly iron and various type of vitamins. It is also a good source of potassium, phosphorus, calcium and magnesium. The fruit is easy to digest, free from fat and cholesterol. Banana powder is used as the first baby food. It helps in reducing risk of heart diseases when used regularly and is recommended for patients suffering from high blood pressure, arthritis, ulcer, gastroenteritis and kidney disorders. Processed products, such as chips, banana

puree, jam, jelly, juice, wine and halwa can be made from the fruit. The tender stem, which bears the inflorescence is extracted by removing the leaf sheaths of the harvested pseudo stem and used as vegetable. Plantains or cooking bananas are rich in starch and have a chemical composition similar to that of potato. Banana fiber is used to make items like bags, pots and wall hangers. Rope and good quality paper can be prepared from banana waste. Banana leaves are used as healthy and hygienic eating plates India is the largest producer of banana and plantain in the world. In India, major banana (*Musa* spp.) growing states are Maharashtra, Gujarat, Tamil Nadu, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Orissa and West Bengal (Bauri *et al.*, 2014). In Koshi region of Bihar, particularly in Katihar, Purnea and Naugachhia sub division of Bhagalpur, banana is grown by farmers on commercial basis and they use good agricultural practices for cultivation of banana. Banana is attacked by more than 200 species of insect and non-insect pests (Simmonds, 1966 and Singh, 1970). In India, more than 15 insect pests attack banana which include insects, mites, mollusks and birds. Insect attack noticed from planting to harvesting at different stages of crop growth. In India about 19 insect pests have been found associated with banana from planting to harvesting (Padmanaban *et al.*, 2002). 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 (Singh *et al.*, 1997). The extent of damage has been reported to be approximately 30 per cent of the banana bunches during rainy season in Bihar (Ahmad *et al.*, 2003; Mukherjee, 2004; Samui *et al.*, 2004 and Mukherjee, 2006). Leaf and fruit scarring beetle, (*Basilepta* sp., *Colaspis* sp.) (Coleoptera:

Chrysomelidae) is considered as one of the most economically important pests in Eastern India which is reported to occur in West Bengal and some other parts of India also. The damage done by this beetle has tremendous influence on both quantity and quality of banana. The extent of damage inflicted upon banana crop by this pest has been reported to be around 80 per cent (Roy and Sharma, 1952) and in case of severe infestation, the percentage of infested orchards and intensity of the pest have been recorded up to 100 per cent.

Materials and Methods

To study the effect of Banana scarring beetle, *Basilepta* sp., *Colaspis* sp., a field experiment was conducted at Bhola Paswan Shastri Agricultural College, Purnea, which is situated Koshi region of Bihar during kharif March, 2014 to February, 16. Purnea is situated at 25°13'80"N-27°07'59"N Latitude and 86°59'06"E-87°52'55"E Longitude. Tissue culture banana plant cv. Grand Naine (G9) was planted in BPSAC, Purnea on November, 2012 by maintaining plant to plant and row to row distance as 1.5 x 1.5 m respectively. The crop was grown by following recommended package of practices for this region. Population of the adult beetle and its scars was recorded from 16 randomly selected plants at fortnightly interval from top (furled or unfurled) leaf of plant from 4 PM onward, during the active period of the beetle. The adult of this pest come out early in the morning and causes damage to top whorl leaf and fruits of Banana by making scratches. These scratches cause rusty brown pustules on effected banana fingers, due to necrosis of surrounding tissues. Due to scars appearance on banana fingers and deterioration of quality, it ultimately fetch low price in the market. Observation was also recorded on the number of scars per 20

sq. cm caused by this beetle from 16 selected young emerge leaves as well as new fingers emerges from flower on 16 plants.

Results and Discussion

Population buildup of the scarring beetle and its infestation (Scars) has been given in table 1. The behavioral studies on the pest were also recorded. The beetle specimens were identified from Zoological survey of India, Kolkata, West Bengal, India. Since plant was planted in November, 2012, it takes some times to establish in field and adult of beetle appear in second fortnight of March, 2013. In initial month since banana plant is small in size, so it has small leaf whorl as well as small leaf canopy thus result in less beetle population on leaves. Adults of Banana scarring beetle hide in unfurled leaf of Banana plant and eat out tender leaf of Banana in the early stage of plant and when flower comes out from whorl this beetle appears in huge numbers and causes scars on fingers of new Banana. The table shows in first year, 2013-14 population of beetle appear from second fortnight of March, 2013 and in 2014-15 beetles observed throughout of the year.

In year 2013-14, two peak population of this beetle was recorded first during yearly July, 38.16 per plant and second highest peak, 51.32 per plant was during second fortnight of September that results maximum infestation (Scars) two times during yearly July (43.81 scars/20cm² area of banana) and peak in second fortnight of September (57.08 scars/20cm² area of banana). While in 2014-15, also two peak population of this pest recorded, first during late May, 31.08 per plant and second highest peak, 68.00 per plant was recorded that causes 24.82 (No. of scars/20cm² area of banana) in first fortnight of May and highest, 68.41 (No. of scars/20cm² area of banana) in late

September. In both the year, highest population of this beetle was observed during rainy season when temperature and humidity was high. Population of banana scarring beetle was maximum from July to September, 51.32 per plant and minimum during December to January 5.8 per plant in 2013-14 and 68.41 per plant to 12.8 per plant respectively in 2014-15. Banana has found infested with scarring beetle that causes scars on finger of Banana that ranges from 6.63 to 57.08 (No. of scars/20cm² area of banana) in 2013-14 and 13.98 to 69.75 (No. of scars/20cm² area of banana) in 2014-15 respectively. We observed that in both years population of this beetle was increased gradually and continued its activity up to second fortnight of September and least in second fortnight of December. During field survey in local banana growing area in for documenting the pest occurrence of banana, it was observed that it caused serious damage to leaves as well as fruits during rainy months viz., July, August and September and population slowly decreased towards winter. Scarring beetle was found to infect banana plant from the sucker stage till fruiting. The sign of the presence of this pest was irregular patches on unfurled and furled leaf. The beetle lived within the roll of the central leaf, flower bracts and fed the epidermis of leaves, skin of newly emerged young and tender fruits, upper and lower surface of the flower bracts causing innumerable scars on them. Batra (1952) also reported that this beetle prefer the central rolled up leaf of the banana plants forming the top whorl at the crown and worse affected than other leaves (Sen and Prasad, 1953). As fruiting commenced, the attack of the beetle was confined only to very young fruits as evidenced by presence of unblemished matured fruits in the same field under natural field condition. Scars on the fruits grew bigger as the fruit matured and fruits become disfigured. Infested fruits

got spotted and severe scarring of fruit skin led to underdeveloped fruit of less commercial value. Only young leaves, still compactly rolled were attacked.

The market value of banana was reduced due to attack of this pest and in some cases, cent per cent banana plants were attacked if no controlled measures were undertaken.

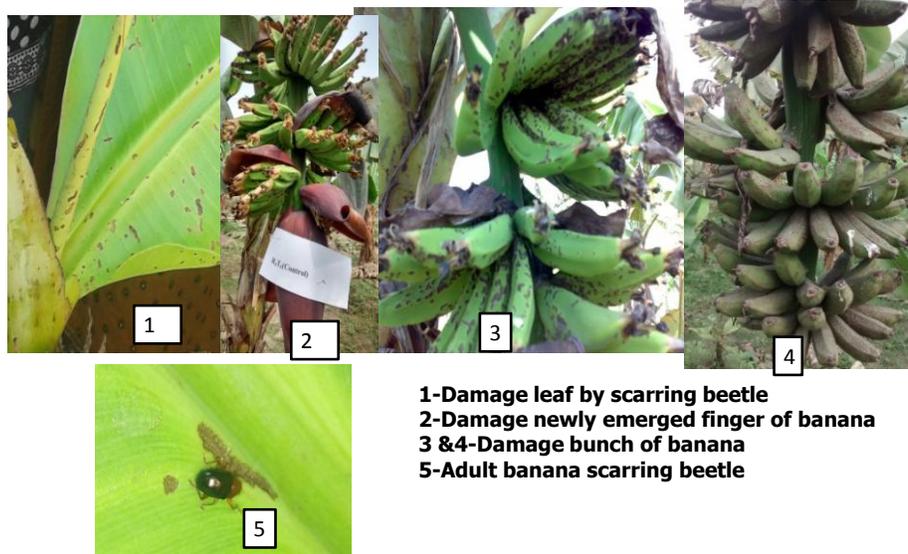
The damage was very high at early stage when new fingers of banana fruit emerged. The damage caused to skin of the fruit, left the bunch so badly scarred as to lose its commercial value. Due to this damage on leaves, it is presumed that photosynthetic area was reduced and ultimately growth and yield was affected .

Table.1 Adult Population and scars caused by *Basilepta* sp., *Colaspis* sp. during 2013-14 and 2014-15

Observation		Adult population per plant			No.of scars/20cm ² area of banana		
		2013-14	2014-15	Mean	2013-14	2014-15	Mean
March	I	5.28	21.33	13.31	6.63	23.27	14.95
	II	7.79	24.43	16.11	9.45	25.16	17.31
April	I	8.81	22.08	15.45	10.67	22.19	16.43
	II	10.55	27.33	18.94	12.64	22.99	17.82
May	I	14.21	29.33	21.77	16.72	24.82	20.77
	II	9.96	31.08	20.52	15.82	21.18	18.5
June	I	19.46	27.33	23.40	29.01	30.82	29.92
	II	30.99	34.33	32.66	37.19	36.48	36.84
July	I	38.16	43.08	40.62	43.81	44.82	44.32
	II	35.23	44.58	39.91	39.84	36.88	38.36
August	I	41.54	47.33	44.44	46.31	49.47	47.89
	II	47.35	50.83	49.09	52.71	54.84	53.78
September	I	44.51	57.08	50.80	49.88	56.82	53.35
	II	50.01	68	59.01	57.08	68.41	62.75
October	I	46.15	61.29	53.72	47.17	53.71	50.44
	II	41.05	46.79	43.92	48.65	47.17	47.91
November	I	38.31	41.04	39.68	46.98	29.49	38.24
	II	23.23	29.29	26.26	18.97	24.17	21.57
December	I	15.33	17.34	16.34	14.89	18.65	16.77
	II	7.34	9.24	8.29	14.23	12.8	13.52
January	I	5.8	10.41	8.105	13.03	12.53	12.78
	II	7.94	13.34	10.64	13.93	13.95	13.94
February	I	12.19	14.69	13.44	13.75	12.9	13.33
	II	16.94	21.24	19.09	18.75	21.16	19.96

I- First fortnight
 II- Second fortnight

Photographs showing damage to different part of banana



Fruit size of banana was not normal under infested condition as compared to uninfested fruits. The extent of damage by banana scarring beetle, *Nodostoma (Basilepta) subcostatum* has been reported to be approximately 30 per cent of the banana bunches during rainy season in Bihar (Ahmad *et al.*, 2003; Mukherjee, 2004; 2006). Another species of scarring beetle *N. viridipennis* was reported to be the most destructive pest of banana in Bangladesh. Of different varieties of banana, Amritasagar, Shabri, Champa etc grown in Bangladesh are badly affected by this beetle pest (Sen and Prasad, 1953).

From the present study, it may be concluded that low temperature adversely affect the population build up and infestation of this insect. Further winter (low temperature and low humidity) is responsible for the dormancy of insect in pupal stage. The findings of Kumar, 1996 and Maiti and Hansda, 2002 confirm the result of the present investigation. Choudhary *et al.*, (2010) also worked out the correlation

coefficient for beetle and weather parameters and pointed out that some of climatic factors imparted crucial role. It is in accordance with the findings of earlier workers. Sen and Prasad (1953) reported that the beetle appeared in May and caused the greatest destruction in August and September and disappeared by March. Likewise, Singh *et al.*, (1997) reported the extensive damage by scarring beetle to leaves as well as fruits during summer and kharif season. Leaf scars produced by the infestation of this pest were noticed throughout the year, irrespective of population density of the pest / plant however, maximum scars on the leaf occurred during the month of September, the rainiest month of the year. The infested fruits lost colour, eye appeal, market value and to some extent weight. Damaged fruits showed prolonged ripening duration and reduced fruit weight in comparison with beetle free fruits and also stated that the quality of infested banana related to skin colour and thickness, taste, smell and pulp of fruit was not normal, considerably

affecting the consumption value. The higher damage as recorded in present study as the variety grown has been reported to be susceptible to scarring beetle (Ahmad *et al.*, 2003 and Chaudhary *et al.*, 2010).

The present study revealed the occurrence *Basilepta sp.*, *Colaspis sp.* under Koshi region of Bihar which causes serious damage to young and developing fruits well as to leaves. Earlier this pest of Banana not found in winter season during December to January but now it was also observed in that period and now got the status of a major pest of Banana in Koshi region of Bihar.

Several management practices are being practiced including clean cultivation, spraying and dusting of bio pesticide chemical insecticide and covering banana bunches with poly propylene (PP) bag at the time of flowering of banana. However, integrated management of this scarring beetle needs further attentions for timely control.

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