



ISSN 2320-7078
JEZS 2014; 2 (4): 68-71
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Received: 02-06-2014
Accepted: 02-07-2014

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Impact of ecological factors on the infestation of mango red banded caterpillar

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ABSTRACT

The study on the incidence pattern of mango red banded caterpillar (*Autocharis albizonalis* Hampson) was carried out along with the different aspects of infestation and their varietal preference. The study concluded that the fruit borer infestation occurred from the pea to marble sized stage of the fruit and continued to maturity stage. The first pest brood was seen in the 1st fortnight of March and continued to June. Fifteen commercially grown mango cultivars were selected and cultivated under RBD. The Duncan Multiple Range test was subsequently performed to identify the differential level of varietal preference towards the pest. Himsagar, Arka Anmol, Prabha Sankhar and Amrapali were the most susceptible varieties and Neeluddin the least. The maximum pest attack was found from the West direction.

Keywords: Cultivars, Fifteen, Himsagar, Neeluddin, Pest, West.

1. Introduction

Mango is known as the king of the fruits. It is known from the literature that the Vedas and Ramayana showed mango as a well-known fruit during the Vedic and Aryan ages. The world's first recorded presence of the existence of mango is seen in the text by Ludovico di Varthema in Italian Language (1510) as Manga. Later this text was further translated in post-classical Latin and French language. Mango has been cultivated in the Indian subcontinent for thousands of years and reached East Asia between fifth and fourth century B.C. [23].

India is the largest producer of mango in the world accounting for 52.63% of the total production. Mango cultivation accounts for 37.61% of the total area under fruit cultivation and 22.21% of the total fruit production in the country. The country produced 10.99 million tonnes of mangoes from an area of 1.23 million hectares. The total area under mango cultivation in Bengal is 70,000-80,000 hectares, almost 44% of the total area in the state food crop cultivation.

Several insects attack mango from its nursery stage to maturity. Low productivity of mango occurs due to irregular and erratic bearing, damage due to innumerable insect and non insect pest and damageable diseases. Nearly 400 insects and non insect pests have been recorded from Indian subcontinent shows records of 260 insects and mite pest of which, according to Kapadia, (2003) [11] thirty pests are serious pests. Mango fruit borer, commonly known as Red banded caterpillar *Autocharis albizonalis* Hampson is thought to be recorded as a new pest, causing alarming losses to mango in Andhra Pradesh and Karnataka, due to injudicious and improper application of insecticides (Phd thesis submitted by SK. Sahoo in 2006 (Title –“ Studies on Insects Pest complex of Mango with special preference to Management of Mango fruit weevil and Mango fruit borer), to Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India). In West Bengal it was first recorded in Malda during although survey of mango orchards in Malda and Murshidabad by Jha *et al.* [10]. 10-52% damage of fruits from pin head stage is noticed in West Bengal, particularly in Malda, Murshidabad, Nadia and Hooghly [10, 16].

2. Materials and Methods

To study the incidence pattern and varietal preference of mango fruit borer during 2008-2009 and 2009-2010 fruiting season, sixteen different cultivars were selected two replications of each from the selected cultivars were taken for the study and tagged during the month of Feb-March, i.e. at the flowering stage of the plant. The infestation of fruit borer was noticed at the pea to marble stage of the fruit when kernels were yet to harden i.e. during last week of March to 1st of week of April. Data were taken at ten day interval on the tagged shoots. The plants under observation were kept free from any pesticide application.

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The attack of mango fruit borer was recorded by recording the number of damaged fruits out of 100 shoots randomly from each direction (i.e. East, West, North, and South) equally. The population of mango fruit borer was counted at a definite time interval. Weather data during this period were summarised to study their comparative influence on the population dynamics of mango fruit borer. For this data on daily rainfall, maximum temperature, minimum temperature and humidity were collected from Principal Agro Meteorological Observatory, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal (India). The mango cultivars studied were Neelgoa, Neelshan, Prabha Sankar, Ratna, Mallika, Amrapali, Kesar, Zardallu, Fazli, Bangalora, Suvernerekha, Langra, Arka Puneet, Arka Anmol, Neeluddin, Himsagar.

3. Results and Discussion

3.1 Incidence of mango red banded caterpillar

In the year 2009-2010 the infestation of the pest started from the first week of April when fruits were in the pea to marble size, infestation reached maximum during the second fortnight of April (i.e. 2.29%) when temperature, relative humidity and rainfall regime were in the range of 29.04-42.48 °C. The relative humidity range being 14-100% and rainfall regime 0 mm respectively. Later, the population was found to decline. Lowest infestation was found in the end of May when temperature, relative humidity and rainfall were in the range 25.3-36.2 °C, the humidity ranged between 63-97% and rainfall being 5.7 mm respectively (Table-1). In the year 2009 the population had been found to be continually increasing from 04.04.09 to 24.04.09 thereafter the pest population decreased and came to zero on 24.05.09.

Table 1: Incidence of Mango Red Banded Caterpillar and Weather Parameters during 2009

Date of Observation	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	% of pest infestation
	Maximum	Minimum	Maximum	Minimum		
04.04.09	37.08	25.82	97	42	0	0.36
14.04.09	39.97	26.72	98	18	0	0.56
24.04.09	42.28	29.04	100	14	0	2.29
04.05.09	38.58	24.27	97	50	0	1.36
14.05.09	34	23	96	54	0	0.49
24.05.09	36.2	25.3	97	68	5.7	0

In the next year early appearance of the pest was noticed at the pea stage of the fruit. Peak damage (i.e. 3.81%) was observed during the last week of March in the year 2010, (Table-3), when temperature, relative humidity and rainfall regime were in the range of 36.6-16.9 °C, 98-31.4% and 0 mm respectively. The

infestation of mango fruit borer was lowest during the second week of May when temperature, relative humidity and rainfall varied from 38.4-22.8 °C, 93-51.6% and 27.1 mm respectively. In the year 2010, a gradual decrease of the pest population was noticed from 20.03.2010 to 10.05.2010.

Table 2: Incidence of Mango Red Banded Caterpillar and Weather Parameters during 2010

Date of Observation	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	% of pest infestation
	Maximum	Minimum	Maximum	Minimum		
20.03.2010	36.6	16.9	98	31.4	0	3.81
30.03.2010	38.0	16.9	98	31.4	0	2.63
10.04.2010	37.0	24.3	99	45.9	17.0	1.53
20.04.2010	36.9	21.4	97	49.0	1.1	1.41
30.04.2010	38.4	23.1	94	49.9	24.4	1.06
10.05.2010	38.4	22.8	93	51.6	27.1	0.44

From the investigation undertaken on the incidence of mango fruit borer during 2008-2010, it could be concluded that the fruits in the marble to pea size stage were mostly susceptible to the pest attack during the month of March to April, which was almost similar to the observation of Sahoo *et al.* [15]. According to Sahoo and Jha (2006) infestation of mango fruit borer started from the early part of March, when the fruits were in the pea stage, but the first peak was recorded during the latter part of March and maximum infestation during the last week of April. Regarding the incidence pattern of the fruit borer, Golez HG [9] stated that the insect population based on the fruit infestation record was high in the summer with a peak of abundance observed either in March or April.

The present investigation on mango red banded caterpillar was carried out at the Regional Research Station of Bidhan Chandra Krishi Viswavidyalaya at Gayeshpur, West Bengal. The pest was not a major pest of mango previously, but the present scenario of

study revealed that the pest had gained the status of a post serious and alarming pest of mango throughout the fruiting stage of mango in mango orchards. However the important factor in the appearance of this pest was the availability of the fruit. In the absence of the fruit the pest may fail to reproduce.

3.2 Varietal Preference of Mango red banded caterpillar

Sahoo and Jha (2009) [16] reported that among all the varieties Gopalbhog and Rakhbhog were least susceptible to the fruit borer. While Langra (17.78%), Fazli (16.28%) and Phunia (16.67%) were recorded as highly susceptible to this pest. [8] studied for comparative development of mango fruit borer on different mango varieties Philippines. This study showed the order of preference of the fruit borer to develop in Kanchamitha> Pico> Pahuton> Apple.

Table 3: Varietal Preference of Mango fruit borer in terms of percent damaged fruits in 2009

Cultivar	Direction				Mean
	East	West	North	South	
Neelgoa	0.3	0.39	0.39	0.47	0.38
Neelshan	0.6	0.15	0.17	0.26	0.29
Prabha Sankar	0.39	0	0.23	1.42	0.51
Ratna	0	0.26	0.45	0.8	0.37
Mallika	0.54	0.35	0.3	0.61	0.45
Amrapali	1.43	2.44	0.82	1.37	1.51
Kesar	0.39	4.48	1.06	1.78	1.93
Zardallu	0.6	0.46	0	0.36	0.35
Fazli	0.62	0.36	1.85	0.49	0.83
Bangalora	0.29	0.37	0.49	0.38	0.38
Suvernerekha	0	3.5	2.04	1.69	1.81
Langra	0.92	0.56	1	0.57	0.76
Arka Puneet	0	0	0.63	0	0.15
Arka Anmol	0.7	0.38	0.18	1.57	0.71
Neeluddin	0	0	0	0	0
Himsagar	1.61	3.05	3	2.7	2.59
MEAN	0.51	1.01	0.75	0.86	

From an overall sum up on all four directions during 2009 mentioned in Table-3 it could be inferred that Himsagar variety showed the highest percentage of bored fruit i.e. 2.59% and was the most susceptible to this pest. The order of preference of the fruits for this pest is like Himsagar> Kesar> Suvernerekha> Amrapali>

Langra> Arka Anmol. The remaining varieties had less infestation. It was evident from the research that West direction was most vulnerable to the pest attack and showed nearly 1.01% compared to other directions. Neeluddin was the least susceptible variety which showed no infestation by this borer pest.

Table 4: Varietal Preference of Mango fruit borer in terms of percent damaged fruits in 2010

Cultivar	Direction				Mean
	East	West	North	South	
Neelgoa	0	1.33	0.39	0	0.43
Neelshan	0	0.66	0.66	0.66	0.495
Prabha Sankar	0	2.00	0.66	2.0	1.165
Ratna	0	0	0	0	0
Mallika	0	0	0.66	2.0	0.665
Amrapali	1.00	0	0	0	0.25
Kesar	0	0	0.66	0	0.165
Zardallu	0	0.66	0	0.66	0.33
Fazli	0	0	0	0	0
Bangalora	0	1.33	0	0	0.332
Suvernerekha	0	0	0	0	0
Langra	0.66	0.66	0	0.66	0.495
Arka Puneet	0	0	0	0	0
Arka Anmol	0	0	0	0	0
Neeluddin	0	1.33	0	1.33	0.665
Himsagar	0	3.33	3.0	3.33	2.415
MEAN	0.103	0.706	0.376	0.665	

From an overall sum up on all four directions during 2010 mentioned on Table-13. It could be revealed that among all the varieties. Himsagar variety (2.415% bored fruit) was the most susceptible to this pest. The others, in order of susceptibility could be ranked as Himsagar > Prabhaskar> Neeluddin> Langra > Neeleshan> Neelgoa. The remaining varieties, namely Arka Anmol, Arka Puneet, Suvernerekha, Fazli etc. were free from infestation. It was evident from this investigation that West

direction was the most vulnerable site of the pest attack. The infestation of this fruit borer was found in all directions, but the order of preference could be documented as West>South>North> East.

Southern and Eastern parts of the plants were more exposed to sunlight. Wind generally blew from South Eastern sides. As a result, these directions of plants were not conducive for pest infestation due to better aeration and exposure to sunlight. In the

present investigation the low intensity of fruit borer infestation in a South East direction was definitely due to better light interception and more aeration compared to northern and western side plant canopy.

From the findings of the two year studies on varietal preference of mango fruit borer or mango red banded caterpillar, it can be inferred that among the commercial mango varieties Himsagar, Prabhashankar, Fazli and Langra were the most susceptible to the mango fruit borer, *Autocharis albizonalis* (Hampson), whereas Bangalora and Arka Puneet were registering lower fruit infestation. The lowest being the variety Neeluddin which was free from the pest attack. Sahoo and Das (2004) [15] reported 3.0-42.0% average infestation of fruits in different varieties prevalent in West Bengal.

4. Conclusion

Studies undertaken on the incidence of mango fruit borer during 2009 and 2010 revealed that the peak damage took place during the last week of March to first week of April and infestation declined gradually reaching the lowest during mid May. Investigation on the incidence of this borer in the orchard during 2009-2010 showed that infestation of borer started from the last part of March to the first week of April when fruits were in the pea to marble size with a first peak recorded during the last week of March and continuing upto first week to mid May after which the population began to decrease. Among the varieties studied, Himsagar followed by Prabhasankar were highly susceptible to the borer and other varieties, namely Arka Anmol, Arka Puneet, Suvernerekha and Fazli etc., were found free from infestation.

5. Acknowledgement

I would like to convey my thanks to my Maa, Papa and Sister and friends. I feel it a rare privilege to place deepest sense of gratitude to my Respected Sir, Professor Shantanu Jha, Department of Entomology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal for suggesting the work to me and for his perennial guidance, valuable suggestions and constructive criticism during my research works.

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