

Studies on incidence pattern of banana pseudo stem weevil (*Odoiporus longicollis* Oliv) under Gangetic tracts of West Bengal

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Received:19-01-2015, Revised:10-04-2015, Accepted:12-04-2015

ABSTRACT

Keeping in view of the growing economic importance of banana pseudostem weevil (*Odoiporus longicollis* Oliv.) and dearth of detailed information regarding seasonality of the pest, the present investigation has been conducted to study the incidence pattern of this pest on cv. Martaman (AAB) and Kanchkel (ABB) in farmers' plots at different locations of Nadia district, West Bengal during 2007-08. The field investigation revealed that the pest infestation appeared and established in 8 months old plants where the planting was completed within September, 2006. The trend of incidence pattern of *O. longicollis* shows that it remains active throughout the year on both the cultivars. Initial infestation was 3.63% on cv. Martaman and 2.14% on cv. Kanchkel at 23rd standard week i.e. during June, 2007. The infestation has been recorded highest at 26th standard week i.e. during June, 2008 in both the cultivars but, the degree of damage has been recorded higher on cv. Martaman (17.56%) as compared to cv. Kanchkel (10.43%) indicating that cv. Kanchkel is less susceptible to *O. longicollis* than cv. Martaman. The results from correlation studies on the influence of meteorological parameters showed that incidence of *O. longicollis* was positively correlated with maximum and minimum temperature and minimum relative humidity in case of cv. Martaman whereas a positive correlation of maximum and minimum temperature of this pest on cv. Kanchkel has been recorded.

Keywords : Banana, correlation, incidence pattern, meteorological parameters

Banana is one of the oldest fruits cultivated by man from pre-historic times and today it is the leading tropical fruit in world market with a highly organized and developed industry. India is the largest producer of banana in the world (Sharangi and Acharya, 2007) and West Bengal is a major banana growing state like Maharashtra, Tamil Nadu, Gujarat, Karnataka, Andhra Pradesh, Bihar and Madhya Pradesh (Bauri *et al.*, 2014). In West Bengal, banana is grown in districts like Nadia, Hooghly, North 24 Parganas, South 24 Parganas, Jalpaiguri and Purba Medinipur. Insect pests play a major role in lowering both the quantitative and qualitative value of banana. A total of 470 species of insects and mites were reported to infest banana (Ostmark, 1974), however, in Indian condition, rhizome weevil, pseudostem weevil (BSW), leaf and fruit scarring beetle, leaf feeding caterpillar are some important insect pests causing serious damage to this crop (Singh, 1970). It is estimated that banana pseudostem weevil (*Odoiporus longicollis* Oliv.) has the potentiality to cause 10-90% yield loss depending upon the growth stage of crop as well as management efficiency (Padmanaban and Sathiamoorthy, 2001). The pest has firmly established itself in all the varieties of banana cultivated in West Bengal like Martaman, Champa, Kanchkela, Kabuli *etc.* In view of the growing economic importance of this pest and lack of detailed information regarding the seasonality of BSW in West

Bengal conditions, the present investigation has been conducted which would be helpful in finding out the suitable options to manage this pest.

MATERIALS AND METHODS

To study the incidence pattern, the experiment was laid out in two different locations of Nadia district during June, 2007 to June, 2008 on two cultivars of genomic group *i.e.* cv. Martaman (AAB) and cv. Kanchkel (ABB) commonly known as cooking type, the planting of has been completed within September, 2006. For this study, different life stages *i.e.* egg, larva, pupa and adult of BSW were collected from the experimental fields and subsequently identified. Direct counting method has been followed and the observation was taken at weekly intervals. The small black pin head spots on the pseudostem have been counted directly for incidence studies. The percent incidence of the pest has been calculated using the following formula (after Thippaiah *et al.*, 2010.):

$$\text{Percent incidence} = \frac{\text{Number of infested plants}}{\text{Total number of plants}} \times 100$$

For correlation studies, weekly observations of five meteorological parameters *viz.* maximum and minimum temperature, maximum and minimum relative humidity (RH) and number of rainy days have been recorded and tested for their overall influence on biological activities of this pest.

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RESULTS AND DISCUSSION

The observation on seasonal incidence pattern of BSW on both the cultivars has been recorded and the

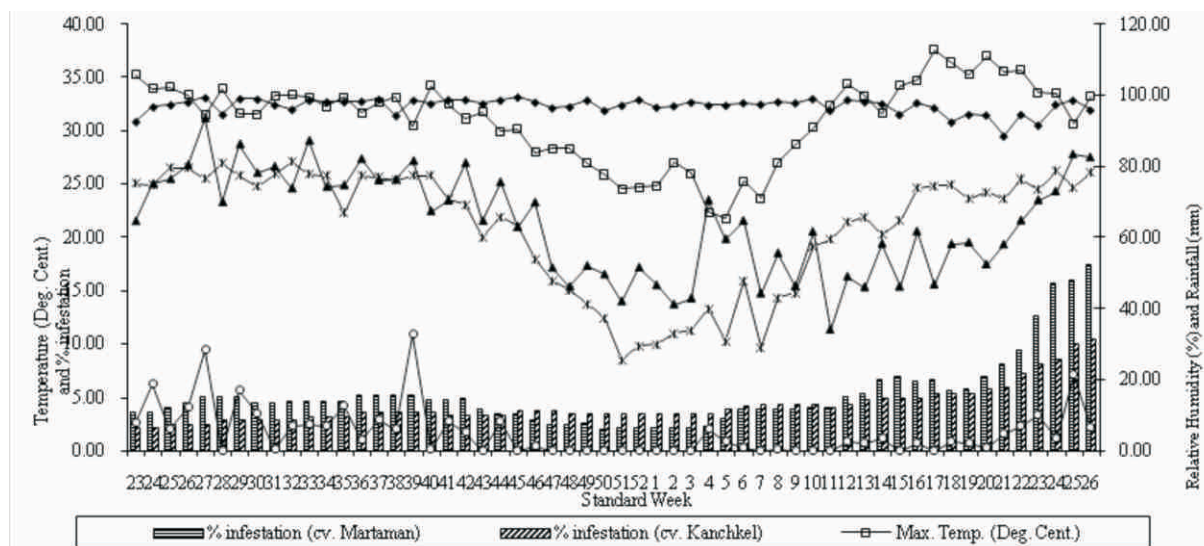
trend shows that the weevil remains active throughout the year on both the cultivars after initiating damage during 23rd standard week (SW) *i.e.* during June, 2007.

Table 1: Infestation of BSW on cultivars of banana along with meteorological parameters

Standard week	Banana cv. Martaman (AAB)		Banana cv. Kanchkel (ABB)		Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	No. of plants	Infestation (%)	No. of plants	Infestation (%)	Max.	Min.	Max.	Min.	
23	220	3.63	280	2.14	35.24	25.10	92.57	64.57	8.00
24	220	3.63	280	2.14	33.92	24.88	96.71	75.14	18.94
25	220	4.09	278	2.51	34.10	26.54	97.28	76.42	6.05
26	199	4.52	278	2.51	33.30	26.50	98.00	80.42	12.31
27	198	5.05	277	2.52	31.47	25.57	99.28	93.57	28.57
28	198	5.05	277	2.88	33.97	27.01	94.58	70.00	0.14
29	198	5.05	277	2.88	31.60	25.77	99.00	86.28	17.08
30	196	4.59	276	2.89	31.52	24.80	98.85	78.14	10.54
31	196	4.59	276	2.89	33.28	25.94	97.28	80.00	0.27
32	195	4.61	276	2.89	33.40	27.11	96.00	73.85	6.81
33	194	4.63	275	3.27	33.14	25.94	98.57	87.28	7.57
34	194	4.63	275	3.27	32.24	25.84	98.14	74.28	6.91
35	192	4.68	274	3.28	33.12	22.30	98.14	74.71	12.80
36	192	5.20	274	3.64	31.67	25.78	98.28	82.14	3.05
37	191	5.23	274	3.64	32.60	25.71	98.85	76.14	8.70
38	191	5.23	270	3.70	33.12	25.31	94.28	76.28	6.20
39	190	5.26	270	3.70	30.47	25.85	98.57	81.57	32.80
40	186	4.83	269	3.71	34.18	25.82	97.57	67.42	0.47
41	185	4.86	267	3.37	32.45	23.65	98.71	70.42	8.14
42	182	4.94	267	3.37	31.12	23.11	98.71	81.00	5.20
43	176	3.97	266	3.38	31.74	20.04	97.57	64.71	0.00
44	172	3.48	266	3.38	29.95	21.92	98.57	75.57	8.40
45	170	3.52	264	3.78	30.11	21.07	99.42	63.00	0.00
46	167	2.99	263	3.80	27.97	18.02	98.00	69.85	1.42
47	161	2.48	262	3.81	28.31	15.97	96.42	51.42	0.00
48	157	2.54	260	3.46	28.31	15.12	96.71	46.14	0.00
49	150	2.66	260	3.46	26.94	13.77	98.58	52.00	0.00
50	144	2.08	259	3.47	25.90	12.41	95.71	49.57	0.00
51	137	2.18	258	3.48	24.58	8.51	97.14	42.00	0.00
52	136	2.20	258	3.48	24.68	9.85	98.71	51.57	0.00
1	133	2.25	257	3.50	24.78	9.97	96.57	46.57	0.00
2	132	2.27	256	3.51	26.98	10.95	97.00	41.14	0.00
3	132	2.27	256	3.51	26.04	11.31	98.00	42.85	0.00
4	130	2.30	256	3.51	22.40	13.28	97.14	70.57	6.20
5	128	3.12	256	3.90	21.77	10.21	97.14	59.57	2.77
6	128	3.90	256	4.29	25.21	15.95	97.85	64.71	0.97
7	127	3.93	255	4.31	23.67	9.61	97.42	44.28	0.00
8	127	3.93	254	4.33	26.97	14.38	98.14	55.57	0.58
9	126	3.96	251	4.38	28.71	14.75	97.85	46.28	0.00
10	124	4.03	250	4.40	30.31	19.14	99.00	61.65	0.00
11	120	4.16	248	4.03	32.42	19.81	95.71	34.00	0.00
12	116	5.17	248	4.43	34.34	21.41	98.71	49.00	2.71
13	111	5.40	247	4.85	33.28	21.94	98.14	46.00	2.05
14	104	6.73	243	4.93	31.62	20.27	97.57	58.28	3.54
15	99	7.07	243	4.93	34.20	21.60	94.57	46.14	0.00
16	92	6.52	242	4.95	34.72	24.61	97.85	61.71	2.28
17	89	6.74	241	5.39	37.57	24.85	96.42	46.71	0.00
18	87	5.74	240	5.41	36.34	24.94	92.42	58.14	2.48
19	86	5.81	238	5.46	35.24	23.58	94.57	58.58	2.20
20	85	7.05	237	5.90	37.05	24.27	94.42	52.42	1.05
21	85	8.23	234	5.98	35.54	23.57	88.57	58.00	4.65
22	84	9.52	234	7.26	35.74	25.44	94.57	64.85	7.08
23	79	12.65	232	8.18	33.55	24.54	91.57	70.57	10.20
24	76	15.78	231	8.65	33.47	26.22	97.42	73.00	3.57
25	75	16.00	230	10.00	30.65	24.71	98.57	83.42	21.25
26	74	17.56	230	10.43	33.22	26.07	95.85	82.57	6.57

Table 2: Correlation coefficient between infestation of BSW on banana cultivars and meteorological parameters

Infestation by BSW on banana	Meteorological parameters				
	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Maximum	Minimum	
cv. Martaman	0.4551	0.4991	-0.2580	0.3243	0.2569
cv. Kanchkel	0.2273	0.1627	-0.3047	-0.0147	-0.0013

**Fig. 1 : Infestation by BSW on different cultivars of banana along with meteorological parameters in different standard week**

Seasonal incidence of BSW on cv. Martaman

Initial infestation on cv. Martaman during June, 2007 was 3.63% (Table 1). During this period the average maximum temperature, minimum temperature, maximum RH and minimum RH were 35.24°C, 25.1°C, 92.57% and 64.57%, respectively. Infestation of BSW has been gradually increased up to 39th SW (5.26%) and thereafter decreased gradually during winter months. The least damage was observed in 50th SW *i.e.* 2.08% during December, 2007 when the average maximum temperature, minimum temperature, maximum RH and minimum RH were 25.9°C, 12.41°C, 95.71% and 49.57%, respectively. The infestation has increased up to 7.07% at 15th SW of 2008 and gradually declined for a shorter period of time. But thereafter increased rapidly up to 26th SW *i.e.* during June, 2008 when the average (17.56%) maximum temperature, minimum temperature, maximum RH and minimum RH were 33.22°C, 26.07°C, 95.85% and 82.57%, respectively. It may be mentioned that due to harvesting of the mature banana bunches, the plant population of experimental fields were less in number since November, 2007 though the suckers of first ratoon crop were allowed to come up after harvesting of the main crop. In other studies

infestation started at 8 months after planting though Dutt and Maiti (1970) reported that the plants at 4 to 5 months after planting are more exposed for establishment of BSW, it may be due to the fact that initiation and establishment of BSW in new field will take more time as compared to old and neglected banana orchards.

The correlation studies showed that incidence of BSW on cv. Martaman was positively correlated with maximum and minimum temperature, minimum RH and rainfall and negatively correlated with maximum RH (Table 2).

Seasonal incidence of BSW on cv. Kanchkel

In case of cv. Kanchkel also, initial incidence of 2.14% BSW has been recorded during early June, 2007 *i.e.* at 8 months after planting (Table 1). The average maximum temperature, minimum temperature, maximum RH and minimum RH recorded during this period were 35.24°C, 25.1°C, 92.57% and 64.57%, respectively. The infestation slowly increased to 3.71% till 40th SW *i.e.* during September, 2007 and incidence pattern was maintained up to first week of February, 2008 (5th SW) when the average maximum temperature, minimum temperature, maximum RH and minimum

RH were 21.77°C, 10.21°C, 97.14% and 59.57%, respectively. The range of infestation by BSW during the period of investigation was noticed from 3.37% (at 41st SW of 2007) to 3.51% (at 4th SW of 2008). The infestation of the pest has been increased gradually after 5th SW of 2008 till the harvesting of the crop, though at 11th SW (2008) a sudden decline in infestation has been observed. The infestation due to BSW on cv. Kanchkel has been recorded highest at 26th SW (June, 2008) like cv. Martaman but in case of cv. Kanchkel the infestation recorded was 10.43% when the average maximum temperature, minimum temperature, maximum RH and minimum RH were 33.22°C, 26.07°C, 95.85% and 82.57%, respectively.

The study on susceptibility showed that the infestation of BSW on cv. Kanchkel was more or less constant as compared to cv. Martaman (Fig. 1). In case of cv. Kanchkel, the population of BSW has been observed less and it increased the population density during first ratoon crop. However, the highest infestation recorded on cv. Kanchkel (10.43%) was quite less as compared to cv. Martaman (17.56%) indicating to that cv. Kanchkel is less susceptible to banana pseudostem weevil than cv. Martaman. Positive influence of maximum and minimum temperature on population development of BSW on cv. Kanchkel has been observed from correlation studies (Table 2) but the incidence was negatively correlated with maximum RH, minimum RH and rainfall.

It may be concluded from the study that during the initial stages of the crop stage, infestation of banana pseudostem weevil was negligible and the pest gradually established with increase in age of the crop as mature plants are preferred by the adults of *O. longicollis*. The trend of incidence pattern showed that BSW remains active throughout the year on both the cultivars and population gradually increases during the first ratoon crop or second ratoon crop. However, the degree of damage has been recorded more on cv. Martaman as compared to cv. Kanchkel. The results

from correlation studies on the influence of meteorological parameters showed that incidence of BSW on both the cultivars was positively correlated with maximum and minimum temperature and negatively correlated with maximum RH.

ACKNOWLEDGEMENT

The authors are thankful to all the teaching and non-teaching staff members of AICRP on Fruits, Mohanpur Centre, BCKV for their co-operation and assistance during the period of investigation.

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