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## Impact of infestation of banana pest *Odoiporus longicollis* and *Cosmopolites sordidus* on four common varieties of banana plant namely, Malbhog, Alpan, Champa and Harichhal in Koshi and Vaishali District, Bihar, India

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### Abstract

The commercial yield of banana in Bihar, India, mainly affected by *Odoiporus longicollis* and *Cosmopolites sordidus*. The present study has been designed to test the impact of infestation of these two banana pest on four common varieties of banana plant namely, Malbhog, Alpan, Champa and Harichhal during different seasons in banana cultivation areas of Koshi and Vaishali in the state of Bihar, India during 2015-16. Observations were made in pre-monsoon, monsoon, post monsoon and winter periods of 2015 and 2016. The metrological data of 2015-16 has also studied. The percentages of incidence were transformed in to the angular values and results obtained in respect of relative impact of pest on different varieties of banana have been recorded. The result shows that the banana stem borer *Odoiporus longicollis* caused highest damage in monsoon and its impact on Malbhog variety during monsoon is highest(49.2%) followed by Harichhal (46.49%), Champa (42.90%) and Alpan (40.88%). Another important pest *Cosmopolites sordidus* caused damage to Malbhog, Champa, Alpan and Harichhal during the season pre-monsoon (13.20%, 4.92%, 3.49% and 9.09%), monsoon (15.62%, 4.95%, 4.93% and 12.91%), post-monsoon (14.75%, 2.88%, 2.80% and 10.28%) and winter (12.56%, 4.33%, 3.12% and 6.15%) respectively. The relative evaluation clearly reveals that Malbhog variety of banana is more susceptible to infestations of *Odoiporus longicollis* as well as *Cosmopolites sordidus* the stem and root borer pests of banana followed by Harichhal, Champa and Alpan varieties by and large in all the four seasons in spite of relative differences among themselves. However, the percent of damage during monsoon and post-monsoon seasons as compared to pre-monsoon and winter seasons are relatively greater and susceptible.

**Keywords:** *Odoiporus longicollis*, *Cosmopolites sordidus*, Malbhog, Alpan, Champa, Harichhal

### Introduction

*Musa paradisiaca* popularly known as banana is one of the oldest fruit to mankind and considered as “Queen of tropical fruit” from the times of immemorial. The edible banana perhaps originated from tropical part of South-East Asia and have arisen as a result of natural crosses between two its progenitors namely *Musca acuminata* and *Musca balbisiana*. India is also considered as one of the probable centre of origin. Normally, banana is grown within thirty degree latitude on either side of equator. As far as the nutrient value of banana is concerned, it is rich source of food to our population and certainly provides balanced diet as compared to other fruit crops. The biochemical estimations of banana are indicative of the fact that it contains 70-75% moisture, 20% carbohydrate, 1.2% protein, 0.2% fat, 0.5 to 30mg phosphorus, 20-160mg. calcium, 0.25mg Beta carotene, 0.02mg thiamine, 0.70mg niacin, 10mg ascorbic acid and energy 100 calories/100g. The main commercial products of banana are banana pulp, banana beverages, dehydrated banana products, banana powder, jelly, candid banana slice, banana toffee and banana paste. The popular varieties of banana are Malbhog, Alpan, Champa and Harichhal.

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The total area under banana cultivation in India is 4,00,000 hectare with an annual production of 13.5 million tonnes (Padmanaban, *et al.* 2008). The chief banana growing states in India are Maharashtra, Karanataka, Kerela, Tamil Nadu, Andhra Pradesh, Bihar, Orissa, West Bengal and Assam. Banana is the second most important fruit crop of Bihar grown in about 26,136 hectares with annual production of 5.2 lakh tones entailing a productivity rate of 2,000 tones/hectares (Deshmukh, *et al.* 2000). The loss of crop due to pests is the major problem affecting the productivity and quality of banana fruits in our country. The injurious insects turn as serious pests and feed upon the banana plants and affect the usual growth and development of plant resulting into very poor yield and also quality of banana fruit. Thus the topic of investigation has been hypothesized which aims at understanding the behavioural manifestation of some serious pests particularly *Cosmopolites sordidus* and *Odoiporus longicollis* Oliver the common pests of banana.

### Literature review

The review of relevant literatures reveal that some investigations related to banana pests have been carried out by number of workers in order to minimize the attack of banana pests. Lefroy (1906) reported *Odoiporus glabricollis* in stem of the plantain. The black weevil was found on or in the plant quite commonly. The significant investigations on the banana pests have been made by Ayala, *et al.* (1979), Birat (1968)<sup>[9]</sup>, Cendana (1992), Cheng (1952)<sup>[10]</sup>, Dutt. (1956), Edward (1930), Froggott (1928)<sup>[15]</sup>, Gandhi (1967)<sup>[17]</sup>, Harris (1942)<sup>[20]</sup>, Jones, *et al.* (1983), Kung, *et al.* (1955)<sup>[23]</sup>, Lawson (2010), Lefroy (1906), Lomas (1947), Nair (1977), Pinto (1928)<sup>[30]</sup>, Prasad (1968), Rajnath, *et al.* (2001), Anonymous (2013)<sup>[4]</sup>, Kumar, *et al.* (2014), Barrera (2009)<sup>[5]</sup>, Dutt, *et al.* (1972)<sup>[12]</sup>, Harish, *et al.* (2001), Musabyimana (2001), Mustafa (2011), Turner, *et al.* (2010) and many others.

### Materials and Methods

The studies on the Banana pests and their control have been carried out with a survey of banana growing areas of Bihar particularly the rich banana growing areas in Koshi and Vaishali of North Bihar. The insect pests of banana were collected and brought to Post Graduate Research laboratory, Department of Zoology, Gaya College, Gaya for the required investigations related to project. The research work on the project was carried out during the season 2015 and 2016.

### Results and Discussion

The present experiment has been designed to test the impact of infestation of *O. longicollis* and *C. sordidus* the pests of banana on its four common varieties namely Malbhog, Alpan, Champa and Harichhal during different seasons of banana cultivation in areas of Koshi and Vaishali in the state of Bihar. Observations were made in pre-monsoon (March-May), monsoon (June-September), post monsoon (October-November) and winter (December-February) periods of 2015 and 2016. The percentages of incidence were transformed in to the angular values and results obtained in respect of relative impact of pest on different varieties of banana have been recorded in the table 1. Table 1 indicates the impact of banana stem borer (*O. longicollis*) on four different varieties of banana during different seasons. The results obtained are

indicative of the fact that the percent of damage to host plant due to *O. longicollis* is the highest during the monsoon period to all the four varieties of banana as compared to other seasons. However, the percentage of damage in “Malbhog” has been found relatively higher than the other varieties. The damage percentage in Malbhog during monsoon period is highest (49.2%) as compared to Harichhal (46.49%), Champa (42.90%) and Alpan (40.88%). Results obtained as per table further indicate that relative percentage of damage to host plant by *O. longicollis* to different varieties of banana. Such as Malbhog, Champa, Alpan and Harichhal in pre monsoon (45.5%, 30.98%, 21.0% and 40.15%), post monsoon (46.59%, 36.90%, 26.61% and 42.78%) and winter (45.31%, 32.48%, 35.65% and 40.71%) seasons present evident variations as far as the relative incidence of damage by the pest to four varieties of banana are concerned. It has been found to follow the under-given relative order of damage to different varieties of banana.

Malbhog > Harichhal > Champa > Alpan

It appears that the infestation of pest in respect of damage of varieties of banana is by and large highest in Malbhog perhaps on account of its sweetness and delicious nature as a result it is most susceptible to attack of *O. longicollis* followed by Harichhal, Champa and Alpan varieties. The lowest susceptibility has been recorded Alpan variety under the seasonal changes and environmental conditions of Bihar. Further the relative impact of another serious pest of banana namely *Cosmopolites sordidus* Gen. in respect of damage to four varieties of banana during different seasons of banana cultivation in Bihar has been evaluated and results obtained are recorded in table 2. Observations reveal that the percentage of damage by *Cosmopolites sordidus* to Malbhog, Champa, Alpan and Harichhal during the seasons pre-monsoon (13.20%, 4.92%, 3.49% and 9.09%), monsoon (15.62%, 4.95%, 4.93% and 12.91%), post-monsoon (14.75%, 2.88%, 2.80% and 10.28%) and winter (12.56%, 4.33%, 3.12% and 6.15%) present significant variations in the percentage of damage to four varieties of banana during different season. However, in this case also highest percentage of damage to Malbhog variety followed by Harichhal, Champa and Alpan have been recorded. The infestation of pest, *Cosmopolites sordidus* causing damage to all varieties of banana plants in spite of relative differences are by and large maximum during monsoon season and post-monsoon season as compared to pre-monsoon and winter season and it accounts for the significant impact of seasonal changes in relation to infestation of pest *Cosmopolites sordidus* as far as the percentage of damage to all the four common varieties of banana in the banana growing areas of Bihar is concerned. The relative evaluation as per table 2 thus clearly reveal that Malbhog variety of banana is more susceptible to infestations of *O. longicollis* as well as *Cosmopolites sordidus* the stem and root borer pests of banana followed by Harichhal, Champa and Alpan varieties by and large in all the four seasons in spite of relative differences among themselves. However, the percent of damage during monsoon and post-monsoon seasons as compared to pre-monsoon and winter seasons are relatively greater and susceptible.

## Charts and Tables

**Table 1:** Table showing relative impact of *O. longicollis* on the percentage of damage to four common varieties of banana in the areas of Bihar

Sl. No.	Varieties of Banana	Damage of plant in percentage (%) during different seasons			
		Pre-monsoon	Monsoon	Post-monsoon	Winter
1	Malbolge	45.75	49.42	46.59	45.31
2	Champa	30.98	42.9	36.9	32.48
3	Alpan	21.1	40.88	26.61	25.65
4	Harichhal	40.15	46.49	42.78	40.71
SEM		1.53	2.69	2.58	2.75
C.V. %		14.95	12.37	12.14	18.82
C.D. at 0.5% level		3.79	4.58	4.31	4.72

**Table 2:** Table showing relative impact of *C. sordidus* on the percentage of damage to four varieties of banana in the areas of Bihar

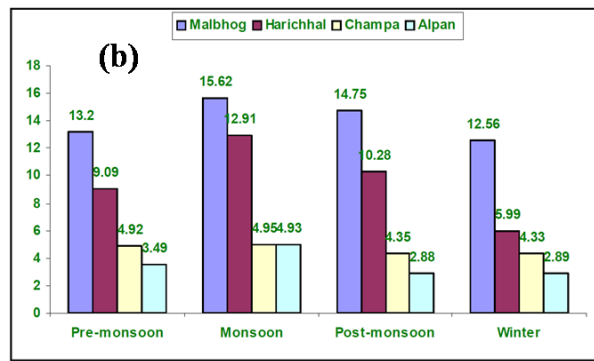
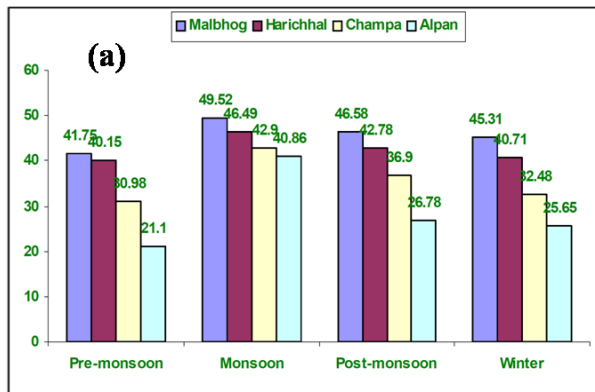
Sl. No.	Varieties of Banana	Damage of plant in percentage (%) during different seasons			
		Pre-monsoon	Monsoon	Post-monsoon	Winter
1	Malbhog	13.2	15.62	14.75	12.56
2	Champa	4.92	4.95	2.88	4.33
3	Alpan	3.49	4.93	4.35	2.89
4	Harichhal	9.09	12.91	10.28	5.99
SEM		2.17	1.67	1.98	2.33
C.V. %		19.91	16.45	14.96	14.32
C.D. at 0.5% level		4.05	3.82	4.55	5.32

**Table 3:** Table showing average metrological data in year 2015

Sl. No.	Months	Temperature °C		Relative Humidity (%)		Rain fall (mm)
		Max	Min	Morning	Day	
1	January	22.13	8.50	97	52	42.40
2	February	23.90	10.50	91	50	32.60
3	March	32.15	14.20	82	28	2.10
4	April	37.80	21.80	72	31	0.60
5	May	36.60	24.60	86	52	28.70
6	June	32.15	25.90	93	79	490.20
7	July	31.90	25.60	94	78	360.40
8	August	32.60	26.40	92	79	189.30
9	September	33.10	26.80	95	81	79.40
10	October	32.30	23.50	88	63	46.96
11	November	31.18	16.20	87	43	-
12	December	25.70	11.70	85	38	-

**Table 4:** Table showing average metrological data in year 2016

Sl. No.	Months	Temperature °C		Relative Humidity (%)		Rain fall (mm)
		Max	Min	Morning	Day	
1	January	22.28	8.30	96	53	43.60
2	February	23.93	10.40	92	51	33.70
3	March	32.14	14.10	83	27	2.56
4	April	37.83	21.90	73	30	0.80
5	May	36.31	24.70	88	51	29.30
6	June	32.31	25.60	94	78	593.30
7	July	31.93	26.80	95	76	362.80
8	August	32.70	26.90	93	77	190.70
9	September	33.18	27.10	96	80	80.90
10	October	32.51	22.80	84	61	47.80
11	November	31.34	15.30	83	42	-
12	December	25.80	11.20	82	37	-



**Histogram: (a)** Showing relative impact of *O. longicollis* on the four varieties of banana in respect of damage during different seasons of banana cultivation in the state of Bihar, **(b)** Showing relative impact of *C. sordidus* on the four varieties of banana in relation to percent of damage during different seasons.

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