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SEASONAL INCIDENCE OF INSECT PESTS ON JACKFRUIT, *ARTOCARPUS HETEROPHYLLUS* LAMARCK

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ABSTRACT
Jackfruit, *Artocarpus heterophyllus* Lamarck is attacked by over 35 species of insects. A field study was obtained at Research Unit, AICRP on Tropical fruits, BCKV, Mondouri, Nadia, West Bengal to identify the pest(s) of this crop and the seasonal incidence of these pests. Shoot and fruit borer, *Diaphania caesalis* Wlk. (Pyralidae: Lepidoptera), slug caterpillar, *Latoia lepida* Cram. (Cochlididae: Lepidoptera), black citrus aphid, *Toxoptera aurantii* Fonscolmbe (Aphididae: Hemiptera), jackfruit mealy bug, *Nipaecoccus viridis* Newstd. (Pseudococcidae: Hemiptera), mango stem borer, *Batocera* sp. (Cerambycidae: Coleoptera) were the different pests observed in the field during the study. *D. caesalis* was absent in the field in the months of July, August and September. They were found to be present throughout the field in the remaining months. Larval stage of *L. lepida* was observed from October to December. The citrus aphid was present from the 1st fortnight of October to the month of February, whereas mealy bug was found to be present in the month of November on jackfruit plants. The infestation of stem borer was recorded during the months of September and October. *D. caesalis* caused 14.61 - 39.93% damage on shoots during January and 20 - 40% damage on fruits throughout the fruiting period.

KEY WORDS: Infestation, Borers, Sucking pests, Damage in shoots, inflorescence and fruits.

INTRODUCTION

India contributes 10 – 13% of the total world production of fruits and ranks second in the world. Among different types of fruits consumed by people of India, the jackfruit, *Artocarpus heterophyllus* Lamarck (Family: Moraceae) produces more yield per tree than any other fruit tree. The states of South India, Assam, Bihar and West Bengal possess the major percentage of jackfruit plantation in our country. In all these states the jackfruit is a popular food ranking next to the mango and banana in total annual production. The food value per 100g of edible portion in the ripe-fresh pulp of jackfruit and these are as follows: calories (98 KCal), moisture (72-77.2%), protein (1.3-1.9g), fat (0.10.3g), carbo hydrates (18.9-25.4 g) and fiber (1.0-1.1 g). Vitamins like retinol (A), thiamin (B_1), riboflavin (B_2), and ascorbic acid (C) are also present in these fruit alongwith minerals like calcium, phosphorus, iron and potassium. Obviously, jackfruit has diverse value in terms of nutrients and should be grown widely. Insect pest infestation is one of the reasons behind the poor productivity of this fruit in India. This crop is reported to be infested by 35 species of insect pests including fruit and shoot borer, bud weevil, spittle bug, mealy bug, castor capsule borer, aphid, thrips, red ant and different species of bark borers, leaf eating caterpillars and scale insects from different parts of the country (Srivastava and Butani 1998). But surprisingly not much work on infestation of insect pest on jackfruit has been done in West Bengal and therefore, the present investigation has been attempted to study the seasonal incidence of different insect pests recorded on jackfruit. This may help to forecast the pest attack for developing a proper schedule for the management of the invading pests.

MATERIALS & METHODS

The field experiments were conducted in the Research Unit of AICRP on Tropical Fruits, Bidhan Chandra Krishi Viswavidyalaya, Mondouri and homestead areas of Mondouri and Barajaguli during October to June. Five plants were randomly selected from the plantation for this purpose. Observation of insect pests was taken from those sampled plants and the pests were identified after thorough study of the morphology and symptoms of damage produced by them. Regarding seasonal incidence especially of fruit and shoot borer, from each of those sampled plants observation were taken from the four sides of the plants; i.e. East, West, North and South, respectively. Observations were taken at fortnightly interval. Total number of shoots and the number of shoots damaged by the larvae of the pests were counted in 250 cm^2 plant area in case of fruit and shoot borer. In case of fruiting trees percentage of fruit infestation by the same pest was estimated in the different fruiting months of jackfruit (January to June). From each of the plants 30 fruits were chosen randomly and thereafter percentage of fruit infestation was estimated.

RESULTS & DISCUSSION

Different insect pest species as recorded on jackfruit are described below:

(a) Fruit and shoot borer

Common name: Jackfruit fruit and shoot borer

Scientific name: *Diaphania caesalis* Walker
Family: Pyralidae
Order: Lepidoptera
The caterpillars have yellowish head and prothorax and reddish brown body with numerous black flattened horny warts, each bearing one short bristle like hair. Full grown larvae are 2.5-3.0 cm in length but before pupation the larvae started to become pale in colour and make them squeezed. Pupae are reddish brown in colour. Adults are whitish brown in colour, moths have grayish elliptical patterns and a marginal series of black specks. The length of the adults with wing expanse is about 26 to 34 mm. The females are slightly bigger than males.
The caterpillars initially bore into tender shoots, flowering buds and developing fruits. As a result the shoots and buds wilt and droop and the fruits start rotting. Pupation takes place inside the tunnels, cracks and crevices of stems and leaves folded by them.

During the present study the pest was observed throughout the year except the months of July, August and September. The mean percentage of damage caused by *D. caesalis* ranged from 0.62%-33.94% when all the four faces were considered together (Table 1). The highest damage was observed in the 2nd fortnight of January (39.93% on east face) whereas the least damage was observed in the 1st fortnight of June (0.02% on west face and north face). The report by Bai and Marimadaiah (2002) was in conformity with the present findings as they recorded severe infestation by *Diaphania* in October to December though the species was different. The least damage was observed in the 17th and 18th fortnights; i.e. the month of June. The minimum percentage of infestation of *Diaphania* in April to June was earlier reported by Gowda *et al.* (2001) though they investigated on mulberry.

TABLE 1. Overall mean percentage of shoot damage by *Diaphania sp.*Walker on the four faces of the plant canopy of Jackfruit

Months with Fortnight	Mean Damage (%)	Months with Fortnight	Mean Damage (%)	Months with Fortnight	Mean Damage (%)
October I	17.96	January I	26.69	April I	3.31
October II	16.87	January II	33.94	April II	1.08
November I	19.78	February I	26.03	May I	2.18
November II	17.58	February II	17.29	May II	2.35
December I	18.31	March I	15.88	June I	0.62
December II	18.04	March II	5.39	June II	0.64

TABLE 2. Percentage of fruit damage by *Diaphania sp.*Walker in different fruiting months of Jackfruit

Months with Fortnight	Mean Damage (%)	Months with Fortnight	Mean Damage (%)
January I	20.00	April I	33.33
January II	23.33	April II	36.66
February I	23.33	May I	36.66
February II	26.66	May II	36.66
March I	26.66	June I	40.00
March II	30.00	June II	40.00

The percentage of infested fruits by the same pest species during different fruiting months (January to June) has been presented in the Table 2. The fruit infestation was ranged from 20 to 40% causing the highest damage (40%) during June and the lowest (20%) in the 1st fortnight of January. The percentage of infestation on fruits shows much higher than in case of shoots which may be due to availability of less number of fruits in this stage of crop growth. The average percentage of fruit infestation was 27.44% as estimated by Khan and Islam (2004). During period from February to June, maximum numbers of infested fruits were recorded instead of shoots which may be due to their preference to the tender inflorescence and young fruits that they invaded more in these parts than the shoots.

(b) Slug caterpillar
Common name: Castor slug or Blue-striped nettle grub
Scientific name: *Latoia lepida* (= *Parasa lepida)* Cram.
Family: Cochlididae
Order: Lepidoptera
The full-fed larva is flat, fleshy and greenish in colour with white lines on the body. It is covered with spines having red and black tips. The young larva feeds gregariously by scraping the surface of the leaves and causes drying up of the foliage. As they grow they scatter and feed on entire leaves and cause defoliation of the plant, jackfruit. Among the different minor pests observed in the orchards, this pest was an important one. The pest was observed in the field condition from the month of October to the month of December in larval stage. But according to Panwar (1995) the activity of this pest can be seen throughout the year.

(c) Aphid
Common name: Black citrus aphid
Scientific name: *Toxoptera aurantii* Fonscolmbe
Family: Aphididae
Order: Hemiptera
The adult is shiny black in colour and measures 1.2-1.8 mm in length. The nymph is smaller and possesses relatively shorter antennae than the adult. Adults were of both apterous and winged forms. Nymphs and adults suck sap from the young leaves, tender shoots and also from tender fruits. They secrete honey-dew which turns black after formation of sooty mould.

In the course of the present study this pest was observed in the field condition from the 1st fortnight of October to the month of February. Both the nymphal and the adult stages were found on the tender shoots and fruits of jackfruit plants.

(d) Mealy bug

Common name: Jackfruit mealy bug
Scientific name: *Nipaecoccus viridis* Newstead
Family: Pseudococcidae
Order: Hemiptera

Nymphs and adults are brownish in colour with their dorsum covered thinly with a whitish mealy material. This pest was observed in the field condition of the present study in both nymphal and adult stages. Clusters of this pest were seen on leaves and tender shoots and both the stages caused damage by sucking the cell sap.

During the present investigation the pest appeared on jackfruit plants in the month of November though the pest was earlier reported to be present throughout the year in other crops like citrus, fig, grapevine, mango, guava and tamarind with peak period of infestation being August to November (Srivastava and Butani, 1998).

(e) Stem Borer

Common name: Mango stem borer
Scientific name: *Batocera rufomaculara* De Geer
Family: Cerambycidae
Order: Coleoptera

The grub tunnels into the stems. Pupation takes place inside the tunnels. After the first monsoon shower the adult emerges by cutting out the pupal cases.In the course of the study this pest species was observed in the field during the month of September – October.

CONCLUSION

The shoot and fruit borer, *Diaphania caesalis* Walker, was found to be the most important pest of jackfruit. It may be concluded that maximum percentage of damage of shoots, by this pest, was found during the 2nd fortnight of month of January, whereas the least damage was found during the 1st fortnight of June. The damage on shoots reduced gradually after the month of January due to the initiation of inflorescence. The pest remained absent from the field during the months of July to September. Afterwards this pest damaged the inflorescence and young fruits as they switched over themselves from the older shoots. The maximum fruit damage was observed during the month of June.

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Metric System

gm (gram)
m (meter)
cm (centimeter)
cm^2 (sq centimeter)
Kcal (Kilo calorie)