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## Damage of flower chafer beetle *Oxycetonia versicolor* Fabricius ((Scarabaeidae: Coleoptera) on brinjal in Dharmapuri district, Tamil Nadu

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### Abstract

The occurrence of flower chafer beetle *Oxycetonia versicolor* Fabricius in brinjal has been studied in Dharmapuri district during 2018 - 19 and 2019 - 20. The survey was under taken in the major brinjal growing regions of Dharmapuri district during 2018-19 and 2019-20. In Dharmapuri district brinjal has been cultivated in precision farming and conventional method. The flower chafer beetle incidence was noticed in all the surveyed fields and the incidence was more during 45 days after transplanting and decreased after 75 days after planting. The number of beetles per ten plants was ranged between 0.3 – 1.3, 1.5 – 4.6, 2.1 – 5.1, 0.8 – 2.4 and 0.4 – 1.3 during 2018-19, 0.6 – 1.6, 1.4 – 5.5, 1.8 – 6.6, 0.6 – 2.3, 0.5 – 1.3 during 2019 – 20 at 30, 45, 60, 75 and 90 days after planting respectively. The study on the incidence flower chafer beetle in the treated and untreated fields conducted at Krishi Vigyan Kendra farm revealed that lower incidence in the treated fields. The number of chafer beetles per ten plants in the treated fields were 4.0, 3.4, 2.8, 2.0 and 2.0 at 30, 45, 60, 75 and 90 days after transplanting. The beetles initiate their feeding on holes made by the brinjal shoot and fruit borer. They also found feeding on the tender shoots, buds and flowers of the brinjal plants. In some plant's congregation of 4-6 adults and frothy secretion were noticed. The periodical application of insecticides for the management of shoot and fruit borer *L. orbonalis* keeps the beetle population under check. The beetle population was more during August to October months and thereafter the population declines. The occurrence of flower chafer beetle during the reproductive stage of the brinjal will lead to huge economic loss to the farmers and increase the cost towards plant protection. The damage level, direct and indirect yield loss, association with shoot and fruit borer *L. orbonalis* and management strategies should be studied in detail before this pest attains major pest status in brinjal.

**Keywords:** Brinjal, chafer beetle, *Leucinodes orbonalis*, *Oxycetonia versicolor*, insecticides

### Introduction

Brinjal *Solanum melongena* L. is one of the important vegetable crops cultivated in South east Asian Countries. During 2017-18 the area under brinjal cultivation and production was 7.30 lakh hectares and 12,801 mt respectively in India <sup>[1]</sup>. In Tamil Nadu the area and production of brinjal was 15,080 hectare and 302.4 mt in the same period. The fruit is low in calories and fats, mostly water, some protein, fiber and carbohydrates <sup>[2]</sup>. Though different shape and colour are available in brinjal the violet and oval or egg-shaped varieties are mostly cultivated in Dharmapuri district. In some pockets long club shaped and green type brinjal has been cultivated which has more preference in Kerala. The brinjal cultivated in Dharmapuri district has been exported to other countries. The exporters prefer 30-35g shining fruits, without any scar or holes in the fruits. Hence the farmers have to protect the brinjal from the insect pest and diseases to avoid market loss to the crop. The farmers have to incur more than 50% of the cultivation expenses towards the management of insect pests as this crop has been invaded by more than 70 insect species <sup>[3]</sup>.

The brinjal shoot and fruit borer *Leucinodes orbonalis* Guen., leaf hopper *Amrasca biguttula* (Ishida), epilachna beetle *Henosepilachna vigintipunctata* (F.) and ash weevil *Mylocerus subfasciatus* are the major insect pests causing damage in this district <sup>[4, 5]</sup>. The changing crop pattern, climate change, use of high yielding hybrids, continuous cultivation and indiscriminate use of fertilizers and pesticides leads to change in pest complex in many crops. In Dharmapuri district more inputs were used in the precision farming method of cultivation to

get more income per unit area which also have impact on the pest and disease incidence. Under these circumstances some of the insects finds new hosts for their survival. In this way the damage of flower chafer beetle *Oxycetonia versicolor* Fabricius was noticed in some brinjal growing regions of Dharmapuri districts. *O. versicolor* has already been reported to cause damage in cotton [6], brinjal [7], red gram, green gram [8], pearl millet [9] and rose [10] in different parts of India. Hence, to assess the potential of *O. versicolor* on brinjal in Dharmapuri district surveys were conducted in the major brinjal growing areas of Dharmapuri district.

## 2. Material and Methods

In Dharmapuri district brinjal is being cultivated throughout the year under precision farming cultivation utilizing ground water. The farmers use to maintain the crop from six to nine months based on the market price. The survey was carried out in the different brinjal growing blocks from June to November during 2018-19 and 2019- 20 (Table 1). In the selected villages five farmers' fields were earmarked for the survey. In the selected farmers' fields an area of 10 x 8m was demarked at five places. In the demarked area ten plants were selected randomly to enumerate the incidence of flower chafer beetle *O. versicolor* at 15 days interval starting from 30 days after transplanting. During 2018-19 it was observed that the application of insecticides for the management of *L. orbonalis* reduces the incidence of flower chafer beetle. In order to study the effect of management strategies against the chafer beetle field trails were laid out Krishi Vigyan Kendra, Papparapatty, Dharmapuri dt. farm. The 25 days old hybrid brinjal seedlings were transplanted in an area of 0.2ha and the field was equally divided. In one part the pest and disease management strategies were imposed and the other part was kept as untreated. Agronomic practices were kept uniform for both the plots. The university recommended package of practices were followed in the field. The occurrence of flower chafer beetle was observed at 15 days interval starting from 30 DAP in the ten randomly selected plants.

## 3. Results and Discussion

The presence of flower chafer beetle *O. versicolor* was noticed in most of the surveyed fields during 2018-19 and 2019-20. During 2018-19 the number beetles were ranged between 0.3 – 1.3, 1.5 – 4.6, 2.1 – 5.1, 0.8 – 2.4 and 0.4 – 1.3 at 30, 45, 60, 75 and 90 days after planting respectively. The occurrence of beetle ranged between 0.6 – 1.6, 1.4 – 5.5, 1.8 – 6.6, 0.6 – 2.3, 0.5 – 1.3 at 30, 45, 60, 75 and 90 days after planting respectively during 2019 -20 at various locations in Dharmapuri district (Table 1). The occurrence of beetle was less during 30, 75 and 90 DAP in both the year of study whereas the number of beetles were more during 45 and 60 DAP in all the locations. The infestation level was very low in Naganampatti village (12.287 N, 78.181 E) during the period of study. The highest number of beetles were recorded in Sitlakarampatti village (12.178N, 78.033E) during 2018 -19 and in Irulapatti village (12.233N, 78.118E) during 2019-20. The beetle activity usually noticed during the morning hours. Ambethgar, 2000 reported that incidence of flower chafer beetle cause serious damage to brinjal at Vriddhachalam, Tamil Nadu. Veeranna Daravath *et al.*, 2020 during their survey found that flower chafer beetle damages the tender shoots of the brinjal which were nearer to the cotton fields. Feeding of *O. versicolor* in brinjal fields nearer to rose garden was reported [10]. In the present investigation the incidence of

*O. versicolor* in brinjal fields which are not surrounded by cotton, maize, rose or sorghum were recorded. This shows the preference of flower chafer beetle towards brinjal.

The brick red beetle was found feeding on the tender shoots, buds and flowers of the brinjal plants. They mostly initiate their feeding on the shoot and fruit borer damage holes. In a single plant about 4-6 adult beetles were noticed in the untreated fields (Plate 1). The frothy secretion was observed in the plants where three or four beetles were congregated (Plate 2). The damage to the buds and flowers reduces the fruit setting in the plants. Most of the time they were noticed near the bore holes of brinjal shoot and fruit borer. As the flower chafer beetle mouth parts are not adopted for penetration of resistant plant tissue [8] they mostly prefer the sites which has been already damaged by the shoot borer. This indicates that the management of brinjal shoot and fruit borer will reduce the incidence of chafer beetle in the brinjal. In the present investigation also the number of beetles were reduced after 60DAP where the farmers intensively carry out the shoot and fruit borer management practices. The farmers usually apply emamectin benzoate 5%SG, flubendamide 39.35% SC, Spinosad 45% SC, chlorantraniliprole 18.5% SC, fipronil 5% SC and combination products for the management of shoot and fruit borer.

The occurrence of flower chafer beetle in the treated and untreated fields were presented in Fig.1. The number of chafer beetles recorded per ten plants in the untreated field (no control measures were taken for *L. orbonalis*) was 4.8, 8.8, 12.2, 12.6 and 10.8 respectively at 30, 45, 60, 75 and 90 days after planting at Krishi Vigyan Kendra farm. The occurrence of chafer beetle was very less in the treated fields (management measures taken for *L. orbonalis*). The number chafer beetles at 30, 45, 60, 75 and 90 days after planting was 4.0, 3.4, 2.8, 2.0 and 2.0 per ten plants respectively in the treated fields. The management measures for the brinjal shoot and fruit borer usually intensified 30 days after planting. The chafer beetle population declines once the management measures were initiated against *L. orbonalis*, which indicates the positive correlation between the shoot and fruit borer damage and flower chafer beetle incidence in brinjal.

Though throughout the year brinjal cultivation is being carried out in this district the survey was carried out between July to November in 2018-19 & 2019-20. In most of the locations the beetle population was more during 45<sup>th</sup> and 60<sup>th</sup> DAP which coincides with August and September months. In cotton and red gram more number of beetles were observed during August to September [6, 8]. Deshpande and Rao (1980) in their study on population fluctuations of cetoniid beetles concluded that the activity of *O. versicolor* continued for nearly two and a half months from mid-August to the last week of October [11]. In the present investigation also, the beetle population declines 75 DAP which corroborate with the above findings. In cotton the emergence of flower chafer beetle coincides with the flowering period [12]. In the present investigation also, more beetles were noticed during the flowering period. The occurrence of flower chafer beetle along with the other insect pests will lead to economic loss to the crops. The farmers are applying insecticide at weekly or fortnight intervals to manage shoot and fruit borer in brinjal. The occurrence of flower chafer beetle in brinjal may increase the number of insecticide application which ultimately increase the cost of cultivation.

In Tamil Nadu after Ambthgar, 2000 the flower chafer beetle infestation in brinjal was not reported in any of the brinjal

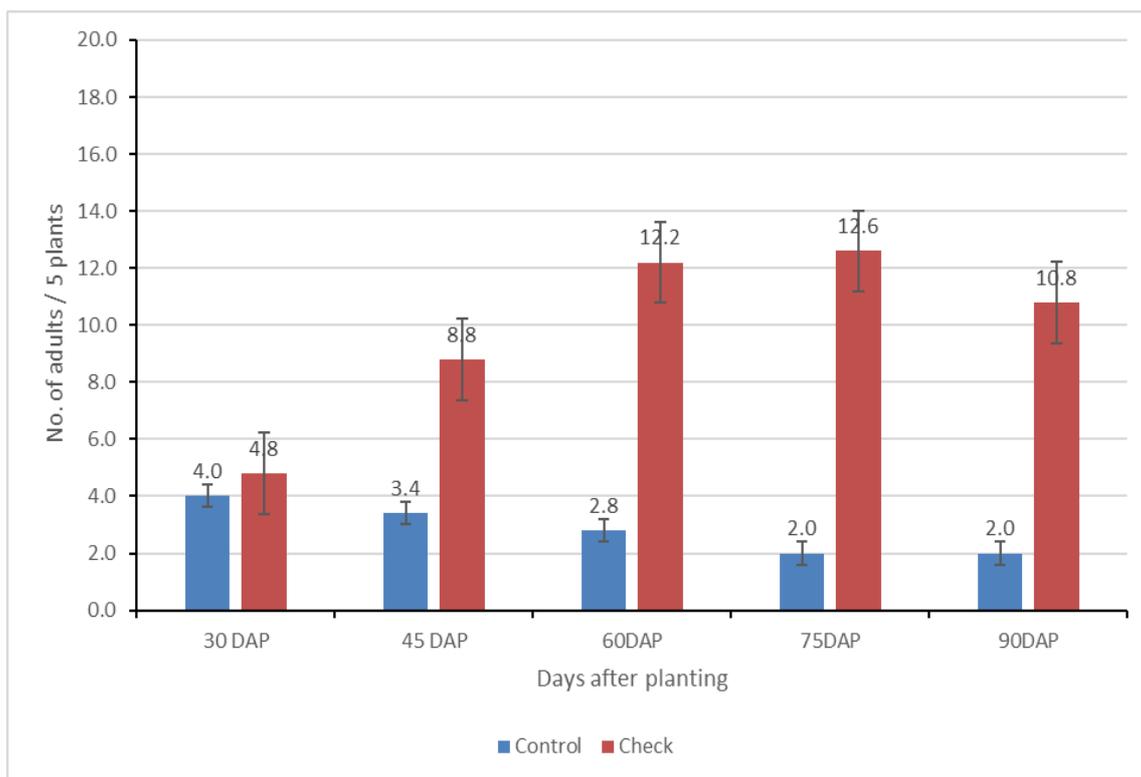
growing regions of the state. The present investigation reveals that the incidence of flower chafer beetle in most of the brinjal growing regions of Dharmapuri district. Flower chafer beetle also found to infest on pigeon pea <sup>[13]</sup>; *Jatropha curcas* <sup>[11]</sup>, rose <sup>[10]</sup>; mung bean <sup>[15]</sup> and cotton <sup>[16]</sup>. In Dharmapuri district the above crops are grown in tandem with brinjal. The wide host range, changing crop pattern and continuous use of

insecticides may change the pest from minor pest to major pest status. As the brinjal is one of the important vegetable crops in Tamil Nadu further studies on the grub behavior, damage level, direct and indirect yield loss, association with shoot and fruit borer *L. orbonalis* and management strategies should be studied in detail before the flower chafer beetle attains the major pest status.

**Table 1:** Incidence of flower chafer beetle *Oxyctonia versicolor* Fabricius in brinjal

Year	Village name	GPS coordinates	No. of beetles / 10 plants*					Total area surveyed (ha)
			30 DAP	45 DAP	60 DAP	75 DAP	90 DAP	
2018-19	Annamalaipatti, Morappur block	12.168 N 78.366 E	1.3	3.2	4.4	1.7	1.2	4.0
	Sitlakarampatti, Pennagaram block	12.178 N 78.033 E	1.1	4.6	5.1	2.4	1.3	4.0
	Agaram, Palacode block	12.225 N 78.104 E	0.5	4.1	4.0	1.8	1.0	4.0
	Naganampatti, Karimangalam block	12.287 N 78.181 E	0.3	1.5	2.1	0.8	0.4	4.0
2019-20	Annamalaipatti, Morappur block	12.168 N 78.366 E	1.3	5.3	6.6	2.3	1.3	4.0
	Palavadi, Nallampalli block	12.173 N 78.046 E	1.0	4.0	4.7	2.0	1.3	4.0
	Irulapatti, Palacode block	12.223 N 78.118 E	1.6	5.5	5.6	2.2	1.0	4.0
	Naganampatti, Karimangalam block	12.287 N 78.181 E	0.6	1.4	1.8	0.6	0.5	4.0

\* Average in ten plants in 5 fields



**Fig 1:** Incidence of flower chafer beetle *Oxyctonia versicolor* F. on brinjal at KVK farm



**Plate 1:** Flower chafer beetle feeding on buds and leaves of brinjal plant



**Plate 2:** Frothy secretion on the damage portion of brinjal buds

#### 4. Conclusion

Brinjal is one of the predominant vegetable crops in Tamil Nadu. The occurrence of flower chafer beetle *O. versicolor* along with other insect pests particularly brinjal shoot and fruit borer will increase the cost of plant protection among the brinjal growers. Present survey clearly indicates the association of flower chafer beetle with shoot and fruit borer. The flower chafer beetle population was maximum during 45 and 60 days after transplanting in the study area. The population declines whenever shoot and fruit borer management measures were initiated. The other hosts recorded for flower chafer beetle are mostly cultivated in close proximity with brinjal. Hence the related studies have to be under taken for the effective management.

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