

Seasonal incidence of mealy bug and there natural enemy on custard apple

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ABSTRACT

The effect of temperature, relative humidity and rainfall on population development of various stages of mealy bug on custard apple under field condition was studied during August 2014 to December, 2014. The incidence of mealy bug was observed in orchard in September 2014 (37th SMW) and then gradually increases up to the month of November (*i.e.* 45th meteorological week) and after that it decreases. The mealy bug population recorded highest (105.32 mealy bug per fruit) in the 45th meteorological week when maximum and minimum temperature, morning and evening relative humidity were 33.6^oC and 18.3^oC, 65.6 and 30.4 per cent, respectively. The non-significant correlation between mealy bug on custard apple and various weather parameters studied clearly indicates that once the population of mealy bug started increasing climatic factors hardly played role in the development during the *Kharif* 2014 season. The population of natural enemies started increasing 45th SMW onwards and that resulted in reduction of mealy bug population on custard apple.

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INTRODUCTION

In India, custard apple is grown over a vast area in the states of Andhra Pradesh, Maharashtra, Tamil Nadu, Assam and Orissa. The custard apple is infested by 20 species of insect pests (Butani, 1979), of which the mealy bug is the most important one. Three species of mealy bugs *viz.*, *Maconellicoccus hirsutus*, *Planococcus citri* and *Ferrisia virgata* are serious pests of this crop. Mealy bugs live in protective areas such as cracks and crevices of the bark, at the base of petioles, on the underside of

leaves and between the fruit eyes. Eggs of mealy bugs protected by waxy filamentous secretion of ovisac are almost impossible to reach with insecticide. Hence, it is very difficult to manage mealy bug.

Recently the incidence of mealy bugs becomes a serious concern in many custard apple orchards in Maharashtra state. Once the pest incidence increased, it is very difficult to control it with conventional insecticide. Similarly, the fruiting seasons of the custard apple favour to the occurrence of mealy bug due to change in environmental conditions. It is therefore,

necessary to know the seasonal incidence of mealy bug so as to adopt the control measure strategy at an appropriate time.

MATERIAL AND METHODS

A field experiment was conducted at the Instructional Farm of Krishi Vigyan Kendra (KVK) Dhule provided by Department of Entomology, College of Agriculture, Dhule under University of Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra during the August, 2014 to December, 2014.

The observations were recorded on the basis of live mealy bug population on trees selected from custard apple orchard. On each tree, four fruits on branches of four directions were tagged for observations at weekly intervals. The observations were recorded on tagged fruit for four months.

In order to study the influence of abiotic factors (meteorological parameters) on seasonal incidence, the meteorological data on maximum and minimum temperature, relative humidity and rainfall was obtained from meteorological observatory, College of Agriculture, Dhule.

The data on weekly mealy bug population was correlated with meteorological parameters.

RESULTS AND DISCUSSION

The data of the pest incidence per fruit and weekly

averages of meteorological parameters are presented in Table 1. Pearson correlation co-efficient of maximum and minimum temperature, morning and evening relative humidity, sunshine hour, evaporation and rainfall against mean population of mealy bug were worked out and presented in Table 2.

It could be seen from the data presented in Table 1 that, population of mealy bug varied from 1.03 to 105.32/fruit during August, 2014 to December, 2014. The first mealy bug incidence was observed in 37th meteorological week and the mealy bug population was 1.03/fruit. The population of mealy bug increased steadily and continuously from 37th meteorological week to 45th meteorological week (105.32/fruit) and then decreased steadily and continuously from 46th meteorological week due to the heavy rainfall (135.4 mm) in 46th SMW and increase in the population of natural enemies.

Highest population was recorded in 45th meteorological week (105.32/fruit). The average maximum and minimum temperature morning and evening relative humidity during 45th meteorological week of 2014 were 33.6°C and 18.3°C and 65.6 and 30.4 per cent, respectively.

The population of mealy bug showed non-significant correlation with minimum temperature ($r = -0.5491$), maximum temperature ($r = -0.2843$) and morning humidity ($r = -0.1008$) rainfall ($r = 0.2355$), sunshine hour ($r = 0.0627$) and evaporation (0.3001). The population of mealy bug showed significant negative correlation ($r = -$

Table 1 : Weekly weather data during the year- 2014 and Seasonal incidence of mealy bugs, parasitoids, *Coccinellids* and *Chrysoperla*

Month	Week No.	Temperature °C		Humidity %		Rain Fall mm	Sun shine hour	Evaporation mm	No. of mealy bug per fruit	No. of coccinellids per plant	No. of Chrysoperla per plant	No. of parasitoids per fruit
		Max	Min	Morn	Even							
Sept., 2014	37	30.8	21	85.4	66.4	5.6	4.9	3.1	1.03	0	0	0
	38	32.8	22.3	81.6	50.9	0	7.7	5	11.03	0	0	0
	39	34.8	21.9	77.4	42.9	0	8.2	5.8	14.83	0	0	0.25
Oct., 2014	40	36	22.1	76	33.3	0	8.6	6.2	19.75	0.25	0	0.25
	41	35.5	21.8	68.4	35.9	0	7.7	6.6	31.16	0.75	0.75	1.25
	42	33.9	22.1	74.9	37.4	0	7.8	5.7	66.41	1.2	1.5	1.65
	43	32.6	19.9	73.4	31.7	0	4.8	5.4	82.54	1.75	1.75	2.25
	44	34.2	17.7	74.1	24.9	0	8.4	5.3	99.33	3.35	2	2.65
Nov., 2014	45	33.6	18.3	65.6	30.4	0	8	6.1	105.32	3.5	2.75	3.15
	46	31.6	21.6	88.1	55.6	135.4	5.7	4.4	91.12	3.25	3.15	4
	47	31.2	16.7	85.7	33.7	0	8.1	3.6	92.75	4	3.15	4.15
	48	31.1	14.1	82.1	27.9	0	7.8	3.7	80	4.25	3.5	5.54
Dec., 2014	49	30.4	11.9	84.9	27.9	0	8.1	3.7	73.81	4.3	4.15	6.25

Table 2 : Correlation co-efficient (r) of mealy bug, parasitoid, ladybird and green lace wing population on custard apple with meteorological parameter

Sr. No.	Variables	Correlation co-efficient						
		Maximum temperature	Minimum temperature	Relative humidity-I (Morning)	Relative humidity-II (Evening)	Rainfall	Sun shine hour	Evaporation
1.	Mealy bug	-0.2843	-0.5491	-0.1008	-0.5749*	0.2355	0.0627	0.3001

* indicate significance of value at P=0.05 (By Pearson's Formula)

Table 3 : Correlation co-efficient between seasonal fluctuation of mealy bugs, predators and parasitoids

Sr. No.	Variables	Mealy bug
1.	<i>Coccinellid</i> predators	0.8506**
2.	<i>Chrysoperla</i> predators	0.8482**
3.	Parasitoid	0.7685**

** indicates significance of value at P=0.01 (By Pearson's Formula)

0.5749*) with evening relative humidity. The non-significant correlation between mealy bug and various weather parameter clearly indicate that once the population of mealy bug started increasing climatic factors hardly played any role in it's development during the *Kharif* 2014 season except evening relative humidity. Anonymous, 1995 reported negative correlation of mealy bug with minimum and maximum temperature, R.H. and rainfall in grape wine. Koli, 2003 reported that mealy bug infestation was at peak in September 2002 and subsequently declined gradually and reached its lowest in last week of November in grape wine.

The natural enemies found attacking mealy bug in the custard apple field are furnished in Table 1.

Predatory populations like *Coccinellids* and *Chrysoperla* were recorded during experimental season but their population was negligible.

The data on population of lady bird beetle per plant are presented in Table 1. The lady bird beetle population was appeared in the 40th SMW and continued till 49th SMW which ranges from 0.25 to 4.3 *Coccinellid* per plant. The peak incidence was noticed in 49th SMW with 4.3 lady bird beetle /plant.

The relationship of mealy bug population and *coccinellids* was studied using correlation co-efficients. Highly significant positive correlation (0.8506**) was observed between the *Coccinellids* and mealy bug population (Table 3) indicates that as the population of mealy bug increases the population of *Coccinellids* also increases.

The population of green lace wing per plant was presented in Table 1. The Green lace wing population was appeared in the 41st SMW and continued till 49th

SMW which ranges from 0.75 to 4.15 *Chrysoperla* per plant. The peak incidence was noticed in 49th SMW with 4.15 Green lace wing /plant.

The relationship of mealy bug population and



Anagyrus dactylopii (male)

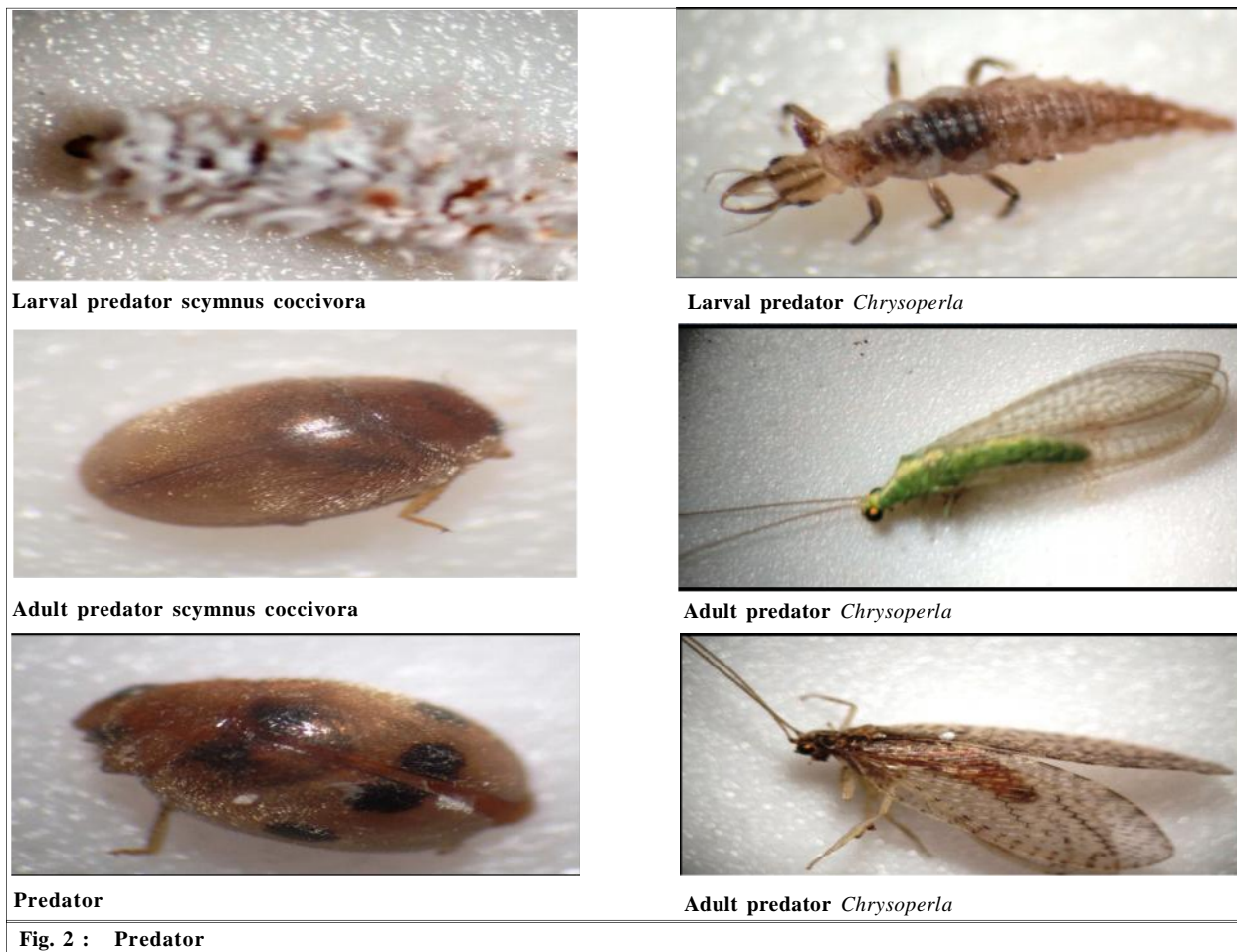


Anagyrus dactylopii (female)



Promuscidea unfaciativentris

Fig. 1 : Parasitoid



Chrysoperla was studied using correlation co-efficients. Presence of *Chrysoperla* shown highly significant positive correlation (0.8482**) with mealy bug population (Table 3).

Parasitoid populations like *Promuscideaun faciatiiventris*, *Anagyrus dactylopii* were recorded during the studies.

The data on parasitoid population per plant are presented in Table 1. The parasitoid population was appeared in the 41st SMW and continued till 49th SMW which ranges from 0.75 to 4.15 parasitoids per plant. The peak incidence was noticed in 49th SMW with 4.15 parasitoids/fruit.

The relationship of mealy bug population and parasitoid shown using correlation co-efficients. Presence of parasitoid was highly significant positive correlation (0.7685**) with mealy bug population (Table 3).

Similar observations were made in the past, Twenty

nine species of predators belonging to five insect orders have been reported on *M. hirsutus* in India by Ranga Reddy and Lakshminarayana (1986). Activity of *Cryptolaemus montrouzieri* on *M. hirsutus* in Karnataka was reported by Mani (1986). Among the predators, *Scymnus coccivora*, *Cryptolaemus montrouzieri* and *Chrysopa* sp. were recorded with maximum activity on citrus mealybug (Malleshiah *et al.*, 1999). The present findings are in confirmation with results.

These results of present investigations are in conformity with Ghose (1971) and Manjunath (1985) who reported that *Anagyrus* sp. causing 19 to 47 per cent parasitisation on *M. hirsutus* in West Bengal and *Anagyrus dactylopii* was found parasitizing *M. hirsutus* on grapes to an extent of 70 per cent in Bangalore, respectively. Similarly another parasitoid, *Promuscideaun faciatiiventris* Girault (Chalcidoidea: Aphelinidae) on mealybug was earlier reported from Andhra Pradesh,

Bihar, Delhi, Karnataka and Maharashtra by Sinha *et al.* (1985) and Hayat (1986). Mani (1986) reported six species of parasitoids on *M. hirsutus*, among them *Anagyrus dactylopii* recorded maximum parasitization compared to others. The present finding is in similar line with the result.

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