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Short Note

Bioecology and Seasonal Abundance of Sucking Pests Infesting Coccinia

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A survey was carried out at the Instructional Farm, College of Agriculture, Vellayani and nearby locations in Thiruvananthapuram, Kerala during 2006-2007 to assess the seasonal abundance of sucking pests infesting coccinia. The dominant sucking pests were scale insect, *Saissetia hemispherica* (Targ.) and aphid, *Aphis spiraecola* Patch. The minor sucking pests recorded were leaf footed bug, *Leptoglossus australis* F. and pentatomid bug, *Aspongopus obscurus* F. Very low infestation of green stink bug, *Nezara viridula* Linn. and mealy bug, *Ferrisia virgata* (Ckll.) was also observed. Due to desapping activity of these pests, the vigour of the plant was reduced. Seasonal occurrence of the pests showed higher population and more damage in summer than rainy season. Correlation studies revealed strong positive correlation between maximum temperature and population of the pests and extent of damage whereas rainfall had significant negative relationship with them.

Key words: Coccinia, *Seasonal incidence, Saissetia hemispherica*, *Aphis spiraecola*, *Aspongopus obscurus*

In India, coccinia or Ivy gourd is extensively grown in West Bengal, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. Due to ease in cultivation, prolific bearing, keeping quality, availability of fruits throughout the year, yielding nature for three to four years and scope for export, the vegetable is cultivated on a large scale throughout the country. Now there is great demand in both domestic as well as foreign markets due to its medicinal qualities viz. antioxidant, anti-hypoglycemic, immune system modulator and laxative properties. Compounds in the plant inhibit the enzyme glucose -6-phosphatase (Shibib *et al*, 1993) which is one of the key liver enzymes involved in regulating sugar metabolism. Therefore, Ivy gourd is recommended for diabetics where the juice of the roots and leaves is used in the treatment. Hitherto, mainly confined to kitchen gardens, the gourd has now attained the status of a commercial crop. The extensive cultivation attracts large number of pests to coccinia. There are very few reports of pest incidence in coccinia from Kerala (KAU, 2002). Coccinia being a vegetable generally cultivated along with other cucurbitaceous vegetables, there is every possibility of cross infestation of many of the pests of cucurbits to coccinia. Hence a detailed survey was conducted to assess the occurrence, distribution, magnitude of damage caused by sucking pests of coccinia and the pest population was correlated with various weather parameters.

Materials and Methods

A survey was undertaken to record the sucking pests of coccinia (*Coccinia grandis* (L.) Voigt.) to assess their seasonal occurrence in Kalliyoor panchayat of Thiruvananthapuram district during July 2006 to June 2007. Ten plots with four month old plants were selected for recording the pest population. Among the total ten plots selected, four replications were in the Instructional Farm, Vellayani, where the crop was raised without applying insecticides and six replications were located in the farmers' field in Kalliyoor panchayat where the crop was grown under chemical protection. The populations of *Aphis spiraecola* and *Saissetia hemisphaerica* were recorded from randomly selected vines from 10 cm length of the growing point and mature vine. Two months after completion of observation of pest population, the number of plants completely destroyed by *S. hemisphaerica* was also recorded to determine the intensity of attack of the pest. The total number of nymphs and adults feeding on a plant were recorded for *Aspongopus obscurus* and *Leptoglossus australis*. Monthly weather parameters were correlated with the population pests and extent of damage caused by the sucking pests of the unprotected fields during the month of observation and the succeeding month. Data were subjected to ANOVA (Panse and Sukhatme, 1985).

Results and Discussion

S. hemisphaerica

The adult *S. hemisphaerica* is convex with a smooth, reddish brown helmet shaped carapace. Scale insects congregated in large numbers on the stem, leaves, petiole and even fruits and suck the sap. The infested plants had distorted leaves, with shortened and thick petioles and deformed fruits.

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Ultimately, the infested vines became weak, withered and dried up. Though the occurrence of *S. hemisphaerica* on coccinia was reported by a few workers (Nayar *et al*., 2001), no report is currently available on its mode of feeding, severity of attack or distribution.

A definite trend was observed in the population dynamics of the pest. Variation in the population of *S. hemisphaerica* was noticed during the period under study (Table 1). The mean population was low during July to September 2006 in all the locations and the mean number ranged from 2.66 to 5.90,

Table 1. Seasonal occurrence of sucking pests in coccinia in Thiruvananthapuram district

Month / Year	Mean number per 10 cm length of vine											
	S. hemisphaerica			*A. spiraecola*			*A. obscurus*			*L. australis*		
	A	B	Mean	A	B	Mean	A	B (single field)	Mean	A	B	Mean
July-2006	2.60	2.73	2.66	23.03	15.18	18.32	2.23	2.40	2.26	1.33	0	1.33
August-2006	6.93	4.88	5.90	40.43	28.43	33.23	2.70	2.30	2.62	1.28	0	1.28
September-2006	6.93	4.88	5.90	45.9	34.92	39.31	3.23	3.60	3.30	1.50	0	1.50
October-2006	24.28	5.88	15.08	47.58	41.23	43.77	1.90	3.60	2.24	1.38	0	1.38
November-2006	30.05	7.20	18.63	52.4	37.73	43.60	2.98	3.80	3.14	1.53	0	1.53
December-2006	35.35	7.30	21.33	59.2	47.35	52.09	3.50	2.90	3.38	2.00	0	2.00
January-2007	23.3	8.95	16.13	61.05	52.27	55.78	3.33	3.40	3.34	1.53	0	1.53
February-2007	37.53	13.38	25.45	70.28	60.28	64.28	3.00	3.30	3.06	1.90	0	1.90
March-2007	43.58	11.35	27.46	97.78	66.13	78.79	3.08	2.70	3.00	2.28	0	2.28
April-2007	40.8	11.6	26.20	91.3	63.25	74.47	3.55	3.90	3.62	1.78	0	1.78
May-2007	46.55	12.43	29.49	95.5	72.37	81.59	4.10	3.20	3.92	2.00	0	2.00
June-2007	19.65	8.15	13.90	45.73	27.17	34.59	3.13	2.50	3.00	2.35	0	2.35
CD (P=0.05)		5.977			13.101			N.S			N.S	
MonthLocation		4.880			11.960			N.S			N.S	
M × L		16.90			NS			N.S			N.S	

A-Instructional farm (without protection) B-Farmers' field (with protection)

subsequently it showed an increasing trend until January 2007. The population increased still further during February 2007 (25.45) and reached its maximum (29.49) in May 2007 .Significant variation in the population was not observed during February – May, 2007. Therefore significant decline was observed during June 2006 (13.90). Among the ten locations surveyed, the scales were observed only in eight locations. The incidence was significantly higher in all the four plots located in the Instructional Farm and it ranged from 22.60 to 30.95, as compared to other four locations in the farmers' field, where the population ranged from 7.78 to 10.34. The low population in the farmers field may be due to plant protection measures adopted in these locations. Observation on the damage inflicted by the pest was continued for two more months after the period of population assessment. In pesticide free locations, 82.5% of the plants were completely destroyed due to scale infestation whereas only 5 to 15 % of plants were damaged in fields protected with insecticides. In the present study an increase in the population was recorded during summer from February- May 2007. The finding was supported by the highly significant positive correlation of the population of *S. hemisphaerica* with maximum temperature and significant negative correlation with rain fall (Table 2). The population fluctuation observed might be due to shorter life cycle and comparatively higher survival rate during summer and wash off of crawlers in rain. During the period of observation, the population of scales had significant positive correlation with maximum temperature (r = 0.7992) and significant negative correlation with evening relative humidity (r = 0.5943) and rainfall (r = 0.5961). Similarly maximum temperature was positively correlated with the population of *S. hemisphaerica* of the succeeding month and had significant negative correlation with evening relative humidity (r = 0.7394) and rainfall (r =0.7636).

A. spiraecola

A. spiraecola attacked the tender portions of the plant resulting in growth retardation. Colonies of the pest are also seen on the flowers and fruits, arresting the fruit formation and resulting in subsequent yield reduction. Similar damage caused by related species of the aphid has been reported on other cucurbitaceous crops (Chinta *et al*., 2002). Eventhough *A. spiraecola* attained the status of a major pest in the present study; it has not been reported from the crop so far.

The incidence of *A. spiraecola* was observed in all the ten plots throughout the period of observation from July 2006 to June 2007 (Table 1) and the mean population of the aphid ranged from 18.32 to 81.59. The lowest population was recorded in July 2006 (18.32) and there was significant increase in the population of the aphid in August 2006 (33.23) and it was on par with the population recorded during September to November 2006 and June 2007, the population ranged from 34.59 to 43.77 respectively. The population showed further increase during March 2007 to May 2007 with a range of 74.47 to 81.59. The highest incidence of aphid was observed in the first location (73.51) in the Instructional Farm, Vellayani and it was significantly higher than the population recorded in all other locations. As in the case of scale insect comparatively lower population was recorded in all the locations in the farmers' field. The type and frequency of insecticide application might have accounted for these variations.

Correlation coefficients between weather parameters and the population of various pests of

Table 2. Correlation between weather parameters and the population of sucking pests of coccinia during current and succeeding months

Parameter	*S. hemisphaerica*		*A. spiraecola*		*L. australis*		*A. obscurus*	
	Current month	Succeeding month						
Maximum temp.	0.7992**	0.7657**	0.8081**	0.8204**	0.7110**	0.6645*	0.4761	0.6596*
Minimum temp.	-0.0175	0.0728	0.0753	0.0633	0.3797	0.0549	0.3751	-0.0024
RH(Morning)	-0.0463	0.1930	-0.0676	0.1841	0.0522	-0.1615	-0.0979	0.0247
RH (Evening)	-0.5943*	-0.7394**	-0.5998*	-0.8575**	-0.2681	-0.4507	-0.1249	-0.6826*
Rainfall(mm)	-0.5961*	-0.7636**	-0.6178*	-0.8498**	-0.4261	-0.5699	-0.3941	-0.6648*
No. of rainy days	-0.5082	-0.5503	-0.5512	-0.7132**	-0.5714	-0.5126	-0.4674	-0.4575

coccinia during the month and succeeding month are shown in Table 2. The population of *A. spiraecola* showed significant positive correlation with maximum temperature (r= 0.8081) and significant negative correlation with evening relative humidity (r =0.5998) and rainfall (r=0.6178) of the corresponding month of observation. The maximum temperature (r = 0.8204) had significant positive correlation whereas evening relative humidity (r = 0.8575), rainfall (r =0.7132) and the number of rainy days had significant negative correlation with the population of *A. spiraecola* in the succeeding month. Comparison of the population in summer and rainy period showed a two fold increase in summer, might probably be due to the shorter life cycle and increased fecundity in summer and longer developmental period and wash off of various stages during the rainy season. The results were in agreement with the observations of Prasad and Logisenan, (1997) . Chakraborthy, (2011) reported that the population of *Aphis gossypii* showed a positive influence with the relative humidity. Correlation studies revealed that average relative humidity and total rainfall showed significant negative correlation with the population of aphids in okra (Shah *et al*., 2009).

A. obscurus

Sucking of sap from the vines by the nymphs and adults of *A. obscurus* resulted in general weakening of the plants. When compared to *S. hemisphaerica* and *A. spiraecola*, the incidence of *A. obscurus* was not widespread and was observed in the field only in five locations throughout the period of observation (Table 1). Significant difference was not observed in the population of the pest in the various locations during different months. The population of *A. obscurus* of succeeding month of observation (Table 2) showed significant positive correlation with the maximum temperature (r =0.6596) and significant negative correlation with evening relative humidity(r = 0.6826) and rainfall (r = 0.6648).

L. australis

Nymphs and adults of *L. australis* suck sap from the tender vines and fruits, resulting in the formation of thickened areas on the vines and thickened spots on the fruits. Similar damage by the pest was reported from other cucurbits (Reghupathy *et al.,* 2003) .Only very low population of the pest was recorded from the four locations in the Instructional Farm throughout the year and no significant difference was noticed (Table 1). The population was significantly and positively correlated with maximum temperature (Table 2) . The study thus revealed that sucking pests are a major impediment in the cultivation of perennial vegetable, coccinia. An array of sucking pests was recorded from the vegetable, some of which could be devastating and will be a potential threat to the crop and therefore timely monitoring and proper management measures should be adopted for tackling them.

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