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Population Dynamics of *Coccidohystrix insolita* (Green) on Pigeonpea*

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ABSTRACT

Studies on population dynamics of *Coccidohystrix insolita* (Green) infesting pigeonpea were made during 1991-93 at Pulse Research Station, Gujarat Agricultural University, Junagadh. The first peak of the pest was recorded in the 35th to 38th standard weeks (September) and second peak in the 47th to 49th standard weeks (December). Relative humidity, rainy days, rainfall and entomogenous fungi were negatively correlated with the pupulation build up to the pest. The temperature (27 to 28° C) and relative humidity (85 to 95%) were found to be favourable for pest multiplication. Among biotic factors, entomogenous fungi were most active recording 17 to 42 and 16 to 75 per cent parasitization of bug during 1991-92 and 1992-93, respectively.

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INTRODUCTION

Recently, the mealybug, *Coccidohystrix insolita* (Green) (Pseudococcidae : Homoptera) has been found seriously infesting pigeonpea (*Cajanus cajan* (L.) Millsp.) crop in isolated patches in the region. It is commonly known as brinjal mealybug and has been reported by Chaudhuri (1976) and Nair and Nair (1977) attacking brinjal. It has also been reported to feed on pigeonpea in Gujarat (Patel *et al.* 1985 and Bhalani, 1990). There is no information available regarding population dynamics of *C. insolita* vis-a-vis pigeonpea. Hence, an attempt was made to know the population dynamics of *C. insolita* on pigeonpea and pinpoint the main period of activity of the pest which could be utilised in formulating the strategies of Integrated Pest Management.

MATERIALS AND METHODS

The pigeonpea crop (var. BDN 2) was sown at Pulse Research Station, Gujarat Agricultural University, Junagadh in the third week of July in both the years, (1991-92 and 1992-93). All the recommended agronomical practices were followed for raising the crop. In order to record the mealybug population, sample quadrates of five plants were selected randomly and tagged with lable and such 20 quadrates were observed at weekly intervals till crop maturity. From each tagged plant, five

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secondary branches were selected randomly and observations were recorded on three leaves from top, middle and bottom of each branch for mealybug population. The activity of biotic factors viz., predators, parasitoids and entomogenous fungi was also recorded at weekly intervals. Data thus obtained were correlated with biotic and abiotic factors for determining the fluctuation of mealybug population by using correlation coefficient analysis.

RESULTS AND DISCUSSION

During 1991-92, mealybug incidence (Table 1) on pigeonpea crop commenced from the 31st standard week (0.23 mealybug/leaf) i.e. from the first fortnight of August and gradually increased in succeeding weeks reaching the highest peak (20.83 mealybugs/leaf) by the 38th standard week. Thereafter, the population started declining gradually, though not smoothly onwards till the end of crop season. Thus, there were two distinct peaks, first occurred during the 38th and the next during the 49th standard week. The temperature during the period was found between 27 and 29° C with 85 to 90 per cent relative humidity and these were found conducive for pest multiplication under field condition (Fig. 1). Mainly entomogenous fungi played an important role in pest suppression (Fig. 2). The temperature below 24° C and 80 per cent relative humidity were unfavourable for the development of entomogenous fungi.

During the year 1992-93 (Table 2) the mealybug first appeared on pigeonpea crop in the 31st standard week (0.22 mealybug/leaf). It increased gradually up to the 35th standard week (17.67 mealybugs/leaf) i.e. first fortnight of September then declined from 36t standard week being minimum (0.6 mealybug/leaf) during 38th standard week Again, the population increased from 39t standard week exhibiting the highest peak (21.67 mealybugs/leaf) during the 47th standard week and then decreased in succeeding weeks till the end of crop season. Thus, this year's study also indicated two distinct peaks, the first peak in the 35th standard week (second fortnight of November). Among the major abiotic factors, temperature and relative humidity played important role on pest activity (Fig. 1). These factors also influenced the activity of entomogenous fungi and parasitoids. The temperature below 27° C and 80 per cent relative himidity did not favour the development of fungi and parasitoids under field condition (Fig. 2).

Thus, from foregoing results the major activity of the pest was noticed during the 35th to 38th (September) and the 47th to 49th (December) standard weeks in both the years under Junagadh condition. The highest peaks of *C. insolita* were recorded during the 38th and 47th standard week in the year 1991-92 and 1992-93, respectively. Similarly, Iyer (1922) noted the activity of the mealybug, *Phenacoccus insolitus* Green on egg plants during the month of September in Mysore. According to Patel *et al.* (1989), the incidence of *C. insolita* occurred from November to January on pigeonpea in Bharuch region of Gujarat State.

The correlation coefficient values presented in Table 3 revealed that the relative humidity, rainy days and rainfall has shown sigificantly negative association with the build up of mealybug population during both the years, whereas, the

TABLE 1
Effect of abiotic and biotic factors on incidence of *C. insolita* on pigeonpea during the year 1991-92.

Standard week	No. of mealybug / leaf	Abiotic factors					Biotic factors			
		Temp. (°C)	R.H. (%)	Rainy days	Rain-fall (mm)	Sun-shine (hr.)	Per cent parasitism		Predatory larvae / 100 leaves	
							Entom. fungi	para-sitoids	S. eptus	M.bo-nine-nsis
30	0.00	27.2	94	3	107.8	0.1	0.00	0.00	0	0
31	0.23	27.5	94	4	8.7	1.0	9.63	0.74	1	0
32	0.40	27.2	93	3	16.6	1.7	14.50	0.00	2	0
33	0.53	27.4	95	6	28.9	2.9	16.75	1.08	3	0
34	0.63	26.9	94	6	24.0	1.3	27.38	2.98	4	2
35	1.20	26.6	93	3	19.1	0.6	34.65	6.25	2	3
36	4.50	26.9	91	2	10.5	1.5	41.55	3.87	0	0
37	1095	26.5	90	0	0.0	7.0	30.33	1.29	2	1
38	20.83	28.02	86	0	0.0	8.0	21.27	2.66	2	2
39	10.35	28.5	86	0	0.0	9.1	17.77	6.28	4	3
40	11.78	27.3	70	0	0.0	909	17.39	5.56	5	4
41	11.50	28.5	92	0	0.0	8.3	13.89	5.21	3	2
42	12.50	26.7	67	0	0.0	8.5	13.02	4.45	4	2
43	11.33	27.0	72	0	0.0	8.5	13.39	4.46	3	1
44	14.45	24.8	76	0	0.0	7.9	10.81	5.83	2	0
45	13.60	24.4	75	0	0.0	7.8	12.97	2.40	3	1
46	15.25	26.4	69	0	0.0	6.8	6.44	2.15	0	1
47	15.55	26.1	61	0	0.0	6.6	6.53	1.51	1	1

1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
48	15.63	23.2	60	0	0.0	7.5	5.12	1.40	1	0
49	15.90	22.2	68	0	0.0	8.1	3.12	2.08	2	0
50	14.38	22.2	69	0	0.0	8.4	0.00	0.95	2	0
51	10.53	22.0	75	0	0.0	8.2	2.04	2.04	1	0
52	6.63	17.3	85	1	10.3	7.2	0.00	0.77	2	0
1	5.83	18.4	72	0	0.0	8.9	0.97	0.00	3	0
2	3.67	18.3	60	0	0.0	8.7	0.00	0.63	0	0
3	0.12	20.4	50	0	0.0	9.1	0.00	0.00	0	0
AV	8.78	24.9	78.3	3.5	28.2	6.3	13.39	2.58	2.08	0.92

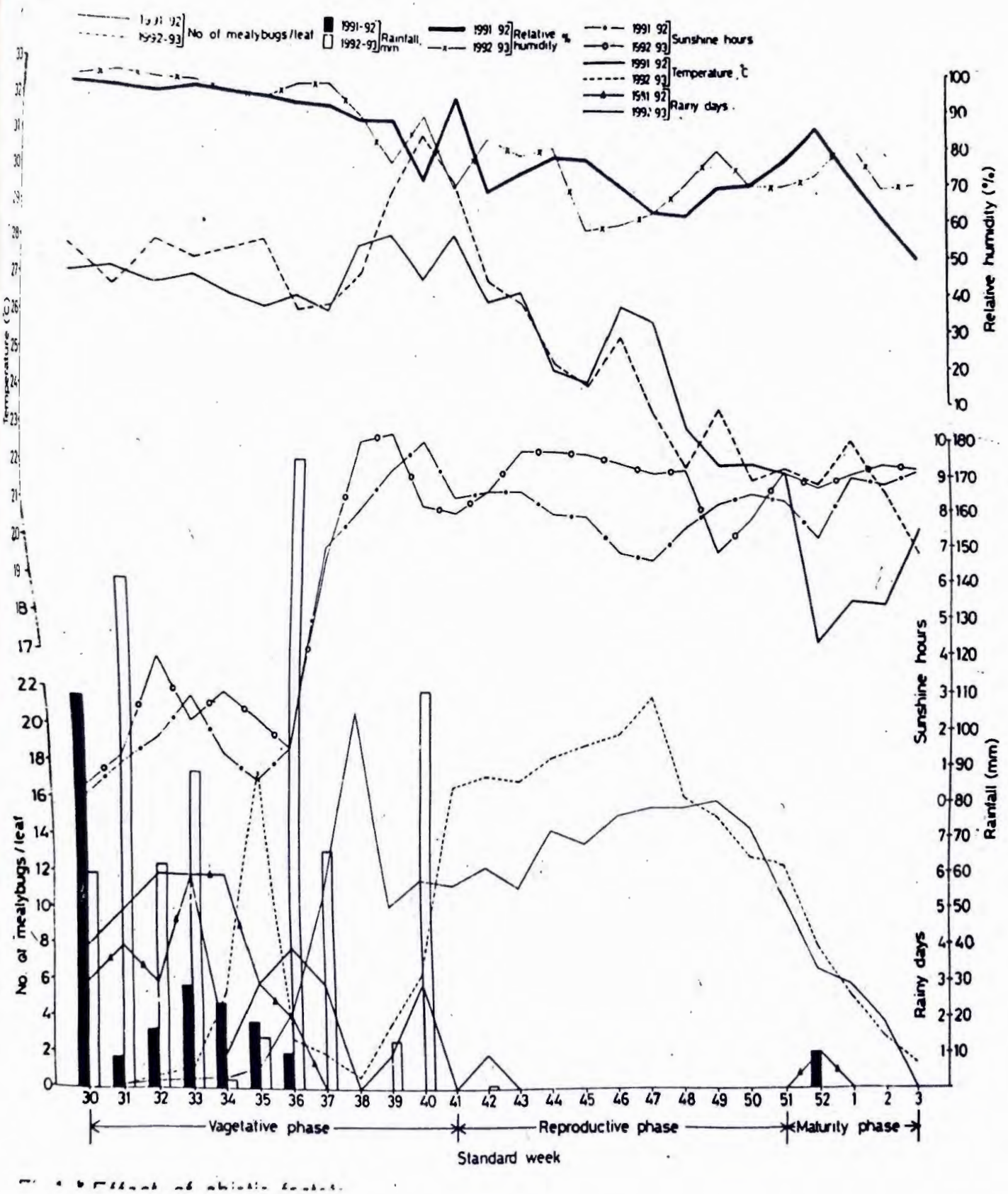

Fig. 1: Effect of abiotic factors on incidence of mealybug on pigeonpea during the years 1991-92 and 1992-93.

Fig. 2 : Effect of biotic factors on incidence of mealybug on pigeonpea during the years 1991-92 and 1992-93.

TABLE 2

Effect of abiotic and biotic factors on incidence of *C. insolita* on pigeonpea during the year 1992-93.

Standard week	No. of mealybug / leaf	Abiotic factors					Biotic factors			
		Temp. (°C)	R.H. (%)	Rainy days	Rain-fall (mm)	Sun-shine (hr.)	Per cent parasitism		Predatory larvae / 100 leaves	
							Entom. fungi	para-sitoids	S. epius	M.bo-nine-nsis
30	0.00	28.0	96	4	59.7	0.4	0.00	0.00	0	0
31	0.22	27.0	98	5	140.2	1.2	0.00	1.61	0	0
32	0.69	28.3	97	6	62.7	3.9	0.00	3.70	0	0
33	1.18	27.8	97	6	87.8	2.2	3.00	2.39	1	1
34	5.49	28.1	94	1	2.8	3.0	24.68	2.67	1	0
35	17.67	28.4	93	3	15.1	2.3	44.62	4.05	1	1
36	2.87	26.5	96	4	174.2	1.5	55.92	2.63	1	1
37	2.02	26.6	96	3	67.1	6.6	67.30	2.88	0	1
38	0.67	27.5	88	0	0.0	9.9	74.61	1.06	0	0
39	3.82	29.6	75	1	14.4	10.1	32.58	2.33	1	0
40	6.56	31.2	88	3	110.0	8.1	16.18	0.51	0	1
41	16.82	29.1	68	0	0.0	7.9	12.36	1.18	0	1
42	17.44	27.2	82	1	0.8	8.5	8.87	0.99	1	1
43	17.11	26.6	77	0	0.0	9.6	3.67	0.46	0	1
44	18.44	24.9	79	0	0.0	9.6	1.91	0.95	1	1
45	19.02	24.3	56	0	0.0	9.5	0.75	0.00	0	0
46	19.71	25.7	58	0	0.0	9.3	0.00	0.00	0	0
47	21.67	23.6	61	0	0.0	9.0	0.00	0.36	0	1

1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
48	16.22	22.2	69	0	0.0	9.1	0.00	0.46	1	0
49	15.00	23.7	79	0	0.0	6.8	0.00	0.27	0	0
50	12.67	21.8	69	0	0.0	7.7	0.00	0.00	1	0
51	12.42	22.1	69	0	0.0	9.0	0.00	0.00	1	0
52	7.89	20.7	72	0	0.0	8.6	0.00	0.00	0	0
1	5.20	22.9	82	0	0.0	9.0	0.00	0.00	0	0
2	2.89	21.5	69	0	0.0	9.3	0.00	0.00	0	0
3	1.42	19.8	70	0	0.0	9.2	0.00	0.00	0	0
AV	9.43	25.6	80.3	3.7	73.5	7.0	26.65	1.14	0.40	0.40

TABLE 3

Correlation coefficient between mealybug (*C. insolita*) population and bioecological factors during the years 1991-92 and 1992-93.

(A) Abiotic factors

Year	*Temperature (°%)*	*R.H. (%)*	*Rainy days*	*Rainfall (mm)*	*Sunshine (hr)*
1991-92	0.0561	-0.4068*	-0.7223*	-0.5824*	0.6658*
1992-93	-0.1589	-0.6438*	-0.5593*	-0.5343*	0.0458

(B) Biotic factors

Year	*Per cent parasitism*		*Predatory larvae/100 leaves*	
	Entomogenous fungi	*Parasitoids*	*S. epius*	*M. boninensis*
1991-92	-0.1184	0.2930	0.1606	0.2002
1992-93	-0.2989	0.2840	0.1482	0.2920

* Significant at 0.05 level (n=26).

sunshine hours exhibited significantly positive correlation with this pest only during the year 1991-92. The activity of entomogenous fungi exhibited negative correlation with population build up of mealybugs, while the parasitoids and predators showed positive correlation with this pest.

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