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Population fluctuation of *Scutellera nobilis* Fabricius on jatropha

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ABSTRACT

Investigation on population fluctuation of shield-backed bug (*Scutellera nobilis* Fabricius) in jatropha was carried out at Anand Agricultural University, Anand during 2006-07. The incidence of the pest began from 2nd week of June and continued till 2nd week of March with a peak activity in first week of January. The higher activity of the pest was noticed during last week of October to third week of February. The egg parasitoids (*Psix sp.* and *Anastatus sp.*) had significantly positive correlation with the number of egg masses of *S. nobilis*. It was also observed that temperature, vapour pressure, wind speed and rainfall had significantly negative association with all the stages of *S. nobilis* on jatropha.

Key words : Population fluctuation, Jatropha, *Scutellera nobilis*

Jatropha is a soft wooded shrub or small tree found in almost all the tropical and sub-tropical regions of the world. The oil can be converted into biodiesel by transesterification. This crop is attacked by a few insect pests and diseases, which cause severe reduction in production and deterioration in the quality. The important and common insect pests found on jatropha crop in this region are leaf webber, semilooper (*Archaca janata*), shield-backed bug (*Scutellera nobilis* F.), blotch miner, termite, aphids, jassids and thrips. Of these shield-backed bug (*Scutellera nobilis* F.) is the key pest which damaging jatropha crop by suck the cell sap from leaves, tender parts of the plant, flowers and capsules. The proper management of the pest it is necessary to have an idea about its activity but past work indicated that there were lacunae in the information. Considering the importance of the pest and present need of the work a study was conducted to know the population fluctuation of this pest on jatropha crop.

MATERIALS AND METHODS

The study on population fluctuation of *S. nobilis* on *jatropha curcas* was conducted at Anand Agricultural University, Anand during June 2006 to May 2007. Available jatropha plants as border shrubs at Agronomy farm were used to record the observations. For the purpose, equal aged (3 years old) and sized (3 m height) of 50 jatropha shrubs were randomly selected. The observations on number of egg masses, nymphs and adults per plant were recorded at weekly interval throughout the year. Data, thus obtained were correlated with biotic and abiotic factors to determine its effect on fluctuation of *S. nobilis* infesting jatropha.

RESULTS AND DISCUSSION

Egg

The eggs of *S. nobilis* on jatropha was first time (0.10 egg masses/plant) observed during 23rd standard week (2nd week of June). The number of egg masses increased in subsequent meteorological standard weeks and reached to the highest level (1.22 egg masses/plant) during first standard week (first week of January). The egg parasitism (*Psix sp. and Anastatus sp.*), temperature, relative humidity, vapor pressure, bright sunshine and wind speed noted as 26.42%, 19 °C, 70%, 10.7 mm, 9.0 hrs and, 2.5 kmph, respectively. The higher number of the egg masses were registered during 43rd to 5th standard week (4th week of October to 1st week of February). The number of egg masses gradually reduced from 2nd standard week (2nd week of January) till 10th standard week (2nd week of March) and it was not seen on jatropha plants from 11th standard week (3rd week of March) to 22nd standard week (1st week of June).

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Table 1 Population abundance of *S. nobilis* on jatropha in relation to biotic and abiotic factors

Std week	Month and week	*S. nobilis* / plant			Egg parasitism (%)	Abiotic factors					
		Nymph	Adult	Egg mass		Temp (°C)	RH (%)	VP (mm)	BSS (hrs)	WS (kmph)	RF (mm)
22	June I	0.00	0.00	0.00	0.00	32.1	68	23.0	6.5	6.4	56.7
23	II	0.00	0.24	0.10	0.00	30.7	66	21.9	9.1	6.8	6.0
24	III	0.34	0.30	0.14	0.00	31.6	61	20.5	11.1	7.6	0.0
25	IV	0.44	0.52	0.14	0.00	32.8	62	22.4	8.4	6.2	4.4
26	July I	0.62	0.64	0.24	0.00	30.2	81	24.9	4.1	4.9	51.8
27	II	0.62	0.82	0.22	0.00	29.4	84	25.4	5.3	7.7	216.0
28	III	0.76	0.70	0.28	5.00	29.4	79	23.9	1.3	9.0	23.1
29	IV	1.14	1.40	0.24	0.00	28.8	83	23.9	0.2	5.6	6.7
30	V	0.84	1.44	0.28	4.35	27.6	86	23.9	3.7	7.7	355.4
31	Aug I	0.88	1.48	0.26	8.00	26.5	90	23.6	1.1	8.3	255.2
32	II	1.12	1.22	0.28	3.85	27.1	94	23.9	1.0	9.7	270.8
33	III	1.54	1.64	0.30	0.00	27.5	90	24.1	2.0	6.0	63.8
34	IV	1.32	1.76	0.28	0.00	27.2	88	23.8	1.4	6.8	64.2
35	Sept I	1.90	2.20	0.28	3.70	27.9	83	23.0	4.1	7.4	10.3
36	II	1.96	2.64	0.28	3.13	28.4	81	23.3	3.7	5.5	26.1
37	III	2.36	2.84	0.28	0.00	29.4	75	23.6	5.8	2.8	0.5
38	IV	2.08	2.80	0.28	0.00	29.4	81	23.9	6.2	3.5	3.9
39	V	2.54	3.06	0.32	0.00	29.2	84	23.8	5.9	3.7	0.0
40	Oct I	2.48	2.72	0.24	0.00	30.3	73	22.9	7.0	3.9	0.0
41	II	2.56	3.04	0.28	0.00	28.5	65	19.3	8.8	2.3	0.0
42	III	2.64	3.20	0.36	6.67	29.3	56	16.2	9.5	2.4	0.0
43	IV	4.30	4.64	0.42	7.50	28.2	51	13.8	9.5	2.3	0.0
44	Nov I	4.48	5.32	0.40	9.38	26.2	54	14.0	10.0	3.4	0.0
45	II	5.60	7.90	0.44	45.83	26.1	60	14.6	9.8	2.8	0.0
46	III	5.42	8.40	0.46	45.65	25.1	71	17.2	9.6	2.5	0.0
47	IV	6.22	9.92	0.36	47.62	24.8	62	13.0	8.9	2.4	0.0
48	Dec I	7.02	10.10	0.34	42.00	22.5	61	11.9	8.2	2.8	0.0
49	II	8.92	10.72	0.36	32.65	23.6	70	14.3	8.6	2.4	0.0
50	III	9.68	11.52	0.48	44.68	20.7	70	13.0	9.2	3.3	0.0
51	IV	10.06	11.98	0.50	37.25	21.6	65	11.9	9.7	3.2	0.0
52	V	10.99	11.99	0.86	33.33	22.0	68	12.9	8.4	3.1	0.0
1	Jan I	11.00	12.22	1.12	26.42	19.0	70	10.7	9.0	2.5	0.0
2	II	10.00	10.23	0.98	18.52	18.8	58	8.8	8.5	4.5	0.0
3	III	7.00	9.66	0.76	19.61	19.1	58	9.0	9.7	3.0	0.0
4	IV	7.00	9.96	0.52	6.00	21.3	58	10.4	9.6	3.7	0.0
5	Feb I	6.22	6.58	0.33	10.20	22.1	64	11.6	8.3	2.6	0.0
6	II	5.20	5.77	0.23	8.33	23.4	66	13.1	8.8	3.4	2.4
7	III	4.30	5.66	0.17	9.52	21.2	62	10.4	9.8	3.8	0.0
8	IV	1.36	2.08	0.12	0.00	24.9	54	11.0	9.8	3.0	0.0
9	March I	1.96	1.68	0.11	0.00	23.3	59	11.5	9.8	3.5	0.0
10	II	0.56	0.38	0.33	3.85	24.2	49	10.2	10.1	3.3	0.0
11	III	0.00	0.00	0.00	0.00	25.5	51	11.0	9.8	4.2	0.0

Nymphs

The activity of *S. nobilis* nymphs was found through out the year except second fortnight of March to first fortnight of June (Table 1). The data (Table 1 and Fig. 1) on population fluctuation of *S. nobilis* nymphs indicated that the pest appeared (0.34 nymph/plant) on jatropha crop from 24th standard week (3rd week of June) and gradually but slowly increased (2.64 nymphs/plant) up to 43rd standard week (4th week of October). Thereafter, the population was increased rapidly and reached to a peak (11 nymphs/plant) level in the first standard week (first week of January). The temperature, relative humidity, vapor pressure, bright sunshine and wind speed recorded during the peak activity of the pest were 19 °C, 70%, 10.7 mm, 9 hrs and 4.5 kmph, respectively. The higher number of nymphs noted during 42nd (3rd week of October) to 7th standard week (3rd week of February) on jatropha plants. After the first standard week, the nymphal population found in decreasing trend and reached the minimum in 10th standard week (2nd week of March) (0.56 nymphs/plant). The nymphs disappeared on jatropha crop from 11th standard week (3rd week of March).

Adults

The active of *S. nobilis* adults (Table 1 and Fig. 1) on jatropha plants (0.24 adult/plant) from 23rd standard week (2nd week of June). The population increased gradually and attained its peak (12.22 adults/plant) in the 1st standard week (1st week of January). The temperature, relative humidity, vapour pressure, bright sunshine hours and wind speed during the peak activity period were 19 °C, 70%, 10.7 mm, 9.0 hrs and 2.5 kmph, respectively. The higher activity *S. nobilis* adults on jatropha plants registered during 43rd (4th week of October) to 7th standard week (3rd week of February). The population of *S. nobilis* adults gradually decreased up to 10th standard week (2nd week of March) and disappeared from 11th standard week (3rd week of March) from jatropha plant The population of *S. nobilis* was 5 per bunch and reached maximum of 15 bugd per bunch on jatropha in Uttar Pradesh (Shankar and Dhyani, 2006).

The higher activity of *S. nobilis* (Eggs, nymphs and adults) was observed during 43rd standard week (last week of October) to 7th standard week (3rd week of February). During the higher activity period of the pest, the egg parasitism (*Psix sp. and Anastatus sp.*), temperature, relative humidity, vapor pressure, bright sunshine, wind speed and rainfall prevailing in the area were 6.00 to 47.62%, 18.8 to 28.2 °C, 51 to 71%, 8.8 to 17.2 mm, 8.2 to 10.0 hrs, 2.3 to 4.5 kmph and 0.0 to 2.4 mm, respectively. Maximum incidence of the *Bagrada cruciferarum* infesting mustard were noticed at 17 to 18 °C temperature with 61 to85 % RH (Srivastava and Srivastava, 1972) and 22 to 25 °C temperature with 54% RH (Singh *et al.*, 1993).

The above results on population abundance of *S. nobilis* reflected that the pest was active from 2nd week of June to first fortnight of March. The activity started with the commencement of rain. The pest was inactive from 3rd week of March to first week of June. During this dry period pest might have shifted on other crops or under went diapause or hidden in safe places. *Pachycoris klugii* adults, a pest of physic nut hiding in dry season (Grimm and somariba, 1998) which is in accordance with the present findings of *S. nobilis*. The higher activity of this pest was noted during the end of October to 3rd week of February with a peak level in first week of January, which coincides with the period of flowering and fruit setting on jatropha. It is suggested that the pest could be easily managed if proper monitoring is carried out and necessary spray application was made before it reached to the maximum level.

The correlation analysis (Table 2) revealed that all the tested biotic and abiotic parameters were significantly correlated with the pest (all three stages) activity except relative humidity (all three stages) and bright sunshine as well as wind speed (with egg population). The egg parasitoids had significantly positive correlation with the number of egg masses of *S. nobilis* (r = 0.611**). It indicated that the pest population increased and simultaneously parasitoids activity also increased. The temperature (r = -0.797** and -0.787**), vapor pressure (r = -0.662** and -0.659**), wind speed (r = -0.343* and -0.333*) and rainfall (r = -0.579** and -0.598**) had significantly negative correlation associated with the nymphs and adults population on jatropha crop. Of these parameters, temperature (r = -0.611**), vapor pressure (r = -0.407**) and rainfall (r = -0.404**) were also significantly negative correlated with number of egg masses. The bright sunshine had significantly positive relationship with *S. nobilis* nymphs (r = 0.437**) and adults (r = 0.448**) activity. The bright sunshine and wind speed positive and negative association but non-significant with the number of egg masses on jatropha crops. The relative humidity had negative correlation with pest activity (eggs, nymphs and adults) but it was non-significant.

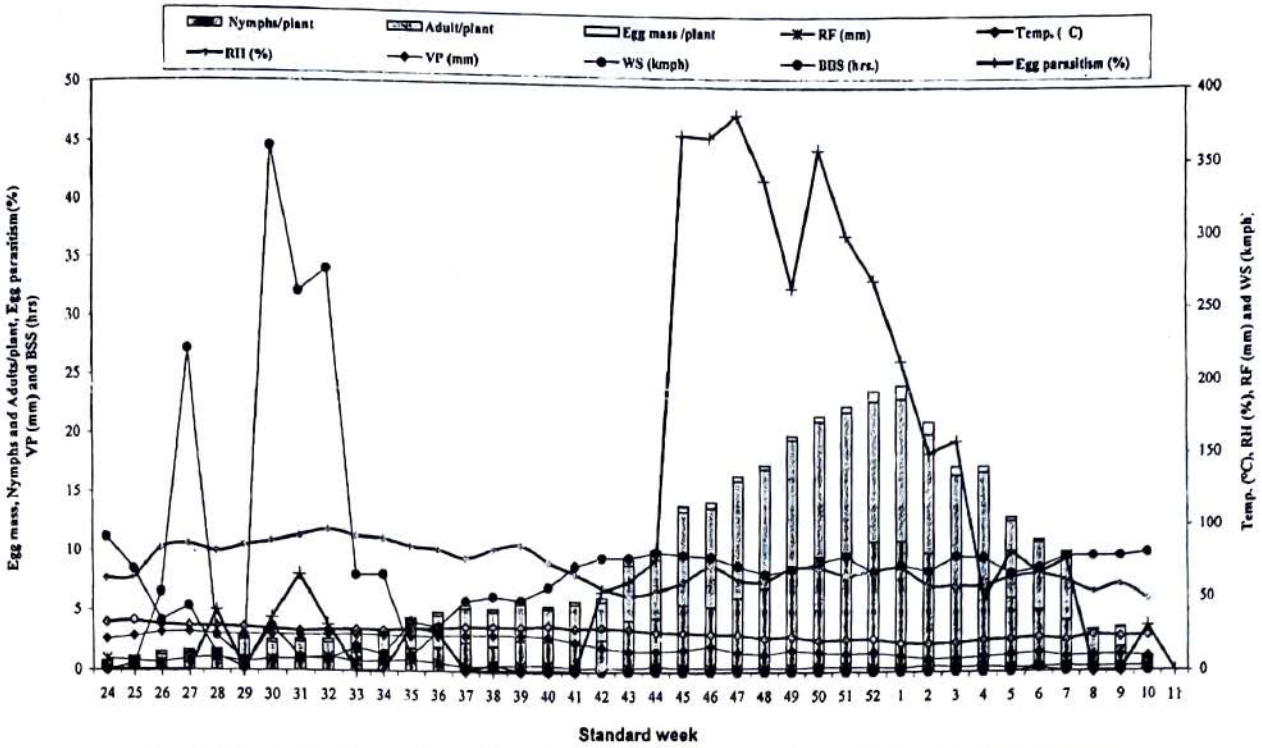


Fig. 1 : Population fluctuation of *S. nobilis* on jatropha in relation to biotic and abiotic factors

Table 2 Correlation coefficient (r) between *S. nobilis* numbers and biotic as well as abiotic factors on jatropha

S. nobilis stages	Egg parasitism (%)	Temp (°C)	RH (%)	VP (mm)	BSS (hrs)	WS (kmph)	RF (mm)
Nymphs	-	-0.797**	-0.302	-0.662**	0.437**	-0.343*	-0.579**
Adults	-	-0.787**	-0.307	-0.659**	0.448**	-0.333*	-0.598**
Egg mass	0.611**	-0.611**	-0.097	-0.407**	0.167	-0.138	-0.404**

* Significant at 5 % level, ** Significant at 1 % level. Temp: Temperature, RH: Relative humidity, VP: Vapour pressure, BSS: Bright sun shine, WS: Wind speed, RF: Rain fall

Thus, results suggested that the pest could be easily managed if proper monitoring is carried out and necessary spray application of botanical and synthetic insecticides should be made before it reached to the maximum level.

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