

Population Dynamics of *Liriomyza trifolii* (Burgess) on Castor and Fenugreek under Middle Gujarat Agro-Climatic Zone*

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American serpentine leafminer, *Liriomyza trifolii* (Burgess) (Diptera : Agromyzidae) is an important polyphagous pest, got accidentally introduced in India during 1990-91 and now has attained the status of a serious polyphagous pest in different crops (Viraktamah *et al.*, 1993). Kapadia (1994) and Jyani (1999) reported 57 host plants of serpentine leafminer. Though, the pest has been recorded on many cultivated crops, the information on seasonal activity of *L. trifolii* on castor and fenugreek, the important host crops in middle Gujarat region is scanty. The present study was undertaken to know the population dynamics of the pest in relation to biotic and abiotic factors.

A field trial on population dynamics of *L. trifolii* infesting castor and fenugreek was carried out at Agronomy farm, Gujarat Agricultural University, Anand during 1998-99. The castor (GCH-4) crop was sown in an area of 40 m x 30 m during first week of July, whereas fenugreek (Local) was sown in an area of 20 m x 12 m during first week of November, 1998. The castor crop

was sown at 90 x 45 cm distance, whereas the fenugreek crop was raised by broadcasting method. Each plot was divided into 6 equal quadrants. From each quadrant, 5 plants were randomly selected for recording the observations. The observations on larval population and mine-density were recorded from three (3rd, 4th and 5th leaf from top) leaves in castor and 10 leaves in fenugreek with the interval of 7 days starting from first week of germination and continued till harvest of the crop. The number of leaves damaged by leaf miner were counted from each randomly selected plant and per cent leaf damage was worked out. To know the activity and extent of parasitism due to different parasitoids the infested leaves of castor and fenugreek were collected at weekly intervals and brought to the laboratory during the study period. On the basis of total number of larvae and emergence of larval-pupal parasitoids, per cent parasitism was calculated.

Data on population fluctuation of *L. trifolii* on castor (Table 1, Fig. 1) indicated that the pest incidence (0.96 larva/leaf) commenced during second week of July (28th std. week). Then, activity increased gradually in subsequent weeks and reached to its first peak (87.63 larvae/leaf) during the 2nd week of October (41st std. week). Mine density was maximum (98.54 mines/leaf) during this period, whereas the leaf damage was 66.07 per cent. Thereafter, the pest activity decreased gradually up to 4th week of November (47th std. week). It again increased from last week of November and attained the second peak

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TABLE 1

Population abundance of *L. trifolii* on castor in relation to biotic and abiotic factors.

Std. Week	Month and week	No. of larvae/leaf	No. of Mines/Leaf	Leaf damage (%)	Parasitism (%)			Abiotic factors				
					Ch	Gr	Total	Mean temp. (°C)	Rain-fall (mm)	Sun-shine (hrs)	Rainy days	R.H. (%)
28	July II	0.96	0.96	87.58	0.00	0.00	0.00	28.94	52.40	0.79	2	82.78
29	July III	2.55	2.76	76.26	0.00	0.00	0.00	29.27	25.50	4.61	2	79.69
30	July IV	6.87	7.29	70.52	0.00	0.00	0.00	30.09*	-	6.73	0	71.90
31	Aug I	4.29	6.87	70.64	0.00	4.35	4.35	28.73	263.20	2.30	6	86.74
32	Aug II	12.62	15.32	71.25	1.90	3.00	4.90	20.49	41.50	1.10	4	88.32
33	Aug III	29.56	33.68	70.39	0.00	3.00	3.00	28.40	17.80	4.61	2	81.02
34	Aug IV	23.75	30.45	73.57	2.20	6.70	8.90	30.34	27.20	5.90	1	79.11
35	Aug V	27.44	35.74	69.53	0.00	6.15	6.15	28.07	31.20	3.29	4	85.62
36	Sep I	44.67	54.42	68.22	1.00	8.00	9.00	29.24	67.20	7.77	2	76.25
37	Sep II	72.76	97.57	68.55	2.15	10.55	12.70	28.20	149.40	5.13	6	86.78
38	Sep III	64.54	78.59	69.75	2.25	9.10	11.35	28.08	51.40	3.59	3	85.58
39	Sep IV	60.74	75.66	62.26	2.25	11.20	13.45	29.54	38.20	6.97	1	78.36
40	Oct I	80.45	94.78	60.02	3.95	8.45	12.40	30.20	12.60	9.01	1	72.94
41	Oct II	87.63	98.54	66.07	4.77	10.20	14.97	31.26	3.40	9.36	1	68.10
42	Oct II	63.46	74.54	59.75	3.55	11.65	15.20	26.35	65.70	5.79	3	82.40
43	Oct III	67.85	79.65	56.58	2.75	11.50	14.25	27.34	0.00	8.37	0	67.65
44	Nov I	43.48	70.29	54.52	4.00	9.45	13.45	27.72	0.00	8.54	0	62.57
45	Nov II	15.34	70.22	54.57	0.00	2.65	2.65	25.72	11.00	9.29	1	58.26
46	Nov III	14.27	32.56	63.15	0.00	0.00	0.00	24.02	-	9.19	-	62.71
47	Nov IV	5.79	35.08	63.74	0.00	0.00	0.00	23.19	-	9.33	-	61.94
48	Nov V	11.85	42.50	65.19	1.26	2.75	4.01	21.66	-	9.76	-	57.55
49	Dec I	8.64	36.05	67.96	1.25	2.00	4.25	21.90	-	9.83	-	54.51
50	Dec II	19.74	43.79	70.22	0.00	3.00	3.00	21.25	-	7.14	-	53.76
51	Dec III	36.27	54.70	73.73	1.64	3.95	5.59	20.81	-	8.79	-	67.95
52	Dec IV	31.62	52.10	73.15	1.15	4.00	5.15	19.74	-	9.43	-	61.96
1	Jan I	16.55	62.22	72.25	0.65	3.65	4.30	19.91	-	8.73	-	60.89
2	Jan II	14.95	62.46	70.20	0.00	3.25	3.25	17.19	-	9.69	-	57.82
3	Jan III	4.24	62.45	70.00	0.00	0.00	0.00	20.48	-	9.50	-	62.10
4	Jan IV	0.00	60.77	70.00	-	-	-	19.79	-	9.60	-	69.24
	Av.	31.35	50.40	70.24	2.30	6.22	7.94	25.92	57.20	6.92	2.60	68.67

Ch = *Chrysotomysia* sp.Gr. = *Gronotoma* sp.

(36.27 larvae/leaf) during 3rd week of December (51st std. week). At the second peak, the mine density was 54.70 per leaf and the leaf damage was 73.73 per cent. The pest activity declined thereafter as the crop withered and disappeared from February onwards. It clearly showed that *L. trifolii* remained active from July to January on castor with two distinct peaks in middle Gujarat Agro-climatic zone.

Incidence of *L. trifolii* of fenugreek was first observed (3.15 larvae/10 leaves) during 4th week of November (47 std. week), increased during

subsequent periods and reached to its peak (13.60 larvae/10 leaves) during last week of December (52nd std. week). when the crop was 50 days old (Table 2). At the same time, the mine density and leaf damage was 17.16/10 leaves and 38.50 per cent, respectively. The extent of parasitism was 2.75 per cent during high pest activity therefore, the pest infestation was decreased and finally disappeared in last week of January (Fig.1).

Significant positive correlation was observed (Table 3) between *L. trifolii* population and biotic

TABLE 2

Population abundance of *L. trifolii* on fenugreek in relation to biotic and abiotic factors.

Std. week	Month and week	No. of larvae/ 10 leaves	No. of mines/ 10 leaves	Leaf damage (%)	Parasitism (%)			Abiotic factors		
					Ch	Gr	Total	Mean temp. (°C)	R.H. (%) (hrs)	Sun-shine (hrs)
46	Nov III	0.00	0.00	0.00	-	-	-	24.02	62.71	9.19
47	Nov IV	3.15	3.15	56.50	0.00	0.00	0.00	23.19	61.94	9.33
48	Nov V	2.73	3.00	42.70	0.00	0.65	0.65	21.66	57.55	9.76
49	Dec I	3.77	4.84	36.75	0.00	0.60	0.60	21.90	54.51	9.83
50	Dec II	10.44	13.95	31.45	0.00	1.65	1.65	21.25	53.76	7.14
51	Dec III	8.55	10.65	31.76	0.65	2.50	3.15	20.81	67.95	8.79
52	Dec IV	13.60	17.16	38.50	0.00	2.75	2.75	19.74	61.96	9.43
1	Jan I	9.90	14.77	38.75	0.60	2.55	3.15	19.91	60.89	8.73
2	Jan II	10.65	16.95	40.20	0.00	3.00	3.00	17.19	57.82	9.69
3	Jan III	5.55	13.00	40.53	0.00	1.20	1.20	20.48	62.10	9.50
4	Jan IV	2.26	12.80	38.67	0.00	0.00	0.00	19.79	69.24	9.60
5	Jan V	0.00	15.00	38.46	-	-	-	17.87	57.12	9.94
	Av.	7.06	11.03	39.57	0.63	1.86	2.02	20.62	60.80	9.22

Ch = *Chrysonotomyia* sp.Gr. = *Gronotoma* sp.

factors in castor ($r=0.927^*$) and fenugreek ($r=0.898^*$). With increase in the pest population, the parasitoid activity also increased. Among the abiotic factors, the mean temperature had significant correlation ($r=0.431^*$) with *L. trifolii* population in castor. Similarly, the pest population had positive association with relative humidity (R.H.) sunshine hours, rainfall and rainy days in castor. Bagmare *et al.* (1995) found positive correlation between abiotic factors and *L. trifolii* population. This reports strongly supports the above established relationship. However, no significant relationship between larval population of *L. trifolii* and abiotic factors (mean temperature, relative humidity and sunshine hours) were found in fenugreek crop. The non-significant relationship existed between larval population

and abiotic factors may be due to narrow range of upper and lower limit of abiotic factors.

The above study revealed that the *L. trifolii* remained active from July to January on castor and attained two peaks 41st and 51st standard weeks (2nd week of October and 3rd week of December), whereas it was found from November to January, being maximum with peak activity during last week of December in fenugreek crop. The significant and positive relationship were observed between larval population of *L. trifolii* and biotic factors. Among abiotic factors, mean temperature had significant positive association with larval population of the pest on castor.

TABLE 3

Correlation coefficient (r) between larval population of *L. trifolii* and biotic as well as abiotic factors.

Host	Biotic factors			Abiotic factors				
	<i>Chrysonotomyia</i> sp.	<i>Gronotoma</i> sp.	Total	Mean Temp. (°C)	R.H. (%)	Sunshine (hrs.)	Rainfall (mm)	Rainy days
Castor	0.836*	0.912*	0.927*	0.431*	0.256	0.049	0.082	0.199
Fenugreek	0.338	0.933*	0.898*	-0.367	0.413	-0.456	--	--

* Significant at 5% level.

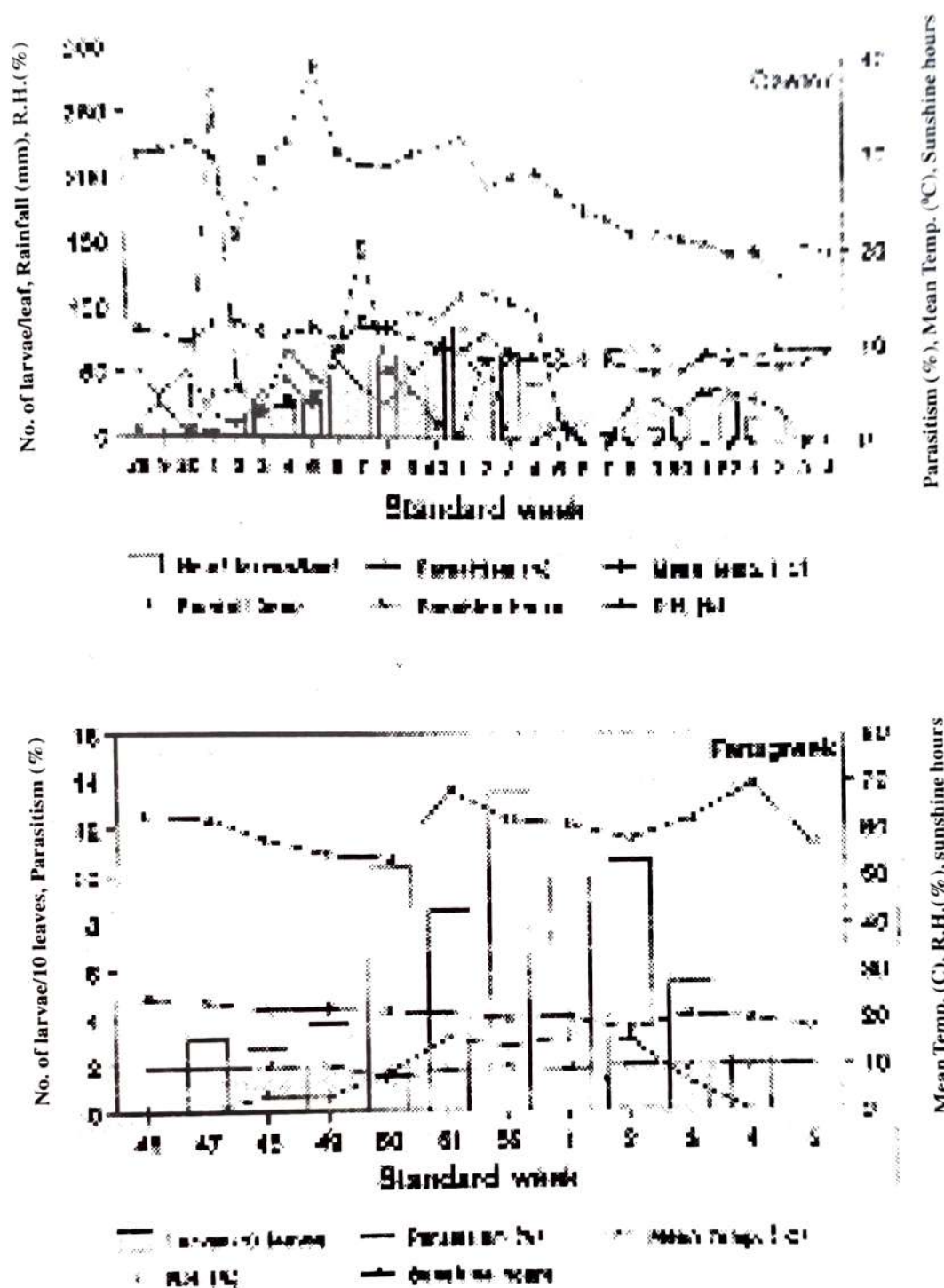


Fig. 1 : Activity of *L. trifolii* on castor and fenugreek

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