



Seasonal Occurrence of the Brown Lacewing *Micromus igorotus* (Banks) in Bhadra Command Area of Karnataka

M.P. Praveen^{1*}, S.V. Hugar¹, Y.H. Sujay², Venkatesh Hosamani¹ and N. Mallikarjun¹

¹Department of Agricultural Entomology, Agriculture College, Shimoga
²AEEC, University of Agricultural Sciences, Lingasuguru (Raichur) – 584 122

Seasonal incidence of *Micromus igorotus* (Banks) was studied at ARS Honnavile (Shimoga taluk), Sugarcane Development Research Station MPM, Karehalli (Bhadravathi taluk) and ARS Kathalagere (Davanagere taluk). The results revealed that an incidence ranging from 0.00 to 7.72 nymph per plant at Honnavile, Shimoga taluk, 0.00 to 7.25 at SRDC, MPM, Bhadravathi taluk and 0.00 to 13.9 at Kathalagere, Davanagere district. The high incidences of 7.72, 7.25 and 13.9 nymph per plant were observed during September, June and August months, respectively. The lowest incidence of 0.00 nymph per plant was observed during November to February months at Honnavile and Karehalli and December to January in Kathalagere respectively, due to rainfall received during that period in all the locations. In relation to weather parameters showed that there is two peaks in the year in May and September. Further *M. igorotus* population was negatively correlated with minimum temperature, maximum temperature, relative humidity and rainfall at all the three locations and positively correlated with relative humidity.

Key words: *Micromus igorotus*, brown lacewing, sugarcane woolly aphid, seasonal incidence, relative humidity, temperature and rainfall.

Globally sugarcane is cultivated in 19.37 million ha with an annual production of 1252.91 million tonnes and productivity of 64.69 tonnes per ha. India occupies the second position among the sugar producing countries, next to Brazil. In India, it is cultivated in 4.10 million ha with an annual production of 231.09 million tonnes with a productivity of 64.90 tonnes per ha (Anon., 2006), which is higher than the world average. Uttar Pradesh ranks first in area with 1.4 million ha. About 289 different pests ravage sugarcane, out of which 213 are insects and 76 are non-insect pests. Of these, about 20 are considered as major pests, 81 are minor and 188 are sporadic in occurrence. The non-insects viz., rodents, mites, nematodes, squirrels, wild boars are some of the important pests damaging sugarcane. The major insect pests of sugarcane includes the moth borers, termites, white grubs, scales, black bugs, pyrilla, white flies, mealy bug, army worm, grasshoppers, etc. The severe outbreak of sugarcane woolly aphid (SWA), *Ceratovacuna lanigera* (Zehntner) is a new addition as major pest causing notable loss in cane yield (7 to 39%) and sugar recovery (1.2 to 3.43%) (Patil *et al.*, 2003). Solitary and the first report of brown lacewing *Micromus igorotus* (Banks) (Hemerobiidae: Neuropteran) in India by Lingappa *et al.*, (2004) as a most potent and amenable predator for mass production and utilization in SWA management paved way for undertaking this investigation in an effort to provide effective and

sustainable biocontrol technology. This insect encountered commonly in SWA infested fields in South Karnataka.

Materials and Methods

For studying the seasonal incidence of *M. igorotus*, three sugarcane fields were selected at ARS Honnavile (Shimoga taluk), Sugarcane Development Research Station, MPM Karehalli (Bhadravathi taluk) and ARS Kathalagere (Davanagere taluk). The observations were initiated from the first fortnight of June 2007 to second fortnight of May 2008. The observations were recorded at fortnightly intervals. For studying the seasonal abundance, ten sugarcane clumps were selected randomly and all the leaves were observed and the total numbers of nymphs were recorded. On the same plant the population of woolly aphid per 2.5 cm² leaf area on top, middle and bottom leaves were recorded. The meteorological data on mean temperature, relative humidity and rainfall were collected from the meteorological observatories of Shimoga, Bhadravathi and Davanagere and correlated with the population of *M. igorotus*.

Results and Discussion

Seasonal occurrence of *M. igorotus* at Honnavile (Shimoga taluk)

The study on seasonal incidence of *M. igorotus* from May 2007 to April 2008 revealed that the incidence ranged from 0.00 to 8.00 nymph per plant.

*Corresponding author email: morphosis77@gmail.com

The highest incidence of 7.72 larvae per plant was observed during II fortnight of September, while no insect was observed during II fortnight of November 2007 to I fortnight of March 2008 (Table 1). The population also showed peak during September i.e. 5.20. The population declined to 0.00 from II fortnight of November 2007 to I fortnight of March. From II fortnight of March onwards the population started increasing. Thus, the population had two peaks in the year. The simple correlation between the population of *M. igorotus* was established from May 2007 to April 2008 in relation to mean temperature. *M. igorotus* population had a non significant positive correlation ($Y = 0.0422 + 1.0758, P = 0.610, r = 0.109$) with minimum temperature and non significant negative correlation ($y = -0.2257 x + 9.182, P = 0.107, r = 0.336$) with maximum temperature. The highest population of 7.72 nymphs per plant was recorded during II fortnight of September, which coincided with 27.51°C mean

temperature. Similarly the lowest population of 0.00 nymphs per plant was recorded during I fortnight of November to I fortnight of March, which coincided with 25.67°C.

The incidence of *M. igorotus* showed a non-significant positive correlation ($Y = 0.1407 x - 8.973, P = 0.100, r = 0.343$) with relative humidity. The highest population of 8.00 and 6.00 nymphs per plant were recorded at 68.67 and 74.40 % relative humidity during May respectively. The lowest population of 0.00 nymphs per plant was recorded at 72.67 to 71.10 % relative humidity during November II to March I fortnight. The incidence of *M. igorotus* showed a significant positive correlation ($Y = 0.0258 x + 1.174, P = 0.024, r = 0.458$) with rainfall. The highest population of 8.0 nymphs per plant was found at 111.25 mm and was no rainfall during November II to March II during which SWA was not observed (Table 1). Simple correlation

Table 1. Seasonal incidence of *Micromus igorotus* on SWA from May 2007 to April 2008 in Karnataka

Period	Shimoga taluk					Bhadravathi taluk					Davanagere taluk				
	Mean No. of SWA/2.5 cm ²	Mean No. of <i>Micromus</i> / Plant	Mean Temperature (°C)	RH (%)	Total Rainfall (mm)	Mean No. of SWA/2.5 cm ²	Mean No. of <i>Micromus</i> / Plant	Mean Temperature (°C)	RH (%)	Total Rainfall (mm)	Mean No. of SWA/2.5 cm ²	Mean No. of <i>Micromus</i> / Plant	Mean Temperature (°C)	RH (%)	Total Rainfall (mm)
May - I 2007	60.24	8.00	31.56	68.67	111.25	62.70	4.25	28.03	64.76	9.45	41.40	4.00	29.25	67.67	30.20
May - II	54.00	6.00	31.69	74.40	48.75	45.00	5.81	26.37	68.53	35.40	30.02	6.00	29.46	79.75	97.60
June - I	32.60	4.00	26.53	84.70	61.65	34.40	4.00	25.87	81.57	51.00	38.82	8.00	28.10	79.43	24.10
June - II	22.40	4.30	25.40	85.43	102.30	30.60	7.25	25.27	82.20	68.20	24.13	7.00	26.98	80.65	60.70
July - I	18.60	3.20	25.05	82.13	133.35	26.57	2.80	24.11	83.47	79.80	29.24	6.00	25.29	86.20	56.90
July - II	21.10	3.40	25.29	82.07	62.55	30.10	3.00	23.27	86.31	68.20	35.00	7.00	24.96	75.84	36.00
August - I	28.20	4.00	23.70	80.66	79.35	18.59	3.80	21.39	84.13	79.80	32.18	6.50	24.59	80.50	6.00
August - II	20.40	3.82	24.55	74.67	24.45	43.29	6.20	23.75	78.93	51.90	49.28	13.90	24.15	79.37	70.30
Sept - I	20.18	5.02	25.54	76.00	72.60	26.39	5.20	24.59	75.40	105.20	20.20	6.00	25.30	78.73	102.70
Sept - II	44.20	7.72	27.51	76.60	26.55	45.17	5.30	23.46	86.46	40.90	38.34	10.50	26.96	79.33	11.80
Oct - I	40.76	4.30	25.69	75.78	29.25	24.32	2.00	24.26	73.80	53.70	26.21	5.80	25.00	74.31	28.50
Oct - II	38.30	2.00	27.77	76.57	0.00	18.84	0.90	25.46	68.00	35.40	22.03	4.60	26.70	78.95	0.00
Nov - I	5.23	0.80	25.26	73.77	73.20	0.00	0.00	24.10	75.33	3.90	12.14	4.00	23.60	79.39	129.00
Nov - II	0.00	0.00	25.67	72.67	2.40	0.00	0.00	25.60	71.40	28.50	5.95	2.00	22.36	87.36	0.00
Dec - I	0.00	0.00	23.39	74.97	0.00	0.00	0.00	22.77	75.87	47.70	0.00	0.00	21.85	85.40	0.00
Dec - II	0.00	0.00	22.32	76.64	0.00	0.00	0.00	22.26	74.36	0.00	0.00	0.00	22.91	78.92	0.00
Jan - I 2008	0.00	0.00	23.05	75.94	0.00	0.00	0.00	23.76	73.81	0.00	0.00	0.00	24.66	71.70	0.00
Jan - II	0.00	0.00	24.20	74.63	0.00	0.00	0.00	24.99	71.80	0.00	0.00	0.00	24.92	81.98	0.00
Feb - I	0.00	0.00	25.14	76.93	0.00	0.00	0.00	24.10	67.18	0.00	18.80	3.00	25.75	70.98	0.00
Feb - II	0.00	0.00	25.05	71.10	0.00	10.14	0.80	25.35	69.12	0.00	21.25	4.50	25.50	65.58	0.00
March - I	10.20	0.00	28.22	70.92	0.00	22.20	1.20	26.58	65.53	0.00	45.03	10.30	27.25	54.43	0.00
March - II	12.40	0.60	30.21	66.83	0.00	19.86	1.10	27.75	65.13	4.32	48.12	11.80	28.23	60.88	0.00
April - I	28.56	1.00	30.39	83.93	4.50	21.73	1.80	28.22	64.28	8.20	37.41	8.60	28.45	67.21	8.00
April - II	20.80	1.30	30.99	86.93	49.50	26.80	2.00	27.91	64.96	11.70	48.36	9.60	27.80	73.00	17.20

between the population of *M. igorotus* was established from May 2007 to April 2008 in relation to SWA population. The *M. igorotus* population had ($Y = 0.100 x + 0.036, P = 1.78, r = 0.80$) significant positive relation with SWA population.

Seasonal occurrence of *M. igorotus* at Karehalli (Bhadravathi taluk)

The seasonal incidence of *M. igorotus* surveyed from May 2007 to April 2008 revealed that the incidence ranged from 0.00 to 7.25 per plant during II fortnight of June, while the lowest of 0.00 nymphs per plant was observed during I fortnight of November to I fortnight of February. It showed two peaks in the year i.e. in June and August. II fortnight of August onwards it started decreasing and reached zero in the I fortnight of November. Again population

started increasing from II fortnight of February onwards (Table 1). The simple correlation between the population of *M. igorotus* was established from May 2007 to April 2008 in relation to mean temperature. The population of *M. igorotus* had a non significant, positive correlation ($Y = 0.3292 x - 3.5082, P = 0.071, r = 0.374$) with minimum temperature and non significant negative correlation ($Y = -0.1875 x + 8.383, P = 0.302, r = 0.219$) with maximum temperature. The highest population of 7.25 nymphs per plant was recorded during June II fortnight at 25.27°C mean temperature. No population was recorded during I fortnight of November to I fortnight of February at 24.10°C to 24.10°C mean temperatures.

The incidence of *M. igorotus* showed a non-

significant positive correlation ($Y = 0.0938x - 4.542$, $P = 0.1609$, $r = 0.295$) with relative humidity. The highest population of 7.25 nymphs per plant and lowest population to 0.00 nymphs per plant were recorded at 75.33 to 67.18% RH during I fortnight of November to I fortnight of February respectively (Table 2). The incidence of *M. igorotus* showed a non-significant positive correlation ($Y = 0.0387x + 1.3579$, $P = 0.0114$, $r = 0.5071$) with rainfall. The highest population of 7.25 nymphs per plant was recorded during June II fortnight with 68.20 mm rainfall and the lowest population of 0.00 larvae per plant was recorded during I fortnight of November, to I fortnight of February at rainfall of 0.00 mm. The simple correlation between the populations of *M. igorotus* was established from May 2007 to April 2008 in relation to SWA population. The *M. igorotus* population had ($Y = 0.122x - 0.198$, $P = 6.47$, $r = 0.928$) positively significant correlation with SWA population.

Seasonal occurrence of *M. igorotus* at Kathalagere (Davangere taluk)

The seasonal incidence of *M. igorotus* surveyed from May 2007 to April 2008 revealed that the incidence ranged from 0.00 to 13.90 nymphs per plant. The highest incidence of 13.90 nymphs per plant was observed during II fortnight of August, while the lowest of 0.00 nymphs per plant were observed from I fortnight December to II fortnight of January (Table 1). The population increased from I fortnight of May onwards upto II fortnight of November. Later the population show increasing trend from I fortnight of February onwards. The simple correlation between the populations of *M. igorotus* was established from May 2007 to April 2008 in relation to mean temperature. The *M. igorotus* population had ($Y = 0.917x - 12.84$, $P = 0.00$, $r = 0.644$) significant positive correlation with minimum temperature and non-significant positive correlation ($Y = 0.2829x - 3.013$, $P = 0.548$, $r = 0.128$) with maximum temperature. The highest population of 13.90 nymphs per plant was recorded during II fortnight of August with the mean temperature of 24.15°C. The lowest population of 0.00 was recorded during I fortnight of December to II fortnight of January when the mean temperatures ranged from 21.85°C to 24.92°C.

The simple correlation between the populations of *M. igorotus* was established from May 2007 to April 2008 in relation to SWA population. The *M. igorotus* population had ($Y = 0.2186x + 0.2805$, $r = 0.905$, $P = 1.14$) significant positive correlation with SWA population. The incidence of *M. igorotus* showed a non-significant negative correlation ($Y = -0.1039x + 13.783$, $r = 0.209$, $P = 0.3256$) with relative humidity. The highest population of 13.9 nymphs per plant and the lowest population of 0.00 nymphs per plant was observed at 79.37 and 85.40 to 81.98

per cent relative humidity during II fortnight of August and I fortnight of December to II fortnight of January, respectively. The incidence of *M. igorotus* showed a non-significant positive correlation ($Y = 0.0087x + 5.7155$, $r = 0.084$, $P = 0.6948$) with rainfall. The highest population of 13.90 nymphs per plant was recorded during II fortnight of August with 70.30 mm rainfall and the lowest population of 0.00 larvae per plant was observed during December I fortnight to January II at rainfall of 0.00 mm.

The seasonal incidence of *M. igorotus* from May 2007 to April 2008 revealed an incidence ranging from 0.00 to 7.72 nymphs per plant at Honnavile, Shimoga taluk, 0.00 to 7.25 at SRDC, MPM, Bhadravathi taluk and 0.00 to 13.9 at Kathalagere, Davanagere district. The highest incidence of 7.72, 7.25 and 13.9 nymphs per plant were observed during September, June and August months, respectively. The lowest incidence of 0.00 nymphs per plant was observed during November to February months at Honnavile and Karehalli and December to January in Kathalagere respectively, due to rainfall received during that period in all the locations. The influence on seasonal incidence of *M. igorotus* population showed significant positive correlation with SWA population in all location. This revealed that predators occurred in large numbers during September to May months when the SWA population was also high on the crop. The predator was host dependent.

Further *M. igorotus* population was negatively correlated with mean temperature, relative humidity and rainfall at all the three locations and positively correlated with relative humidity. These results are in conformity with the findings of Phukan *et al.*, (1988) who reported that one peak in the population of *M. igorotus* in October.

Acknowledgment

The authors are grateful to Agriculture College, Shimoga, University of Agricultural Sciences, Bangalore for providing necessary facilities to carryout this study.

References

- Anonymous, 2006. *FAO Production Year Book*. FAO, Rome, Italy, pp. 32 – 33.
- Lingappa, S., Patil, R.K., Mulimani, V. and Ramegowda, G.K., 2004. Brown lacewing, *Micromus igorotus* (Banks) a potential predator of sugarcane woolly aphid. *Curr. Sci.*, **87**: 1056-1057.
- Patil, R.K., Ramegowda, G.K., Rachappa, V., Lingappa, S. and Tippannavar, P.S. 2003. Record of woolly aphid, *Ceratovacuna lanigera* (Zehntner) (Homoptera: Pemphigidae) on sugarcane in Northern Karnataka. *Insect Environ.*, **9**:57-58.
- Phukan, E., Datta, S.K. and Smarifulaph, M. 1988. Population build up of sugarcane aphid, *Ceratovacuna lanigera* (Zehntner). *Co-operative Sug.*, **19**: 311-312.