



## Mass production of *Dipha aphidivora* (Meyrick) (Lepidoptera: Pyralidae), a potential predator of sugarcane woolly aphid, in shade nets

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**ABSTRACT:** Mass production of *Dipha aphidivora* (Meyrick), a potential predator of sugarcane woolly aphid, *Ceratovacuna lanigera* Zehntner, was attempted in 'makeshift' type green shade nets of 40 and 50% mesh with temporarily installed bamboo frames by covering 6 and 7 months old sugarcane crop on small scale (25 m<sup>2</sup>). Seven-month-old sugarcane crop with 60-70% SWA infestation covered by 50% green shade net in bamboo frame of 5 x 5 m size yielded a maximum of 2700 larvae and pupae of *D. aphidivora* within 75 days.

**KEY WORDS:** *Dipha aphidivora*, mass production, shade net, sugarcane woolly aphid

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Sugarcane woolly aphid (SWA), *Ceratovacuna lanigera* Zehntner, is considered the most devastating pest of sugarcane in recent years across many states of India due to its rapid spread and damage within a span of 2-3 years. In Maharashtra, the SWA infestation was first noticed in Sangli district during July, 2002 and subsequently rapid spread occurred all over the sugarcane growing areas of the state. Though the estimated loss due to SWA damage in terms of reduction in cane yield is non-significant, apprehensions on the recovery of sugar haunted the spirits of sugar industry (Patil and Nerkar, 2004).

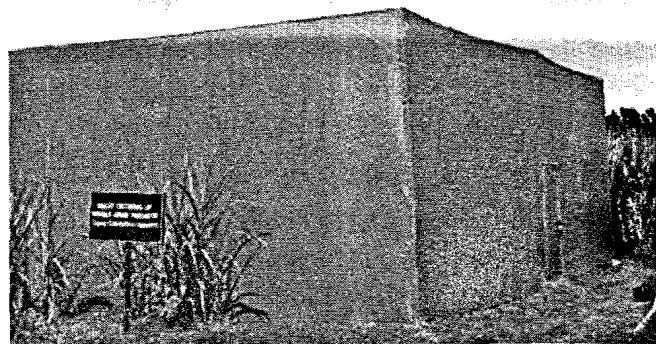
The SWA produces enormous progeny parthenogenetically under natural conditions and its proliferation occurs even during summer months in sugarcane fields near water sources and shade. So far, more than 50 natural enemies have been

recorded preying on SWA in sugarcane fields (Joshi and Viraktamath, 2004; Puttannavar, 2005) and most of them are not voraciously feeding on SWA. The predators, viz., *Dipha aphidivora* (Meyrick), *Micromus igorotus* Banks and *Eupeodes confrater* (Wiedemann) are regularly occurring and gave good control in Maharashtra and other parts of the country (Rabindra *et al.*, 2002). Amongst them, the predatory potential of *D. aphidivora* larvae was observed to be higher than that of *M. igorotus*. Secondly, the distribution of *D. aphidivora* among SWA populations was uniform as compared to *M. igorotus* under field conditions (Ghorpade *et al.*, 2006). Besides, *D. aphidivora* larvae could sustain adverse weather conditions because of their tunnel spinning and concealed habit of living. Based on these facts, it seems that *D. aphidivora* could successfully be utilized for the management of SWA under epidemic

conditions. Hence, an attempt was made for the multiplication of *D. aphidivora* under shade net conditions for undertaking augmentative release of the predator in SWA infested sugarcane fields in small scale, which would be cost effective to farming community.

### Production of *D. aphidivora* in bamboo shade nets

The mass culturing of *D. aphidivora* on SWA colonies was undertaken at the research farm of Entomology Section, College of Agriculture, Pune, in mini shade nets during 2004-05. Makeshift type mini shade nets supported with bamboo frames were used. The dimension of the shade net was 5 x 5 x 4 m (Fig. 1). The bamboo frames were fixed in the ground over SWA infested sugarcane crop (var. Co 86032) of 6 and 7 months. Green coloured nets with 40 and 50 per cent shade were used to cover the crop when SWA colonies were established well in about 60-70 per cent of the plants. Nitrogenous fertilizer (275 kg N) was applied (@10 per cent above the normal dose and frequent irrigations were given to encourage the development of SWA population. Inoculative release of 100 larvae of *D. aphidivora* was carried out in each net. Weather parameters inside and outside the shade nets were recorded



**Fig. 1.** Shade net for mass production of *Dipha aphidivora*

daily. In all, seven shade nets were employed for the production of *D. aphidivora* in each treatment.

The predator completed one generation in a month and yield in terms of larvae and / or pupae was counted from each shade net of 25 m<sup>2</sup> size as an output for field release for 2-3 months. A maximum of 2,700 larvae / pupae of *D. aphidivora* were harvested from seven months old crop planted in January and February, 2005 covered with 50 per cent shade net over 25 m<sup>2</sup> area within a period of 75 days (Table 1). Thus, mass rearing of *D. aphidivora* on seven months crop in 50 per cent shade net

**Table 1.** Mass production of *D. aphidivora* in shade net (5 x 5 x 4 m)

Treatment	Age of crop in month	Av. No. of SWA / 2.5 cm <sup>2</sup> / leaf / plant*		Av. No. of <i>Dipha</i> larvae / leaf / plant 30 days after release	Total production of <i>Dipha</i> / shade net
		Initial population	Population after 30 days		
Shade net with 40 % mesh	6	32 (5.74)	82 (9.11)	3.4 (2.09)	1600 (40.00)
	7	40 (6.39)	85 (9.27)	3.5 (2.12)	2160 (46.46)
Shade net with 50 % mesh	6	30 (5.56)	90 (9.53)	3.7 (2.17)	2360 (48.58)
	7	42 (6.55)	65 (8.12)	3.8 (2.19)	2700 (51.97)
Control plot (Uncovered)	6	25 (5.09)	47 (6.92)	1.8 (1.67)	220 (14.86)
	7	25 (5.14)	45 (6.78)	2.0 (1.73)	300 (17.33)
CD (P= 0.05)		(0.38)	(0.37)	(0.09)	(1.15)

\* Figures in parentheses are  $\sqrt{n} + 1$  transformed values

**Table 2. Weather parameters inside and outside the shade nets**

Met. week	Conditions inside the shade net				Conditions outside the shade net				Sunshine hours/day
	Temp. (°C)		RH (%)		Temp. (°C)		RH (%)		
	Max	Min	Morn	Even	Max	Min	Morn	Even	
Dec, 04									
49	21.0	16.4	84	59	29.6	9.4	94	31	8.5
50	22.5	17.0	70	58	29.8	9.5	93	27	6.7
51	26.3	18.3	74	56	30.5	9.4	96	31	9.0
52	26.0	17.0	85	59	29.6	12.6	94	36	8.1
Jan, 05									
1	27.0	16.8	98	66	29.8	14.0	92	41	7.1
2	23.0	15.3	93	52	30.1	9.5	95	30	9.1
3	20.2	16.0	89	52	29.0	8.6	93	28	9.1
4	25.2	13.0	88	51	31.2	10.4	94	35	8.8
5	22.3	11.8	95	63	26.0	11.7	92	44	7.4
Feb, 05									
6	24.0	14.2	95	59	32.0	12.7	88	26	10.0
7	30.5	15.8	87	53	33.6	12.1	83	25	10.5
8	29.8	15.6	86	47	31.4	10.1	82	23	10.5
9	27.6	18.8	81	53	35.1	16.1	79	22	9.1
Mar, 05									
10	32.0	15.2	83	53	33.1	14.8	82	28	9.2
11	32.0	15.0	82	50	33.0	15.0	84	29	10.0

conditions was more efficient than that on six months old crop as well as caging 6 and 7 months old crop in 40 per cent shade net. Further, it was observed that the shade net conditions inside the net house were most congenial for the multiplication of SWA as well as *D. aphidivora*, because there was minimum variation ( $5 \pm 2$  °C) in maximum and minimum temperatures and relative morning and evening humidity ( $10 \pm 5$  %) inside and outside (Table 2). The use of GI trays under laboratory conditions was attempted on small scale for multiplication of *D. aphidivora* at Sugarcane Breeding Institute, Coimbatore (Anonymous, 2006).

The release of *D. aphidivora* could be

conveniently made by cutting leaf pieces along with larvae / pupae with scissors and distributing them in infested fields by stapling on to the under side of sugarcane leaves with SWA colonies at early stages of establishment. The cost of a single shade net was computed to Rs. 2,500/-, which included the cost of 35 m net (Rs. 1820/-), 16 bamboo poles (Rs. 400/-) and labour and transport charges (Rs. 280/-).

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