

Influence of artificial diets on the development of *Mallada boninensis* Okamoto

A.B. PATIL, S.M. WANKHEDE, D.B. UNDIRWADE, M.R. SOMKUWAR AND R.S. MUNGHATE

Accepted : September, 2008

ABSTRACT

See end of the article for authors' affiliations

Correspondence to:

S.M. WANKHEDE

Entomology Section,
College of Agriculture,
NAGPUR (M.S.) INDIA

The present investigation was carried out at Entomology Section, College of Agriculture, Nagpur, during 2004-2005, with a view to standardize mass rearing technique of *Mallada boninensis*. Ten different types of diets were used and studies were made on the effect on biological parameters viz., larval period, pupation per cent, pupal period, pre-mating period, mating period, pre-oviposition period, oviposition period, fecundity, female longevity, incubation period and per cent of viable eggs of *Mallada boninensis*. Considering all diets together, eggs of *Corcyra cephalonica* performed best followed by Venkatesan's diet-2, proposed diet-3, Venkatesan's diet-1, proposed diet-1 and Pushpalathas's diet. The predator grows faster on eggs of *Corcyra* than artificial diets.

Key words : *Mallada boninensis*, Diets, Larval period, Pupal period, Fecundity.

Number of natural enemies of insect pests, which co-exist with them in different ecosystem. Amongst a very complex network of bioagents, the Chrysopid is known to be the most effective predator. *Mallada boninensis* Okamoto (Neuroptera: Chrysopidae) is the predominant species. It has a great potential to use as biocontrol agent against citrus aphids, whiteflies, citrus psylla and mealy bugs. The natural population of this bioagent in the field is not adequate to suppress the increased population of the prey. Therefore, it becomes necessary to mass produce them in laboratory for release in the field. Rearing in captivity needs good diet. In the efforts to mass rear them, the present investigation was carried out.

MATERIALS AND METHODS

The present laboratory experiment was carried out in Biocontrol laboratory of Entomology Section, College of Agriculture, Nagpur (M.S.) during the year 2004-2005.

The experiment was laid in completely randomized block design in which ten different types of diets were used (Table 1) and each one was replicated thrice. The test bioagent was obtained from the laboratory reared culture and further reared on different artificial diets. A set of 10 larvae of *M. boninensis* was used for each treatment. Various biological parameters viz., larval, pupal, adult and egg stages were recorded. Economics of diets were also calculated. The obtained data were subjected to appropriate statistical analysis.

RESULTS AND DISCUSSION

It is inferred from the data given in Table 2, that the eggs of *Corcyra cephalonica* found superior as a laboratory host for *M. boninensis* in all the biological parameter studied in present experiment except pre-oviposition period, oviposition period and female longevity. Amongst the artificial diets, proposed diet 5, Venkatesan's diet-2, Pushpalathas's diet and Venkatesan's diet-3

Table 1 : Ingredients required for the preparation of 100 g artificial diet for used rearing of *Mallada boninensis* larva (in g)

Sr.No.	Ingredients	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
1.	Hydrolysed soybean powder	1.3	-	-	-	-	2.00	-	-	-
2.	Soybean powder	-	1.3	-	-	-	-	2.50	-	3.70
3.	Multi vitamin	0.6	-	-	-	1.00	1.00	1.00	0.8	0.4
4.	Vitamin-E	0.6	-	-	-	1.00	1.00	1.00	0.8	0.4
5.	Egg yolk	31.9	32.3	32.3	42.01	41.9	25.00	25.00	25.00	26.00
6.	Honey	15.90	16.10	16.10	4.20	15.11	15.00	15.00	15.00	15.00
7.	Yeast extract	1.3	1.3	1.3	1.68	1.3	1.40	1.40	1.50	1.40
8.	Petroleum jelly	0.7	0.7	0.7	-	0.6	0.6	0.6	0.7	0.6
9.	Paraffin wax	9.5	9.6	9.6	-	9.5	9.5	9.5	9.6	9.5
10.	Wheat germ powder	-	-	1.3	-	-	-	-	2.10	-
11.	Wheat flour	-	-	-	-	1.3	-	-	-	-
12.	<i>C. cephalonica</i> abdomen powder	-	-	-	1.68	-	-	-	-	-
13.	Albumin (white of egg)	-	-	-	-	-	6.50	6.00	6.50	3.50
14.	Water (ml)	38.2	38.7	38.7	50.42	38.29	38.00	38.00	38.00	40.00

Table 2 : Influence of different diets on the development of *Mallada boninensis*.

Treatments	Larval period (in days)	% pupation	Pupal period (in days)	Premating period (in days)	Mating period	Pre-oviposition period (in days)	Ovi-position period (in days)	Fecundity (Eggs/female)	Female longevity	Incubation period (in days)	% of viable eggs	Economical status of diets
T ₁ : Venkatesan's diet-1	18.49	59.59 (50.49)*	10.90	4.30	1.36	9.10	45.30	180.00	55.29	3.90	86.00 (9.27)**	18.34
T ₂ : Venkatesan's diet-2	15.83	41.56 (40.14)	10.00	4.50	1.30	10.80	40.35	110.00	52.09	4.00	85.00 (9.21)	18.09
T ₃ : Venkatesan's diet-3	16.23	35.31 (36.31)	9.70	4.36	1.13	6.80	50.50	195.00	53.06	4.05	83.00 (9.10)	17.52
T ₄ : Pushpalaths's diet	16.20	27.60 (31.96)	10.63	3.96	1.23	6.80	28.40	113.33	43.16	4.60	74.66 (8.64)	15.92
T ₅ : Proposed diet-1	16.41	44.40 (41.78)	9.63	5.10	1.33	8.90	21.20	174.00	35.15	4.25	86.00 (9.27)	18.14
T ₆ : Proposed diet-2	17.40	22.73 (28.47)	8.70	6.06	1.13	10.20	16.65	93.66	32.15	4.20	86.00 (9.27)	18.15
T ₇ : Proposed diet-3	16.56	25.56 (30.37)	9.13	5.20	1.20	10.00	40.30	106.66	35.35	3.13	80.66 (8.98)	16.99
T ₈ : Proposed diet-4	17.96	40.70 (39.64)	9.42	5.20	1.30	9.23	38.06	180.66	49.20	3.30	88.20 (9.39)	18.72
T ₉ : Proposed diet-5	15.56	28.50 (32.26)	9.11	6.13	1.32	9.70	22.30	170.00	28.00	3.50	63.00 (7.93)	13.28
T ₁₀ : <i>Corcyra</i> eggs	8.90	94.00 (75.46)	7.98	3.53	1.09	8.35	41.70	295.00	53.00	3.10	94.00 (9.69)	19.92
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	
S.E. ±	0.25	0.09	0.13	0.08	0.07	0.12	0.41	1.48	0.19	0.05	0.04	
C.D. (P=0.05)	0.76	0.27	0.39	0.23	0.21	0.36	1.23	4.38	0.56	0.17	0.13	

* Figures in parenthesis are arc sin transformed values

** Figures in parenthesis are square root transformed values

recorded 15.56, 15.83, 16.20 and 16.23 days larval duration, respectively and found at par with each other. Longest larval duration *i.e.* 18.49 days was observed in Venkatesan's diet-1, while *Corcyra* eggs had minimal larval duration. When concern with per cent pupation next to *Corcyra* eggs, Venkatesan's diet-1 (59.59%) found superior than other diets. Proposed diet-2, proposed diet-5 and proposed diet-3 recorded highest pupal period *i.e.* 8.70, 9.11 and 9.13 days, respectively and at par with each other next to *Corcyra* eggs. Premating period of *M. boninensis* found superior on Pushpalatha's diet (3.96 days) than other diets. *M. boninensis* took near about same mating period on Venkatesan's diet-3 (1.13 days), Proposed diet-2 (1.13 days), Proposed diet-3 (1.20 days), Pushpalatha's diet (1.23 days), Venkatesan's diet-2 (1.30 days) and Proposed diet 4 (1.30 days). Venkatesan's diet 3 recorded significantly maximum fecundity (195.00 eggs/female) and minimum *i.e.* 93.66 eggs/female on Proposed diet-2. In case of incubation period, Proposed diet-3 (3.13 days) was found at par with *Corcyra* eggs. Maximum percentage of viable eggs *i.e.* 88.20% were brought when reared on Proposed diet-4 after *Corcyra* eggs. Minimum percentage of viable eggs (63.00%) was obtained from Proposed diet-5. Regarding the economical status of diets, the natural host *Corcyra* eggs found best which recorded maximum benefit of Rs. 19.92. Among artificial diet,

Proposed diet-4 proved best and recorded benefit of Rs. 18.72 followed by Venkatesan's diet-1 (Rs. 18.34) and Proposed diet-2 (Rs. 18.15).

Venkatesan *et al.* (2000) reared *Chrysoperla carnea* (Stephens) for 10 successive generations on 16 different larval semi-synthetic diets and studied the different biological parameters of *Chrysoperla carnea*. Katole (2003) studied the influence of different diets on the biological parameters of *Chrysoperla carnea* and reported that *Corcyra* eggs was superior as a laboratory host.

Authors' affiliations:

A.B. PATIL, D.B. UNDIRWADE, M.R. SOMKUWAR AND R.S. MUNGHATE, Entomology Section, College of Agriculture, NAGPUR (M.S.) INDIA

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