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Predatory efficacy of *Mallada boninensis* (Okamoto) against *Aleurocanthus woglumi* Ashby on citrus

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ABSTRACT

A field study was carried out to evaluate the predatory efficacy of *M. boninensis* against *A. woglumi*. It was revealed that, all releases of *M. boninensis* for the suppression of *A. woglumi* were significantly superior over control. Amongst all the releases, 60 eggs and 50 eggs per tree were most promising treatments. Though the chemical method offers effective control, the control by *M. boninensis* can be the most suitable method due to its ecofriendlyness as well as continuous process of pest suppression.

Key words: *Aleurocanthus woglumi*, *Mallada boninensis*, Citrus, Biological control.

INTRODUCTION

Citrus (Nagpur Mandarin) is a very important fruit crop, especially for the Vidarbha region. Citrus blackfly, *Aleurocanthus woglumi* Ashby is considered to be the main reason for citrus decline, causing heavy losses in yield and quality of fruits. Both nymphs and adults suck the cell sap and excrete honeydew like substance on which black sooty mould (*Capnodium citri*) grows rapidly in humid conditions, that leads to the black layer manifestation locally called as 'kolshi'. For a successful fruit set a minimum of 2.2 per cent organic nitrogen content in leaf is a pre-requisite and five to ten blackflies per cm^2 area are sufficient to reduce leaf nitrogen level below that and affect fruit setting (Shivankar and Singh, 2000). It is seen that a Chrysopid, *M. boninensis* predates on *A. woglumi* and it also has a wide range of hosts i.e. aphids, citrus psylla, mealy bugs. Hence *M. boninensis* can survive in the field in absence of citrus blackfly.

MATERIALS AND METHODS

The studies on field releases of *Mallada boninensis* against *A. woglumi* Ashby were conducted during 2004-2005. The experiment was initiated in randomized block design with total 10 treatments and was replicated thrice. One citrus tree was considered as a treatment plot.

Treatment details

T_1 - 10 eggs of *Mallada boninensis* (Okamoto) per tree
T_2 - 20 eggs of *Mallada boninensis* (Okamoto) per tree
T_3 - 30 eggs of *Mallada boninensis* (Okamoto) per tree
T_4 - 40 eggs of *Mallada boninensis* (Okamoto) per tree
T_5 - 50 eggs of *Mallada boninensis* (Okamoto) per tree
T_6 - 60 eggs of *Mallada boninensis* (Okamoto) per tree
T_7 - 10 larvae (first instar) of *Mallada boninensis* per tree
T_8 - 20 larvae (first instar) of *Mallada boninensis* per tree
T_9 - Malathion 50 EC @ 0.075 per cent
T_{10} - Control

The mass rearing of *M. boninensis* was carried out as per the standard procedure (Anonymous, 1997) in the Biocontrol laboratory, College of Agriculture, Nagpur during entire experimentation. The infestation of *A. woglumi* was observed in the field with about 50 per cent hatching of eggs. Thirty trees were selected and from each tree ten shoots were selected. The proportionate number of eggs and larvae were released on each tree. First release of eggs, larvae and spraying of malathion was undertaken on 04/12/2004 and subsequent application was done on 19/12/2004, 15 days after first application on same shoot. Pretreatment observations were recorded 24 hrs. before each release. Post-treatment observations were recorded 7 and 14 days after each application.

RESULTS AND DISCUSSIONS

The data presented in Table 1 revealed that, the results were significant and all the treatments were significantly superior over control.

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Table 1: Cumulative average per cent reduction in the eggs and nymphal population of *A. woglumi* 14 days after second application

Treatments	Treatment details	Cumulative average per cent reduction of *A. woglumi*			
		Days after 1st application		Days after 2nd application	
		7 days	14 days	7 days	14 days
T_1	10 eggs per tree	4.46	9.43	16.38	22.00
		(2.22)	(18.10)	(23.88)	(27.99)
T_2	20 eggs per tree	4.91	10.35	18.25	24.21
		(2.32)	(18.80)	(25.31)	(29.50)
T_3	30 eggs per tree	5.42	11.16	20.45	26.84
		(2.42)	(19.52)	(26.91)	(31.23)
T_4	40 eggs per tree	5.91	12.41	23.21	30.30
		(2.53)	(20.64)	(28.83)	(33.40)
T_5	50 eggs per tree	6.42	13.18	23.68	31.90
		(2.62)	(21.30)	(29.14)	(34.42)
T_6	60 eggs per tree	6.92	14.11	24.60	33.98
		(2.72)	(22.08)	(29.75)	(35.67)
T_7	10 larva per tree	4.04	8.02	13.29	17.75
		(2.13)	(16.44)	(21.40)	(24.95)
T_8	20 larva per tree	4.64	9.97	16.79	22.93
		(2.28)	(18.23)	(24.21)	(28.63)
T_9	Malathion @ 0.075 %	16.03	33.13	49.33	69.89
		(4.06)	(35.16)	(44.64)	(56.76)
T_{10}	Control	2.73	3.91	5.97	7.81
		(1.78)	(11.39)	(14.20)	(16.15)
'F' test		Sig.	Sig.	Sig.	Sig.
$SE_{(m)} \pm$		0.11	0.52	0.60	0.80
CD at 5%		0.31	1.53	1.78	2.38

Figures in parenthesis are arc sin values

Average per cent reduction in the population of Aleurocanthus woglumi 7 and 14 days after first application

The findings on the effect of various treatments on the population level of *A. woglumi* 7 days after first application revealed that, the highest per cent reduction of 16.03 per cent was observed in the treatment (T_9) malathion 0.075 per cent. The treatment (T_6) 60 eggs per tree was promising treatment with the reduction of 6.92 per cent followed by treatments, (T_5) 50 eggs per tree with 6.42, (T_4) 40 eggs per tree with 5.91 and (T_3) 30 eggs per tree with 5.42 per cent reduction. Treatments T_5, T_4 and T_3 were at par with each other. The treatments, (T_2) 20 eggs per tree with 4.91, (T_8) 20 larvae (first instar) per tree with 4.64, (T_1) 10 eggs per tree with 4.46 and (T_7) 10 larvae (first instar) per tree with 4.04 per cent reduction in the population of *A. woglumi* were at par with each other and were found significantly superior over (T_{10}) control with 2.73 per cent reduction in the population of *A. woglumi*. The findings on the effect of various treatments on the population level of *A. woglumi* 14 days after first application revealed that, the highest per cent reduction of 33.13 per cent was observed in the treatment (T_9) malathion 0.075 per cent. The treatment (T_6) 60 eggs per tree recorded reduction of 14.11 per cent followed by treatments, (T_5) 50 eggs, (T_4) 40 eggs per tree which were recorded 13.18 and 12.41 per cent reduction, respectively and were at par with each other. The treatments, (T_3) 30 eggs, (T_2) 20 eggs, (T_8) 20 larvae (first instar) and (T_1) 10 eggs per tree recorded 11.16, 10.35, 9.97 and 9.43 per cent reduction, respectively and were at par with each other. The treatments, (T_7) 10 larvae (first instar) per tree and (T_{10}) control recorded 8.02 and 3.91 per cent reduction in the population of *A. woglumi*.

Average per cent reduction in the population of Aleurocanthus woglumi 7 and 14 days after second application

The findings on the effect of various treatments on

the population level of *A. woglumi* 7 days after second application revealed that, the highest reduction of 49.33 per cent was observed in the treatment (T_9) malathion 0.075 per cent. Amongst the different treatments of *M. boninensis*, (T_6) 60 eggs, (T_5) 50 eggs and (T_4) 40 eggs per tree were recorded 24.60, 23.68 and 23.21 per cent reduction, respectively and were at par with each other. The treatments, (T_3) 30 eggs and (T_2) 20 eggs per tree recorded population reduction of 20.45 and 18.25, respectively and were at par with each other. (T_8) 20 larvae (first instar) and (T_1) 10 eggs per tree recorded population reduction of 16.79 and 16.38 per cent, respectively and were at par with each other. The treatments, (T_7) 10 larvae (first instar) and (T_{10}) control recorded 13.29 and 5.97 per cent reduction, respectively in the population of *A. woglumi*. The findings on the effect of various treatments on the population level of *A woglumi* 14 days after second application showed that, the highest per cent reduction of 69.89 per cent was observed in the treatment (T_9) malathion 0.075 per cent. The treatments, (T_6) 60 eggs, (T_5) 50 eggs, (T_4) 40 eggs per tree were recorded 33.98. 31.90 and 30.30 per cent reduction, respectively and were at par with each other. The treatments, (T_3) 30 eggs, (T_2) 20 eggs, (T_8) 20 larvae (first instar), (T_1) 10 eggs and (T_7) 10 larvae per tree were recorded 26.84, 24.21, 22.93, 22.00 and 17.75 per cent, respectively. (T_{10}) untreated control was recorded 7.81 per cent reduction in the population of *A. woglumi*.

The results of present investigation are in the close agreement with results obtained by Wadhai (2001), Anonymous (2004), Bhagat (2004). *M. boninensis* is found promising predator of *A. woglumi* and it can be effectively incorporated in the integrated pest management of citrus blackfly. The present study also indicates that the releases of eggs of *M. boninensis* are more effective in reducing *A. woglumi* population as compared to larval releases.

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