

SEASONAL INCIDENCE AND MANAGEMENT OF APHID, *Aphis punicae* on POMEGRANATE

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ABSTRACT

The maximum incidence of aphid, *Aphis punicae* was observed on pomegranate during the third week of February and March respectively in hill area at Yercaud and plains at Namakkal in Tamil Nadu. Both grubs and adults of the predatory coccinellid beetle, *Scymnus coccivora* were highly effective in reducing the population of aphids. A grub could feed on an average of 423 nymphs or 216 adults of aphids during the entire grub period. Inundative release of the green lace wing, *Chrysoperla carnea* @ 50 first instar nymphs per flowering branch four times at 10 days interval, coinciding the first release on the occurrence of aphids, resulted in 53.67 per cent reduction in aphid population. Among the chemicals, spraying of neem oil 3%, fish oil rosin soap 2.5%, phosalone and endosulfan at 0.07%, dimethoate and phosphamidon at 0.03% and methyl demeton 0.025% were highly effective in controlling the aphid population.

KEY WORDS : Pomegranate, aphid, coccinellid, inundative release, green lace wing.

The cultivation of pomegranate has increased several folds in the recent past after the introduction of soft seeded varieties. Pomegranate is attacked by a large number of insect pests. The aphid, *Aphis punicae* Passerini cause severe damage to flowers, fruits, twigs and leaves by desapping which results in loss of quality of fruits and yield reduction. The present investigation aimed at the seasonal abundance and management of aphid with biocontrol agents and insecticides.

MATERIALS AND METHODS

The seasonal occurrence of *A. punicae* was recorded at weekly intervals starting from August '92 to July '94, at the Horticultural Research Station, Yercaud (hill area) and in farmers holding at Namakkal (plains) on the variety Ganesh. The number of aphids per 3 terminals (each of 2.5 cm shoot length) were observed in 5 randomly selected plants. The weather parameters like maximum and minimum temperature, relative humidity (morning and evening), intensity of rainfall and number of rainy days were gathered from both the areas.

Biological control

A laboratory study was conducted to assess the predatory potential of *Scymnus coccivora* Ayyar on nymphs and adults of *A. punicae*. The predatory potential was studied by allowing the freshly emerged first, second, third and fourth instar grubs

and adults of *S.coccivora* in separate glass vials @ one per container and any one of the preys viz., 100 nymphs or 50 adults were provided for feeding. This was replicated 10 times. The number of prey consumed was observed daily.

A field experiment was conducted in farmers field with two treatments viz., (1) release of *Chrysoperla carnea* Stephens and (2) untreated control against *A. punicae* in plots of 25 cents each from April - May '93 on 5 year old Ganesh pomegranate. Four releases of the first instar larvae of the predator were made @ 50 per flowering

Table 1. Predatory potential of different stages of *Scymnus coccivora*

Developmental stage of the predator	Number of prey consumed per day (Mean + SD)	
	Aphid nymphs	Aphid adults
Grub - I	7 - 9 (7.83 ± 0.77)	4 - 6 (5.0 ± 0.82)
Grub - II	13 - 17 (14.81 ± 1.21)	6 - 7 (7.59 ± 1.10)
Grub - III	25 - 33 (27.63 ± 2.34)	10 - 17 (13.22 ± 2.12)
Grub - IV	62 - 78 (68.27 ± 4.34)	25 - 43 (32.74 ± 5.20)
Total	118.54	58.55
Total consumed during grub period	327 - 471 (423.1 ± 40.9)	155 - 257 (216.4 ± 27.9)
Adult	63 - 85 (74.60 ± 7.23)	30 - 45 (36.8 ± 4.37)

Figures in the parentheses are mean values

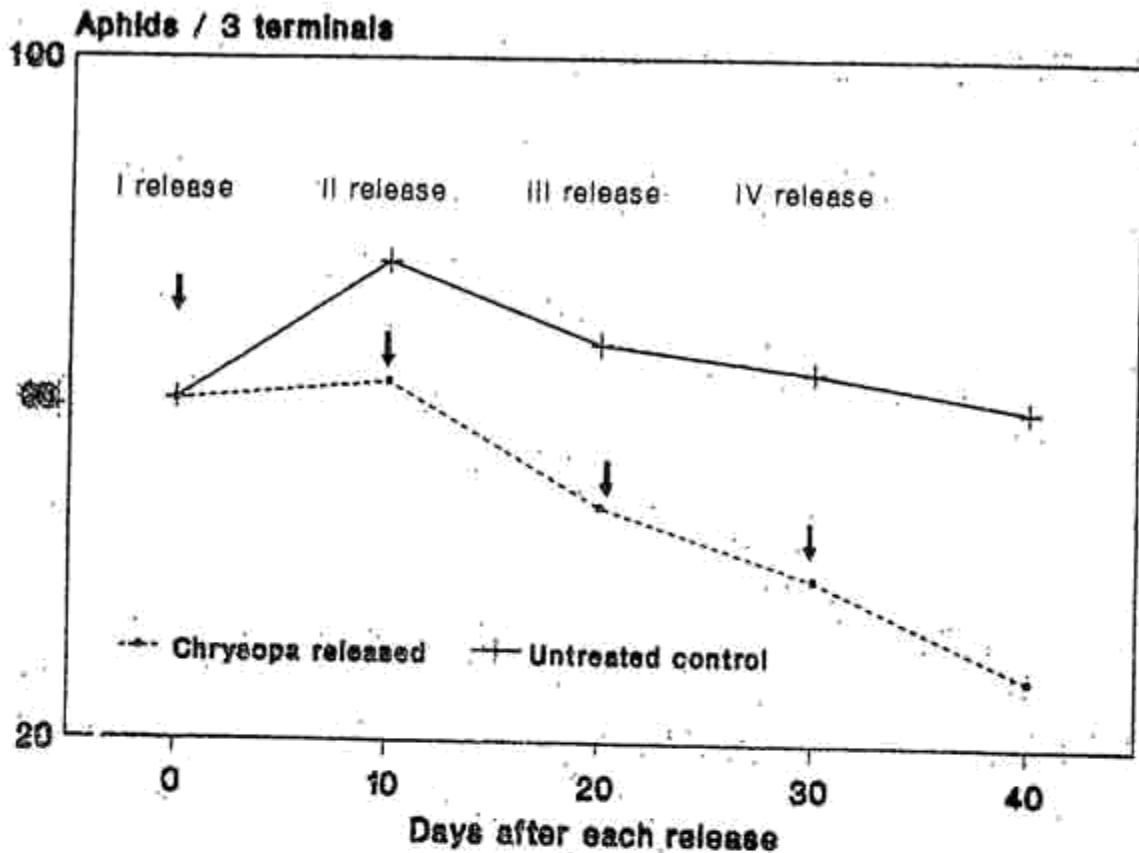


Fig.1 Efficiency of *Chrysoperla carnea* against aphids on pomegranate

branch at 10 days interval, the first release coinciding with the occurrence of aphids. Pretreatment count on the number of aphids on 3 terminals of 10 random plants and post treatment counts were made at 10 days after each release of the predator.

Chemical control

Another field experiment was conducted at Naravalur, Namakkal with 9 treatments replicated thrice for the control of *A.punicae* during February-March '93. The observations on the pretreatment and post treatment counts were made

by counting the number of aphids per 3 terminals in 5 randomly selected plants.

RESULTS AND DISCUSSION

The incidence of aphids started during the last week of January and gradually reached the maximum of 283 / 3 terminals of 37.5 cm length during the third week of March '93 and then declined during April-May (2 aphids / 3 terminals) at Namakkal in the plains whereas the incidence of aphid was observed during February - April in the hills with the population ranging from 1 to 73, the maximum population was recorded during the third week of February. The correlation between the

Table 2. Efficacy of *Chrysoperla carnea* in the control of aphid, *A. punicae*

Treatments	Aphids per 3 terminals of 2.5 cm length				
	Initial population	10 days after release of predator			
		I release	II release	III release	IV release
Release of <i>C. carnea</i>					
4 times at 10 days interval	60.0	62.2 a	47.5 a (20.83)	39.2 a (34.67)	27.8 a (53.67)
Untreated control	60.1	76.2 b	66.7 b	60.4 b	58.2 b
t value (n-1) df	NS	3.30	5.05	6.05	7.41

Figures in parentheses are per cent reduction of aphid compared to initial population.

Table 3. Chemical control of aphid, *A. punicae* on pomegranate

Treatments	Aphids per 3 terminals	
	Pretreatment count	3 days after treatment
Malathion 50 EC 0.1%	63.33	1.00 ^a (1.17)
Phosalone 35 EC 0.07%	61.33	0.00 ^a (0.71)
Dimethoate 30 EC 0.03%	66.00	0.67 ^a (1.05)
Methyl demeton 25 EC 0.025%	67.00	0.67 ^a (1.00)
Endosulfan 35 EC 0.07%	53.67	0.00 ^a (0.71)
Phosphamidon 85 EC 0.03%	67.33	3.33 ^a (1.95)
Neem oil 3%	72.00	0.00 ^a (0.71)
Fish oil rosin soap 2.5%	62.67	0.00 ^a (0.71)
Untreated control	71.67	68.67 ^b (8.28)

Means followed by a common letter are not significantly different at 5% level.

incidence of aphid and weather parameters was not significant.

Biological control

Among the nymphs and adults of aphid, the nymphs were most preferred by all stages of the predator and the predatory potential increased with age (Table 1). This increasing trend in feeding rate is in agreement with other *Scymnus* spp (Behara, 1984; Buntin and Tamaki, 1980) Patro and Behera (1992) also reported that an individual of *Scymnus* sp. fed an average of 139.8 *Aphis craccivora* on beans to complete the grub period with an average consumption of 16.0, 19.1, 33.8 and 70.9 aphids during the first, second, third and fourth instar respectively.

Four releases of first instar larvae of *C. carnea* @ 50 nymphs / flowering branch at 10 days interval, with the first release coinciding with aphid occurrence resulted in gradual reduction in aphid population starting from 10 days after first release. The percentage reduction in aphid population in the predator released plots gradually increased from 20.83 per cent 10 days after second release to

53.63, 10 days after fourth release (Table 2; Fig 1.) Uthamasamy and Krishna mohan (1990) also reported the efficacy of *C. carnea* on aphids, mealy bugs, whiteflies, thrips, eggs of *Spodoptera litura* Fab., *Helicoverpa armigera* Hubn. and of *Pectinophora gossypiella* Saunders as well as mites on different crops. The reduction in aphid, *A. craccivora* population on beans due to another species of chrysopid, *Micromus timidus* Hagen was reported by Srinivasa Rao, Subba Rao and Nagalingam (1989).

Chemical control

Sprays of phosalone and endosulfan at 0.07%, neem oil 3%, fish oil rosin soap 2.5% were highly effective in causing cent per cent mortality of aphids 3 days after insecticide treatment. The other chemicals namely dimethoate, methyl demeton, malathion and phosphamidon were also effective against *A. punicae* and all these treatments were on a par and significantly reduced the population of aphids to a greater extent (Table 3).

Mote *et al.*, (1993) also reported the efficacy of dimethoate and methyl demeton against aphids by causing over 90 per cent mortality. From the present study, the release of the predator, *C. carnea* and the sprays of neem oil and fish oil rosin soap could also be employed for getting better results against the aphids.

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