

Field Evaluation of *Cryptolaemus montrouzieri* Muls. in the Suppression of *Maconellicoccus hirsutus* (Green) on Grapevine

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ABSTRACT

The coccinellid predator, *Cryptolaemus montrouzieri* (Muls.) was multiplied in large numbers and adult beetles were released against *Maconellicoccus hirsutus* in three localities in Karnataka. The release of predatory beetles gave excellent control of the grape mealybug within 75 days.

KEY WORDS: *Cryptolaemus montrouzieri*, predator, control of *Maconellicoccus hirsutus*

In recent years, the pink mealybug, *Maconellicoccus hirsutus* (Green) has caused severe damage to grapevine in certain parts of India (Azam, 1983; Manjunath, 1985). According to Azam (1983), it caused yield loss ranging from 50 to 100 per cent. Insecticidal applications are not effective against the mealybug populations. Following reports on the establishment and recovery of the coccinellid predator, *Cryptolaemus montrouzieri* Mulsant in mealybug-infested vineyards (Sysoev, 1953; Ranga Reddy and Lakshminarayana, 1986), the release and evaluation of the predator has been considered for managing the grape mealybug.

MATERIALS AND METHODS

C. montrouzieri was bred on mealybug-infested pumpkin fruits (*Cucurbita maxima* D.) in the laboratory as outlined by Chacko *et al.* (1978). Newly-emerged adults were kept together in plastic jars for 10 days to ensure mating and completion of the preoviposition period. Adults were fed with 50% honey solution. Releases of the predator were made in vineyards (var. Anab-e-shahi) at 3 different localities in Karnataka State. In all the vineyards, spraying of insecticides was discontinued a month prior to the release, and also during the study period.

Adult beetles were released in the evening. Prior to release and after the release, the population of mealybugs, *C. montrouzieri* and

other natural enemies if any was observed at 15-day intervals on 20 randomly selected vines. Ten shoots and secondary rachis with berries were removed from each vine and brought to the laboratory. After counting the mealybug population, each sample was placed over a pumpkin fruit which facilitated the feeding of parasitised mealybugs if any in a wooden cage (30 x 30 x 30 cm) and eventually for recording the emergence of parasitoids and predators. Population of the mealybug was also recorded in nearby vineyards where the predatory beetles were not released.

RESULTS AND DISCUSSION

Locality 1. (Devanahalli, Bangalore District)

In March 1984, all the 300 plants in a 0.5 ha vineyard were found to be infested with *M. hirsutus*. The mealybug population ranged from 370 to 446 with a mean of 420 per plant. The predator *C. montrouzieri* was not observed prior to release. However, other predators, viz., *Scymnus coccivora* Ayyar, (Coccinellidae, Coleoptera) *Cacoxenus perspicax* (Knab) (Drosophilidae, Diptera) and the parasite *Anagyrus dactylopii* (How.) (Encyrtidae, Hymenoptera) were observed. On 16th April, a total of 3000 *C. montrouzieri* (i.e. @ 10/vine) were released.

Grubs of *C. montrouzieri* were observed feeding on grape mealybugs 15 days after release. Mean population of grubs was 4.70 per vine. Activity of grubs was observed up to 75 days after the release. A peak population of 12.7 grubs per vine was recorded

TABLE 1. Population of *M. hirsutus* and their natural enemies at Devanahalli

Period	Mean population/plant \pm S.D.				
	Mealybugs	<i>Cryptolaemus</i>	<i>Scymnus</i>	<i>Cacoxenus</i>	<i>Anagyrus</i>
Pretreatment	420.01 \pm 50.60	0.00	1.80 \pm 1.48	2.60 \pm 1.49	8.10 \pm 4.72
15th day	465.10 \pm 52.80	4.70 \pm 1.70	5.30 \pm 1.42	1.90 \pm 0.75	10.50 \pm 4.46
30th day	232.00 \pm 18.20	8.00 \pm 1.49	6.20 \pm 1.39	3.90 \pm 2.69	11.80 \pm 4.16
45th day	107.10 \pm 12.10	12.70 \pm 1.48	7.70 \pm 1.25	3.60 \pm 2.00	19.40 \pm 3.43
60th day	34.70 \pm 8.90	12.00 \pm 2.94	5.00 \pm 1.05	0.60 \pm 1.00	1.10 \pm 0.75
75th day	9.00 \pm 2.20	4.50 \pm 1.27	1.60 \pm 0.74	0.20 \pm 0.0	0.40 \pm 0.58
30th day of Pruning	1.50 \pm 2.10	0.00	0.00	0	0.00
At harvesting	2.00 \pm 2.70	0.00	0.00	0	0.00

S.D. = Standard deviation

on the 60th day after release. The population of the other natural biotic agents also started increasing and complemented *C. montrouzieri* in reducing the grape mealybug population (Table 1). A reduction in mealybug population was observed 30 days after release. Further observations indicated that there was a drastic reduction in the mealybug population with increased activity of the predator. A mean of 9 mealybugs per vine was observed on the 75th day of the release of *C. montrouzieri*. During the course of the above study, observations made in another vineyard, located one kilometer away from the release site, revealed that the mealybug population ranged from 218 to 296 per vine. Natural enemies were totally absent in this vineyard site it was sprayed heavily with insecticides. Mealybugs did not reappear on the young sprouts after pruning in June in the predator-released vineyard. At the time of harvesting, the mealybugs were observed only on two bunches out of 30,000.

Locality 2. (Bangarpet, Kolar District)

Mealybug infestation was observed on the bunches in February, 1985. The pretreatment mealybug population ranged from 218 to 283 per vine with a mean of 240.5. No natural enemy was recorded prior to release. A total of 700 beetles (i.e. 7 per vine) were released on 1st April 1985. The grubs of *C. montrouzieri* were observed feeding on

TABLE 2. Population of *M. hirsutus* and *C. montrouzieri* at Bangarpet

Period of observation	Mean population/plant \pm S.D.	
	Melaybugs	<i>Cryptolaemus</i>
Pretreatment	240.50 \pm 24.46	0.00
15th day	221.00 \pm 76.25	1.20 \pm 0.82
30th day	123.00 \pm 24.90	2.25 \pm 0.84
45th day	86.30 \pm 6.48	6.50 \pm 1.43
60th day	26.50 \pm 6.11	5.45 \pm 1.65
75th day	4.80 \pm 1.81	1.20 \pm 0.26
30th day of pruning	1.21 \pm 0.41	0.00

S.D. = Standard deviation

M. hirsutus on the 15th day after release. A maximum population of 6.50 grubs per vine was recorded on the 45th day. Mealybug population declined from 15th day of release onwards (Table 2). The crop was pruned in May but the mealybugs did not reappear on the young sprouts. The mealybug population in a nearby orchard ranged from 174 to 217 per vine.

Locality 3. (Kadur, Chikkamagalur district)

M. hirsutus appeared in a one ha vineyard in March, 1985. Mealybug population per vine was 53.4 prior to release. A total of 2000 beetles (@ 5 per vine) was released in July 1985. The observations made on the 30th day revealed the presence of *C. montrouzieri* grubs (Table 3). Reduction in mealybug

TABLE 3. Population of *M. hirsutus* and *C. montrouzieri* at Kadur

Period of observation	Mean population/plant \pm S.D.	
	Mealybugs	<i>Cryptolaemus</i>
Pretreatment	53.40 \pm 15.32	0.00
30th day	34.20 \pm 6.21	1.90 \pm 0.74
60th day	12.65 \pm 2.72	2.80 \pm 0.79
90th day	12.25 \pm 1.95	1.25 \pm 0.57
30th day of pruning	1.55 \pm 0.89	0.00

S.D. = Standard deviation

population was gradual. Mean predatory grub population of 1.90, 2.80, 1.25 per vine was recorded on 30th, 60th and 90th day of release respectively. No other natural enemy was recorded during the study period. The percentage of mealybug-infested bunches was 4.85 in March 1986 in the released vineyard as compared to 36.80 per cent in a nearby orchard.

Ranga Reddy and Lakshminarayana (1986) reported the recovery of *C. montrouzieri* in mealybug-infested vineyards around Hyderabad after the release of adult beetles indicating the possibility of utilising this predator to manage *M. hirsutus* in grape gardens. The predator was of rare occurrence in many gardens in Karnataka and hence injudicious releases were made in three localities. Adult beetles, released @ 10,7 and 5 per vine at Devanahalli, Bangarpet and Kadur respectively, effectively suppressed the pest population within two months. However, results were more convincing with *C. montrouzieri* when the density

of mealybug was high as in Devanahalli. The effective mealybug control in this locality may be also due to the presence of other local natural enemies. The mealybug did not appear until April 1988. According to Sysoev (1953), this coccinellid had successfully established against *Planococcus citri* (Risso) infesting grapevine in USSR. It is also suggested to introduce the parasite *Anagyrus kamali* Moursi (Encyrtidae, Hymenoptera) into India since it was reported to have effected permanent control of *M. hirsutus* in Egypt as reported by Kamal (1951).

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REFERENCES

- Azam, K.M. 1983. Losses due to pests in grapes, *Indian J. Entomol.*, (special issue) 2, 387-389.
- Chacko, M.J., Bhat, P.K., Ananda Rao, L.V., Deepak Singh, M.B., Ramanarayanan, E.P. and Sreedharan, K. 1978. The use of the lady bird beetle, *Cryptolaemus montrouzieri* for the control of coffee mealybugs. *J. Coffee Res.*, 8, 14-19.
- Kamal, M. 1951. Biological control projects in Egypt with a list of introduced parasites and predators. *Bull. Soc. Fouad 1^{er} Entomol.*, 35, 205-220.
- Ranga Reddy, A. and Lakshmi Narayana, K. 1986. Biology and control of grape mealybug. *Indian Grape J.*, 2, 30-39.
- Manjunath, T.M. 1985. *Maconellicoccus hirsutus* on grapevine. *FAO Plant Prot. Bull.*, 33, 74.
- Sysoev, A.T. 1953. The possibility of combining biological and chemical methods in the control of agricultural crops. *Doki Vgeseouz Akad Sel Khoz Nauk Lenin*, 18, 25-31.