Biological control of green shield scale, *Pulvinaria psidii* Maskell, on red ginger in India

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ABSTRACT: The green shield scale, *Pulvinaria psidii* Maskell, was found at high levels on red ginger (*Alpinia purpurata* K. Schum.) at IIHR Farm, Bangalore in June 2006. Following the release of the Australian ladybird beetle, *Cryptolaemus montrouzieri* Mulsant @10 / plant, the scale population declined from 174.60 scales / shoot on 15 June to 1.40 / shoot on 1 September in 2006. The population of *C. montrouzieri* ranged from 3.40 to 10.34 per shoot during the study period. Since no other natural enemies were recorded, the reduction in the population of *P. psidii* in the red ginger biocontrol plot was attributed mainly to the action of *C. montrouzieri*.

KEY WORDS: *Aphis nerii, Pulvinaria psidii, Cryptolaemus montrouzieri, Ferrisia virgata, Planococcus citri,* red ginger.

The green shield scale, *Pulvinaria psidii* Maskell, has been reported causing damage to the leaves and flowers of red ginger (*Alpinia purpurata* K. Schum.) in India (Mani and Krishnamoorthy, 2007). It is difficult to achieve perfect control of the green shield scales with conventional insecticides mainly due to the mealy covering over their bodies (Chatterji and Datta, 1974). Since the Australian ladybird beetle, *Cryptolaemus montrouzieri* Mulsant, has been reported to be effective against various species of green shield scales (Mani and Krishnamoorthy, 1997a, b), a study was conducted to evaluate the efficacy of *C.montrouzieri* in the suppression of *P.psidii* on red ginger.

Cryptolaemus montrouzieri was multiplied on mealybug-infested pumpkin fruits (*Cucurbita moschata* Linn.) as described by Chacko *et al.* (1978) at 26 ± 2°C and 60-70% RH in the laboratory. A red ginger plot covered with a net house located at IIHR Farm was selected to study the efficacy of *C. montrouzieri* in the suppression of *P. psidii*. In this red ginger plot, severe green shield scale damage was observed on the leaves and flowers in June 2006. A total of 140 plants infested with the scale insects were present in this plot. Another untreated red ginger plot of 120 plants of similar age covered with a net house located in the nearby area was also maintained as a check. In all, 1400 larvae of *C. montrouzieri* @10 larvae / plant were released in June 2006 in the biocontrol plot. The scale population was recorded at fortnightly intervals on 10 randomly selected plants from June to September in 2006. In each plant, five shoots were selected to count the green shield scales. Similar observations were made in the check plot.

The results on the population trend of the green shield scale are presented in Table 1. A mean of 174.64 scales / shoot was observed on 15 June 2006. Following the release of *C.montrouzieri*, the scale population declined to 110.50 / shoot after a month. The population of *C. montrouzieri* ranged from 3.40 to 10.34 per shoot during the study period. The plants were cleared of almost all the scale insects by the first week of September 2006 as compared to 260.35 scales / shoot in the check plot during the same time. In the biocontrol plot at IIHR Farm, *C. montrouzieri* was found preying on *P. psidii* on the red ginger plants throughout the study period. Since no other natural enemies were recorded, the reduction in the population of the green shield scale in the red ginger biocontrol plot was attributed mainly to the action of *C. montrouzieri* in the present study.

Cryptolaemus montrouzieri has given control of several species belonging to the genus *Pulvinaria* in different countries on many crops (Mani and Krishnamoorthy, 1997). In the present investigation, 99.19% reduction in the green shield scale population was recorded within 75 days of *Cryptolaemus* release on red ginger (Table 1). *C. montrouzieri* took 40 days on lemon (Mani and Krishnamoorthy, 1999) and 180 days on guava (Mani and Krishnamoorthy, 1990) after release to give significant

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Table 1. Population of *Pulvinaria psidii* and *Cryptolaemus montrouzieri* on red ginger

| Date | Mean population/shoot ± S.D. | | | % reduction in scale population in biocontrol |
| | Check | Biocontrol | | |
	P. psidii	*P. psidii*	*C. montrouzieri*	
15-06-2006	162.85 ± 9.52	174.64 ± 10.24	–	–
01-07-2006	194.28 ± 8.64	162.84 ± 8.64	3.40 ± 2.60	6.74
15-07-2006	224.62 ± 11.26	110. 50 ± 7.80	7.62 ± 3.12	36.84
1-08-2006	180.48 ± 7.38	60.25 ± 5.94	10.34 ± 4.30	65.49
16-08-2006	234.16 ± 14.82	32.44 ± 5.68	6.28 ± 2.12	81.40
01-9-2006	260.35 ± 20.57	1.40 ± 0.95	4.20 ± 1.92	99.19

S.D = Standard deviation

control of *P. psidii. C. montrouzieri* had established on *P. psidii* populations attacking Erythrina in Puerto Rico (Wolcott, 1958), coffee in Hawaii (Zimmerman, 1948) and oleander in Bermuda (Bennett and Hughes, 1959). It was found to be very effective in bringing down the population of *P. psidii* on guava and sapota in India (Mani and Krishnamoorthy, 1990 & 1997). Adults and grubs of *C. montrouzieri* were observed in large numbers feeding on *P. psidii* infesting Ficus on Shevaroy hills of Tamil Nadu (Kumar and Prakasam, 1984).

Besides green shield scales, *C. montrouzieri* also gives excellent control of other mealybugs which are emerging as major pests of red ginger. Hence, there is good scope for using *C. montrouzieri* to manage these sucking pests on red ginger as it can be multiplied and supplied by commercial insectaries to the public.

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