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#### M Ayyamperumal

Biocontrol Laboratory  
(Entomology), Central  
Integrated Pest Management  
Centre, Directorate of Plant  
Protection Quarantine &  
Storage, Ministry of Agriculture  
and Farmers Welfare,  
Government of India,  
Tiruchirappalli, Tamil Nadu,  
India

#### S Ganasambandan

Biocontrol Laboratory  
(Entomology), Central  
Integrated Pest Management  
Centre, Directorate of Plant  
Protection Quarantine &  
Storage, Ministry of Agriculture  
and Farmers Welfare,  
Government of India,  
Tiruchirappalli, Tamil Nadu,  
India

#### M Amutha

Biocontrol Laboratory  
(Entomology), Central  
Integrated Pest Management  
Centre, Directorate of Plant  
Protection Quarantine &  
Storage, Ministry of Agriculture  
and Farmers Welfare,  
Government of India,  
Tiruchirappalli, Tamil Nadu,  
India

#### N Sathyanarayana

IPM Division, Directorate of  
Plant Protection Quarantine &  
Storage, Ministry of Agriculture  
and Farmers Welfare,  
Government of India, N.H-VI,  
Faridabad, Uttar Pradesh, India

#### Corresponding Author:

#### M Ayyamperumal

Biocontrol Laboratory  
(Entomology), Central  
Integrated Pest Management  
Centre, Directorate of Plant  
Protection Quarantine &  
Storage, Ministry of Agriculture  
and Farmers Welfare,  
Government of India,  
Tiruchirappalli, Tamil Nadu,  
India

## New host report of a parasitoid *Anagyrus alami* Hayat (Hymenoptera: Encyrtidae) on *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) from India

M Ayyamperumal, S Ganasambandan, M Amutha and N Sathyanarayana

#### Abstract

New host report of a parasitoid *Anagyrus alami* Hayat (Hymenoptera: Encyrtidae) from cotton mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) in Tamil Nadu, India and also new distributional report of *A. alami* from Tamil Nadu.

**Keywords:** Cotton mealybug, Sternorrhyncha, Encyrtidae, Tamil Nadu, New record

#### Introduction

*Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Pseudococcidae), a mealybug of Nearctic and Neotropical origin and described originally from the USA (Tinsley) [16]. Worldwide, the *Phenacoccus solenopsis* (Tinsley) is a major threat to agriculture and horticulture in many tropical and subtropical countries which was found to attack large number of plant species including agricultural crops, vegetables, ornamental plants and weeds. It is a major invasive pest in India and Pakistan since 2005 causing severe damage and heavy reduction of yield in several agricultural and horticultural crops (Hodgson *et al.*; Hayat; Wang *et al.*; Vennila *et al.* and Nagrare *et al.* [5, 4, 18, 17, 9] reviewed the details on its diversity, abundance, geographical distribution, seasonal incidence, severity, host range and natural bioagents of *P. solenopsis*.

Biological control of mealybugs has been widely studied since the early twentieth century, due to the economic importance and invasive habits of this mealybugs (McKenzie, 1967). Encyrtids are the most important mealybug parasitoids and species belonging to the genera *Aenasius*, *Anagyrus*, *Leptomastix*, *Leptomastidea*, *Gyranusoidea*, *Coccidoxenoides* or *Acerophagus* are used worldwide in biological control (Moore; Manickavasagam and Ayyamperumal) [6, 8]. Poorani *et al.* [13] diagnosed and studied the biology of *Aenasius bambawalei* Hayat in a, *Phenacoccus solenopsis* in 2009.

*Anagyrus alami* belongs to encyrtid parasitoid described by Hayat [1], and it is a parasitoid of the genus *Nipaecoccus* sp. and *Pseudococcus* sp. of Pseudococcidae. This paper documents the new natural enemy of *P. solenopsis* from India was reported, and First report of *A. alami* from Tamil Nadu. Application of these studies will be helpful during proper implementation of biological control measures against this pest.

#### Materials and Methods

##### Survey of *Phenacoccus solenopsis* and its natural enemies

Regular field surveys were conducted by, Central Integrated Pest Management Centre (CIPMC), Tiruchirappalli in different districts of Tamil Nadu & Pondicherry, to record new insect-pests and their natural enemies on different Agricultural and horticultural crops.



**Fig 1:** Mealybug infected plant parts

### Collection of specimens

During the survey in the enroute of Tiruvarur District, Valangaiman Block, Uthamadhanapuram village. Field observations were taken for cotton mealybug infestation and its damage. All the plant parts were carefully observed and infected samples were collected for laboratory rearing of mealybug and its possible natural enemies emergence. The infested plant parts were cut with a sharp knife and placed in polythene bags sealed with rubber bands and labeled with date and locality of collection. The samples thus collected were brought to the Biocontrol laboratory (Entomology) at Central Integrated Pest Management Centre, Tiruchirapalli for natural enemies emergence from *P. solenopsis*. The emerged parasitoids from the mealybug samples were monitored regularly and were identified taxonomically.

### Specimens identification

The mealybug specimens were collected from infested leaves, twigs and fruits using a brush and placed into well labelled vials containing 70 per cent alcohol for identification. Natural enemies were also preserved in glass vials and mealybug were submitted to ICAR-National Bureau of Agricultural Insect Resources (NBAIR), Bengaluru for identification.

Parasitoid were identified using Noyas and Hayat; and Hayat, [3,12] identified specimens were deposited with Biocontrol Laboratory (Entomology), Central Integrated Pest Management Centre, Tiruchirapalli, Tamil Nadu (identification was reconfirmed by Dr. Mohammad Hayat from Aligarh Muslim University).

### Results and Discussion

The survey resulted in the three parasitoids from *P. solenopsis*, among three two are primary parasitoids and one secondary parasitoid. Survey result from the present study conformity of Tanwar *et al.*, [15]. The major primary parasitoid of *P. solenopsis* is a solitary endoparasitoid *A. bambawalei*, described in 2009 from India by Hayat [4]. This parasitoid has spread to all parts of central and peninsular India and the extent of parasitism by this parasitoid was reported to vary from 5 to 100% with mean parasitisation of 30% depending upon seasons and host plants in different parts of India (Nagrare *et al.*) [9]; *Anagyrus dactylopii* by Nalini and Manickavasagam [10]. Members of the genus *Anagyrus* are primary parasitoids of mealybugs, in general; *Coccophagus pseudococci* has been reported as a primary parasitoid of many species of mealybugs (Hayat) [2], but not from *P. solenopsis* so far; from the present study two primary parasitoids are reported *A. arizonensis* and *A. alami*, among

this the additional primary parasitoid *A. alami* from *P. solenopsis* reported first time in the present study.



**Fig 2:** *Anagyrus alami* Hayat

Vennila *et al.* [17] reported *Aprostocetus bangaloricus* Narendran (Eulophidae), *Encyrtus aurantii* (Geoffroy), *Anagyrus dactylopii*, *A. mirzai* Agarwal and Alam and *Homalotylus albiclavatus* (Agarwal) (Encyrtidae) as parasitoids recovered from *P. solenopsis* and *Maconellicoccus hirsutus* (Green) from Central India. Nagrare *et al.* [9] reported few other parasitoids as recovered from *P. solenopsis*, viz., *Metaphycus* sp., *Anagyrus dactylopii*, *A. mirzai*, *Homalotylus albiclavatus*, *Pachyneuron leucopiscida* Mani (Pteromalidae) and *Chartocerus kerrichi* (Agarwal) (Signiphoridae). Tanwar *et al.* [15] reported two parasitoids, *Aenasius arizonensis* (= *bambawalei*) Hayat and *Promuscidea un fasciati ventris* Girault, from North and Central India. However, present study only two primary parasitoids were reported viz., *A. arizonensis* and *A. alami*, among the two *A. alami* is new report of *P. solenopsis* from India.

In addition with primary parasitoids, hyperparasitoids also reported from the present study, *Promuscidea un fasciati ventris* are recorded as hyperparasitoid of *A. arizonensis* in the present paper. However, and Ram and Saini [14] reported that this is the dominant hyperparasitoid of *P. solenopsis*. *Prochiloneurus agarwali*, *P. aegyptiacus* and *P. pulchellus*, were recovered from *P. solenopsis* on weeds like *Solanum*, *Parthenium* and *Abutilon*, whereas *P. agarwali* was recorded only from *P. solenopsis* on cotton. From the present survey, it was noted that hyperparasitism is more common in cotton. Among the hyperparasitoids, *P. un fasciati ventris* was more abundant in cotton at present and also from earlier literature.

### New distributional record

**Specimen Examined:** 17.07.2019, India, Tamil Nadu, Thiruvarur, Valangaiman, five females and three males through host rearing from cotton ecosystem, Coll. M. Ayyamperumal

**Distribution India:** Andhra Pradesh and Maharashtra [11].

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