Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(6): 1454-1455
Received: 27-09-2018
Accepted: 29-10-2018

Dr. Sangeeta Rathore
Faculty of Science, Department of Zoology, Bhopal Nobles University, Udaipur, Rajasthan, India

Pratishtha Trivedi
Faculty of Science, Department of Zoology, Bhopal Nobles University, Udaipur, Rajasthan, India

Avinash D Patil
Faculty of Science, Department of Botany Bhopal Nobles University, Udaipur Rajasthan, India

Correspondence
Avinash D Patil
Faculty of Science, Department of Botany Bhopal Nobles' University, Udaipur Rajasthan, India

Collection, identification and mass multiplication of Mealybug, *Phenacoccus solenopsis*, under laboratory conditions

Dr. Sangeeta Rathore, Pratishtha Trivedi and Avinash D Patil

Abstract
An around 10-15 adult mealybugs were collected from the mealybug infected cotton plants located in the agricultural field of B. N. University Udaipur, Rajasthan. Collected mealybug species were brought to laboratory and mass multiplied at an initial level on the potted *Hibiscus rosa sinensis* under the laboratory conditions. The collected mealybug species were sent to NBAIR, Bangalore and the same was identified as *Phenacoccus solenopsis.* Mass multiplication of insect is being carried for further study in understanding the biology of insect.

Keywords: Mealybug, cotton, hibiscus and mass multiplication

Introduction
Mealybugs (Homoptera: Pseudococcidae) are the insects having cottony appearance, small oval and soft-bodied. Adult mealybugs are found on leaves, stems and roots and are covered with white mealy wax, which makes them difficult to eradicate. They form colonies on stems and leaves developing into dense, waxy, white masses and suck large amount of sap from leaves and stems with the help of piercing/sucking mouth parts, depriving plants of essential nutrients. The excess sap is excreted as honeydew which attracts ants and develops sooty mould inhibiting the plant's ability to manufacture food through photosynthesis.

Over a decade, the trend of increased build-up of various mealybug species in crop plants and in the wild is attributed to certain abiotic changes in climate and environment. During the last few years mealybugs, which were considered to be minor pests in many crops have acquired the status of major pests especially in cotton, vegetables and fruits (Tanwar RK *et al*., 2007) [1]. Mealybug species *Phenacoccus solenopsis* during the first decade of 21st century emerged as the most devastating pest of agricultural crops and ornamentals. These species are well spread over a wide range of tropical and subtropical countries. The success of mealybug as a devastating pest of cotton is attributed to wide range of morphological traits and ecological adaptability. The pest status of these species was first time reported from Texas, America which later on spread throughout the world. *Phenacoccus solenopsis* has been reported as key pest from over 35 localities around the globe pertaining to various ecological zones. Since its discovery as a pest at Texas during 1991, it has been reported from various countries as major pest of cotton crop. The cotton mealybug *P. solenopsis* Tinsley (Hemiptera: Pseudococcidae) reported as pest from Texas, Caribbean and Ecuador, Chile, Argentina, Brazil, Pakistan, India, Nigeria, Sri Lanka, China and Australia. Cotton mealybug infestations in the cotton fields of Pakistan during 2005 resulted in complete crop failure mainly unavailability of control measures as none of pesticide available at that time proved successful against the pest outbreak (Tanwar RK *et al*., 2008) [2].

P. solenopsis has been recorded as pest of 154 host-plant species out of which 20 field crops, 64 weeds, 45 ornamental plants and 25 shrubs and trees, belonging to a total of 53 plant families. Live adult females of *P. solenopsis* possess paired dark spots or stripes on dorsal sides, whereas the other species are uniformly white (Ghose SK., 1972) [3]. It is an exotic pest with a wide host range, a waxy protective coating on the dorsal side which counter potential mortality factors, having high reproductive rate, and ability of overwintering. The major signs of cotton mealybug infestations are wrinkled leaves and shoots, distorted and bushy branches, white powdery substance on leaves, shoots and stem, presence of honey dew, less number of bolls, unopened flowers, chlorosis, stunting, deformation and death of plants (Hall WJ., 1921) [4]. The chemical control of the *Phenacoccus solenopsis* through Sulfoxaflor, Buprofezin, Chlorpyrifos, Profenofos, Imidacloprid, Dimethaote, Thiamethoxam, Ethanol,

Isopropyl alcohol, Petroleum sprays and plant based insecticides has been extensively investigated and are effective but pose threats to the environment and farmer (Irulandi S, *et al*., 2001) [5]. For better management of *Phenacoccus solenopsis*, it is necessary to understand its life history, so as to target the pest at its weak stage of life span. Evaluation of new and safer economically feasible molecules and developing viable management strategy to combat the *Phenacoccus solenopsis* is the need of hour.

Materials and Methods

There were several severely mealybug infected cotton plants were found in the agricultural field of B. N. University Udaipur, Rajasthan. Mealybug species numbering 10-15 were carefully collected from the infected cotton plant using soft painting hair brush into a perforated plastic container, brought to laboratory and released on the *Hibiscus rosa sinensis* plant and mass multiplied at an initial level, under the laboratory conditions. Mealybugs were also multiplied on the cut branches of *Hibiscus rosa sinensis* and *Lantana camera* plant under cage system. For the identification of mealybugs species, mealybugs were preserved in 70% alcohol, in a vial and sent to NBAIR, Bangalore.

Result and Discussion

The collected mealybugs were identified as *Phenacoccus solenopsis*. Hibiscus and lantana live potted plants were used for the mass multiplication. Mealybug species rapidly multiplied on the hibiscus and lantana host plant within a short period of time (Fig. B and C). Mealybugs were also multiplied on the cut branches of hibiscus and *Lantana camera* plant under cage system (Fig. F). But, the rate of multiplication of mealybug was most faster rate on the live potted plants rather than on the cut branches of host plants under the cage system. When mealybugs were released near the base of the hibiscus and lantana stem (Fig. A), insects swiftly climbed the plant and established themselves on the young growing shoot tip, succulent branches, under surface of the leaves on the leaf vein and young flower buds (Fig. D) and remained settled at the same place for several days, immobile. Soon after, hundreds of small and immature stages of mealybugs were witnessed on the plant and were found feeding on the plant relentlessly and growing in the size (Fig. E). Rathod *et al*. (2008) [6] reported the aggressive and dynamic polyphagous nature of *Phenacoccus solenopsis* for their own multiplication and survival on number of host plants and weeds, including hibiscus and lantana plants. Several potted hibiscus and lantana plants in the current experiments were destroyed due to severe infestation of mealybug, while mass multiplication. On the similar line, Acharya *et al*. (2008) [7] also reported complete destroy of mealybug infected host plant and elaborated that the infected plant portion completely covered with the mealybug. The affected plants exhibited curling, twisting, become distorted and severely stunted.

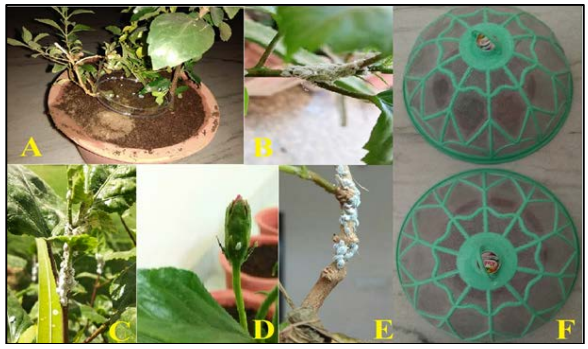

Fig: A. Realease of *Phenacoccus solenopsis*, B and C. Mealybug mass on growing succulent branch, D. Mealybug on unopened flower bud, E. *Phenacoccus solenopsis* mass multiplied on *Lantana camera* plant, F. Rearing and mass multiplication under cage system.

Conclusion

Phenacoccus solenopsis is turning to be one of the most devastating pests of several field and vegetable crops including cotton and okra plant, respectively. Severe infestation of this insect species is mainly attributed to its ecological adoptability. In the absence of main host it can survive on numerous plant species including weeds. Chemical pesticides are ecologically harmful in controlling the insect and thus there is a scope in understanding the biology for the further study in managing the insect in an economically and ecologically feasible way. Mealybug mass multiplication is pre-requisite for understanding the biology of insect for further studies.

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