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Consequences of mealybug, *Phenacoccus solenopsis* Tinsley infestation on hibiscus plants under laboratory conditions

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Abstract

As a part of research programme hibiscus plant were used as a host plant for the mass multiplication of Mealybug, *Phenacoccus solenopsis* under the laboratory conditions. Five adult female mealybugs were released at the base of the each potted hibiscus plant. These mealybugs over a period of 20-30 days have undergone mass multiplication to a number ranging from 500- 600/plant. All the aerial parts of the plants including, stem, leaves, flower buds and flowers were severely infested. Leaves of the mealybug infected hibiscus plants turned yellow and finally withered and fallen down. In a period of 25-35 days, plants totally lost all of its healthy leaves dried and finally dried. None of the dried plants rejuvenated again.

Keywords: Mealybug, cotton, hibiscus and mass multiplication

Introduction

Mealybugs (Homoptera: Pseudococcidae) are the soft-bodied insects. Adult mealybugs found infesting leaves, stems and roots and are covered with white mealy wax, making them difficult to eradicate. They form colonies on stems and leaves. These insects collectively suck large amount of sap from leaves and stems with the aid of piercing/sucking mouth parts, depriving plants of essential nutrients. *Phenacoccus solenopsis* Tinsley (cotton mealy bug) was first described from U.S.A. It became wide spread on several ornamental and fruit and vegetable crops. This report is of great importance, as the occurrence of this species was not previously reported in India and Pakistan (Arif *et al.*, 2009) ^[1]. Thus, *P. solenopsis*, might have been probably introduced into India. Mealybugs, which were earlier considered to be minor pests, have now acquired the status of major pests in many crops (Tanwar *et al.*, 2007) ^[2]. Female adults of *P. solenopsis* looks relatively large, covered with a fine, white waxy secretions. Devoid of waxy coat, the insect exhibits dark green to almost black body. *P. solenopsis* mostly exhibits parthenogenic mode of reproduction (Bhosle *et al.*, 2009) ^[3]. The female lays eggs in an egg sac of white wax, in clusters on the under surface of the leaves, twigs, branches, bark of the host plant. Each egg sac holds as many as 600 eggs and the majority being female, finally resulting in an explosive outbreak of insects (Dhawan *et al.*, 2009) ^[4]. Eggs are of small size, ranging from 0.3 to 0.4 mm in length. There are three nymphal instars found in female and four in males, which lasts for 22-25 days. The last instar of the male exhibited an inactive stage, having wing buds, within a cocoon of white powdery mealy wax (Tanwar *et al.*, 2007) ^[2]. On *Hibiscus rosasinensis* L., mealybug exhibited three nymphal stages in female which lasted for six, eight and ten days and the adult stages. The total number of days from egg to adult longevity was 37 days (Akintola and Ande, 2008) ^[5]. Sharma (2007) ^[6] reported the presence of *P. solenopsis* on okra plant from 15 days intervals after germination until the end of the cropping season.

Materials and Methods

As a part of research programme Hibiscus plants (*Hibiscus rosasinensis* L) was used as a host plant for the mass multiplication of mealybug, *Phenacoccus solenopsis* under the laboratory conditions. At an early stage before the release of mealybug, hibiscus plants were healthy and well grown in the pots, exhibiting green leaves all around and growing buds. Few twigs were also had flower buds and opened flower. Five adult female mealybugs were released at the base of the each potted hibiscus plant during early morning. Within a period of one hour, the mealybugs climbed over the potted hibiscus plant and occupied different positions, preferably on the young shoots and under surface of the leaves. The plants were regularly watered and allowed for the photosynthesis to take place regularly.

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Result and Discussion

After releasing, these mealybugs on hibiscus plants over a period of 20-30 days have undergone mass multiplication to a number ranging from 500 to 600/plant. All the aerial parts of the plants including leaves (Plate 1, A), stem (Plate 1, B), twigs, flower buds (Plate 1, C and E) and flowers were severely infested with the mealybugs. Honey dew secretions (Plate 1, B) was also visible on the leaves and twigs. Leaves

of the Mealybug infested hibiscus plant turned yellow and finally withered and fallen down. Growth of the mealybugs infested hibiscus plants was totally hindered. Premature fall of flower buds and flowers was noticed. Whole plants were covered with mealybugs consisting of adults and immature stages. In a period of 25 to 35 days, plants totally lost all of its healthy leaves and become dry (Plate 1, D). None of the dried plants rejuvenated again.

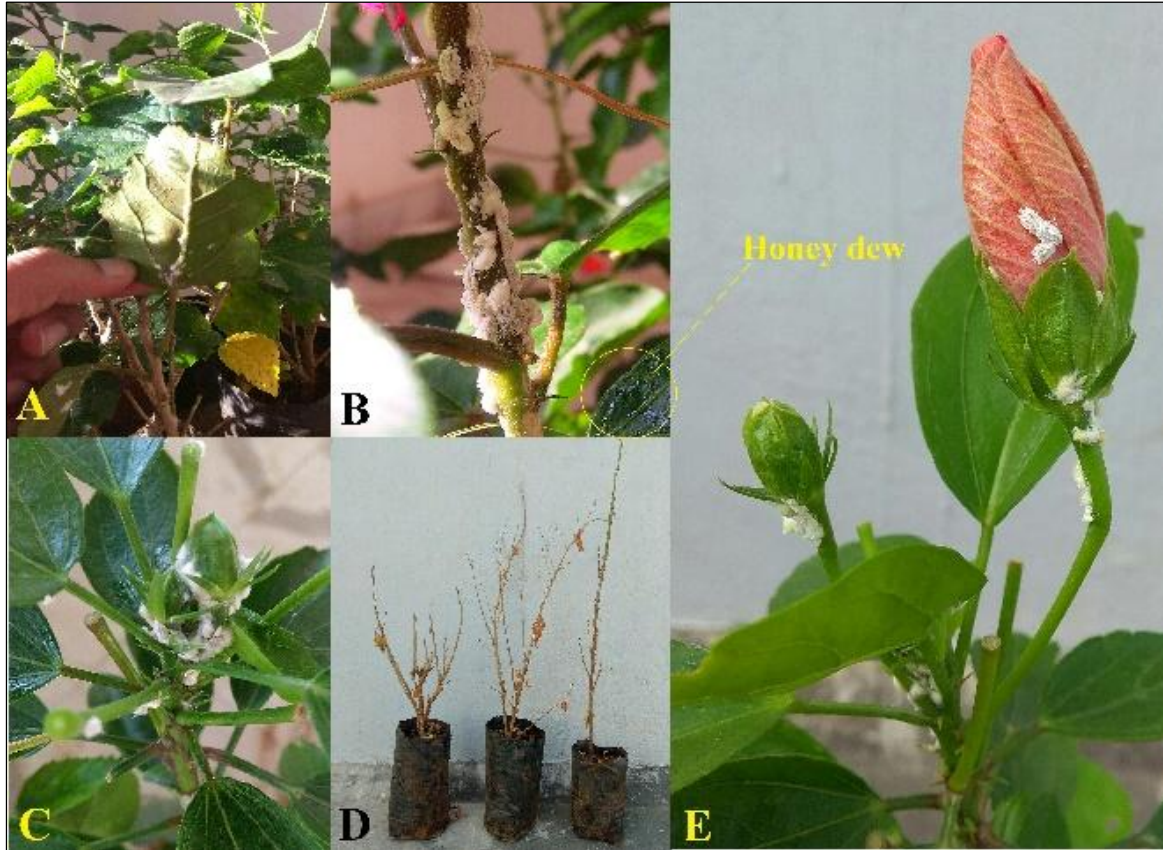


Plate 1: A. Mealybug leaf infestation B. Adult mealybug on stem and honey dew secretion (in circle) C. Unopened flower bud infestation and D. Plant dried due to mealybug infestation E. Partially opened flower bud with mealybug infestation

Conclusion

Phenacoccus solenopsis is turning to be one of the most devastating pests of several ornamental plants, field and vegetable crops. Severe infestation of this insect species is mainly attributed to high fecundity, broad host range and its ecological adoptability. In the absence of main host it can survive on numerous plant species including weeds. Chemical pesticides can be used to manage these insects on plants but are ecologically harmful. Botanical way of managing these insects using crude plant extracts in an eco-friendly manner is the need of hour. There is a scope in understanding the biology of the mealybug for the further study in managing the insect in an economically and ecologically feasible way. Mealybug mass multiplication and its biology study is the preliminary work in understanding the management aspects.

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