

Studying the effects of *Paracoccus marginatus* (Mealybug) attack on forming of *Tagetes spp.* (Indian Marigold) flower

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Introduction

Merigold (Asteraceae: *Tagetes spp.*) is native plant to America and Mexico which is introduced to Sri Lanka for ornamentation. Widely grows in home gardens throughout the country, cultivates for cut-flowers and use as insects repellent (Vennila *et al.*, 2011). The plant use to medicinal remedies and cultivates as a food crops in some other countries but not in Sri Lanka.

Managing Mealybug (Hemiptera: Pseudococcidae; *Paracoccus marginatus*) insects presents unique challenges. Mealybugs are polyphagous and multiply on different hosts. These have been recorded on many plant species including field crops, vegetables, ornamentals, weeds, bushes and trees in Sri Lanka. Important host plants include okra, holly hock, brinjal, potato, maize, sorghum, groundnut, pigeon pea, sunflower, beetroot, mulberry, *Amaranthus spp.*, Marigold and cucurbits (Anon, 2008). The severity of problem may be estimated from the fact that this insect produces as many as 15 generations per year. The nymphs and adults suck plant sap from tender shoots, leaves and even hard tissues including main stem and branches and cause damage (Anon, 2008) which cause direct plant injury by feeding on plant fluids or sap in the vascular tissues, primarily the phloem or mesophyll or both, with their piercing-sucking mouthparts. In addition, Mealybugs excrete a clear sticky liquid called honeydew which serves as a growing medium for black sooty mold fungi that is secreted on to the leaves which interferes with photosynthesis (Lysandrou *et al.*, 2012). As a result of Mealybug attack, plants become stunted and in severe cases may die. They may also inject a toxin. This may cause leaf yellowing, plant stunting, and wilting. Mealybugs are also capable of transmitting diseases, including viruses. Mealybugs tend to congregate in large numbers at leaf junctures where the petiole meets the stem, on leaf undersides, on stem tips, and under the leaf sheaths. Mealybug is origin in Central America (Williams and Granara, 1992) has its spread at the Caribbean and Ecuador, Chile, Argentina, Brazil, Pakista, India, Nigeria, China, Australia and Sri Lanka (Prishanthini and Laxmi, 2009). Such a vast and fast distribution of Mealybug across the globe largely during the past few years and its economic damage to several crops make it necessary to characterize the ecological factors associated with the pest. In this study, evaluate Mealybug attack on the damage of marigold flower forming.

Materials and Methods

Seeds of Indian Merigold were purchased from the Seed and Planting Material Division, Huggala botanical garden, Sri Lanka. In this study was conducted in green house at the Department of Agriculture Biology, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya, Sri Lanka. Four pot replicates were conducted on Merigold plants that was

infested with *Paracoccus marginatus*. Two pots were used as controls. Potting medium was taken 1:1:1 Sand, compost and topsoil and two Merigold plants were cared in each pot. At the flowering stage, two adults of *Paracoccus marginatus* were taken from infected Papaya plant (*Carica papaya*) and introduced to the every branch of Merigold plant. Data were collected from maturity stage of the flower (after blooming 3days). Data regarding Merigold flowers diameter reduction were subjected to analysis mean average value and compared with the control. Experiment was repeated 3 times.

Results and Discussion

Mean average flower diameter in control pots was 5.85 cm and average mean flower diameters of the infected plants were 3.5 cm. It showed significant reduction of flower formation which were attacked by mealy bug. Merigold flowers were used as insects repellent in biologically. In this study, 59.8% of flower were damaged by Mealy bugs' activities (Figure 1;d,e,f.). Same result was also showed in many ornamental plant species (Vennila *et al.*, 2011; Janet *et al.*, 2009). Merigold flowers infected by Mealy bug showed reduction of number of petals, decrease the bud size and further infected changed the colour to brown and died.



Figure 1: Different stages of Mealy bug infected flowers

(a, Mealybug infected flower; b, Indian Merigold Plant(control); c, Indian Merigold flower without infected Mealybug; d, Mealybug associated with ants; e and f, reduction of flower formation of infected flowers)

The present results of the ants association with mealybug (Figure1;d) were in close conformity with the report of earlier workers who reported the association of *S. geminate* with *Phenacoccus solenopsis* Tinsley association of *S. geminata* with homopterans (Gowda *et al.*, 2014). During the present study different ant species were found to transfer the mealybugs from one plant to another. This finding is in agreement with Genter (1925) who found that the ant, *Camponotus lineolata* (Say) transferring the grape mealybug, *Pseudococcus maritimus*. Saini *et al.* (2009)

also noticed that ants were responsible for quick colonization of *P. solenopsis* to new areas. Smith (1928) reported that ants collected during the surveys comprised *Tapinoma sessile* Say, *Pheidole* sp., and *Technomyrmex* sp. (Hymenoptera: Formicidae).

Conclusion

Mealybugs severely damage to Indian Marigold flower production. Researchers and farmers should have to use control measures to prevent Mealybug and ants entering to the plantation. Special attention should be paid when growing Marigold in the crop field as an insect repellent.

References

- Anon. 2008. Mealy Bug: a new threat to cotton production in Pakistan and India. The ICAC Recorder, International Cotton Advisory Committee, *Tech Inf. Sect.* Vol. XXVI(2):15-19.
- Genter, L. G., 1925. Some important grape insects. *Michigan Agric. Expt. Sta. Spec. Bull.*, 14: 19-23.
- Gowda, B. G., Chakravarthy, A. K., Jagadish, K. S. and. Kandakoor, S. B., 2014. Ecology and distribution of papaya mealybug, *Paracoccus marginatus* Williams and Granara De Willink (Hemiptera: Pseudococcidae) in South Karnataka, *Current Biotica*, 7(4): 266-274.
- Janet, J. K., Kinzer, K. and Smith, R., 2009. Houseplants; Proper Care and Management of Pest Problems, NDSU extension service, North Dakota State University and U.S. Department of Agriculture cooperating. Available online: www.ag.ndsu.edu.
- Lysandrou, M., Ahmad, M. and Longhurst C., 2012. Management of mealybug, phenacoccus solenopsis tinsley in cotton with a new sap feeding insecticide "SULFOXAFLO", *J. Agric. Res.*, 50(4) :494-496.
- Prishanthini, M. and Laxmi V.M., 2009. The Phenacoccus solenopsis. Department of Zoology, Eastern University, Sri Lanka. Available online: <http://www.dailynews.lk/2009/07/01/fea30.asp>.
- Saini, R. K., Palaran, S. S. and Rohilla, H. R., 2009. Mealybug, Phenacoccus solenopsis Tinsley and its survival in cotton ecosystem in Haryana. In: Proc. Nat. Symp. Bt Cotton: Opportunities and Prospects, Central Institute of Cotton Research, Nagpur, November 17-19: 150.
- Smith, M. R., 1928. The biology of *Tapinoma sessile* Say, an important house-infesting ant. *Ann. Entomol. Soc. Am.* XXI: 307-330.
- Vennila, S., Prasad, Y.G., Prabhakar M., Kumar, R., Nagrare V., Amuth, M., Dharajyothi, Agarwal M., Sreedevi, G., Venkateswarlu B., Kranthi, K.R. and Bambawale, O.M., 2011, Spatio-temporal Distribution of Host Plants of Cotton Mealybug, Phenacoccus solenopsis Tinsley in India, Technical Bulletin No. 26, National Centre for Integrated Pest Management, New Delhi: 50-62.
- Williams, D.J. and Granara de Willink, M.C., 1992. Mealybugs of Central and South America, CAB International: 635.