

THE BIOLOGY OF MANGO LEAF GALL MIDGE, *PROCONTARINIA MATTIENA* KIEFFER AND *CECCONI* (DIPTERA: *CECIDOMYIIDAE*)

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ABSTRACT: A new pest of mango leaf gall midge *Procontarinia mattiena* was found in 2008 at main mango growing areas of Sindh, Pakistan. The study of biology carried out in the laboratory and in the field. During biological study, 5 infested twigs of mango (15.0 cm) were observed visually from managed and un-managed garden of different varieties from 4 directions of each variety from top, middle and base of trees and were brought in the laboratory. The lower end of twigs were passed through the small holes of the lids of small jar of (15.0 cm) containing water and kept them in large cage (60×60×60cm) in laboratory at room temp: (25±2 °C), the infested twigs remained fresh till 15 days. At the same time the mango seedling (22.5cm) were placed in the same large cage for the adult midge emerged from infested twigs which attacked new fresh leaves of seedlings. Red spots on soft leaves of mango indicated the eggs, laid by female producing galls on leaves after some time. The symptoms of leaf gall midges were recorded throughout the year. The activity of midges was at peak in the month of March and decreased up to the November. The development from egg to adult completed within the galls without pupating in the soil. The total life cycle was completed in varied from 25.24±3.16-119.05±9.48 days from March to November. The managed gardens received minimum infestation of leaf gall midges as compared to un-managed gardens.

Keywords: Biology of leaf gall midge, *Procontarinia mattiena*, *Cecidomyiidae*: *Diptera* managed gardens

INTRODUCTION

Mango (*Mangifera indica* L.) a member of family Anacardiaceae [1] is known as king of fruits [2] for its sweetness, excellent flavor, delicious taste and high nutritive value. A number of insect pests are known to attack mango trees in the world, which have been studied in detail by [3, 4, 5, 6, 7, 8]. In Pakistan about 200 species of insect pests attacking mango, have been reported [9, 10, 11, 12, 13]. Among those the midges (Diptera: Cecidomyiidae) are one of the major insect pests attacking on mango trees in Pakistan. Midges are considered serious insect pests of mango in Sindh and results main constraint of low yield of mango in Pakistan. About 22 described and 10 UN described species of midges were reported by [14], some of them are serious pests of mango in India and Pakistan. [15] Mentioned that the mango gall midge (*Procontarina matteiana* Kieffer and Cecconi) (Diptera: Cecidomyiidae) a new threat to mango industry in south Kordofan. [16] found mango gall midges, *procontarinia mattiana* Kiffer & Cocconi and mango inflorescence midge *Erosomyia mangifera* Felt Dip: Cecidomyiidae) among the most important insect pests of mango trees in Hormozgan province in Iran. [17] reported the identification of new species, recently found in Okinawa, Japan. The leaf gall midge was identified as *Procontarinia mangicola* and was placed originally in the genus *Erosomyia*. [18] reported that the *Procontarinia matteiana* considered an important and serious pest of mango in Oman. [19] studied the biology and population fluctuation of *procontarinia mattiena* (Dip: Cecidomyiidea) in Hormonzgan province and reported that the life cycle of gall midge completed in 46.594±0.933 days. One of those species *procontarinia mattiena* has been introduced in Sindh until now no identification of midges has been reported in Sindh. However; [8] reported midges on mango in Sindh but did not mention their identification. The massive use of

pesticides on crops, particularly on vegetable and fruits are the most concerning in health conscious world. Pakistan exports fruits and vegetables therefore, may face serious threat due to extensive use of pesticides as per WTO regulations. The international standards of exportable fruits and vegetables have to be followed for pest and pesticides residue free export. Therefore, there is a need to identify midges and find the ways to create congenial conditions for their encouragement and develop right strategies which may lead to least disturbance in natural balance between pests and natural enemies and check pest resurgence of uprising minor pests. Thus, finding control measures other than pesticides is top research priority of the present proposal. This could be only possible when basic knowledge on biology of the midges are known.

MATERIALS AND METHODS

During biological study, 5 infested twigs of mango (15.0 cm) were observed visually from managed and un-managed garden of different varieties from 4 directions of each variety from top, middle and base of trees and were brought in the laboratory. The lower end of twigs were passed through the small holes of the lids of small jar of (15.0 cm) containing water and kept them in large cage (60×60×60cm) in laboratory at room temp: (25±2 °C), the infested twigs remained fresh till 15 days. At the same time the mango seedling (22.5cm) were placed in the same large cage for the adult midge emerged from infested twigs which attacked new fresh leaves of seedlings. After attack of midges on new seedlings leaves which were shifted in the field and covered with Muslin cloth. The observations were carried out on daily basis. As the leaves carrying galls matured, some of twigs again brought in the laboratory and kept in small jars containing water for recording the number of adult emergence. The total life cycle from egg to adult and number of males and females were also recorded.

RESULTS AND DISCUSSION

Biology of leaf gall midge (*Procontarinia matteiana*) Description

This pest *P. matteiana* was recorded from the surveyed areas of growing mango orchards of Sindh including

Table 1. Mean period (days) of life stages of leaf gall Midges of mango.

Month	Mean galls/leaf	Mean period (days) of life stages							Total life Period	Ratio
		Hatching	1st instar	2nd instar	3rd instar	4th instar	Pupa	Adult longevity		Female : Male
Mar	51	4.00±1.30	4.22 ±0.96	6.18 ±1.02	5.47 ±1.32	6.36 ±0.84	12.12 ±2.01	8.16±1.62	46.49 ±5.89	1:2.2
Jun	54	2.18±0.64	2.00 ±0.34	3.14 ±0.68	2.80 ±0.67	3.84 ±0.56	4.12 ±0.56	7.16±1.66	25.24 ±3.16	1:1.50
Sept	41	5.01±1.02	6.34 ±1.30	7.88 ±0.88	7.00 ±1.06	8.12 ±1.32	17.26 ±2.30	10.26±1.0	61.87 ±7.48	1:1.83
Nov	47	8.03±1.20	9.41 ±1.64	8.24 ±1.14	7.68 ±1.32	10.68 ±0.84	59.66 ±3.46	15.36±1.7	119.05 ±9.48	1:1.17

Hyderabad, Tando Allahyar and Mirpurkhas districts. The larvae of leaf gall midge were not emerged from the leaves for the pupation; but pupated within the leaf gall. The adult emerged from the gall after completing their life cycle. At the beginning of gall development, it seems light green and gradually became hard and concaved. The attacked leaves finally curled and dried. It forms solitary or grouped galls on both surfaces of the leaves. This species seems multivoltine. The symptoms of leaf gall midges were recorded through out the year. Its all stages were recorded from the March up to the November. The activities of midges were seen on peak in the month of March and decreases up to first week November, but remains in active from the second week of November underwent hibernation or breeding on other hosts. The red spot of tender leaves showed the symptoms of egg laid by the female on the leaves. The egg laid on tender leaves and lie embedded within the leaf tissue. The egg is an oval and watery yellowish in color were seen after some time within galls under microscope. The first and second instar larvae were found to dull yellow, 3rd instars seen yellow and 4th instar hard and clear yellow. Some time two larvae were seen inside the one spot of the leaf gall midge. The abdomen of male was brown and female seems to be light green (Figure 1).

During studied the following steps were observed such as egg hatching period, larval instar period, pupal period, (adult emergence period), total life cycle period and number of male and female. In leaf gall midges the hatching period varied 4.00 ±1.30- 8.03±1.20 days, the first instar persist for 2.00±0.34-9.41±1.64 83 days, second instar 3.14±0.68-8.24±1.14 days, third instar 2.80±0.67-7.68±1.32 days and fourth instar persists for 3.84±0.56-10.68±0.84 days. The pupa period were recorded as 4.12±0.56-59.66±3.46 days and adult longevity period were recorded as 7.16±1.66-15.36±1.65 days and results are illustrated in Table 1. The total life cycle completed in 25.24±3.16-119.05±9.48 days from March to November. The results are in agreement with [19]. Reported the biology of leaf gall midge *Procontarinia matteiana* and further stated that the life cycle completed in (46.594+±0.933) days, egg hatched in (2.46+±0.244) days, larva in (35.984+±0.63) days and pupa in (8.15+±0.623) days. Other research workers also reported of this pest for leaf gall

problem in mango, their finding are in agreement such as: [14, 18, 17].

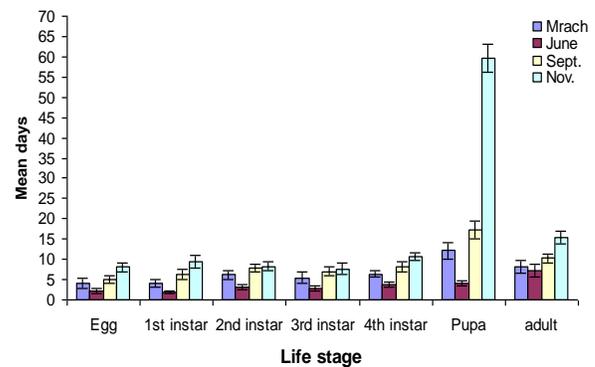


Figure 1. Biology of leaf gall midges during different months of 2008

CONCLUSION

In the light of this study as this pest was newly found in Sindh region. So that natural enemies against this pest may require developing but avoiding pesticide for its control. The parasitoid (*Closterocerus pulcherrimus*) has been found in this study for controlling this pest.

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