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New report of branch gall midge (*Procontarinia* Sp.) on mango in Karnataka

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Abstract

Mango is affected by various gall midge species on leaves, fruits, buds and inflorescence. Gall midge on the twigs and branches of mango was recorded for the first time in Karnataka. A survey was conducted to know the incidence, severity and varietal preference of the branch gall midge in major mango regions viz., Dharwad and Belgaum. Incidence and severity of this pest ranged from 12.34 to 97.22 and 4.2 to 25.19%, respectively. The Alphonso variety recorded the highest incidence and it was lowest in Mallika variety among the mango varieties screened during survey. Feeding by the midge induces gall like structures on the branches and will also affect translocation system of the affected part which ultimately results into drying of the affected branches from tips and will not produce inflorescence. The emerged adults from the gall was sent for identification and identified as *Procontarinia* sp. Looking to the nature of damage and parts get affected on mango tree, the pest is considered as a potential threat to mango cultivation and needs immediate attention.

Keywords: Mango, branch gall midge, Karnataka

Introduction

Mango (*Mangifera indica* L.), the king of fruit crops, cultivated in an area of 2.24 million hectare accounting about 35% of total area under fruit cultivation in India. Mango is attacked by as much as 260 insect and mite pests in Indian subcontinent, of which nearly 30 pests are serious and capable of causing losses to crop growth and yield [3]. Karnataka is one among the major mango grower with an estimated area of about 1.8 million hectare encompassing important districts such as Kolar, Dharwad, Chikkaballapura, Belgaum and Ramanagara.

The insect pests such as leafhopper, fruit flies, stem borer, mealy bug and gall midge on leaves were the major in the state. Among gall causing insects, psyllid galls or bud galls (*Apsylla cistellata* Bucton.) are affecting mango cultivation in many countries and may cause loss even up to 50% in some parts of the world [1]. However, in the recent days branches of the mango trees in Karnataka were invaded by an insect pests causing gall like out growth on them. Looking to the notorious nature of the pest and probable yield loss a study was conducted to know the incidence, severity and varietal preference by the newly noticed branch gall midge on mango.

Materials and Methods

The present study was conducted at Department of Agricultural Entomology, University of Agricultural sciences, Dharwad. A random survey was conducted in Dharwad, Belgaum and Srinivaspura to know the incidence and severity of the pest. Eight orchards from each region were randomly selected and observed for the pest incidence.

Ten plants were selected randomly in each orchard and visual observation for the damage was recorded. Total number of main shoots, branches and number of affected shoots, branches were counted. Based on the count and by following a formula% incidence was calculated. To know the varietal preference; incidence and severity was recorded in different varieties present in the orchards. The number of branches infested, dried were calculated. The influence of plant age was also observed to check the incidence pattern. % severity was calculated using the formula.

$$\% \text{ Incidence} = \frac{\text{Number of branches infested}}{\text{Mean number of branches observed}} \times 100$$

$$\% \text{ Severity} = \frac{\text{No. of branches dried}}{\text{Total no. of branches infested}} \times 100$$

The infested branches were collected and kept in laboratory for the adult emergence at 25^o C temperature and 70% relative humidity. The emerged adults were collected, preserved in 75% ethyl alcohol and sent for the taxonomic identification.

Results

A roving survey was conducted in several villages in Belgaum and Dharwad districts covering fifteen villages. The incidence and severity was ranged from 12.34 to 97.22 and 4.2 to 25.19% (Table 1). Belgaum (97.22%) district has recorded highest infestation. Among the villages orchards at Kittur (97.22), Garag (83.16%), Mummigatti (69.11%) and Malligawad (66.32%) has recorded highest infestation. However incidence was also observed in other villages of Dharwad and Chickaballapur districts. This indicates that the pest is spreading very fast in the mango orchards.

Study revealed that the infestation level is influenced by cropping pattern, spacing and regular cultural operations of the orchards. The orchards with wider spacing, regular training pruning and with good hygiene has recorded less infestation. However, soil type and topography has no bearing on the incidence of the pest.

The pest infest the young shoots of pencil/ more thickness in a numerous number and based on severity the infested shoot's will dry from tip. The immature stages of the pest *i.e* maggots feeds on the inside tissues of the young shoots and causes a gall like structure externally (Plate 1). The presence of gall like structure on the shoots indicates their damage inside. Further, as the severity increases the blockage of translocation system and leading to the death of the shoots. Further drying of productive shoots (inflorescence producing) from the tip directly bearing on the yield of the affected tree.

The pest incidence level was recorded on different varieties (Alphonso, Mallika, Mankoor, Pairi and Kesar) during the survey. Among all the varieties, the incidence and severity

was highest on Alphonso (97.22%) and which was followed by Mankoor (47.24%), Kesar (39.58%), Pairi (33.33%) and was least on Mallika (18.11%) among the observed varieties during the survey. Further study indicates that the pest was sever on Alphonso (25.19%), followed by Kesar (14.04%), Mankoor (12.77%), Mallika (8.7%) and Pairi (8.57%). Due to higher incidence and severity of the infestation. The other varieties except Alphonso had good inflorescence and fruit set (Plate 2).

The emerged adults were sent for identification and it was identified as *Procontarinia* sp.

Discussion

Among the several gall midge species affecting the mango, a few species can cause considerable yield loss. Sixteen species of gall midges (Diptera: Cecidomyiidae) are known to attack mango in Asia. Two genera, *Procontarinia* Kieffer and *Erosomyia* Felt, are particularly associated with mango. The maggots were creamish in colour, adults emerged were having the slight yellow abdomen, females has got stout and males had slender abdomen and long legs which are similar to the morphological characters. In India *Oligotrophus mangiferae* Keiffer was reported on the branches of mango and was univoltine (Samui and Jha ^[4]). Based on the study it can inferred that the new genera of midge *Procontarinia* is occurring on the mango.

The incidence and severity of the gall midge was higher in the Alphonso variety (Fig 1). Samui and Jha ^[4] 2012 and Kalleshwara Swamy *et al.* ^[2] 2016 also revealed that the Alphonso variety is more prone to attacked by the midge as compared to any other varieties. The variety alphonso has been grown in majority of the orchards and occupies more area. The very poor maintenance of the orchard without providing proper nutrients may also be a reason for the incidence of the pest. Pruning of the drying shoots should be followed as the regular practice in order to reduce the population in the orchards. Samui and Jha ^[4] 2012 reported the significantly lower number of galls when, shoots were pruned at 30 cm length and higher galls on the unpruned shoots.

Table 1: Incidence and severity of gall midge on the different varieties

Incidence of the gall midge					
Places	Mean no. branches/ ten plants	No. of branches infested/ten plants	Average no. of dried branches	Percent infestation	Percent severity
Kittur	396	385	97	97.22	25.19
Malligawad	484	321	76	66.32	23.68
Kelageri	478	304	62	63.6	20.39
Mugad	561	299	37	53.3	12.37
Kyarekoppa	383	199	28	51.96	14.07
Kanavihonnapura-1	407	270	42	66.34	15.56
Kanavihonnapura-2	401	272	66	67.83	24.26
Mummigatti	203	120	22	69.11	18.33
Belur	193	116	25	60.1	21.55
Kotur	467	246	32	52.68	13.01
Garag-1	766	637	30	83.16	4.71
Garag-2	496	381	16	77.76	4.20
Narendra-1	338	227	19	67.16	8.37
Narendra-2	235	45	5	12.34	11.11
MARS orchard	158	56	3	60.76	5.36



Plate 1: A & B damage symptoms caused by the gall midge. C. Maggot inside the gall



Plate 2: A. Mallika, B. Pairi varieties with good inflorescence and fruit set

Conclusion

The gall midge infestation is added to the already existing long list of insect pest problems in mango. The damage due to midge is bidirectional, as it cause the arrest of growth of the young flush and loss of yield in the affected braches. Hence, the detailed study of the pest is crucial to develop a concrete management strategies to contend the pest.

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