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Harmful Scale Insects (Coccidae: Hemiptera) of Mango and Their Control

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ABSTRACT

Scale insects (Coccidae: Hemiptera) are very destructive pests of mango and many other horticultural crops. They suck the cell sap from leaves, twigs and fruits and affect the yield seriously. They also cause sooty moulds, affect photosynthesis, growth and the crop yield. Hence, in the survey studies (2012-2014) 19 species of scales have been reported damaging mango varieties including Hapus, hybrids and indigenous. Hapus and hybrid varieties were attacked mostly by the scales and indigenous varieties were more resistant to the scales than others. The scales completed their life cycle from 1 to 2 months. On hapus varieties 56% fruits were affected. As a part of ecofriendly control, natural enemies such as ants, mantids, lace wings, lady bird beetles and some parasitoids have been reported on scales. However, the scales can be controlled effectively by spraying the crop with 0.03% phosphamidon/Azadiractin or 0.04% diazinon/ monocrotophos or 0.03% Rogor or 0.2% Carbaryl/ 0.03 DDVP.

KEYWORDS : Scale insects, mango varieties, damage, control.

INTRODUCTION

Mango Mangifera indica Linnaeus, a king of fruits is widely cultivated in India. About 7.50,000 hectares of land is under the cultivation of mango. The prominent states refer to Uttar Pradesh, Andhra Pradesh, Bihar, Maharashtra, West Bengal and Kerala. Out of above states, Maharashtra is leading in mango cultivation. Mango is cultivated in coastal, Ratnagiri region and also from plain regions. Hapus, hybrids and indigenous varieties have economic importance in horticulture business. According to Nayar et al (1976) more than 176 insect species are associated with mango. Weevils, fruits flies, jassids, webworms, mealy bugs and scale insects are very destructive pests of mango. Out of above pests scales damage, leaves, flowering and fruiting bodies. However, fruits are badly damaged by scales affecting marketability of the fruits. Keeping in view all above facts, the present work was carried out from Kolhapur region of Maharashtra. Review of literature indicates that in past, Ayyar (1924), Mishra (1924), Tayler (1935), Rehman & Ansari (1941), Ansari (1942) Fotidar and Kapur (1941),Singh (1960),Ali (1961,1964), Butani (1974), Sathe (1998, 2010),etc worked on scale insects.

MATERIALS AND METHODS

Survey of scale insects was made during the years 2012-2014 by visiting various mango orchards and other host plants in western Maharashtra, India by one week interval by one man one hour search method. Small twigs (1ft long), leaves and fruits were collected along with scale insects and diversity of scales was studied by consulting literature cited in the references. For damage detection spot observations were made in the fields. Similarly, life cycles have also studied by spot observation method. Egg deposition, incubation, nymphal period and adult emergence were the components of life studies. Natural enemies have been recorded on scales by spot observations, predating and parasitizing preys and hosts respectively. For chemical control 0.03% phosphamidon/ Azadirachtin/ DDVP or 0.04% diazinon/ monocrotophos or 0.2% Carbaryl or 0.03% Rogor sprays have been used as the need.

RESULTS

Results recorded in table -1 and fig 1 & 2 indicated that 19 species of scale insects were found damaging mango crop. The most abundant and more destructive scale was A. destructor. It was active during summer and affected the fruit setting adversely. The fruit of ripening stage were found seriously affected with disfiguring, forming whitish, brownish circular spots and marking the fruits insipid. Other scales were occasionally caused damage to mango. Their nature of damage and special features of life cycle are given in table- 1. A. destructor was oval and 2 mm long. The nymphs were yellowish-brown and found settled on under surface of leaves and tender shoots and flowering and fruiting bodies. Female scales were pale brown which reproduced oviparously. Most of the scales have completed their life cycles within 1 to 2 months. Both nymphs and female adults were found sucking the cell sap of leaves, stems, flowering and fruiting bodies. They created sooty moulds which affected the photosynthesis, growth and yield of the crops. Scales were mostly associated with Hapus and hybrid varieties of mango.56% of fruits of Hapus varieties were affected in western Maharashtra if crop was not treated with any insecticides suggested in the text. Indigenous varieties of mango were more resistant to scales and their infestation was mostly found to tender leaves. Ladybird beetles, mantids, lace wings, ants and some parasitoids (Table-1) were found as effective biocontrol agents of scale insects in mango ecosystems of Kolhapur, western Maharashtra. Almost all species of scales effectively controlled by spraying the crop with 0.03% phosphamidon/ Azadiractin or 0.04% diazinon/ monocrotophos or 0.2% carbaryl or 0.03% Rogor.

DISCUSSION:

According to Bhutani (1974) a number of scale insects cause damage to mango by sucking cell sap, affecting photosynthesis and yield of the crops. A. destructor was comparatively more harmful than other scales. This species is widely distributed in India in mango cultivating area and is major threat towards Hapus ripening fruits. Outside India, it has been reported from China, Srilanka, Mexico, West Indies, Africa, Mauritius, etc. In India, it was found throughout the plains and foot of the hills (Butani, 1974).According to Rahman & Ansari (1941) it was a major pest of citrus and mango. They also recorded this species on Papaya, Jamun, guava and banana. Fotidar and Kapur (1941) recorded A. destructor as a serious pest of mango seedling in nurseries and preferred grafted varieties of mango. According to Ansari (1942) A. destructor was active in summer and responsible for affecting fruit setting of the crop adversely. According to Wright and Diez (2005) Aspidiotus destructor Signoret (coconut scale) occurred on bananas in Hawaii, infesting leaves and fruits. Seasonal population fluctuations were noted on two banana varieties. There were distinct seasonal variations in A. destructor numbers on banana in Hawaii and varietal differences in population densities and proportions of plants infested, with cv. Cavendish incurred highest A. Destructor populations. A preliminary sequential sampling plan based on a nominal threshold was provided by Wright & Dies (2005).

Sathe (1988) studied biology, damage and control of scale insects of mulberry from Kolhapur region. On mulberry he reported Saissetia nigra, Aonidiella quaranti and Pulvinaria maxima. For control of these species. Sathe (1998) reported Coccinellid beetles (Chilocorus sp. and

Scymnus sp.) and a parasitoid Aphellinus sp. As a part of chemical control,he suggested 0.03% DDVP spray since residues of DDVP on mulberry leaves degraded shortly and leaves became safer for the silkworms. Therefore, it is advised to use DDVP 0.03% for control of scale insect in mango ecosystem. However, the use of pesticides be avoided on fruiting bodies and minimized on leaves of mango and more emphasis should be given on natural or biological pest control. The natural enemies reported in the present work will be base line data and useful to designing biological pest control programs for mango pests in future.

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Table-1: Diversity, damage, host plants and control of scale insects on mango

Sr. no.	Species	Other host plants	Damage and cycle	Control	Natural control agents
1.	Aonidiella citrina (Coqui.)	Citrus, Custard apple, mulberry	Oval,flat,suck cell sap from leaves. Life cycle completed in about one month	Spray- Phosphamidon 0.03% Or 0.04% Diazinon	Chilocorus sp.
2.	Aspidoitus destructor Signoret	Banana,Ber, Citrus,Papaya, Custard apple,Guava, Grapevine, Tamarind	Whitish to Grey, 20mm long, suck cell sap from leaves, flowering and fruiting bodies. Life cycle completed in about one month.	Spray- 0.02% Phosphamidon/ 0.04% Diazinon/ Monocrotophos/ 0.03%Azadirachtin	Chilocorus sp. Comperiella sp. Aspidiotiphagus sp.
3.	Aulacaspis rosae (Bouche)	Mango,Rose	Oval,flat,suck cell sap from leaves. Life cycle completed in about 40 days	Spray- 0.04% Diazinon	Ants
4.	Aulacaspis tubercularis (Newstead)	Mango	Oval, flat, suck cell sap from leaves. Life cycle completed in about 40 days	Spray- 0.03% Phosphamidon	Ants
5.	Coccus viridis (Green)	Mango,Guava, Citrus	Suck cell sap, 2.5 mm long, Yellow green to brown, life cycle completed in 40-50 days	Spray- 0.03% Phosphamidon	Ants
6.	Crysomphalus ficus (Ashmead)	Mango, Ber, Banana, Citrus,Mulberry.	2.5 mm long, Yellow green to brown, Suck cell sap, life cycle completed in 45-48 days	Spray- 0.04% diazinon/ Monocrotophos	Oecophylla sp. Caponotus sp.
7.	Crysomphalus dictyospermi (Morgan)	Mango, Citrus, Custard apple.	Suck cell sap from leaves and fruits. Life cycle completed in 40-47 days	Spray- 0.04% Diazinon/ Monocrotophos	Empusa (fungi), Lacewings, Ants, Mantids
8.	Chionaesois vitis Green	Mango,Grape vine	Suck cell sap from leaves, stem and fruits.	Spray- 0.04% Diazinon/ Monocrotophos	Lady bird beetle
9.	Insulaspis gloverii (Packard)	Mango,Guava, Citrus	Suck cell sap from leaves, stem and fruits.Life cycle completed in about 1 month	Spray- 0.03% Dimethonate (leafy stage)/ 0.03% Phosphamidon	Ants, Mantids
10.	Insulspis pallidula (Williams)	Mango,Guava, Citrus	Suck cell sap from leaves, stem and fruits. Life cycle completed in about 1 month	Spray- 0.03% Dimethonate (leafy stage)/ 0.03% Phosphamidon	Ants, Mantids
11.	Pulvinaria psidi Maskel	Mango	Suck cell sap from leaves, stem and fruits. Life cycle completed in about 1 month	Spray- 0.03% Dimethonate (leafy stage)/ 0.03% Phosphamidon	Ants, lacewings
12.	Lindingaspis floridana Ferris	Mango	Suck cell sap from leaves and stem	Spray- 0.04% Diazinon/ Monocrotophos	lacewings
13.	Lindingaspis greeni (B. & K.)	Mango, Guava	Suck cell sap from leaves, stem	Spray- 0.04% Diazinon/ Monocrotophos	Mantids
14.	Lindingaspis rossi (Maskell)	Mango, Citrus, Custard apple, Guava	Suck cell sap from leaves, stem	Spray- 0.04% Diazinon/ Monocrotophos	Mantids
15.	Parlatoria cinerea Hadden	Mango, Jamun, Citrus	Suck cell sap from leaves, stem. Life cycle completed in 40-50 days.	Spray- 0.2% Carbaryl/ 0.04% Rogor/ Azadirachtin	Ants
16.	Parlatoria pergandii Comstock	Mango, Citrus, Guava	Suck cell sap from leaves, stem. Life cycle completed in 40-50 days.	Spray- 0.2% Carbaryl/ 0.04% Rogor/ Azadirachtin	Ants
17.	Parlatoria crypta (Mcken.)	Mango, Custard apple	Suck cell sap from leaves and fruits	Spray- 0.2% Carbaryl/ 0.04% Rogor/ Azadiractin	Mantids
18.	Pinnaspis aspidistrae (Signoret)	Mango, Guava, Papaya	Suck cell sap from leaves and fruits	Spray- 0.04% Diazinon/ Monocrotophos	Ants
19.	Radionaspis indica (Marlatt)	Mango, Papaya, Custard apple	Suck cell sap from leaves and fruits. Life cycle completed in 30-35 days.	Spray- 0.03% Phosphamidon	Lacewings



Fig 1: Aspidoitus destructor on mango fruit.



Fig 2: Mango fruits infested with Aspidoitus destructor

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