POPULATION DENSITY OF FRUIT PIERCING MOTHS OF GENUS OTHREIS AND EXTENT OF DAMAGE IN THE ORANGE ORCHARDS OF VIDARBHA REGION OF MAHARASHTRA

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Abstract:

Population density of fruit piercing moths of genus Othreis (Eudocima) and extent of damage to orange fruits due to fruit piercing moths was studied during the first harvest season (Ambia bahar) from August to November1985 and 1986 in the citrus orchards at various places of Vidarbha region of Maharashtra, India. The rate of fruit dropping differs from orchards to orchards and from place to place. The maximum fruit dropping was recorded during September and October. Percent fruit dropping was ranged from 9.37% to 12.58% with an average 10.58 ± 0.87% . The three most dominant species collected from the citrus orchards were Othreis materna (Linnaeus), Othreis fullonia (Clerck) and Othreis homaena (Hübner). Moth population levels peaked in the month of September and October. Among the collected species Othreis materna was found to be 81.91% of the total population density of moths. The other two species of fruit piercing moths Othreis fullonia and Othreis homaena were found to be 12.58% and 5.80%, respectively.

Keywords:

Key words: Extent of Damage, Fruit Piercing Moths, Genus Othreis, Population Density

Introduction:

The fruit piercing moths of Genus Othreis (Eudocima) have attained great importance amongst Noctuidae because of their notorious habits. They are serious pests of fruit crops throughout tropical and subtropical belt from Africa to Southeast Asia and Australia to the Pacific Islands (Bänziger, 1982; Waterhouse and Norris, 1987). According to Baptist (1944) the citrus fruit sucking moths of Othreis species are by far the most notorious, harmful and

widespread. The activity of Othreis species was recorded from second fortnight of July to January (Ramkumar et al. 2010). The extensive damage to orange crop is mostly observed during September to November. Adult fruit piercing moths can pierce ripening fruit, penetrate the skin and pulp of fruit with their modified mouthparts (proboscis) to withdraw juice, and can cause crop losses of more than 50% (Leong and Kueh, 2011). Microorganisms introduced by feeding moths cause rotting and premature fruit dropping (Sands et al. 1993). Recorded crop damage caused by fruit piercing moths in citrus orchards can vary from 10-15% in Fiji (Kumar and Lal, 1983), 10-55% in India (Dadmal and Pawar, 2001), 17-39% in Malaysia (Leong and kueh, 2011) and upto 95% in New Caledonia (Waterhouse and Norris, 1987). Four species of Othreis viz., Othreis fullonia (Clerck), Othreis materna (L.), Othreis homaena (Hubner) and Othreis cajeta (Cramer) have been reported in India as prominent fruit piercer and they are considered as very serious pest on citrus as well as other fruits (Ayyar, 1944; Sundra Babu and David, 1973; Nair, 1975, Bhumannavar and Viraktamath, 2012). Swamiappan (2001) reported less frequently occurring fruit piercing moth viz. Othreis salamina (Fab.) and Rhytia hypermnestra (stoll). Ramkumar et al. (2010) recorded five species of primary fruit piercers in Tamil Nadu, among these Othreis materna was predominant piercer followed by Othreis fullonia and Othreis homaena. Leong and Kueh (2011) recorded three species of Eudocima (= Othreis) in Sarawak, Malaysia. Eudocima phalonia (= Othreis fullonia) moths were found actively feeding on citrus fruits. The objectives of present investigation were to study the population density and damage caused by fruit piercing moths in Vidarbha region, which is important citrus cultivating area of Maharashtra, India.

Material and Method:

Studies were consisted of damage caused by fruit piercing moths to the orange crops and population density of primary fruit piercing moths of genus Othreis. Weekly survey was carried out in four various orange orchards at six different

places of orange cultivating area of Nagpur and Amravati districts of Vidarbha region of Maharashtra during the months of August to December, 1985 and 1986. Assessment of damage to orange crops: An assessment of fruit piercing moths damaged fruits was carried out for fruiting season called Ambia Bahar (August-November). The feeding puncture site on the citrus fruits surface became discoloured and resulted in the fruit dropping prematurely. On the basis of approximate number of fruits present in the orchard and punctured fruits drop daily, the percent fruit dropping by fruit piercing moths in various orchards at different places was calculated. Assessment of population density of fruit piercing moths: The population density of fruit piercing moths was monitored weekly by collecting the adult moths from August to December in citrus orchards of various places. The fruit piercing moths were collected three hours after sunset till the midnight with the help of hand nets. The total collected moths were counted and their species wise percent population was determined. The mean number of caught moths was expressed on a monthly basis.

Result and Discussion:

Extent of citrus fruit damage: The rate of dropping of the orange fruits differs from orchard to orchard and place to place. The percentage of fruit dropping at various places of Vidarbha region ranges from 9.37% to 12.58% with an average of 10.58 ± 0.87% (Figure 1) and the maximum fruit dropping was recorded during the September and October (Figure 2). An adult pierces ripening fruit with its proboscis to extract juice leaving puncture which causes premature ripening, fruit drop and rot (Leong and Kueh, 2011). Fungal and bacterial infection at the site of puncture is very common (Yadava, 1969 and Atwal, 1976). The puncture becomes brownish, the area surrounding the puncture becomes pale and later on the fruit turn yellow. Such fruits fall down within a short period of about a week (Pruthi, 1969; Yadava, 1969 and Atwal, 1976). Yadava (1969) reported that the green fruits are also not spared from

attack. Damage caused by fruit piercing moths in citrus orchards can vary over years, rising and falling from very low (< 5%) to very high levels (> 90%) (Leong and Kueh, 2011). Sontakakey (1944) recorded 30 to 40% damage, while Dadmal and Pawar (2001) observed 10 to 55% damage to orange crop in India. These moths were serious pests of orange in Vanua Levu and Fiji where 10 to 15% of ripe fruits were lost every year (Kumar and Lal, 1982). Leong and Kueh (2011) recorded 16.8 to 39.2% damage to citrus fruits in Sarawak. Figure 1: Percent fruit dropping caused by the fruit piercing moths in the orange orchards of Vidarbha region. Figure 2: Month wise damage caused by the fruit piercing moths in orange orchards of Vidarbha region. Population density of fruit piercing moths of Othreis species: It has been reported that fruit piercing moths can be collected by light trap and are attracted towards light (Baptista, 1944; Bindra, 1969 and Pruthi, 1969). In the present study on the contrary found that fruit piercing moths of genus Othreis are photonegative and cannot be collected by light trap. The attack of moth was much in orchards having indisposed fallen and decaying fruits, weeds and wild creepers belonging to family Menispermaceae around the orchards. During the months of September, they were in large number in the orange orchards and during the month of November, the population of fruit piercing moths of genus Othreis dropped down (Figure 3). Pruthi (1969) and Yadava (1969) reported that Othreis materna and Othreis fullonia are active from July to October. Bänziger (1982) also reported that in Thailand the population of fruit piercing moths increases in the months of June to October, decreasing markedly only thereafter. Bhumannavar (2000) observed higher moth activity during October at Raichur and Dharwad districts of Karnatka. Leong and Kueh (2011) have detected fruit piercing moths throughout the year in Sarawak. They have also reported that fruit piercing moth"s activity was lowest during the wet months (September to February) while highest during the dry months (May to June). Three major Othreis species recorded in the citrus orchards of Vidarbha region were Othreis materna, Othreis fullonia and Othreis homaena. Among these species Othreis

materna was recorded to be in highest density constituting 81.91% of the total population density of the moths. The other two species of fruit piercing moths Othreis fullonia and Othreis homaena occurred comparatively in thin density i.e. about 12.58% and 5.80% of the total population density, respectively (Figure 4). It was observed that some orchards were mostly infested by Othreis materna. These findings are in agreement with Baptista (1944), he reported that Othreis materna in their numerical strength outnumber all other species of genus and occupy a position far more conspicuous and important than other species. Figure 3: Population density of primary fruit piercing moths of genus Othreis in Vidarbha region. Figure 4: Diversity of primary fruit piercing moths of genus Othreis in Vidarbha region of Maharashtra.

Conclusion:

The percentage of fruit dropping at various places of Vidarbha region ranges from 9.37% to 12.58% with an average of 10.58 ± 0.87% and the maximum fruit dropping was recorded during the September and October. Three major Othreis species recorded in the citrus orchards of Vidarbha region were Othreis materna, Othreis fullonia and Othreis homaena. Among these species Othreis materna was recorded to be in highest density constituting 81.91% of the total population density of the moths. The other two species of fruit piercing moths Othreis fullonia and Othreis homaena occurred comparatively in thin density i.e. about 12.58% and 5.80% of the total population density, respectively.

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Figure 1: Percent fruit dropping caused by the fruit piercing moths in the orange orchards of Vidarbha region.

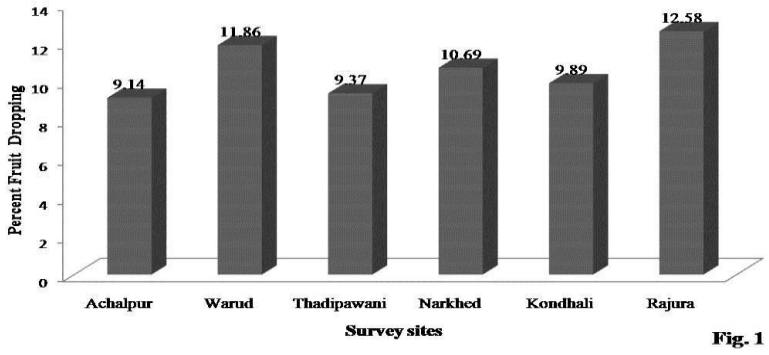

Figure 1: Percent fruit dropping caused by the fruit piercing moths in the orange orchards of Vidarbha region.

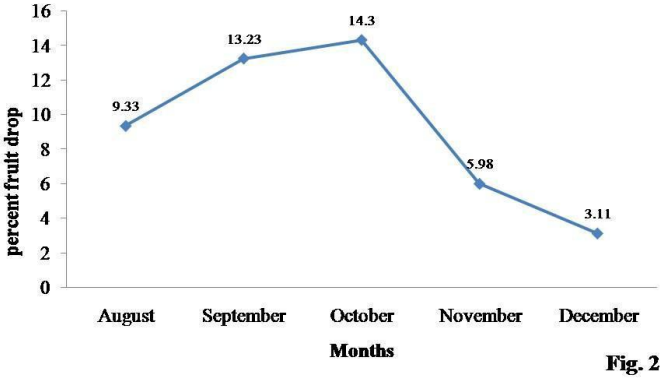

Figure 2: Month wise damage caused by the fruit piercing moths in orange orchards of Vidarbha region

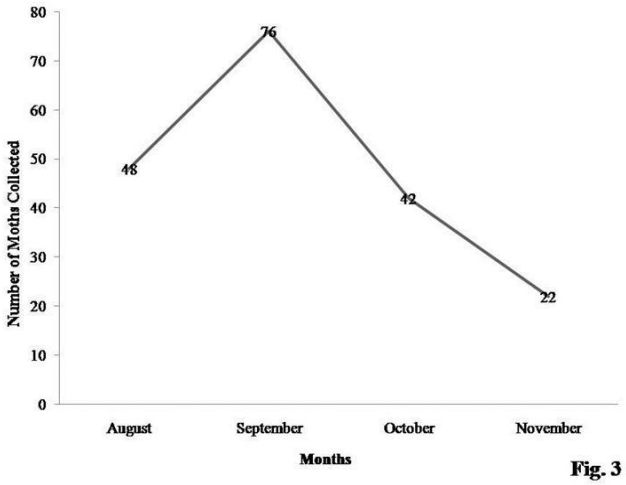

Figure 3: Population density of primary fruit piercing moths of genus *Othreis* in Vidarbha region.

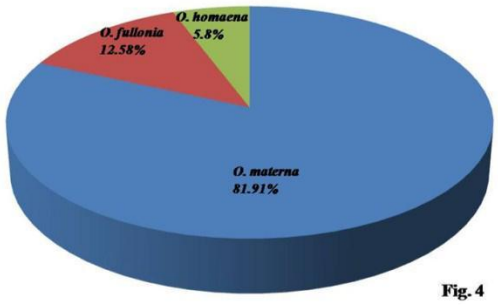

Figure 4: Diversity of primary fruit piercing moths of genus *Othreis* in Vidarbha region of Maharashtra.