

RECORD OF MEALY PLUM APHID, *Hyalopterus pruni* (GEOFFROY) (APHIDIDAE: HEMIPTERA) ON PEACH FROM PUNJAB, INDIA

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ABSTRACT

Surveys were conducted from 2015 to 2019 in the peach growing regions of Punjab, India with the objective of recording different insect-pests infesting peach trees. During these surveys, peach trees were found to be infested with a species of mealy plum aphid, *Hyalopterus pruni* (Geoffroy, 1762) (Sternorrhyncha: Aphididae), for the first time in Punjab, at Fruit Research Farm of Punjab Agricultural University, Ludhiana (India) during the months of March-April, 2015. This pest causes direct damage by sap sucking and indirect damage by honeydew excretion on leaf and fruit surface. Highest mean population per 25 leaves/tree was observed during 4th week of March (393.5 aphids) followed by 3rd week of March (296.7 aphids). Severe incidence of sooty mold was observed on the leaves as well as fruits during last week of March.

Keywords: *Hyalopterus pruni*, Peach, Punjab, Sternorrhyncha

The peach (*Prunus persica* [L.] Batsch) is a deciduous tree, native to northwest China in the region between the Tarim Basin and the north slopes of the Kunlun Shan Mountains, where it was first domesticated and cultivated. Peach is the third most important fruit crop in the world, after apple and pear (Ruiz-Sánchez *et al.*, 2018). It is one of the most important stone fruit crops belonging to the family Rosaceae and is widely grown in temperate zones of the world (Mir and Patel, 2018). In 2018, peach and nectarine production was around 24.5 million tonnes (Mt) in China leading with 62 per cent of world production (FAOSTAT, 2019). In India, it is one of the most important temperate fruit crops grown mainly in Jammu and Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Nilgiri hills, Jharkhand and North Eastern States (Josani *et al.*, 2009), and is valued for its fresh and canned fruit products. Area under peaches and nectarines in India has increased from 37800 ha to 38547 ha from 2014 to 2018 with increase in production from 260000 tonnes to 278417 tonnes, respectively (FAOSTAT, 2019). In Punjab, the area under this crop is 1971 ha with an annual production of 35187 metric tonnes (mt) and productivity of 17853 kg/ha (Singh and Kaur 2015). Peach is a crop of temperate climate but in Punjab, it is possible to grow peaches in the sub-tropical climate due to the availability of suitable low chilling cultivars and suitable production technologies such as propagation on Sharbati and Flordaguard rootstock and stenting technique. Currently, commercially cultivated cultivars of peach are Earli Grande, Florida Prince, Partap, Shan-i-Punjab, Prabhat and Sharbati (Singh

and Kaur, 2015). In recent times, peach production has a declining trend mingled with factors such as insect-pests, diseases, overdependence on selective cultivars and global warming (Singh *et al.*, 2014). The major insect-pests attacking peach trees in Punjab are peach leaf curl aphid, *Brachycaudus helichrysi* (Kaltenbach) (Aphididae: Hemiptera); peach black aphid, *Pterochlorus persicae* (Cholodkovsky) (Aphididae: Hemiptera); chafer beetle, *Adoretus* sp. (Scarabaeidae: Coleoptera); hairy caterpillar, *Euproctis lunata* (Walker) (Lymantriidae: Lepidoptera); fruit flies, *Bactrocera dorsalis* (Hendel) and *Bactrocera zonata* (Saunders) (Tephritidae: Diptera); flat headed-borer, *Sphenoptera dadkhani* (Obenberger) (Buprestidae: Coleoptera); plum caseworm, *Cremastopsycha pendula* (de Joannis) (Singh and Kaur, 2015). The present study highlights the presence of mealy plum aphid, *Hyalopterus pruni* (Geoffroy) (Aphididae: Hemiptera) for the first time on peach in Punjab, India.

MATERIALS AND METHODS

Site selection

Roving surveys were conducted in various peach growing regions of Punjab during 2015 to 2019. Fixed plot surveys were carried out in the Fruit Research Farm, Punjab Agricultural University (PAU), Ludhiana, Punjab, India (30°54'02.8"N and 75°47'34.3"E) to record the incidence of different insect pests.

Collection of insects

Peach trees were observed randomly to check the infestation by insect-pests and during course of

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investigations, unidentified green aphids were observed on the leaves and trunk in large numbers. The aphids were collected directly from the peach trees with the help of sable hair brush and were directly placed in the vial containing 70 per cent ethanol. The leaf samples (containing aphid population) were collected randomly from trees in a transparent plastic bag. The samples represented five replicates each of five leaves totalling to of 25 leaves per tree, and 10 trees were sampled from each location.

Data Collection

The aphid numbers were recorded weekly and the population fluctuations were plotted. The number of adult and nymphal instar were counted on the leaves using manual lens (Opticron LED Hand Magnifier (15x), USA) in the field and were then brought to laboratory for identification.

Taxonomic identification

The adult viviparous females were preserved in 70 per cent ethanol and specimens were mounted in Canada balsam (Sigma-Aldrich, India) following the methods described by Blackman and Eastop (2000). The species was identified by using keys developed by Blackman and Eastop (2006).

Data analysis

The data on population of aphid were analysed using statistical package CPCS-1, detailed by Cheema and Singh (1991). The population fluctuation of aphid

during each year from 2015 to 2019 is represented graphically.

RESULTS AND DISCUSSION

During surveys, mealy plum aphid, *Hyalopterus pruni* (Geoffroy) was observed infesting leaves (Fig. 1A) of peach trees. It caused direct damage by sucking plant sap which results in deformities and indirect damage by production of honeydew on leaf and fruit surface, thus hindering photosynthesis. This species does not cause leaf curl, however, in case of severe damage, leaf rolling was observed (Fig. 1B), leaves turned yellow (Fig. 1C) and fall prematurely. It was first observed during the first week of March, 2015 and was recorded at weekly intervals till third week of April, 2019 at Fruit Research Farm, PAU, Ludhiana and at other places in Punjab. In some orchards, where the population was very high, nymphs and adults were also observed on tree trunk (Fig. 1D). During the study period, in last week of March 2015, severe incidence of sooty mould was observed on the leaves due to honeydew excreted by the aphids. The sooty mould produced on honeydew due to attack of this aphid resulted in blackening of leaves (Fig. 1C) and fruits (Fig. 1E).

In the present study, 181.3 aphids/25 leaves were recorded during 1st week of March, 2015 which increased up to 510.6 aphids/25 leaves in 4th week of March, 2015. After that, population started declining and during 3rd week of April, 2015, only 15.1 aphid/25 leaves were observed (Fig. 2). Similar trend was observed during 2016, 2017, 2018 and 2019. Data on mean of

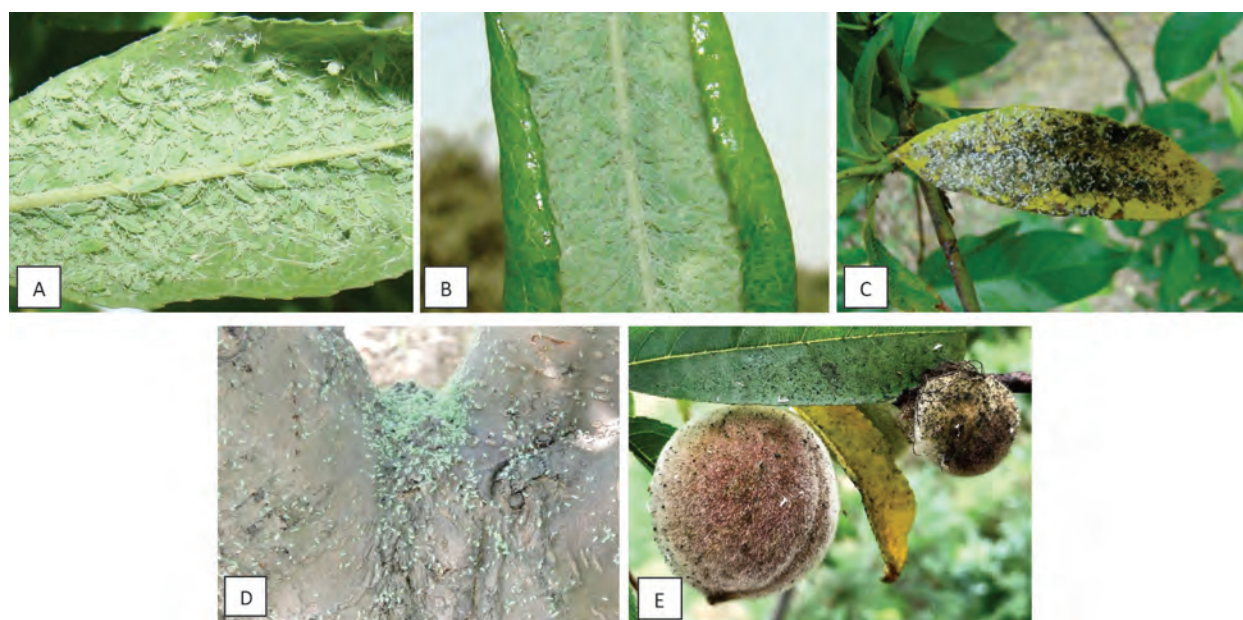


Fig. 1. *Hyalopterus pruni* (Geoffroy) on plant parts of peach tree and sooty mould. A. Adults on peach leaf, B. Twisting of leaf from outside due to aphid infestation, C. Sooty mould on leaf, D. High population on peach trunk, E. Sooty mould on fruits.

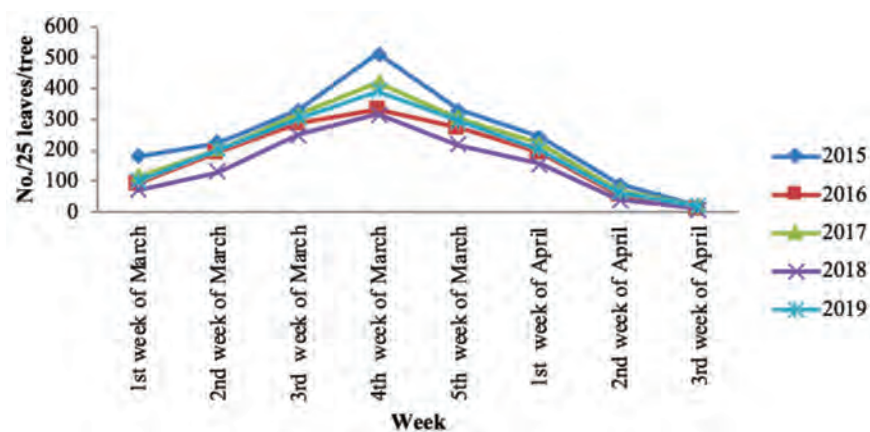


Fig. 2. Population of *Hyalopterus pruni* (Geoffroy) on peach trees during different years at Fruit Research Farm, PAU, Ludhiana

all the years revealed that the highest mean population per 25 leaves/tree was observed during 4th week of March (393.5 aphids) followed by 3rd week of March (296.7 aphids). With the onset of summer season, the population started declining and least population (15.6 aphids/25 leaves) was observed during 3rd week of April (Fig. 2). Later on, during summer season, the population of aphids disappeared. Similar pattern has been observed earlier on other fruit crops like apricot, almond and peach during March-May by Amin and Muhammed (2008) in Iraq. On apricot, the authors observed *H. pruni* from last week of March to third week of May and its per cent infestation decreased from 14 per cent to 10 per cent, respectively. On almond, the infestation varied from 53.8 per cent in March to 16.2 per cent in May and on peach, its population was observed during mid-April to first week of June with 12.3 and 9.6 per cent infestation, respectively. In Egypt, maximum population of *H. pruni* was observed during the month of July and similar observations were observed by Jin *et al.* (2007). *Hyalopterus pruni* can become a serious pest as they develop large colonies and have high reproductive potential at the time of frequent irrigations during period of high temperature in the mid-season (Ben Halima-Kamel *et al.*, 2013).

Taxonomic identification

The genus *Hyalopterus* Koch was earlier used in very broad sense for including all aphids under subfamily Aphidinae with small siphunculi. But now it is restricted to aphids with elongate mealy body. More recent studies using morphological and molecular techniques indicated existence of three taxa [*Hyalopterus amygdali* (Blanchard), *H. arundiniformis* Ghulamullah and *H. pruni* (Geoffroy)] which utilise *Prunus* as their primary host (Rakauskas *et al.*, 2013). All these migrated to the secondary hosts viz., *Phragmites*, *Arundo* and other

graminaceous hosts in wetlands. Lozier *et al.* (2008) provided a key to Apteræ on *Prunus*, and Rakauskas *et al.* (2013) provided some additional key characters. Only above mentioned three species have been described under the genus *Hyalopterus* till date.

Field identification characters

Apteræ are small to medium-sized, body rather elongate, pale-green, mottled with darker green, always covered with white waxy meal. Colonies are found on the under surface of leaves. Infested leaves do not curl. Both alatae and apteræ have green abdomen with white wax patches on each segment. Dark pink aphids with similar wax coating are found in the same colony (Joshi and Poorani, 2004).

Diagnostic characters

Body elongate oval (Fig. 3A). Head smooth, not ornamented with spicules or nodules (Fig. 3B). Antenna six segmented, shorter than body, flagellum faintly imbricated; antennal segment III without secondary rhinaria (Fig. 3C); processus terminalis about 3-4 times base of antennal segment VI (Fig. 3D). Dorsum of abdomen pale. Siphunculi subcylindrical, gradually narrowing apically, without flange (Fig. 3E), about 0.04-0.06 times as long as body. Cauda dark, elongate, 0.16 – 0.18 mm long, bearing 5-6 hairs (Fig. 3F).

Mealy plum aphid, *H. pruni* has been reported to occur on fruit crops in other regions also. This species has been reported as an economically damaging insect-pest of stone fruits such as apricot, plum and peach in Turkey (Toros *et al.*, 1996). In our study, maximum population was observed during ending March and by the end of April, decline in population was observed. This could be due to the shifting of this aphid on secondary host during summer. Further studies on its

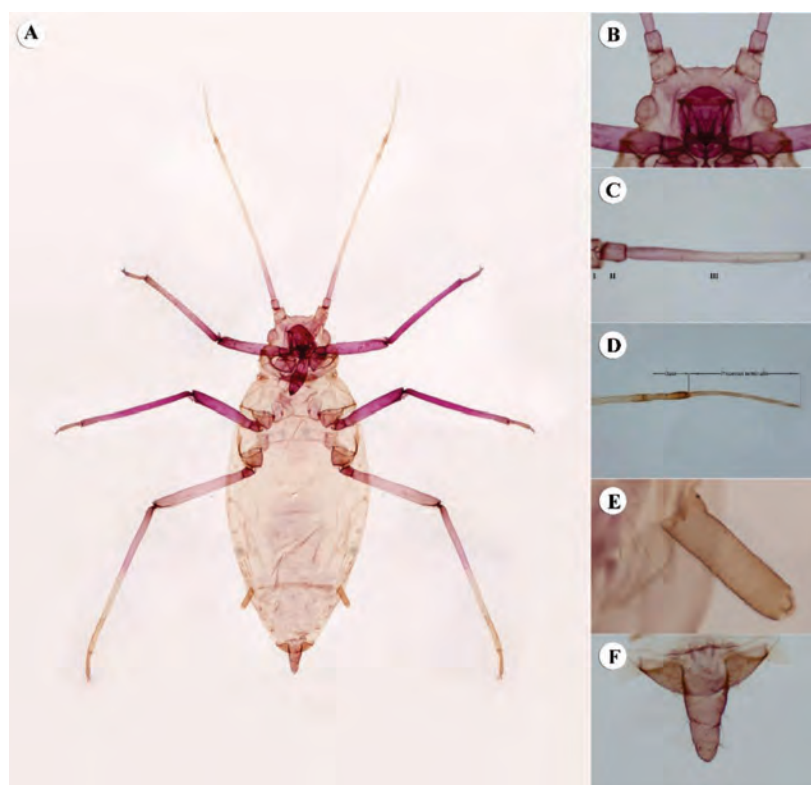


Fig. 3. Morphological characters of apterous viviparous female of *Hyalopterus pruni* (Geoffroy). A. Elongate oval body, B. Head smooth, not ornamented with spicules or nodules, C. Antennal segment III without secondary rhinaria, D. Processus terminalis about 3-4 times base of antennal segment VI, E. Siphunculi subcylindrical, gradually narrowing apically, without flange, F. Cauda dark, elongate, bearing 5-6 hairs

biological features, secondary host plants of this aphid species, survival during off season and natural enemies are being investigated.

This study revealed the outbreak of mealy plum aphid, *H. pruni* (Geoffroy) for the first time in Punjab on peach trees from 2015 to 2019 during the months of March-April. This aphid causes both direct damage by sap sucking and indirect damage by honeydew excretion on leaf surface. High population of aphids was observed on the leaves. Severe incidence of sooty mould was observed on the leaves as well as fruits during last week of March, resulting in blackening of leaves and fruits and making them unsuitable for marketing. There is need to study its life cycle, other hosts, host preferences and natural enemies under Punjab conditions so as to develop an effective management strategy.

Authors' contribution

Conceptualization of research work and designing of experiments (SS, RK, SJ); Execution of field/lab experiments (RK, SJ); Data analysis and interpretation (SS, RK, SJ); Preparation of manuscript (SS, RK, SJ).

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