

Influence of Geographical Direction and Pistachio Cultivar on the Capture of Adult Pistachio Psylla by Yellow Sticky Card

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Abstract

Pistachio psylla, *Agonoscena pistaciae* Burckhardt and Lauterer (*Homoptera: Psyllidae*) is a major pest of the cultivated pistachio trees, *Pistacia vera* L. in Iran. Sucking sap from leaves by both nymphs and adults reduced plant vigor, defoliation, stunting, bud drop, also producing a large amount of honey dew. Currently the main control measure of this pest is based on insecticides which are used 8-10 times per season. Monitoring the population density of the pest can determine the proper time of pesticide spraying and reduce the amount of pesticides used, and it is also needed for organic pest control strategies. Yellow sticky card traps have been shown useful to detect and gauge the relative abundance of *A. pistaciae*, but specific information on the effect of geographical direction and cultivar on the capture of adult pistachio psylla in the region is not known. During the growth season of 2009, an adult population of pistachio psylla was monitored at different geographical direction on 'Ohadi', 'Sefid', 'Akbari', 'Ghermez' and 'Kale ghoochi' commercial female cultivars of *Pistacia vera* L. and male tree as control in Mahvelat region (Razavi Khorasan province). Five traps were placed at the same height (2 m above the ground) and in the four cardinal directions of each tree as well as one trap in the middle of the canopy (30 traps in each replicate). After 2 weeks the trapped adults of psylla were counted. This procedure was repeated 8 times throughout the season. Data were subjected to analysis of variance. As result, there were differences among the position of yellow sticky card trap and cultivars, in terms of trapped adult psylla. The traps placed on either of two directions of south and east captured more adults than the other positions. Also, it was shown that some *P. vera* cultivars had significantly higher population of adult psylla throughout the season, namely 'Sefid', 'Akbari', 'Kale ghoochi', 'Ghermez' and 'Ohadi'.

INTRODUCTION

Pistachio (*Pistacia vera*) is a subtropical plant of the *Anacardiaceae* family and it is an important horticultural crop in Iran. Pistachio psylla (*Agonoscena pistaciae*) that is well known to dry-sap, is one of the most important key pests of pistachio in Iran and causes important economical yield losses, due to psylla feeding damage to aerial parts of the trees. This pest in Khorasan is too important as well as in other pistachio growing areas. The damage caused by this pest depends on various factors, namely the cultivar, irrigation system, nutritional status of the plants, stage of insect's life and population of natural enemies of psylla.

Psylla can cause damage from April to October in the area. However, its damage is not economically important until May even in high crowded populations. Sticky yellow traps can be a method for capturing adult insects, as previous studies indicated that they are attracted to yellow color. Emami (1995), Emami and Yazdani (1993) reported that yellow traps have high attraction for pistachio psylla and they studied the effect of trap shape, height and direction of trap on capturing of adult psylla. Also, Hadian and Seyedoleslami (2002) indicated that capture of adult insects by yellow traps can determine the trend of population change in comparison to egg and nymphs population. Emami (1995) investigated the effect of geographical direction and height on capturing adult psylla of pistachio and reported that population of psylla in south direction of the

tree was higher than in other directions but this difference was not statistically significant. Robasker et al. (1990) conducted some trials using yellow sticky trap and found that those traps placed in north direction of citrus tree captured more *Anastrepha ludens* than in the other directions. Beavers et al. (1971) indicated that when traps were placed in height of 2.7 m above the ground in south direction of citrus tree, more traps were captured. Pear psylla has numerous biological similarities to pistachio psylla. Adams et al. (1989) conducted an experiment on pear psylla and showed that the population of adult psylla at the height of 1.2 to 1.8 m in south direction has more correlation with contamination of trees to egg and nymph of this insect.

In recent years, the application of yellow sticky traps in monitoring of population fluctuation of many insects has been used widely. Based on these findings, this method can be useful in IPM (Integrated Pest Management) programs, as well as for organic pest control strategies. The objective of the present study was to evaluate the effect of geographical direction and the cultivar effects on the efficacy of yellow sticky cards for capturing the adult pistachio psylla in Mahvelat region, the main area of pistachio production in Khorasan Razavi, province of Iran.

MATERIALS AND METHODS

An experiment was conducted in a commercial orchard during June until October 2009 in Mahvelat region (58°25' to 59°5'E and 34°40'N), which has an agricultural area of 42558 ha and is one of the main agricultural poles in the Khorasan razavi province. Mahvelat has 5250 ha of pistachio with a total of 8995 t dried pistachio yield, which represents about 42% of pistachio produced in Khorasan razavi province. The experiment included 'Ohadi', 'Sefid', 'Akbari', 'Ghermez' and 'Kale ghoochi' commercial female cultivars of *Pistacia vera* L. and male tree as control, grafted at 1992 on *P. vera* seedling. Plant spacing was 3×6 m and the soil was a loamy soil type with low organic matter content (0.9%) and pH of 8.2. The maximum and minimum annual mean temperature was 40 and 12°C, respectively.

The commercial orchard was irrigated every 24 days and the average annual precipitation in this area is about 250 mm. The trees were trained as free spindles. Soil management includes frequent grass moving in the alleyways in conjunction with the maintenance of 1 m wide herbicide strips along the tree rows. To do this experiment, five yellow traps were placed at the same height, 2 m above the ground and in the four cardinal directions of each tree as well as one trap in the middle of the canopy (30 traps in each replicate).

After 2 weeks, the trapped adult psylla were counted and this procedure was repeated every 2 weeks throughout the season. The dimensions of yellow cards used were 10×15 cm with both surfaces covered with transparent glue. For each sampling time, the density of egg and nymph were measured by counting the number of eggs and nymphs on 5 leaflets, collected randomly from each treatment. The data were analyzed by using the analyses of variance using the GLM procedure of SAS 9.1 (SAS, 2004) and Duncan's multiple range tests was used to compare means.

RESULTS AND DISCUSSION

Figure 1 shows that there was a significant difference among different pistachio cultivars in terms of infestation to pistachio psylla. Among the examined cultivars, it was found that male pistachio tree and the 'Sefid' cultivar had higher number of adult psylla and the 'Ghermez' cultivar showed the least infestation during the experimental period. No significant differences were found between 'Ohadi', 'Akbari' and 'Kale goochi' cultivars. 'Sefid' pistachio cultivar is native to Mahvelat and is the more used cultivar.

Time of placing the traps is important, because natural enemies of psylla may be captured by these traps which have adverse effects on their populations. When temperature increases and relative humidity decreases, population of psylla increases rapidly which happens usually from June onwards in this region. In this period the yellow sticky traps are not efficient in reducing pest population and also dust carried out

by the wind reduces its efficiency. Moreover, hot climatic conditions reduce the activity of natural enemies (Adams, 1989). The results showed that the effect of the number of eggs and nymph of psylla on leaves for cultivar; time and interaction of them were significantly different (Table 1).

The highest population density of psylla was found in the male tree. There were no significant differences between 'Ohadi', 'Akbari', 'Kale goochi' and 'Sefid' cultivars (Fig. 2). Thus, cultivars with lower psylla damage should be selected for cultivation. Figure 3 shows change in the number of adult psylla captured by yellow sticky traps and the number of eggs and nymph on leaves at different sampling time. In every sampling, yellow traps had good efficiency for attraction of adult psylla and at late season, the number of captured psylla per trap rapidly increased. In October, an average of 401 adults was captured by each trap. This shows that yellow traps have good efficiency for attraction of adult psylla and, therefore, they can be used as an effective method for reducing the population of this key pest of pistachio trees and a good monitoring of the pest population.

In this study the mean density of adult psylla captured by traps in different places on the tree was different (Fig. 4). The number of captured psylla in either direction of south and east was higher than in the other directions, although these differences were not significant. These results are in agreement with Emami (1995) that reported a higher density of adult insects in south direction of the tree. Also Seyedoleslami (2002) reported that traps placed on the south direction had significant difference with east and north, but difference with west were not significant. This study showed that the yellow sticky card traps had high efficacy in monitoring of population fluctuation as well as in reducing the population of that key pest of pistachio trees.

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Tables

Table 1. Effect of cultivar and time on density of egg and nymph of pistachio psylla.

Source of variation	Degree of freedom	Mean square
Cultivar	5	115.79**
Time	7	210.41**
Time×cultivar	35	87.75**
Error	192	21.65

Figures

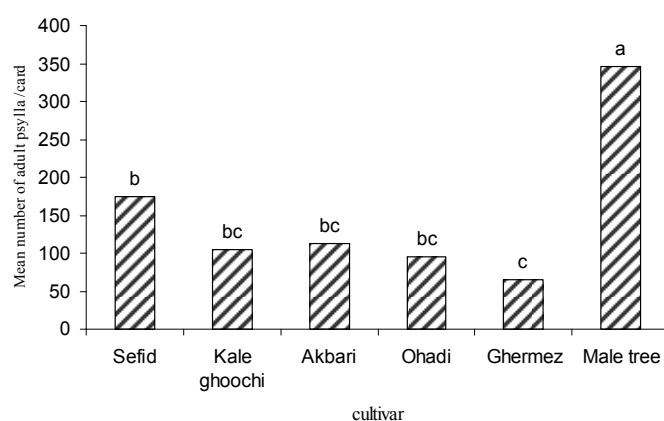


Fig. 1. Mean number of adult psylla captured by yellow sticky traps on different pistachio cultivars. Each figure is mean of 40 samples.

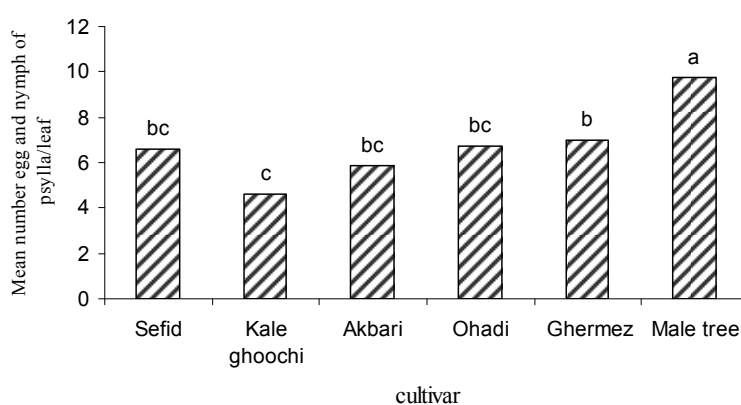


Fig. 2. Mean number of egg and nymph of pistachio psylla on different pistachio cultivars in Mahvelat region in 2009.

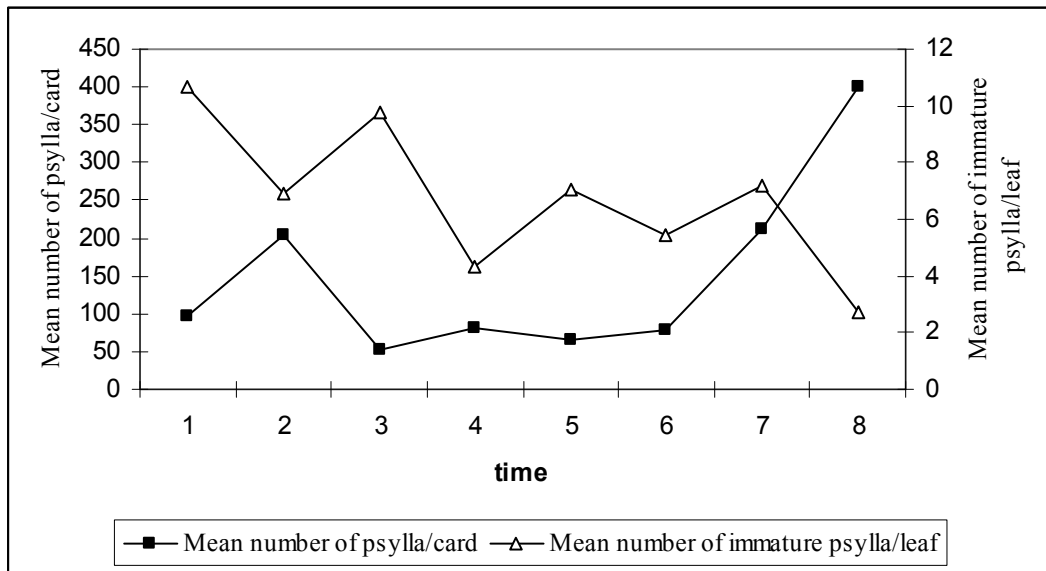


Fig. 3. Trend of changes in adult and immature stages of pistachio psylla throughout the sampling period in 2009 in Mahvelat region.

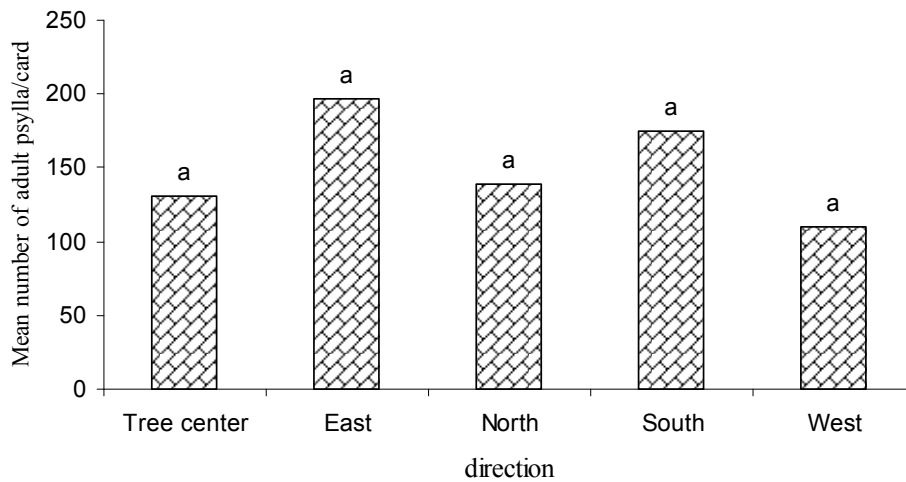


Fig. 4. Mean number of adult psylla captured by yellow sticky traps on different of coordinat direction pistachio tree. Each figure is the mean of 48 samples.

