Bio-Science Research Bulletin
http://www.bpasjournals.com

Original Research Article

Print version ISSN 0970 0889
Online version ISSN 2320 3161
DOI: 10.5958/2320-3161.2022.00002.5
Volume 38, Number 1
January-June 2022: P.21-25

Bioecology of San José louse *Diaspidiotus perniciosus* (Hemiptera: Diaspididae) on apple variety Anna in Draa Ben Khedda area (Tizi-Ouzou, Algeria)

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Received on 17.01.2022
Revised on 24.04.2022
Accepted on 13.05.2022

ABSTRACT

San José louse *Diaspidiotus perniciosus is a scale* insect, which can affect several species of fruit trees. *This insect presents two to four generations per year depending on the climatic conditions of the environment, the characteristics of the agro-ecosystem as well as the varietal characteristics of the host plants. Knowledge of the biological cycle of this pest and its spatio-temporal relationships with its host plant is essential in order to consider a fight that is more respectful of the environment. Our study aims to assess the dynamics of populations San Jose louse D. perniciosus through using sex-specific pheromone traps in an apple orchard Anna variety in Draa Ben Khedda area wilaya of Tizi-Ouzou (Algeria). Use of sex pheromone traps reveals the existence of three flight periods, which indicates three main generations per year in the environment studied. The estimate of the damage caused by this pest to fruit on trees shows an infestation rate ranging from 4,2%, to32,89%.*

KEYWORDS: *Diaspidiotus perniciosus*, Sex-Specific Pheromone, Apple, Draa Ben Khedda.

How to cite this article: Guermah D, Lakabi L, Medjdoub-Bensaad F. (2022). Bioecology of San José louse *Diaspidiotus perniciosus* (Hemiptera: Diaspididae) on apple variety Anna in Draa Ben Khedda area (Tizi-Ouzou, Algeria). *Bio-Science Research Bulletin,* 38(1), 21-25.

1. INTRODUCTION

San José louse *Diaspidiotus perniciosus* is a scale insect, which can affect several species of fruit trees, between which apple tree and pear tree and thus cause the mortality of branches, to degrade the quality of fruits. In the absence of phytosanitary treatment, it can cause the total destruction of crops.

Chemical control is generally used to suppress this cochineal, which causes significant damage to apples, however, it appears the last years, and there has been a phenomenon of resistance to pesticides.

As part of a study on the spatio-temporal relationships between San José louse *D. Perniciosus* and its host plant, it seems necessary to us to study the biological

cycle of the species and the damage it can cause on apple crop in Tizi-Ouzou area (Kabylia).

2. MATERIAL AND METHODS

For the study of bioecology of San José louse *D. perniciosus*, the flight of adult males is monitored by sex pheromone traps as well as the observation of female bites on fruit on trees; at the rate of one outing per week during the period of activity of the insect for the year 2015, in Draa Ben Khedda area wilaya of Tizi-Ouzou (Figure 1).

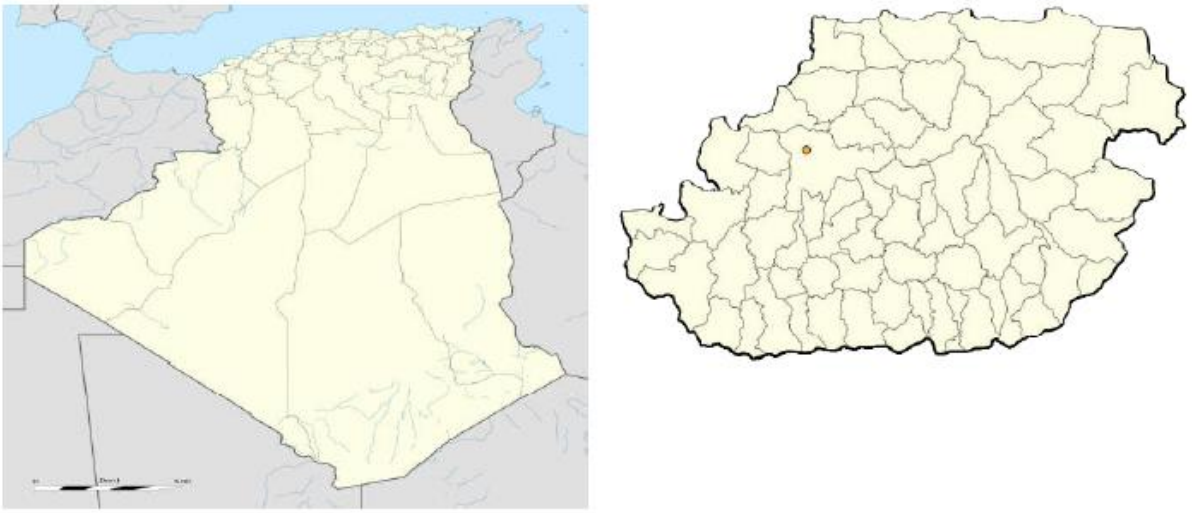

Figure 1: location of the study area in Kabylia

According to Comstock (1881), San José louse is classified as follows:

Reign :	Animalia
Branch :	Arthropoda
Class :	Insecta
Order :	Homoptera
Family :	Diaspididae
Genus :	*Diaspidiotus*
Specie :	*D. perniciosus* (Comstock, 1881)

San José louse *D. perniciosus* belongs to the order of Homoptera, to Diaspididae family, and *Diaspidiotus* genus.

The wingless female lives attached to the plant on which she feeds, protected by a detachable disc 2 mm in diameter. Males have a pair of wings.

The larva, yellow, moves through three pairs of short legs before settling on the plant of choice. It then secretes a "shield"; the fertility of the female can range from 50 to 400 larva. In the early cold, the first instar larvae enter diapause; the other stages, with the occasional exception of pregnant females, disappear during the winter.

This scale insect can feed on more than 150 species of trees, mainly apple, common pear, plum, peach, cherry, currant and blackcurrant.

The animal injects a toxic substance when it bites a plant, which leads to leaf fall and a degradation of the visual quality of fruit, as well as the decline of the plant.

2.1. Capture of adult males *D. Perniciosus* by sex pheromone trap

Sexual pheromone attractant traps are used to track flight progress of adult males, as well as the estimate of the pest population level *D. Perniciosus* in the study plot.

The sex trap consists of a plate coated with glue on which a capsule is placed

containing the specific pheromone attracting males to enter the delta trap and are trapped in the sticky surface (Figure 2).The device is attached by a wire to the canopy of the tree. The installation of the trap is carried out 15 days after fruit set in order to determine the date of appearance of the first flight.

Figure 2: Delta pheromone sex trap aimed at capturing males of San José louse (Original, 2015).

Observations are made once a week for 5 months covering the flowering and fruiting period of *Malus pumila* and this during the study year 2015. For each trip, the date of the captures and the total number of mealy bugs captured are mentioned.

2.2. Estimation of fruit damage on tree

Fruits attacked by cochineal females *D. Perniciosus* are identified in order to quantify the damage caused by the devastation caused by this pest. The estimate of the damage caused by *D. Perniciosus* on the fruit on the tree is carried out by counting using the method recommended by Charmillot (1980), Audemard et *al.* (1990) and Trillot (2002).This method consists of the observation of 1000 fruits in each plot at the rate of 20 fruits per tree on 50 trees distributed in the plot; every week throughout the fruiting period until harvest, to examine fruit showing signs of attack by females of the pest.

3. RESULTS

3.1 Temporal evolution of the number of adults *D. Perniciosus* captured in the study plot

Adult flight curves of San José louse are the result of capturing males using sex traps using a specific pheromone diffuser (Figure 3).

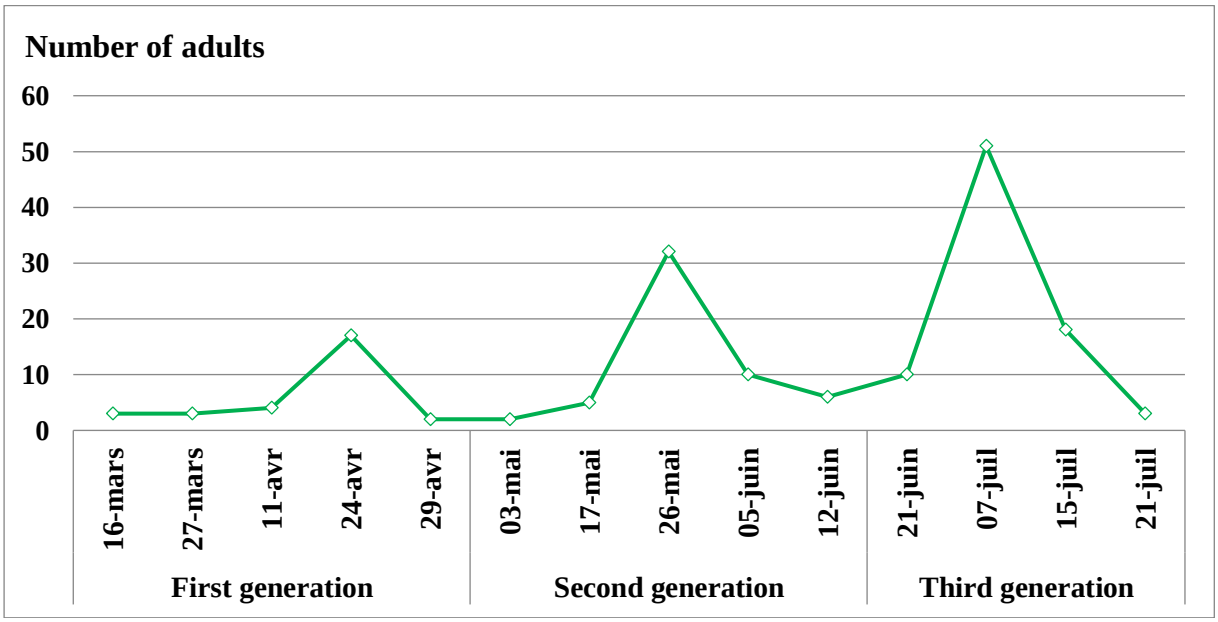

Figure 3: Course of flights of adults of the San José louse in the region of Draa Ben Khedda.

Scientific trials, using pheromone traps, and studies, based on examining the population structure of the San José cochineal over a year, revealed the existence of three peaks corresponding to three annual generations of the insect.

The periods of activity of *D. perniciosus* is spread over five months, from March through July at the study plot level.

The first peak of *Quadraspidiotus perniciosus* runs from the end of March until the end of April, the second flight begins in May corresponding to the fruit setting period of the apple tree until mid-June apple tree fruiting period and the third flight occurs from mid-June and ends towards the end of July of ripening and harvesting of fruits.

3.2 Estimation of fruit damage on tree

Observations of damage caused by the San José louse on fruit on trees started in early June after the mealy bug attachment points appeared (Figure 4).

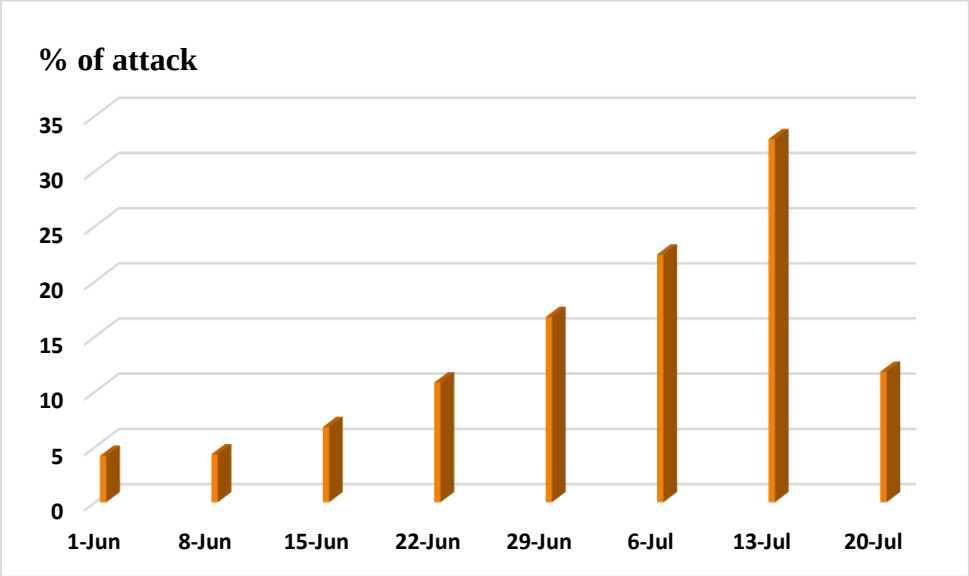

Figure 4: Percentage of fruit attacked on trees by the San José louse in the Draa Ben Khedda region.

The first and second-generation cochineal did not cause significant damage to the apple orchard plot. Third generation mealy bugs show severe damage with fruit perforations, these attacks reached an average frequency of 16.77% on June 29, 2015. These attacks intensified over time and reached an average frequency of 32.89% on July 13 of the same year.

4. DISCUSSIONS AND CONCLUSION

The flight curves of the adults of San José louse are the result of the catches of the males by employing sex traps using a specific pheromone diffuser.

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The stop flights to the end of July were observed in the study area, it usually coincides with the harvest of fruits. Thus, the appearance of first generation occurs at variable dates depending on the rupture of diapause and the duration of development of the scale insects, which depend on climatic conditions.

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Around the attachment points of mealy bugs, we generally observe the presence of a red halo on the fruits. Under the bark of branches infected by the pest, we can see a red coloration of the parenchyma.

The San José Louse is a biting sucking insect, it attacks the twigs and the branches cause deformation of the organs with the toxins injected, crusts on twigs and branches can be observed.

Attacks are generally made on wood, but during severe infestations, fruits and leaves may be affected. Within 24 hours of securing a young larva, a red-violet halo forms around the fruit. The red cortical tissues swell with a build-up of sap.

The bark cracks and gums appear on the fruit, which causes a brown to black gelatinous area to appear. Heavy infestation causes fruit growth to stop and yield losses in quantity and quality.

REFERENCES

1. Audemard H., Gendrie J.P. et Jeay M., (1990). Lutte raisonnée contre la tordeuse orientale (*Cydia molesta* Busck) en verger de pêcher ANPP. Paris. (2) : 525-531.
2. Charmillot P.J., (1980). Etude des possibilités d'application de la lutte pour la technique de confusion contre le carpocapse *(Laspeyresia pomonelle* L.). Thèse Doctorat Ecole Polytechnique Fédérale de Zurich, 122 p.
3. Trillot M., (2002).le pommier : monographie, CTIFL. 292 p.

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