

VARIOUS OBSERVATIONS ON SOME BIOLOGICAL CHARACTER OF PISTACHIO WHITE SCALE [*Suturaspis pistaciae* (Lindinger) Hemiptera: *Sternorrhyncha: Coccoidea: Diaspididae*]

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Abstract

Suturaspis pistaciae (Lindinger) Hemiptera: Sternorrhyncha: Coccoidea: Diaspididae) is an important pest on pistachio trees of Turkey. Various observations on the biology of *Suturaspis pistaciae* were carried out under laboratory conditions. In this study, development time of immature stages of one of most important pest of pistachio *Suturaspis pistaciae* were studied at $27 \pm 1^\circ\text{C}$ and $65\% \pm 5$ Rh. with 16/8 hours lighting period under laboratory conditions.

Development time of immature stages of *S. pistaciae* determined first larvae stage: mean 16 (10-28) days, second larva stage mean 12.9 (7-15) days and virgin female stage 8.5 (4-12) days shortened when biological stages increase. Development time from active larva to adult was 37.4 days. The death rate from larvae to adult until it becomes 50% is determined. Stereoscopic binocular Microscope with different biological periods of the pests was measured. Biological measurements are made for a biological stage of 25 individuals each. In addition, morphological characteristics of each stage were also investigated.

Key words: *Suturaspis pistaciae*, Hemiptera, Diaspididae, biology.

INTRODUCTION

Pistacia Linnaeus (*Anacardiaceae*) is mainly a subtropical genus comprising some 11 species of wind pollinated deciduous and dioecious trees and shrubs. Geographically, the largest concentration of *Pistacia* species is found in West Asia and in the Mediterranean region (Zohary, 1995; Tous and Ferguson, 1996). The pistachio, *Pistacia vera* Linnaeus, originated in Asia Minor, in the northern part of Afghanistan, but has largely spread throughout the Mediterranean and the Middle East (Shrestha, 1995).

Pistachio is one of the most important economic crops in Turkey, with about 43,000 ha of plantations, mostly in Adıyaman, Batman, Gaziantep, Diyarbakır, Kilis, Mardin, Siirt and Şanlıurfa province in the southern Anatolia region of the country (TUİK, 2012). Turkey is in the third place in pistachio production following Iran and USA 90% of the pistachio production is Southeastern Anatolia (USDA, 2016).

Scale insects are a diverse group of mostly-sap sucking insects with at least 30 families and

around 8,000 species. These insects feed on leaves or branches of many ornamental plants grown in landscapes and nurseries. They attach themselves to a plant and feed by sucking fluids through straw-like mouthparts.

Scale insects can be divided into two broad categories: armored scale and soft scale. The distinction is important because behavior and management of the two groups are different. Both groups live beneath waxy covers that protect them from predators, parasitoids and pesticides. Soft scales secrete a waxy layer over themselves that cannot be separated from their body. Soft scales also excrete sugary honeydew and may move from branches to leaves during their life cycle.

The most species-rich family of scale insects is Diaspididae, the armored scales, with more than 2,400 described insects. Armored scales are also some of the toughest nursery pests around, because they cause severe plant damage and their “armor” makes them difficult for growers to manage effectively. They have colonized every continent except Antarctica, and are among the most invasive insects in the world. Some of the most common armored

scale species in nurseries are euonymus scale, tea scale, oystershell scale, Japanese maple scale, false oleander scale, poplar scale and juniper scale (Anonymous, 2016).

Scale insects vary dramatically in their appearance from very small organisms (1-2mm) that occur under wax covers (some look like oyster shells), to shiny pearl-like objects (about 5mm), to creatures covered with mealy wax. They spend most or all of their lives feeding on plants and are primarily important as plant pests in greenhouses, backyards, and on fruit trees. Scale insects damage millions of dollars worth of food, ornamental, fiber and greenhouse crops each year (Ben-Dov et al., 2010).

Turkey is one of the origins of the pistachio. Pistachio was cultured for the first time in Southeastern Anatolia in Eti's period. Turkey is in the third place in pistachio production following Iran and USA 90% of the pistachio production is Southeastern Anatolia (TÜİK 2012). There are a lot of pests' effects pistachio production Bolu (2002) has determined 8 important hazardous species in the investigation made on the insect and mite fauna in the pistachio fields within Southeastern Anatolian Region. These species are: *Anapulvinaria pistaciae* Bod., *Eulecanium rugulosum* Arch., *Kermania pistaciella* Amsel., *Chatoptelis (Hylesinus) vestitus* Mulsant et Rey, *Suturaspis pistaciae* Lindinger., *Megastigmus pistaciae* Walker, *Idiocerinus stali* Fieb. and *Agonosцена pistaciae* Burck. and Laut..

Suturaspis pistaciae Lind. (Homoptera; Diaspididae) the pistachio tree's trunk, branches, shoots, leaves, and rip the fruits which is harmful by absorbing a widespread species. Depending on the population density, trunk, branch, twig, shoot, leaf and fruit damage as a result of sticking and sucking on plants, leaves, flowers, fruits and the loss of bud, and hence it leads to the loss of product (Bolu, 2002; Bolu and Uygun, 2003; Bolu and Uygun, 2005).

Because of its considerable economic importance and given that details of the life history are poorly documented, I studied the biology of this species in the laboratory and in nature. The results are presented in this paper.

MATERIALS AND METHODS

Collection and identification of scale insect

A field survey on the host plants of the armored scale was carried out in different region of Şanlıurfa province. Infected scale insects were most often found on trunks and branches of host pistachio trees and were removed by cutting out small pieces of bark, which were placed in paper bags and kept cool for return to the laboratory.

Infestation was accomplished by placing a branch with crawlers of *S. pistaciae* onto each sapling for a period of two weeks. After the crawlers had settled, 25 nymphs on each sapling were marked by attaching numbered tags to needles bearing one or two nymphs each.



Figure 1. Crawlers over the pumpkin settlement

Following initial infestation, biology of pistachio scale was studied in the laboratory on pumpkin nursery plants in pots at 27 ± 1 °C and 65 ± 5 % RH. All life stages were marked separately to observe change in size, color and shape. Insects sample also inspected under compound microscope by using an ocular micrometer to measure length of the armored scale. A total of 25 individuals of each representative life stage were examined, measured.

Host identification (*Suturaspis pistaciae*) was made by Dr. Lerzan ERKILIÇ (Plant protection Research Institute, Adana/Turkey).

RESULTS AND DISCUSSIONS

Development time of immature stages of *S. pistaciae* determined first larvae stage: mean 16

(10-28) days, second larva stage mean 12.9 (7-15) days and virgin female stage 8.5 (4-12) days shortened when biological stages increase. Development time from active larva to adult was 37.4 days. The death rate from larvae to adult until it becomes 50% is determined.

Description of the pest

Eggs

Eggs are whitish pink, oval in shape. Shortly before hatching, the egg will appear dull pink. In a number ranging from 2 to 4 eggs in the abdomen of the females were found to have.

Crawlers

Crawlers are flat, oval, and pink with six well-developed legs and two antennae.

Larvae 1st instar

The larvae are fixed, after the pink color is a darker color, turning to black. During this period, the larvae; antenna, eyes, legs, and atrophy were observed. The first instar nymph averaged 0.45 ± 0.02 mm in length by 0.26 ± 0.02 mm in width.

Larvae 2nd instar

With the start of the second larval period: starting over with the expansion of the abdomen, covered with a crust of white that are observed. Over this period the measurements: The second instar larvae, averaged 0.65 ± 0.02 mm in length by 0.34 ± 0.02 mm in width.

Virgin female

Virgin female, a wine-red color, the body began to grow and covered with a completely white shell (Figure 2). The female third instar nymph, or virgin adult, averaged 1.06 ± 0.02 mm in length by 0.37 ± 0.02 mm in width.



Figure 2. Virgin female on pumpkin

Adult Female

In adult females, a wine-red color, the abdomen swells, the part began to widen, and are elongated. The adult female, averaged 2.31 ± 0.02 mm in length by 0.75 ± 0.02 mm in width (Figure 3).



Figure 3. Adult female on pumpkin

Pupae

Pupae period: Eyes, antennae, legs, and abdomen formation is marked. A wine-red color, the pupae averaged 1.26 ± 0.02 mm in length by 0.50 ± 0.02 mm in width.

CONCLUSIONS

There is no detailed information about the biology of the Pistachio white scale in controlled conditions in the world. Studying is very difficult because of the viviparous the Pistachio white scale. My opinion is that the information obtained to shed light on future studies.

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