

I. KARACA, N. UYGUN, N. Z. ELEKÇIOĞLU, D. SENAL

### **Population development of *Aonidiella aurantii* (Maskell) and *Parlatoria pergandii* Comstock (Homoptera: Diaspididae) in Çukurova Region of Turkey**

**Abstract** - This study was carried out in a citrus orchard in Adana, Turkey, in 1990-95, to investigate the population fluctuations of two scale insects, *Aonidiella aurantii* (Maskell) and *Parlatoria pergandii* Comstock, and their parasitoid *Aphytis melinus* DeBach (Hymenoptera: Aphelinidae). Live and parasitized specimens of both species were counted on 50 randomly selected leaves. Sampling was carried out biweekly between May and October and monthly during the remainder of the year. It was found that the population of *A. aurantii* was always lower than that of *P. pergandii*. Average numbers per leaf of *P. pergandii* and *A. aurantii* were 9.91 and 2.68, respectively. Populations of two scale insects and their parasitoid fluctuated together. Under the reducing effect of the parasitoid, population levels of the two scale insects always remained low. The parasitization rate of *A. aurantii* was almost always higher than that *P. pergandii*, during the study. Average parasitization rate of *A. aurantii* was 35.79%, while that of *P. pergandii* was 27.11 %.

**Key words** : *Aonidiella aurantii*, *Parlatoria pergandii*, *Aphytis melinus*, Biological control, Population development.

### **INTRODUCTION**

Citrus production and export are very important for the economy of Turkey and because of that citrus growing areas are increasing day by day. The increase in citrus growing areas and production is more obvious in Çukurova Region, where about 87% of the total production is obtained (Anonymous, 1993). However, the number of pests and their populations are also increasing. Today, it is known that there were more than 90 species of pests in citrus growing areas of Turkey (Uygun & Karaca, 1997). Scale insects are among the most important key pests on citrus. California Red Scale (CRS) (*Aonidiella aurantii* (Maskell)) is especially very important. Biological control rather than cultural and chemical methods was commonly used against these pests. The parasitoid *Aphytis melinus* DeBach is naturally reducing the population of CRS in

Çukurova Region (Uygun *et al.*, 1995). Another scale insect causing damage on citrus is Chaff scale (CS) (*Parlatoria pergandii* Comstock). An increase in the population of CS has been observed in recent years. Although many investigations on CRS were conducted in the region (Eronç, 1971; Karaca *et al.*, 1987; Sekeroglu *et al.*, 1989; Karaca & Uygun, 1990; Karaca & Uygun, 1992; Uygun *et al.*, 1995), there is no detailed study on CS.

In the present study, population development and fluctuations of both scale insects and their parasitoid *A. melinus* were investigated.

## MATERIALS AND METHODS

The study was performed in a 2 hectares, 20 years old orange grove (cv. Valencia), at the research farm of Plant Protection Department of the Agricultural Faculty, Çukurova University, Adana, Turkey, where no chemical control measure was undertaken. The research lasted from November 1990 to March 1995.

Samples were taken biweekly between May and October, and monthly for the remaining time of the year. At each sampling date, 50 leaves were taken from 10 trees, 5 leaves from four different directions and inside of the canopy. Leaf samples were taken to the laboratory and all individuals of scale insects on the whole surface of the leaves were counted under a stereomicroscope. Biological stages of the individuals and live, dead and parasitized ones were determined by removing the scale covers using a pin. Population developments of both scale insects and their parasitoid *A. melinus* and parasitization rate of the scale insects were found. Parasitized scales were determined by counting the scales with parasite emergence holes and by lifting the cover of all other scales and checking for eggs, larvae or pupae of the parasitoid.

## RESULTS AND DISCUSSION

Throughout the study, trends of population fluctuation of both scale insects were similar (Fig. 1). However, population level of CS was always higher than CRS. During the study, average and the highest numbers of CS and CRS per leaf were, 9.91, 26.76 and , 2.68 ,16.52, respectively.

The parasitization rate of CRS was almost always higher than that of CS. Average and the highest parasitization rates of CRS were 35.79 and 82.85 while those of CS were found as 27.11 and 62.89 (Fig. 1).

According to DeBach (1969), the parasitization rates between 15 – 20 % are appropriate to reduce CRS population. From this point of view, we can say that both scale insects are under control, in the study area. Thus, serious damage has not been observed on the trees and shoots in the orchard, during the investigation.

When the number of parasitized individuals of both scale insects were examined separately for each biological stage, it can be seen in the Fig. 2 that the highest numbers

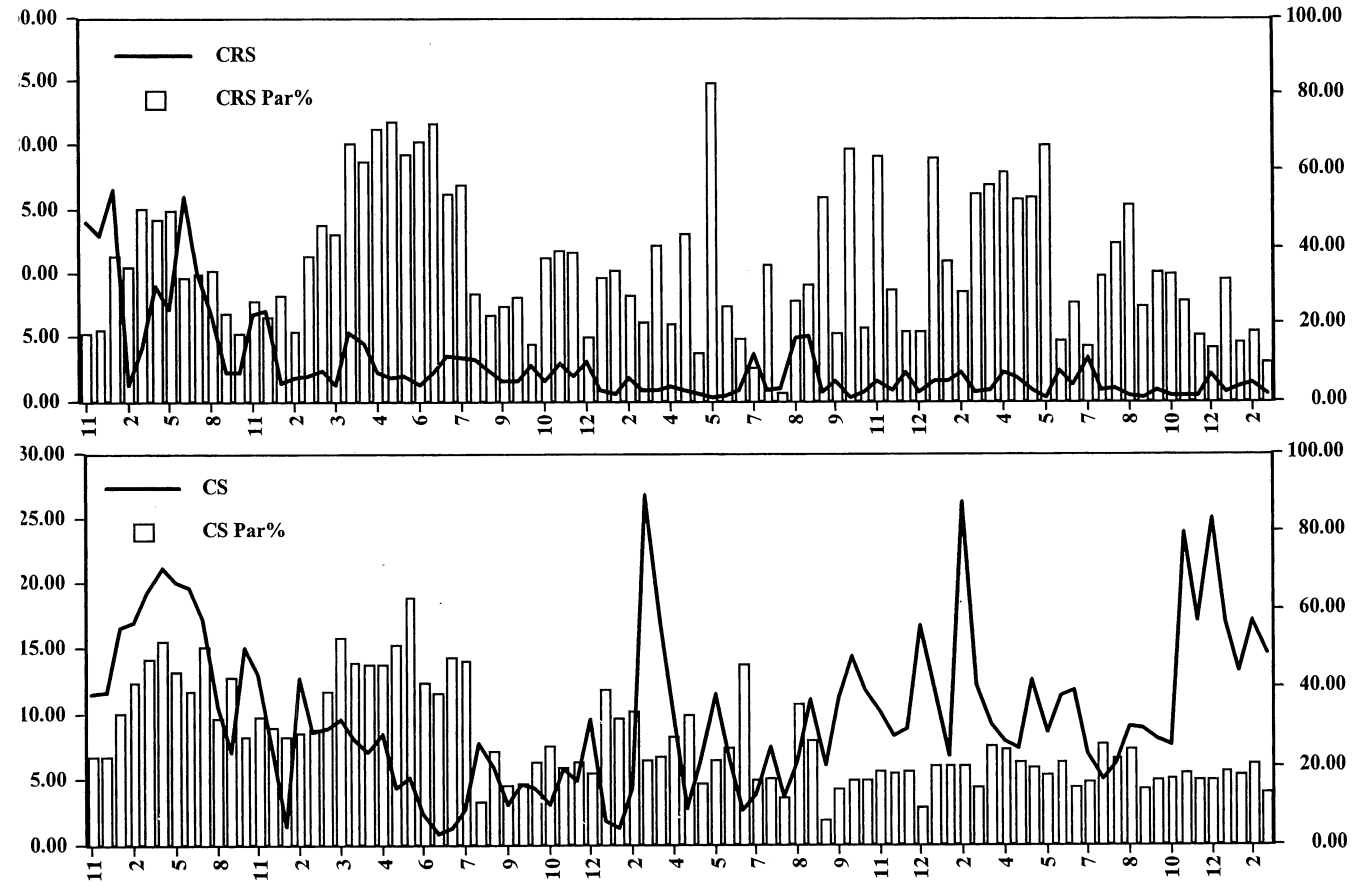


Fig. 1 - Population trends of CRS and CS, and parasitization rate in percent of CRS and CS by *Aphytis melinus*, Adana , Turkey.

of parasitized individuals were at the adult stages. For both pests, numbers of parasitized individuals were very little at the first stage, while at the second stage those were moderate. The reason for the first stage not being preferred as a host was reported to be its small body size (Opp & Luck, 1986; You, 1986; Karaca, 1998).

Consequently, it was determined that the populations of both pests remained at certain level, despite no chemical control was undertaken in the citrus grove. This indicated that the parasitoid efficiently reduced the population developments of both scale species. The reason for higher population density levels of CS than that of CRS was thought to be the consequence of highest parasitization rate observed for CRS during the study. According to our results, the population of the latter appeared to be dynamically more stable at low levels in the study site. This indicates that when the negative effects such as dust and the use of broad spectrum insecticides are eliminated and integrated pest management programs utilised, *A. melinus* can successfully control CRS and CS populations in citrus orchards in Çukurova region of Turkey, and stabilises their populations at low levels for a long period.

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PROF. ISMAIL KARACA - Department of Plant Protection, University of Süleyman Demirel, 32260 Isparta, Turkey. E-mail: [ikaraca@ziraat.sdu.edu.tr](mailto:ikaraca@ziraat.sdu.edu.tr)

PROF. NEDİM UYGUN - Department of Plant Protection, University of Çukurova, 01330 Adana, Turkey. E-mail : [nuygun@mail.cu.edu.tr](mailto:nuygun@mail.cu.edu.tr)

DR. NAİME Z. ELEKÇİOĞLU - Plant Protection Research Institute, Adana, Turkey. E-mail:

RES.ASS. DERYA SENAL - Department of Plant Protection, University of Çukurova, 01330 Adana, Turkey. E-mail: [senald@mail.cu.edu.tr](mailto:senald@mail.cu.edu.tr)

