

Seasonal population development of spider mites (Acari: Tetranychidae) and their predators in sprayed and unsprayed apple orchards in Van, Turkey*

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Abstract

The aim of this study was to determine the seasonal population dynamics of spider mites [*Panonychus ulmi* (Koch), *Amphitetanychus viennensis* (Zacher), *Bryobia rubrioculus* (Scheuten)] and their natural enemies [*Kampimodromus aberrans* (Oudemans), Acari, Phytoseiidae; *Zetzellia mali* (Ewing), Acari, Stigmaeidae; and *Stethorus punctillum* Weise, Coleoptera, Coccinellidae] on Golden Delicious and Starking Delicious apple cultivars in three apple orchards of Van, Turkey, during 2002–2003. Surveys were carried out weekly from May to November in sprayed and unsprayed apple orchards. The results of study indicated that the population densities of spider mites began to increase generally in early May, reached the maximum level from mid June to late August and persisted until late September in both years. During 2002 the dominant species on both apple cultivars was *P. ulmi*, whereas in 2003 it was *A. viennensis*. In this two-year period, the population densities of *P. ulmi* and *A. viennensis* reached the maximum level of 318.1 and 427.2 mites per leaf, respectively, in sprayed orchards. In unsprayed orchard, spider mites remained at very low levels because of the presence of *K. aberrans* which was the only predator of spider mites. On the other hand, in sprayed orchards, although *S. punctillum* and *Z. mali* were the most abundant predatory species on spider mites, they could not control them in either apple cultivar and years.

Key words: Biological control, coccinellids, population dynamics, spider mites, predatory mites

Introduction

Apple is one of the most common crops in the world; worldwide, apple production reaches about 58 billion tons at each year (Gül & Erkan, 2001). About 2,410 thousand tons of apple are produced at each year in Turkey, where the growing areas are mainly concentrated in the regions of Bursa-Yalova-Çanakkale, Amasya-Tokat, Isparta-Burdur-Antalya and Niğde-Nevşehir-Kayseri (Gül & Erkan, 2001). Apple is a major fruit crop in the Van region of Turkey, where approximately 4,568 tons of apple are produced in 1,596 ha at each year, accounting for 0.2% of Turkey's total apple production (Anonymous, 2005).

During the growing season, various arthropod species and diseases cause economic losses to apple, particularly aphids (especially *Aphis pomi* De Geer, Homoptera, Aphididae), mites [*Panonychus ulmi* (Koch) and *Amphitetanychus viennensis* (Zacher), Acari, Tetranychidae], moths (*Yponomeuta malinellus* Zeller and *Cydia pomonella* Linnaeus, Lepidoptera, Yponomeutidae, Tortricidae) and apple scab [*Venturia inaequalis* (Cooke)]. These have become serious pests and disease during the last years (Erol & Yaşar, 1996; Yardım *et al.*, 2002). Control of these pests and disease relies mainly on pesticide spraying programs. The disruptive effects of pesticides, especially due to development of resistance by pests, have led to greater reliance on natural enemies for their control in the Van region (Erol & Yaşar, 1996; Atlıhan *et al.*, 2002; Yardım *et al.*, 2002). Yet, suppression of the natural enemies by pesticides has been causing spider mites outbreaks. The effects of predatory species on the species composition and seasonal abundance of spider mites have not been previously investigated in commercial apple orchards in Van.