

## ACAROLOGY

# Damage caused by *Tetranychus Merganser* Bondreaux (Acari: Tetranychidae) on Nopal Verdura *Opuntia Ficus-Indica* (L.) Miller during winter

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## Abstract

The spider mite *Tetranychus merganser* occurs in some crops in Mexico and USA. This mite could be considered a potential pest in countries like Japan. In this work we recorded the damages that *T. merganser* causes to the nopal verdura (prickly pear vegetable crop) in one of the principal cactus crop regions of Mexico.

## Short communication

The spider mites (Acari: Tetranychidae) are economically important because of the damage they can cause to crops (Jeppson *et al.*, 1975; Park & Lee, 2005) and the high costs for controlling them (Park & Lee, 2007). The mite *Tetranychus merganser*

is distributed along China, Mexico and USA and its development occurs mainly on species of families as Caricaceae, Oleaceae, Solanaceae and Rosaceae (Migeon & Dorkeld, 2006-15). In Mexico, *T. merganser* affects papaya crops *Carica papaya* L. (Caricaceae) (Valencia *et al.*, 2011), and is present on chili peppers *Capsicum annuum* L. (Solanaceae) (Estébanes-Gonzalez & Rodríguez-Navarro, 1991), peanut *Arachis hypogaea* L. (Fabaceae) (Rodríguez, 1999) and occasionally edible young cactus pads (less than 30 days, said *nopal verdura* or *nopalito*) of *Opuntia ficus-indica* (L.) Miller (Cactaceae) (Lomeli-Flores *et al.*, 2008). The nopal verdura is a perennial crop native and domesticated in Mexico (Griffith, 2004); this country is its main producer (12,600 ha cultivated and bearing 813,000 tons per year) and concentrates its major density of crops in two regions: Milpa Alta (Mexico City) and Tlalnepantla (Morelos) (SIAP, 2015). Nowadays *T. merganser* occurs only, in warm periods, on nopal verdura crops in Tlalnepantla. This research was aimed at studying the economic impact of *T. merganser* on this crop during winter 2016 in Tlalnepantla, Morelos.

The study area was located in Tlalnepantla, Morelos (-120.3185°N, 132.4173°W), distributed between 1700 to 2500 meters above sea level (Vanegas-Rico *et al.*, 2010). This region is integrated by small plots ( $\leq 0.5-2$  ha) (Interdisciplinary Researchers Group of Nopal, unpublished data), in which the mites were searched considering the records of previous years and the current observations of the farmers. For this reason, data collection was undertaken in the lowest region (1700 m), observations were also made at higher altitude. The area infested was estimated through Arc View 10 (Environmental Systems Research Institute Inc., Redlands, CA, USA). It encompassed weekly visits to count infested plants per hectare (incidence), total affected one and discarded young pads per plot. Specimens of *T. merganser* were collected and their density (mites/cm<sup>2</sup>) was determined through photographs on 30 random plants per hectare. The cost of controlling mites was calculated as cost of pesticide and its application first per plot and then calculated per hectare. The key of Barker & Tuttle (1994) was used to identify the species sampled, and its *aedeagus* was compared with other voucher specimens at the Colegio de Postgraduados and using a private collection of the junior author.

Before the current study, *T. merganser* had been recorded sporadically during March and April in some plots of Tlalnepantla, Morelos at the same altitude (Lomeli-Flores *et al.*, 2008). During 2009, 2011 and 2012 the records were inconsistent and occurred in a total area up to 6 ha, mostly on careless crops (Vanegas-Rico, pers. comm.). During those years the mite was not considered as a pest by farmers, according to their criterion based on malforma-

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tions or other negative characteristics to sell nopalitos, notwithstanding the unregistered incidence or severity.

The presence of *T. merganser* detected during early winter 2016 was considered unusual because of the seasons and its distribution occurred in less than 4 ha with incidence of 40 to 90% in the plots. The commercial product (young pads) was affected by the mite feeding causing turgor loss, many scars and tissue discoloration that were not accepted by intermediaries' buyers. High incidence of mites was associated to deformations of the young pads. There were about 16,000 young pads per hectare damaged and removed during the winter 2016. The population density of *T. merganser* averaged on  $9.9 \pm 0.6$  individuals per  $\text{cm}^2$  and about 3800 infested plants were registered. Before winter 2016, *T. merganser* could have been indirectly controlled by spring treatments using combinations of insecticides and agricultural soaps applied against the wild cochineal *Dactylopius opuntiae* Cockerell (Hemiptera: Dactylopiidae) (Vanegas-Rico *et al.*, 2010). In the period of study on 2016, some applications of abamectin for mite direct control were required. The mite population density decreased after the applications of acaricides although the mite was still present on the crop in spring; however, in this season nopalitos have low cost, so the farmers do not harvest them or they do severe pruning, leaving only older pads which are less suitable for the mite. When the rainy season starts the cochineal population decrease (Vanegas-Rico *et al.*, 2017) and several farmers use to apply insecticides trying to eliminate them (Vanegas-Rico *et al.*, 2017; Lima-Espíndola, *pers. comm.*). Although there are no evaluations, it is supposed that precipitation also affects mite populations, but until the next spring they are again observed in autumn, *O. ficus-indica* plants are pruned again to stimulate growth during the winter, when its commercial value increases because other regions suffer severe frosts.

Nowadays, *T. merganser* occurs only on nopal verdura crops in Tlalnepantla, Morelos, and during the winter of 2016 caused losses of  $586 \pm 234$  dollars per hectare. The source of infestations of *T. merganser* over nopal verdura in Tlalnepantla is still unknown. However, alternating crops such as green tomato (*Physalis ixocarpa* Brot.) (Solanaceae), pumpkin (*Cucurbita pepo* L.) and cucumber (*Cucumis sativus* L.) (Cucurbitaceae), have been observed in adjacent regions. The last two species have been positively detected with *T. merganser* in Japan customs shipments, (Ullah *et al.*, 2011). Since this mite has an important capacity of development at different temperatures (Reyes-Pérez *et al.*, 2013), could represent a phytosanitary problem in crops of that continent (Ullah *et al.*, 2011). For this reason, continuous monitoring is required to prevent further outbreaks. In addition, other productive and wild zones of *Opuntia* spp. should be investigated to determine their role as a potential pest in nopal crops in Mexico.

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