

Note

First report of *Tetranychus urticae* Koch (Acari: Tetranychidae) occurring in the Ecuadorian Sierra on two Andean crops

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Abstract

The presence of the two-spotted spider mite, *Tetranychus urticae* Koch is recorded for the first time at the Ecuadorian Sierra, Province of Tungurahua, Ecuador. High populations and severe damages caused by this spider mite were found on *Arracacia xanthorrhiza* (arracacha) and *Solanum muricatum* (pepino dulce) leaves in the experimental orchard located in the Campus of the Universidad Técnica de Ambato. So far, this species had been reported in Ecuador only occurring on ornamental or conventional crops, thus its incidence on such Andean crop species opens a gate on research on other economic important crops in the Andes.

Additional keywords: arracacha, pepino, phytophagous mite.

Production of Andean roots and tubers, including arracacha, oca, ulluco, pepino dulce is concentrated in the Andean region from Ecuador (Barrera *et al.* 2004). According to Hermann (1997), arracacha (*Arracacia xanthorrhiza* Bancroft) is considered the only umbellifer domesticated in South America. Although there are no evidences about the area of origin of arracacha, it is presumed to be northern South America, based on the presence of taxonomically related wild species (Hernández-Bermejo and León, 1994). Outside the Andes, it is grown in the Antilles, Central America, Africa, Sri Lanka and in large commercial areas in southern Brazil, where it is industrialized.

Although the genus *Arracacia* is particularly diverse in Mexico, the wild species most closely resembling arracacha are known to be from Peru and especially Ecuador (Hermann 1997). Despite this high diversity, in Ecuador

decreasing production, consumption and utilization have been observed during the last 10-20 years, except for San José de Minas, province of Pichincha (Barreras *et al.* 2004). According to Hernández-Bermejo and León (1994), the main cause of the crop marginalization seemed to be the socio-economic context of growers, but also limiting factors of an agronomic nature, such as: long production cycle, root lignification on maturity, and damage by pests and diseases, rotting caused by *Pseudomonas* sp., *Alternaria* sp., *Erwinia* spp. and *Rhizoglyphus crocorum*; and lesions from nematodes, such as *Pratylenchus penetrans*.

The pepino dulce, *Solanum muricatum* Aiton, originates from the Andean region and has been domesticated since pre-Hispanic times and it is known only as a cultivated species (Hernández-Bermejo and León, 1994). This solanaceous vegetable is grown in Colombia, Ecuador, Bolivia, Peru, Chile and New Zealand (Dennis *et al.*

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1985). Although there is no information about worldwide production, according to Torrent (2014), pepino dulce's production increased almost five fold from 1998-2010 in Ecuador where it is consumed as a fresh fruit.

Some phytophagous mite species have been reported causing feeding damage on arracacha, including *Tetranychus desertorum* Banks, *Tetranychus turkestanii* (Ugarov & Nikolskii) and *Tetranychus urticae* Koch (Bolland *et al.* 1998). Previous studies had mentioned tetranychid mites feeding on arracacha in some South American countries such as Brazil (Vasconcelos, 2011), Colombia and Venezuela (Doreste 1968). On the other hand, *T. urticae*, *Aculops lycopersici* and *Polyphagotarsonemus latus* have been reported on pepino in Chile and Costa Rica (Aguilar and Murillo 2012, Larraín 2002). However, so far, information about economic impact of phytophagous mites associated to arracacha or pepino dulce is still scarce.

In December 2015, as part of a study dealing with genetic characterization of Arracacha germoplasm existing in Ecuador, the authors of this note found high populations of tetranychid mites on arracacha plants growing in the experimental station of the Universidad Técnica

de Ambato (UTA) (lat 01°22'02" S, long 78°36'20"W; 2868 masl). In the same opportunity, we could observe a pepino dulce crop growing associated with arracacha. In both plant species, the attacked leaves showed yellowish to purple spots on adaxial surface as symptoms of tetranychid feeding, mites and their cast skins were found in large numbers on the abaxial surfaces of those leaves. Although damage intensity quantification was not made, field observations showed both of the arracacha and pepino dulce plants bearing high number of *T. urticae* and subsequently showing symptoms of feeding of this mite species, as evidenced in Figures 1 and 2.

Some leaf samples were taken to the Plant Health Laboratory and females and males of the tetranychid specimens were mounted on slides using Hoyer medium. To certify the identification 12 females, seven males and 10 nymphs were observed under optical microscope from arracacha leaves and five females, eight males from pepino dulce. Genus was determined using a taxonomical key (Gutierrez 1985) and species by comparing aedeagus shape (Figure 3) (Ochoa *et al.* 1994). Voucher specimens are deposited at the the Plant Health Laboratory (UTA).



Figure 1. Adaxial (A) and abaxial (B) leaf surface of *A. xanthorrhiza* showing symptoms of *T. urticae* feeding.



Figure 2. Adaxial leaf surface of *S. muricatum* showing symptoms of *T. urticae* feeding.

Previous studies have reported severe damage by *T. urticae* on arracacha in Brazil (Ide *et al.* 2011) causing general leaf yellowing, leaf lost, strong reduction in the production of new leaves, lateness in the plant development and consequently diminishing in the production (Bôas *et al.* 1997). In addition, this mite species is considered a main pest on pepino dulce in Chile (Larraín 2002). Attempts to

manage pest populations have included use of pesticides such as abamectin (Bueno 2004), amitraz, cyhexatin and sulphur (Larraín 2002). Some natural *Neoseiulus chilensis* (Dose) populations have been observed controlling *T. urticae* on pepino dulce in Chile (Larraín 2002). Although *T. urticae* is a cosmopolitan tetranychid mite, this species had not been reported in Ecuador (Bolland *et al.* 1998),



Figure 3. Female specimen and egg (left) and male aedeagus (right) of *T. urticae* from a pepino dulce leaf.

and to this date, we could not find a current report related to this regard. Considering that, *T. urticae* has a wide range of host plants; the authors suggest that surveys might be carried out in order to establish the current distribution in Ecuador.

In particular, several cultivars of arracacha supposedly exist in the Andean region (Tapia *et al.* 1996), more detailed studies dealing with the economic impact and possible cultivar resistance should be addressed to establish sustainable management strategies. These strategies should be available for small-farm holders, mainly for the native people, who predominantly grow and consume this crop in Ecuador.

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