Researchers verify that agricultural biodiversity is an effective tool to fight plagues

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Credit: Asociación RUVID

Researchers of the Ecophysiology and Biotechnology group of the Universitat Jaume I (UJI) in Castellón, Spain, have taken part in a study

that reveals how agricultural biodiversity is an effective tool for combatting plagues and the effects that climate change has on crops. The results of the work, now published in *Frontiers in Plant Science*, show that preservation of traditional varieties improves the effects of hydric deficit and damages caused by red spider mites.

The research has been conducted by the Department of Agricultural and Natural Environment Sciences of the UJI and the Laboratory of Agricultural Entomology Plant-Insect Interaction of the Centre for Biological Research of the Spanish National Research Council (CSIC). They have studied the influence of hydric deficit on the invasive and damaging capabilities of red spider mites on indigenous varieties of tomato plants from the Balearic Islands.

This work includes "an analysis of the physiological factors of the plant that affect the plant-mite interaction, and we have specifically observed that the accumulation of sugars and amino acids resulting from the lack of water have a positive effect on the growth and development of the red spider mites," says Miguel González Guzmán, who recently joined the Ecophysiology and Biotechnology laboratory with a Ramón y Cajal grant and is one of the researchers involved in the project along with professors Vicent Arbona and Aurelio Gómez Cadenas.

Furthermore, this positive effect, according to Gómez Cadenas, "is coupled with the alteration of the abscisic acid hormone levels, which create the response to drought, as well as a decrease in the activity of certain protease inhibitors, defence proteins involved in protecting the tomato plant against the attack of the red spider mite."

The results obtained in this study also support "the use of traditional varieties of tomato which are well adapted to the Mediterranean conditions as a source of variability to produce genotypes with increased tolerance to drought and the attacks of plagues," adds González.

In the last few years, the UJI researchers have been witnessing a significant change in climate conditions caused by global warming which, as well as having a noticeable effect on agricultural production and quality, also influences the growth parameters of various agricultural plagues such as, for example, the red spider mite or Tetranychus urticae.

"This species has a cosmopolitan nature, and is also able to infest almost any crop, including those of vegetables such as tomatoes or fruits such as citric fruits. It feeds off the cellular content of the vegetables, and the damage it inflicts on the crops is noticeable and affects its growth and reproductive capability, as well as reducing the economic viability of the fruits," explains Arbona.

On the other hand, the harmful effect of the red spider mite is worsened by adverse climate conditions such as drought and, given that in field conditions, these usually happen jointly, it becomes necessary to simultaneously study the effect of the red spider mites on crops during droughts to fight against reduced productions, and the quality of our crops due to adverse climate conditions caused by climate change.

More information: Miguel G. Ximénez-Embún et al. Plant-Mediated Effects of Water Deficit on the Performance of Tetranychus evansi on Tomato Drought-Adapted Accessions, *Frontiers in Plant Science* (2018). DOI: 10.3389/fpls.2018.01490

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