

SURPLUS ZINC AMELIORATES THE RESPONSE OF TOBACCO PLANTS TO *XYLELLA FASTIDIOSA* INFECTION

Bàrbara M. Quetglas^{*1}, Rafael Bosh^{1,2}, Catalina Cabot³, Antoni Busquets¹, John V. Sibole³, Pere A. Gost⁴, Guillem Seguí³, Maria Cañellas¹, Margarita Gomila¹, Analia Perelló⁴, Josep Cifre², Jaume Vadell³ and Charlotte Poschenrieder⁵

¹ Department of Biology, ² IMEDEA (CSIC-UIB), ³ Department of Engineering, Universitat de les Illes Balears, Palma, SPAIN.

barbaraquetglascaivo@gmail.com, rbosch@uib.es, ccabot@uib.es, toni.busquets@uib.es, john.sibole@uib.es, pereantonigostgarcia@gmail.com, g.segui@uib.es, maria.canellas@uib.es, marga.gomila@uib.es, josep.cifre@uib.es, jaume.vadell@uib.es

⁴ Faculty of Agriculture and Forestry, Universidad Nacional de La Plata, La Plata, ARGENTINE. anaperello2@yahoo.com.ar

⁵ Department of Plant Physiology, Universitat Autònoma de Barcelona, Barcelona, SPAIN. charlotte.poschenrieder@uab.cat

Abstract: *Xylella fastidiosa* (*Xf*), is a xylem-confined bacteria and a quarantine pathogen organism in the EU that causes important diseases in vineyards and almond tree orchards in Mallorca (Balearic Islands) (Gomila et al., 2019). Zinc is a key micronutrient that participates in the plant's protection against pathogens (Cabot et al., 2019). The virulence of *Xf* is affected, among other factors, by plant ionic composition. Zinc concentration has been related to planktonic growth and *Xf* biofilm production (Andersen et al., 2007; Navarrete et al., 2015). Here, the role of surplus Zn in the plant response to *Xf* has been studied in *N. tabacum* var. Petit Havana. Plants were grown in 50% Hoagland nutrient solution modified with 2 (control) or 12 μ M (surplus Zn) Zn. In 2-month-old plants, the lowest non-senescent leaf in half of the plants for each Zn treatment were inoculated with *Xf* subsp. *fastidiosa*. Forty days after inoculation, visual symptoms, plant biomass, and water content were recorded. Bacterial population in plant extracts was quantified by qPCR. Wilting symptoms were shown in the lower leaves of inoculated plants in both Zn treatments. Moreover, *Xf* accelerated flowering more markedly in control than in surplus Zn plants. In both Zn treatments, leaf fresh and dry biomass decreased in infected plants, with the exception of the youngest leaves in surplus Zn, which showed no differences with respect to control. *Xf* decreased water content in the leaves closest to the inoculation site, which showed the highest *Xf* colonization in both Zn treatments. Bacterial colonization decreased in the upper leaves, with surplus Zn plants showing the lowest values. *Xf* decreased total plant biomass in control plants, while no differences were found in the surplus Zn treatment. In surplus Zn, *Xf*-inoculated plants showed a significant increase in root growth with respect to control. Our results suggest that the ameliorating effect of surplus Zn in the response of tobacco plants to *Xf* could be related to promotion of the development of a larger root system, which

could contribute to maintain plant growth, rather than surplus Zn having an inhibitory effect on bacterial colonization or improving leaf water status.

Key words: *Nicotiana tabacum*, Surplus zinc, *Xylella fastidiosa*

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