

# 6<sup>th</sup> Global Summit on Plant Science

October 29-30, 2018 | Valencia, Spain

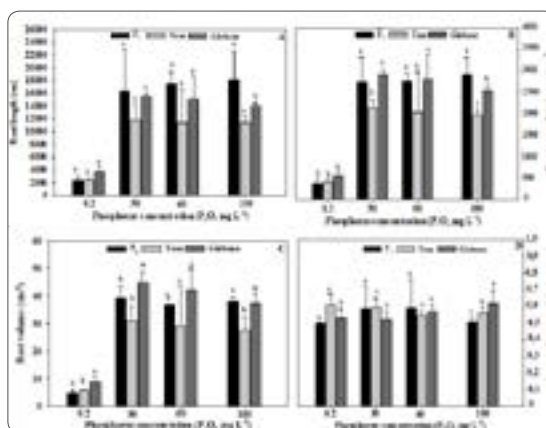


## Douglas J Marques

Universidade José do Rosário Vellano, Brazil

### Differential responses of root system and gas exchange in contrasting tomato genotypes under phosphorus starvation

Phosphorus (P) is an essential macronutrient for the development of plants. Although it is not always required in larger amounts, its presence is often limited, since the Brazilian and other soils of the world are generally poor in this element. Introduction of tomato plants with greater efficiency in the absorption of phosphorus have been identified. Study conducted by Hochmuth et al., (1985) evaluated more than 200 tomato types (*Solanum lycopersicum*), with at least two of these introductions being highly efficient in extracting P from the poor-P solution. In one of these introductions (PI 121665 was described as Globonnie cultivar), the efficiency in the extraction of phosphorus was associated with a morphological characteristic in the roots, when this type was cultivated in nutrient solution containing a low content of P. This characteristic, called "cotony root", showed up in simple heritage (a recessive gene, termed crt) and is associated with a large number of roots that can be observed in a microscope after being stained with carmine acetic, when plants are grown in solutions with low content (2 ppm) P, while that this response is not observed when higher concentrations of P (8 ppm) are used. The objective of the research was to evaluate the development of the root system, gas exchange and efficiency in the absorption of phosphorus in contrasting tomato genotypes. The experimental design was a randomized block in the factorial scheme with three tomato genotypes (Globonnie, Tom-598 and F1) and four phosphorus levels (0.2, 30, 60 and 100 mg L<sup>-1</sup>) with four replications. By evaluating the root morphology, it was observed that the genotype Globonnie produced the highest length, surface area and volume of the root at dose 0.2 mg L<sup>-1</sup> of P. For the gaseous exchange there was a higher photosynthetic rate, perspiration and stomatal conductance for Globonnie at the lowest dose of P. For the concentration of P in the leaf and root Globonnie also presented higher content at the dose of 0.2 mg L<sup>-1</sup> of P. It was concluded with the research that Globonnie and F1 presented better performances at the dose of 0.2 mg L<sup>-1</sup> of P, due to higher root production and gas exchange. Here, we reveal a possible reduction of phosphorus and consequent production costs in tomato agriculture. The Globonnie genotype has the expression of its gene under the conditions of lack of P.



**Figure 1 :** Root characteristics: (A) length, (B) surface area, (C) volume and (D) average diameter for genotypes de tomato (Globonnie, TOM 598, F 1) with regard to different concentrations of phosphorus

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## Recent Publications

1. Silva E C and Maluf W R (2012) Hydroponic technique for screening tomato genotypes on the efficiency of phosphorus uptake. *Brazilian horticulture* 30:317-321.
2. Zhang F, Shen J, Zhang J, Zuo Y, Li L and Chen X (2010) Rhizosphere processes and management for improving nutrient use efficiency and crop productivity: implications for China. *Advances in agronomy* 107: 1-32.
3. Marques D J, Silva E C, Moraes L F R, Caetano E, Silva R A, Araújo T H, Abreu V M and Maciel G M A (2007) Introgression of resistance and characterization of the gene phosphorus deficiency in tomato. In: *IV Brazilian Congress of Plant Breeding, Summaries...São Lourenço, Brazil: ABMP (CD-ROM)*.
4. Hochmuth G J, Gabelman W H and Gerloff G C (1985) The gene affecting tomato root morphology. *Hortscience* 20:1099-1101.

## Biography

Douglas J Marques, PhD in Agronomy - Soil Science/Plant Nutrition and Fertility at the Unifversidade Federal de Lavras, Brazil/UFLA (2013). I currently hold the position of Integral Professor at the Alfenas/FETA Foundation of Education and Technology, which is the maintainer of the Universidade José do Rosário Vellano/UNIFENAS, Coordinator of the Olericultura Studies Center, Horticulture and Experimentation Sector and Experimental Area of Organic Agriculture. Professor of the Professional Master's Degree in Production Systems in Agriculture and in the PhD course in Sustainable Agriculture. In the area of Ecophysiology and Fertility and Mineral Nutrition of Plants I have directed the studies to the beneficial effect of silicon as a source of water stress in maize and sorghum for arid and semi-arid regions. We are working with some extension projects in the creation and conduction of gardens: community, urban, schools, asylums and therapeutic and transformation of the same to the system of organic agriculture.

[douglasmarques81@yahoo.com.br](mailto:douglasmarques81@yahoo.com.br)

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