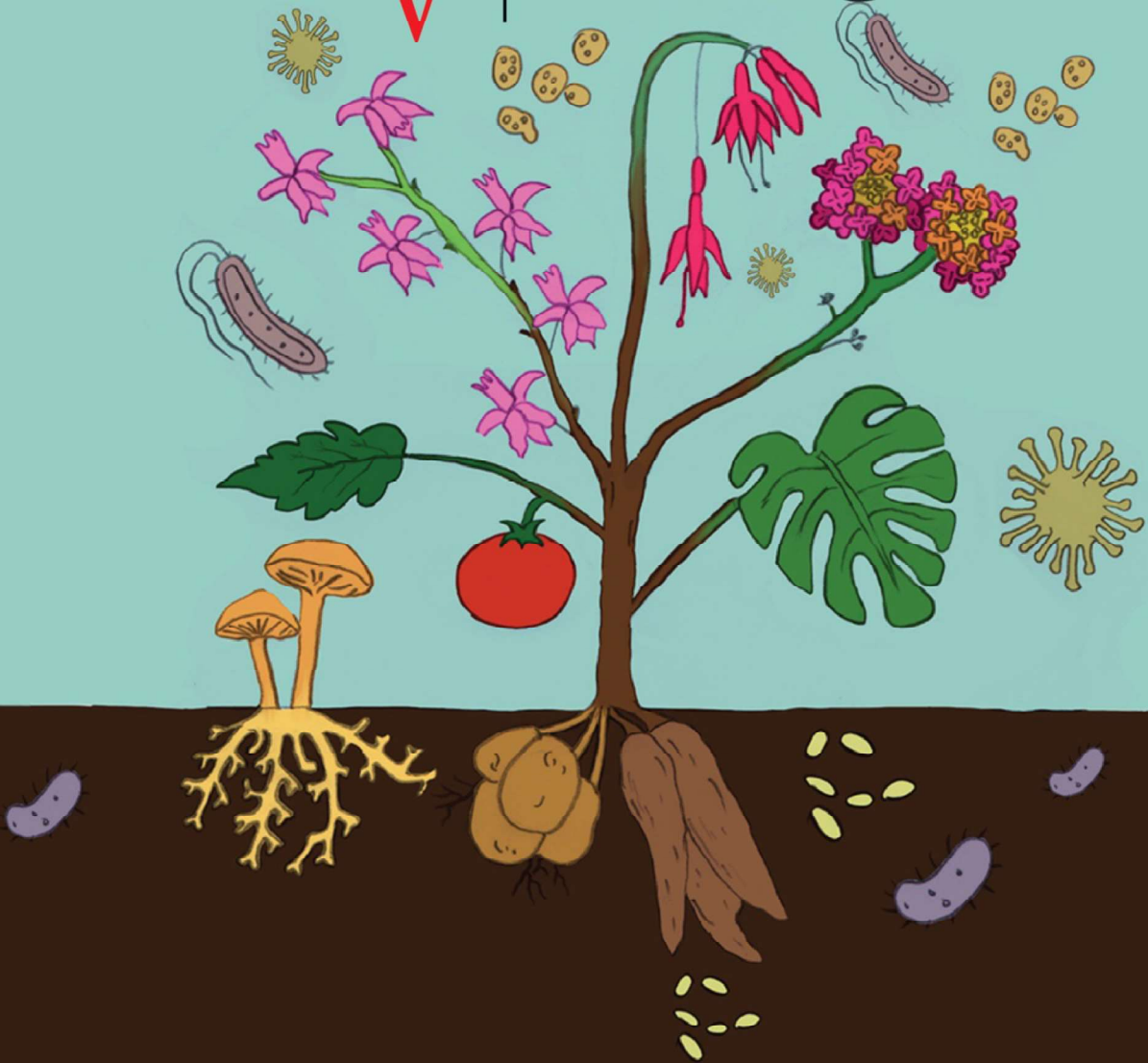


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4th Plant Microbiome Symposium

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USFQ PRESS

Universidad San Francisco de Quito USFQ
Campus Cumbayá USFQ, Quito 170901, Ecuador
Octubre 2023, Quito, Ecuador

ISBN: 978-9978-68-275-3

Catalogación en la fuente: Biblioteca Universidad San Francisco de Quito USFQ, Ecuador

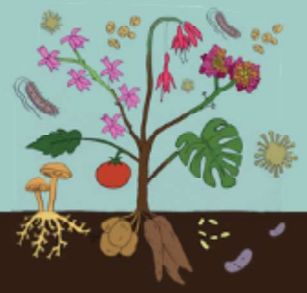
<p>Plant Microbiome Symposium (4th : 2023 : Quito, Ecuador) 4th Plant Microbiome Symposium / [editores, Pieter van't Hof, Antonio León-Reyes, Noelia Barriga Medina, Paola Espinosa Torres, Brianne Sagnay Ramírez : expositores, Jos Raaijmakers ... [y otros]]. - Quito : USFQ Press, ©2023. p. cm. : (Archivos Académicos USFQ, ISSN: 2528-7753 ; no. 50 (octubre 2023)) ISBN: 978-9978-68-275-3 1. Microbiomas vegetales - Congresos, conferencias, etc. - 2. Plantas - Microorganismos - Congresos, conferencias, etc. - I. Hof, Pieter van't, ed. - II. León-Reyes, Antonio, ed. - III. Barriga Medina, Noelia, ed. - IV. Espinosa Torres, Paola, ed. - V. Sagnay Ramírez, Brianne, ed. - VI. Raaijmakers, Jos, exp. - VII. Título. - VIII. Serie monográfica. CLC: QR74.8 .P53 2023 CDD: 579.3 OBI-182</p>

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Citación recomendada de toda la obra: Van't Hof, P., León-Reyes, A., Barriga Medina, N., Espinosa Torres, P., Sagnay Ramírez, B. (Eds.) (2023) 4th Plant Microbiome Symposium. *Archivos Académicos USFQ* 50, 1-118.

Citación recomendada de un resumen: Mendes, R. (2023) Microbiome-plant conversation in the rhizosphere. *Archivos Académicos USFQ* 50, p.39.



P-11

From Susceptibility to Resilience: Uncovering the Rhizosphere Microbial Contributions to Drought Tolerance in Common Bean

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Keywords: Microbial ecology, Drought tolerance mechanisms, flux balance analysis, network analysis

Climate change has intensified drought-related events in agricultural production, adversely affecting economic stability, societal well-being, and food security. While genetic advancements in crops and soil microorganisms have shown promise in enhancing resistance to abiotic stressors, our understanding of the rhizosphere microbiome remains limited, especially in tropical regions. In this study, four common bean (*Phaseolus vulgaris* L.) genotypes underwent 96 hours of drought stress. Two genotypes are renowned for their drought susceptibility (SC) (IAC-Carioca 80SH and IAC Milenio), and the other two for their drought tolerance (TL) (BAT477 and Sea5). Using short-read metagenomic sequencing, we analyzed the rhizosphere microbial composition across these genotypes throughout the experiment. Based on the community structure analysis, we found that rhizosphere communities in all genotypes were similar before water stress exposure. However, after 96 hours of drought, SC plants' microbial structure remained largely unchanged, while the rhizosphere community of TL plants underwent significant alterations. Network analysis revealed an increase in the number of edges for SC plants compared to the control, suggesting an increase in the complexity of microbial interactions under stress. In contrast, TL plants exhibited a decrease in edges compared to the control, indicating a reduction in the complexity of microbial interactions and potential selection of specific stress-tolerant microorganisms. These results imply that TL plants might favor a distinct community compared to SC plants, thus enhancing their ability to cope with such challenges. Flux balance analysis of rhizosphere microbial communities suggested that chemical flux of compounds involved in the regulation of stomatal closure, osmotic balance, and protection of cellular membranes, as well as affecting membrane fluidity and permeability, could contribute to drought resistance in TL plants. Our study illustrates the effects of abiotic stress on plants and highlights the role rhizosphere microbial communities play in fostering stress tolerance in the context of climate change.