Sarina Tsui et al., J Med Microb Diagn 2018, Volume 7
DOI: 10.4172/2161-0703-C1-018

47th World Congress on Microbiology

September 10-11, 2018 | London, UK

Evidence of horizontal gene transfer of a four-genes cluster exclusively in the sugarcane endophytic strain *Burkholderia seminalis* TC3.4.2R3

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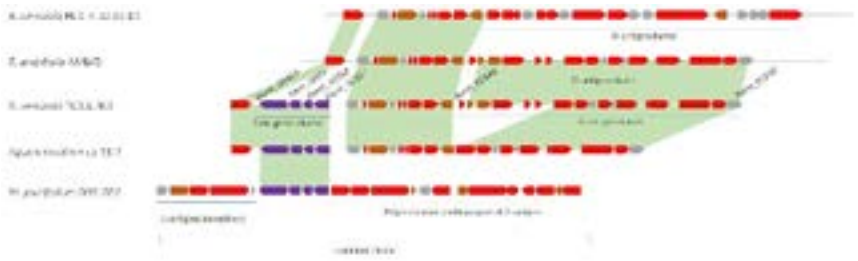
The *Burkholderia seminalis* strain TC3.4.2R3, isolated from sugarcane roots, belongs to the *Burkholderia* cepacia complex (BCC) and inhibits phytopathogenic fungi such as *Fusarium oxysporum*, Ceratocystis paradoxa and *Colletotrichum falcatum*. We show that antifungal production in *B. seminalis* TC3.4.2R3 could be due to the expression of a methyltransferase gene present in a unique four-gene cluster. AlienHunter software analysis revealed that this four-gene cluster has the highest score for potential sequences acquired by horizontal gene transfer. In silico comparisons revealed that the four-genes cluster had no matches with any BCC group. The GC content was not a good methodology to compare and speculate about the horizontal gene transfer since the GC content of the four-gene cluster was too similar to the average GC content of the strain TC3.4.2R3 (61-68%). Using PCR, we examined the presence of the four-gene cluster among 16 environmental *Burkholderia* species. However, no positive PCR products for the analyzed sixteen *Burkholderia* species were recovered. Thus, the methyltransferase gene present in the cluster appeared to be exclusive for TC3.4.2R3, reinforcing its possible origin by horizontal gene transfer. Horizontal gene transfer is a critical factor determining virulence, divergence, and survival in Burkholderia, and apparently in *B. seminalis* it occurred as an adaptative mechanism for survival. A better understanding of this four-genes cluster will provide clues about their origin and how the synthesis of antifungal compounds evolves.



Recent Publications

1. Lopes, R., Tsui, S., Gonçalves, P. J., & de Queiroz, M. V. (2018). A look into a multifunctional toolbox: endophytic Bacillus species provide broad and underexploited benefits for plants. World Journal of Microbiology and Biotechnology, 34(7), 94.
2. Batista, B. D., Lacava, P. T., Ferrari, A., Teixeira-Silva, N. S., Bonatelli, M. L., Tsui, S., ... & Quecine, M. C. (2018). Screening of tropically derived, multi-trait plant growth-promoting rhizobacteria and evaluation of corn and soybean colonization ability. Microbiological research, 206, 33-42.
3. Bonatelli, M. L., Tsui, S., Marcon, J., Batista, B. D., Kitajima, E. W., Pereira, J. O., ... & Quecine, M. C. (2016). Antagonistic activity of fungi from anthracnose lesions on Paullinia cupana against Colletotrichum sp. Journal of Plant Pathology, 197-205.
4. Quecine, M. C., Araújo, W. L., Tsui, S., Parra, J. R. P., Azevedo, J. L., & Pizzirani-Kleiner, A. A. (2014). Control of Diatraea saccharalis by the endophytic Pantoea agglomerans 33.1 expressing cry1Ac7. Archives of microbiology, 196(4), 227-234.
5. Quecine, M. C., Araújo, W. L., Rossetto, P. B., Ferreira, A., Tsui, S., Lacava, P. T., ... & Pizzirani-Kleiner, A. A. (2012). Sugarcane growth promotion by the endophytic bacterium Pantoea agglomerans 33.1. Applied and environmental microbiology, AEM-00836.

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Biography

Sarina Tsui is a Bachelor in Biology, she has got Master of Science degree in 2015, now has been doing her PhD in Microbiology since 2016 at University of Sao Paulo in Brazil. Most of the research projects have been involving Genetics, with emphasis on Molecular Genetics of Microorganisms, the main working topics: molecular interaction between beneficial bacteria and plant-host; cloning and gene expression study aiming at biological control through endophytic bacteria, molecular analysis of microorganisms diversity and also study of potential genetic tools applied as plant pathogen control.

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