9th Edition of International Conference on **Environmental Science &Technology**

&

48th World Congress on **Microbiology**

&

50th International Congress on **Nursing Care**

June 24-25, 2019 Moscow, Russia

Chitin fragments from *Alternaria alternata* as possible elicitor of PR3 activity and Chi1 gene expression in tomato fruit

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Tomato is a crop of economic importance throughout the world, whose production is affected by the fungus *Alternaria alternata*. Among the strategies proposed for its control is the induction of the natural defense mechanism, which can be activated in response to the recognition of specific phytopathogenic molecules such as chitin and its oligosaccharides. Chitin and its oligosaccharides are recognized by membrane receptors, initiating the transduction of signaling pathways and the expression of defense genes, which will code for proteins related to pathogenesis. The objective of this work was to evaluate the effect of chitin fragments of *A. alternata* on the activity of chitinase (PR3) and the relative expression of the gene encoding *Chi1*. Chitin fragments of low molecular weight (<1 kDa, F1) with an acetylation degree of 76% and a degree of polymerization ≤5 were obtained from *A. alternata* by enzymatic degradation. Tomatoes were immersed in F1 treatment and tissue samples were taken at different post-exposure times (0, 0.25, 0.50, 0.75, 1, 3, 6, 24, 48 h). The activity of chitinase was measured by a fluorometric method and the quantitative expression of the *Chi1* gene was measured by real-time PCR. F1 induced a significant increase in the chitinase activity in tomato after 0.5 h of the treatment. Higher relative expression of *Chi1* was observed at 0.5 h post-exposure time. This relative expression was 4.6 times and 2.5 times higher in 0.5 h than in 0 and 0.25 h respectively, which suggests an early response of the fruit to the fragments of fungal chitin. The low molecular weight chitin fragments (<1 kDa) of *A. alternata* participate as inductors in the defense response in the tomato fruit.

Recent Publications

1. Troncoso-Rojas R and Tiznado-Hernández M E (2014) *Alternaria alternata* (black rot, black spot). Postharvest Decay 147-187.

2. Liu T, Liu Z, Song C, Hu Y, Han Z, She J, Fan F, Wang J, Jin C, Chang J, Zhou J M and Chai J (2012) Chitin-induced dimerization activates a plant immune receptor. Science 336(6085):1160-1164.

3. Iizasa E, Mitsutomi M and Nagano Y (2010) Direct binding of a plant LysM receptor-like kinase, LysM RLK1/CERK1, to chitin in vitro. Journal of Biological Chemistry 285(5):2996-3004.

4. Sun C, Fu D, Jin L, Chen M, Zheng X and Yu T (2018) Chitin isolated from yeast cell wall induces the resistance of tomato fruit to Botrytis cinerea. Carbohydrates Polymers 199:341–352.

5. Cota I E, Troncoso-Rojas R, Sotelo-Mundo R, Sanchez-Estrada A and Tiznado-Hernández M E (2007) Chitinase and beta-1, 3-glucanase enzymatic activities in response to infection by *Alternaria alternata* evaluated in two stages of development in different tomato fruit varieties. Scientia Horticulturae. 112(1):42-50.

Biography

Yaima Henry Garcia is a PhD student at the Plant Biotechnology and Post-harvest laboratory at the Food and Development Research Center in Mexico. Her expertise area includes molecular biology of fungi, plant physiology and the construction of supressive subtractive libraries in order to identify differentially expressed genes. Currently, she works in the identification of differentially expressed genes in tomato pericarp in response to the application of fragments of fungal chitin.

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