Quantitative Analysis of Coffee Defensive Gene Expression Induced by Products Based on Humic Acid and Phosphite Against Leaf Rust

1,2 Pires, N. F.; 2 Romano, E.; 3 Ribeiro Júnior, P. M.; 4 Guimarães-Dias, F.; 3 Paiva, L. V.; 1 Franco, O. L. 3 Resende, M. L. V.

1 Centro de Análises Proteômicas e Bioquímicas, Universidade Católica de Brasília (UCB) Brasília-DF, Brasil. 2 Embrapa Recursos Genéticos e Biotecnologia Brasília-DF, Brasil. 3 Universidade Federal de Lavras (UFLA), Lavras-MG, Brasil. 4 Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, RJ, Brasil.

The coffee rust caused by Hemileia vastatrix is a devastating disease that affects coffee plants causing severe crop losses (35% to 50%). The coffee rust control improvement has been pursued through the activation of natural plant defense mechanisms by previous application of biotic and abiotic elicitors. Two commercial elicitors Soloflex® (based on humic acids) and Reforce® (potassium fosfite) showed effectiveness in coffee rust management. Nevertheless, the mechanisms involved in plant responses to these products remains unclear until now. This report shows the utilization of real time PCR for study defensive responses induced by these two elicitors. In this view, the expression of glucanase GLU1, alene oxid synthase AOS2 and osmotin like- PR5 were evaluated. Expression profile indicated that spraying treatments with Soloflex® and Reforce® up-regulated GLU1 in coffee seedlings susceptible to leaf rust. Furthermore, AOS2 gene was induced upon 24h only for plants treated with Reforce®. Moreover, PR5 gene was up-regulated after 24h of treatment with both inducers. A synergistic effect was observed for the pathogen-presence and elicitor that leads to a GLU1 and PR5 up-regulation. For GLU1 gene, induction occurred 24h after inoculation in plants treated with two products. Regarding PR5, gene induction occurred 24h after plant inoculation with Reforce® and 48h after Soloflex® plants inoculation. No significant variations were observed for AOS2 in the presence of pathogen. In summary, data here reported suggest that treatments of coffee plants with Soloflex® or Reforce® increases the expression of genes related to defense response.

Key words: induced defense, Coffee, Hemileia vastatrix, real time PCR.
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