ASIC2016 CHINA·KUNMING
分享咖啡科技进步
Sharing Advance in Coffee Science & Technology

PB232

DIFFERENTIAL EXPRESSION OF CANDIDATE GENES TO RESISTANCE TO *MELOIDOGYNE PARANAENSIS* IN CLONES OF *COFFEA CANEPHORA*

LIMA, Edriana A. de*, RÊGO, Erica C.S., COTTA, Michelle G.**, ***, COSTA, Tatiana S.**,***, CARNEIRO, Fernanda A.**, ***, CARNEIRO, Regina M.D.G.***, MARRACCINI, Pierre***,****, ANDRADE. Alan C.***,*****

*Universidade de Brasilia, Campus Universitário Darcy Ribeiro, Brasilia, DF, Brazil 70910-900, **Federal University of Lavras, MG, Lavras, BRAZIL ***Embrapa Genetic Resources and Biotechnology, Brasilia, DF, BRAZIL, ****CIRAD, UMR AGAP, Montpellier, FRANCE, *****EMBRAPA Coffee-INOVACAFÉ, Lavras, BRAZIL.

Abstract

Candidate genes for resistance to *Meloidogyne paranaensis* in roots of clones 14 and 22 of *Coffea canephora,* respectively resistant and susceptible to this nematode, were proposed.

Introduction

Root-knot nematode-plant interactions, as well the physiological processes of parasitism and coffee genes involved in the resistance, are still poorly understood. It was previously reported that the drought-tolerant clone 14 of *Coffea canephora* Conilon was resistant to six different populations of root-knot nematodes, while the drought-sensitive clone 22 was susceptible to these nematodes (1). The aims of this study were to identify candidate genes putatively involved in nematode resistance and to analyze their expression profiles in roots inoculated with *Meloidogyne paranaensis*.

Methodology

Total RNA was extracted from roots of clones 14 and 22 of *C. canephora* Conilon at different days (4, 8, 12, 20, 32 and 45) after inoculation with *M. paranaensis,* converted into cDNAs and used in real time qPCR experiments to check the expression of *Cc03_g09540* (*CcCPI1*, JF950585) coding a cysteine protease inhibitor, *Cc01_g13400* coding a protein phosphatase, and *Cc00_g16260* and *Cc10_g14530* of unknown function.

Results

- For the *Cc00_g16260*, *Cc10_g14530* and *Cc03_g09540* genes, expression profiles were up-regulated upon nematode inoculation mainly in roots of clone 14 (Fig. 1).
- Compared to clone 14, expression of *Cc10_g14530* and *Cc03_g09540* remained very low in inoculated clone 22.
- Expression of *Cc10_g14530* gene in clone 14 was high soon after nematode inoculation and decreased hereafter. In the same clone, expression of *Cc00_g16260* and *Cc03_g09540* increased gradually over the time.
- On the other hand, expression of *Cc01_g13400* decreased in roots of clone 22 inoculated with *M. paranaensis*.

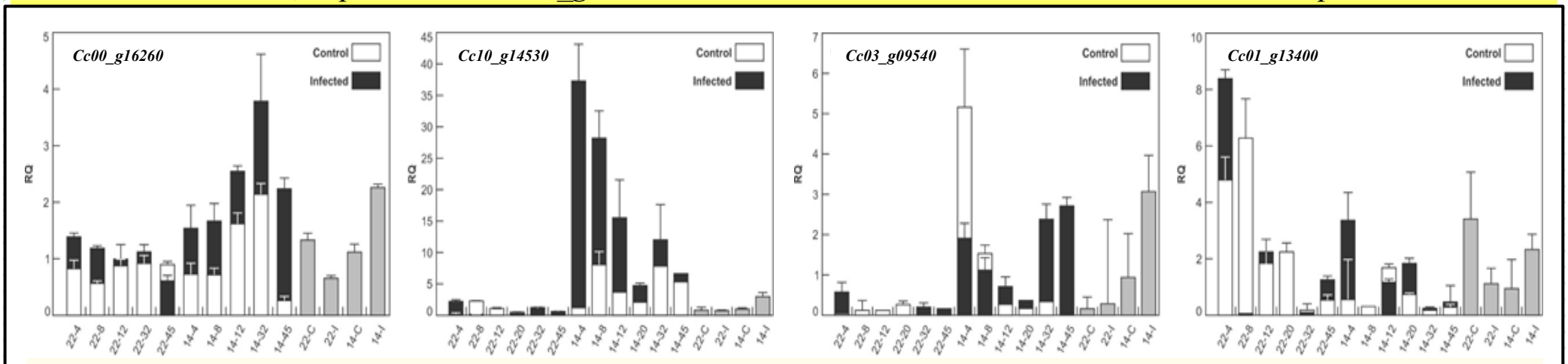

Figure 1: Relative expression of *Cc00_g16260, Cc10_14530*, *Cc03_g09540* (*CcCPI1*) and *Cc01_g13400 (*PP2C-type) genes on clones 22 and 14 of *C. canephora* Conilon at different days (4, 8, 12, 20, 32 and 45) after inoculation with *M. paranaensis*. White and black isobars represent control (non-inoculated) and inoculated plants, respectively. Grey isobars represent the mean of expression in inoculated (I) and non-inoculated (C) clones. The *x* axis mentions the days after inoculation. RQ: relative quantification in arbitrary units. The *CcUBQ10* gene was used as a reference gene.

Discussion

- Protease inhibitors are important proteins in plant defense processes as providers of natural resistance, and also excellent candidates for defense construction, being active against nematodes and other pathogens (2).
- The up-regulated expression of *Cc01_g13400* (coding a PP2C protein putatively involved in the abscisic acid signalization pathway) in inoculated clone 14 is worth noting. It suggests that "cross-talks" between biotic and abiotic signaling pathways (3,4) occurred specifically in the clone 14 of *C. canephora.*

Conclusion

Our results suggest that the four genes analyzed in this study are involved (directly or indirectly) in the resistance process of the clone 14 of *C. canephora* Conilon against infection by *M. paranaensis*.

References:

1- Lima E.A., *et al.* (2015). The multi-resistant reaction of drought-tolerant coffee 'Conilon Clone 14' to *Meloidogyne spp*. and late hypersensitive-like response in *Coffea canephora*. *Phytopathol*. 105: 805-814.
2- Rabovich C., *et al.* (2009). Protease inhibitors and reproduction of reniform nematode in pineapple. *Ann. Appl. Biol.* 154: 127-132.
3- Ramegowda V., Senthil-Kumar M. (2015). The interactive effects of simultaneous biotic and abiotic stresses on plants: mechanistic understanding from drought and pathogen combination. J. Plant Physiol. 176: 47-54.

UFLA UNIVERSIDADE FEDERAL DE LAVRAS · Universidade de Brasília · cirad · Consórcio Pesquisa Café · CAPES · INCT CAFÉ INSTITUTO NACIONAL DE CIÊNCIA E TECNOLOGIA DO CAFÉ · Embrapa