Expression analysis of ROS scavenging enzyme encoding genes in rubber tree infected by Microcylus ulei

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INTRODUCTION

South American Leaf Blight (SALB), caused by the ascomycete Microcylus ulei is responsible for the low productivity of rubber tree in Latin America and represents an important threat for rubber plantations in Asia and Africa, where production is derived from highly susceptible clones. Reactive oxygen species (ROS) control many different processes in plants. In biotic interactions, ROS were proposed to orchestrate the establishment of plant defenses and hypersensitive response (HR) following successful pathogen recognition (Lamb and Dixon, 1997). In this study, we present the expression of 9 genes potentially involved in ROS scavenging during infection of three different SALB resistant genotypes.

RESULTS

Expression of ROS scavenging encoding gene

The basal levels of expression of HbCat, HbGCL1 and HbGCL2 were different between the genotypes (Table 1): in MDF 180, the relative transcript levels of HbCat, HbGCL1 and HbGCL2 genes were respectively 55-fold and 2- to 3-fold lower than in FX 2784 and PB 314 (Figure 1). Slight differences in basal levels of expression between genotypes were detected 24 and/or 48 hpi for HbcuZnSOD, HbAPX1, HbAPX2, HbOASTL and HbMDHAR. M. ulei infection did not induce major variations of expression levels (several non significant P values for the variable Inoculation). Only two significant interaction between the genotype and the inoculation (G*I) were found for HbGCL1 gene, which was down-regulated in infected genotype and HbOASTL gene which was up-regulated in infected MDF180, both at 48 hpi (Table 1).

ROS scavenging encoding gene and DNA fragmentation

TUNEL and histological analysis indicated the presence of TUNEL positive nuclei (Figure 4F) and tissues degradation (Figure 5C) only in PB314 168hAI. This histological differences between the three genotypes were not directly related to the variation of expression of the 9 studied genes involved in ROS scavenging. Further gene expression analysis of the pathways using ROS as lignin biosynthesis pathway (Garcia et al, 1995, 1999; Sambagaro et al, 2004; Koop et al. 2011) are required.

CONCLUSIONS

- HbCat, HbGCL1 and HbGCL2 can be considered as reporter genes of the basal level of the oxidative status characteristic of the genotype;
- Other genes of the ROS scavenging pathway and lignin biosynthesis pathway have to be studied to get a best comprehensive overview of the oxidative status of the leaf and the possible variation of expression during infection by M. ulei.