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Genome wide analysis of nonhost resistance in *Arabidopsis thaliana* inoculated with *Phakopsora pachyrhizi*

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Asian soybean rust (ASR), caused by *Phakopsora pachyrhizi*, is a devastating soybean disease. We report the use of *Arabidopsis thaliana* to identify the genetic basis of nonhost resistance (NHR) to ASR. NHR protects plants against attack by the vast majority of potential pathogens. Its stability has been proposed to be the consequence of several successive layers of protective mechanisms that include both constitutive barriers as well as inducible reactions. Arabidopsis plants from the wild-type Col-0 were grown in a growth chamber at short-day conditions and inoculated with a final concentration of 15x 10^4 spores/mL. These spores were from a population collected in Brazilian fields and maintained for over 10 generations on the susceptible cultivar BRSMS-Bacuri. The infected leaves were collected during the first 4 days of infection (6, 12, 24, 48, 72 and 96 hours after inoculation - hai) for microarray analysis. The experiment followed a completely randomized design with three replications and two treatment factors; time (6 levels), and infection type (ASR-infected; mock-inoculated control). A total of 924 genes were classified as differentially expressed using a $q<0.05$ corresponding to a false discovery rate of less than 5% at one or more time points. Two peaks of genes activation were observed in the inoculated samples compared with the mock ones at 12 and 96 hai. This result suggests that Arabidopsis nonhost response to *P. pachyrhizi* could be related to response mechanisms, in both, the penetration stage and in the later stages post penetration. Among the up regulated genes we observed a large number of receptor kinases, genes related with the penetration process, transcriptions factors, PR proteins, and secondary metabolites biosynthesis. The PR1b and PDF1.2 gene markers for salicylic acid (SA) and jasmonic acid (JA)/ethylene hormone pathways respectively were among the most up regulated genes. Further studies will reveal whether the observed NHR of *Arabidopsis* against *P. pachyrhizi* might lead to new concepts in our understanding of NHR.

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