

## Expression patterns of genes involved in the defense and stress response of *Spiroplasma citri* infected Madagascar Periwinkle *Catharanthus roseus*.

### ABSTRACT

Madagascar periwinkle is an ornamental and a medicinal plant, and is also an indicator plant that is highly susceptible to phytoplasma and spiroplasma infections from different crops. Periwinkle lethal yellows, caused by *Spiroplasma citri*, is one of the most devastating diseases of periwinkle. The response of plants to *S. citri* infection is very little known at the transcriptome level. In this study, quantitative real-time PCR (RT-qPCR) was used to investigate the expression levels of four selected genes involved in defense and stress responses in naturally and experimentally *Spiroplasma citri* infected periwinkles. Strictosidine  $\beta$ -glucosidase involved in terpenoid indole alkaloids (TIAs) biosynthesis pathway showed significant upregulation in experimentally and naturally infected periwinkles. The transcript level of extensin increased in leaves of periwinkles experimentally infected by *S. citri* in comparison to healthy ones. A similar level of heat shock protein 90 and metallothionein expression was observed in healthy, naturally and experimentally spiroplasma-diseased periwinkles. Overexpression of Strictosidine  $\beta$ -glucosidase demonstrates the potential utility of this gene as a host biomarker to increase the fidelity of *S. citri* detection and can also be used in breeding programs to develop stable disease-resistance varieties.

**Keyword:** *Spiroplasma*; Periwinkle.