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DIFFERENTIAL EXPRESSION OF DEFENSE-RELATED GENES IN YELLOW PASSION FRUIT AFTER INOCULATION WITH MYCORRHIZAL FUNGI AND FUSARIC ACID APPLICATION

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Abstract:

Several studies have been developed to reduce the damage caused by fusariosis in *Passiflora edulis*, a disease caused by the fungus *Fusarium oxysporum* f. sp. *passiflorae*. The pathogen produces fusaric acid (FA), a mycotoxin that increases virulence and plays a pivotal role in manifesting the symptoms characteristic of fusariosis wilt. The biocontrol by beneficial microorganisms comprises a still unexplored alternative for yellow passion fruit under fusariosis, microorganisms such as arbuscular mycorrhizal fungi (AMF), which have a symbiosis with several plants. In this way, this work aimed to validate the differential expression of defense-related genes via quantitative real-time PCR (qPCR) in *P. edulis* under FA application. Inoculation with AMF was performed using mixed soil-inoculum containing *Gigaspora albida* and *Claroideoglomus etunicatum*. After 30 days of inoculation with AMF, the procedure followed the application of AF at a concentration of 400 mg/L. Root tissues were collected 24 and 48 hours after exposure to AF. Total RNA extraction was performed using a commercial kit with silica columns. Samples were quantified and evaluated for RNA purity and concentration, then converted to complementary DNA (cDNA). Primers were designed in the software Primer3Plus using pre-established parameters and evaluated for their specificity in the Primer-BLAST tool. qPCR reactions were performed using biological and technical triplicates, three reference genes for normalization of relative expression data, and SYBR Green detection. Three pairs of primers for the target genes were produced, one L-type lectin kinase receptor (*Pe*LecRK) and two pathogen-related proteins (PR), *Pe*CAP_PR1 and *Pe*Defensin (PR12). These showed efficiencies of 110.55 %, 109.08%, and 99.65%, respectively. The qPCR results indicated that at 48h, *Pe*LecRK was induced 2.158 times in roots inoculated with AMF and AF compared to non-inoculated controls. In contrast, *Pe*Defensin was induced 1.459 times in the treatment with AMF, which are the same constitutive or repressed in the other treatments and at 24h. For *Pe*CAP_PR1, no induction was observed at any time of collection or treatment. So far, the induction of LecRKs expression in *P. edulis* inoculated with AMF and under FA application has not been reported, and the present work is the first to report such a mechanism. For PR proteins, the expression patterns observed are still unclear, suggesting that the harvesting times of plant material after induction with FA may have been early for the activation of PR proteins since PRs constitute the second line of plant defense. The results obtained contribute to a better understanding of the differential expression of defense genes in *P. edulis* and provide evidence of the participation of lectins in the process of plant adaptation to high concentrations of FA.

Palavras-chave: *Passiflora edulis*; AMF; Plant defense; qPCR;

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