

Plant-pathogen interactions during infection process of asparagus with *Fusarium* spp.

Research Article

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Abstract: Background: *Asparagus officinalis* L. is often infected by fungi from the *Fusarium* genus which also contaminate the plant tissues with highly toxic secondary metabolites. To elucidate the plant-pathogen interactions between asparagus and *Fusarium oxysporum* or *F. proliferatum*, a fungal mycotoxins profile was assessed together with an impact of the infection on all forms of salicylic acid content. Methodology: Fungal isolates were identified by their morphological features, species-specific PCR and transcription elongation factor 1a (TEF-1a) sequencing. Mycotoxins were assessed by high-performance liquid chromatography (HPLC). The salicylic acid and its derivatives content was analyzed by the HPLC method combined with fluorometric detection. The levels of free radicals were measured by electron paramagnetic resonance (EPR). Results: After infection both *Fusarium* pathogens formed fumonisin B₁ and moniliformin. Infection altered salicylic acid biosynthesis and conjugation rates both in the roots and stems when compared with non-inoculated plants. Samples with higher free radical concentrations in stems showed higher concentrations of all forms of salicylic acid. Conclusions: We postulate that infection by both *Fusarium* pathogens produces mycotoxins, which may be transported to the upper part of plant. Pathogen attack initiated a plant defense reaction involving increased salicylic acid levels and resulting in increase in free radical levels.

Keywords: *Asparagus* • EPR • *Fusarium oxysporum* • *Fusarium proliferatum* • HPLC • Molecular identification • Mycotoxins • Salicylic acid

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Abbreviations:

APx - ascorbate peroxidase;
CAT - catalase;
EPR - electron paramagnetic resonance;
Foa - *F. oxysporum* f. sp. *asparagi*;
FR - free radicals;
FBs - fumonisins;
FB₁ - fumonisin B₁;
HR - hypersensitive reaction;
IR - induced resistance;
MeSA - methyl-salicylates;

MON - moniliformin;
PDA - potato dextrose agar;
PAL - phenylalanine ammonia lyase;
POD - peroxidase;
PR - proteins;
ROS - reactive oxygen species;
SA - salicylic acid;
SAG - salicylic acid glucoside esters;
SOD - superoxide dismutase;
SAR - systemic acquired resistance;
TSA - total content of free and glucoside bound salicylic acid.

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