

Full Length Research Paper

# Biochemical and molecular investigations on prime mechanisms of induced resistance in French bean (*Phaseolus vulgaris* L.) and soybean (*Glycine max* L.)

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The prime mechanisms of induced resistance in French bean and soybean plants were investigated against three pathogenic fungi, namely *Fusarium solani* f. sp. *phaseoli*, *Fusarium solani* f. sp. *glycine* and *Colletotricum lindemuthianum*. This latter fungal pathogen was chosen for a comparative purpose, as it represents a non related genus of the main fungal pathogens used in this study. The efficacy of the induced resistance was tested using four different incubation temperatures (20, 25, 30 and 35°C), in combination, with the use of the non pathogenic *Fusarium*, isolated from potatoes, served as an inducer or elicitor for 4 h and, subsequently, the challenged hypocotyls were inoculated with the pathogenic isolate of *F. solani* f. sp. *phaseoli* in all the pathosystems tested in this study. Among the tested cultivars, Nebraska was moderately resistant and Crawford was moderately susceptible to *Fusarium* infection, whereas the other tested cultivars were susceptible. Randomly amplified polymorphic DNA (RAPD) fingerprinting profiles characterized the tested cultivars and pathogens genomes, whereas SDS protein electrophoresis showed the newly induced proteins as a result of prime mechanisms of induced resistance.

**Key words:** French bean, prime resistance, soybean, *Fusarium*, randomly amplified polymorphic DNA (RAPD).

## INTRODUCTION

Plant disease resistance involves activation of a series of defense pathways to counterattack the pathogen. Understanding the defense mechanisms by which the plant responds to pathogen attack will elucidate molecular markers for selecting genotypes with higher disease resistance attributes, and/or suggest alternative disease control strategies (Harborne and Williams, 2000; Treutter, 2006). If a host lacks a specific resistance gene, the corresponding a virulence gene can not be detected and a resistance response is not initiated. The changes between incompatible and compatible interactions are driven by the continuous replacement of new avirulence

and new resistance genes, leading to an arms race between host and pathogen (Stahl and Bishop, 2000).

Induced resistance is the resistance depends on factors present only after the host is challenged by the pathogen, whereas constitutive resistance is depends on preformed factors. However it should be known that resistance cannot be induced unless preformed components from both the host and the pathogen interact (Sequeira, 1983). Phaseollinisoflavan was metabolized in vitro by *Fusarium solani* f. sp. *phaseoli* (VanEtten and Smith, 1975). More recent work by Zhang and Smith (1983) indicated that phaseollinisoflavan is concurrently metabolized, with phaseollin and kievitone, by *F. solani* f. sp. *phaseoli* in liquid culture. The undefined metabolic product of phaseollinisoflavan was less toxic. When cell-free culture filtrate was treated with the three phytoalexins,

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