

**THE EXPRESSION OF A BEAN PGIP IN TRANSGENIC WHEAT CONFERS
INCREASED RESISTANCE TO THE FUNGAL PATHOGEN *BIPOLARIS*
SOROKINIANA.**

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ABSTRACT

A possible strategy to control plant pathogens is the improvement of natural plant defense mechanisms against the tools that pathogens commonly use to penetrate and colonize the host tissue. One of these mechanisms is represented by the host plant's ability to inhibit the pathogen's capacity to degrade plant cell wall polysaccharides. Polygalacturonase-inhibiting proteins (PGIPs) are plant defence cell wall glycoproteins that inhibit the activity of fungal endopolygalacturonases (endo-PGs). To assess the effectiveness of these proteins in protecting wheat from fungal pathogens, we produced a number of transgenic wheat lines expressing a bean PGIP (PvPGIP2) having a wide spectrum of specificities against fungal PGs. Three independent transgenic lines were characterized in detail, including determination of the levels of PvPGIP2 accumulation, its sub-cellular localization and inhibitory activity. Results show that the transgene-encoded protein is correctly secreted into the apoplast, maintains its characteristic recognition specificities, and endows the transgenic wheat with new PG recognition capabilities. As a consequence, transgenic wheat tissue showed increased resistance to digestion by the PG of *Fusarium moniliforme*. These new properties were also confirmed at the plant level during interactions with the fungal pathogen *Bipolaris sorokiniana*. All three lines showed significant reductions in symptom progression (46%-50%) through the leaves following infection with this pathogen. Our results illustrate the feasibility of improving wheat's defenses against pathogens by expression of proteins with new capabilities to counteract those produced by the pathogens.