

Defence Responses and Associated Signalling Pathways Associated with the *Bt10* Gene in Wheat for Resistance to *Tilletia tritici*, the Common Bunt Pathogen

D.A. GAUDET, Z.-X. LU, M. FRICK, B. PUCHALSKI and A. LAROCHE

Agriculture and Agri-Food Canada, Lethbridge Research Centre, P.O. Box 3000, 5430-1st Avenue, South, Lethbridge, Alberta, T1J 4B1 Canada, e-mail: GaudetD@agr.gc.ca

Abstract: In most incompatible plant host-parasite interactions, defence responses are triggered following activation of signalling pathways involving salicylic acid (SA) and/or jasmonic acid (JA). Our goal is to understand the key signalling pathways and associated defence proteins involved in the expression of resistance to common bunt (*Tilletia laevis* Kühn). The expression of several defence-related PR-proteins belonging to classes PR-1, -2, -3 and -14 were evaluated following 10–36 days post-inoculation in compatible and incompatible interactions. Results confirmed the overall higher expression of these genes in resistant cultivar BW553 containing the *Bt10* gene for resistance compared to the susceptible near isogenic sib, Neepawa. We also observed the differential up-regulation of transcripts for wheat *lipase*, *chitinase* and *PR-1a* in the expression of the incompatible interaction. Additionally, the expression of wheat *lipoxygenase* and *allene oxide synthase*, key enzymes in the jasmonic acid synthesis pathway were differentially upregulated in the incompatible interactions involving *Bt10*. The effects of the defence signalling compounds SA and methyl-jasmonate (MeJA) applied to *T. laevis* inoculated wheat seedlings 1, 2, or 3 weeks following emergence, on infection and transcript levels of defence-related genes were investigated. Application of SA or MeJA co-ordinately activated transcripts of different groups of defence-related proteins and reduced common bunt infection. MeJA exerted a greater effect in up regulating the majority of defence-related genes. Collectively, these results implicate the JA pathway as the major defence signalling pathway in *Bt10* resistance expression to common bunt in wheat.

Keywords: host-parasite interaction; signalling pathways; expression of resistance; jasmonic acid; salicylic acid