The effect of low and high molecular weight chitosan on the control of gray mold (*Botrytis cinerea*) on kiwifruit and host response

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Abstract

The inhibitory effect of low (LMWC, 3.4–51.3 kDa) and high molecular weight chitosan (HMWC, 136.8–342.0 kDa) on gray mold (*Botrytis cinerea*) of kiwifruit was evaluated. Results indicated that both LMWC and HMWC significantly inhibited the development of gray mold, with LMWC having a greater inhibitory effect than HMWC. LMWC, was more effective than HMWC in inhibiting spore germination and mycelial growth of *B. cinerea*. LMWC also induced the accumulation of higher levels of hydrogen peroxide (H₂O₂), and greater level of activity of several defense-related enzymes. Moreover, LMWC had a greater ability than HMWC to penetrate the cell walls in kiwifruit epidermal peel tissue. While the expression of chitin elicitor receptor kinase 1 (*CERK1*), mitogenactivated protein kinase (*MPK3*), *PR1*, and *PR5* were significantly induced in kiwifruit by both LMWC and HMWC, the level of induction of *CERK1* and *PR5* was more highly induced by LMWC. Collectively, the results indicate that LMWC is more effective than HMWC in inhibiting gray mold of kiwifruit, most likely due to the ability of LMWC to more readily penetrate the epidermal cell walls of kiwifruit and activate a greater defense response.