Title Novel role for reactive oxygen species (ROS) in host-antagonistic yeast-pathogen interactions in postharvest biocontrol systems

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Abstract

To achieve the full potential of postharvest biocontrol microorganisms as a viable commercial technology, fundamental knowledge on their mechanisms of action is crucial. After more than 20 years of postharvest biocontrol research there is still limited understanding of interactions taking place between the host, the pathogen, and the antagonist mainly due to difficulties associated with the study of this complex system.

Our recent research showed that various antagonistic yeasts used to control postharvest diseases (*Metschnikowia fructicola, Candida oleophila, Candida saitoana*, and *Pichia guilliermondii*) secreted high, transient levels of superoxide anion as they colonized wounded host tissue and intact surfaces of apple, peach and citrus fruits. The application of *Metschnikowia fructicola* and *Candida oleophila* into citrus and apple fruit wounds induced a significant ($P \leq 0.05$) increase in hydrogen peroxide accumulation in host tissue. Importantly, living cell of *M. fructicola* were detected on the third day after inoculation in fruit wounds exhibiting a high level of host-generated hydrogen peroxide indicating the ability of this yeast to tolerate elevated levels of host ROS. ROS-tolerance may be an essential characteristic of effective yeast antagonists. These data, together with our earlier finding on the importance of hydrogen peroxide in the mechanism of fruit defense against postharvest pathogens, indicate that the ability of yeast antagonists to self-generate and possibly stimulate an oxidative response in host tissue could be one of the major factors underlying the performance of a biocontrol agent.