

Title Putative modes of action of *Pichia guilliermondii* strain R13 in controlling chilli anthracnose after harvest

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Abstract

The mode of action of an antifungal yeast, *Pichia guilliermondii*, strain R13, against the fungal pathogen of chilli anthracnose, *Colletotrichum capsici*, was examined both on agar plates and in chilli fruitwounds. Light microscopy revealed that strain R13 attached to the fungal pathogen, and this attachment apparently restricted the proliferation of *C. capsici* in the chilli fruitwounds. In chilli juice, strain R13 suppressed *C. capsici* spore germination and germ tube length, but the suppression was completely overcome by addition of 0.05% glucose, sucrose, or 1% of nitrate sources (NH_4NO_3 , NaNO_3 , $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, and KNO_3), suggesting the yeast was competing with the fungus for these substrates. Strain R13 also produced hydrolytic enzymes, including β -1,3-glucanase, and chitinase, in both solid and liquid media. The activities of these enzymes were highest when the *C. capsici* hyphal cell walls, rather than laminarin or glucose, were the carbon source; the activities were approximately 2 and 15 times higher with hyphal cell wall than with laminarin or glucose. Unlike the other strains tested, strain R13 did not produce a lethal toxin when cultivated under similar conditions. This study provides evidence that attachment, competition for nutrients, and secretion of hydrolytic enzymes, at least partially, explain how *P. guilliermondii* strain R13 suppresses *C. capsici*.