

Title            Integration of biocontrol yeast and thiabendazole protects stored apples from fungicide sensitive and resistant isolates of *Botrytis cinerea*

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### **Abstract**

Three selected biocontrol yeasts, known for their elevated antagonistic activity against several fungal pathogens, were tested in vitro for compatibility with common fungicides. The antagonists were resistant to several fungicides, but they were inhibited by triazoles and dithiocarbamates. The yeast isolate LS28 (*Cryptococcus laurentii*), which tolerated in vitro high rates of benzimidazoles, was tested, alone or in combination with a low dose (10% of the full label rate) of thiabendazole, against grey mould on stored apples. Wounded fruit were inoculated with thiabendazole resistant and sensitive isolates of *Botrytis cinerea*, applied separately or as a mixture. A more effective and prolonged control of fungal decay was always exerted by the biocontrol yeast applied together with thiabendazole at a low dose. This treatment provided synergistic effects and was markedly better than treatments applied separately, whereas the fungicide applied alone at the highest label dose was ineffective in the presence of the isolate of *B. cinerea* resistant to thiabendazole. The biocontrol yeast applied alone provided significant protection of apples stored for up to 12 days at 20 °C (from 39 to 81% less decay than untreated control), whereas the fungicide alone at low or high dose was always ineffective in the presence of the *B. cinerea* isolate resistant to benzimidazoles. The integrated treatment was highly effective and durable showing high reduction of decay (from 66 to 92%) even after 18 days of storage. This study suggests that the integration of a biocontrol agent with a low rate of fungicide may be a useful alternative strategy to manage both sensitive and resistant isolates of fungal pathogens efficiently and to reduce risks involved with extensive use of synthetic chemicals.