

Title *Lentinula edodes* enhances the biocontrol activity of *Cryptococcus laurentii* against *Penicillium expansum* contamination and patulin production in apple fruits

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Abstract

Penicillium expansum is a post-harvest pathogen of apples which can produce the hazardous mycotoxin patulin. The yeast *Cryptococcus laurentii* (LS28) is a biocontrol agent able to colonize highly oxidative environments such as wounds in apples. In this study culture filtrates of the basidiomycete *Lentinula edodes* (LF23) were used to enhance the biocontrol activity of LS28. *In vitro* *L. edodes* culture filtrates improved the growth of *C. laurentii* and the activity of its catalase, superoxide dismutase and glutathione peroxidase, which play a key role in oxidant scavenging. In addition, LF23 also delayed *P. expansum* conidia germination. The biocontrol effect of LS28 used together with LF23 in wounded apples improved the inhibition of *P. expansum* growth and patulin production in comparison with LS28 alone, under both experimental and semi-commercial conditions. The biocontrol effect was confirmed by a semi-quantitative PCR analysis set up for monitoring the growth of *P. expansum*.