

Title Antifungal activity of lemongrass (*Cymbopogon citratus* L.) essential oil against key postharvest pathogens

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Abstract

Lemongrass (*Cymbopogon citratus* L.) oil (ranging between 25 and 500 ppm) was tested for antifungal activity against *Colletotrichum coccodes*, *Botrytis cinerea*, *Cladosporium herbarum*, *Rhizopus stolonifer* and *Aspergillus niger* in vitro. Oil-enrichment resulted in significant ($P < 0.05$) reduction on subsequent colony development for the examined pathogens. Fungal spore production inhibited up to 70% at 25 ppm of lemongrass oil concentration when compared with equivalent plates stored in ambient air. In the highest oil concentration (500 ppm) employed, fungal sporulation was completely retarded. Lemongrass oil reduced spore germination and germ tube length in *C. coccodes*, *B. cinerea*, *C. herbarum* and *R. stolonifer* with the effects dependent on oil concentration. However, lemongrass oil (up to 100 ppm) accelerated spore germination for *A. niger*. Work is currently focussing on the mechanisms underlying the impacts of essential oil volatiles on disease development with a major contribution to limiting the spread of the pathogen by lowering the spore load in the storage/transit atmospheres as well as the use of essential oil as an alternative food preservative.

Industrial relevance

The present study suggests that the use of pure lemongrass essential oil is an innovative and useful tool as alternative to the use of synthetic fungicides or other sanitation techniques in storage/packaging. Oil enrichment may reduce disease development with a major contribution to limiting the spread of the pathogen by lowering the spore load (spore production) in the storage/transit atmospheres as well as the use of essential oil as an alternative food preservative. The effectiveness (oil concentration) of the oil depends on the target pathogen. The effects of natural compounds on individual microorganisms (fungi and bacteria), both responsible for spoilage and food-borne pathogens, as well as the minimum concentration to gain effectiveness without affecting fresh produce quality and storage deserve further research.