Title Lemon post-harvest decay control by natural products

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Abstract

Postharvest diseases of lemon fruits represent one of the most severe sources of production loss. They are controlled by imazalil (IMZ), thiabendazole (TBZ) and sodium ortho-phenil-phenate (SOPP) registered fungicides for postharvest treatments. Nowadays, the chemical control is becoming more restricted for environmental concerns and development of fungicide-tolerance strains of fungal pathogens. In the last few years a renewed interest in alternative methods for postharvest decay control has been increasing and the research for natural products has provided encouraging results. The aim of this research has been the *in vitro* and *in vivo* evaluation of six essences (garlic, cloves, oregano, mint, geranium and eugenol) and three mineral products (sodium bicarbonate, potassium metabisulphite and kaoline) to control *Penicillium digitatum* Sacc. and *Phytophythora citrophthora* (R. e E. Sm.) Leonian, the main agents of postharvest decay in lemon fruit. In 2006-2008, in the *in vitro* assay, the essences and mineral substances were tested at different concentrations using the Grover and Moore method. In the *in vivo* trial, the products were tested on mature lemons both on intact and wounded fruits, the latter previously infected with *Penicillium* spores and a *Phytophthora* colony fragments. In both experiments fruits were sprayed with the products at different concentrations, air dried and stored at 5°C for 5 weeks. In *in vitro* results, oregano, geranium and cloves essential oils showed a better *P. citrophthora* inhibition at all concentrations, while garlic and mint oils were effective only at the highest concentrations. Only mint essential oil showed a good inhibition of *P. digitatum* colony at all concentrations. Geranium, oregano, eugenol, sodium bicarbonate and potassium metabisulphite *in vivo* treatments on intact fruits showed a higher control against both fungi as well as IMZ treatment. On artificially infected lemons, the results showed the efficacy of IMZ compared to a light inhibition activity of the natural products. Among them, a better inhibition on *Penicillium* was obtained by mint essential oil, while geranium, cloves, oregano and eugenol oils were more effective against *Phytophthora*.