Title Use of essential oil of *Laurus nobilis* obtained by means of a supercritical carbon dioxide technique against post harvest spoilage fungi

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Abstract

The aspects of the antifungal activity of essential oil of laurel (*Laurus nobilis*) obtained by means of a supercritical carbon dioxide (SFE-CO_2) technique against post harvest spoilage fungi, have been studied in this research work by tests performed under *in vitro* and *in vivo* conditions. The measurement of antifungal activity of the oil, for its potential application as botanical fungicide, is very useful to find alternatives to synthetic fungicides. The present paper reports, for the first time, the results about the antifungal activity of laurel oil, obtained by a semi-industrial process that utilize a SFE-CO_2 technique, against three plant pathogenic fungi. The determination of the main active substances was carried out by gas chromatography analysis: laurel oil was characterized by high content ($\geq$10%) of 1.8-cineole, linalool, terpineol acetate, methyl eugenol and a low content (<10%) of linalyl acetate, eugenol, sabinene, β-pinene, α-terpineol. The inhibition of the mycelial growth of *Botrytis cinerea*, *Monilinia laxa* and *Penicillium digitatum* was evaluated *in vitro* at the concentration range of 200, 400, 600, 800 and 1000 μg/mL. *M. laxa* was totally inhibited by application of the oil at the lowest concentration, *B. cinerea* was completely inhibited at the highest concentration, and a fungistatic action was observed in both cases. *P. digitatum* was only partially inhibited at all the concentration ranges. The activity of the oil, placed in the form of spray on the fruit skin at the concentration range of 1, 2 and 3 mg/mL, was studied by biological tests. Both curative and protective activities of the oil have been evaluated on peaches, kiwifruits, oranges and lemons artificially inoculated with *M. laxa*, *B. cinerea* and *P. digitatum*, respectively. A very good antifungal activity has been found on kiwifruits and peaches when the oil was placed before the inoculation at a concentration of 3 mg/mL (68 and 91% of decay inhibition respectively). The same activity has been found on peaches when the oil was placed after the infection (76% of decay inhibition). The application of the oil did not caused any phytotoxic effect and kept any fruit flavour, fragrance or taste. This study has demonstrated that the essential oil of *L. nobilis* extracted by a SFE-CO_2 technique, is one potential and promising antifungal agent which could be used as botanical fungicide in the postharvest protection of peaches and kiwifruits against *M. laxa* and *B. cinerea*.