

First report on *Meloidogyne chitwoodi* hatching inhibition activity of essential oils and essential oils fractions

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Abstract The Columbia root-knot nematode (CRKN), *Meloidogyne chitwoodi*, is an EPPO A2 type quarantine pest since 1998. This nematode causes severe damage in economically important crops such as potato and tomato, making agricultural products unacceptable for the fresh market and food processing. Commonly used nematicidal synthetic chemicals are often environmentally unsafe. Essential oils (EOs) may constitute safer alternatives against RKN. EOs, isolated from 56 plant samples, were tested against CRKN hatching, in direct contact bioassays. Some of the most successful EOs were fractionated and the hydrocarbon molecules (HM) and oxygen-containing

molecules (OCM) fractions tested separately. 24 EOs displayed very strong hatching inhibitions ($\geq 90\%$) at $2 \mu\text{L mL}^{-1}$ and were further tested at lower concentrations. *Dysphania ambrosioides*, *Filipendula ulmaria*, *Ruta graveolens*, *Satureja montana* and *Thymbra capitata* EOs revealed the lowest EC_{50} values ($< 0.15 \mu\text{L mL}^{-1}$). The main compounds of these EOs, namely 2-undecanone, ascaridol, carvacrol, isoascaridol, methyl salicylate, *p*-cymene and/or γ -terpinene, were putatively considered responsible for CRKN hatching inhibition. *S. montana* and *T. capitata* OCM fractions showed hatching inhibitions higher than HM fractions. The comparison of EO and corresponding fractions EC_{50} values suggests interactions between OCM and HM fractions against CRKN hatching. These species EOs showed to be potential environmentally friendly CRKN hatching inhibitors; nonetheless, bioactivity should be considered globally, since its HM and OCM fractions may contribute, diversely, to the full anti-hatching activity.

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