

Nematicidal activity of phytochemicals against the root-lesion nematode *Pratylenchus penetrans* and effect on potato host

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Abstract

The root-lesion nematode, *Pratylenchus penetrans*, is among the most harmful plant parasitic nematodes for crop productivity worldwide, parasitizing a significant number of plant hosts. Common pest management strategies rely on the use of synthetic chemical nematicides, which impose serious concerns regarding their impacts on human health and the environment.

In the present study, the nematicidal activity of 40 phytochemicals was assayed against *P. penetrans* using standard direct and indirect contact methodologies. The nematode was remarkably insensitive to the tested phytochemicals at the highest concentration tested, 2 mg/mL, seldomly reaching full mortality after a 24 h exposure period. However, high activities were obtained for benzaldehyde, carvacrol, 3-octanol, and thymol, in comparison to the other phytochemicals or the synthetic nematicide oxamyl; about 1 h was required for carvacrol, 3-octanol, and thymol to kill half population. Mortality percentages obtained from the indirect contact bioassays for the most active compounds were lower than the ones from direct contact, not exceeding 65%. For these, 25 min were required to kill half of the population.

Growth chamber pot assays were performed separately for carvacrol and thymol by mixing the compound solutions (6 mg / Kg substrate) in the soil of pots with potato plants. Pots were placed under growth chamber conditions (23°C and 50% relative humidity day, 10°C and 70% relative humidity night; 14h photoperiod). Physiological parameters were assessed 7, 14, 21 and 28 days after plant emergence from the soil surface. No statistical differences ($p > 0.05$) were recorded between the control treatment and the two phytochemicals in terms of growth. These compounds are good candidates for the development of biopesticides for a more sustainable root-lesion nematode management strategy.