

Host plant response to the application of nematicidal phytochemicals

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Potato (*Solanum tuberosum*) is one of the world's most common agricultural crop for human consumption and considered an excellent source of essential nutrients and vitamins. The productivity of this crop is threatened by several plant-parasitic nematodes, among which the root-lesion nematode *Pratylenchus penetrans* is already considered to have a significant impact. Over the years, due to an increasing need of food resources and absence of knowledge, synthetic nematicides were extremely applied on crop fields. However, new policies, supported by the Sustainable Development Goals, impose serious limits to the application of such products. Volatile organic compounds naturally produced by plants have long been recognized for their nematicidal effectiveness. In previous work, the nematicidal activity of several standards of naturally occurring phytochemicals was *in vitro* assessed on *P. penetrans*. Only 4 compounds caused more than 99% nematode mortality, namely benzaldehyde, carvacrol, octanol and thymol. The aim of this work was to determine the most suitable approach to apply the selected compounds in soil in order to maintain their nematicidal effectiveness without compromising host health. Two consecutive trials were performed using potato seed plants (cv. Agria), namely: (i) to evaluate the effect of three solvent agents - 10% (v/v) dimethyl sulfoxide (DMSO), 5 mg/mL TRITON-X, and 1% (v/v) acetone - in plant growth; and (ii) to evaluate the best solvent agent spiked with 2 mg/mL of each selected compound. For both trials, a control treatment with water was considered. Pots were maintained in growth chamber conditions, routinely watered and fertilized. Plant growth related parameters were assessed at collection time. In the 1st trial, potato plants were unable to grow in the presence of 10% DMSO solution or the 5 mg/mL TRITON-X. The potato seeds could germinate only in the presence of 1% acetone. In the 2nd trial, potato seeds could germinate in the presence of the 4 compounds dissolved in 1% acetone. No statistical differences ($p > 0.05$) were recorded between the control treatment and the different compound applications in terms of growth parameters observed. Ongoing research is now accessing the nematicidal activity of each of the four compounds in the presence of the potato plant.

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