

## **Environmental and human health benefits of bionematicidal volatiles in comparison to commercial synthetic nematicides**

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Modern farming is heavily dependent on the frequent application of pesticides, that are known to disturb plant, animal and microbial biodiversity, accumulate in the environment, and influence human health. Plant parasitic nematodes are some of the most damaging pathogens to food crops, impacting crop yield up to double the damage caused by phytophagous insects. To combat these pests, large amounts of pesticides are added to agricultural soils and eventually leach out to the adjacent environments, accumulate in food and feed and become very toxic. Volatiles produced by plants and microbes have been increasingly analysed for their anti-nematodal activities since they can present very active chemical structures suitable to develop novel biopesticides. The present study reviews the benefits of some of the most active compounds found in the literature in comparison to the most widely used commercial nematicides. By resorting to data retrieved from freely available online databases on their experimental properties, and certified software for the prediction of their environmental, toxicological and ecotoxicological impacts, namely US EPA Estimation Program Interface (EPI) and Toxicity Estimation Software Tool (TEST), the advantages and disadvantages of using volatiles in the development of bionematicides is discussed. Ultimately, shifting to a more sustainable usage of pesticides and to farming practices that favour biodiversity can be beneficial to crop production.

Keywords: nematicide; predictive models; soil health; sustainable crop production; toxicity; volatiles