

Encapsulated Western Red Cedar (*Thuja plicata*) Essential Oil as a Prospective Biopesticide against *Phytophthora* Pathogens

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Abstract : In many parts of the world, various *Phytophthora* species pose a serious threat to forests and crops. With the rapidly growing international trade in plants and the ongoing impacts of climate change, the harmful effects of plant pathogens of the genus *Phytophthora* are increasing, damaging the biodiversity and sustainability of forest ecosystems. This genus is one of the most destructive plant pathogens, causing the majority of fine root (66%) and collar rot diseases (90%) of woody plant species worldwide. Eco-friendly biopesticides, based on plant-derived products, such as essential oils (EOs), are one of the promising solutions to this problem. In this study, among three different EOs investigated (*Chamaecyparis lawsoniana* (A. Murr.) Parl., *Thuja plicata* Donn ex D. Don and *Juniperus communis* L.), western red cedar (*Thuja plicata*) essential oil almost completely inhibited the growth of three *Phytophthora* species (*P. plurivora* Jung and Burgess, *P. quercina* Jung, and *P. ×cambivora* (Petri) Buisman) during seven days of exposure for the EO concentrations of 0.1% and 0.5% (v/v). To prolong the inhibiting effect, *Thuja plicata* EO was encapsulated into a biopolymer matrix consisting of a chitosan-gelatin mixture to form a water-in-oil emulsion. This approach allowed the prolonged effect of the essential oil by its slow release from the biopolymer matrix and protection of the active components from atmospheric influences. Thus, it was demonstrated that encapsulated *Thuja plicata* EO consisting of sustainable bioproducts is efficient in controlling of *Phytophthora* species and can be considered a means of protection in natural and semi-natural ecosystems.

Keywords : emulsions, essential oils, phytophthora, thuja plicata

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