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Glycerodendrimers: new tools for slow release essential oil based biosourced herbicides

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PURPOSE OF THE ABSTRACT

The long-term harmful effects of chemical pesticides are one of the major controversies these days. Following the objective of reducing the use of these products without decreasing crop yield, essential oils (EOs) are a prime candidate for biocontrol. However, high volatility of EOs begets a challenge: increasing the duration of efficient activity of EOs.

In this work, an innovative green matrix for essential oil retention is proposed. Indeed, glycerol carbonate surface-modified dendrimers (GDs) have shown their ability to encapsulate some metallic complexes and organic compounds (Balieu S. et al., 2013; Menot B. et al., 2015). As a consequence; the final goal is to produce an efficient slow release biosourced herbicide based on a glycerodendrimer - essential oil combination.

Cymbopogon winterianus Jowitt and Cinnamomum zeylanicum Blume essential oils have been chosen for their herbicide properties. The total retention rate and a quantification of the main compounds was determined by dynamic headspace gas chromatography coupled with mass spectrometry (Kfoury M. et al., 2015). Results show that dendrimers encapsulate essential oils with some efficiency, which is influenced by dendrimer structure, size, concentration and stirring duration.

Furthermore, interactions between GDs and EOs were studied by nuclear magnetic resonance spectrometry. In parallel, efficiency of created products has been controlled by analyzing both the inhibition of Arabidopsis thaliana seed germination and the herbicide effect on plantlets of the same plant.

The talk will focus on optimization of the EOs retention by biobased dendrimers, the interactions mechanisms and their efficiency as biosourced herbicide.

FIGURES

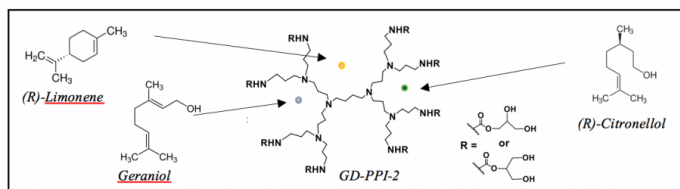


FIGURE 1

Encapsulation of *Cymbopogon winterianus* Jowitt major compounds

R-citronellol, geraniol and R-limonene in the second generation of glycerodendrimer poly(propyleneimine) (GD-PPI-2).

FIGURE 2

KEYWORDS

biosourced dendrimer | essential oil | biosourced herbicide | slow release

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