

## Essential Oil Encapsulated into Succinic Acid Modified Beta-Cyclodextrin: Characterization, Docking Study, and Antifungal Activity

**Authors :** Amine Ez-Zoubi, Abdellah Farah

**Abstract :** Because of their effectiveness and environmental safety, many essential oils have been investigated as biopesticides. Nevertheless, the encapsulation process is necessary to improve its physical, chemical, and biological properties. Therefore, the purpose of this paper was to study the physicochemical characteristics, and antifungal activity of the Artemisia Herba-Alba essential oil (HAEO) encapsulated in succinic acid modified  $\beta$ -CD (SACD). A yellowish oil was obtained from plant A. Herba-Alba using hydrodistillation and GC-MS was used to identify the chemical composition, in which  $\alpha$ -Thujone (65.0%) was the main component in HAEO. The succinic acid has been esterified via the hydroxyl groups in  $\beta$ -CD to produce SACD. In addition, the inclusion complex formation of HAEO and SACD was generated according to the co-precipitation method and was analyzed by several techniques. The antifungal activity in vitro was examined against Botrytis cinerea by direct contact with a potato dextrose agar culture medium. At a 0.1 % concentration, the HAEO in encapsulated form showed higher potential for the control of B. cinerea when compared to the EO in free form (38.34 to 12%). Thus, these results produced evidence that the encapsulation of EOs in SACD can be useful for the development of B.cinerea inhibitors and a promising alternative biopesticide.

**Keywords :** Artemisia Herba-Alba essential oil, succinic acid modified  $\beta$ -cyclodextrin, inclusion complex, co-precipitation, Botrytis cinerea, direct contact

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