

“ ENCAPSULATION OF FUNCTIONAL ESSENTIAL OILS FOR APPLICATION IN AGRICULTURE”

The application of microcapsules has been spread in recent years in many different sectors such as food, medical, cosmetic and textile due to the benefits that these systems have, with respect to the use of the unencapsulated active compounds. The microcapsules get a progressive and effective release of highly volatile to ensure their functionality over time molecules.

Essential oils are volatile liquid fractions biosynthesized by plants that have very interesting properties, such as antimicrobial, insecticide or pesticide capacity.

To take advantage of these properties of oils for use in agriculture, the microencapsulation has been studied by different techniques: spray drying, interfacial polymerization and co-extrusion/gelling, because each technique allows the use of a membrane material, and different operating conditions which result in microcapsules with very different properties.

The microcapsules developed were characterized by using different techniques. Thermal analysis using Differential Scanning Calorimetry (DSC) has provided useful information about the thermal stability of the starting materials to select conditions most suitable microencapsulation process, and to determine the thermal stability of the microcapsules obtained. By using electron microscopy (SEM) state and morphology of the microcapsules were determined. Meanwhile, Fourier Transform Infrared Spectroscopy (FTIR) has corroborated the presence of essential oils inside the microcapsules, such as the antimicrobial trial performed.

Parallel to the development of the microcapsules, obtaining a biodegradable textile substrate to serve as a vehicle for applying microcapsules has been studied. The textile substrate consisted of a nonwoven fabric made from hemp pruning waste with a high capacity for disintegration, which can be encompassed in the field of bio blankets application in agriculture.

Microcapsules have been applied on the nonwoven fabric by applying a binder; in this case, the use of two completely biodegradable natural polymers was studied, given the final application substrate. Nonwoven fabrics have been characterized by different techniques, among them; the antimicrobial activity and resistance to weathering under real conditions were evaluated.

With the development of this research it is intended to harness the potential provided by microencapsulation, in order to functionalize a product providing it with greater added value while maintaining the concept of sustainability.