

Bioproducts Based on Microencapsulated Oils and Biostimulants Used in Agriculture Crops [†]

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1. Introduction

The use of synthetic pesticides creates problems due to their toxicity, low biodegradability, and use of them in high amounts, which can damage crops and contaminate the environment. Controlled release formulation by the microencapsulation of pesticides seems to be the best choice for increasing efficiency and minimizing environmental damage. The use of essential oils as biopesticides has been the subject matter of many investigations in recent years, due to their eco-friendly and biodegradable nature. They are completely non-toxic to mammals, have increased specificity, and pests do not acquire resistance over time due to the intensive use of pesticides. Nevertheless, essential oils are volatile and susceptible to oxidation.

This paper presents a new composition for the rapeseed treatment based on the microencapsulation of essential oils and hydrolyzed protein in terms of resistance to drought and pest damage of seeds, during their germination and emergence.

Materials and methods: Microencapsulation of essential oils was performed by the complex coacervation method. Complex coacervation is the separation of a macromolecular solution, composed of oppositely charged, macroions into two immiscible liquid phases [1].

2. Results

The composition of thyme oil was analyzed using gas chromatography coupled with mass spectrometry (GC/MS), using a GC-MS/MS TRIPLE QUAD (Agilent 7890 A). Hydrolyzed proteins from waste have been used as microencapsulation agents. The microcapsules had a central core formed by an essential oil, covered with a shell made of polymeric material—i.e., hydrolyzed proteins and a

phase-type with a polyelectrolyte which induces coacervation. The new composition used for rapeseed treatment was analyzed in terms of total organic nitrogen (SR EN 15478:2009), ash (AOAC 920.153), density (SR ISO 758:1995), pH (SR EN 10523:2012), and total sulfur (SR ISO 10084:1995) by gravimetric methods and Mn, Zn, Cu, Mg by the ICP-OES method (inductively coupled plasma atomic emission spectroscopy).

3. Conclusions

The new composition—based on microcapsules as concentrated suspensions containing plant biostimulants which were based on hydrolyzed proteins—was used for rapeseed treatments, in terms of resistance to drought and pest damage of seeds, during their germination and emergence.

The final treatment composition corresponds to the standards regarding the quality and composition of the products intended for seed treatments.

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