Innovative agriculture: bicontinuous structures as delivery systems for fertilizers and pesticides

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Fertilizers and pesticides management has become essential over the past few years. The role of fertilizers in increasing crop yields, together with the protection against pests provided by pesticides, is of utmost importance to support the population growth and the increasing pest demand [1]. Moreover, the abuse of these substances has caused significant damages to underground waters and water body, such as eutrophication [2,3]. In this work, bicontinuous interfacially jammed emulsion gels (bijels) are used as controlled release systems and co-release systems for an effective use of both fertilizers and pesticides. Initially, the bijel systems have been completely characterized, and their abilities of releasing the loaded molecules have been tested both in water and solid media. Then, the co-delivery scenario has been studied and analytical method for the quantification of both fertilizers and pesticides has been developed, allowing the quantification of such molecules even in the ppb range. Derivatization and UV-Vis has been selected for the fertilizer analysis, while GC-ECD has been exploited for the pesticide. After all the initial trials have been performed, analyses on real soil and plants have been carried out. Different seeds have been selected for germination studies and treated in real soil, showing a positive results for the bijel case study [4].

References:

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