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Formulation of micronutrient enriched feed additives via biosorption

Abstract

This research is focused on the utilization of plant waste from the process of extraction with supercritical CO₂ for agricultural purposes. The presented approach includes the process of enrichment of plant biomass (alfalfa, goldenrod) in trace element ions (Cu(II), Zn(II), Mn(II)) by using biosorption method. The process conditions for obtaining feed additives were optimized by response surface methodology (RSM). Both biomasses physicochemical properties were analysed. The sorption capacity in mono and binary systems was determined for selected ions and biomasses. The enriched biomass was used in feeding studies on laying hens, during which the effect of their use was examined (e.g. the transfer of ions to the edible parts of eggs). A method of utilizing the micronutrient solution (obtained during the biosorption process) for fertilizer purposes was developed. Series of application tests were performed to confirm the possibility of its use during plant cultivation. Finally, based on the collected data, a technological concept was proposed, according to the principles of a circular economy.