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Abstract 56

EVALUATION OF THE COMPOSITION OF SERICIN SOLUTION: A NOVEL PROMISING TOOL FOR AGRICULTURE

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Raw silk processing results in the production of wastewater rich in sericin, a globular protein mainly discarded in the effluent. During the last decade, sericin has emerged as a resource in cosmetic and pharmaceutical sectors. Moreover, the unique physicochemical properties of sericin suggest that it could be suitable for agricultural applications, according to a circular economy concept potentially able to reduce the environmental impact of agro- and textile sectors.
In this study, we used industrial wastewater from raw silk degumming process (high temperature treatment) concentrated by ultra-filtration to 5% (w/v) of sericin and preserved by stabilization. The application of this solution, diluted to 0.25% w/v of sericin (1:20, pH 7), resulted in positive effects on plant growth. In details, radish plants (Raphanus sativus L.) were germinated in pots in greenhouse for 5 days, after which the sericin solution was applied to a soil-like substrate every 7 days for 3 weeks. The evaluation of plant growth revealed increases in radish and shoot biomass.
Starting from this, the study then aimed to unravel which chemical components of the sericin solution could support the radish plant response. First, the mineral ionomic profile confirmed the environmental safety of the formulation, revealing the absence of heavy metal pollutants and non-toxic Na level. Additionally, it highlighted the presence of some macro- and micro- nutrients, such as K, S and NH4+, Fe, Cu, at concentrations capable of contributing to plant growth. Secondly, we focused the attention on the polypeptide and amino acid composition. The analysis of the sericin solution by SDS-PAGE showed a smeared profile, suggesting random protein degradation that weakens the hypothesis of specific bioactive polypeptides. Finally, the amino acid composition pointed out high content of Asp, Leu and Arg, indicating differences from previous literature, likely due to various (a)biotic and industrial factors. Interestingly, the Asp content could enable the sericin solution to chemically interact with plant mineral nutrients, enhancing their bioavailability.
This study provides novel information about chemo-physical properties of industrial sericin solution, which could be useful for exploiting this wastewater in agriculture.

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