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Searching for the bioactive components in a silk industry by-product with potential biostimulant properties on lettuce (*Lactuca sativa* L.)

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The degumming process of raw silk produces wastewater containing sericin, a protein with properties potentially useful for agriculture. Previously, we analysed this by-product, concentrated to 5% (w/v) of sericin, stabilized with benzoic acid and adequately diluted, revealing other components that could be beneficial for plants, such as NH_4^+ , other minerals and amino acids. In this study, we evaluated the effects of this solution in lettuce (*Lactuca sativa* L.). After germination, young seedlings were grown for 9 days in Petri dishes on sole liquid treatment in a growth chamber, to avoid microbial contamination and ensure controlled conditions. All plants were fed with mineral nutrients every 2 days, and treatments were applied at the first and seventh day of growth. First, the effects of the sericin solution at different concentrations were tested, achieving the highest biomass in plants treated with the 20-fold dilution, corresponding to sericin 0.25% (w/v), 460 μM NH_4^+ and 11 μM of total free amino acids. Then, the relevance of the different components was examined to explain the positive effects of the sericin solution. The plants were tested with no treatment, only benzoic acid, complete sericin solution (0.25% w/v), one solution mimicking its free amino acid profile, one reflecting its NH_4^+ content, and one containing NH_4^+ and amino acids. Interestingly, beneficial effects were observed only for plants treated with the complete sericin solution. These plants showed a 30% biomass increase compared to the control plants and huge increments in root and leaf amino acid contents. Regarding these parameters, no other differences nor synergistic effects between components were observed. Similarly, NH_4^+ was detected only in traces in all plants. In addition, seedlings treated with sericin had the lowest contents of Mg and P, and the highest Na level.

This study suggests that the sericin solution could positively affect N metabolism, highlighting a mechanism that appears not to be solely ascribable to the provision of mineral nutrients and amino acids. Hence, the growth-promoting activity of the sericin solution seems mainly related to its (poly) peptidic components, whose characterization by LC-MS/MS is ongoing.

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