Contribution ID : **52** Type : **Oral**

Recombinant Expression of Silk Sericin in Duckweed (Lemna japonica) as a Sustainable Platform for Functional Biomaterial Production

venerdì 2 ottobre 2026 09:00 (15)

Silk sericin, a glycoprotein produced by Bombyx mori, naturally coats and binds silk fibroin fibers during cocoon formation. Beyond this role, sericin's biocompatibility, low immunogenicity, and bioactive properties, including antioxidant and adhesive effects, have made it attractive for a range of biomedical and biomaterial applications. However, conventional degumming methods are harsh, reduce protein purity, and are constrained by low yield and poor reproducibility between batches. To overcome these limitations, we explored duckweed (Lemna japonica), a fast-growing, readily transformable aquatic plant, as an alternative production platform. We generated stable transgenic duckweed lines expressing silk sericin, representing one of the first efforts to establish duckweed as a platform for recombinant silk-derived protein expression, and characterized expression levels and tissue-specific accumulation. Soluble sericin was recovered from plant extracts via heat-treatment method. We then evaluated the functional bioactivity of duckweed-derived sericin using an established mammalian cell model, benchmarking its performance against commercially available sericin under standardized conditions. Quantitative and morphological assessments confirmed that duckweed-derived sericin significantly enhanced the assessed functional endpoints, outperforming commercial sericin. This work establishes proof-of-concept for duckweed as a scalable, plant-based platform for producing functional recombinant sericin via a mild extraction route, offering a sustainable, cost-effective alternative to conventional methods with broader implications for recombinant protein production in plants and downstream biomaterial applications.

Corresponding author email

julia-eva.titz@weizmann.ac.il

Scientific Session

Applications

Keywords

Sericin Lemna Recombinant expression Biomaterial

References

Silk sericin — properties and biomedical relevance Lamboni, L., et al. Silk Sericin: A Promising Sustainable Biomaterial for Biomedical and Pharmaceutical Applications. PMC (2022). Covers sericin's biocompatibility, low immunogenicity, antioxidant/anti-inflammatory activity, and conventional degumming-based extraction limitations. https://pmc.ncbi.nlm.nih.gov/articles/PMC9699483/

Primary author(s) : Ms. FORTMUELLER, Julia Eva (Weizmann Institute of Science)

Co-author(s) : Dr. ZIONI, Naama (Weizmann Institute of Science); Dr. VUNSH, Ron (Weizmann Institute of Science); Ms. SIMAN-TOV, Priel (Weizmann Institute of Science); Prof. AHARONI, Asaph (Weizmann Institute of Science)

Presenter(s) : Ms. FORTMUELLER, Julia Eva (Weizmann Institute of Science)

Session Classification : Applications III — Biotech