



Contribution ID : 30

Type : **Oral**

Duckweed as a platform for oral vaccines in sustainable fish aquaculture

venerdì 2 ottobre 2026 09:00 (15)

Vaccination is a cornerstone of modern health management. It's particularly important in intensive animal production systems, such as aquaculture, where high stocking densities facilitate the rapid spread of pathogens. Oral vaccines offer a stress-free, scalable alternative to traditional fish injections. Our study explores duckweed as a platform for vaccine production and as a vehicle for oral administration. Using a deconstructed potato virus X-based transient expression system [1], recombinant proteins analogous of antigens of koi herpesvirus (KHV) and carp edema virus (CEV) were expressed in duckweed. Freeze-drying was shown to preserve the recombinant antigens in the duckweed biomass, enabling long-term storage at room temperature. Obtained freeze-drying duckweed biomass expressing KHV antigens was used for carp immunization via intraperitoneal injection and intubation [2]. Both methods of administration induced release of the specific KHV-neutralising antibodies. Such data provide a strong support for the efficacy of duckweed as producer of oral vaccines. Transient expression of recombinant proteins in duckweed can facilitate and accelerate the development of oral vaccines for animals.

Corresponding author email

kishchenko@ipk-gatersleben.de

Scientific Session

Applications

Keywords

transient transgene expression, oral vaccines

References

- [1] Peterson, A., Kishchenko, O., Zhou, Y., Vasylenko, M., Giritch, A., Sun, J., et al. (2021). Robust Agrobacterium-mediated transient expression in two duckweed species (Lemnaceae) directed by non-replicating, replicating, and cell-to-cell spreading vectors. *Front. Bioeng. Biotechnol.* 9, 761073. doi: 10.3389/fbioe.2021.761073 [2] Kishchenko, O., Peterson, A., Adamek, M., Schroers, V. J., Piačková, V., Korytář, T., et al. (2026). Fish immunization by duckweed biomass accumulating recombinant cyprinid herpesvirus 3 antigens induces specific immune response. *New Biotechnol.* 94, 272–282. doi: 10.1016/j.nbt.2026.06.011

Primary author(s) : Dr. KISHCHENKO, Olena (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Germany; Institute of Cell Biology and Genetic Engineering, National Academy of Science of Ukraine); PETERSON, Anton (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Germany; Institute of Cell

Biology and Genetic Engineering, National Academy of Science of Ukraine); Dr. ADAMEK, Mikolaj (Fish Disease Research Unit, Institute for Parasitology, University of Veterinary Medicine Hannover, Germany); Dr. JUNG SCHROERS, Verena (Fish Disease Research Unit, Institute for Parasitology, University of Veterinary Medicine Hannover, Germany); Dr. PIACKOVA, Veronika (University of South Bohemia in Ceske Budejovice Faculty of Fisheries and Protection of Waters, South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses, Vodnany, Czech Republic); Dr. KORYTAR, Tomas (Laboratory of Fish Immunology, Institute of Parasitology, Biology Centre, Czech Academy of Sciences, České Budějovice, Czech Republic); Dr. GIRITCH, Anatoli (Nomad Bioscience GmbH, Germany); Prof. SCHUBERT, Ingo (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Germany); Dr. NAGEL, Manuela (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Germany)

Presenter(s) : Dr. KISHCHENKO, Olena (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Germany; Institute of Cell Biology and Genetic Engineering, National Academy of Science of Ukraine)

Session Classification : Applications III – Biotech