Winner of BGU-FOR February 2023 Grant

Solving the global shortage of Omega 3 LC-PUFAs through phytoremediation of aquaculture effluent

Dina Zilberg, Inna Khozin-Goldberg, Osnat Gillor, Moshe Herzberg, Avner Gross

Fish assimilate only about 30% of the nutrients in the food applied, while the rest is excreted to the water as toxic ammonia and solids. These excretions containing high-value nutrients must be removed due to their toxicity to fish. Traditional Recirculating Aquaculture Systems (RAS) utilize nitrification to convert the excreted toxic ammonia into nitrate (100 times less toxic) and water exchange is applied to remove solids and accumulated nitrate, resulting in the waste of valuable nutrients and contributing to environmental pollution .
Microalgae represent a renewable source of nutrients and valuable bioactive compounds, including polyunsaturated fatty acids (PUFAs), antioxidants, pigments, and more. Microalgae require a steady supply of nutrients for biomass production, primarily carbon, nitrogen, and phosphorus, all of which are found in fish excretions. Additionally, microalgae offer sustainability benefits by absorbing carbon dioxide (CO_2) and releasing oxygen during their growth .

We aim to develop a method to utilize the nutrients excreted by fish to produce high-valued microalgae, which will clean the water by ridding them of fish excretions. This will be achieved through a novel microalgae-integrated RAS (mic-RAS) where water circulates between a fish culture tank and a microalgal bioreactor.
.