

Tel Aviv University develops 'Super Seaweed'

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After developing an innovative technology that enables the growth of seaweed enriched with proteins and minerals such as zinc, iron, iodine, magnesium, and calcium for humans and animals, researchers from Tel Aviv University's School of Zoology at The George S. Wise Faculty of Life Sciences and the Israel Oceanographic and Limnological Research Institute (IOLR) have made a new advancement. Researchers succeeded in significantly increasing the ability of seaweed to produce healthy natural substances, focusing on enhancing the production of bio-active compounds that offer medical benefits to humans, such as antioxidants - the concentration of which was doubled in the seaweed; natural sunscreens - its concentration tripled; and unique protective pigments of great medical value, the concentration of which increased by ten-fold.

The study was carried out with the innovative and sustainable approach of integrated aquaculture, which combines seaweed with fish cultivation, upgrading the seaweed while at the same time helping to purify the seawater and minimising negative environmental impacts. According to the researchers, these findings may serve the pharmaceutical, cosmetics, food, and nutritional supplement industries.

The new development was led by Doron Ashkenazi PhD student of Tel Aviv University and the Israel Oceanographic and Limnological Research Institute, under the guidance of Prof. Avigdor Abelson of Tel Aviv University's School of Zoology and Prof. Alvaro Israel of the IOLR in Haifa, in collaboration with other leading researchers from Israel and around the world, including Guy Paz from IOLR; organic chemistry expert Dr Shoshana Ben-Valid; Dr Eitan Salomon from the National Centre for Mariculture in Eilat and Prof. Félix López Figueroa, Julia Vega, Nathalie Korbee, and Marta García-Sánchez from Malaga University in Spain. The article was published in the scientific journal *Marine Drugs*.

Doron Ashkenazi explains that 'seaweed, also known as macroalgae, are marine plants that form the basis of the coastal marine ecosystem. The seaweed absorbs carbon dioxide and releases oxygen into the environment. They purify the water

and provide food, habitat, and shelter for numerous species of fish and invertebrates. Not many know that seaweed also produce a wide variety of distinct bio-active compounds that are beneficial to humans. The seaweed living in the intertidal zone face extreme stress conditions, which include changes in salinity, temperature, desiccation [loss of moisture] conditions, changes in the availability of nutrients and high exposure to solar radiation, especially in the ultraviolet (UV) range."

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To survive, seaweed has developed a unique set of chemical defence mechanisms – natural chemicals that help them cope with these harsh environments. They are highly efficient natural factories that produce valuable substances that may offer significant benefits to humans.

In the current study, they sought to examine whether and how it is possible to increase and maximise the seaweed's production of bio-active compounds, and secondary metabolites, that offer significant health benefits. These substances include antioxidants, protective pigments, and natural UV radiation filters.