

Halophilic Microalgae from Trapani Salt Ponds: Bioactive Potential and Biostimulant Applications in Sustainable Agriculture

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Introduction

The salt ponds of Trapani, located in Western Sicily, represent unique ecosystems characterized by extreme salinity and environmental conditions, serving as a rich reservoir of extremophile biodiversity¹. In this study, *Dactylococcopsis salina* and *Dunaliella* sp. were isolated from these environments and assessed for their biological activities, including antimicrobial and plant growth-promoting (PGP) properties. For comparative purposes, *Chlorella* sp. was also included as a model strain.

Materials and methods

A combination of *in vitro* and *in vivo* experiments was conducted to evaluate their PGP potential. All strains were tested for salt tolerance, indole-3-acetic acid (IAA) production, and ability to solubilize phosphates. In addition, their effects on tomato seedlings (*Solanum lycopersicum*, cv. Regina Ostuni) were assessed through plant bioassays, which revealed significant improvements in growth parameters.

Results

All the tested strains showed PGP traits into under vitro experiments. Moreover, treatments with *Dunaliella* sp., *Dactylococcopsis salina*, and *Chlorella* sp. led to enhanced fresh biomass accumulation in shoots and promoted favorable morphological traits, such as increased primary root and hypocotyl lengths.

Conclusions

Our findings highlight the multifaceted potential of halophilic and halotolerant microorganisms, particularly *Dunaliella* sp., *Dactylococcopsis salina*, and *Chlorella* sp., as valuable resources for sustainable agriculture and the development of bio-based strategies suited to saline and arid environments.



Figure 1: Aerial picture of salt ponds of Trapani.

REFERENCES

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