Photosynthetic microalgae as a sustainable platform for the production of high quality edible biomass

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Why microalgae?
- Cultivable in closed photobioreactors
- Lower H₂O requirement than plants
- Flu gasses and wastewater as nutrients
- High photosynthetic efficiency

\[
\frac{\text{CO}_2 \text{ consumed}}{\text{CO}_2 \text{ released}} = 1.8
\]
- Production of metabolites important for human health (Carotenoids, vitamins, fatty acid w3 or w6)

Solutions to increase production yield

In *Chlamydomonas reinhardtii* mutants with reduced thermal dissipation of the light absorbed: higher photosynthetic efficiency and biomass production

Solutions to increase biomass quality

Astaxanthin is a strong antioxidant with important benefit for human health

Increase carotenoid content by metabolic engineering: induction of astaxanthin production in *Chlamydomonas reinhardtii*

- Productivity of 0.3-0.6 gr/L/day with 1% of astaxanthin
- Weak cell wall: increased bioavailability
- Approved by FDA

Omega-3 are acids important for brain, eyes and cardiovascular functions

Omega-3 are nowadays supplemented mainly as fish oil but the primary producers are microalgae.

*Nannochloropsis gaditana* (marine algae) strain obtained by biotechnological manipulation in order to accumulate both EPA and astaxanthin:
- High biomass productivity (1gr/L/day),
- EPA (5%) and Astaxanthin (1%).
- APPROVED BY FDA for human consumption

\[\text{C. reinhardtii mutant accumulating astaxanthin}\]
\[\text{N. gaditana mutant accumulating astaxanthin and EPA}\]