

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

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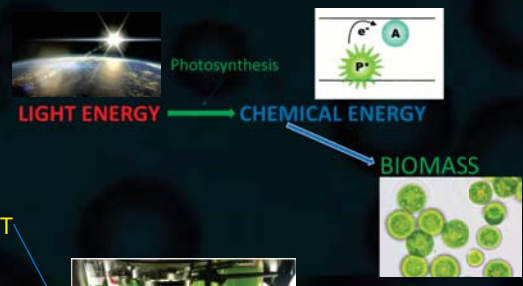
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## Why microalgae?

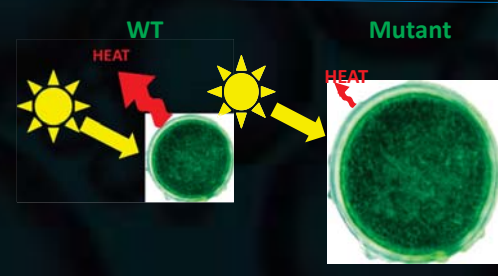
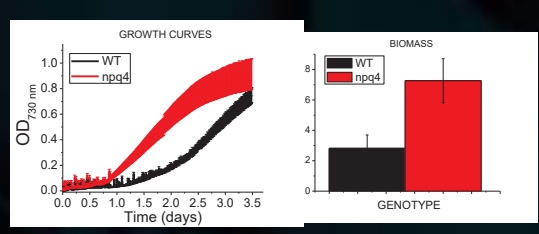
- Cultivable in closed photobioreactors
- Lower H<sub>2</sub>O requirement than plants
- Flu gasses and wastewater as nutrients
- High photosynthetic efficiency

$$CO_2 \text{ consumed} / CO_2 \text{ released} = 1.8$$

- Production of metabolites important for human health (Carotenoids, vitamins, fatty acid w3 or w6)



## Solutions to increase production yield

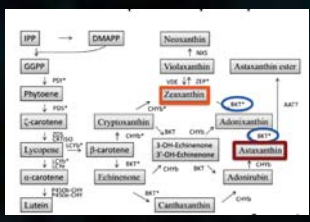


In *Chlamydomonas reinhardtii* mutants with reduced thermal dissipation of the light absorbed: higher photosynthetic efficiency and biomass production

## Solutions to increase biomass quality



**Astaxanthin** is a strong antioxidant with important benefit for human health



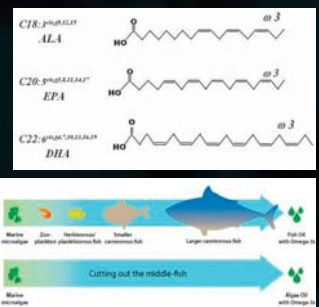
Increase carotenoid content by metabolic engineering: induction of astaxanthin production in *Chlamydomonas reinhardtii*



*C. reinhardtii* mutant accumulating astaxanthin

- 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



*N. gaditana* mutant accumulating astaxanthin and EPA