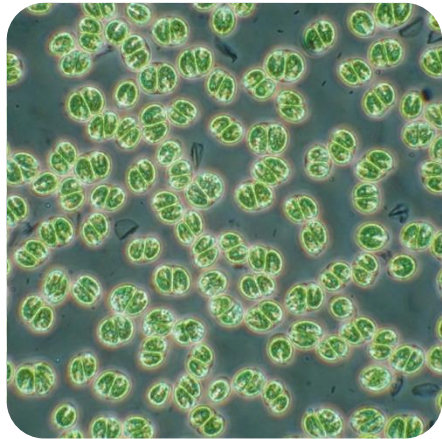


Metabolic modelling of *Nannochloropsis gaditana*

Jorijn Janssen, Dirk Martens, Packo Lamers and René Wijffels

Wageningen University, Bioprocess engineering
PhD-trip October 2014

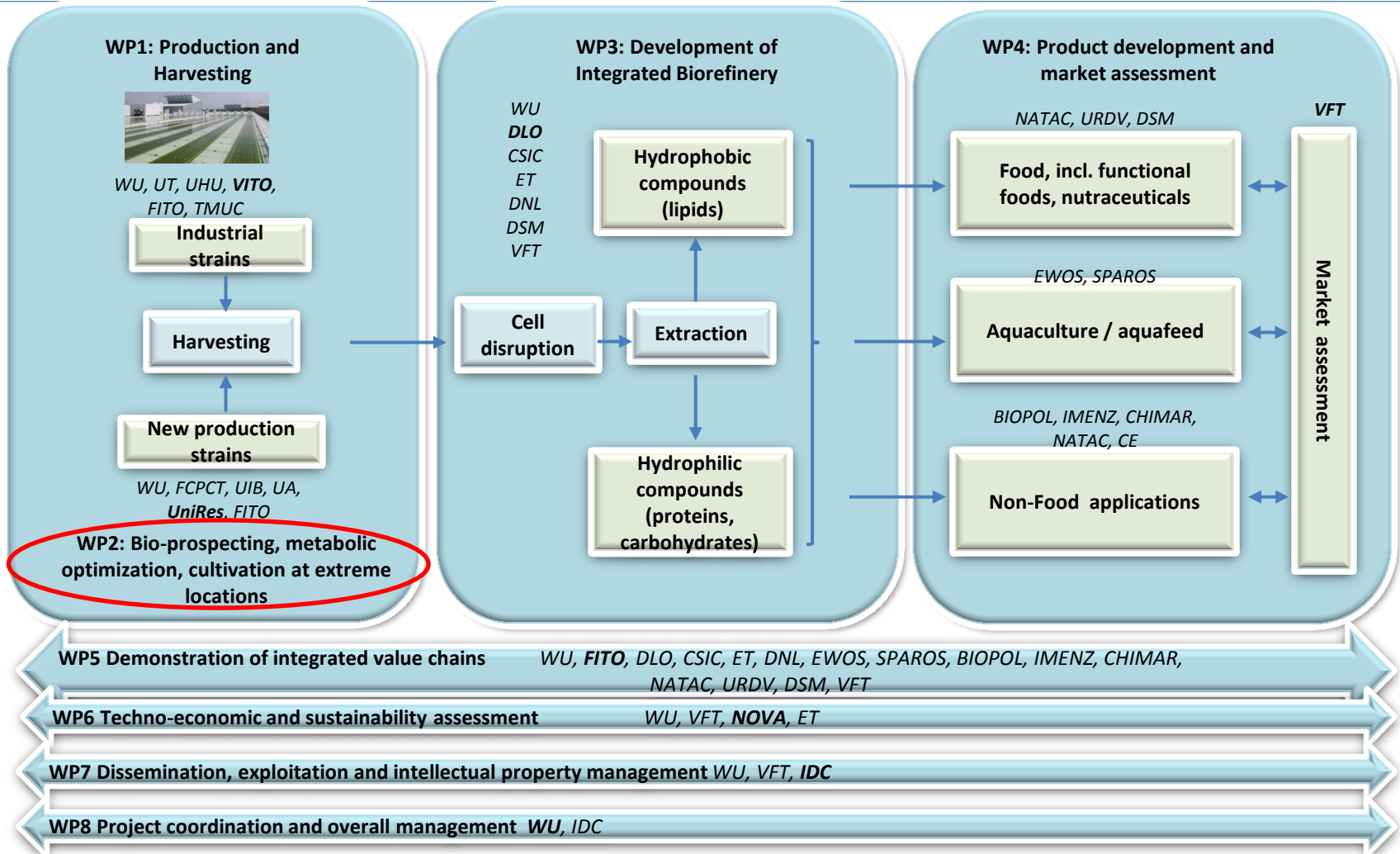


Project data

- **M**ulti-product **I**ntegrated bio**R**efinery of **A**lgae: from **C**arbon dioxide and **L**ight **E**nergy to high-value **S**pecialties: **MIRACLES**
- The consortium consists of 6 Universities, 5 Research Organisations, 12 SME's and 3 MNI/end users in 6 EU countries + Norway + Chile.
- Website: **<http://miraclesproject.eu/>**



Miracles WPs and Activities

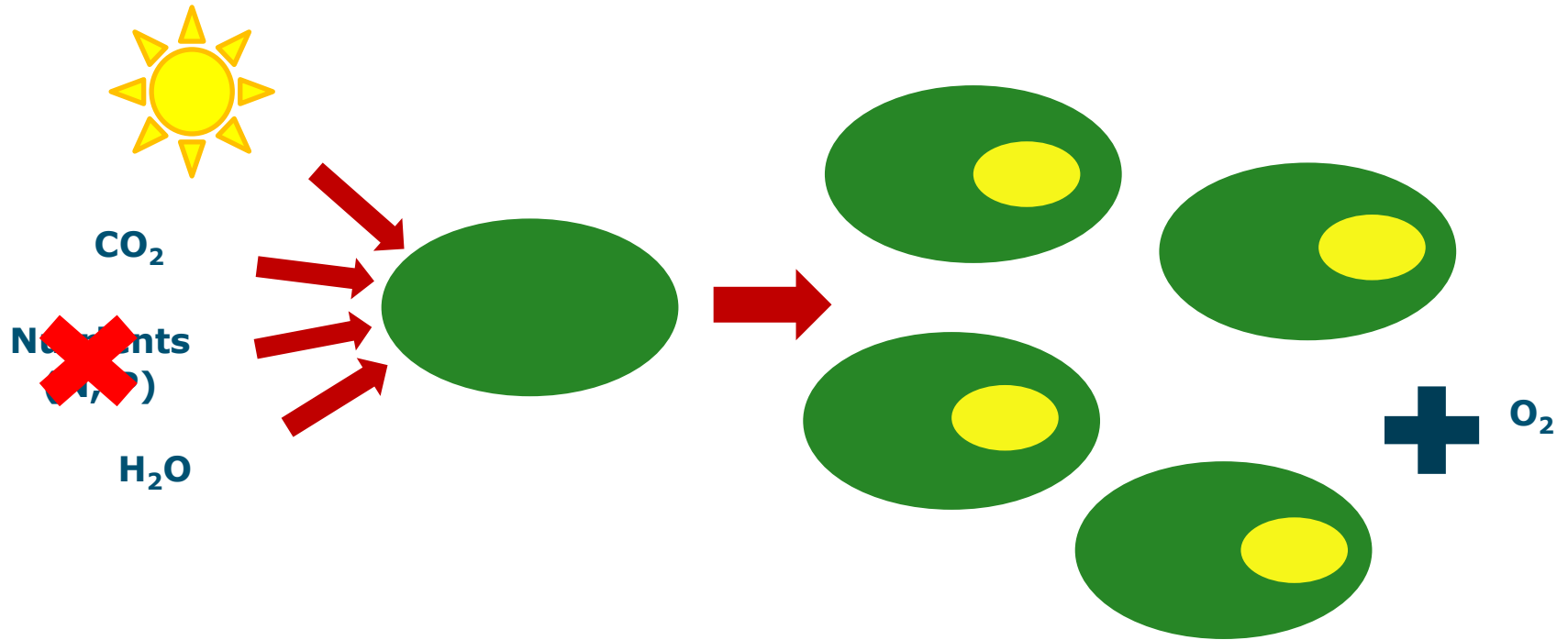


Why research on microalgae?

- Natural resources decline
- Global warming
- Political independence
- Alternative sources
 - Fossil fuels
 - Omega 3 fatty acids
- Biobased economy
- Economic feasibility
 - Increase lipid productivity



Microalgal growth



Advantages microalgae

- No competition food crops
- Higher productivities than conventional crops
- Seawater
- Range of products
 - Lipids (saturated and unsaturated fatty acids)
 - Proteins
 - Carbohydrates
 - Pigments

α -Linolenic acid
(ALA) (18:3)



Eicosapentanoic acid
(EPA) (20:5)

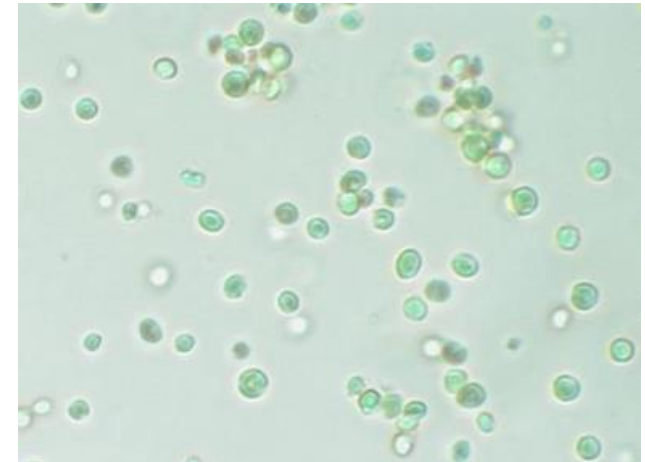


Docosahexanoic acid
(DHA) (22:6)

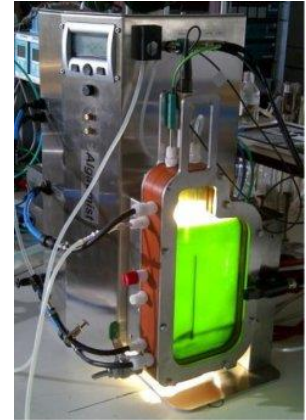
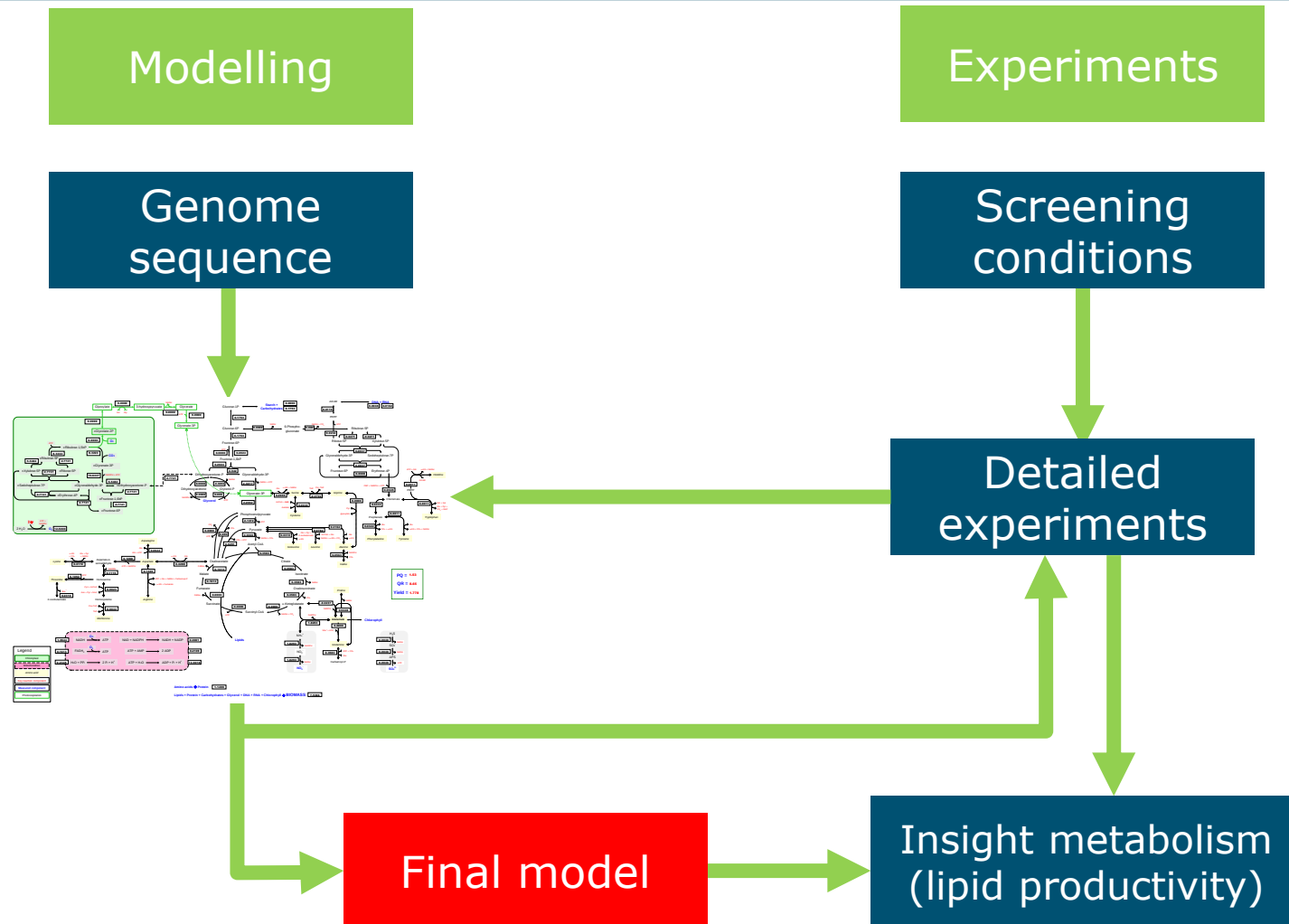


Nannochloropsis gaditana

- Marine species
- Small cells 2-3 μm
- Genome sequenced
- Lipid accumulation
- EPA (omega-3 fatty acid)
- Aquafeed

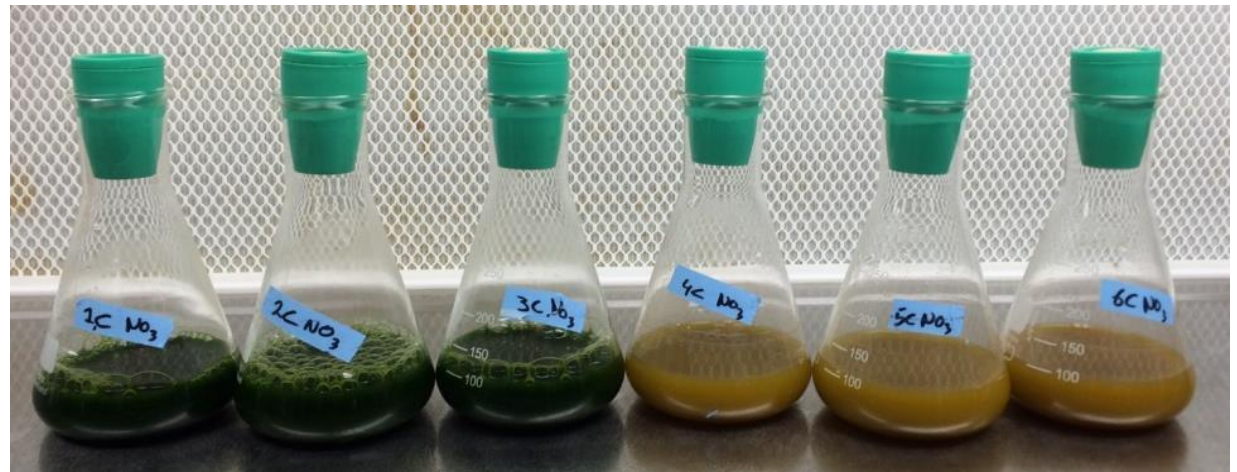


Metabolic model of *Nannochloropsis gaditana*

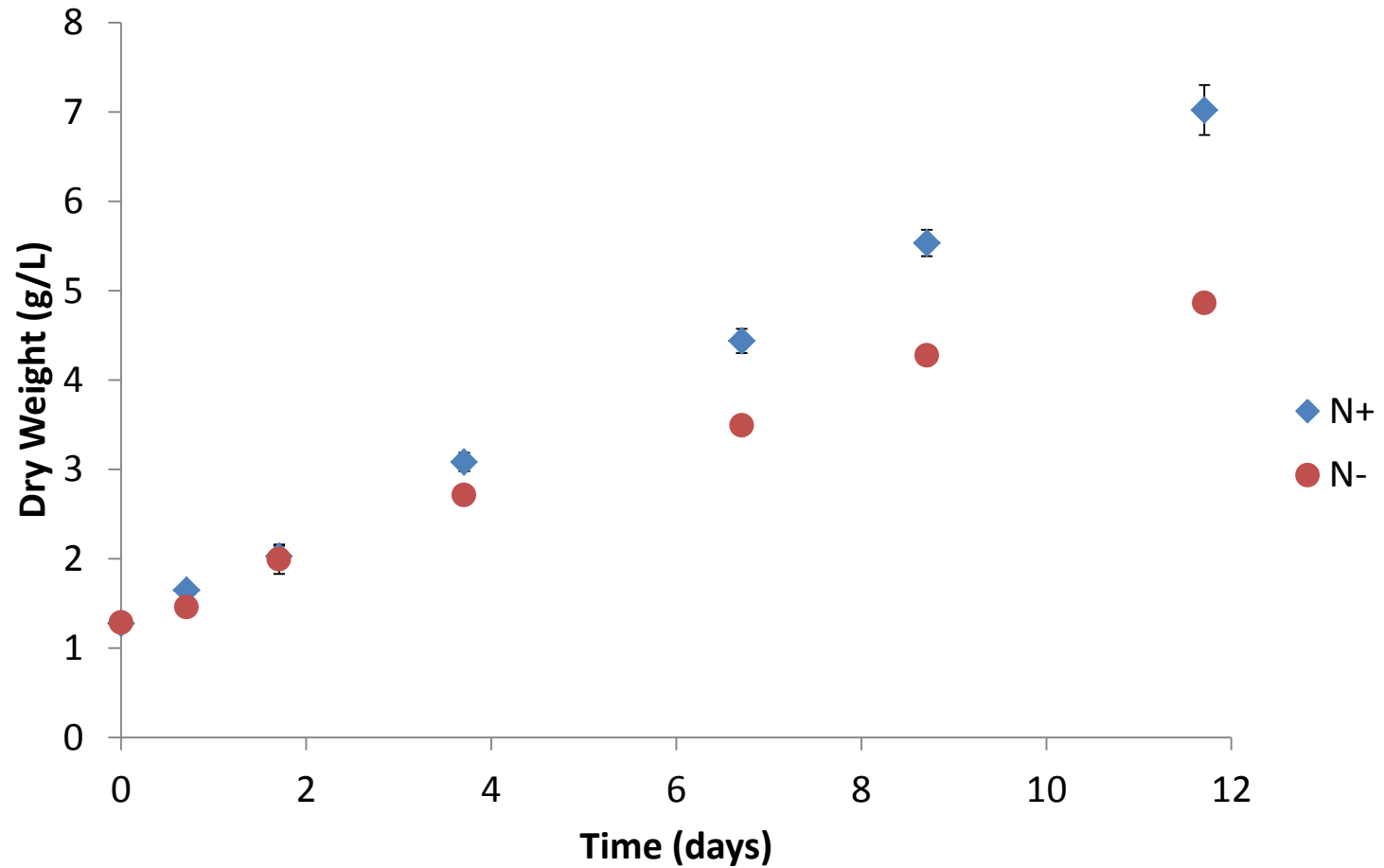


First experiment

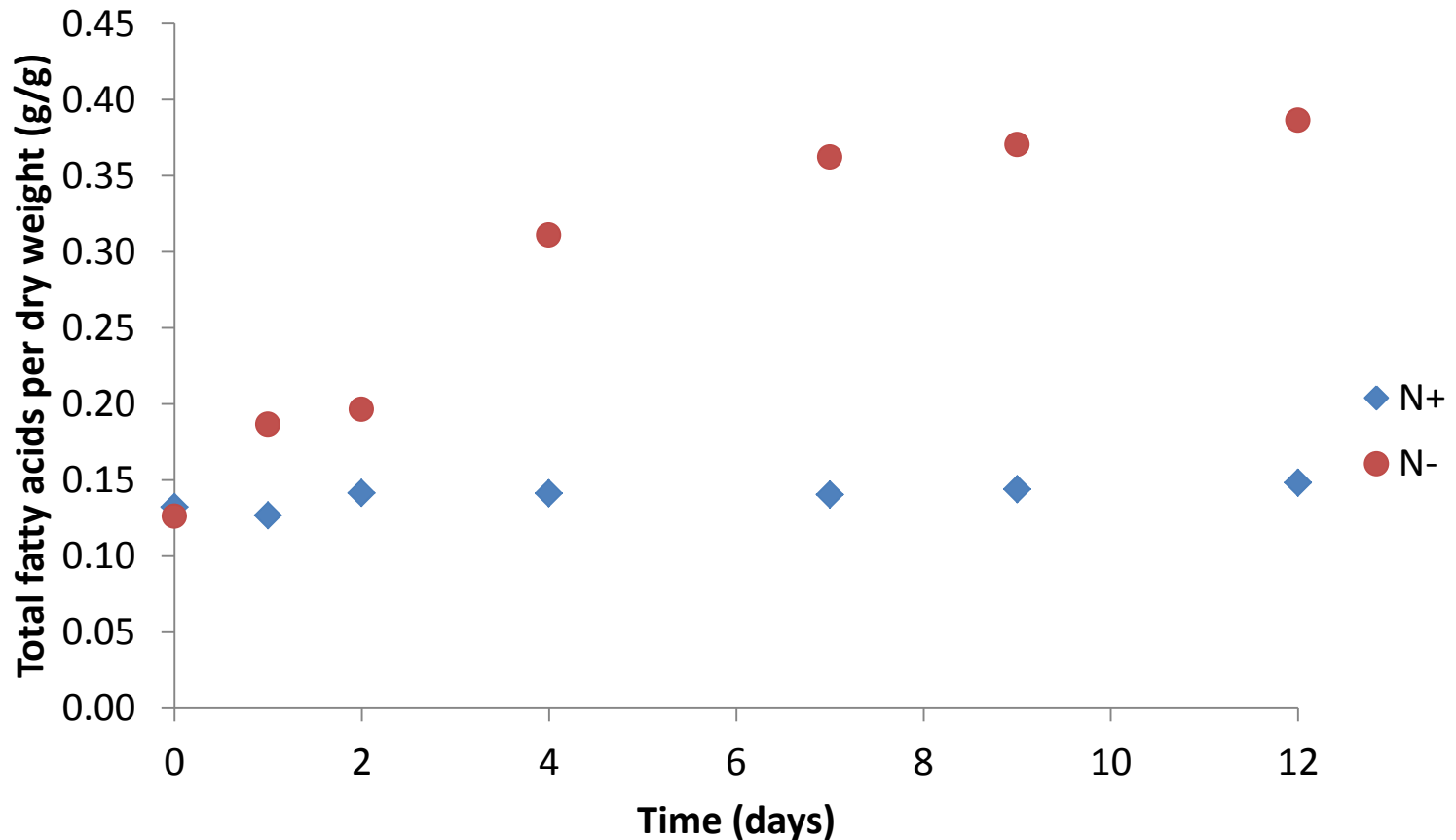
- Erlenmeyer flasks
- Nitrogen replete and deplete growth (wash)
- Constant light intensity



Growth curve N+ and N-

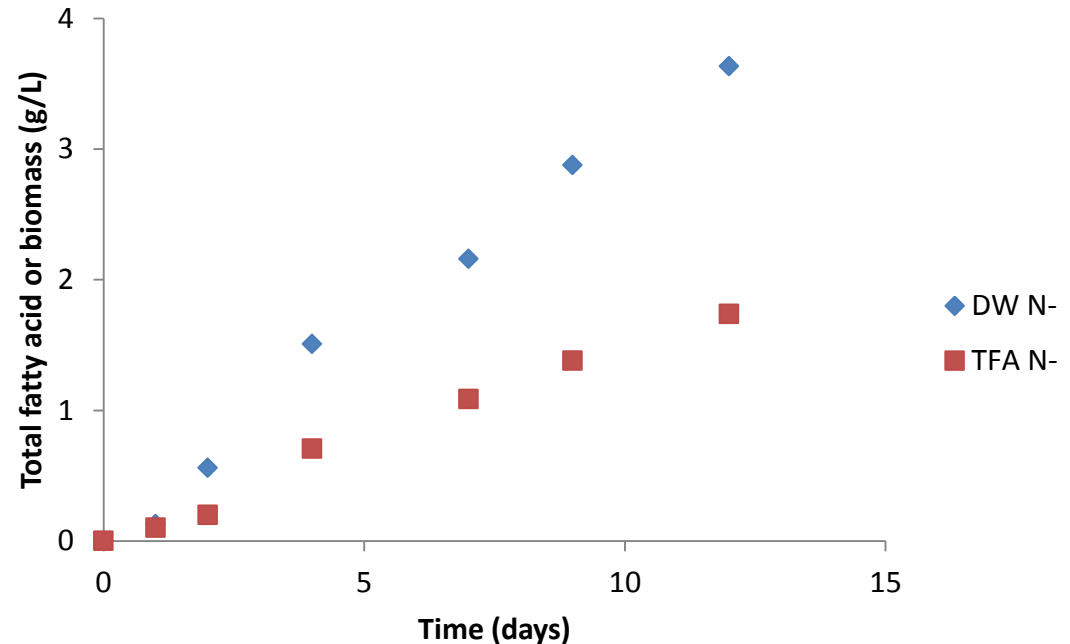


Total fatty acids per dry weight (g/g)



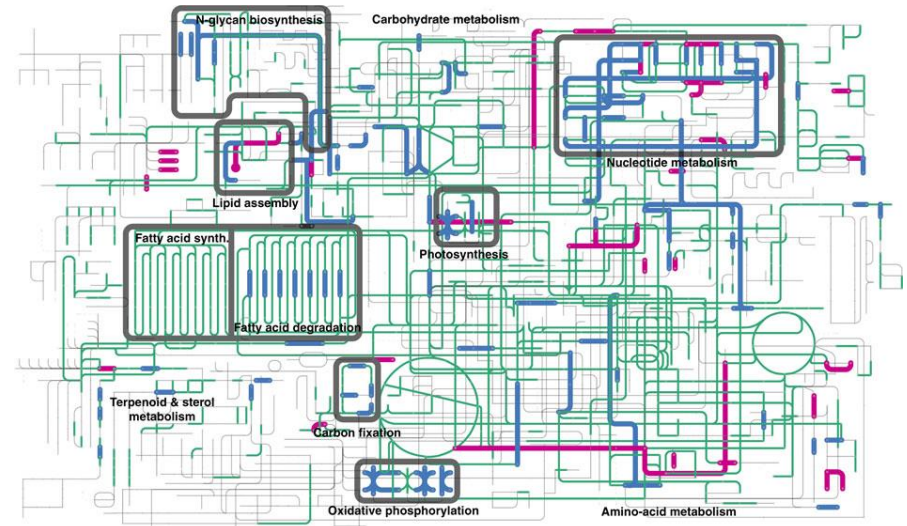
Nitrogen depletion

- Newly formed biomass
 - Consist ~ 50% of fatty acids
- Composition rest?



Future work

- Biomass composition
- Metabolic modelling



Thanks!

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