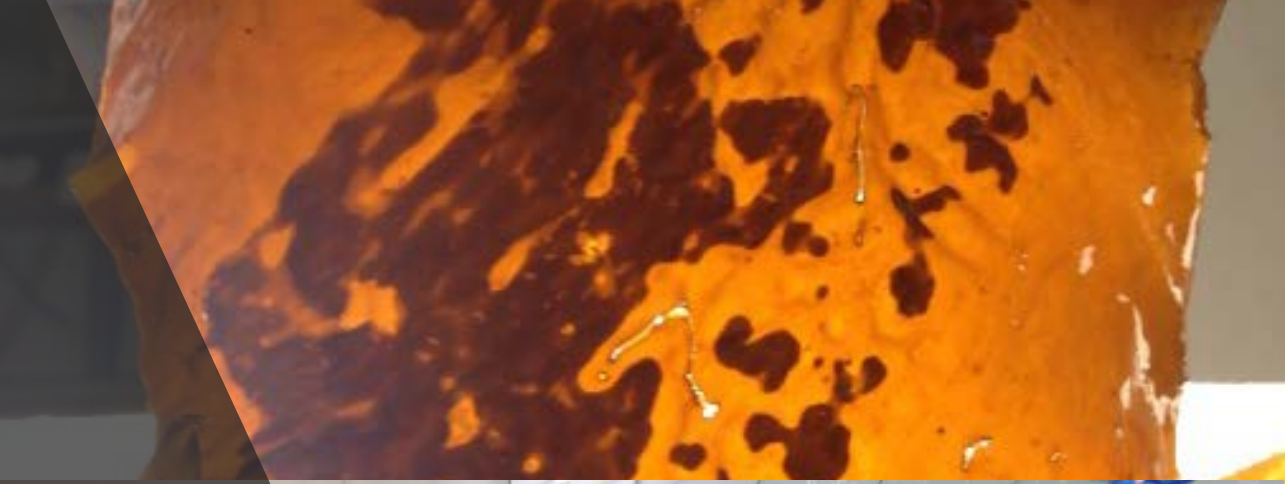
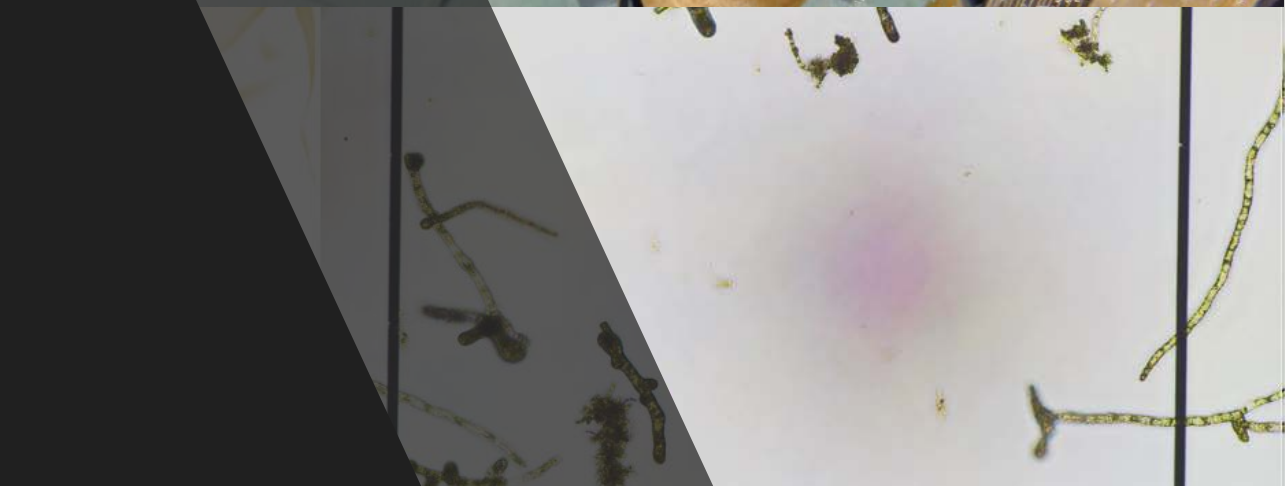
Jorunn Skjermo, Aires Duarte, Raven Cammenga, Kristine Steinhovden, Silje Forbord, Arne Malzahn, Aleksander Handå, Torfinn Solvang-Garten, Trond Størseth

MACROSEA WP1 Seedling Biology





WP1 Objectives

i. Establish quality parameters for use in seedlings production *of S. latissima, A. esculenta and P. palmata*

ii. Characterize biological requirements and treshold levels for environmental variables

iii. Develop a protocol for industrial production of *P. palmata*

Approaches

Initial studies of defined bottlenecks in the Palmaria seedlings protocol

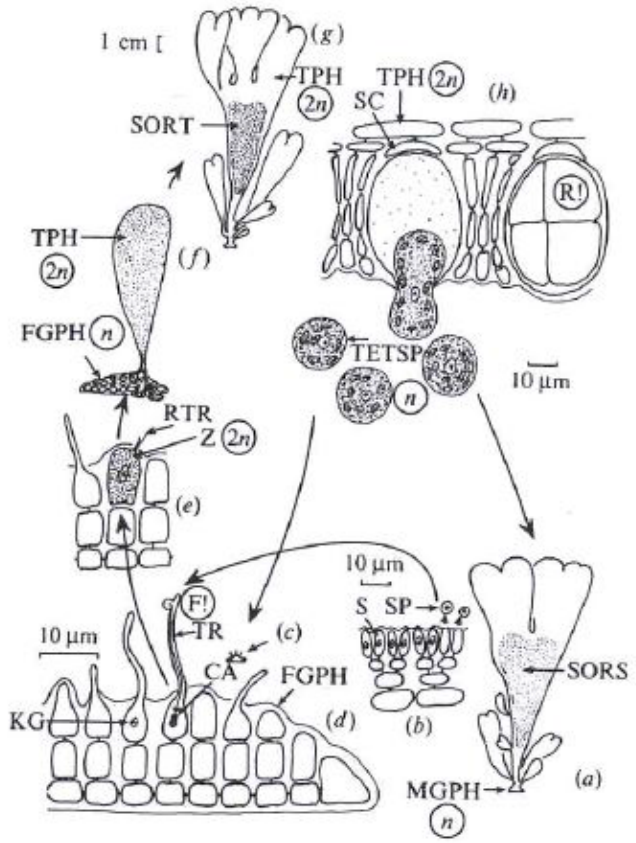
Compare different methods for monitoring of growth and quality of early stages of kelp

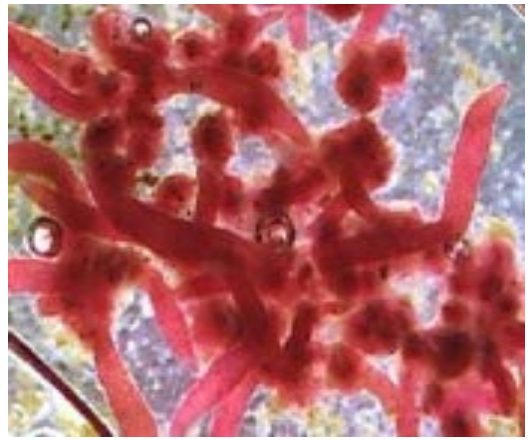
Establish more knowledge about the seedlings production of A. esculenta (photoperiod and time for fertility induction, seeding density, fertilizer)

Evaluate polyphenols as a possible indicator for quality or stress during the seedlings development

Cultivation protocol for *Palmaria palmata*

- Disinfection
- Spore release
- Material
- Incubation conditions
- Contaminants
- Sea-phase



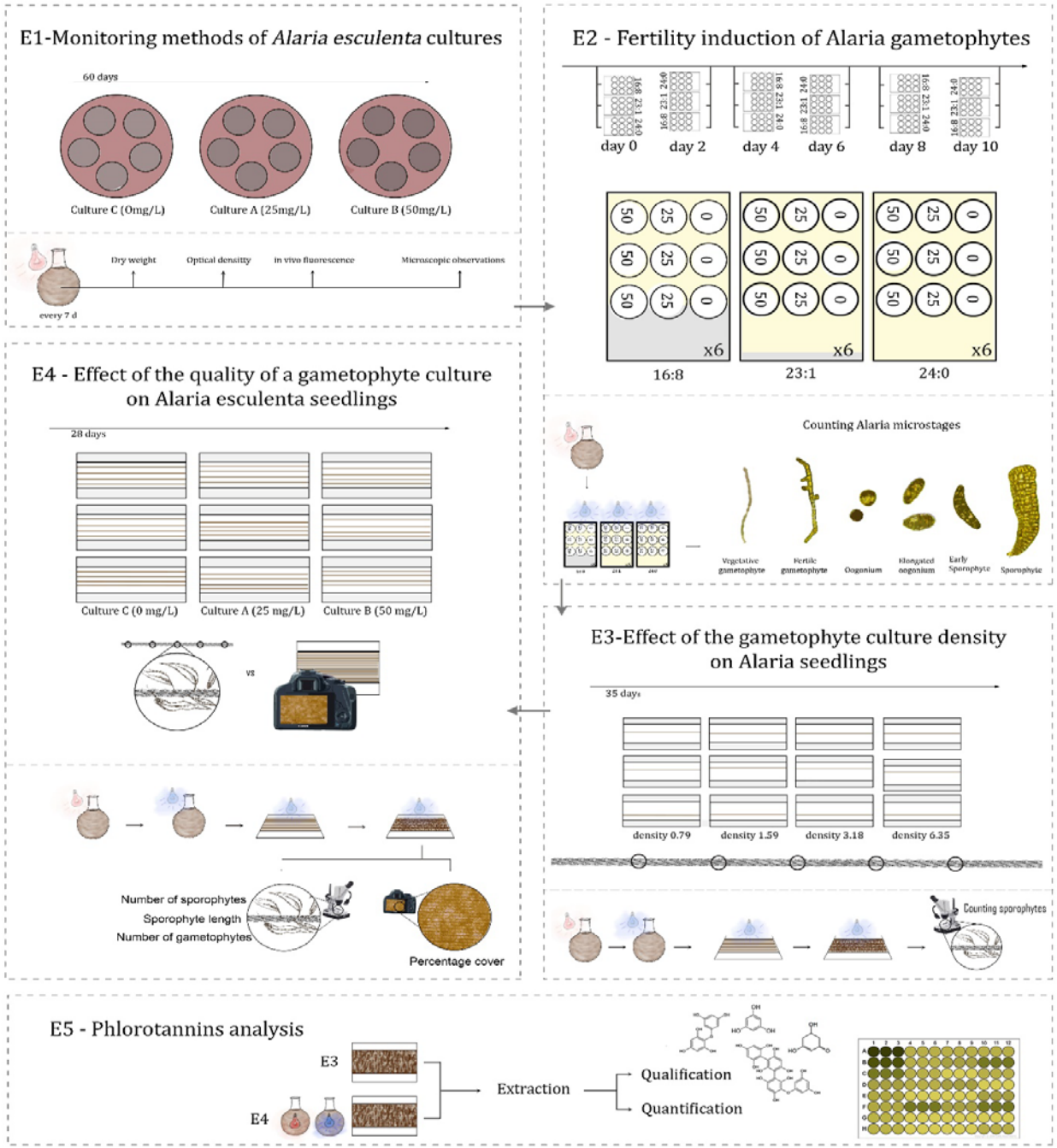


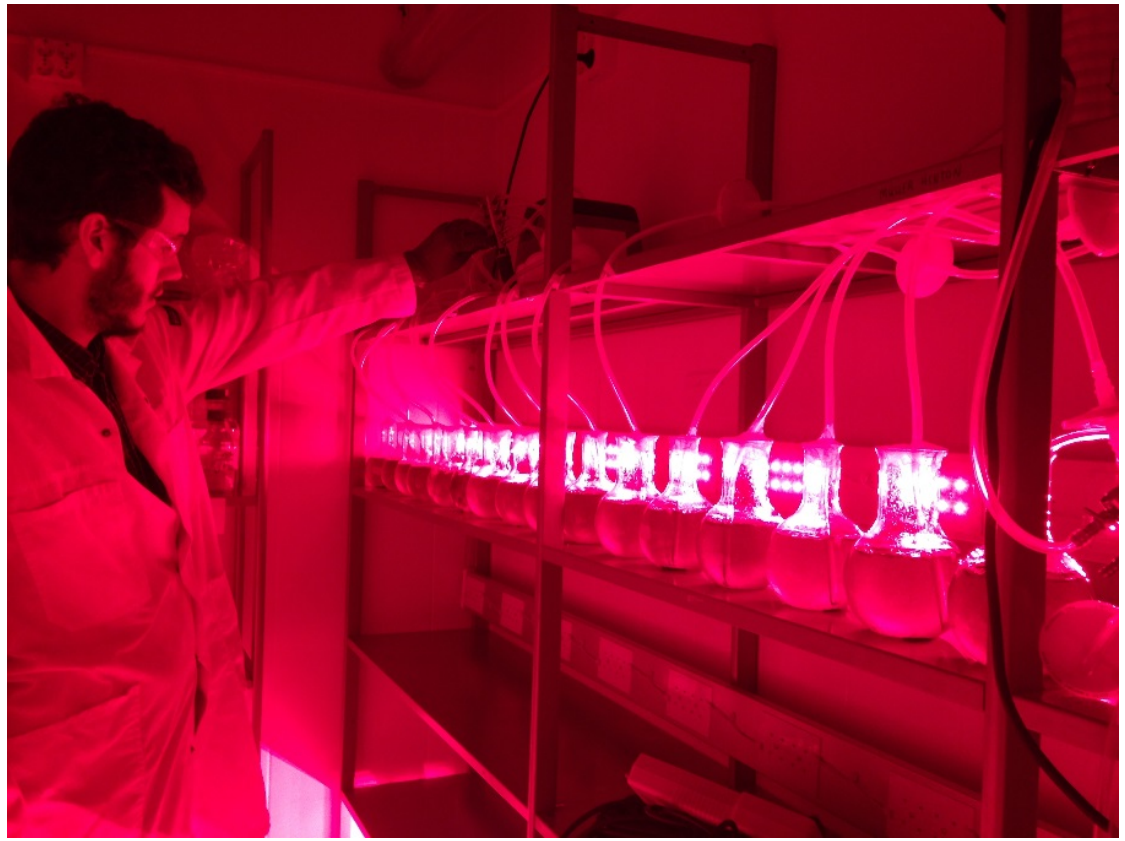
Monitoring of growth and quality of early stages

- Gametophytes of Alaria
  - Effect of cultivation conditions on quality
    - OD
    - In vivo fluorescence
    - Density
    - Percentage distribution of life stages in the gametophyte culture
    - Dry weight
    - Seedlings size, number
    - Phlorotannins

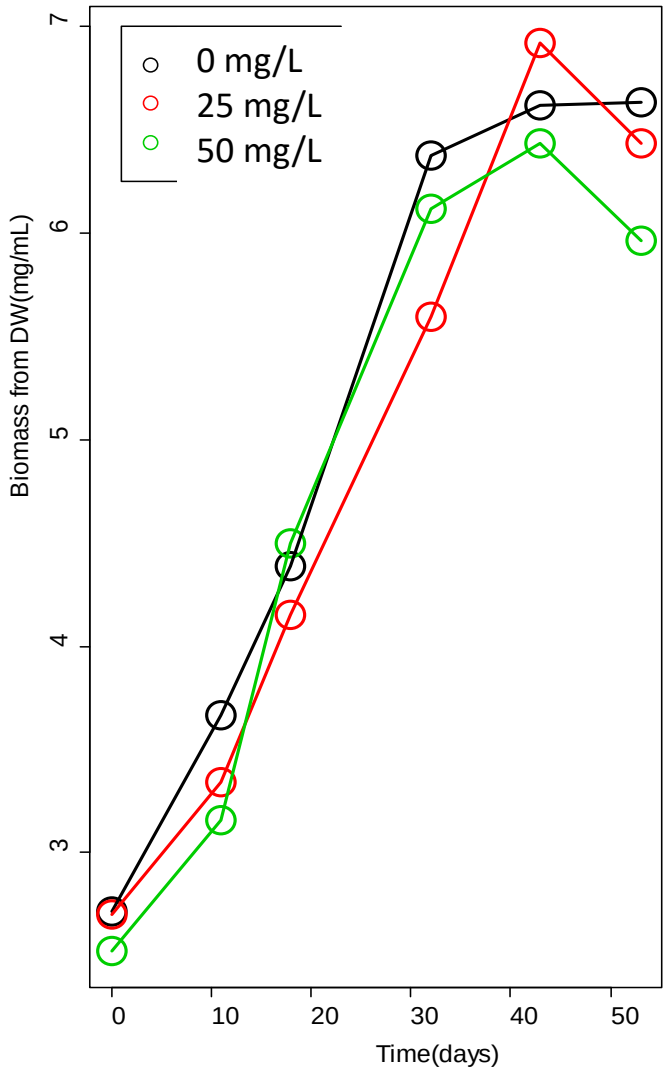
Monitoring of growth and quality of early stages

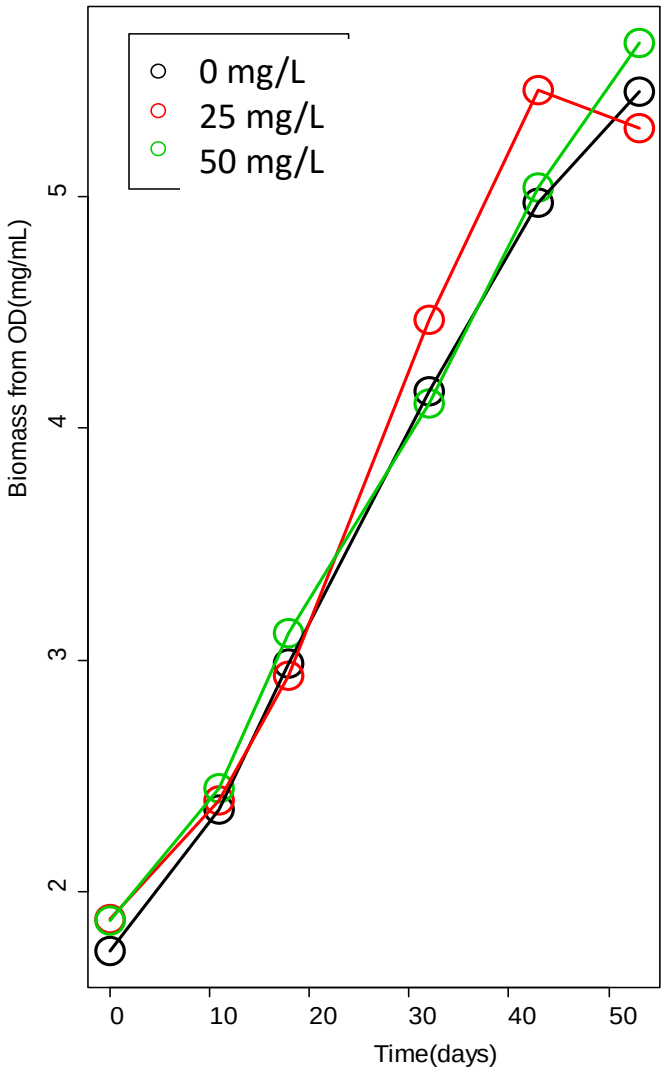
MSc-student Aires Duarte
University of Porto

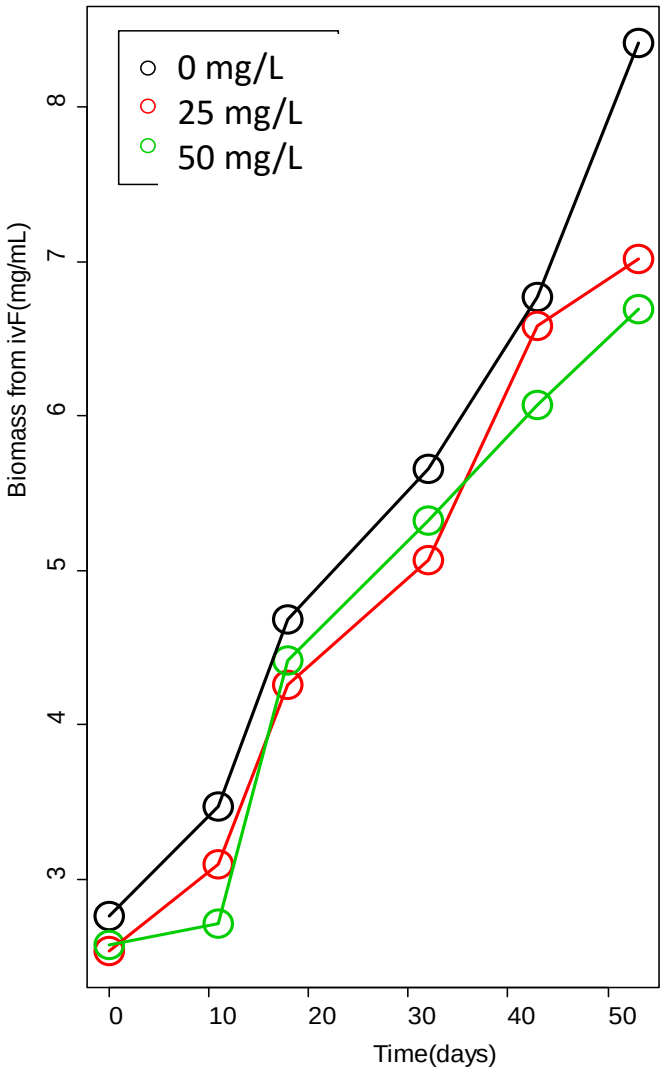




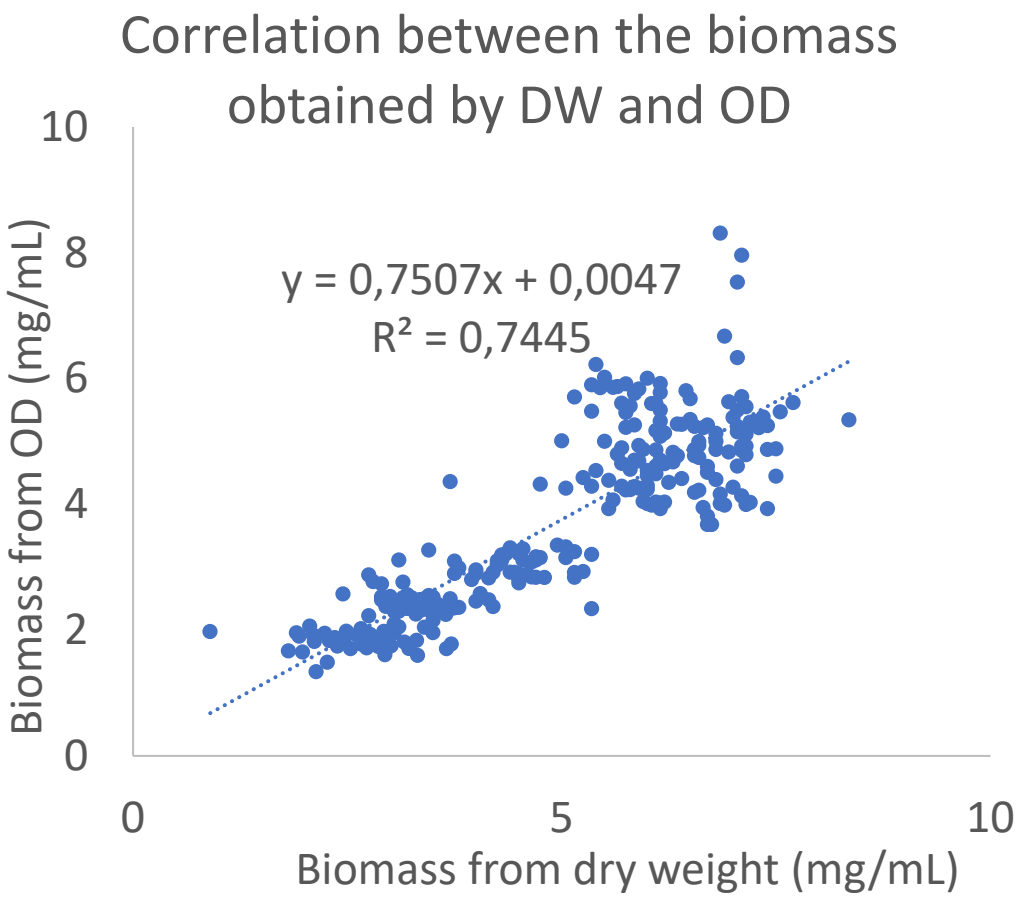
Biomass of Alaria gametophytes from DW, OD

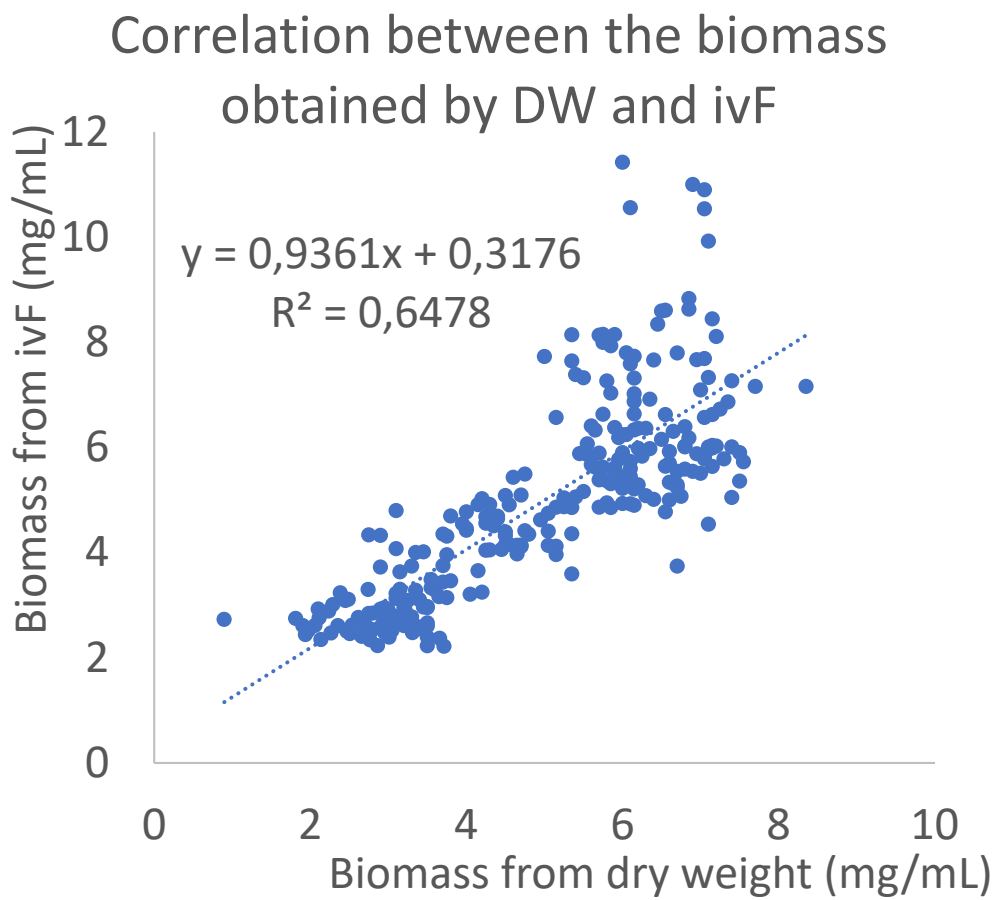




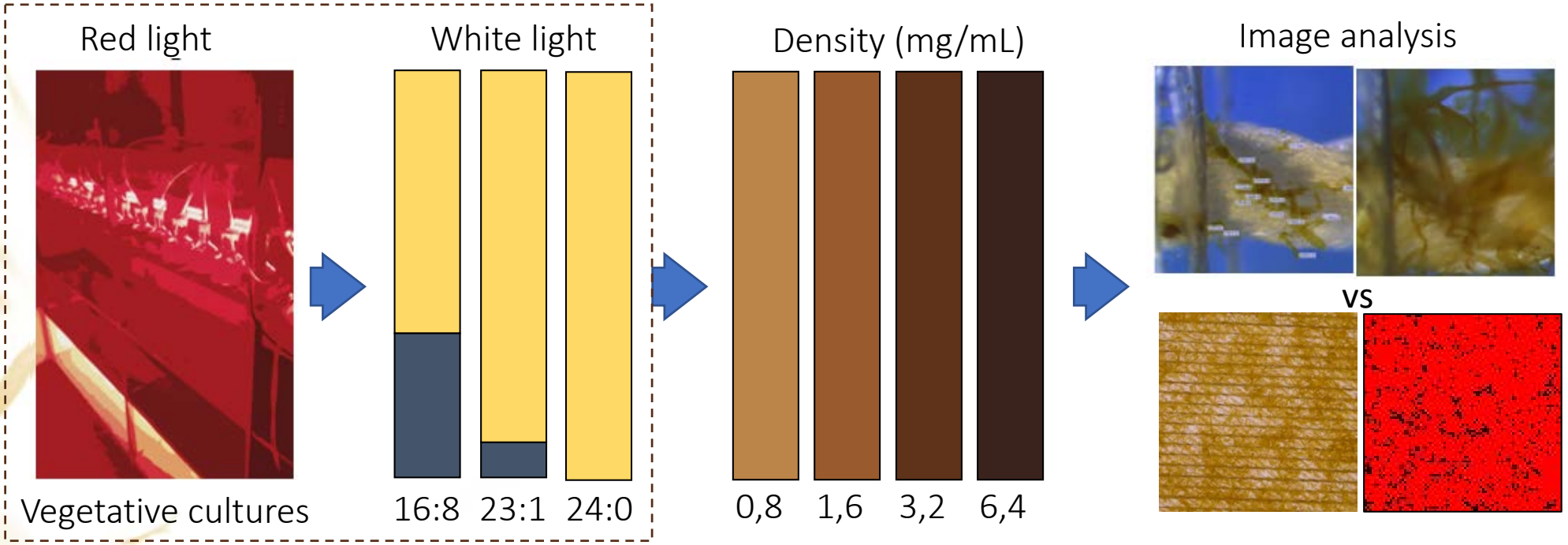


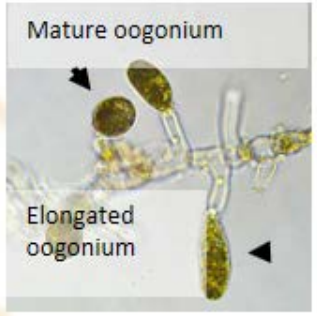
Correlation between dry weight (mg DW/mL), optical density (OD) and in vivo fluorescence (ivF)

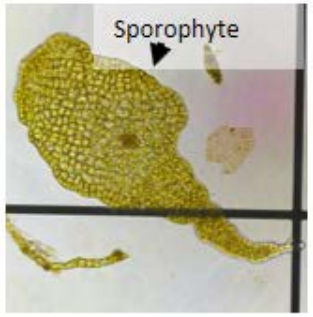




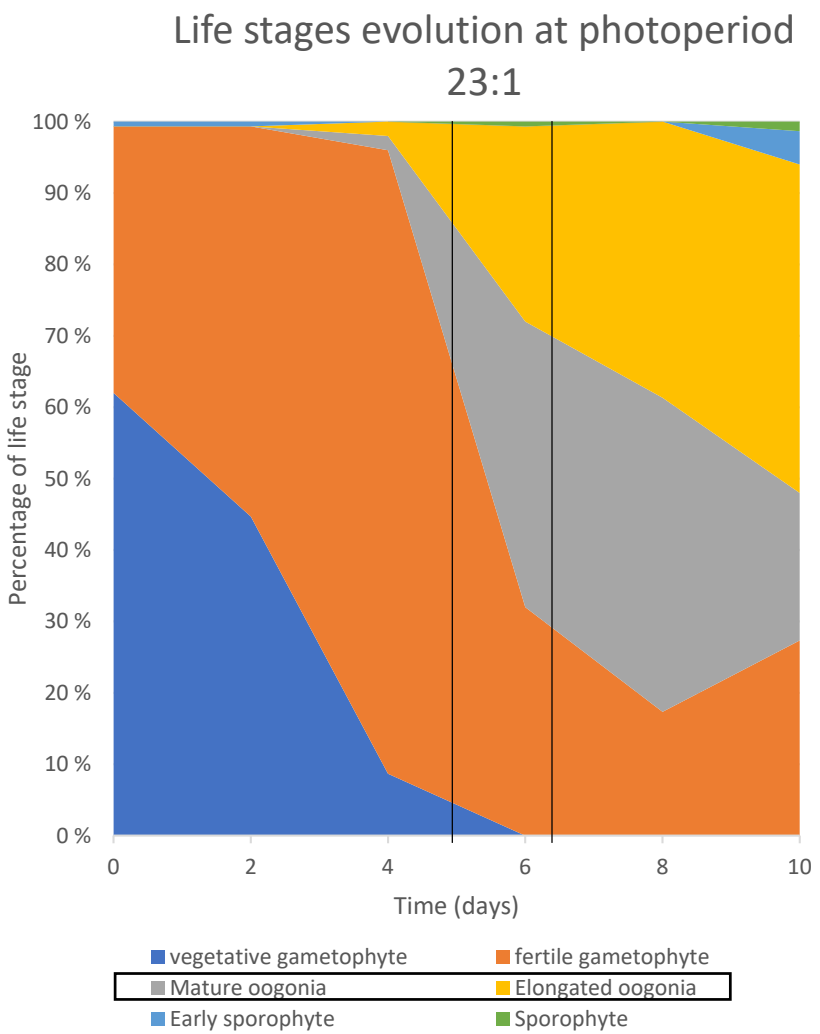
Photoperiod and time for fertility induction - Experimental design

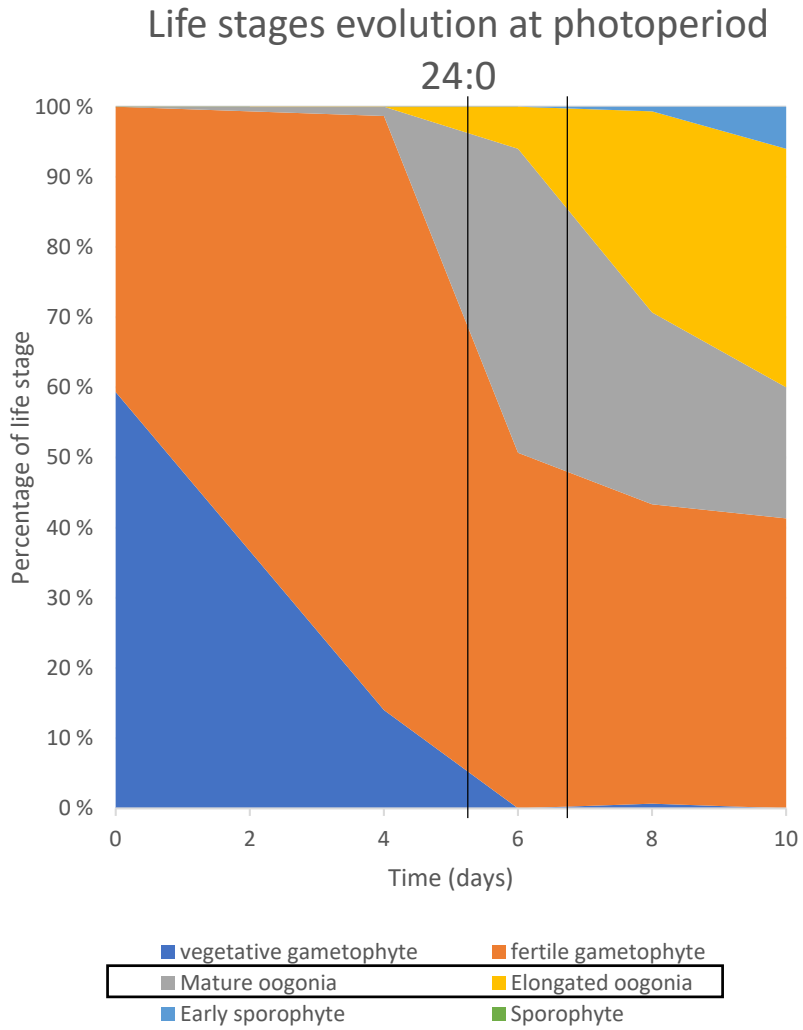


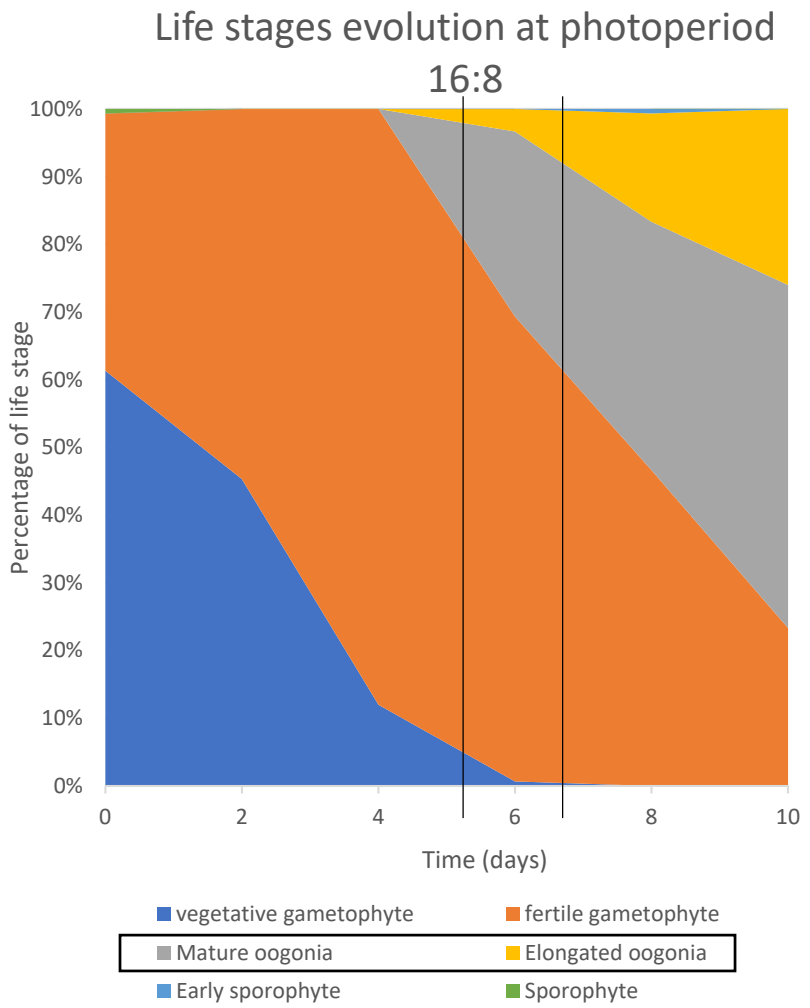




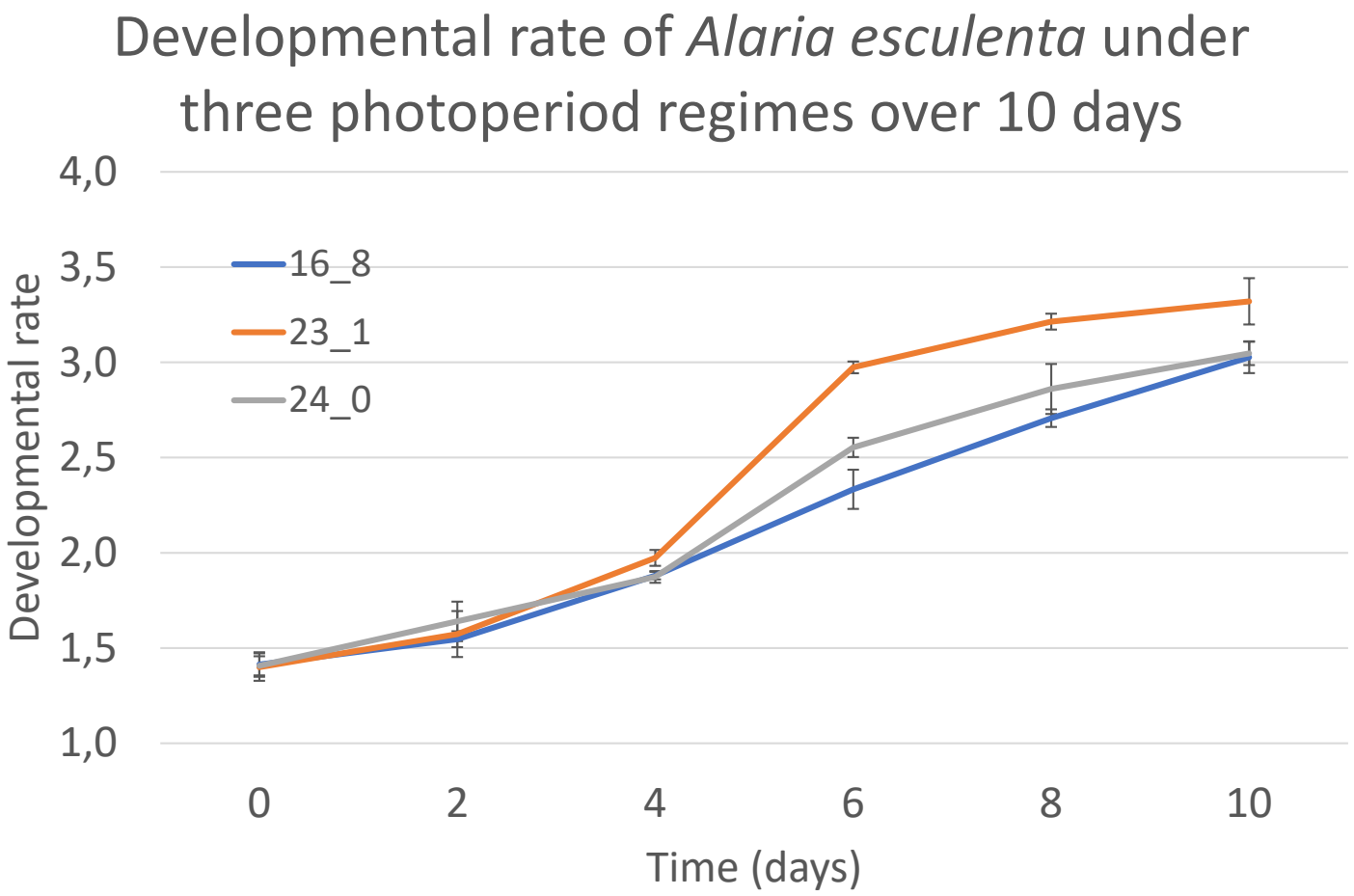
Optimum photoperiod and time for fertility induction *(A.esculenta)*

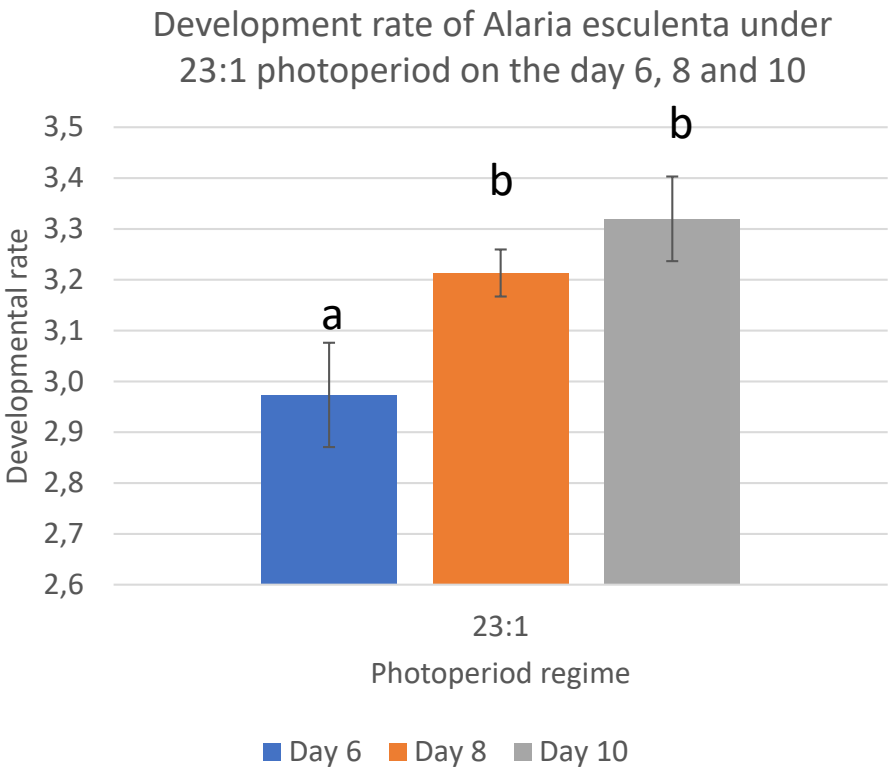






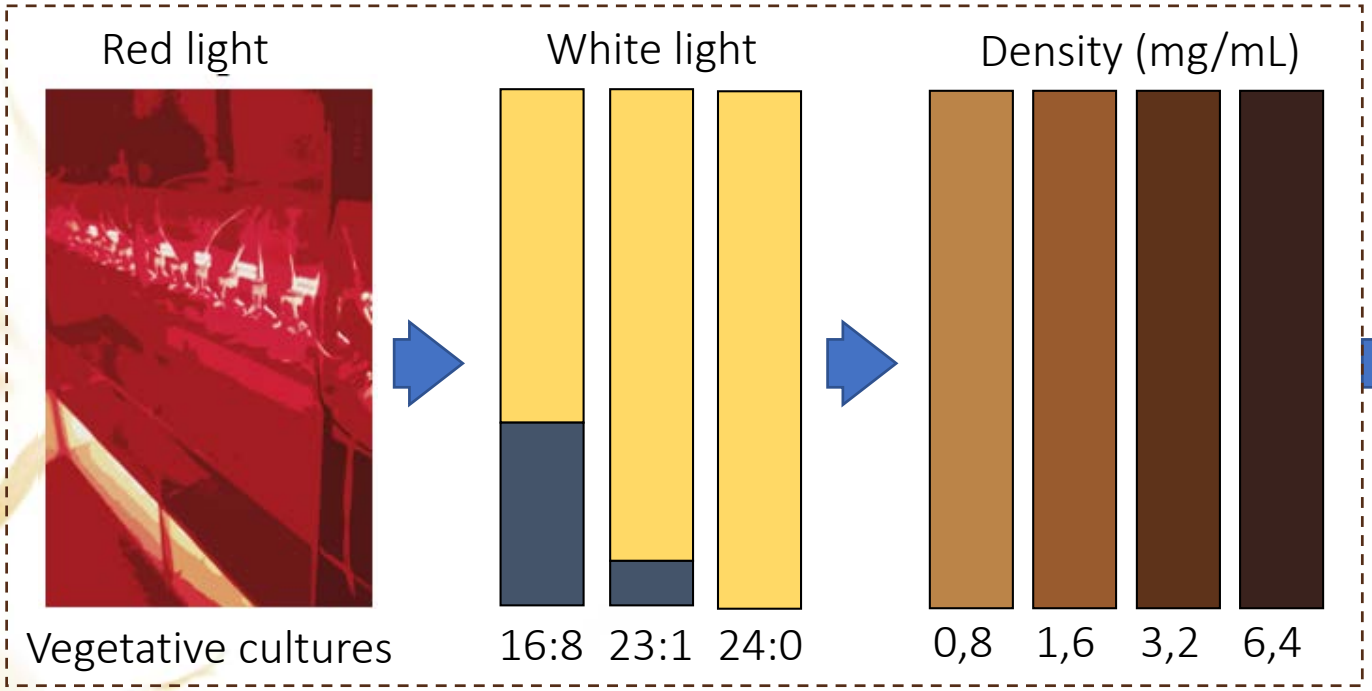
Optimal photoperiod regime for fertility induction

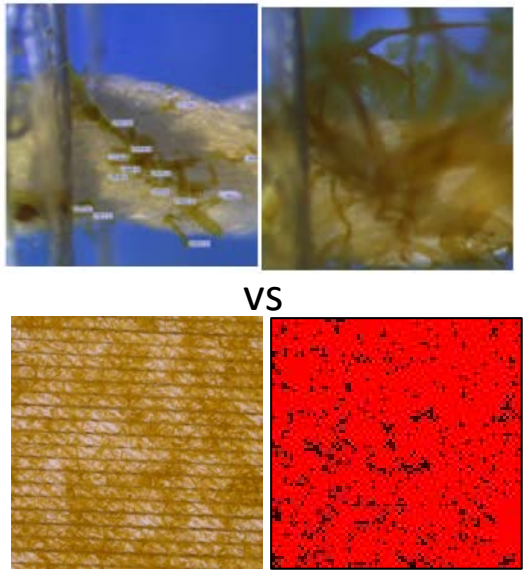


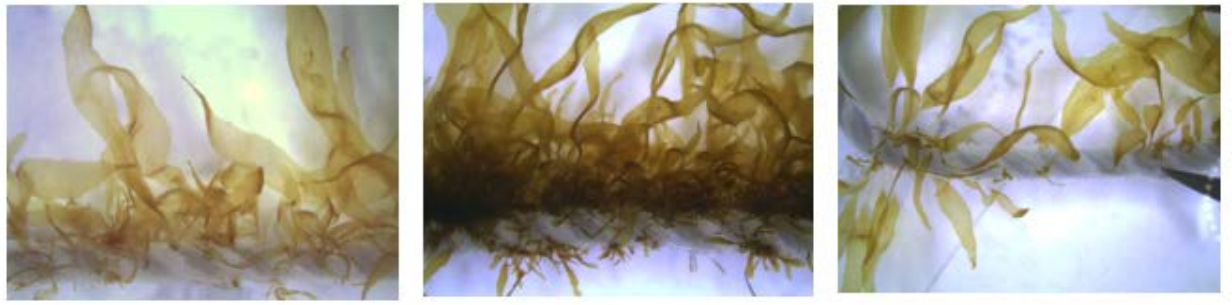


Photoperiod: 23:1 ✓ Induction time: 8d ✓ Density:

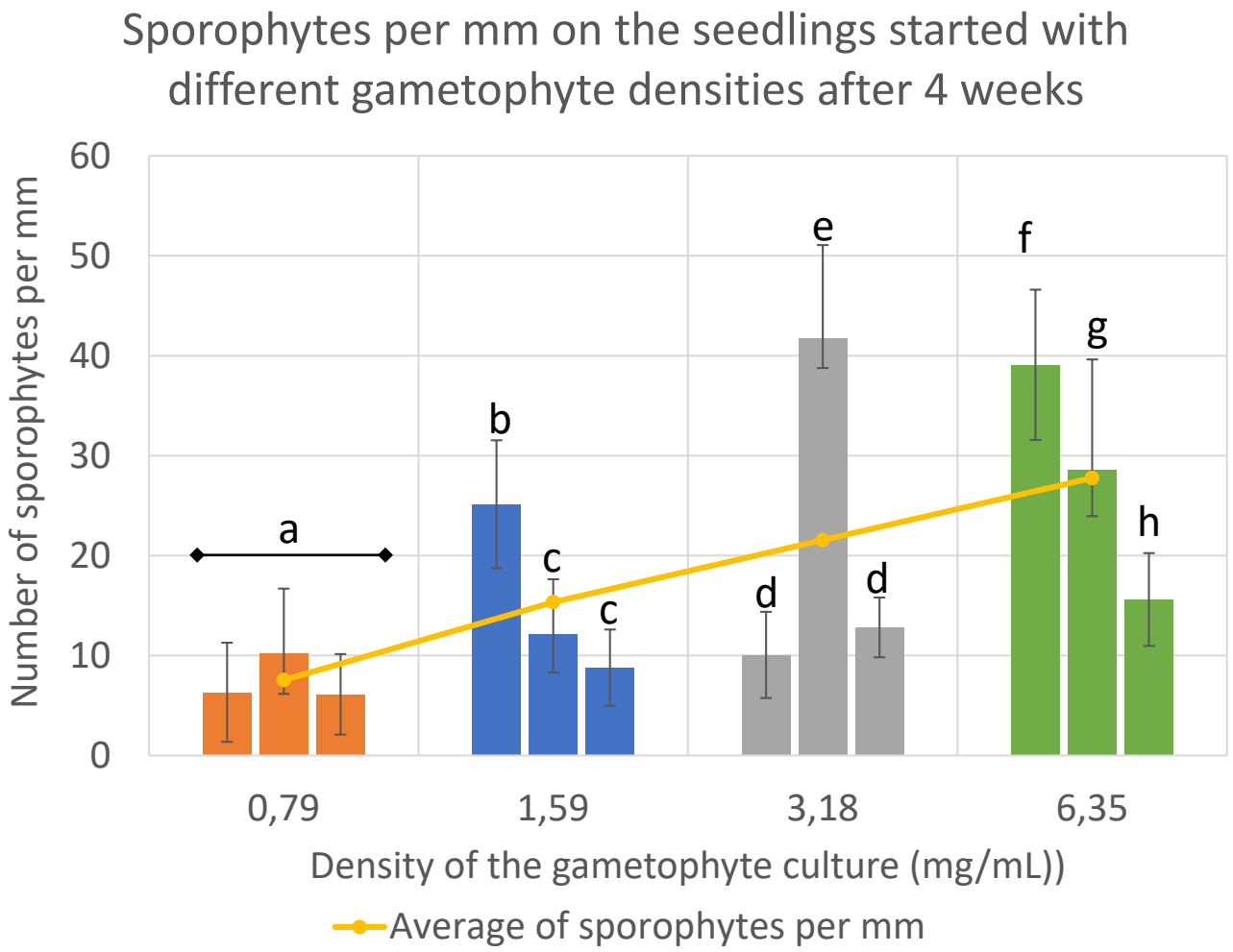
Experimental design







Optimal seeding density with gametophyte culture



Densities (mg/mL)	Sporophytes per mm twine
0,8	7
1,6	15
3,2	21
6,4	27

200 ml pr plate (34x40cm)

Photoperiod: 23:1 ✓ Induction time: 8h ✓ Density ✓

Experimental design

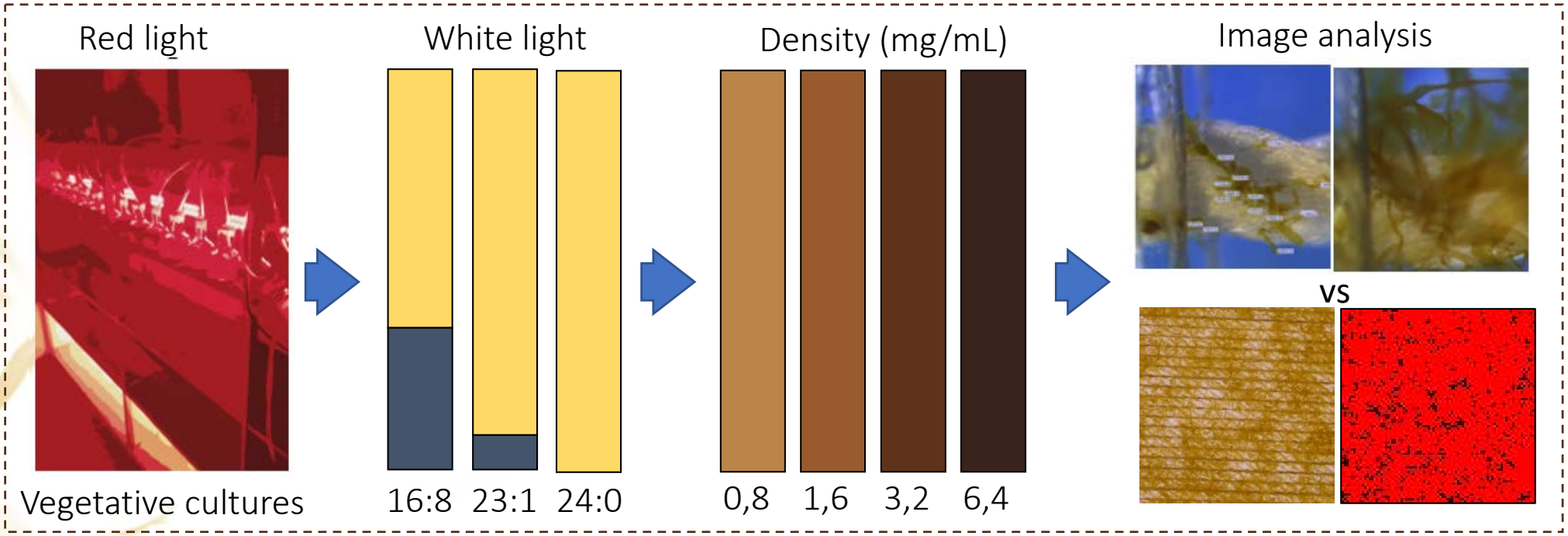
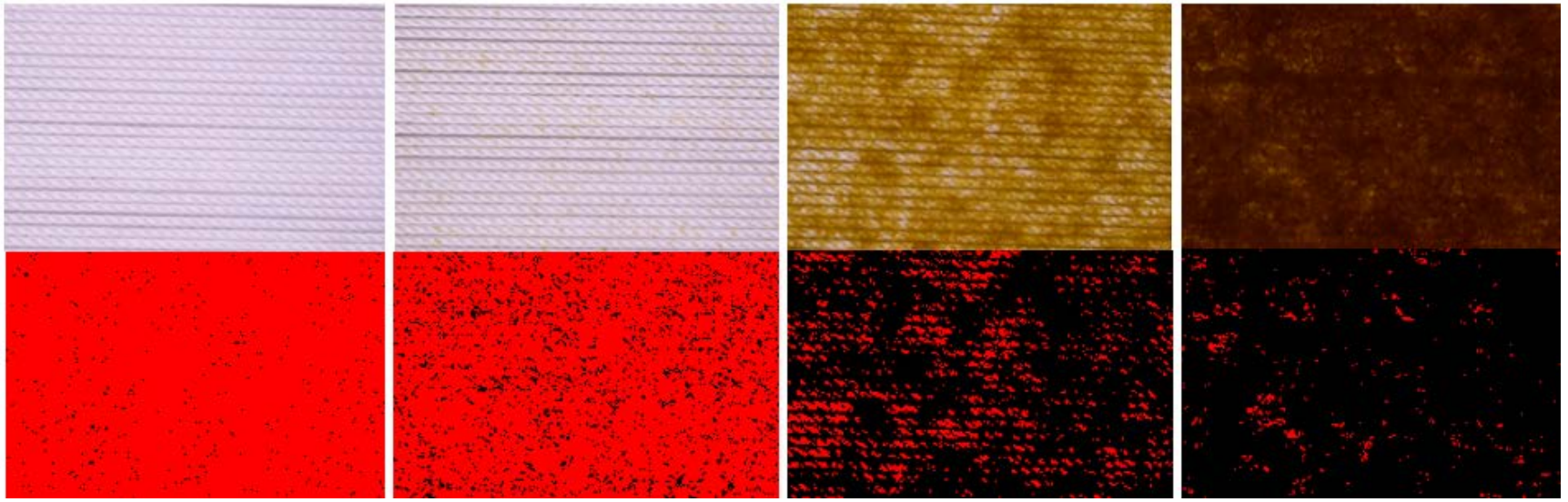


Image analysis to estimate growth
Percent coverage (PC)



Day 7 Day 14 Day 23 Day 30

Alternative way to estimate the seedling growth

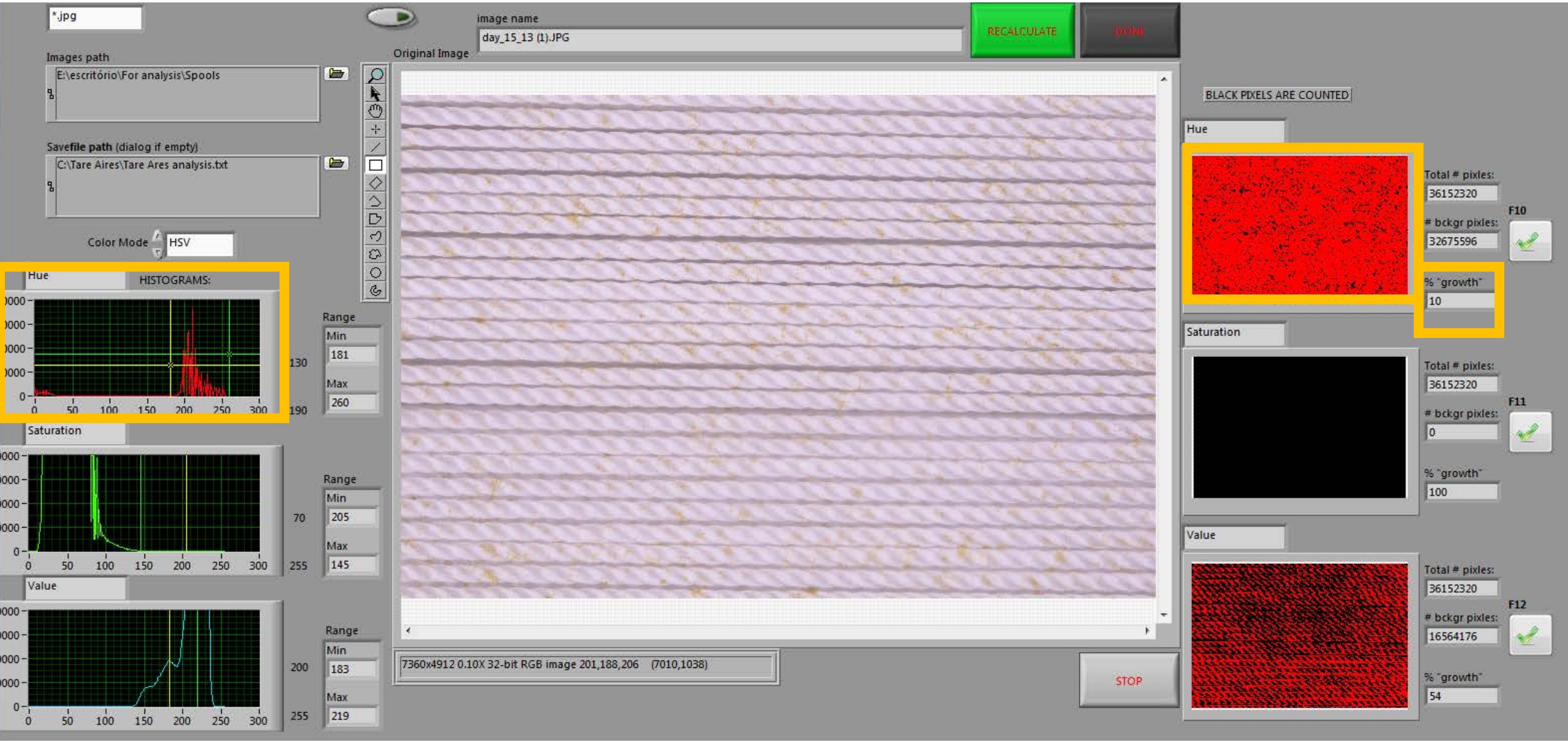
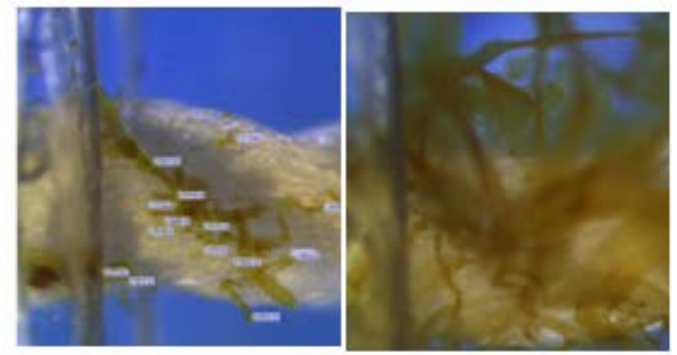
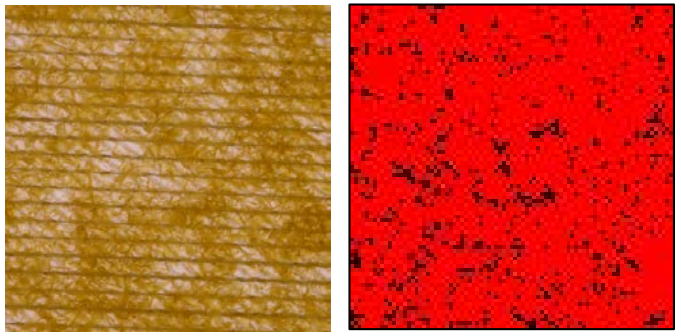


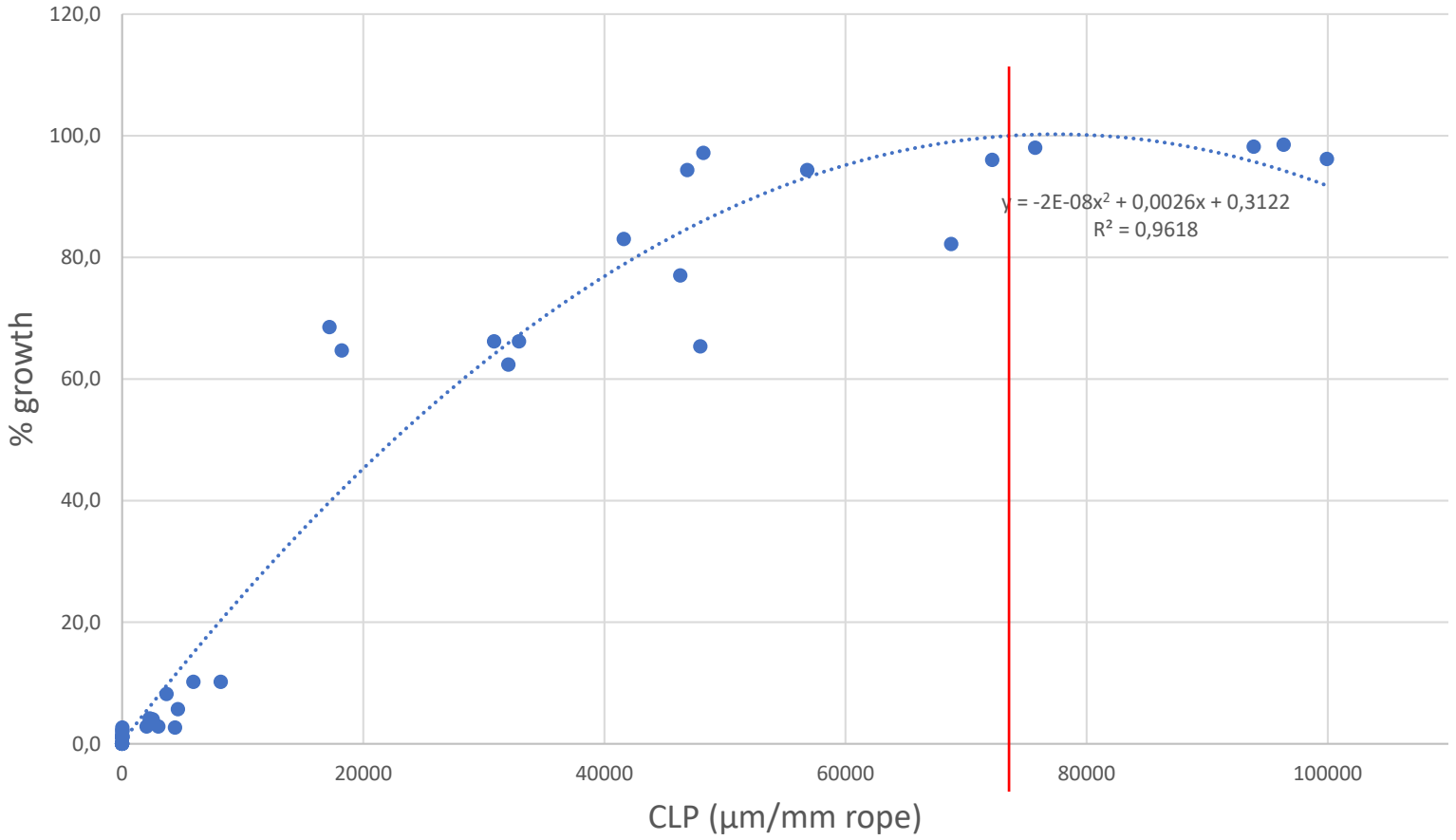
Image analysis to estimate growth



vs



Correlation between the seedling growth (%) obtained by image analysis and the counting and length product(CLP)

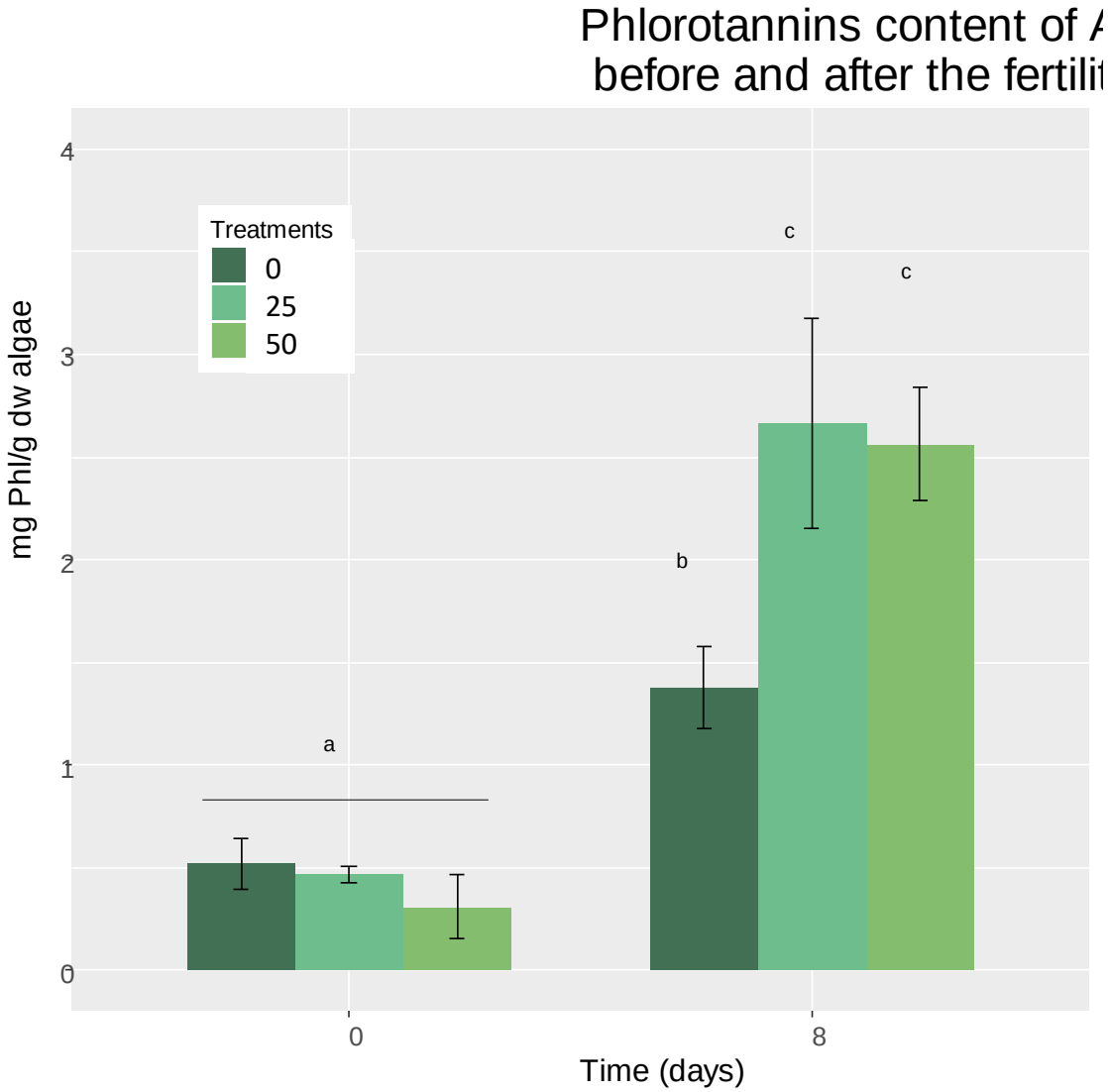


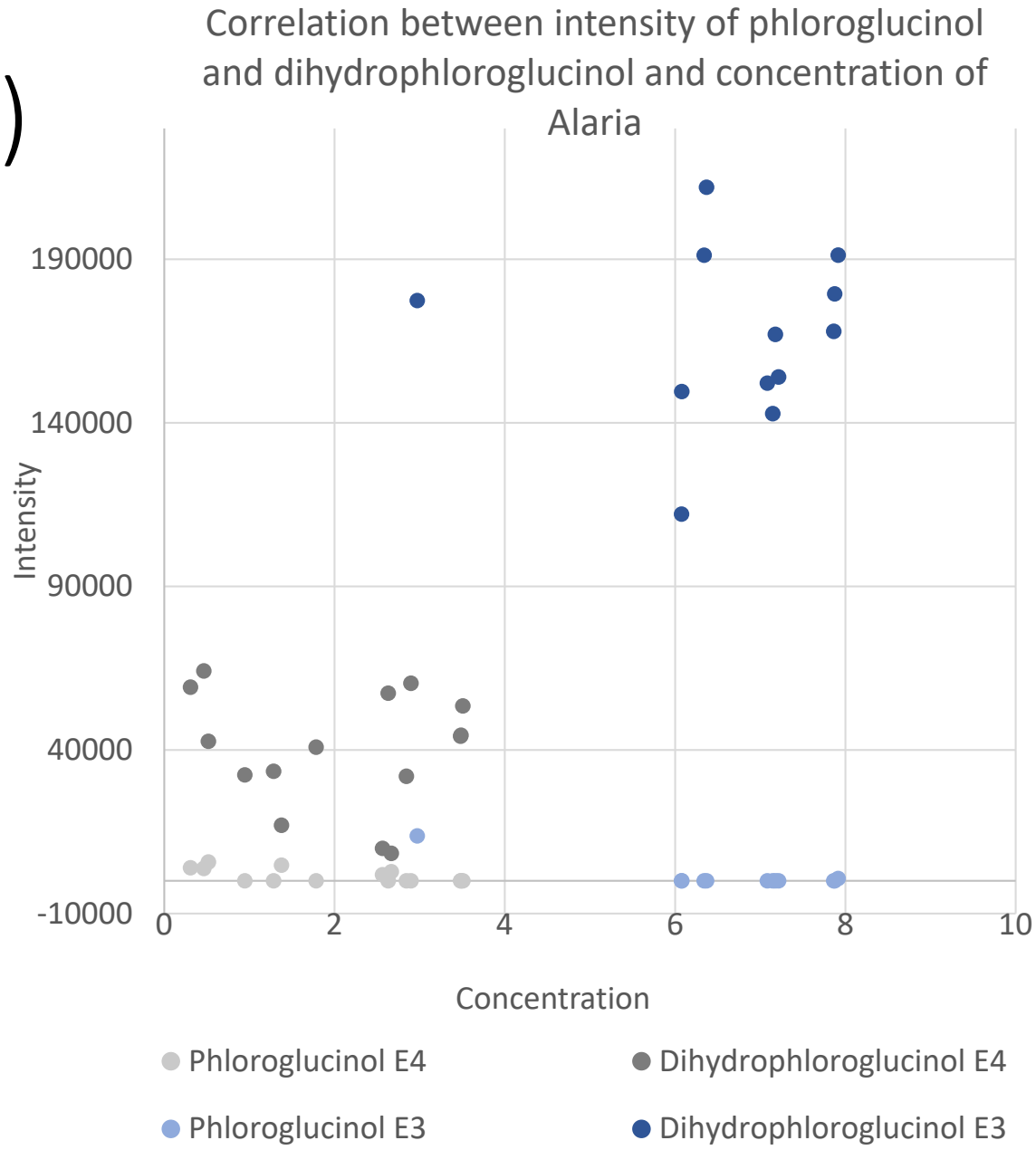
CLP = counting * sporophytes length

Summary

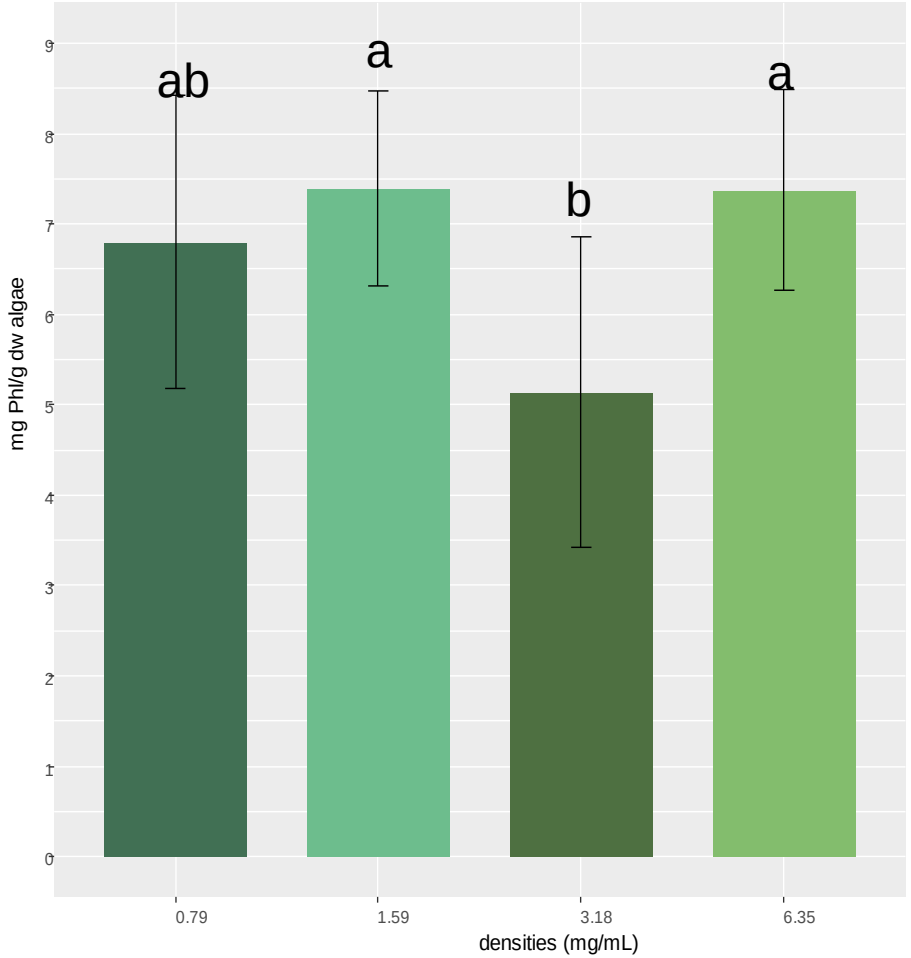
- The optimal photoperiod for fertility induction was 23:1 (light:dark regime) during 8 days
- Of the tested culture densities, seeding with 0,8 mg/mL was most optimal (still too high?)
- Grow estimation of seedlings is possible by image analysis

Phlorotannin content (FC)





Seeding density, no effect on total phlorotannin content



Densities (mg/mL)	Sporophytes per mm twine
0,8	7
1,6	15
3,2	21
6,4	27

Conclusions so far

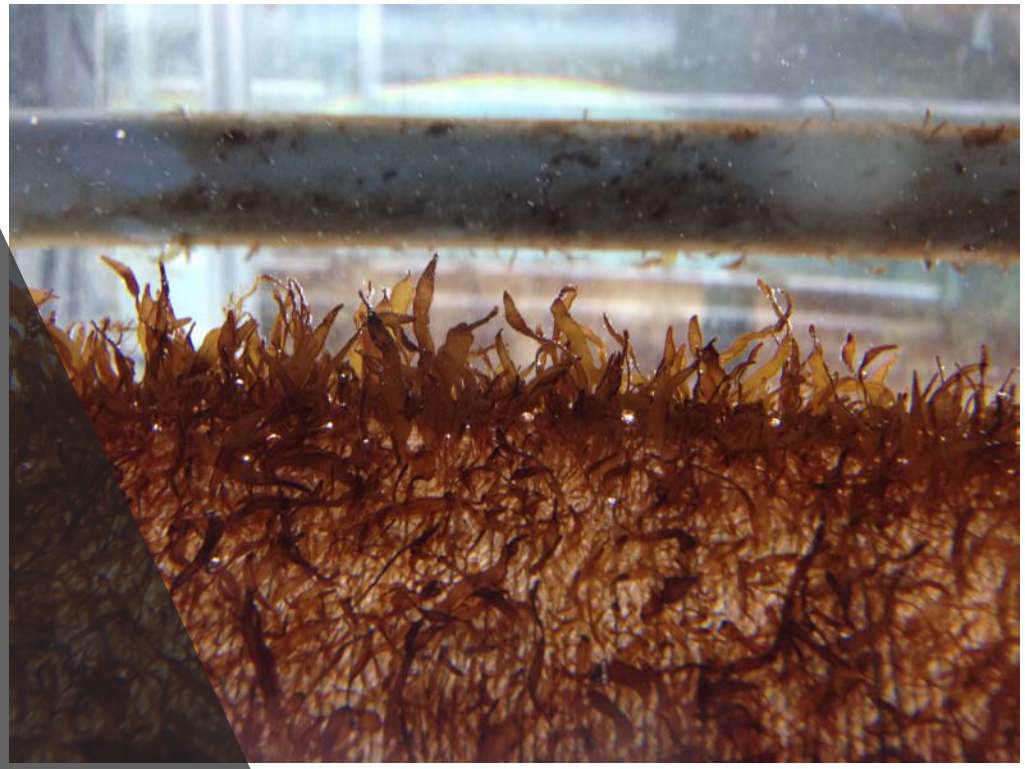
Made progress in the methods for monitoring of growth and quality of early stages of A.esculenta

Defined photoperiod and time fertility induction in A.esculenta

Promising results from initial quantitative and qualitative analysis of phlorotannins

Need more focus on Palmaria

Thank you!



MACROSEA