TURBIDITY AND DRY WEIGHT CORRELATION FOR THREE ALGAL SPECIES GROWN IN PHOTOBIOREACTORS

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Continuous monitoring of algal growth

In order to establish an economical and viable microalgae culture system it is crucial to reduce the costs to cultivate microalgae in photobioreactors. An important contributor to the costs of microalgae cultivation is the manual labour linked with e.g. following up the growth of a microalgae culture and estimating the microalgal biomass. To reduce both, the costs and labour, an online continuously monitoring system of the microalgae culture was tested at the Sunbuilt installation at Thomas More.

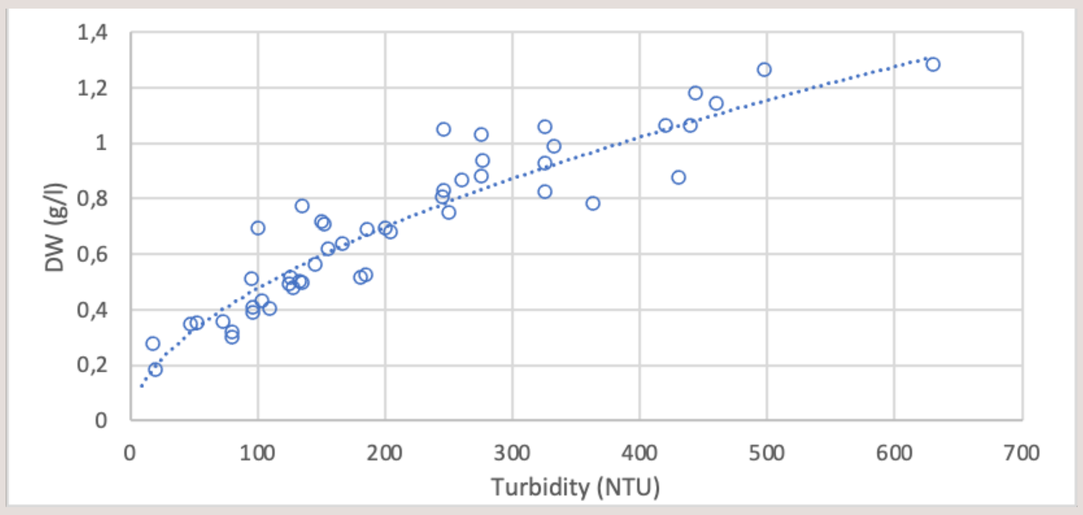
Setup

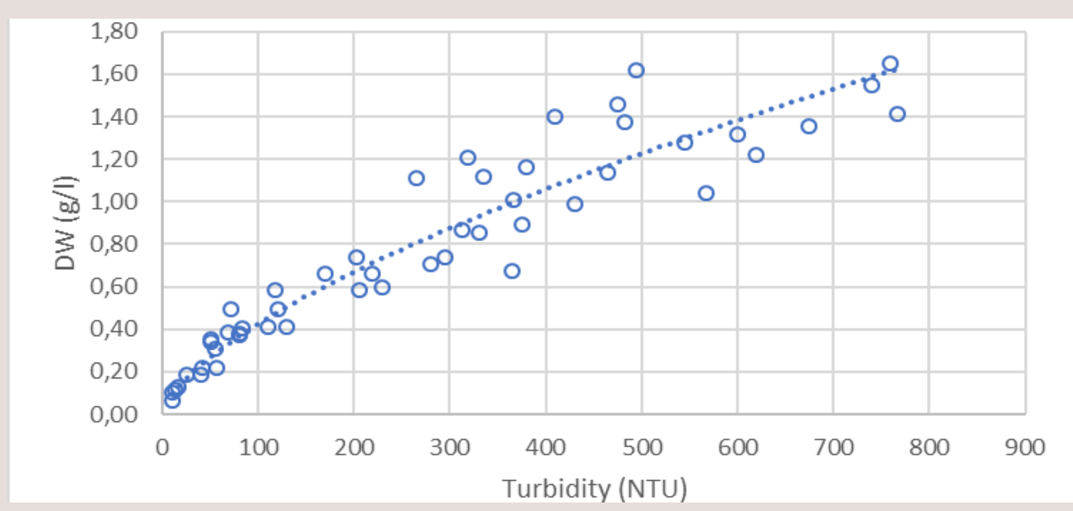
In order to continuously measure the growth of the microalgae an online turbidity meter was installed on a 300 and a 1500 liter photobioreactor.
Three algal species (*Porphyridium purpureum*, *Nannochloropsis gaditana* and *Chloromonas typhlos*) were then grown for several weeks to establish a correlation between the turbidity (in nephelometric turbidity units, NTU) and dry weight (DW, g/l) for each specific microalgae.

Results

For the three algal species a correlation between the measured turbidity (NTU) and dry weight was found after a growth period between 100 and 200 days for each algal species in the 300 and/or 1500 liter photobioreactors.

Species	Correlation	NTU for 1 gram
P. purpureum	DW (g/l) = 0,0214xNTU^0,6503	369
N. gaditana	DW (g/l) = 0,0211xNTU^0,5889	701
C. typhlos	DW (g/l) = 0,0379xNTU^0,5496	385





The left figure shows the correlation between the NTU value measured by the online turbidity instrument (X-axis) and the dry weight (Y-axis; g/l) obtained by taking samples throughout the growth period of *C. typhlos* in the photobioreactor.
The right pictures shows the graphical representation of the correlation between the NTU and DW for *P. purpureum*.

Conclusions and future perspectives

An online continuous turbidity measurement can reduce the time and cost to predict the density of the microalgae. In order to apply such as system a correlation between the turbidity and DW needs to be established for each algal species. Next to the above an online turbidity measurement can also be used to start/stop the automatic harvesting of algae in a continuous growth/harvesting system.

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