Supplementary Material

Microalgae cultivation: closing the yield gap from laboratory to field scale

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# Productivity data from the 38 studies reported in Figure 1

The numbers in bold are the legend for the numbers in Figure 1:

**1**: Weissman et al., 1988; **2**: Pushparaj et al., 1997; **3**: Huesemann et al., 2009; **4**: Ashokkumar and Rengasamy, 2012; **5**: Wang et al., 2018; **6**: Querijero-Palacpac et al., 1990; **7**: Grobbelaar, 2008; **8**: Saito et al., 2020 (average productivity obtained in 20 m2 raceway operated for 2 summer months); **9:** Saito et al., 2020 (average productivity obtained in 2 m2 raceway operated for 2 summer months); **10:** Saito et al., 2020 (average productivity obtained in 200 m2 raceway operated for 2 summer months); **11:** Saito et al., 2020 (average productivity obtained in 4000 m2 raceway operated for 2 months between summer and autumn);**12:** Boussiba et al., 1987 (average productivity from summer months); **13**: Vonshak and Guy, 1992 (productivity reported for Spirulina strain SP-G); **14**: Vonshak and Guy, 1992 (productivity reported Spirulina strain SP-RB); **15**: Koley et al., 2019; **16**: Boussiba et al., 1987 (average productivity from winter months); **17**: Laws et al., 1988; **18**: Hase et al., 2000; **19**: Sing et al., 2014; **20**: Park and Craggs, 2010 (productivity reported from a HRAP operated at 4 days HRT with CO2 addition); **21**: Park and Craggs, 2010 (productivity reported from a HRAP operated at 8 days HRT with CO2 addition); **22**: Posadas et al., 2015; **23**: Arbib et al., 2013; **24**: Richmond et al., 1990 (average productivity recorded between May-October); **25**: Cromar et al., 1996; **26**: Matamoros et al., 2015 (productivity reported from a HRAP operated at 4 days HRT); **27**: Richmond et al., 1990 (average productivity recorded between November - April); **28**: Matamoros et al., 2015 (productivity reported from a HRAP operated at 8 days HRT); **29**: Plouviez et al., 2019 (productivity reported from a HRAP operated at 7.5 days HRT); **30**: Plouviez et al., 2019 (productivity reported a HRAP operated at 10 days HRT); **31**: White and Ryan, 2015 (average productivity recorded between April – October in 2012); **32**: White and Ryan, 2015 (average productivity recorded between April – October in 2014); **33**: Lewis, 2015; **34**: Sutherland et al., 2020; **35**: Sutherland et al., 2020; **36**: Sutherland et al., 2014 (productivity reported from a HRAP with a culture depth of 20 cm); **37**: Sutherland et al., 2014 (productivity reported a HRAP with a culture depth of 30 cm); **38**: Sutherland et al., 2014 (productivity reported from a HRAP with a culture depth of 40 cm); **39**: Sutherland et al., 2020; **40**: Jimenez et al., 2003; **41**: AI-Shayji et al., 1994; **42**: Moheimani and Borowitzka, 2006 (average productivity recorded for *Pleurochrysis carterae*); **43**: Moheimani and Borowitzka, 2006 (average productivity recorded for *Dunaliella salina*); **44**: Arashiro et al., 2019 (productivity recorded from a HRAP receiving primary wastewater); **45**: Moreno et al., 2003; **46**: Arashiro et al., 2019 (productivity recorded from a HRAP receiving secondary wastewater); **47**: Marin et al., 2018; **48**: Matsumoto et al., 1995; **49**: Passos et al., 2015; **50**: Park and Craggs, 2013; **51**: Average productivity reported in 1991 by Belay, 1997; **52**: Passell et al., 2013; **53**: Craggs et al., 2012; **54**: Hong et al., 2016; **55**: Hong et al., 2017.

# Description of the Scopus search and full references list for Figure 2.

To list the biomass productivities commonly used during economics and sustainability assessments of microalgal biotechnology, we searched for the scientific literature focusing on those assessments. We identified this literature by searching for “microalgae”, “algae”, “algal”, “microalgal”, and “life cycle” within article titles in Scopus as followed:

TITLE ("microalgae" OR "algae" OR "microalgal" OR "algal") AND TITLE ("life cycle")).

This search, conducted on August the 1st 2023, yielded 380 documents cited 17334 times. Reviews, meta data analyses and studies clearly irrelevant to the purpose of our analysis were removed from the list. Overall, 241 documents all together cited 13067 times were kept. We then focused on the 43 most cited studies representing 70% of the total 13067 citations for the 241 selected studies. Productivity data was only available for 35 studies out of 43, but these 35 studies alone yielded 68% of the total citation of the 241 selected studies. Only the base case scenario productivity data were selected. Most of the 35 studies were focusing on virtual facilities cultivating microalgae in raceways ponds or HRAPs. If several cultivation designs were compared, only the data documented for raceways were selected. The data is presented in Figure 2 of the manuscript.

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