Supporting information

Supp. Table 1 System configurations of recirculating aquaculture systems (RAS) integrated with algae. The rates of nitrogen removal of algal reactors are shown in Table 1. (Studies 1 – 8 refer to labels used in the main text, Figures 1, 2, 3 and 4 and Supp. Table 1).

References	RAS configurations	System flow rate, L min^{-1}	Plant tank flow rate, L min^{-1}	Hydraulic retention time, HRT, (day)	Algae tank surface area, m^2 (volume, m^3)	Algae reactor: fish tank	Study duration, days	T, ^oC	pH	Animal tank's dissolved oxygen, mg L^{-1}	Light intensity for plant (photoperiod, L:D) µmol m^{-2} s^{-1}
Microalgae											
Study 2 RAS - Periphyton turf scrubber, (PTS) (Valeta and Verdegem, 2015)	Fish tank - PTS - sump	6.7	6.7	0.002	2 m^2 (0.02 m^3)	n.a	49	27 to 28	7.6±0.3	6.15±0.52	120.68 (18:6)
Study 3 RAS – PTS (Huang et al., 2013)	Mussel trough-sump/biofilter - PTS-	23.3	n.a	n.a	0.36 m^2 (n.a)	n.a	91	22.1±1.6	8.72± 0.3	8.4±1.6	Day- natural light (no intensity mentioned) Night- 1034
Study 4 RAS – PTS pond (SustainAqua, 2009)	Fishpond-sedimentation pond – periphyton pond	900	434	1.6	1000 m^2 (1000 m^3)	3:1	180	n.a	n.a	n.a	n.a
Study 7 Combined Intensive-extensive	Outdoor pond system	23148		60	200000 m^2 (200000 m^3)	13.5:1	1095	n.a	n.a	n.a	n.a

RAS (Gál et al., 2003)											
Study 8 RAS-raceway (Li et al., 2019)	3 fish tanks - particle separator - mechanical filter – biofilter - algae HRAP	67	3	4	12	6:12	60	19.4 ± 2.3	7.2 ± 0.2	8.6 ± 2.6	54
Macroalgae											
Study 1a *Ulva lactuca* (Cahill et al., 2010)	Fish tank - alga tank	10	10	(0.003)	(0.04 m^3)	1:1	14	9.04±0.22	8.4	n.a	207 to 782
Study 1b *Ulva pinnatifida* (Cahill et al., 2010)	Fish tank - algal tank	10	10	(0.003)	(0.04 m^3)	1:1	14	9.04±0.22	8.4	n.a	207 to 782
Study 5 RAS - outdoor high rate algal pond, (HRAP) (Pagand et al., 2000)	2 fishponds - particle separator - mechanical filter - algae HRAP	500	1.04	(3.9)	11.8 m^2 (5.9 m^3)	1:1.7	540	24 (summer) 7 (winter)	7.6 (midday:9)	10 to 15 (midday) >5 (morning)	104 - winter 694 - summer
Study 6 RAS - HRAP (Deviller et al., 2004a)	2 fishponds - particle separator- mechanical filter - algae HRAP	167	11.7 to 16.7	(0.5)	24 m^2 (12 m^3)	3:1	365	21 to 26 (summer) 12 (winter)	6.9 to 7.8	6 to 9	46 – winter 89 - summer

Supp. Table 2 Aerial algal biomass (g wet weight m^{-2}) or volumetric algal biomass (g wet weight m^{-3}) (given in parenthesis) and total ammonia nitrogen (TAN), nitrite-N (NO_2-N) and nitrate-N (NO_3-N) concentration in a recirculating aquaculture system integrated with algae.

Reference	**Algae biomass, g wet weight m^{-2} (g wet weight m^{-3})**	**NH_4-N, mg L^{-1}**	**NO_2-N, mg L^{-1}**	**NO_3-N, mg L^{-1}**
(Valeta and Verdegem, 2015)	77.14 [1]	1.58 to 3.21	0.55 to 1.28	80.5 to 217.3
(Huang et al., 2013)	n.a	0.026	0.008	0.104
(SustainAqua, 2009)	34.72 (34.72)	negligible	negligible	negligible
(Gál et al., 2003)	60 [2]	0.9 to 6.02 (nitrogen)	n.a	n.a
(Li et al., 2019)	791 [3]	0.43 ± 0.07	0.20	5.12
(Cahill et al., 2010)	*1230 (4098)[4]	0.03±0.01	n.a	0.03±0.01
(Cahill et al., 2010)	* 2430 (8111.25)[5]	0.03± 0.01	n.a	0.02±0.00
(Pagand et al., 2000)	2500 [6]	0.05	n.a	0.06
(Deviller et al. 2004)	455 to 2727[7] (909-5454)	0.34±0.12	0.13±0.05	14.5±5.1

[1] 1.08± 0.32 kg $week^{-1}$/7 day/2 m^2

[2] 2.4 to 2.6 g C m^{-2} day^{-1} (primary production)

[3] Equals to 174 mg L^{-1} TSS algae

[4] 21.64 g m^{-2} day^{-1} growth rate

[5] 34.04 g m^{-2} day^{-1} growth rate

[6] 3.3 $kg.m^{-2}year^{-1}$ of algal dry weight were harvested

[7] HRAP was restocked between 0.1 and 0.6 g of dry weight per litre (g DW L^{-1}) weekly in summer and autumn and biweekly in winter and spring