

## Supplementary material

**Table S1.** Concentration of dissolved inorganic phosphorous (DIP) and dissolved inorganic nitrogen (DIN) along the experimental period in *H. portulacoides* aquaponics tank system, *S. ramosissima* aquaponics tank system and *S. perennis* aquaponics tank system.

Halophytes	Aquaponics tank	Parameter	Spring	Summer	Autumn
<i>H. portulacoides</i>	Effluent inlet	DIP (mg L <sup>-1</sup> )	0.078 ± 0.002	0.131 ± 0.002	0.433 ± 0.002
	Effluent outlet		0.054 ± 0.007	0.461 ± 0.008	0.495 ± 0.008
	Effluent inlet	DIN (mg L <sup>-1</sup> )	0.847 ± 0.002	4.902 ± 0.001	8.315 ± 0.002
	Effluent outlet		0.739 ± 0.002	0.461 ± 0.001	3.455 ± 0.001
<i>S. ramosissima</i>	Effluent inlet	DIP (mg L <sup>-1</sup> )	0.090 ± 0.003	0.445 ± 0.001	0.443 ± 0.027
	Effluent outlet		0.096 ± 0.005	0.520 ± 0.006	0.513 ± 0.010
	Effluent inlet	DIN (mg L <sup>-1</sup> )	0.869 ± 0.002	4.736 ± 0.001	8.096 ± 0.003
	Effluent outlet		0.766 ± 0.004	0.514 ± 0.001	6.371 ± 0.003
<i>S. perennis</i>	Effluent inlet	DIP (mg L <sup>-1</sup> )	0.084 ± 0.005	0.312 ± 0.002	0.462 ± 0.015
	Effluent outlet		0.042 ± 0.001	0.380 ± 0.011	0.474 ± 0.004
	Effluent inlet	DIN (mg L <sup>-1</sup> )	0.754 ± 0.001	4.543 ± 0.003	8.225 ± 0.002
	Effluent outlet		0.359 ± 0.017	0.085 ± 0.001	3.250 ± 0.001

**Table S2.** Fatty acid profile (percentage of relative abundance) of wild *H. portulacoides* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates  $\pm$  standard deviation. ND: fatty acid not detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1*n*-7; 16:1*n*-9; 18:1*n*-9; 18:1*n*-7; 20:1*n*-7. Polyunsaturated fatty acids (PUFA): 16:3*n*-3; 18:2*n*-6; 18:3*n*-3; 20:2*n*-6.

Fatty acids	Wild					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
16:0	17.57 $\pm$ 0.08	17.30 $\pm$ 0.58	15.37 $\pm$ 0.08	20.35 $\pm$ 0.09	19.32 $\pm$ 0.83	19.61 $\pm$ 0.11
18:0	1.23 $\pm$ 0.04	1.26 $\pm$ 0.04	0.99 $\pm$ 0.01	1.34 $\pm$ 0.25	1.19 $\pm$ 0.10	1.61 $\pm$ 0.19
20:0	0.63 $\pm$ 0.02	1.16 $\pm$ 0.01	0.93 $\pm$ 0.03	2.89 $\pm$ 0.04	2.96 $\pm$ 0.31	2.73 $\pm$ 0.05
22:0	1.25 $\pm$ 0.08	2.81 $\pm$ 0.03	2.87 $\pm$ 0.13	6.37 $\pm$ 0.26	11.06 $\pm$ 1.51	10.72 $\pm$ 0.25
24:0	3.38 $\pm$ 0.18	8.91 $\pm$ 0.51	11.72 $\pm$ 0.44	3.73 $\pm$ 0.47	5.34 $\pm$ 0.84	4.84 $\pm$ 0.24
$\Sigma$ SFA	24.29 $\pm$ 0.20	31.62 $\pm$ 0.30	32.05 $\pm$ 0.50	34.68 $\pm$ 1.09	39.87 $\pm$ 1.73	39.51 $\pm$ 0.28
16:1 <i>n</i> -7	ND	ND	ND	0.93 $\pm$ 0.11	2.08 $\pm$ 0.39	0.62 $\pm$ 0.03
16:1 <i>n</i> -9	1.39 $\pm$ 0.01	0.85 $\pm$ 0.03	1.20 $\pm$ 0.01	ND	ND	ND
18:1 <i>n</i> -9	9.38 $\pm$ 0.06	11.46 $\pm$ 2.09	6.81 $\pm$ 0.10	12.20 $\pm$ 0.14	12.92 $\pm$ 0.23	11.22 $\pm$ 0.13
18:1 <i>n</i> -7	0.58 $\pm$ 0.01	0.79 $\pm$ 0.03	0.52 $\pm$ 0.01	1.23 $\pm$ 0.00	3.75 $\pm$ 0.57	1.29 $\pm$ 0.05
20:1 <i>n</i> -7	0.43 $\pm$ 0.00	0.58 $\pm$ 0.02	0.43 $\pm$ 0.02	ND	ND	ND
$\Sigma$ MUFA	11.78 $\pm$ 0.06	13.68 $\pm$ 2.05	8.95 $\pm$ 0.09	14.36 $\pm$ 0.25	18.75 $\pm$ 1.18	13.14 $\pm$ 0.20
16:3 <i>n</i> -3	2.03 $\pm$ 0.02	0.89 $\pm$ 0.04	1.22 $\pm$ 0.01	ND	ND	ND
18:2 <i>n</i> -6	17.34 $\pm$ 0.08	14.38 $\pm$ 0.46	15.35 $\pm$ 0.18	41.10 $\pm$ 0.74	35.51 $\pm$ 0.23	40.69 $\pm$ 0.29
18:3 <i>n</i> -3	43.67 $\pm$ 0.03	36.75 $\pm$ 1.31	40.86 $\pm$ 0.36	9.85 $\pm$ 0.12	5.87 $\pm$ 0.32	6.66 $\pm$ 0.07
20:2 <i>n</i> -6	0.89 $\pm$ 0.08	2.68 $\pm$ 0.16	1.57 $\pm$ 0.14	ND	ND	ND
$\Sigma$ PUFA	63.93 $\pm$ 0.14	54.7 $\pm$ 1.91	58.99 $\pm$ 0.42	50.95 $\pm$ 0.84	41.38 $\pm$ 0.55	47.35 $\pm$ 0.32

**Table S3.** Fatty acid profile (percentage of relative abundance) of aquaponics *H. portulacoides* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates  $\pm$  standard deviation. ND: fatty acid not detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1*n*-7; 16:1*n*-9; 18:1*n*-9; 18:1*n*-7; 20:1*n*-7. Polyunsaturated fatty acids (PUFA): 16:3*n*-3; 18:2*n*-6; 18:3*n*-3; 20:2*n*-6.

Fatty acids	Aquaponics					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
16:0	15.49 $\pm$ 0.14	16.05 $\pm$ 0.05	15.75 $\pm$ 0.10	26.31 $\pm$ 0.19	23.24 $\pm$ 0.21	22.50 $\pm$ 0.08
18:0	0.87 $\pm$ 0.01	1.00 $\pm$ 0.02	1.03 $\pm$ 0.00	1.21 $\pm$ 0.05	1.26 $\pm$ 0.05	1.34 $\pm$ 0.02
20:0	0.54 $\pm$ 0.01	0.52 $\pm$ 0.01	0.72 $\pm$ 0.01	0.70 $\pm$ 0.01	0.80 $\pm$ 0.03	1.33 $\pm$ 0.02
22:0	1.06 $\pm$ 0.02	1.39 $\pm$ 0.06	2.24 $\pm$ 0.04	2.65 $\pm$ 0.08	3.35 $\pm$ 0.16	4.22 $\pm$ 0.07
24:0	3.29 $\pm$ 0.30	3.49 $\pm$ 0.60	4.98 $\pm$ 0.23	2.76 $\pm$ 0.06	2.12 $\pm$ 0.07	3.15 $\pm$ 0.06
$\Sigma$ SFA	21.25 $\pm$ 0.18	22.45 $\pm$ 0.58	24.72 $\pm$ 0.08	33.63 $\pm$ 0.27	30.87 $\pm$ 0.30	32.54 $\pm$ 0.17
16:1 <i>n</i> -7	ND	ND	ND	1.37 $\pm$ 0.08	20.20 $\pm$ 0.63	8.57 $\pm$ 0.03
16:1 <i>n</i> -9	1.44 $\pm$ 0.01	1.35 $\pm$ 0.03	1.08 $\pm$ 0.01	ND	ND	ND
18:1 <i>n</i> -9	6.67 $\pm$ 0.06	7.54 $\pm$ 0.04	7.09 $\pm$ 0.00	5.51 $\pm$ 0.09	7.09 $\pm$ 0.06	8.84 $\pm$ 0.18
18:1 <i>n</i> -7	0.26 $\pm$ 0.01	0.41 $\pm$ 0.01	0.51 $\pm$ 0.00	1.29 $\pm$ 0.05	7.87 $\pm$ 0.13	3.81 $\pm$ 0.14
20:1 <i>n</i> -7	0.45 $\pm$ 0.03	0.38 $\pm$ 0.01	0.43 $\pm$ 0.00	ND	ND	ND
$\Sigma$ MUFA	8.82 $\pm$ 0.09	9.68 $\pm$ 0.07	9.11 $\pm$ 0.01	8.17 $\pm$ 0.18	35.16 $\pm$ 0.70	21.21 $\pm$ 0.29
16:3 <i>n</i> -3	3.41 $\pm$ 0.05	1.73 $\pm$ 0.03	1.23 $\pm$ 0.01	ND	ND	ND
18:2 <i>n</i> -6	20.45 $\pm$ 0.12	16.84 $\pm$ 0.14	19.62 $\pm$ 0.04	50.95 $\pm$ 0.45	30.01 $\pm$ 0.67	38.28 $\pm$ 0.16
18:3 <i>n</i> -3	44.99 $\pm$ 0.23	48.64 $\pm$ 0.38	44.45 $\pm$ 0.03	7.25 $\pm$ 0.08	3.96 $\pm$ 0.12	7.96 $\pm$ 0.05

<b>20:2n-6</b>	1.08 ± 0.07	0.67 ± 0.04	0.86 ± 0.01	ND	ND	ND
<b>Σ PUFA</b>	69.93 ± 0.28	67.87 ± 0.52	66.17 ± 0.07	58.20 ± 0.41	33.97 ± 0.80	46.24 ± 0.20

**Table S4.** Fatty acid profile (percentage of relative abundance) of wild *S. ramosissima* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates ± standard deviation. ND: fatty acid not detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1n-7; 16:1n-9; 18:1n-9; 18:1n-7; 20:1n-7. Polyunsaturated fatty acids (PUFA): 18:2n-6; 18:3n-3; 20:2n-6.

Fatty acids	Wild					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
<b>16:0</b>	18.79 ± 0.05	18.21 ± 0.12	18.69 ± 0.05	26.58 ± 0.10	25.14 ± 0.16	21.83 ± 0.32
<b>18:0</b>	1.73 ± 0.02	1.47 ± 0.02	1.10 ± 0.02	1.04 ± 0.01	1.25 ± 0.06	1.08 ± 0.04
<b>20:0</b>	0.57 ± 0.01	0.55 ± 0.01	0.56 ± 0.00	ND	ND	ND
<b>22:0</b>	0.62 ± 0.01	0.72 ± 0.01	1.76 ± 0.01	3.19 ± 0.08	3.81 ± 0.10	4.95 ± 0.28
<b>24:0</b>	1.36 ± 0.02	1.75 ± 0.02	2.17 ± 0.03	4.71 ± 0.24	7.18 ± 0.30	8.62 ± 0.96
<b>Σ SFA</b>	23.07 ± 0.02	22.71 ± 0.15	24.27 ± 0.08	35.52 ± 0.25	37.38 ± 0.08	36.48 ± 0.96
<b>16:1n-7</b>	ND	ND	ND	0.64 ± 0.02	0.57 ± 0.01	0.50 ± 0.06
<b>16:1n-9</b>	1.59 ± 0.03	2.30 ± 0.02	1.46 ± 0.00	ND	ND	ND
<b>18:1n-9</b>	2.04 ± 0.01	1.44 ± 0.00	2.68 ± 0.03	3.22 ± 0.03	3.00 ± 0.01	3.13 ± 0.19
<b>18:1n-7</b>	0.29 ± 0.01	0.26 ± 0.01	0.77 ± 0.02	0.80 ± 0.03	0.76 ± 0.01	1.24 ± 0.38
<b>20:1n-7</b>	0.15 ± 0.01	0.14 ± 0.00	0.43 ± 0.01	ND	ND	ND
<b>Σ MUFA</b>	4.07 ± 0.03	4.14 ± 0.01	5.34 ± 0.05	4.66 ± 0.05	4.33 ± 0.02	4.876 ± 0.15
<b>18:2n-6</b>	23.24 ± 0.11	22.83 ± 0.22	32.93 ± 0.02	52.42 ± 0.25	50.98 ± 0.06	48.95 ± 0.88
<b>18:3n-3</b>	49.46 ± 0.11	50.15 ± 0.37	36.96 ± 0.03	7.40 ± 0.04	7.32 ± 0.03	9.70 ± 0.22
<b>20:2n-6</b>	0.16 ± 0.00	0.18 ± 0.00	0.51 ± 0.02	ND	ND	ND
<b>Σ PUFA</b>	72.86 ± 0.01	73.15 ± 0.19	70.39 ± 0.03	59.82 ± 0.27	58.29 ± 0.06	58.65 ± 0.10

**Table S5.** Fatty acid profile (percentage of relative abundance) of aquaponics *S. ramosissima* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates ± standard deviation. ND: fatty acid not detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1n-7; 16:1n-9; 18:1n-9; 18:1n-7; 20:1n-7. Polyunsaturated fatty acids (PUFA): 18:2n-6; 18:3n-3; 20:2n-6.

Fatty acids	Aquaponics					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
16:0	18.11 ± 0.13	16.78 ± 0.06	19.57 ± 0.10	26.93 ± 0.09	32.88 ± 0.24	25.89 ± 0.13
18:0	1.97 ± 0.07	2.20 ± 0.02	1.71 ± 0.01	1.15 ± 0.09	1.94 ± 0.07	1.82 ± 0.09
20:0	0.71 ± 0.00	0.66 ± 0.00	0.71 ± 0.01	1.40 ± 0.04	1.54 ± 0.04	2.12 ± 0.02
22:0	1.11 ± 0.00	0.82 ± 0.00	1.45 ± 0.00	2.72 ± 0.07	3.16 ± 0.09	4.50 ± 0.03
24:0	1.88 ± 0.01	1.53 ± 0.02	2.21 ± 0.00	4.99 ± 0.34	4.55 ± 0.09	4.69 ± 0.03
Σ SFA	23.77 ± 0.16	21.99 ± 0.06	25.66 ± 0.08	37.19 ± 0.45	44.07 ± 0.53	39.02 ± 0.15
16:1 <i>n</i> -7	ND	ND	ND	1.98 ± 0.06	13.44 ± 0.27	4.47 ± 0.04
16:1 <i>n</i> -9	1.86 ± 0.01	0.75 ± 0.02	1.05 ± 0.02	ND	ND	ND
18:1 <i>n</i> -9	1.54 ± 0.01	1.53 ± 0.00	2.17 ± 0.04	1.73 ± 0.09	3.29 ± 0.01	5.74 ± 0.01
18:1 <i>n</i> -7	0.36 ± 0.00	0.19 ± 0.01	0.23 ± 0.03	2.34 ± 0.07	7.65 ± 0.11	3.90 ± 0.02
20:1 <i>n</i> -7	0.14 ± 0.00	0.10 ± 0.01	0.32 ± 0.01	ND	ND	ND
Σ MUFA	3.91 ± 0.01	2.58 ± 0.01	3.77 ± 0.07	6.06 ± 0.22	24.38 ± 0.37	14.12 ± 0.05
18:2 <i>n</i> -6	27.28 ± 0.03	19.71 ± 0.02	32.31 ± 0.15	47.41 ± 0.57	26.85 ± 0.15	38.03 ± 0.13
18:3 <i>n</i> -3	44.80 ± 0.15	55.57 ± 0.04	37.78 ± 0.18	9.34 ± 0.09	4.71 ± 0.06	8.83 ± 0.06
20:2 <i>n</i> -6	0.25 ± 0.00	0.16 ± 0.01	0.49 ± 0.01	ND	ND	ND
Σ PUFA	72.33 ± 0.15	75.43 ± 0.06	70.57 ± 0.04	56.75 ± 0.67	31.55 ± 0.21	46.86 ± 0.19

**Table S6.** Fatty acid profile (percentage of relative abundance) of wild *S. perennis* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates ± standard deviation. ND: fatty acid not detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1*n*-7; 16:1*n*-9; 18:1*n*-9; 18:1*n*-7. Polyunsaturated fatty acids (PUFA): 18:2*n*-6; 18:3*n*-3.

Fatty acids	Wild					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
16:0	20.64 ± 0.06	20.54 ± 0.03	17.98 ± 0.32	19.03 ± 0.26	19.30 ± 0.14	15.80 ± 0.08
18:0	1.32 ± 0.06	1.41 ± 0.04	2.11 ± 0.05	1.44 ± 0.08	1.44 ± 0.05	1.27 ± 0.02
20:0	0.60 ± 0.01	0.65 ± 0.00	0.87 ± 0.02	4.01 ± 0.07	3.70 ± 0.18	4.13 ± 0.04
22:0	1.10 ± 0.02	1.09 ± 0.07	2.38 ± 0.04	7.52 ± 0.14	6.93 ± 0.11	9.85 ± 0.09
24:0	1.77 ± 0.04	1.71 ± 0.13	2.65 ± 0.06	10.38 ± 1.15	8.53 ± 0.58	15.52 ± 0.24
Σ SFA	25.41 ± 0.16	25.41 ± 0.31	26.00 ± 0.30	42.38 ± 1.18	39.90 ± 0.71	46.57 ± 0.28
16:1 <i>n</i> -7	ND	ND	ND	ND	ND	ND
16:1 <i>n</i> -9	1.79 ± 0.01	1.97 ± 0.02	1.18 ± 0.01	ND	ND	ND
18:1 <i>n</i> -9	3.50 ± 0.00	2.51 ± 0.03	7.68 ± 0.21	7.11 ± 0.13	9.78 ± 0.11	10.74 ± 0.03
18:1 <i>n</i> -7	ND	ND	ND	1.28 ± 0.02	1.12 ± 0.02	1.68 ± 0.01
Σ MUFA	5.29 ± 0.01	4.48 ± 0.01	8.86 ± 0.20	8.39 ± 0.15	10.90 ± 0.12	12.42 ± 0.03
18:2 <i>n</i> -6	24.24 ± 0.13	23.92 ± 0.13	42.25 ± 0.62	41.45 ± 0.92	40.13 ± 0.48	33.89 ± 0.27
18:3 <i>n</i> -3	45.06 ± 0.07	46.19 ± 0.44	22.89 ± 0.52	7.77 ± 0.11	9.07 ± 0.12	7.13 ± 0.01
Σ PUFA	69.29 ± 0.17	70.11 ± 0.32	65.14 ± 0.12	49.22 ± 1.03	49.20 ± 0.59	41.02 ± 0.26

**Table S7.** Fatty acid profile (percentage of relative abundance) of aquaponics *S. perennis* in edible plant part and roots biomass in spring, summer and autumn. Values are averages 3 replicates ± standard deviation. ND: fatty acid not

detected. Saturated fatty acids (SFA): 16:0; 18:0; 20:0; 22:0; 24:0. Monounsaturated fatty acids (MUFA): 16:1*n*-7; 16:1*n*-9; 18:1*n*-9; 18:1*n*-7. Polyunsaturated fatty acids (PUFA): 18:2*n*-6; 18:3*n*-3.

Fatty acids	Aquaponics					
	Edible plant part			Root		
	Spring	Summer	Autumn	Spring	Summer	Autumn
<b>16:0</b>	18.66 ± 0.13	19.14 ± 0.04	19.02 ± 0.16	24.39 ± 0.07	29.20 ± 0.09	26.91 ± 0.07
<b>18:0</b>	1.36 ± 0.02	1.08 ± 0.02	1.04 ± 0.06	1.15 ± 0.02	1.53 ± 0.02	2.11 ± 0.02
<b>20:0</b>	0.50 ± 0.01	0.44 ± 0.01	0.42 ± 0.10	1.52 ± 0.02	1.82 ± 0.01	1.66 ± 0.00
<b>22:0</b>	0.72 ± 0.02	0.94 ± 0.01	0.89 ± 0.27	2.14 ± 0.03	3.30 ± 0.03	2.57 ± 0.01
<b>24:0</b>	1.24 ± 0.06	1.18 ± 0.03	1.08 ± 0.27	3.46 ± 0.10	4.17 ± 0.02	2.42 ± 0.08
<b>Σ SFA</b>	22.48 ± 0.05	22.79 ± 0.03	22.46 ± 0.82	32.66 ± 0.11	40.02 ± 0.08	35.67 ± 0.16
<b>16:1<i>n</i>-7</b>	ND	ND	ND	0.49 ± 0.00	4.90 ± 0.07	14.33 ± 0.10
<b>16:1<i>n</i>-9</b>	0.85 ± 0.01	1.11 ± 0.00	1.64 ± 0.02	ND	ND	ND
<b>18:1<i>n</i>-9</b>	4.05 ± 0.03	3.38 ± 0.01	2.77 ± 0.13	3.99 ± 0.02	4.85 ± 0.04	5.50 ± 0.01
<b>18:1<i>n</i>-7</b>	ND	ND	ND	0.60 ± 0.01	3.69 ± 0.04	5.81 ± 0.01
<b>Σ MUFA</b>	4.90 ± 0.03	4.49 ± 0.01	4.41 ± 0.15	5.08 ± 0.02	13.35 ± 0.07	25.64 ± 0.10
<b>18:2<i>n</i>-6</b>	20.57 ± 0.10	19.75 ± 0.05	23.05 ± 0.25	53.80 ± 0.09	40.67 ± 0.07	33.94 ± 0.06
<b>18:3<i>n</i>-3</b>	52.04 ± 0.18	52.97 ± 0.07	50.08 ± 1.03	8.46 ± 0.01	5.86 ± 0.03	4.75 ± 0.01
<b>Σ PUFA</b>	72.61 ± 0.08	72.72 ± 0.03	73.13 ± 0.97	62.26 ± 0.10	46.53 ± 0.09	38.68 ± 0.07