

Table S1. Reference intake for an average adult, as reported in the Commission Regulation (EU) No 1169/2011, and tolerable upper intake level (UIL), safe and adequate intake (SAI) or acceptable daily intake (ADI) of mineral elements and nitrate (NO₃) set by the European Food Safety Authority*.

Element	Reference intake	UIL, SAI or ADI	Reference
	mg/day		
Ca	800	2500 (UIL)	EFSA, 2012
Cl	800	3100 (SAI)	EFSA, 2019
Cu	1	5 (UIL)	EFSA, 2006
Fe	14	n.a.	
K	2000	n.a.	
Mg	375	250 (UIL)	EFSA, 2006
Mn	2	n.a.	
Na	n.a.	2000 (SAI)	EFSA, 2019
P	700	n.a.	
Zn	10	25 (UIL)	EFSA, 2006
NO ₃	n.a.	222(ADI*)	EFSA, 2008

* Acceptable Daily Intake (ADI), for a 60 kg adult.

Table S2. Results of 4-way ANOVA with salinity and N-NO₃ concentration of the nutrient solution, plant species and cut as variables.

	Yield	Leaf DW/F W	Leaf area	Leaf succule nce	NO ₃	N-org	N- NO ₃	P	K	Ca	Mg	Cl	Na	Cu	Mn	Fe	Zn
	kg FW m ⁻²	%	m ² m ⁻²	kg m ⁻²	mg kg ⁻¹ FW												
Source								P-value									
Species	<.0001	<.0001	0.4636	0.0018	<.0001	<.0001	<.0001	0.4925	0.0279	0.0160	0.0030	<.0001	<.0001	0.1442	0.0005	0.5086	0.2267
IO	<.0001	<.0001	<.0001	0.0349	<.0001	0.0512	0.9877	0.4328	<.0001	<.0001	0.0006	<.0001	<.0001	0.0004	<.0001	0.3862	0.0390
Species*IO	0.2938	0.5685	0.3485	0.1327	0.3612	0.0204	0.8336	0.0225	0.6214	0.1568	0.6818	0.0416	0.1943	10.000	0.0048	0.0602	0.9218
NO ₃	<.0001	<.0001	<.0001	0.5739	<.0001	<.0001	<.0001	0.1800	<.0001	0.7134	<.0001	<.0001	<.0001	0.5238	0.0021	0.7691	0.0531
Species*NO ₃	0.7267	0.0625	0.0663	0.2720	0.0195	0.2903	0.9080	0.2611	0.7236	0.3479	0.1824	0.2813	0.0138	0.2080	0.1418	0.9262	0.1370
IO*NO ₃	0.0030	0.0052	0.0616	0.2923	<.0001	0.7962	0.0001	0.9532	0.9501	0.3936	0.3629	0.0468	0.4865	0.6701	0.7161	0.6215	0.3308
Species*IO*NO ₃	0.8685	0.7578	0.3546	0.4178	0.0490	0.0004	0.0008	0.2621	0.0322	0.1938	0.0794	0.8644	0.0171	0.1442	<.0001	0.4884	0.0041
Cut	<.0001	<.0001	<.0001	<.0001	0.0289	<.0001	<.0001	0.0846	0.0541	0.0117	<.0001	0.0004	<.0001	0.0464	0.1055	0.0007	0.0177
Species*Cut	0.0043	0.0066	<.0001	0.0440	0.2232	0.0568	<.0001	<.0001	0.1177	0.0057	0.0742	0.4269	0.0014	<.0001	0.0923	0.1007	0.0005
salinity*Cut	0.1261	0.1177	0.4924	0.0130	0.5947	0.0047	0.0424	0.2166	0.8387	0.5004	0.0512	0.2750	0.0334	0.1620	0.3774	0.4360	0.0755
Species*IO*Cut	0.7120	0.3969	0.1104	0.7921	0.7273	<.0001	0.1301	0.0399	0.0762	0.1509	0.0062	0.1465	0.1192	0.4309	0.1994	0.1587	0.3006
NO ₃ *Cut	<.0001	0.0872	<.0001	0.7056	<.0001	<.0001	<.0001	0.0159	0.0025	0.1998	0.1052	0.4110	0.4905	0.0993	0.4954	0.9678	0.2632
Species*NO ₃ *Cut	0.4285	0.4328	0.0005	0.0527	<.0001	0.7645	<.0001	0.2958	0.2831	0.7238	0.4989	0.2075	0.0301	0.7853	0.2050	0.1914	0.1267
IO*NO ₃ *Cut	0.4768	0.2180	0.0008	0.0167	0.1163	0.0067	0.0076	0.6033	0.6491	0.8225	0.3173	0.1770	0.5152	0.0157	0.7782	0.7523	0.1930
Species*IO*NO ₃ * Cut	0.3900	0.3599	0.0837	0.1050	0.2457	0.2142	0.0364	0.2967	0.0135	0.2272	0.3007	0.6896	0.0396	0.6553	0.3897	0.6533	0.3161

Table S3. Root concentration of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sodium (Na), and chloride (Cl) in **Swiss chard and sea beet** plants grown hydroponically with different concentrations of the sea salt Instant Ocean (IO; 0 and 10 g L⁻¹) and nitrate (N-NO₃⁻; 1 and 10 mM) in the nutrient solution. The K/Na molar ratio is also shown.

Plant species	IO (g L ⁻¹)	NO ₃ (mM)	N	P	K	Na	Cl	K/Na molar ratio
(g kg ⁻¹ DW)								
Swiss chard	0	10	11.73	17.13	38.62	12.33	59.80	3.13
		1	18.67	7.33	41.99	10.92	61.94	4.56
	10	10	14.17	6.93	30.04	26.83	101.33	1.12
		1	19.95	6.56	45.32	46.95	120.52	1.13
Sea beet	0	10	13.02	13.14	39.89	14.51	54.37	2.75
		1	19.92	6.97	45.39	11.94	66.70	3.80
	10	10	14.13	5.18	40.79	32.21	92.64	1.27
		1	18.75	5.92	59.61	59.92	102.61	0.99
MEAN EFFECTS								
Swiss chard			16.13	9.49	38.99	24.26	85.90	2.48
Sea beet			16.46	7.80	46.42	29.65	79.08	2.20
	0		15.84	11.14 a	41.47	12.43 b	60.70 b	3.56 a
	10		16.75	6.15 b	43.94	41.48 a	104.27 a	1.13 b
		10	19.32	6.69	37.33 b	21.47	77.03	2.07
		1	13.26	10.60	48.08 a	32.44	87.94	2.62
Swiss chard	0		15.20	12.23	40.30 b	11.62 b	60.87 b	3.85 a
	10		17.06	6.75	37.68 b	36.89 a	110.92 a	1.12 b
Sea beet	0		16.47	10.06	42.64 b	13.23 b	60.53 b	3.27 a
	10		16.44	5.55	50.20 a	46.07 a	97.62 a	1.13 b
Swiss chard		10	19.31	6.94	34.33 c	19.58	80.56	2.13
		1	12.95	12.03	43.65 b	28.94	91.23	2.84
Sea beet		10	19.34	6.45	40.34 bc	23.36	73.50	2.01
		1	13.57	9.16	52.50 a	35.93	84.65	2.40
	0	10	19.30	7.15	39.25 b	13.42 c	57.08 b	2.94 b
		1	19.35	6.24	43.69 ab	11.43 c	64.32 b	4.18 a
	10	10	12.38	15.13	35.41 b	29.52 b	96.98 a	1.20 c
		1	14.15	6.06	52.46 a	53.44 a	111.56 a	1.06 c
ANOVA								
Plant species (PS)			ns	ns	ns	ns	ns	ns
IO concentration			ns	*	ns	***	***	***
NO ₃ ⁻ concentration			ns	ns	**	ns	ns	ns
PS x IO			ns	ns	ns	**	***	**
PS x NO ₃ ⁻			ns	ns	**	ns	ns	ns
IO x NO ₃ ⁻			ns	ns	**	***	***	***
PS x IO x NO ₃ ⁻			ns	ns	ns	ns	ns	ns

Means (n = 3) keyed by the same letter are not statistically different for P = 0.05 after Duncan's test. Significance level: *** P ≤ 0.001; ** P ≤ 0.01; * P ≤ 0.05; ns = not significant.

Table S4. Total root content of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sodium (Na), and chloride (Cl) in **Swiss chard and sea beet** plants grown hydroponically with different concentrations of the sea salt Instant Ocean (IO; 0 and 10 g L⁻¹) and nitrate (N-NO₃⁻; 1 and 10 mM) in the nutrient solution. The K/Na molar ratio is also shown.

Plant species	IO (g L ⁻¹)	NO ₃ (mM)	N	P	K	Na	Cl	K/Na molar ratio
(g m ⁻²)								
Swiss chard	0	10	2.66 ab	0.53 bc	2.80 bc	0.90	4.30 cd	1.84 ab
		1	2.49 ab	1.82 a	4.49 a	1.14	6.55 ab	2.68 a
	10	10	2.04 bc	0.33 cd	1.52 c	1.36	5.10 bc	0.66 b
		1	1.70 bc	0.40 bc	2.71 bc	3.08	7.12 a	0.66 b
Sea beet	0	10	3.31 a	0.57 b	3.30 ab	1.20	4.45 c	1.62 ab
		1	0.95 c	0.48 bc	1.65 c	0.43	2.43 d	2.24 a
	10	10	1.96 bc	0.32 cd	2.13 bc	1.65	4.78 bc	0.75 b
		1	0.91 c	0.17 d	1.92 c	1.92	3.29 cd	0.58 b
MEAN EFFECTS								
Swiss chard			2.22	0.77	2.88	1.62	5.77 a	1.46
Sea beet			1.78	0.39	2.25	1.30	3.73 b	1.30
0			2.35	0.85 a	3.06	0.92 b	4.43	2.09 a
10			1.65	0.30 b	2.07	2.00 a	5.07	0.66 b
		10	2.49 a	0.44	2.44	1.28	4.66	1.22
		1	1.51 b	0.72	2.69	1.65	4.85	1.54
Swiss chard	0		2.57	1.17 a	3.65	1.02	5.43 ab	2.26 a
	10		1.87	0.37 b	2.11	2.22	6.11 a	0.66 b
Sea beet	0		2.13	0.53 b	2.47	0.82	3.44 b	1.93 a
	10		1.43	0.24 b	2.02	1.79	4.03 ab	0.67 b
Swiss chard		10	2.35 a	0.43	2.16 b	1.13	4.70 b	1.25
		1	2.09 a	1.11	3.60 a	2.11	6.84 a	1.67
Sea beet		10	2.64 a	0.45	2.72 ab	1.43	4.61 b	1.18
		1	0.93 b	0.32	1.78 b	1.18	2.86 c	1.41
	0	10	2.99 a	0.55 ab	3.05	1.05	4.38	1.73 a
		1	1.72 b	1.15 a	3.07	0.79	4.49	2.46 a
	10	10	2.00 ab	0.33 b	1.83	1.51	4.94	0.70 b
		1	1.30 b	0.28 b	2.31	2.50	5.20	0.62 b
ANOVA								
Plant species (PS)			ns	ns	ns	ns	**	ns
IO concentration			ns	*	ns	*	ns	***
NO ₃ ⁻ concentration			*	ns	ns	ns	ns	ns
PS x IO			ns	*	ns	ns	*	**
PS x NO ₃ ⁻			*	ns	*	ns	***	ns
IO x NO ₃ ⁻			*	*	ns	ns	ns	***
PS x IO x NO ₃ ⁻			*	***	**	ns	**	*

Means (n = 3) keyed by the same letter are not statistically different for P = 0.05 after Duncan's test. Significance level: *** P ≤ 0.001; ** P ≤ 0.01; * P ≤ 0.05; ns = not significant.

Table S5. Leaf production of some vegetables species grown hydroponically under greenhouse.

Species	Cultivation system	Nutrient solution salinity (EC, dS m ⁻¹)	Plant density (plants m ⁻²)	Growing season	Growing cycle (days)	Number of cuts	Yield (kg m ⁻²)	Reference
<i>Beta vulgaris</i> L.	NFT	2.0 – 2.4	10 - 40	Summer-Autumn	114	8 -15 -22	7.5 - 22	Maboko & du Plooy, 2013
Swiss chard (<i>Beta vulgaris</i> var. cicla)	Flood and drain	2.0	n.a.	Autumn	42	3	250 – 600 (g/plant)	Hlophe et al., 2019
Spinach (<i>Spinacia oleracea</i> L.)	Floating system	n.a.	n.a.	Winter	54	2	2.2 – 2.4	D'Imperio et al., 2019
Swiss chard (<i>Beta vulgaris</i> var. cicla)	Floating system	n.a.	n.a.	Winter	71	2	2.2 – 2.9	

n.a., not available

Table S6. Health risk index (HRI, %) associated with the consumption of 100 g FW of leaves of Swiss chard and sea beet plants grown hydroponically with different concentrations of the sea salt Instant Ocean (IO; 0 and 10 g L⁻¹) and nitrate (N-NO₃; 1 and 10 mM) in the nutrient solution (see Table 2 for abbreviations). The leaves were harvested trice during the experiment (see Table 1 for more information in the experiment and the test for the calculation of HRI).

Element	Cut	Swiss chard				Sea beet			
		0IO-10N	0IO-1N	10IO-10N	10IO-1N	0IO-10N	0IO-1N	10IO-10N	10IO-1N
Ca	1 st cut	1.1	1.5	1.0	1.1	1.9	2.4	1.5	2.2
	2 nd cut	1.3	1.8	1.4	1.3	1.9	1.8	1.5	1.6
	3 rd cut	1.5	1.8	1.3	1.3	1.7	2.0	1.8	1.9
Mg	1 st cut	10.0	10.0	15.5	9.4	16.5	14.6	23.4	18.4
	2 nd cut	15.6	15.1	31.4	21.4	25.2	17.9	31.2	24.4
	3 rd cut	17.7	15.1	28.6	20.0	23.0	19.8	35.1	26.9
Cl	1 st cut	4.0	5.4	7.6	9.5	4.8	7.0	6.5	8.3
	2 nd cut	4.8	7.6	8.1	10.3	4.4	4.8	7.0	8.5
	3 rd cut	5.5	7.9	10.3	13.8	6.6	7.3	10.5	11.6
Na	1 st cut	5.2	6.3	12.0	10.3	13.0	25.1	26.5	36.6
	2 nd cut	7.4	10.2	17.8	26.7	12.8	23.7	31.3	32.3
	3 rd cut	9.9	13.4	23.1	28.4	17.9	24.0	43.3	43.3
Cu	1 st cut	1.0	1.4	1.4	1.5	2.4	3.2	2.6	2.7
	2 nd cut	1.9	2.7	2.5	1.8	2.3	2.4	2.1	2.3
	3 rd cut	2.2	2.7	2.6	3.2	1.6	1.6	1.3	2.8
Zn	1 st cut	1.0	1.5	1.4	1.4	1.5	2.6	1.8	3.0
	2 nd cut	1.4	2.4	2.5	2.3	2.0	1.7	2.0	2.7
	3 rd cut	1.7	2.6	2.7	2.3	2.2	2.6	2.2	2.1
NO ₃	1 st cut	76.5	17.5	107.7	23.9	148.3	30.7	219.8	22.5
	2 nd cut	60.3	8.9	87.8	10.2	127.5	62.8	160.2	69.7
	3 rd cut	80.9	11.8	123.7	9.1	106.1	100.3	162.3	84.0

Table S7. Percentage of the reference intake for an average adult (as reported in the Commission Regulation (EU) No 1169/2011) associated with the consumption of 100 g of fresh leaves of **Swiss chard** or **sea beet** plants grown hydroponically with different concentrations of the sea salt Instant Ocean (IO; 0 and 10 g L⁻¹) and nitrate (N-NO₃; 1 and 10 mM) in the nutrient solution (see Table 2 for abbreviations). The leaves were harvested trice during the experiment (see Table 1 for more information in the experiment and the text for the calculation of EDI).

Element	Cut	Swiss chard				Sea beet			
		0IO-10N	0IO-1N	10IO-10N	10IO-1N	0IO-10N	0IO-1N	10IO-10N	10IO-1N
P	1 st cut	0.9	0.9	1.4	1.4	0.9	1.0	1.0	1.0
	2 nd cut	0.8	1.0	1.8	1.4	1.2	1.2	1.3	1.3
	3 rd cut	0.6	1.1	0.9	1.1	1.5	1.5	1.7	2.0
K	1 st cut	15.7	16.7	22.7	14.2	32.6	20.3	25.3	23.2
	2 nd cut	19.7	21.9	26.7	15.4	25.7	21.5	22.9	20.1
	3 rd cut	17.5	20.6	16.0	16.2	23.1	27.9	34.8	29.3
Ca	1 st cut	3.4	4.8	3.1	3.4	6.0	7.5	4.7	6.8
	2 nd cut	4.1	5.6	4.3	4.1	6.0	5.6	4.6	4.8
	3 rd cut	4.7	5.5	4.0	4.2	5.2	6.2	5.6	5.8
Mg	1 st cut	6.7	6.6	10.3	6.3	11.0	9.8	15.6	12.3
	2 nd cut	10.4	10.1	20.9	14.3	16.8	12.0	20.8	16.3
	3 rd cut	11.8	10.1	19.1	13.3	15.3	13.2	23.4	17.9
Cl	1 st cut	15.3	20.7	29.4	36.8	18.4	27.0	25.2	32.1
	2 nd cut	18.4	29.4	31.2	39.7	17.1	18.7	27.3	33.1
	3 rd cut	21.4	30.5	40.0	53.5	25.5	28.3	40.8	44.8
Cu	1 st cut	5.0	7.2	7.1	7.3	11.9	16.2	12.8	13.5
	2 nd cut	9.5	13.6	12.6	9.2	11.6	12.1	10.7	11.3
	3 rd cut	11.0	13.3	13.0	16.0	8.2	8.1	6.5	13.9
Mn	1 st cut	26.5	48.3	28.8	27.2	56.2	71.9	50.2	77.2
	2 nd cut	32.6	85.3	39.8	36.5	74.7	59.4	49.3	65.3
	3 rd cut	37.5	77.6	33.9	39.0	61.2	58.3	54.9	88.7
Fe	1 st cut	4.3	5.5	5.3	6.4	8.4	9.6	8.4	10.6
	2 nd cut	9.8	16.3	11.0	14.0	10.6	11.1	13.2	10.8
	3 rd cut	9.1	10.0	10.3	7.4	6.5	6.1	11.7	18.7
Zn	1 st cut	2.6	3.8	3.5	3.4	3.7	6.5	4.5	7.4
	2 nd cut	3.5	6.0	6.2	5.7	5.1	4.3	5.1	6.8
	3 rd cut	4.3	6.5	6.8	5.9	5.4	6.4	5.5	5.2

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