**Supplementary materials**

**Table S1.** Growth parameters of *Lactuca sativa* L. in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)

**Table S2.** Composition of nutrient solutions – cations and anions

**Table S3.** ICP-OES of nutrient solutions

**Table S4.** Total phenol content

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**Table S6.** ORAC

**Table S7.** DPPH

**Table S8.** Macroelements in lettuce leaves

**Table S9.** Microelements in lettuce leaves

**Table S10.** Organic acids in lettuce leaves

**Table S11.** Anions in lettuce leaves

**Table S1: Growth parameters of *Lactuca sativa* L. in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **System** | **Plant number** | **Head fresh weight** | **Root fresh weight** | **SR ratio** | **Number of leaves** | **Dry weight** |
| HS | 1 | 91.48 | 20.35 | 0.222 | – | – |
| HS | 2 | 151.96 | 25.7 | 0.169 | – | – |
| HS | 3 | 181.18 | 32.22 | 0.178 | 53 | 6.32 |
| HS | 4 | 173.61 | 26.19 | 0.151 | – | – |
| HS | 5 | 207.45 | 30.75 | 0.148 | – | – |
| HS | 6 | 224.57 | 35.62 | 0.159 | – | – |
| HS | 7 | 193.1 | 29.14 | 0.151 | 50 | 5.89 |
| HS | 8 | 268.39 | 34.33 | 0.128 | – | – |
| HS | 9 | 205.64 | 32.29 | 0.157 | – | – |
| HS | 10 | 258.28 | 32.07 | 0.124 | – | – |
| HS | 11 | 307.56 | 41.2 | 0.134 | – | – |
| HS | 12 | 256.13 | 37.01 | 0.144 | – | – |
| HS | 13 | 177.01 | 33.53 | 0.189 | 39 | 5.20 |
| HS | 14 | 227.22 | 42.6 | 0.187 | – | – |
| HS | 15 | 170.35 | 23.91 | 0.14 | – | – |
| HS | 16 | 269.13 | 31.6 | 0.117 | – | – |
| HS | 17 | 172.64 | 30.16 | 0.175 | – | – |
| HS | 18 | 134.22 | 22.66 | 0.169 | – | – |
| HS | 19 | 215.16 | 29.5 | 0.137 | – | – |
| HS | 20 | 237.8 | 37.5 | 0.158 | 42 | 5.79 |
| HS | 21 | 192.9 | 36.94 | 0.191 | – | – |
| HS | 22 | 227.1 | 36.74 | 0.162 | – | – |
| HS | 23 | 230.25 | 34.9 | 0.152 | – | – |
| HS | 24 | 224.38 | 36.17 | 0.161 | – | – |
| HS | 25 | 225.98 | 38.25 | 0.169 | 54 | 4.92 |
| HS | 26 | 155.72 | 22.62 | 0.145 | – | – |
| HS | 27 | 245.45 | 40.94 | 0.167 | – | – |
| HS | 28 | 190.41 | 33.08 | 0.174 | 52 | 5.00 |
| HS | 29 | 230.49 | 39.65 | 0.172 | – | – |
| HS | 30 | 176.42 | 25.07 | 0.142 | – | – |
| HS | 31 | 116.29 | 17.15 | 0.147 | – | – |
| HS | 32 | 237.39 | 36.86 | 0.155 | 53 | 5.41 |
| HS | 33 | 225.89 | 35.43 | 0.157 | – | – |
| HS | 34 | 234.54 | 35.88 | 0.153 | – | – |
| HS | 35 | 252.42 | 38.06 | 0.151 | – | – |
| HS | 36 | 269.36 | 35.12 | 0.13 | – | – |
| HS | 37 | 279.45 | 35.69 | 0.128 | 47 | 5.63 |
| HS | 38 | 245.06 | 37.07 | 0.151 | – | – |
| HS | 39 | 274.44 | 43.81 | 0.16 | – | – |
| HS | 40 | 250.32 | 22.87 | 0.091 | – | – |
| HS | 41 | 267.87 | 66.61 | 0.249 | – | – |
| HS | 42 | 174.11 | 15.85 | 0.091 | 49 | 5.22 |
| AS | 1 | 13.1 | 13.65 | 1.042 | – | – |
| AS | 2 | 19.85 | 18.04 | 0.909 | – | – |
| AS | 3 | 32.8 | 25.18 | 0.768 | 29 | 8.77 |
| AS | 4 | 42.59 | 27.7 | 0.65 | – | – |
| AS | 5 | 52.64 | 44.28 | 0.841 | – | – |
| AS | 6 | 52.94 | 20.56 | 0.388 | – | – |
| AS | 7 | 45.93 | 31.55 | 0.687 | 30 | 7.02 |
| AS | 8 | 48.5 | 35.31 | 0.728 | – | – |
| AS | 9 | 41.18 | 35.92 | 0.872 | – | – |
| AS | 10 | 69.88 | 46.1 | 0.66 | – | – |
| AS | 11 | 38.64 | 27.63 | 0.715 | – | – |
| AS | 12 | 28.84 | 24.76 | 0.859 | 28 | 8.63 |
| AS | 13 | 24.44 | 12.03 | 0.492 | – | – |
| AS | 14 | 29.76 | 22.15 | 0.744 | – | – |
| AS | 15 | 26.89 | 22.34 | 0.831 | – | – |
| AS | 16 | 12.27 | 11.01 | 0.897 | – | – |
| AS | 17 | 61.27 | 40.83 | 0.666 | 28 | 8.80 |
| AS | 18 | 26.24 | 13.39 | 0.51 | – | – |
| AS | 19 | 22.57 | 10.65 | 0.472 | – | – |
| AS | 20 | 21.61 | 16.52 | 0.764 | – | – |
| AS | 21 | 47.02 | 28.71 | 0.611 | – | – |
| AS | 22 | 31.82 | 22.4 | 0.704 | ­– | – |
| AS | 23 | 53.07 | 41.39 | 0.78 | 25 | 8.80 |
| AS | 24 | 31.87 | 22.3 | 0.7 | – | – |
| AS | 25 | 5.82 | 5.74 | 0.986 | – | – |
| AS | 26 | 22.91 | 19.05 | 0.832 | – | – |
| AS | 27 | 21.08 | 19.84 | 0.941 | 24 | 9.65 |
| AS | 28 | 63.9 | 24.6 | 0.385 | – | – |
| AS | 29 | 14.73 | 12.1 | 0.821 | – | – |
| AS | 30 | 30.62 | 22.07 | 0.721 | – | – |
| AS | 31 | 34.76 | 24.22 | 0.697 | – | – |
| AS | 32 | 31.7 | 24.76 | 0.781 | 27 | 7.99 |
| AS | 33 | 28.3 | 16.61 | 0.587 | – | – |
| AS | 34 | 32.55 | 19.35 | 0.594 | – | – |
| AS | 35 | 59.59 | 36.44 | 0.612 | – | – |
| AS | 36 | 21.92 | 18.02 | 0.822 | 26 | 8.56 |
| AS | 37 | 42.51 | 30.28 | 0.712 | – | – |
| AS | 38 | 54.96 | 31.31 | 0.57 | – | – |
| AS | 39 | 62.27 | 51.49 | 0.827 | – | – |
| AS | 40 | 68.11 | 23.34 | 0.343 | – | – |
| AS | 41 | 26.4 | 19.61 | 0.743 | 27 | 9.64 |
| AS | 42 | 36.5 | 24.99 | 0.685 | – | – |

**Table S2: Composition of nutrient solution in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **System** | **F–** | **Cl–** | **NO2–** | **NO3–** | **NH4+** |
| HS1 | 0.04 | 20.70 | 0.33 | 536.330 | 43.908 |
| HS2 | 0.05 | 21.11 | 0.04 | 545.440 | 45.644 |
| AS1 | 0.06 | 135.47 | 0.82 | 84.970 | 0.460 |
| AS2 | 0.06 | 136.52 | 0.05 | 66.210 | 2.030 |
| AS3 | 0.04 | 142.87 | 0.77 | 49.740 | 3.024 |
| AS4 | 0.04 | 139.79 | 0.05 | 4.730 | 1.845 |
| AS5 | 0.06 | 128.76 | 0.16 | 8.300 | 5.500 |
| AS6 | 0.07 | 131.33 | 0.20 | 8.400 | 8.012 |

**Table S3: Composition of nutrient solution in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **System** | **B** | **Ca** | **Cu** | **Fe** | **K** | **Mg** | **Mn** | **Na** | **P** | **S** | **Si** |
| HS1 | 0.214 | 77.494 | 0.242 | 1.998 | 150.866 | 27.644 | 1.359 | 6.712 | 32.980 | 39.556 | – |
| HS2 | 0.232 | 75.431 | 0.217 | 1.874 | 145.808 | 25.682 | 1.343 | 6.680 | 31.435 | 37.977 | – |
| AS1 | 0.224 | 73.085 | – | – | 24.185 | 34.483 | 0.008 | 80.646 | 13.523 | 60.231 | 2.915 |
| AS2 | 0.162 | 72.822 | 0.079 | – | 27.154 | 36.125 | 0.013 | 83.804 | 15.331 | 64.873 | 2.208 |
| AS3 | 0.160 | 70.198 | 0.063 | – | 29.006 | 36.620 | 0.015 | 86.588 | 15.172 | 63.811 | 2.348 |
| AS4 | 0.162 | 67.904 | 0.076 | – | 33.365 | 38.247 | 0.015 | 90.078 | 15.411 | 68.724 | 1.977 |
| AS5 | 0.138 | 64.433 | 0.062 | – | 30.631 | 35.922 | 0.031 | 79.339 | 11.678 | 60.877 | 2.225 |
| AS6 | 0.147 | 69.518 | 0.065 | – | 33.227 | 36.797 | 0.023 | 82.203 | 14.886 | 63.808 | 2.489 |

**Table S4: Total phenol content in lettuce from Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TPC | mgGA/gDW | | | | mgGA/gDW | | mgGA/100g FW | |
| mgGA/gDW | 2mg/mL | 1mg/mL | 1mg/mL | 0.5mg/mL | AVE | stdev | AVE | stdev |
| HS 1 | 7.039 | 11.91 | 12.61 | 11.28 | 10.71 | 2.507 | 67.64 | 15.83 |
| HS 2 | 6.929 | 11.16 | 12.16 | 9.853 | 10.03 | 2.270 | 59.08 | 13.38 |
| HS 3 | 6.376 | 11.67 | 11.93 | 9.205 | 9.80 | 2.590 | 50.93 | 13.46 |
| HS 4 | 11.93 | 18.87 | 18.37 | 14.77 | 15.98 | 3.263 | 92.55 | 18.89 |
| HS 5 | 7.014 | 11.35 | 11.34 | 9.22 | 9.73 | 2.070 | 47.87 | 10.18 |
| HS 6 | 8.47 | 12.77 | 13.67 | 10.91 | 11.45 | 2.299 | 57.30 | 11.50 |
| HS 7 | 5.516 | 8.726 | 10.88 | 8.77 | 8.47 | 2.214 | 47.70 | 12.46 |
| HS 8 | 15.58 | 12.2 | 12.59 | 10.42 | 12.70 | 2.142 | 66.32 | 11.19 |
| HS 9 | 6.435 | 12.54 | 12.28 | 10.05 | 10.33 | 2.826 | 55.90 | 15.30 |
| AS 1 | 11.32 | 20.07 | 20.64 | 17.64 | 17.42 | 4.267 | 122.36 | 29.97 |
| AS 2 | 17.85 | 32.18 | 32.71 | 24.46 | 26.80 | 7.057 | 231.41 | 60.93 |
| AS 3 | 20.36 | 34.63 | 35.03 | 32.41 | 30.61 | 6.927 | 269.37 | 60.96 |
| AS 4 | 18.39 | 31.18 | 30.93 | 25.97 | 26.62 | 5.985 | 212.66 | 47.81 |
| AS 5 | 18.11 | 30.47 | 31.77 | 24.62 | 26.24 | 6.250 | 224.68 | 53.51 |
| AS 6 | 22.65 | 34.61 | 37.04 | 27.23 | 30.38 | 6.635 | 292.80 | 63.94 |
| AS 7 | 18.46 | 30.44 | 31.61 | 26.45 | 26.74 | 5.945 | 230.19 | 51.17 |
| AS 8 | 12 | 17.2 | 19.4 | 17.38 | 16.49 | 3.157 | 115.39 | 22.09 |
| AS 9 | 16.43 | 25.4 | 27.46 | 22.01 | 22.82 | 4.816 | 185.93 | 39.23 |

**Table S5: Total flavonoid content in lettuce from Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TFC | mgRE/gDW | | | | mgRE/gDW | | mgRE/100g FW | |
| mgRE/gDW | 4mg/mL | 2mg/mL | 1mg/mL | 4mg/mL | AVE | stdev | AVE | stdev |
| HS 1 | 5.55 | 8.08 | 6.46 | 10.7 | 7.7 | 2.26 | 48.60 | 14.25 |
| HS 2 | 6.627 | 7.755 | 7.653 | 10.98 | 8.3 | 1.89 | 48.64 | 11.11 |
| HS 3 | 6.975 | 7.455 | 6.629 | 11.24 | 8.1 | 2.14 | 41.98 | 11.11 |
| HS 4 | 9.934 | 11.99 | 12.1 | 14.74 | 1.2 | 1.97 | 70.60 | 11.40 |
| HS 5 | 6.016 | 7.987 | 6.897 | 10.95 | 8.0 | 2.15 | 39.16 | 10.57 |
| HS 6 | 6.654 | 7.909 | 6.587 | 11.87 | 8.3 | 2.49 | 41.29 | 12.43 |
| HS 7 | 7.025 | 8.203 | 7.554 | 9.823 | 8.2 | 1.21 | 45.88 | 6.84 |
| HS 8 | 6.4 | 7.167 | 6.197 | 11.24 | 7.7 | 2.36 | 40.47 | 12.33 |
| HS 9 | 8.606 | 10.61 | 11.15 | 14.37 | 11.2 | 2.39 | 60.54 | 12.93 |
| AS 1 | 10.47 | 11.72 | 13.21 | 15.64 | 12.8 | 2.22 | 89.62 | 15.59 |
| AS 2 | 16.13 | 19.13 | 19.02 | 20.51 | 18.7 | 1.84 | 161.43 | 15.90 |
| AS 3 | 16.55 | 19.23 | 22.19 | 20.13 | 19.5 | 2.34 | 171.82 | 20.60 |
| AS 4 | 14.23 | 16.27 | 17.94 | 18.71 | 16.8 | 1.99 | 134.13 | 15.87 |
| AS 5 | 15.79 | 18.29 | 20.31 | 21.26 | 18.9 | 2.42 | 161.91 | 20.75 |
| AS 6 | 14.58 | 16.91 | 19.08 | 19.76 | 17.6 | 2.34 | 169.43 | 22.53 |
| AS 7 | 7.502 | 18.52 | 20.52 | 19.97 | 16.6 | 6.14 | 143.12 | 52.86 |
| AS 8 | 10.61 | 13.06 | 13.45 | 17.07 | 13.5 | 2.66 | 94.77 | 18.61 |
| AS 9 | 14.59 | 17.16 | 17.53 | 18.06 | 16.8 | 1.54 | 137.13 | 12.56 |

**Table S6: ORAC content in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ORAC | | | | | | | | | | |
| TE (µM/g DW) | working concentration (mg DW/mL) | | | | | | mgRE/gDW | | mgRE/100g FW | |
| 0,1 | 0,05 | 0,02 | 0,01 | 0,02 | 0,01 | AVE | stdev | AVE | stdev |
| HS 1 | 215.4 | 224.2 | 240.1 | 221.2 | – | – | 225.2 | 10.57 | 1422 | 67 |
| HS 2 | 199.9 | 199.1 | 179.6 | 162.8 | – | – | 185.4 | 17.72 | 1092 | 104 |
| HS 3 | 169.6 | 176 | 181.7 | 186.3 | – | – | 178.4 | 7.22 | 928 | 38 |
| HS 4 | 289.6 | 311.6 | 295.7 | 278.4 | – | – | 293.8 | 13.81 | 1702 | 80 |
| HS 5 | 176.1 | 184.9 | 185.7 | 189.7 | – | – | 184.1 | 5.73 | 906 | 28 |
| HS 6 | 223.3 | 225.1 | 235.4 | 230.5 | – | – | 228.6 | 5.49 | 1144 | 27 |
| HS 7 | 264.6 | 239.7 | 197.2 | 247.1 | 195.9 | 183.5 | 221.3 | 33.24 | 1246 | 187 |
| HS 8 | 269.5 | 253.6 | 263.9 | 243.5 | 222 | 250.2 | 250.4 | 16.80 | 1308 | 88 |
| HS 9 | 266.6 | 260.6 | 219.8 | 194.7 | 205.4 | 205.6 | 225.5 | 30.67 | 1220 | 166 |
| AS 1 | 384 | 427.6 | 411.6 | 438.4 | 381.7 | 424.2 | 411.3 | 23.63 | 2889 | 166 |
| AS 2 | 750.6 | 809.3 | 608.1 | 768.3 | 617 | 736.5 | 715.0 | 83.06 | 6173 | 717 |
| AS 3 | 751.6 | 989 | 762.6 | 701.3 | 700.1 | 729 | 772.3 | 109.19 | 6796 | 961 |
| AS 4 | 607.5 | 692.8 | 484 | 516.7 | 698.6 | 723 | 620.4 | 101.41 | 4957 | 810 |
| AS 5 | 557.4 | 583.4 | 380.1 | 420.5 | 583.5 | 687.8 | 535.5 | 114.59 | 4584 | 981 |
| AS 6 | 629.5 | 715.5 | 446.5 | 461.3 | 621.6 | 741.2 | 602.6 | 124.41 | 5807 | 1199 |
| AS 7 | 665.7 | 699.8 | 386.8 | 417.5 | 509.9 | 580.6 | 543.4 | 128.28 | 4678 | 1104 |
| AS 8 | 390.8 | 413.7 | 290 | 300 | 405.1 | 477 | 379.5 | 71.82 | 2655 | 502 |
| AS 9 | 506.3 | 589.6 | 437.3 | 460.3 | 671.1 | 722.2 | 564.5 | 116.01 | 4598 | 945 |

**Table S7: DPPH content in Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | DPPH | IC50 (µgDW/mL) | | | | | | | | | |  | IC50 (µgDW/mL) | | |  | IC50 (mgFW/mL) |
|  | 1:09 |  | 1:04 |  | 1:04 |  |  |  | | | AVE | stdev | AVE | stdev |
| HS 1 | 523.5 | 527.1 | – | – | 703.7 | 728.8 | 618.6 | 619.1 | | | 620.1 | 85.77 | 9.82 | 1.36 |
| HS 2 | 587.5 | 553.9 | 888.7 | – | 743.6 | 755.8 | 657 | 661.5 | | | 692.6 | 113.70 | 11.75 | 1.93 |
| HS 3 | 547.4 | 565.8 | 594.7 | 595.8 | – | – | 613.6 | 612 | | | 588.2 | 26.35 | 11.31 | 0.51 |
| HS 4 | 477.3 | 469.4 | 533.4 | 488.3 | 686.4 | 726.3 | 371.2 | 363 | | | 514.4 | 132.19 | 8.88 | 2.28 |
| HS 5 | 598.1 | 583.2 | 616.6 | 611.1 | – | – | 712 | 714.2 | | | 639.2 | 58.40 | 12.99 | 1.19 |
| HS 6 | 917.8 | – | 532.3 | 520.5 | 561.4 | 559.3 | 599.7 | 641.9 | | | 619.0 | 138.0 | 12.37 | 2.76 |
| HS 7 | – | – | 660.1 | 659.1 | 891.7 | 877.2 | 812.6 | 815.3 | | | 786.0 | 102.97 | 13.96 | 1.83 |
| HS 8 | 558.6 | 569.4 | 584.5 | 576.2 | – | – | 677.1 | 652 | | | 603.0 | 49.09 | 11.55 | 0.94 |
| HS 9 | – | – | 625.6 | 618.9 | 767.7 | 708.3 | 684.3 | 697.8 | | | 683.8 | 55.54 | 12.63 | 1.03 |
| AS 1 | – | – | 312.5 | 318.9 | 221.5 | 223.2 | 363.6 | 350.8 | | | 298.4 | 61.94 | 4.25 | 0.88 |
| AS 2 | 120 | 117.9 | 182.4 | 169.7 | 328.7 | 309.2 | 245.6 | 246.8 | | | 215.0 | 80.47 | 2.49 | 0.93 |
| AS 3 | 102.9 | 104.6 | 154.2 | 160.5 | 303.5 | 298.5 | 242.1 | 249.1 | | | 201.9 | 81.74 | 2.29 | 0.93 |
| AS 4 | 107.6 | 109.1 | – | – | 321.5 | 314.6 | 265.8 | 265.7 | | | 230.7 | 97.65 | 2.89 | 1.22 |
| AS 5 | 387.8 | 146.9 | – | 460.2 | 301 | 291.7 | 253.4 | 239.1 | | | 297.1 | 102.25 | 3.47 | 1.19 |
| AS 6 | 312.6 | – | 301.8 | 290.3 | 266.3 | 258.2 | 162.6 | 159.4 | | | 250.2 | 63.79 | 2.60 | 0.66 |
| AS 7 | 395.5 | 371.2 | – | 477 | 295.2 | 278.9 | – | 206.5 | | | 337.4 | 96.26 | 3.92 | 1.12 |
| AS 8 | 271.2 | 277.5 |  |  | 558.3 | 517.8 | 310.5 | 306.8 | | | 373.7 | 128.88 | 5.34 | 1.84 |
| AS 9 | 154.8 | 146.5 |  |  | 314.1 | 330.4 | 227.4 | 233.4 | | | 234.4 | 77.06 | 2.88 | 0.95 |
| Trolox | 6.083 | 6.331 | 6.484 | 6.659 | 7.525 | 7.785 | 8.649 | 8.759 | | | 9.28 | 1.869 |  |  |
|  | 8.835 | 9.396 | 9.547 | 9.776 | 9.899 | 10.6 | 10.65 | 10.73 | | |  |  |  |  |
|  | 10.9 | 11.05 | 11.53 | 11.65 | 11.96 |  |  |  | | |  |  |  |  |

**Table S8: Macroelements in lettuce leaves fed by Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **mg/g** | **Na** | **K** | **Ca** | **Mg** | **S** | **P** |
| HS 1 | 0.30 | 43.17 | 11.79 | 3.96 | 2.36 | 8.05 |
| HS 2 | 0.31 | 45.56 | 10.73 | 3.58 | 2.42 | 7.31 |
| HS 3 | 0.30 | 43.31 | 10.30 | 3.62 | 2.43 | 7.74 |
| HS 4 | 0.28 | 21.82 | 8.43 | 3.05 | 2.04 | 6.41 |
| HS 5 | 0.36 | 36.26 | 10.05 | 3.33 | 2.34 | 8.29 |
| HS 6 | 0.42 | 29.74 | 11.96 | 4.18 | 2.50 | 8.49 |
| HS 7 | 1.12 | 29.90 | 11.26 | 4.37 | 2.34 | 6.76 |
| HS 8 | 0.34 | 38.86 | 11.33 | 3.89 | 2.59 | 8.27 |
| HS 9 | 0.70 | 37.51 | 10.78 | 4.00 | 2.40 | 7.69 |
| AS 1 | 7.41 | 21.19 | 12.44 | 5.26 | 1.94 | 5.98 |
| AS 2 | 6.79 | 19.89 | 13.52 | 5.95 | 2.10 | 4.81 |
| AS 3 | 6.92 | 20.13 | 12.80 | 5.53 | 1.86 | 4.47 |
| AS 4 | 6.73 | 22.47 | 11.73 | 5.11 | 1.82 | 4.48 |
| AS 5 | 6.72 | 18.53 | 12.52 | 5.53 | 1.72 | 4.09 |
| AS 6 | 5.09 | 20.52 | 8.77 | 4.10 | 1.45 | 3.71 |
| AS 7 | 6.38 | 22.36 | 12.68 | 5.50 | 1.65 | 4.32 |
| AS 8 | 7.49 | 19.73 | 13.74 | 5.88 | 1.48 | 4.38 |
| AS 9 | 6.50 | 20.16 | 13.03 | 5.56 | 1.40 | 4.10 |

**Table S9: Microelements in lettuce leaves Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **μg/g** | **Zn** | **Fe** | **Cu** | **Co** | **Si** | **Se** | **Cr** | **Mn** | **Ni** | **Al** | **B** |
| HS 1 | 287.78 | 76.28 | 14.85 | 0.16 |  | 20.86 | 6.07 | 258.37 | 7.56 | 6.53 | 27.19 |
| HS 2 | 220.28 | 63.30 | 12.86 | 0.05 | 51.40 | 1.61 | 7.14 | 229.69 | 7.91 | 16.33 | 23.32 |
| HS 3 | 234.44 | 64.00 | 14.28 | 0.23 | 27.06 | 14.98 | 6.23 | 232.21 | 7.45 | 5.45 | 24.63 |
| HS 4 | 171.81 | 59.91 | 11.48 |  | 21.66 | 5.87 | 5.60 | 188.95 | 7.26 | 4.80 | 22.60 |
| HS 5 | 218.35 | 58.05 | 14.18 | 0.02 | 20.69 |  | 5.68 | 210.38 | 7.38 | 4.50 | 23.92 |
| HS 6 | 254.31 | 69.94 | 15.19 | 0.44 | 31.18 |  | 6.53 | 263.88 | 8.57 | 5.22 | 28.48 |
| HS 7 | 140.86 | 52.62 | 13.01 | 0.13 | 24.45 | 4.04 | 6.70 | 223.92 | 7.71 | 4.87 | 21.30 |
| HS 8 | 254.92 | 73.43 | 14.16 | 0.27 | 25.58 | 3.53 | 6.83 | 250.45 | 7.91 | 5.68 | 25.65 |
| HS 9 | 157.95 | 55.61 | 12.31 |  | 24.83 |  | 6.09 | 233.22 | 7.79 | 4.84 | 22.56 |
| AS 1 | 14.30 | 23.51 | 4.49 | 0.08 | 80.64 | 10.45 | 6.92 | 41.34 | 6.18 | 10.95 | 32.70 |
| AS 2 | 10.34 | 21.28 | 4.88 |  | 81.68 | 8.88 | 6.51 | 33.16 | 6.40 | 8.36 | 33.32 |
| AS 3 | 3.17 | 24.60 | 4.43 |  | 90.84 | 0.69 | 6.60 | 32.95 | 6.30 | 7.48 | 28.47 |
| AS 4 | 36.96 | 25.21 | 5.08 |  | 113.54 | 20.23 | 7.32 | 30.52 | 6.57 | 10.86 | 31.00 |
| AS 5 | 11.93 | 33.86 | 3.55 |  | 111.82 | 3.87 | 8.58 | 36.94 | 7.34 | 12.64 | 29.08 |
| AS 6 |  | 28.26 | 4.08 |  | 79.27 | 8.23 | 7.83 | 29.22 | 6.64 | 12.26 | 22.97 |
| AS 7 | 21.69 | 25.02 | 4.61 | 0.16 | 107.71 |  | 6.13 | 37.29 | 6.02 | 6.50 | 28.91 |
| AS 8 | 8.90 | 21.65 | 2.98 | 0.31 | 75.67 | 3.58 | 5.21 | 40.03 | 5.32 | 13.11 | 23.25 |
| AS 9 | 3.04 | 20.77 | 3.68 |  | 62.29 | 15.93 | 5.19 | 38.40 | 5.36 | 6.00 | 26.20 |

**Table S10: Organic acids in lettuce leaves fed by Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **mg/kg** | **Quinate** | **Lactate** | **acetate** | **Propionate** | **Formate** | **Malate** | **Tartrate** | **Oxalate** | **Citrate** | **Isocitrate** |
| HS 1 | 168.30 | 500.50 | 357.50 | 478.50 | 195,80 | 48922,50 | 4127,20 | 139,70 | 6501,00 | – |
| HS 2 | 207.90 | 337.70 | 244.20 | 497.20 | 144.10 | 39825.50 | 4778.40 | 114.40 | 3403.40 | – |
| HS 3 | 230.56 | 313.50 | 253.00 | 385.00 | 95.70 | 34344.20 | 3923.70 | 169.40 | 3516.70 | – |
| HS 4 | 185.90 | 270.60 | 390.50 | 159.50 | – | 42411.60 | 4281.20 | 193.60 | 4877.40 | – |
| AS 1 | 547.80 | 310.20 | 347.60 | – | – | 45455.30 | 5435.10 | 240.90 | 9546.90 | 28.60 |
| AS 2 | 73.70 | 159.50 | 178.20 | – | – | 43753.60 | 4254.80 | 104.50 | 9353.30 | 25.30 |
| AS 3 | 157.30 | 227.70 | 198.00 | – | – | 34705.00 | 5264.60 | 161.70 | 7750.60 | 25.30 |
| AS 4 | 227.70 | 342.10 | 269.50 | – | – | 49980.70 | 5798.10 | 222.20 | 9053.00 | – |

**Table S11: Anions in lettuce leaves fed by Hydroponic Solution System (HS) and Aquaponic Solution System (AS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **mg/kg** | **F-** | **Cl-** | **NO3-** | **SO42-** | **PO43-** |
| HS 1 | 160.60 | 2615.80 | 13711.50 | 925.10 | 12788.60 |
| HS 2 | 160.60 | 1524.60 | 10016.60 | 671.00 | 8671.30 |
| HS 3 | 353.10 | 1208.90 | 7062.00 | 851.40 | 5754.10 |
| HS 4 | 404.80 | 1371.70 | 7484.40 | 811.80 | 5597.90 |
| AS 1 | 245.30 | 6523.00 | 26.40 | 1100.00 | 5736.50 |
| AS 2 | 281.60 | 6188.60 | 214.50 | 1236.40 | 4326.30 |
| AS 3 | 157.30 | 4335.10 | 8.80 | 1006.50 | 3698.20 |
| AS 4 | 225.50 | 6864.00 | 48.3 | 1346.40 | 4804.80 |