Supplementary Table S1. Relative signal intensities of selected metabolites contributing to genotypic and germination capacity related variance across tested sample sets of sugar beet fruits.

The genotype KT4 corresponds to G3 and HE3 corresponds to G4 used in the metabolite profiling of seed lots with different germination capacities.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Oxalic acid** |  |  | **Urea** |  |  | **Phosphate** |  |  | **Glycine** |  |  | **L-Serine** |  |
|  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |
| **Genotype** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| AO1 | 910.79 | 210.06 |  | 43.22 | 7.99 |  | 472.76 | 138.62 |  | 142.13 | 27.85 |  | 59.31 | 14.97 |
| AP5 | 1443.83 | 214.36 |  | 299.54 | 37.55 |  | 3631.53 | 385.36 |  | 530.17 | 49.31 |  | 350.59 | 40.71 |
| BC7 | 1780.82 | 329.38 |  | 126.83 | 13.68 |  | 1304.77 | 406.15 |  | 100.18 | 12.24 |  | 61.58 | 5.82 |
| BQ6 | 1492.04 | 89.19 |  | 78.01 | 4.37 |  | 389.77 | 21.32 |  | 302.62 | 10.81 |  | 39.01 | 2.12 |
| CD2 | 1037.92 | 242.70 |  | 116.60 | 10.91 |  | 1423.42 | 1130.58 |  | 116.54 | 35.24 |  | 80.36 | 29.93 |
| CR2 | 489.95 | 43.12 |  | 45.14 | 2.39 |  | 709.42 | 119.25 |  | 60.40 | 3.27 |  | 41.16 | 2.24 |
| GE3 | 924.45 | 105.51 |  | 57.59 | 4.19 |  | 1273.72 | 289.92 |  | 88.01 | 7.43 |  | 46.42 | 8.01 |
| HE3 | 2382.12 | 142.38 |  | 142.99 | 20.23 |  | 1323.25 | 258.43 |  | 207.11 | 15.60 |  | 95.45 | 27.54 |
| KT4 | 1455.80 | 102.69 |  | 359.02 | 86.48 |  | 4404.65 | 400.18 |  | 342.41 | 55.08 |  | 260.91 | 31.73 |
| LU1 | 1700.30 | 515.23 |  | 381.61 | 122.88 |  | 3573.69 | 749.63 |  | 280.99 | 68.05 |  | 340.05 | 103.23 |
| MV8 | 619.52 | 145.45 |  | 53.40 | 10.55 |  | 593.40 | 255.94 |  | 96.56 | 36.57 |  | 45.02 | 17.44 |
| NW4 | 391.54 | 162.67 |   | 38.80 | 12.11 |   | 383.23 | 186.45 |   | 73.87 | 11.71 |   | 24.90 | 8.04 |
| **Seed lots germination capacity** |  |  |  |  |  |  |  |  |  |  |  |  |
| G1 good | 619.52 | 145.45 |  | 53.40 | 10.55 |  | 593.40 | 255.94 |  | 96.56 | 36.57 |  | 45.02 | 17.44 |
| G1 very low | 497.04 | 71.59 |  | 16.14 | 1.92 |  | 808.61 | 144.07 |  | 41.62 | 3.31 |  | 26.88 | 4.56 |
| G2 low | 576.47 | 4.69 |  | 54.95 | 3.49 |  | 1072.00 | 110.70 |  | 124.84 | 7.76 |  | 53.22 | 2.82 |
| G2 very low | 518.97 | 67.35 |  | 15.72 | 2.11 |  | 684.03 | 71.92 |  | 124.89 | 10.34 |  | 50.92 | 5.35 |
| G3 good | 1455.80 | 102.69 |  | 359.02 | 86.48 |  | 4404.65 | 400.18 |  | 342.41 | 55.08 |  | 260.91 | 31.73 |
| G3 very low | 1511.90 | 163.74 |  | 79.99 | 2.59 |  | 3060.66 | 163.10 |  | 260.94 | 15.43 |  | 300.02 | 31.64 |
| G4 good | 2382.12 | 142.38 |  | 142.99 | 20.23 |  | 1323.25 | 258.43 |  | 207.11 | 15.60 |  | 95.45 | 27.54 |
| G4 medium | 1700.92 | 221.45 |  | 68.77 | 14.58 |  | 1661.97 | 108.78 |  | 171.82 | 35.78 |  | 159.26 | 45.66 |
| G5 medium | 1321.20 | 225.94 |  | 19.66 | 2.96 |  | 525.27 | 134.84 |  | 63.53 | 5.27 |  | 54.46 | 8.94 |
| G5 very low | 1583.36 | 424.21 |  | 84.61 | 31.07 |  | 2054.91 | 674.83 |  | 64.54 | 8.58 |  | 86.96 | 13.42 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Malic acid** |  |  | **L-Proline** |  |  | **L-Aspartat** |  |  | **Glutamic acid** |  | **Citric acid** |  |
|  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |
| **Genotype** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AO1 | 81.06 | 20.90 |  | 334.62 | 86.68 |  | 24.90 | 8.58 |  | 74.29 | 19.60 |  | 235.63 | 107.73 |
| AP5 | 322.26 | 38.36 |  | 1597.41 | 169.58 |  | 171.11 | 24.71 |  | 325.66 | 60.94 |  | 1690.92 | 215.89 |
| BC7 | 471.01 | 79.03 |  | 603.88 | 34.93 |  | 80.05 | 9.67 |  | 207.27 | 24.93 |  | 1138.28 | 80.36 |
| BQ6 | 132.74 | 13.23 |  | 338.99 | 12.29 |  | 34.08 | 1.77 |  | 98.01 | 6.93 |  | 473.73 | 36.48 |
| CD2 | 113.82 | 9.35 |  | 433.10 | 141.50 |  | 78.52 | 40.85 |  | 94.43 | 39.11 |  | 159.39 | 89.61 |
| CR2 | 180.72 | 14.54 |  | 319.62 | 42.90 |  | 30.48 | 2.30 |  | 98.89 | 20.51 |  | 464.84 | 26.88 |
| GE3 | 331.99 | 49.68 |  | 378.24 | 40.48 |  | 44.89 | 6.34 |  | 117.82 | 18.09 |  | 431.23 | 84.96 |
| HE3 | 195.91 | 17.29 |  | 620.78 | 84.48 |  | 72.35 | 18.04 |  | 249.47 | 47.16 |  | 1712.00 | 200.69 |
| KT4 | 1679.11 | 317.03 |  | 1259.54 | 167.25 |  | 282.05 | 70.99 |  | 333.74 | 67.16 |  | 2564.25 | 494.97 |
| LU1 | 964.17 | 390.43 |  | 1877.14 | 694.82 |  | 351.67 | 81.96 |  | 726.39 | 238.51 |  | 3172.36 | 1081.15 |
| MV8 | 189.53 | 56.84 |  | 280.57 | 92.46 |  | 35.10 | 11.88 |  | 101.61 | 43.59 |  | 394.02 | 122.97 |
| NW4 | 230.32 | 85.11 |   | 128.45 | 39.08 |   | 15.63 | 6.15 |   | 29.41 | 13.53 |   | 477.87 | 175.00 |
| **Seed lots germination capacity** |  |  |  |  |  |  |  |  |  |  |  |  |
| G1 good | 189.53 | 56.84 |  | 280.57 | 92.46 |  | 35.10 | 11.88 |  | 101.61 | 43.59 |  | 394.02 | 122.97 |
| G1 very low | 47.81 | 9.65 |  | 205.29 | 24.74 |  | 31.05 | 4.13 |  | 61.38 | 6.26 |  | 251.74 | 19.96 |
| G2 low | 142.59 | 2.91 |  | 390.54 | 26.20 |  | 51.33 | 4.14 |  | 128.65 | 6.07 |  | 519.42 | 38.96 |
| G2 very low | 108.31 | 8.94 |  | 402.32 | 14.64 |  | 59.91 | 5.49 |  | 119.98 | 7.30 |  | 477.59 | 52.24 |
| G3 good | 1679.11 | 317.03 |  | 1259.54 | 167.25 |  | 282.05 | 70.99 |  | 333.74 | 67.16 |  | 2564.25 | 494.97 |
| G3 very low | 740.61 | 18.71 |  | 1112.31 | 162.58 |  | 278.22 | 32.33 |  | 475.58 | 51.01 |  | 2086.45 | 302.54 |
| G4 good | 195.91 | 17.29 |  | 620.78 | 84.48 |  | 72.35 | 18.04 |  | 249.47 | 47.16 |  | 1712.00 | 200.69 |
| G4 medium | 118.23 | 24.26 |  | 1241.07 | 212.36 |  | 332.40 | 69.83 |  | 388.47 | 93.92 |  | 1876.61 | 345.70 |
| G5 medium | 29.74 | 7.60 |  | 346.03 | 46.60 |  | 42.45 | 8.34 |  | 119.46 | 33.70 |  | 599.85 | 96.47 |
| G5 very low | 248.37 | 86.62 |  | 737.01 | 102.59 |  | 178.10 | 15.73 |  | 309.77 | 62.54 |  | 921.41 | 520.83 |

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|  | **Pinitol** |  |  | **Tetradecanoic acid** |  | **Fructose** |  |  | **Glucose** |  |  | **Sorbitol** |  |
|  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |
| **Genotype** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AO1 | 121.58 | 24.89 |  | 3.22 | 0.84 |  | 143.92 | 35.55 |  | 705.32 | 158.08 |  | 11.76 | 4.51 |
| AP5 | 363.64 | 39.16 |  | 50.95 | 1.31 |  | 559.44 | 79.52 |  | 2052.77 | 221.57 |  | 125.75 | 51.33 |
| BC7 | 198.88 | 12.12 |  | 5.22 | 0.46 |  | 125.66 | 17.96 |  | 475.62 | 67.30 |  | 23.35 | 7.93 |
| BQ6 | 87.83 | 8.80 |  | 3.82 | 0.86 |  | 99.42 | 11.98 |  | 370.68 | 29.48 |  | 39.59 | 7.53 |
| CD2 | 114.59 | 11.41 |  | 381.97 | 650.78 |  | 191.12 | 18.28 |  | 590.67 | 95.46 |  | 11.66 | 2.93 |
| CR2 | 73.41 | 4.99 |  | 8.92 | 0.69 |  | 281.44 | 39.52 |  | 589.76 | 110.37 |  | 2.37 | 0.80 |
| GE3 | 85.77 | 7.21 |  | 7.47 | 0.27 |  | 265.03 | 19.74 |  | 583.49 | 59.04 |  | 13.94 | 4.15 |
| HE3 | 105.27 | 6.70 |  | 7.51 | 1.08 |  | 402.40 | 73.24 |  | 1138.18 | 137.99 |  | 55.05 | 10.98 |
| KT4 | 505.16 | 50.87 |  | 33.14 | 5.69 |  | 4251.40 | 157.97 |  | 4269.79 | 112.46 |  | 202.23 | 49.98 |
| LU1 | 403.85 | 139.18 |  | 27.77 | 4.47 |  | 346.74 | 159.63 |  | 1384.60 | 488.16 |  | 100.21 | 51.73 |
| MV8 | 39.18 | 9.91 |  | 8.06 | 1.26 |  | 173.40 | 43.42 |  | 655.09 | 175.30 |  | 51.83 | 34.14 |
| NW4 | 62.94 | 9.78 |   | 9.90 | 2.44 |   | 126.01 | 42.21 |   | 236.81 | 57.00 |   | 11.77 | 2.77 |
| **Seed lots germination capacity** |  |  |  |  |  |  |  |  |  |  |  |  |
| G1 good | 39.18 | 9.91 |  | 8.06 | 1.26 |  | 173.40 | 43.42 |  | 655.09 | 175.30 |  | 51.83 | 34.14 |
| G1 very low | 15.77 | 1.50 |  | 7.63 | 0.92 |  | 27.85 | 4.33 |  | 161.94 | 23.79 |  | 87.89 | 13.35 |
| G2 low | 48.88 | 3.34 |  | 9.06 | 0.37 |  | 371.83 | 59.13 |  | 642.15 | 68.78 |  | 27.70 | 5.23 |
| G2 very low | 23.43 | 3.70 |  | 9.55 | 1.03 |  | 52.10 | 11.67 |  | 229.32 | 43.15 |  | 129.85 | 11.86 |
| G3 good | 505.16 | 50.87 |  | 33.14 | 5.69 |  | 4251.40 | 157.97 |  | 4269.79 | 112.46 |  | 202.23 | 49.98 |
| G3 very low | 350.75 | 27.65 |  | 32.42 | 3.42 |  | 1501.52 | 207.26 |  | 2501.71 | 86.64 |  | 1069.74 | 222.09 |
| G4 good | 105.27 | 6.70 |  | 7.51 | 1.08 |  | 402.40 | 73.24 |  | 1138.18 | 137.99 |  | 55.05 | 10.98 |
| G4 medium | 47.51 | 3.68 |  | 40.26 | 6.17 |  | 68.73 | 6.85 |  | 546.22 | 56.07 |  | 1596.59 | 266.39 |
| G5 medium | 5.56 | 1.03 |  | 3.18 | 0.81 |  | 202.86 | 332.31 |  | 442.56 | 324.98 |  | 405.28 | 56.96 |
| G5 very low | 17.61 | 4.32 |  | 4.02 | 0.98 |  | 18.93 | 4.70 |  | 298.49 | 30.17 |  | 673.54 | 157.56 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Hexose alcohol RT 28.02** |  | **Hexadecanoic acid** |  | **Inositol** |  |  | **Hexanedioic acid derivative** | **Sucrose** |  |
|   | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |
| **Genotype** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| AO1 | 133.92 | 29.58 |  | 32.16 | 6.10 |  | 99.42 | 19.91 |  | 0.27 | 0.04 |  | 1550.41 | 101.54 |
| AP5 | 630.82 | 48.91 |  | 355.02 | 27.22 |  | 314.47 | 21.81 |  | 845.38 | 68.97 |  | 2243.01 | 52.46 |
| BC7 | 514.38 | 58.65 |  | 57.28 | 3.23 |  | 179.48 | 4.63 |  | 0.86 | 0.16 |  | 1657.98 | 43.76 |
| BQ6 | 383.41 | 20.97 |  | 41.91 | 6.87 |  | 85.55 | 5.12 |  | 0.54 | 0.11 |  | 1613.60 | 60.00 |
| CD2 | 130.47 | 16.89 |  | 1949.60 | 3274.77 |  | 77.74 | 4.21 |  | 1.49 | 1.14 |  | 1442.19 | 136.54 |
| CR2 | 49.08 | 2.91 |  | 40.20 | 8.42 |  | 77.54 | 10.60 |  | 311.65 | 10.93 |  | 833.40 | 43.17 |
| GE3 | 81.19 | 4.21 |  | 29.78 | 2.54 |  | 65.45 | 4.68 |  | 285.86 | 11.40 |  | 927.14 | 4.27 |
| HE3 | 304.79 | 27.02 |  | 69.21 | 13.52 |  | 137.82 | 14.90 |  | 0.74 | 0.35 |  | 2217.48 | 85.56 |
| KT4 | 502.44 | 13.78 |  | 221.59 | 66.55 |  | 385.78 | 36.17 |  | 844.20 | 54.87 |  | 2478.58 | 69.97 |
| LU1 | 1119.77 | 560.79 |  | 183.52 | 33.56 |  | 476.49 | 173.48 |  | 757.04 | 195.56 |  | 2462.02 | 167.00 |
| MV8 | 79.18 | 22.49 |  | 32.05 | 8.64 |  | 59.42 | 13.61 |  | 296.91 | 18.85 |  | 805.05 | 101.95 |
| NW4 | 112.37 | 14.97 |   | 56.30 | 14.32 |   | 52.83 | 4.43 |   | 131.16 | 47.49 |   | 647.47 | 37.02 |
| **Seed lots germination capacity** |  |  |  |  |  |  |  |  |  |  |  |  |
| G1 good | 79.18 | 22.49 |  | 32.05 | 8.64 |  | 59.42 | 13.61 |  | 296.91 | 18.85 |  | 805.05 | 101.95 |
| G1 very low | 38.03 | 2.15 |  | 33.09 | 7.26 |  | 27.99 | 2.48 |  | 297.88 | 23.97 |  | 705.40 | 7.40 |
| G2 low | 73.35 | 2.00 |  | 40.30 | 7.16 |  | 68.86 | 3.77 |  | 320.33 | 15.04 |  | 890.28 | 63.41 |
| G2 very low | 67.90 | 1.89 |  | 42.12 | 6.35 |  | 38.60 | 0.95 |  | 322.70 | 8.47 |  | 847.20 | 19.58 |
| G3 good | 502.44 | 13.78 |  | 221.59 | 66.55 |  | 385.78 | 36.17 |  | 844.20 | 54.87 |  | 2478.58 | 69.97 |
| G3 very low | 388.68 | 30.96 |  | 229.62 | 13.39 |  | 212.72 | 14.80 |  | 832.20 | 33.06 |  | 2299.88 | 63.79 |
| G4 good | 304.79 | 27.02 |  | 69.21 | 13.52 |  | 137.82 | 14.90 |  | 0.74 | 0.35 |  | 2217.48 | 85.56 |
| G4 medium | 486.45 | 89.65 |  | 276.66 | 64.58 |  | 73.76 | 3.22 |  | 833.79 | 99.63 |  | 2092.17 | 86.12 |
| G5 medium | 87.16 | 19.72 |  | 37.25 | 8.34 |  | 36.84 | 2.11 |  | 0.32 | 0.11 |  | 2107.11 | 103.58 |
| G5 very low | 246.81 | 40.05 |  | 46.44 | 11.69 |  | 95.64 | 29.07 |  | 0.64 | 0.30 |  | 2116.42 | 152.64 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Xanthosine** |  |  | **Galactinol** |  |  | **Raffinose** |  |
|  | **Mean** | **σ** |  | **Mean** | **σ** |  | **Mean** | **σ** |
| **Genotype** |  |  |  |  |  |  |  |  |
| AO1 | 19.95 | 12.50 |  | 1553.48 | 461.58 |  | 1552.28 | 840.25 |
| AP5 | 128.22 | 95.82 |  | 4686.76 | 227.38 |  | 3494.45 | 1295.76 |
| BC7 | 158.52 | 27.74 |  | 3193.57 | 106.97 |  | 2091.99 | 326.14 |
| BQ6 | 126.47 | 25.25 |  | 3342.90 | 85.96 |  | 2781.40 | 213.45 |
| CD2 | 11.60 | 8.82 |  | 2026.56 | 326.36 |  | 1757.33 | 730.04 |
| CR2 | 123.54 | 26.16 |  | 1436.11 | 94.44 |  | 3711.93 | 103.93 |
| GE3 | 95.00 | 22.12 |  | 1966.52 | 164.38 |  | 2934.54 | 345.17 |
| HE3 | 270.90 | 41.87 |  | 4376.09 | 224.57 |  | 6804.25 | 626.12 |
| KT4 | 584.65 | 176.65 |  | 4409.69 | 215.73 |  | 7697.29 | 993.67 |
| LU1 | 880.85 | 558.75 |  | 5091.62 | 550.25 |  | 5919.19 | 2141.19 |
| MV8 | 174.20 | 70.13 |  | 2661.08 | 355.35 |  | 4116.20 | 655.31 |
| NW4 | 57.96 | 33.43 |   | 1954.65 | 320.81 |   | 1340.70 | 683.78 |
| **Seed lots germination capacity** |  |  |  |  |  |  |
| G1 good | 174.20 | 70.13 |  | 2661.08 | 355.35 |  | 4116.20 | 655.31 |
| G1 very low | 172.81 | 10.35 |  | 1987.92 | 112.13 |  | 2956.24 | 125.88 |
| G2 low | 188.45 | 14.22 |  | 2154.21 | 145.20 |  | 4136.64 | 220.28 |
| G2 very low | 183.31 | 9.80 |  | 1851.66 | 87.58 |  | 2419.27 | 23.12 |
| G3 good | 584.65 | 176.65 |  | 4409.69 | 215.73 |  | 7697.29 | 993.67 |
| G3 very low | 628.71 | 83.33 |  | 4168.66 | 239.79 |  | 7705.34 | 563.74 |
| G4 good | 270.90 | 41.87 |  | 4376.09 | 224.57 |  | 6804.25 | 626.12 |
| G4 medium | 405.10 | 139.82 |  | 4595.38 | 369.10 |  | 2039.03 | 764.48 |
| G5 medium | 47.74 | 16.02 |  | 2615.45 | 554.75 |  | 1409.50 | 624.58 |
| G5 very low | 48.55 | 28.36 |  | 2560.83 | 865.54 |  | 830.56 | 448.71 |