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| **Table S2. Nitrogen substrate absorbance unitsa of stromatolitic microbial mats** |
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| **Nitrogen Substrate (n = 96)** | **Type 1 Matb  ± SEM** | **Type 3 Matb ± SEM** | **P-value** |
| Ammonia | 249.7 ± 40.1 | 201.0 ± 92.5 | 0.33 |
| Nitrite | 109.7 ± 15.3 | 159.0 ± 75.1 | 0.29 |
| Nitrate | 210.6 ± 69.5 | 297.0 ± 12.5 | 0.17 |
| Urea | 192.6 ± 0.7 | 322.0 ± 7.2 | 0.00 |
| Biuret | 33.0 ± 24.0 | 17.0 ± 4.2 | 0.29 |
| L-Alanine | 278.3 ± 33.7 | 320.0 ± 3.6 | 0.17 |
| L-Arginine | 241.6 ± 39.7 | 332.3 ± 3.7 | 0.07 |
| L-Asparagine | 270.7 ± 34.8 | 327.7 ± 4.6 | 0.12 |
| L-Aspartic Acid | 289.0 ± 17.1 | 288.7 ± 3.4 | 0.49 |
| L-Cysteine | 298.3 ± 52.5 | 355.3 ± 4.1 | 0.20 |
| L-Glutamic Acid | 310.0 ± 6.9 | 324.3 ± 5.2 | 0.09 |
| L-Glutamine | 290.6 ± 30.4 | 315.0 ± 6.1 | 0.25 |
| Glycine | 186.6 ± 77.2 | 268.0 ± 14.2 | 0.20 |
| L-Histidine | 284.0 ± 19.3 | 330.3 ± 2.3 | 0.07 |
| L-Isoleucine | 37.6 ± 7.3 | 55.7 ± 2.3 | 0.06 |
| L-Leucine | 75.6 ± 37.7 | 61.0 ± 2.5 | 0.37 |
| L-Lysine | 60.0 ± 7.2 | 188.0 ± 15.5 | 0.00 |
| L-Methionine | 248.6 ± 24.8 | 150.0 ± 6.7 | 0.02 |
| L-Phenylalanine | 169.6 ± 26.4 | 176.7 ± 16.0 | 0.42 |
| L-Proline | 268.6 ± 3.2 | 256.3 ± 14.7 | 0.25 |
| L-Serine | 158.6 ± 13.3 | 159.3 ± 12.2 | 0.49 |
| L-Threonine | 189.3 ± 8.2 | 184.7 ± 35.7 | 0.45 |
| L-Tryptophan | 214.0 ± 48.2 | 280.3 ± 26.2 | 0.16 |
| L-Tyrosine | 249.3 ± 32.2 | 270.7 ± 11.4 | 0.29 |
| L-Valine | 142.3 ± 37.0 | 77.3 ±5 .3 | 0.11 |
| D-Alanine | 221.3 ± 57.6 | 264.7 ± 5.2 | 0.27 |
| D-Asparagine | 17.6 ± 0.9 | 262.7 ± 0.7 | 0.00 |
| D-Aspartic Acid | 77.3 ± 62.4 | 104.0 ± 7.5 | 0.36 |
| D-Glutamic Acid | 29.0 ± 26.5 | 276.0 ± 2.6 | 0.01 |
| D-Lysine | 9.6 ± 3.07 | 11.7 ± 4.4 | 0.36 |
| D-Serine | 102.3 ± 94.8 | 51.3 ± 4.9 | 0.32 |
| D-Valine | 33.3 ± 10.7 | 3.3 ± 1.8 | 0.05 |
| L-Citrulline | 255.3 ± 45.3 | 157.0 ± 49.6 | 0.11 |
| L-Homoserine | 62.3 ± 14.0 | 19.3 ± 2.7 | 0.04 |
| L-Ornithine | 316.3 ± 41.7 | 299.3 ± 14.3 | 0.37 |
| N-Acetyl-L-Glutamic Acid | 171.0 ± 78.0 | 285.3 ± 5.2 | 0.14 |
| N-Phthaloyl-L-Glutamic Acid | 4.3 ± 3.8 | 30.7 ± 30.2 | 0.24 |
| L-Pyroglutamic Acid | 192.0 ± 35.9 | 317.7 ± 1.9 | 0.04 |
| Hydroxylamine | 13.0 ± 1.0 | 40.3 ± 33.1 | 0.25 |
| Methylamine | 81.3 ± 17.9 | 136.3 ± 9.2 | 0.04 |
| N-Amylamine | 50.7 ± 1.2 | 92.7 ± 6.6 | 0.01 |
| N-Butylamine | 37.0 ± 15.0 | 59.7 ± 10.4 | 0.15 |
| Ethylamine | 28.7 ± 15.6 | 109.3 ± 16.3 | 0.01 |
| Ethanolamine | 240.3 ± 8.0 | 194.7 ± 21.3 | 0.08 |
| Ethylenediamine | 55.7 ± 27.6 | 7.7 ± 5.8 | 0.11 |
| Putrescine | 161.3 ± 88.5 | 214.7 ± 16.3 | 0.30 |
| Agmatine | 152.0 ± 99.0 | 247.0 ± 10.4 | 0.22 |
| Histamine | 27.7 ± 13.3 | 5.0 ± 2.0 | 0.11 |
| b-Phenylethylamine | 26.0 ± 10.0 | 2.3 ± 1.5 | 0.07 |
| Tyramine | 24.0 ± 3.2 | 19.7 ± 2.4 | 0.17 |
| Acetamide | 170.0 ± 59.6 | 130.0 ± 56.5 | 0.33 |
| Formamide | 60.7 ± 3.8 | 116.0 ± 51.6 | 0.20 |
| Glucuronamide | 198.7 ± 33.0 | 147.3 ± 21.4 | 0.14 |
| D,L-Lactamide | 8.0 ± 2.0 | 305.7 ± 4.6 | 0.00 |
| D-Glucosamine | 87.0 ± 77.0 | 152.0 ± 19.7 | 0.25 |
| D-Galactosamine | 28.7 ± 18.4 | 79.0 ± 73.5 | 0.28 |
| D-Mannosamine | 203.0 ± 53.9 | 233.7 ± 32.3 | 0.33 |
| N-Acetyl-D-Glucosamine | 297.3 ± 11.8 | 285.0 ± 4.0 | 0.21 |
| N-Acetyl-D-Galactosamine | 88.3 ± 56.1 | 16.0 ± 3.1 | 0.16 |
| N-Acetyl-D-Mannosamine | 21.7 ± 4.3 | 12.3 ± 5.2 | 0.12 |
| Adenine | 160.3 ± 29.0 | 74.3 ± 2.9 | 0.05 |
| Adenosine | 282.0 ± 15.2 | 316.0 ± 1.5 | 0.08 |
| Cytidine | 293.7 ± 16.2 | 257.3 ± 8.8 | 0.07 |
| Cytosine | 101.3 ± 15.2 | 294.0 ± 14.4 | 0.00 |
| Guanine | 169.0 ± 52.8 | 150.3 ± 23.1 | 0.38 |
| Guanosine | 244.7 ± 28.9 | 332.0 ± 2.0 | 0.05 |
| Thymine | 41.3 ± 24.9 | 119.0 ± 4.7 | 0.04 |
| Thymidine | 26.0 ± 12.6 | 122.7 ± 2.0 | 0.01 |
| Uracil | 30.3 ± 3.2 | 185.0 ± 12.6 | 0.00 |
| Uridine | 75.0 ± 18.6 | 153.7 ± 6.6 | 0.02 |
| Inosine | 313.7 ± 24.7 | 341.0 ± 2.0 | 0.19 |
| Xanthine | 266.7 ± 32.6 | 314.0 ± 5.2 | 0.14 |
| Xanthosine | 161.3 ± 24.1 | 157.7 ± 8.9 | 0.45 |
| Uric Acid | 217.7 ± 54.9 | 185.7 ± 14.5 | 0.31 |
| Alloxan | 154.0 ± 24.3 | 194.3 ± 41.4 | 0.23 |
| Allantoin | 195.7 ± 43.2 | 323.7 ± 1.5 | 0.05 |
| Parabanic Acid | 228.0 ± 26.7 | 314.3 ± 0.9 | 0.04 |
| D,L-a-Amino-N-Butyric Acid | 22.3 ± 16.3 | 69.0 ± 4.2 | 0.05 |
| g-Amino-N-Butyric Acid | 121.0 ± 48.2 | 208.3 ± 4.2 | 0.11 |
| e-Amino-N-Caproic Acid | 177.7 ± 25.2 | 177.3 ± 9.8 | 0.50 |
| D,L-a-Amino-Caprylic Acid | 63.0 ± 9.2 | 64.3 ± 2.2 | 0.45 |
| d-Amino-N-Valeric Acid | 151.0 ± 74.5 | 163.0 ± 6.9 | 0.44 |
| a-Amino-N-Valeric Acid | 119.7 ± 62.7 | 67.0 ± 4.9 | 0.24 |
| Ala-Asp | 272.0 ± 15.5 | 328.3 ± 4.7 | 0.03 |
| Ala-Gln | 324.3 ± 12.9 | 340.0 ± 5.2 | 0.18 |
| Ala-Glu | 337.0 ± 17.6 | 339.0 ± 2.9 | 0.46 |
| Ala-Gly | 338.3 ± 7.1 | 343.7 ± 0.9 | 0.26 |
| Ala-His | 251.0 ± 29.0 | 340.0 ± 4.2 | 0.04 |
| Ala-Leu | 257.3 ± 38.5 | 306.7 ± 5.2 | 0.16 |
| Ala-Thr | 244.3 ± 1.9 | 296.3 ± 5.2 | 0.00 |
| Gly-Asn | 291.3 ± 33.2 | 331.3 ± 2.8 | 0.18 |
| Gly-Gln | 274.3 ± 19.7 | 325.7 ± 5.5 | 0.06 |
| Gly-Glu | 221.3 ± 38.0 | 322.3 ± 7.5 | 0.06 |
| Gly-Met | 207.3 ± 31.2 | 297.7 ± 13.1 | 0.04 |
| Met-Ala | 301.0 ± 33.2 | 315.0 ± 9.0 | 0.36 |
| asubstrates were considered utilized if absorbance readings were above threshold of 50 units |
| bvalues represent mean absorbance unit for three replicate phenotypic microarrays |