Table 1. Soil health properties and indexes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PH | OM | CaCO3 | CEC | EC | SAR | ESP | Na-Exch | N | P | K | Fe | Mn | Zn | Cu | CCI | qCO2 | BMICROBI | DIS | SS | SSI | BR | SIR | MBC |
| 9.13 | 0.62 | 16.50 | 12.97 | 2.20 | 6.18 | 7.70 | 0.9989 | 0.0561 | 10.14 | 177.2875 | 4.12 | 5.34 | 0.91 | 0.2374 | 0.0364 | 0.0000300 | 0.0852039 | 12.48 | 28.3913 | 1.5500 | 0.0528 | 0.4664 | 475.7640 |
| 8.10 | 0.77 | 17.50 | 13.22 | 3.10 | 6.40 | 8.11 | 1.0722 | 0.0609 | 12.43 | 162.2875 | 3.49 | 4.60 | 0.61 | 0.2011 | 0.1132 | 0.0001110 | 0.0614178 | 5.20 | 12.5652 | 1.9366 | 0.0581 | 0.4862 | 750.1350 |
| 8.10 | 0.84 | 16.00 | 14.52 | 2.20 | 6.50 | 6.53 | 0.9483 | 0.0862 | 14.24 | 182.2875 | 4.29 | 5.12 | 0.98 | 0.3514 | 0.0227 | 0.0000221 | 0.0569998 | 4.72 | 11.5217 | 2.0915 | 0.1003 | 0.5148 | 762.3960 |
| 8.10 | 1.55 | 13.50 | 15.58 | 1.90 | 4.90 | 6.00 | 0.9345 | 0.1067 | 20.93 | 212.2875 | 4.68 | 5.95 | 1.22 | 0.3871 | 0.1949 | 0.0001139 | 0.0568293 | 5.52 | 13.2609 | 3.8732 | 0.1162 | 0.5280 | 1011.6530 |
| 8.90 | 0.90 | 17.00 | 15.08 | 2.00 | 5.20 | 6.40 | 0.9651 | 0.0970 | 19.74 | 207.2875 | 4.67 | 5.42 | 1.00 | 0.3210 | 0.1195 | 0.0000720 | 0.0879318 | 5.42 | 13.0435 | 2.2464 | 0.1003 | 0.5126 | 871.8350 |
| 7.80 | 2.08 | 17.00 | 13.10 | 2.60 | 5.70 | 7.11 | 0.9875 | 0.0585 | 10.38 | 162.2875 | 4.13 | 4.43 | 0.92 | 0.2018 | 0.2200 | 0.0001148 | 0.0487304 | 3.92 | 9.7826 | 5.1901 | 0.0106 | 0.4642 | 476.8640 |
| 8.20 | 1.83 | 22.50 | 10.83 | 5.80 | 13.46 | 15.50 | 1.6780 | 0.0380 | 5.97 | 154.7875 | 2.42 | 2.96 | 0.38 | 0.1741 | 0.1957 | 0.0001266 | 0.0433444 | 4.22 | 10.4348 | 4.5703 | 0.0158 | 0.4356 | 528.2640 |
| 9.52 | 0.57 | 16.00 | 12.02 | 2.20 | 4.90 | 6.00 | 0.7210 | 0.0525 | 9.81 | 167.2875 | 4.01 | 5.01 | 0.82 | 0.2280 | 0.0121 | 0.0000120 | 0.0772316 | 12.24 | 27.8696 | 1.4250 | 0.0422 | 0.4653 | 478.3420 |
| 8.20 | 0.68 | 18.50 | 12.14 | 2.80 | 6.65 | 8.40 | 1.0199 | 0.0549 | 12.60 | 167.2875 | 3.54 | 4.29 | 0.79 | 0.1888 | 0.0908 | 0.0000883 | 0.0701712 | 3.92 | 9.7826 | 1.7042 | 0.0581 | 0.4812 | 752.3960 |
| 8.10 | 0.74 | 16.50 | 13.88 | 2.40 | 6.40 | 8.40 | 0.9764 | 0.0886 | 14.24 | 187.2875 | 3.90 | 5.12 | 0.95 | 0.3500 | 0.0344 | 0.0000337 | 0.0631437 | 4.22 | 10.4348 | 1.8591 | 0.0898 | 0.5082 | 763.6570 |
| 8.20 | 1.61 | 14.00 | 14.43 | 2.10 | 4.20 | 4.90 | 0.7073 | 0.0995 | 20.93 | 207.2875 | 4.32 | 5.11 | 1.15 | 0.3341 | 0.1766 | 0.0001018 | 0.0546995 | 5.42 | 13.0435 | 4.0281 | 0.1109 | 0.5368 | 1013.5640 |
| 8.66 | 0.74 | 16.50 | 14.33 | 1.98 | 5.21 | 6.30 | 0.9028 | 0.0970 | 18.54 | 204.7875 | 4.64 | 5.54 | 1.11 | 0.3419 | 0.1207 | 0.0000780 | 0.1065550 | 5.67 | 13.5870 | 1.8591 | 0.1109 | 0.4576 | 845.6730 |
| 8.00 | 1.89 | 18.50 | 12.14 | 2.90 | 5.20 | 7.80 | 0.9470 | 0.0549 | 9.94 | 162.2875 | 4.11 | 4.33 | 0.90 | 0.2008 | 0.2066 | 0.0001094 | 0.0536246 | 3.22 | 8.2609 | 4.7253 | 0.0158 | 0.4598 | 469.5680 |
| 7.90 | 1.84 | 23.00 | 10.40 | 6.10 | 13.22 | 15.14 | 1.5752 | 0.0368 | 5.92 | 152.2875 | 2.34 | 2.97 | 0.39 | 0.1781 | 0.2423 | 0.0001259 | 0.0478995 | 4.23 | 10.4565 | 4.5953 | 0.0053 | 0.4378 | 440.2200 |
| 9.40 | 0.59 | 17.00 | 13.38 | 2.40 | 5.20 | 6.20 | 0.8298 | 0.0417 | 10.14 | 167.2875 | 3.99 | 5.34 | 0.85 | 0.2361 | 0.0240 | 0.0000240 | 0.0746136 | 12.72 | 28.9130 | 1.4750 | 0.0422 | 0.4520 | 498.7630 |
| 8.20 | 0.40 | 17.50 | 14.38 | 2.90 | 6.65 | 8.40 | 1.2075 | 0.0609 | 12.68 | 167.2875 | 3.54 | 4.63 | 0.81 | 0.2007 | 0.0935 | 0.0000847 | 0.1238209 | 4.22 | 10.4348 | 1.0070 | 0.0634 | 0.4867 | 757.3450 |
| 8.50 | 0.68 | 15.50 | 16.11 | 2.50 | 5.90 | 8.40 | 0.9134 | 0.0946 | 14.57 | 187.2875 | 4.33 | 5.12 | 0.91 | 0.2914 | 0.0348 | 0.0000334 | 0.0694701 | 4.47 | 10.9783 | 1.7042 | 0.0845 | 0.5038 | 762.3960 |
| 8.60 | 1.77 | 16.00 | 16.92 | 1.96 | 4.70 | 5.60 | 0.9473 | 0.1103 | 20.79 | 207.2875 | 4.61 | 5.94 | 1.19 | 0.3854 | 0.1677 | 0.0000963 | 0.0496795 | 4.92 | 11.9565 | 4.4154 | 0.1056 | 0.5324 | 967.8940 |
| 8.50 | 0.90 | 16.50 | 15.92 | 2.10 | 5.21 | 6.35 | 1.0112 | 0.0910 | 18.41 | 207.2875 | 4.59 | 5.28 | 1.04 | 0.3228 | 0.1302 | 0.0000763 | 0.0876213 | 5.67 | 13.5870 | 2.2464 | 0.0422 | 0.5258 | 877.4230 |
| 8.00 | 2.17 | 18.00 | 13.94 | 2.90 | 5.45 | 6.71 | 0.9355 | 0.0525 | 9.94 | 157.2875 | 3.85 | 4.33 | 0.82 | 0.2111 | 0.1983 | 0.0001091 | 0.0446260 | 3.72 | 9.3478 | 5.4223 | 0.0158 | 0.4554 | 473.5630 |
| 8.00 | 1.67 | 22.50 | 12.09 | 5.60 | 13.70 | 15.84 | 1.9151 | 0.0380 | 6.25 | 157.2875 | 2.58 | 2.95 | 0.40 | 0.1748 | 0.0803 | 0.0000533 | 0.0473578 | 4.23 | 10.4565 | 4.1830 | 0.0106 | 0.4400 | 440.2200 |
| 9.13 | 0.62 | 16.50 | 12.85 | 2.10 | 4.90 | 6.00 | 0.7709 | 0.0537 | 11.2595 | 197.77 | 5.42 | 5.92 | 0.95 | 0.2476 | 0.0487 | 0.0000400 | 0.0852039 | 11.7600 | 26.82609 | 1.5500 | 0.0581 | 0.5364 | 616.3080 |
| 8.10 | 0.71 | 19.00 | 13.34 | 2.90 | 6.41 | 8.11 | 1.0823 | 0.0633 | 12.5951 | 189.52 | 4.36 | 4.86 | 0.85 | 0.1949 | 0.1245 | 0.0000942 | 0.0864795 | 3.9200 | 9.782609 | 1.7817 | 0.0634 | 0.5566 | 880.4400 |
| 8.00 | 0.90 | 16.50 | 15.27 | 2.20 | 5.33 | 6.00 | 0.9159 | 0.1007 | 16.6259 | 211.52 | 5.63 | 5.66 | 1.05 | 0.3610 | 0.0340 | 0.0000291 | 0.0605020 | 4.2300 | 10.45652 | 2.2464 | 0.1003 | 0.5964 | 889.4200 |
| 8.00 | 1.92 | 15.00 | 15.82 | 1.95 | 4.49 | 5.30 | 0.8386 | 0.1115 | 22.6021 | 228.02 | 6.27 | 6.52 | 1.42 | 0.4146 | 0.1934 | 0.0001036 | 0.0504131 | 4.3500 | 10.71739 | 4.8027 | 0.1373 | 0.6553 | 1155.6720 |
| 8.50 | 0.96 | 15.50 | 14.77 | 1.98 | 5.45 | 6.70 | 0.9896 | 0.0910 | 21.4515 | 225.27 | 5.91 | 6.18 | 1.06 | 0.3897 | 0.1309 | 0.0000735 | 0.0916602 | 5.4300 | 13.06522 | 2.4014 | 0.0898 | 0.5920 | 968.4840 |
| 7.90 | 2.20 | 17.00 | 13.22 | 2.50 | 5.21 | 6.40 | 0.8461 | 0.0609 | 10.9328 | 184.02 | 5.27 | 5.50 | 1.00 | 0.2508 | 0.2409 | 0.0001188 | 0.0525329 | 3.5100 | 8.891304 | 5.4998 | 0.0158 | 0.5359 | 543.6570 |
| 8.00 | 1.67 | 25.50 | 11.42 | 5.64 | 12.74 | 14.43 | 1.6484 | 0.0284 | 6.1363 | 152.29 | 2.52 | 2.98 | 0.46 | 0.1628 | 0.1744 | 0.0001009 | 0.0531564 | 4.4700 | 10.97826 | 4.1830 | 0.0211 | 0.4984 | 528.2640 |
| 9.52 | 0.71 | 16.00 | 12.20 | 1.98 | 5.40 | 6.50 | 0.7932 | 0.0561 | 11.2595 | 197.77 | 5.20 | 5.96 | 1.01 | 0.2459 | 0.0244 | 0.0000240 | 0.0620028 | 12.2200 | 27.82609 | 1.7750 | 0.0634 | 0.5541 | 528.2640 |
| 8.10 | 0.77 | 18.00 | 12.39 | 2.80 | 5.58 | 6.89 | 0.8536 | 0.0597 | 12.7605 | 184.02 | 4.76 | 4.86 | 0.93 | 0.2203 | 0.1315 | 0.0001199 | 0.0681952 | 4.4200 | 10.86957 | 1.9366 | 0.0686 | 0.5617 | 880.4400 |
| 8.12 | 0.81 | 15.50 | 13.81 | 2.20 | 6.65 | 5.30 | 0.7322 | 0.0874 | 14.2441 | 195.02 | 5.53 | 5.68 | 1.06 | 0.3792 | 0.0340 | 0.0000309 | 0.0636322 | 4.7200 | 11.52174 | 2.0141 | 0.1003 | 0.5946 | 880.4400 |
| 8.30 | 1.58 | 12.50 | 15.24 | 1.89 | 4.20 | 5.30 | 0.8077 | 0.1151 | 25.1909 | 239.02 | 6.41 | 6.58 | 1.32 | 0.4036 | 0.1940 | 0.0001036 | 0.0612865 | 5.6700 | 13.58696 | 3.9506 | 0.1531 | 0.6123 | 1151.3210 |
| 8.56 | 0.87 | 16.50 | 14.06 | 1.98 | 4.73 | 5.60 | 0.7875 | 0.1143 | 20.8762 | 228.02 | 6.09 | 6.40 | 1.18 | 0.3929 | 0.1405 | 0.0000733 | 0.1014810 | 4.6000 | 11.26087 | 2.1690 | 0.1162 | 0.5946 | 986.5640 |
| 7.80 | 2.29 | 16.50 | 13.80 | 2.80 | 5.70 | 7.11 | 0.8721 | 0.0573 | 10.1610 | 178.52 | 5.36 | 4.97 | 0.98 | 0.2378 | 0.2876 | 0.0001330 | 0.0502120 | 3.2200 | 8.26087 | 5.7323 | 0.0158 | 0.5364 | 512.6340 |
| 8.00 | 1.70 | 24.50 | 10.65 | 5.77 | 13.20 | 15.84 | 1.6876 | 0.0380 | 6.8530 | 157.29 | 2.52 | 2.99 | 0.51 | 0.1874 | 0.2247 | 0.0001319 | 0.0516630 | 3.7500 | 9.413043 | 4.2605 | 0.0106 | 0.4984 | 440.2200 |
| 9.40 | 0.66 | 16.50 | 14.13 | 2.10 | 4.97 | 6.00 | 0.8476 | 0.0561 | 9.0266 | 195.02 | 5.37 | 5.96 | 0.98 | 0.2431 | 0.0241 | 0.0000200 | 0.0800400 | 12.0000 | 27.34783 | 1.6500 | 0.0581 | 0.5566 | 587.5620 |
| 8.00 | 0.77 | 16.50 | 14.50 | 2.80 | 5.70 | 7.00 | 1.0149 | 0.0633 | 12.8432 | 189.52 | 4.87 | 5.25 | 0.89 | 0.2116 | 0.1200 | 0.0000988 | 0.0758502 | 3.9900 | 9.934783 | 1.9366 | 0.0739 | 0.5794 | 968.4840 |
| 8.00 | 0.87 | 16.00 | 16.30 | 2.00 | 6.50 | 6.00 | 0.9778 | 0.0983 | 14.9057 | 200.52 | 5.64 | 5.77 | 1.06 | 0.3669 | 0.0457 | 0.0000397 | 0.0615710 | 4.2300 | 10.45652 | 2.1628 | 0.1267 | 0.5920 | 880.4400 |
| 8.00 | 1.86 | 16.00 | 16.98 | 2.00 | 4.90 | 5.40 | 0.9168 | 0.1115 | 22.6021 | 233.52 | 6.35 | 6.50 | 1.37 | 0.4085 | 0.2462 | 0.0001308 | 0.0520936 | 5.5200 | 13.26087 | 4.6478 | 0.1267 | 0.6047 | 1144.5720 |
| 8.50 | 0.96 | 15.50 | 16.42 | 1.94 | 4.98 | 5.81 | 0.9540 | 0.1007 | 22.3144 | 233.52 | 6.14 | 6.42 | 1.12 | 0.3797 | 0.1467 | 0.0000805 | 0.1008262 | 4.7200 | 11.52174 | 2.4014 | 0.1320 | 0.5946 | 981.5260 |
| 8.00 | 2.20 | 16.50 | 14.31 | 2.80 | 5.21 | 6.40 | 0.9157 | 0.0573 | 9.9405 | 184.02 | 5.32 | 4.96 | 0.99 | 0.2516 | 0.2410 | 0.0001107 | 0.0520284 | 3.9200 | 9.782609 | 5.4998 | 0.0211 | 0.5313 | 532.6570 |
| 7.90 | 1.92 | 21.50 | 12.58 | 4.44 | 12.98 | 14.79 | 1.8603 | 0.0429 | 6.8530 | 157.29 | 2.58 | 3.01 | 0.51 | 0.1879 | 0.2553 | 0.0001499 | 0.0458301 | 4.0000 | 9.956522 | 4.8027 | 0.0106 | 0.5035 | 528.2640 |

Table 2. Correlation Coefficient (Pearson correlation matrix) for measured soil health properties and indexes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **PH** | **OM** | **CaCO3** | **CEC** | **EC** | **SAR** | **ESP** | **Na-Exch** | **N** | **P** | **K** | **Fe** | **Mn** | **Zn** | **Cu** | **CCI** | **qCO2** | **BMICROBI** | **DIS** | **SS** | **SSI** | **BR** | **SIR** | **MBC** |
| PH | **1** | **-0.587** | -0.275 | 0.002 | **-0.375** | **-0.325** | **-0.308** | **-0.368** | -0.018 | 0.046 | 0.171 | 0.166 | **0.370** | 0.149 | 0.057 | **-0.610** | **-0.660** | **0.479** | **0.909** | **0.909** | **-0.587** | 0.124 | -0.075 | -0.114 |
| OM | **-0.587** | **1** | 0.263 | -0.104 | **0.379** | 0.280 | 0.288 | **0.309** | -0.132 | -0.137 | -0.170 | -0.124 | **-0.317** | -0.084 | -0.104 | **0.865** | **0.722** | **-0.737** | **-0.483** | **-0.483** | **1.000** | **-0.356** | -0.086 | -0.212 |
| CaCO3 | -0.275 | 0.263 | **1** | **-0.729** | **0.933** | **0.903** | **0.916** | **0.871** | **-0.734** | **-0.729** | **-0.721** | **-0.790** | **-0.884** | **-0.873** | **-0.710** | 0.253 | **0.329** | -0.283 | -0.234 | -0.234 | 0.263 | **-0.693** | **-0.524** | **-0.601** |
| CEC | 0.002 | -0.104 | **-0.729** | **1** | **-0.719** | **-0.648** | **-0.682** | **-0.515** | **0.851** | **0.806** | **0.769** | **0.698** | **0.751** | **0.791** | **0.798** | -0.077 | -0.147 | 0.234 | -0.109 | -0.109 | -0.104 | **0.745** | **0.601** | **0.749** |
| EC | **-0.375** | **0.379** | **0.933** | **-0.719** | **1** | **0.953** | **0.964** | **0.906** | **-0.698** | **-0.698** | **-0.707** | **-0.804** | **-0.909** | **-0.883** | **-0.674** | **0.341** | **0.407** | **-0.413** | -0.296 | -0.296 | **0.379** | **-0.664** | **-0.524** | **-0.562** |
| SAR | **-0.325** | 0.280 | **0.903** | **-0.648** | **0.953** | **1** | **0.978** | **0.954** | **-0.614** | **-0.646** | **-0.636** | **-0.782** | **-0.863** | **-0.855** | **-0.560** | 0.224 | 0.287 | **-0.367** | -0.252 | -0.252 | 0.280 | **-0.559** | **-0.464** | **-0.504** |
| ESP | **-0.308** | 0.288 | **0.916** | **-0.682** | **0.964** | **0.978** | **1** | **0.959** | **-0.655** | **-0.668** | **-0.677** | **-0.827** | **-0.895** | **-0.882** | **-0.636** | 0.259 | **0.333** | **-0.340** | -0.253 | -0.253 | 0.288 | **-0.621** | **-0.537** | **-0.550** |
| Na-Exch | **-0.368** | **0.309** | **0.871** | **-0.515** | **0.906** | **0.954** | **0.959** | **1** | **-0.549** | **-0.553** | **-0.577** | **-0.765** | **-0.834** | **-0.808** | **-0.539** | 0.296 | **0.375** | -0.297 | **-0.319** | **-0.319** | **0.309** | **-0.530** | **-0.452** | **-0.426** |
| N | -0.018 | -0.132 | **-0.734** | **0.851** | **-0.698** | **-0.614** | **-0.655** | **-0.549** | **1** | **0.946** | **0.885** | **0.714** | **0.775** | **0.846** | **0.945** | -0.065 | -0.130 | 0.232 | -0.168 | -0.168 | -0.132 | **0.902** | **0.657** | **0.875** |
| P | 0.046 | -0.137 | **-0.729** | **0.806** | **-0.698** | **-0.646** | **-0.668** | **-0.553** | **0.946** | **1** | **0.916** | **0.719** | **0.790** | **0.848** | **0.894** | 0.008 | -0.031 | **0.315** | -0.104 | -0.104 | -0.137 | **0.891** | **0.659** | **0.913** |
| K | 0.171 | -0.170 | **-0.721** | **0.769** | **-0.707** | **-0.636** | **-0.677** | **-0.577** | **0.885** | **0.916** | **1** | **0.870** | **0.880** | **0.874** | **0.891** | -0.059 | -0.149 | **0.336** | 0.056 | 0.056 | -0.170 | **0.862** | **0.813** | **0.846** |
| Fe | 0.166 | -0.124 | **-0.790** | **0.698** | **-0.804** | **-0.782** | **-0.827** | **-0.765** | **0.714** | **0.719** | **0.870** | **1** | **0.929** | **0.896** | **0.751** | -0.082 | -0.208 | 0.270 | 0.118 | 0.118 | -0.124 | **0.687** | **0.831** | **0.642** |
| Mn | **0.370** | **-0.317** | **-0.884** | **0.751** | **-0.909** | **-0.863** | **-0.895** | **-0.834** | **0.775** | **0.790** | **0.880** | **0.929** | **1** | **0.928** | **0.801** | -0.265 | **-0.360** | **0.397** | 0.301 | 0.301 | **-0.317** | **0.781** | **0.720** | **0.681** |
| Zn | 0.149 | -0.084 | **-0.873** | **0.791** | **-0.883** | **-0.855** | **-0.882** | **-0.808** | **0.846** | **0.848** | **0.874** | **0.896** | **0.928** | **1** | **0.842** | -0.044 | -0.159 | 0.231 | 0.089 | 0.089 | -0.084 | **0.777** | **0.711** | **0.730** |
| Cu | 0.057 | -0.104 | **-0.710** | **0.798** | **-0.674** | **-0.560** | **-0.636** | **-0.539** | **0.945** | **0.894** | **0.891** | **0.751** | **0.801** | **0.842** | **1** | -0.105 | -0.224 | 0.172 | -0.044 | -0.044 | -0.104 | **0.875** | **0.688** | **0.797** |
| CCI | **-0.610** | **0.865** | 0.253 | -0.077 | **0.341** | 0.224 | 0.259 | 0.296 | -0.065 | 0.008 | -0.059 | -0.082 | -0.265 | -0.044 | -0.105 | **1** | **0.938** | **-0.439** | **-0.564** | **-0.564** | **0.865** | -0.269 | -0.005 | -0.024 |
| qCO2 | **-0.660** | **0.722** | **0.329** | -0.147 | **0.407** | 0.287 | **0.333** | **0.375** | -0.130 | -0.031 | -0.149 | -0.208 | **-0.360** | -0.159 | -0.224 | **0.938** | **1** | **-0.380** | **-0.617** | **-0.617** | **0.722** | -0.264 | -0.047 | 0.034 |
| BMICROBI | **0.479** | **-0.737** | -0.283 | 0.234 | **-0.413** | **-0.367** | **-0.340** | -0.297 | 0.232 | **0.315** | **0.336** | 0.270 | **0.397** | 0.231 | 0.172 | **-0.439** | **-0.380** | **1** | 0.287 | 0.287 | **-0.737** | **0.331** | 0.123 | 0.280 |
| DIS | **0.909** | **-0.483** | -0.234 | -0.109 | -0.296 | -0.252 | -0.253 | **-0.319** | -0.168 | -0.104 | 0.056 | 0.118 | 0.301 | 0.089 | -0.044 | **-0.564** | **-0.617** | 0.287 | **1** | **1.000** | **-0.483** | 0.013 | -0.094 | -0.227 |
| SS | **0.909** | **-0.483** | -0.234 | -0.109 | -0.296 | -0.252 | -0.253 | **-0.319** | -0.168 | -0.104 | 0.056 | 0.118 | 0.301 | 0.089 | -0.044 | **-0.564** | **-0.617** | 0.287 | **1.000** | **1** | **-0.483** | 0.013 | -0.094 | -0.227 |
| SSI | **-0.587** | **1.000** | 0.263 | -0.104 | **0.379** | 0.280 | 0.288 | **0.309** | -0.132 | -0.137 | -0.170 | -0.124 | **-0.317** | -0.084 | -0.104 | **0.865** | **0.722** | **-0.737** | **-0.483** | **-0.483** | **1** | **-0.356** | -0.086 | -0.212 |
| BR | 0.124 | **-0.356** | **-0.693** | **0.745** | **-0.664** | **-0.559** | **-0.621** | **-0.530** | **0.902** | **0.891** | **0.862** | **0.687** | **0.781** | **0.777** | **0.875** | -0.269 | -0.264 | **0.331** | 0.013 | 0.013 | **-0.356** | **1** | **0.696** | **0.899** |
| SIR | -0.075 | -0.086 | **-0.524** | **0.601** | **-0.524** | **-0.464** | **-0.537** | **-0.452** | **0.657** | **0.659** | **0.813** | **0.831** | **0.720** | **0.711** | **0.688** | -0.005 | -0.047 | 0.123 | -0.094 | -0.094 | -0.086 | **0.696** | **1** | **0.750** |
| MBC | -0.114 | -0.212 | **-0.601** | **0.749** | **-0.562** | **-0.504** | **-0.550** | **-0.426** | **0.875** | **0.913** | **0.846** | **0.642** | **0.681** | **0.730** | **0.797** | -0.024 | 0.034 | 0.280 | -0.227 | -0.227 | -0.212 | **0.899** | **0.750** | **1** |

Table 3. p values of Pearson correlation matrix for measured soil health properties and indexes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **PH** | **OM** | **CaCO3** | **CEC** | **EC** | **SAR** | **ESP** | **Na-Exch** | **N** | **P** | **K** | **Fe** | **Mn** | **Zn** | **Cu** | **CCI** | **qCO2** | **BMICROBI** | **DIS** | **SS** | **SSI** | **BR** | **SIR** | **MBC** |
| PH | 0 | 0.000 | 0.078 | 0.990 | 0.014 | 0.035 | 0.047 | 0.016 | 0.912 | 0.772 | 0.279 | 0.294 | 0.016 | 0.347 | 0.719 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.434 | 0.635 | 0.474 |
| OM | < 0.0001 | 0 | 0.092 | 0.510 | 0.013 | 0.073 | 0.065 | 0.046 | 0.405 | 0.388 | 0.282 | 0.434 | 0.040 | 0.597 | 0.510 | < 0.0001 | < 0.0001 | < 0.0001 | 0.001 | 0.001 | < 0.0001 | 0.021 | 0.588 | 0.178 |
| CaCO3 | 0.078 | 0.092 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.107 | 0.033 | 0.069 | 0.135 | 0.135 | 0.092 | < 0.0001 | 0.000 | < 0.0001 |
| CEC | 0.990 | 0.510 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.627 | 0.352 | 0.135 | 0.494 | 0.494 | 0.510 | < 0.0001 | < 0.0001 | < 0.0001 |
| EC | 0.014 | 0.013 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.027 | 0.007 | 0.007 | 0.057 | 0.057 | 0.013 | < 0.0001 | 0.000 | 0.000 |
| SAR | 0.035 | 0.073 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | 0.155 | 0.065 | 0.017 | 0.107 | 0.107 | 0.073 | 0.000 | 0.002 | 0.001 |
| ESP | 0.047 | 0.065 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.097 | 0.031 | 0.027 | 0.106 | 0.106 | 0.065 | < 0.0001 | 0.000 | 0.000 |
| Na-Exch | 0.016 | 0.046 | < 0.0001 | 0.000 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | 0.000 | 0.000 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | 0.057 | 0.014 | 0.056 | 0.039 | 0.039 | 0.046 | 0.000 | 0.003 | 0.005 |
| N | 0.912 | 0.405 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.682 | 0.413 | 0.140 | 0.289 | 0.289 | 0.405 | < 0.0001 | < 0.0001 | < 0.0001 |
| P | 0.772 | 0.388 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.961 | 0.845 | 0.042 | 0.512 | 0.512 | 0.388 | < 0.0001 | < 0.0001 | < 0.0001 |
| K | 0.279 | 0.282 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.713 | 0.348 | 0.030 | 0.726 | 0.726 | 0.282 | < 0.0001 | < 0.0001 | < 0.0001 |
| Fe | 0.294 | 0.434 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | < 0.0001 | 0.606 | 0.186 | 0.083 | 0.456 | 0.456 | 0.434 | < 0.0001 | < 0.0001 | < 0.0001 |
| Mn | 0.016 | 0.040 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | < 0.0001 | 0.090 | 0.019 | 0.009 | 0.053 | 0.053 | 0.040 | < 0.0001 | < 0.0001 | < 0.0001 |
| Zn | 0.347 | 0.597 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | < 0.0001 | 0.781 | 0.313 | 0.141 | 0.577 | 0.577 | 0.597 | < 0.0001 | < 0.0001 | < 0.0001 |
| Cu | 0.719 | 0.510 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | < 0.0001 | 0.000 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0 | 0.508 | 0.154 | 0.276 | 0.781 | 0.781 | 0.510 | < 0.0001 | < 0.0001 | < 0.0001 |
| CCI | < 0.0001 | < 0.0001 | 0.107 | 0.627 | 0.027 | 0.155 | 0.097 | 0.057 | 0.682 | 0.961 | 0.713 | 0.606 | 0.090 | 0.781 | 0.508 | 0 | < 0.0001 | 0.004 | < 0.0001 | < 0.0001 | < 0.0001 | 0.085 | 0.975 | 0.882 |
| qCO2 | < 0.0001 | < 0.0001 | 0.033 | 0.352 | 0.007 | 0.065 | 0.031 | 0.014 | 0.413 | 0.845 | 0.348 | 0.186 | 0.019 | 0.313 | 0.154 | < 0.0001 | 0 | 0.013 | < 0.0001 | < 0.0001 | < 0.0001 | 0.092 | 0.766 | 0.833 |
| BMICROBI | 0.001 | < 0.0001 | 0.069 | 0.135 | 0.007 | 0.017 | 0.027 | 0.056 | 0.140 | 0.042 | 0.030 | 0.083 | 0.009 | 0.141 | 0.276 | 0.004 | 0.013 | 0 | 0.065 | 0.065 | < 0.0001 | 0.033 | 0.436 | 0.072 |
| DIS | < 0.0001 | 0.001 | 0.135 | 0.494 | 0.057 | 0.107 | 0.106 | 0.039 | 0.289 | 0.512 | 0.726 | 0.456 | 0.053 | 0.577 | 0.781 | < 0.0001 | < 0.0001 | 0.065 | 0 | < 0.0001 | 0.001 | 0.937 | 0.554 | 0.149 |
| SS | < 0.0001 | 0.001 | 0.135 | 0.494 | 0.057 | 0.107 | 0.106 | 0.039 | 0.289 | 0.512 | 0.726 | 0.456 | 0.053 | 0.577 | 0.781 | < 0.0001 | < 0.0001 | 0.065 | < 0.0001 | 0 | 0.001 | 0.937 | 0.554 | 0.149 |
| SSI | < 0.0001 | < 0.0001 | 0.092 | 0.510 | 0.013 | 0.073 | 0.065 | 0.046 | 0.405 | 0.388 | 0.282 | 0.434 | 0.040 | 0.597 | 0.510 | < 0.0001 | < 0.0001 | < 0.0001 | 0.001 | 0.001 | 0 | 0.021 | 0.588 | 0.178 |
| BR | 0.434 | 0.021 | < 0.0001 | < 0.0001 | < 0.0001 | 0.000 | < 0.0001 | 0.000 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.085 | 0.092 | 0.033 | 0.937 | 0.937 | 0.021 | 0 | < 0.0001 | < 0.0001 |
| SIR | 0.635 | 0.588 | 0.000 | < 0.0001 | 0.000 | 0.002 | 0.000 | 0.003 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.975 | 0.766 | 0.436 | 0.554 | 0.554 | 0.588 | < 0.0001 | 0 | < 0.0001 |
| MBC | 0.474 | 0.178 | < 0.0001 | < 0.0001 | 0.000 | 0.001 | 0.000 | 0.005 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | 0.882 | 0.833 | 0.072 | 0.149 | 0.149 | 0.178 | < 0.0001 | < 0.0001 | 0 |