Supplementary Material

# Supplementary Tables

Table S1 The detailed information of herbal materials

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Herbal materials | Batches | Sample Source | Years | Use | Place of origin |
| Codonopsis Radix | CR01 | National Institutes for Food and Drug Control | 2012 | "digital identity"; mixed sample | Gansu, China |
| Codonopsis Radix | CR02 | National Institutes for Food and Drug Control | 2015 | Verification; mixed sample | Gansu, China |
| Codonopsis Radix | CR03 | National Institutes for Food and Drug Control | 2019 | "digital identity"; mixed sample | Ningxia, China |
| Codonopsis Radix | CR04 | National Institutes for Food and Drug Control | 2021 | "digital identity"; mixed sample | Shanxi, China |
| Codonopsis Radix | CR05 | National Institutes for Food and Drug Control | 2024 | Verification; mixed sample | Hebei, China |
| Codonopsis Radix | CR06 | National Institutes for Food and Drug Control | 2021 | Verification; mixed sample | Qinghai, China |
|  Stellariae Radix | SR01 | Gansu Institutes for Food and Drug Control | 2018 | Verification; mixed sample | Gansu, China  |
|  Stellariae Radix | SR02 | Gansu Institutes for Food and Drug Control | 2020 | "digital identity"; mixed sample | Ningxia, China |
|  Stellariae Radix | SR03 | Gansu Institutes for Food and Drug Control | 2021 | Verification; mixed sample | Shanxi, China |
|  Stellariae Radix | SR04 | Gansu Institutes for Food and Drug Control | 2024 | Verification; mixed sample | Ningxia, China |
|  Stellariae Radix | SR05 | Gansu Institutes for Food and Drug Control | 2024 | "digital identity"; mixed sample | Liaoning,China |
|  Stellariae Radix | SR06 | Gansu Institutes for Food and Drug Control | 2024 | "digital identity"; mixed sample | Gansu, China |
| 0%SR | Mix01 | self-preparation | — | Identification verification | — |
| 3%SR | Mix02 | self-preparation | — | Identification verification | — |
| 5%SR | Mix03 | self-preparation | — | Identification verification | — |
| 10%SR | Mix04 | self-preparation | — | Identification verification | — |
| 20%SR | Mix05 | self-preparation | — | Identification verification | — |
| 30%SR | Mix06 | self-preparation | — | Identification verification | — |
| 40%SR | Mix07 | self-preparation | — | Identification verification | — |
| 50%SR | Mix08 | self-preparation | — | Identification verification | — |
| 100%SR | Mix09 | self-preparation | — | Identification verification | — |
| Market CR samples | MCR01 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR02 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR03 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR04 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR05 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR06 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR07 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR08 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR09 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR10 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR11 | Hebei Anguo herbal market | 2024 | Identification analysis | — |
| Market CR samples | MCR12 | Hebei Anguo herbal market | 2024 | Identification analysis | — |

Table S2 The top 100 [*Rt*-*m/z*-*I*] data in "digital identities" of *Codonopsis Radix* (CR)

|  |  |  |
| --- | --- | --- |
| Retention time (Rt) | mass-to-charge ratio (m/z) | Ionic strength (I) |
| 2.36  | 268.1602  | 94486.1185  |
| 1.29  | 268.1597  | 57658.0434  |
| 5.96  | 350.2037  | 52191.5521  |
| 6.94  | 352.2210  | 35504.7649  |
| 6.35  | 581.2349  | 30744.6532  |
| 2.18  | 254.1447  | 26813.4996  |
| 6.45  | 352.2205  | 24850.2897  |
| 22.15  | 681.4124  | 19802.3704  |
| 7.18  | 419.1781  | 19278.4361  |
| 16.36  | 420.2809  | 18402.7423  |
| 4.93  | 701.2419  | 15826.6078  |
| 25.51  | 992.8230  | 15555.6271  |
| 1.40  | 283.1470  | 14397.6022  |
| 25.15  | 615.4753  | 13911.4754  |
| 23.37  | 657.4132  | 12816.3593  |
| 17.08  | 991.6956  | 12023.0469  |
| 22.90  | 483.3931  | 11741.8925  |
| 17.81  | 404.2863  | 11428.4866  |
| 25.66  | 1016.8404  | 10766.4327  |
| 4.82  | 366.1970  | 9956.4056  |
| 23.35  | 689.5092  | 9801.2141  |
| 3.48  | 382.1565  | 9596.3057  |
| 22.88  | 645.4824  | 9354.6426  |
| 4.41  | 310.1344  | 9190.3192  |
| 1.11  | 230.1439  | 9022.5569  |
| 6.35  | 597.2088  | 9018.0389  |
| 12.79  | 231.1427  | 8547.2771  |
| 20.67  | 843.4716  | 8498.1286  |
| 20.99  | 681.4138  | 8431.8919  |
| 1.13  | 270.1402  | 8372.5040  |
| 25.25  | 1034.8409  | 8369.2007  |
| 5.30  | 368.2148  | 7334.9666  |
| 1.07  | 326.1304  | 7321.3559  |
| 19.26  | 293.2535  | 7104.2650  |
| 7.18  | 199.1163  | 7099.0678  |
| 25.56  | 1153.3093  | 6938.1870  |
| 22.89  | 889.7187  | 6881.7176  |
| 1.33  | 427.1906  | 6849.0565  |
| 5.69  | 743.2938  | 6744.4093  |
| 17.24  | 468.3198  | 6727.7904  |
| 16.33  | 492.3202  | 6637.1340  |
| 6.47  | 350.2025  | 6625.3452  |
| 22.12  | 657.4142  | 6541.9577  |
| 1.90  | 416.2009  | 6231.8786  |
| 6.35  | 199.1163  | 6184.8687  |
| 14.88  | 233.1582  | 6134.1853  |
| 23.88  | 364.3669  | 5743.1996  |
| 7.19  | 815.3647  | 5638.1319  |
| 19.80  | 277.2219  | 5537.3662  |
| 7.18  | 435.1515  | 5475.3243  |
| 23.80  | 761.4927  | 5401.1585  |
| 5.53  | 449.2097  | 5399.4964  |
| 1.06  | 392.1683  | 5144.1194  |
| 5.70  | 338.2039  | 5004.4881  |
| 16.38  | 231.1425  | 4918.9558  |
| 5.82  | 368.2150  | 4888.7713  |
| 6.05  | 419.1982  | 4866.3863  |
| 25.08  | 671.5066  | 4768.1017  |
| 15.70  | 349.2420  | 4723.9452  |
| 20.01  | 277.2205  | 4678.8838  |
| 23.48  | 557.4358  | 4612.2748  |
| 1.07  | 408.1613  | 4431.8014  |
| 4.78  | 611.2663  | 4406.0261  |
| 4.93  | 717.2156  | 4221.3076  |
| 15.95  | 442.3233  | 3904.6672  |
| 25.38  | 1000.8314  | 3872.4983  |
| 6.58  | 581.2344  | 3742.7377  |
| 15.98  | 616.3605  | 3738.6953  |
| 21.27  | 279.2377  | 3602.9457  |
| 24.67  | 891.7309  | 3533.1239  |
| 2.90  | 297.1607  | 3417.6838  |
| 1.13  | 456.2124  | 3266.6079  |
| 7.58  | 487.3606  | 3219.4442  |
| 6.19  | 265.1014  | 3201.3056  |
| 20.97  | 552.4667  | 3113.8865  |
| 14.85  | 699.3730  | 3062.6480  |
| 16.35  | 619.3006  | 3058.0673  |
| 12.53  | 640.4041  | 3029.7632  |
| 25.98  | 613.4713  | 3021.2123  |
| 7.46  | 331.1590  | 2912.1961  |
| 17.34  | 595.3022  | 2880.3749  |
| 21.85  | 975.5932  | 2872.9242  |
| 21.37  | 483.3919  | 2848.9367  |
| 17.39  | 482.3361  | 2788.6867  |
| 20.24  | 277.2218  | 2767.9873  |
| 24.95  | 340.3667  | 2682.1367  |
| 19.61  | 424.3149  | 2634.8119  |
| 21.55  | 633.4854  | 2592.5201  |
| 25.87  | 591.4736  | 2591.2658  |
| 2.84  | 382.1588  | 2550.6510  |
| 7.18  | 416.1695  | 2543.1639  |
| 1.06  | 240.1255  | 2314.9161  |
| 23.65  | 684.5377  | 2281.7444  |
| 1.20  | 248.1537  | 2230.1593  |
| 6.35  | 155.0888  | 2228.1942  |
| 8.46  | 416.3450  | 2189.5819  |
| 3.94  | 303.1397  | 2186.4101  |
| 19.80  | 315.2559  | 2168.2024  |
| 1.91  | 430.2142  | 2129.5407  |
| 25.98  | 1008.8201  | 2108.1468  |

Table S3 The top 100 [Rt-m/z-I] data in "digital identities" of and Stellariae Radix (SR)

|  |  |  |
| --- | --- | --- |
| Retention time (*Rt*) | mass-to-charge ratio (*m/z*) | Ionic strength (*I*) |
| 9.55  | 720.4427  | 215334.7370  |
| 11.73  | 903.5257  | 197876.2880  |
| 4.63  | 565.1738  | 112183.3954  |
| 9.69  | 983.5212  | 110458.4312  |
| 8.94  | 384.1329  | 100744.1642  |
| 14.41  | 411.1696  | 95791.1305  |
| 11.03  | 1032.5998  | 75433.1548  |
| 11.99  | 1012.5821  | 67128.2070  |
| 20.47  | 676.4360  | 63022.4125  |
| 19.55  | 662.4199  | 52811.3233  |
| 16.97  | 480.1924  | 51705.0229  |
| 9.27  | 637.3548  | 49899.9001  |
| 24.45  | 1104.8699  | 47392.3600  |
| 5.93  | 741.2262  | 45341.2557  |
| 4.93  | 565.1733  | 44398.0722  |
| 25.18  | 972.8210  | 39022.3597  |
| 13.02  | 340.1408  | 37539.4952  |
| 23.14  | 901.7570  | 37323.3998  |
| 5.18  | 595.3195  | 36156.7010  |
| 24.20  | 1090.8526  | 29905.4599  |
| 4.38  | 227.0894  | 27552.5251  |
| 17.60  | 424.1976  | 26808.1639  |
| 6.95  | 578.8304  | 25813.6594  |
| 5.77  | 937.3055  | 25703.7118  |
| 19.24  | 520.2248  | 25564.5919  |
| 11.97  | 269.1009  | 24413.8420  |
| 17.81  | 439.2261  | 23912.6164  |
| 12.24  | 931.5580  | 23877.2300  |
| 10.76  | 502.1985  | 22713.7247  |
| 11.28  | 340.1398  | 22071.2118  |
| 17.59  | 322.1293  | 19879.6592  |
| 7.09  | 303.1078  | 19749.7478  |
| 11.74  | 941.4824  | 17862.1617  |
| 9.56  | 346.7282  | 17358.3133  |
| 25.25  | 866.7043  | 16965.1366  |
| 7.19  | 919.2947  | 16955.4194  |
| 6.05  | 373.1401  | 16471.7812  |
| 16.85  | 410.1840  | 15654.0115  |
| 23.26  | 988.8128  | 15348.1774  |
| 18.31  | 629.3703  | 15297.1560  |
| 18.68  | 530.2067  | 14662.9849  |
| 10.14  | 338.1240  | 14647.0068  |
| 9.69  | 964.5810  | 14014.4865  |
| 15.92  | 422.1845  | 13382.2341  |
| 19.78  | 943.7302  | 12862.6187  |
| 13.39  | 338.1244  | 12805.8069  |
| 10.75  | 271.0799  | 12770.9035  |
| 10.26  | 285.0964  | 12524.2787  |
| 15.35  | 438.1796  | 12197.2366  |
| 12.07  | 873.5145  | 12029.8321  |
| 20.59  | 443.3636  | 12025.9684  |
| 18.20  | 893.3039  | 11944.7620  |
| 4.38  | 181.0821  | 11565.4001  |
| 8.99  | 254.1002  | 11426.2038  |
| 22.56  | 1120.8616  | 11277.3823  |
| 5.59  | 562.1843  | 10994.0145  |
| 8.44  | 517.1979  | 10302.8590  |
| 6.05  | 575.1913  | 9925.4456  |
| 25.55  | 645.4989  | 9860.9215  |
| 9.55  | 607.3550  | 9718.3858  |
| 21.58  | 707.5258  | 9431.7283  |
| 9.69  | 1021.4779  | 9211.4383  |
| 22.96  | 1134.8799  | 9041.0637  |
| 1.35  | 203.0880  | 8803.0199  |
| 7.46  | 400.1264  | 8737.7601  |
| 4.36  | 595.1851  | 8729.0351  |
| 4.37  | 595.1839  | 8712.3588  |
| 18.32  | 427.3192  | 8678.0526  |
| 13.29  | 426.1429  | 8633.0783  |
| 14.18  | 279.2407  | 8449.1318  |
| 15.68  | 480.1917  | 8318.2699  |
| 12.45  | 354.1192  | 8304.0443  |
| 5.24  | 535.1617  | 8181.7565  |
| 9.34  | 470.3113  | 7976.0087  |
| 14.41  | 843.3128  | 7967.0204  |
| 11.28  | 701.2550  | 7827.6009  |
| 22.91  | 705.5217  | 7496.6262  |
| 23.36  | 549.3955  | 7458.1735  |
| 10.15  | 733.2445  | 7438.3937  |
| 15.90  | 438.1794  | 7245.8061  |
| 8.94  | 789.2385  | 7195.1060  |
| 12.96  | 371.1714  | 7006.9951  |
| 14.54  | 413.1831  | 6959.1783  |
| 17.59  | 460.1413  | 6955.0618  |
| 22.27  | 1106.8466  | 6953.1738  |
| 8.99  | 227.0882  | 6488.6723  |
| 9.28  | 675.3113  | 6421.3523  |
| 17.59  | 290.1016  | 6418.1300  |
| 6.37  | 579.3227  | 6244.8708  |
| 9.36  | 518.1928  | 6198.6271  |
| 23.21  | 897.6022  | 5959.3132  |
| 9.68  | 987.5617  | 5958.5789  |
| 23.14  | 575.5224  | 5616.0212  |
| 3.95  | 727.2323  | 5562.3529  |
| 12.19  | 338.1607  | 5499.7076  |
| 7.15  | 449.1695  | 5468.8526  |
| 4.48  | 889.2910  | 5373.3532  |
| 23.51  | 605.4350  | 5273.1618  |
| 4.56  | 727.2326  | 5252.4165  |
| 8.09  | 607.3535  | 5218.4072  |