

**Table S1** Content of phenolic compounds and proline in the three multifloral honey samples (mg/ kg).

| Compounds                     | S17          | C10         | C11         |
|-------------------------------|--------------|-------------|-------------|
| Gallic acid                   | 0.007±0.000  | 0.012±0.000 | 0.063±0.003 |
| Protocatechuic acid           | 0.255±0.001  | 0.081±0.001 | 0.209±0.007 |
| <i>p</i> -Hydroxybenzoic acid | 0.119±0.000  | 0.771±0.009 | 0.400±0.076 |
| Caffeic acid                  | 0.277±0.006  | 0.068±0.001 | 0.029±0.012 |
| <i>p</i> -Coumaric acid       | 0.203±0.008  | 0.310±0.001 | 0.063±0.000 |
| Ferulic acid                  | 0.086±0.001  | 0.174±0.005 | 0.007±0.002 |
| Benzoic acid                  | 0.100±0.011  | 0.231±0.012 | 0.169±0.000 |
| Rutin                         | 0.058±0.028  | ND          | ND          |
| Myricetin                     | ND           | ND          | ND          |
| Morin                         | ND           | ND          | ND          |
| Quercetin                     | 0.185±0.000  | 0.129±0.003 | 0.396±0.007 |
| Naringenin                    | ND           | ND          | ND          |
| Kaempferol                    | 0.0020±0.000 | 0.091±0.001 | 0.087±0.020 |
| Apigenin                      | 0.001±0.000  | 0.002±0.000 | 0.001±0.000 |
| Pinocembrine                  | ND           | ND          | ND          |
| CAPE                          | 0.007±0.000  | 0.004±0.000 | ND          |
| Chrysin                       | 0.278±0.008  | ND          | ND          |
| Galangin                      | ND           | ND          | ND          |
| Proline                       | 612.55±58.60 | 497.74±1.01 | 219.77±3.66 |

Three measurements were performed for each sample. CAPE, Caffeic acid phenethyl ester;  
ND, not detected

**Table S2**

Description of sampling regions, sampleing time and characteristic pollen type frequency for different types of honey in China.

| Sample ID | Honey type | Sampling month | Dominate pollen type(frequence)     | Place of production              | location coordinates(N,E) |
|-----------|------------|----------------|-------------------------------------|----------------------------------|---------------------------|
| R01       | Rape honey | 2015.03.25     | <i>Brassica campestris</i> L. (75%) | Dazhou city, Sichuan province    | 31.18,107.42              |
| R02       | Rape honey | 2015.03.26     | <i>Brassica campestris</i> L. (92%) | Guangan city, Sichuan province   | 30.27,106.95              |
| R03       | Rape honey | 2015.03.27     | <i>Brassica campestris</i> L. (85%) | Suining city, Sichuan province   | 30.74,105.76              |
| R04       | Rape honey | 2015.03.26     | <i>Brassica campestris</i> L. (93%) | Guangan city, Sichuan province   | 30.28,107.17              |
| R05       | Rape honey | 2015.03.26     | <i>Brassica campestris</i> L. (85%) | Yibin city, Sichuan province     | 28.77,104.63              |
| R06       | Rape honey | 2015.03.24     | <i>Brassica campestris</i> L. (87%) | Luzhou city, Sichuan province    | 29.09,105.41              |
| R07       | Rape honey | 2015.03.27     | <i>Brassica campestris</i> L. (79%) | Mianyang city, Sichuan province  | 31.31,105.54              |
| R08       | Rape honey | 2015.03.24     | <i>Brassica campestris</i> L. (84%) | Luzhou city, Sichuan province    | 29.15,105.38              |
| R09       | Rape honey | 2015.03.25     | <i>Brassica campestris</i> L. (90%) | Chengdu city, Sichuan province   | 30.40,103.81              |
| R10       | Rape honey | 2015.03.24     | <i>Brassica campestris</i> L. (81%) | Zhongxiang city, Hubei province  | 31.19,112.83              |
| R11       | Rape honey | 2015.03.23     | <i>Brassica campestris</i> L. (93%) | Zhongxiang city, Hubei province  | 31.19,112.83              |
| R12       | Rape honey | 2015.03.25     | <i>Brassica campestris</i> L. (87%) | Jingmen city, Hubei province     | 31.40,112.05              |
| R13       | Rape honey | 2015.03.27     | <i>Brassica campestris</i> L. (77%) | Jingmen city, Hubei province     | 31.40,112.05              |
| R14       | Rape honey | 2015.03.26     | <i>Brassica campestris</i> L. (83%) | Jingmen city, Hubei province     | 31.40,112.05              |
| R15       | Rape honey | 2015.03.23     | <i>Brassica campestris</i> L. (92%) | Jingmen city, Hubei province     | 31.26,112.22              |
| R16       | Rape honey | 2015.03.22     | <i>Brassica campestris</i> L. (86%) | Jingmen city, Hubei province     | 31.26,112.22              |
| R17       | Rape honey | 2015.03.26     | <i>Brassica campestris</i> L. (74%) | Jingmen city, Hubei province     | 31.26,112.22              |
| R18       | Rape honey | 2015.03.22     | <i>Brassica campestris</i> L. (80%) | Jingmen city, Hubei province     | 31.26,112.22              |
| R19       | Rape honey | 2015.03        | <i>Brassica campestris</i> L. (81%) | Jingmen city, Hubei province     | 31.04,112.19              |
| R20       | Rape honey | 2015.04.23     | <i>Brassica campestris</i> L. (94%) | Changzhou city, Jiangsu province | 31.41,119.49              |
| R21       | Rape honey | 2015.04.23     | <i>Brassica campestris</i> L. (84%) | Nantong city, Jiangsu province   | 32.18,121.32              |

|     |                  |            |                                     |                                                                  |              |
|-----|------------------|------------|-------------------------------------|------------------------------------------------------------------|--------------|
| R22 | Rape honey       | 2015.04.20 | <i>Brassica campestris</i> L. (74%) | Dafeng city, Jiangsu province                                    | 33.03,120.71 |
| R23 | Rape honey       | 2015.04.22 | <i>Brassica campestris</i> L. (77%) | Yancheng city, Jiangsu province                                  | 33.35,120.16 |
| R24 | Rape honey       | 2015.04.22 | <i>Brassica campestris</i> L. (96%) | Taizhou city, Jiangsu province                                   | 32.46,119.92 |
| R25 | Rape honey       | 2015.04.25 | <i>Brassica campestris</i> L. (92%) | Taizhou city, Jiangsu province                                   | 32.46,119.92 |
| R26 | Rape honey       | 2015.04.20 | <i>Brassica campestris</i> L. (95%) | Dongtai city, Jiangsu province                                   | 32.37,118.99 |
| R27 | Rape honey       | 2015.08.12 | <i>Brassica campestris</i> L. (92%) | Yancheng city, Jiangsu province                                  | 33.35,120.16 |
| S01 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (48%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.65,107.09 |
| S02 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (79%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.78,106.88 |
| S03 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (50%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.90,107.15 |
| S04 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (65%)   | Hangjinhouqi,Bayan Nur City, Inner Mongolia Autonomous Region    | 40.87,106.97 |
| S05 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (57%)   | Bayan Nur City, Inner Mongolia Autonomous Region                 | 40.34,107.02 |
| S06 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (74%)   | Hangjinhouqi,Bayan Nur City, Inner Mongolia Autonomous Region    | 40.78,106.88 |
| S07 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (61%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.78,106.88 |
| S08 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (64%)   | Linhe district, Bayan Nur City, Inner Mongolia Autonomous Region | 40.67,109.87 |
| S09 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (59%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.90,107.15 |
| S10 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (80%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.78,106.88 |
| S11 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (50%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.87,106.97 |
| S12 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (66%)   | Linhe district, Bayan Nur City, Inner Mongolia Autonomous Region | 41.00,107.27 |
| S13 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (77%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.76,107.01 |
| S14 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (73%)   | Linhe district, Bayan Nur City, Inner Mongolia Autonomous Region | 40.90,107.15 |
| S15 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (57%)   | Linhe district, Bayan Nur City, Inner Mongolia Autonomous Region | 40.90,107.15 |
| S16 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (53%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.77,107.42 |
| S17 | Mutifloral honey | 2015.08.12 | <i>Helianthus annuus</i> L. (28%)   | Linhe district, Bayan Nur City, Inner Mongolia Autonomous Region | 40.90,107.15 |
| S18 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (69%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.77,107.42 |
| S19 | Sunflower honey  | 2015.08.12 | <i>Helianthus annuus</i> L. (77%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.77,107.42 |
| S20 | Sunflower honey  | 2015.08.11 | <i>Helianthus annuus</i> L. (73%)   | Hangjinhouqi, Bayan Nur City, Inner Mongolia Autonomous Region   | 40.77,107.42 |
| B01 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (86%)   | Guyang County, Baotou city, Inner Mongolia Autonomous Region     | 41.10,110.17 |

|     |                  |            |                                   |                                                                 |              |
|-----|------------------|------------|-----------------------------------|-----------------------------------------------------------------|--------------|
| B02 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (92%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B03 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (75%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B04 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (86%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B05 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (86%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B06 | Buckwheat honey  | 2015.08.14 | <i>Fagopyrum esculentum</i> (66%) | Wuchuan County, Baotou city, Inner Mongolia Autonomous Region   | 40.67,109.89 |
| B07 | Buckwheat honey  | 2015.08.14 | <i>Fagopyrum esculentum</i> (80%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B08 | Buckwheat honey  | 2015.08.14 | <i>Fagopyrum esculentum</i> (84%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B09 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (90%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B10 | Buckwheat honey  | 2015.08.11 | <i>Fagopyrum esculentum</i> (93%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.10,110.17 |
| B11 | Buckwheat honey  | 2015.08    | <i>Fagopyrum esculentum</i> (96%) | Guyang County, Baotou city, Inner Mongolia Autonomous Region    | 41.04,110.07 |
| C01 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (50%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.82,83.41  |
| C02 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (52%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.97,82.61  |
| C03 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (52%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.80,82.52  |
| C04 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (60%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.73,83.44  |
| C05 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (53%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.54,84.44  |
| C06 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (62%)  | Xinyuan County, Xinjiang Uyghur Autonomous Region               | 43.38,83.87  |
| C07 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (59%)  | Nileke County, Xinjiang Uyghur Autonomous Region                | 43.10,82.03  |
| C08 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (64%)  | Gouliu County, Nileke County, Xinjiang Uyghur Autonomous Region | 43.34,82.29  |
| C09 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (51%)  | Xinyuan County, Xinjiang Uyghur Autonomous Region               | 43.34,84.18  |
| C10 | Mutifloral honey | 2015.08    | <i>Codonopsis pilosula</i> (20%)  | Yili Autonomous Prefecture, Xinjiang Uyghur Autonomous Region   | 44.43,84.92  |
| C11 | Mutifloral honey | 2015.08    | <i>Codonopsis pilosula</i> (18%)  | Xinjiang Uyghur Autonomous Region                               | 41.17,80.27  |
| C12 | Codonopsis honey | 2015.08    | <i>Codonopsis pilosula</i> (55%)  | Xinjiang Uyghur Autonomous Region                               | 41.17,80.27  |

**Table S3**

The mass spectrum parameters applied for phenolic compounds.

| Compounds                     | CAS       | Precursor<br>ion (m/z) | Product<br>Ion (m/z) | Dwell<br>time (ms) | Fragmentor(v) | CE(eV) |
|-------------------------------|-----------|------------------------|----------------------|--------------------|---------------|--------|
| Gallic acid                   | 149-91-7  | 168.7                  | 125                  | 12                 | 98            | 8      |
| Protocatechuic acid           | 99-50-3   | 153                    | 109                  | 12                 | 95            | 10     |
| <i>p</i> -Hydroxybenzoic acid | 99-96-7   | 137                    | 93.1                 | 12                 | 90            | 10     |
| Caffeic acid                  | 331-39-5  | 179                    | 135                  | 12                 | 95            | 10     |
|                               |           |                        | 107                  | 12                 | 95            | 22     |
| <i>p</i> -Coumaric acid       | 501-98-4  | 162.7                  | 118.7                | 12                 | 85            | 8      |
| Ferulic acid                  | 1135-24-6 | 193                    | 134                  | 12                 | 76            | 8      |
|                               |           |                        | 178                  | 12                 | 76            | 4      |
| Benzoic acid                  | 65-85-0   | 121                    | 77.1                 | 12                 | 75            | 5      |
| Rutin                         | 153-18-4  | 609                    | 301                  | 12                 | 180           | 30     |
|                               |           |                        | 271                  | 12                 | 180           | 45     |
| Myricetin                     | 529-44-2  | 317                    | 151                  | 12                 | 150           | 25     |
|                               |           |                        | 179                  | 12                 | 150           | 16     |
| Morin                         | 480-16-0  | 301                    | 151                  | 12                 | 128           | 16     |
|                               |           |                        | 125                  | 12                 | 128           | 16     |
| Quercetin                     | 117-39-5  | 301                    | 151                  | 12                 | 150           | 16     |
|                               |           |                        | 179                  | 12                 | 150           | 12     |
| Naringenin                    | 480-41-1  | 271                    | 151                  | 12                 | 102           | 12     |
|                               |           |                        | 119                  | 12                 | 102           | 24     |
| Kaempferol                    | 520-18-3  | 285                    | 93                   | 12                 | 150           | 30     |
|                               |           |                        | 117                  | 12                 | 150           | 40     |
| Apigenin                      | 520-36-5  | 269                    | 117                  | 12                 | 128           | 30     |
|                               |           |                        | 151                  | 12                 | 128           | 20     |
| Pinocembrine                  | 480-39-7  | 255                    | 151                  | 12                 | 125           | 16     |



**Table S4**Regression equation,  $r^2$ , linear range, limit of detection (LOD) and limit of quantification (LOQ) of phenolic compounds.

| compounds                     | Regression equation | $r^2$  | Linear range (ng/mL) | LOD (ng/mL) | LOQ(ng/mL) |
|-------------------------------|---------------------|--------|----------------------|-------------|------------|
| Gallic acid                   | $y=133.283031*x$    | 0.9975 | 16~2000              | 4.68        | 15.61      |
| Protocatechuic acid           | $y=386.010656*x$    | 0.9979 | 3.2~10000            | 5.24        | 17.47      |
| <i>p</i> -Hydroxybenzoic acid | $y=315.651183*x$    | 0.9983 | 16~2000              | 5.66        | 18.87      |
| Caffeic acid                  | $y=491.858145*x$    | 0.9762 | 16~10000             | 4.35        | 14.5       |
| <i>p</i> -Coumaric acid       | $y=146.362096*x$    | 0.9862 | 16~10000             | 2.73        | 9.11       |
| Ferulic acid                  | $y=107.635157*x$    | 0.9998 | 16~10000             | 5.14        | 17.12      |
| Benzoic acid                  | $y=9.393531*x$      | 0.9821 | 16~10000             | 118.81      | 396.04     |
| Rutin                         | $Y=53.568698*x$     | 0.9996 | 6.4~4000             | 1.5         | 4.98       |
| Myricetin                     | $Y=67.318600*x$     | 1      | 200~5000             | 10.34       | 34.46      |
| Morin                         | $Y=46.0177*x$       | 0.9988 | 160~20000            | 5.93        | 18.39      |
| Quercetin                     | $Y=365.6770*x$      | 0.9982 | 1.6~5000             | 1.53        | 5.12       |
| Naringenin                    | $Y=1225.2345*x$     | 0.9889 | 1.6~200              | 0.09        | 0.31       |
| Kaempferol                    | $Y=96.8538*x$       | 0.9897 | 6.4~800              | 1.18        | 3.92       |
| Apigenin                      | $Y=1352.600501*x$   | 0.9891 | 0.32~200             | 0.11        | 0.38       |
| Pinocembrine                  | $Y=618.595701*x$    | 0.995  | 1.6~200              | 0.43        | 0.95       |
| CAPE                          | $y=3261.8x-10084$   | 0.9987 | 16~400               | 3.64        | 12.14      |
| Chrysin                       | $Y=16.997118*x$     | 1      | 40~5000              | 0.08        | 0.28       |
| Galangin                      | $y=98.558x+512.03$  | 0.9889 | 1.6~200              | 1.5         | 5.71       |

CAPE, Caffeic acid phenethyl ester