

**Table S1 Standard curve linear equations and correlation coefficients of carotenoids.** Note: RT: Retention Time; Equation refers to the linear equation; r denotes the correlation coefficient; Weighting indicates the weight; LLOQ (µg/mL) and ULOQ (µg/mL) are the lower and upper limits of quantitation, respectively, within which accurate quantification is possible.

| Compounds                        | Class        | RT    | Equation                 | r       | Weighting | LLOQ  | ULOQ |
|----------------------------------|--------------|-------|--------------------------|---------|-----------|-------|------|
| phytofluene                      | carotenes    | 2.000 | y=2.26361e5x-776.91895   | 0.9956  | 1 / x^2   | 0.1   | 25   |
| (E/Z)-phytoene                   | carotenes    | 5.040 | y=1.03722e5x-284.36599   | 0.99202 | 1 / x^2   | 0.5   | 250  |
| ε-carotene                       | carotenes    | 5.610 | y=1.22286e6x-1848.14806  | 0.99353 | 1 / x^2   | 0.01  | 25   |
| α-carotene                       | carotenes    | 6.000 | y=3.28720e5x+715.85274   | 0.99022 | 1 / x^2   | 0.05  | 250  |
| β-carotene                       | carotenes    | 6.350 | y=6.78594e5x-1646.99534  | 0.99177 | 1 / x^2   | 2     | 250  |
| γ-carotene                       | carotenes    | 7.450 | y=5.71024e5x-18743.62875 | 0.99102 | 1 / x^2   | 0.5   | 250  |
| lycopene                         | carotenes    | 8.380 | y=1.12575e5x-579.31760   | 0.99014 | 1 / x^2   | 1     | 250  |
| violaxanthin                     | xanthophylls | 1.610 | y=3.21242e6x-975.11481   | 0.99074 | 1 / x^2   | 0.1   | 100  |
| neoxanthin                       | xanthophylls | 1.970 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | 0.01  | 50   |
| β-citraurin                      | xanthophylls | 2.850 | y=5.43472e6x-380.88748   | 0.99233 | 1 / x^2   | 0.01  | 100  |
| antheraxanthin                   | xanthophylls | 2.930 | y=5.91438e5x+26.50910    | 0.99057 | 1 / x^2   | 0.05  | 125  |
| astaxanthin                      | xanthophylls | 3.410 | y=3.20852e6x-580.54671   | 0.99323 | 1 / x^2   | 0.5   | 25   |
| lutein                           | xanthophylls | 4.100 | y=7.08681e5x+274.80640   | 0.99061 | 1 / x^2   | 2     | 250  |
| capsanthin                       | xanthophylls | 4.500 | y=3.26173e6x-6.58859e4   | 0.99249 | 1 / x^2   | 0.005 | 100  |
| 8'-apo-beta-carotenal            | xanthophylls | 4.590 | y=2.29513e6x-3172.25435  | 0.99069 | 1 / x^2   | 0.01  | 125  |
| zeaxanthin                       | xanthophylls | 4.670 | y=3.04225e5x-1097.82186  | 0.99009 | 1 / x^2   | 0.1   | 50   |
| canthaxanthin                    | xanthophylls | 4.780 | y=3.80742e7x-259.89839   | 0.99547 | 1 / x^2   | 0.005 | 100  |
| α-cryptoxanthin                  | xanthophylls | 5.120 | y=6.40864e5x-2101.80213  | 0.9904  | 1 / x^2   | 0.05  | 50   |
| β-cryptoxanthin                  | xanthophylls | 5.570 | y=4.92337e5x-1297.75065  | 0.99051 | 1 / x^2   | 0.1   | 250  |
| echinenone                       | xanthophylls | 5.610 | y=1.70388e7x-1325.02439  | 0.99322 | 1 / x^2   | 0.005 | 50   |
| violaxanthin laurate             | xanthophylls | 5.690 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein caprate                   | xanthophylls | 6.090 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin palmitoleate        | xanthophylls | 6.140 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin myristate           | xanthophylls | 6.220 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin palmitate           | xanthophylls | 6.400 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein laurate                   | xanthophylls | 6.500 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein oleate                    | xanthophylls | 6.600 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| rubixanthin caprate              | xanthophylls | 6.680 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin dilaurate           | xanthophylls | 6.690 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin-myristate-laurate   | xanthophylls | 6.860 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin-myristate-caprate   | xanthophylls | 6.870 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| rubixanthin laurate              | xanthophylls | 6.920 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein palmitate                 | xanthophylls | 6.980 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin dioleate            | xanthophylls | 7.020 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| β-cryptoxanthin laurate          | xanthophylls | 7.020 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin palmitate             | xanthophylls | 7.110 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| 5,6epoxy-luttein dilaurate       | xanthophylls | 7.120 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin-myristate-oleate    | xanthophylls | 7.140 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein stearate                  | xanthophylls | 7.170 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin dimyristate         | xanthophylls | 7.190 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein dilaurate                 | xanthophylls | 7.220 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin-myristate-palmitate | xanthophylls | 7.250 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| β-cryptoxanthin myristate        | xanthophylls | 7.310 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin-caprate-laurate       | xanthophylls | 7.320 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| β-cryptoxanthin oleate           | xanthophylls | 7.320 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein dioleate                  | xanthophylls | 7.360 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| antheraxanthin dipalmitate       | xanthophylls | 7.400 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| violaxanthin dipalmitate         | xanthophylls | 7.420 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| β-cryptoxanthin palmitate        | xanthophylls | 7.540 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| rubixanthin palmitate            | xanthophylls | 7.550 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein dimyristate               | xanthophylls | 7.670 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein dipalmitate               | xanthophylls | 7.690 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin dimyristate           | xanthophylls | 7.720 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin-laurate-palmitate     | xanthophylls | 7.760 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| lutein distearate                | xanthophylls | 7.930 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin dipalmitate           | xanthophylls | 7.980 | y=2.83294e6x+4102.03113  | 0.99083 | 1 / x^2   | 0.5   | 5    |
| zeaxanthin-myristate-palmitate   | xanthophylls | 7.990 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |
| zeaxanthin-palmitate-stearate    | xanthophylls | 8.170 | y=1.66300e6x-214.63355   | 0.99089 | 1 / x^2   | N/A   | N/A  |