Supplemental Table S1. Primer sequences for genes involved in carotenoid biosynthesis in sweetpotato

| Target gene | Forward (5'-3') | Reverse (5'-3') | Application |
|-------------|----------------|----------------|-------------|
| *IbOr*      | GCACTGGATCACTAGTCCTT | GTCAATTCGTGGTGGCATGCT | Real-time PCR |
| *GGPS*      | TAAGACGGAGAGCGTGGAAGA | TGGGATGACCTTATCACCAT | Real-time PCR |
| *PSY*       | AAGTTCTTCGACGAGGCTGA | GCAGTTTTCTTTGGCTTGCTT | Real-time PCR |
| *PDS*       | GTACAAAACCGTGCCAGGAT | TCCTTTAAATCGCTGTGC | Real-time PCR |
| *ZDS*       | ATAGCATGGAAGGAGCAACG | AGCTCATCAGATACAGCAGCAG | Real-time PCR |
| *LCY-β*     | ATGGTGTGACGATTCAGACA | GCCAATCCATGAAAACCATC | Real-time PCR |
| *LCY-ε*     | ACCAGTTGGAGAGTATCATGC | CACCAGATACCAGGACTTCGT | Real-time PCR |
| *CHY-β*     | CAAGAGAAGG ACCGTTTGAG | GACGAAACCATGAGGCCCATCC | Real-time PCR |
| *ZEP*       | TGGTACTTGGATCACCAGACA | GCTGCTGCAAACATTTTCAT | Real-time PCR |
| *UBI*       | TCGACAATGTGAAGGCAAAG | CTtgATCTTCTTGGCATTGG | Real-time PCR |
## Supplemental Table S2. Primer sequences for genes involved in carotenoid degradation pathway in sweetpotato

| Target gene | Forward (5'-3') | Reverse (5'-3') | Application |
|-------------|-----------------|-----------------|-------------|
| **CCD1**    | CGGTGGAGAAACTCACTCATTT | TCCCGATATCTTCGGCATAG | Real-time PCR |
| **CCD4**    | TGCTGAACCAGAGACTGGAA | TCCGGTGTTCTCAATCGTGTA | Real-time PCR |
| **NCED**    | GGGAAGATCCCGGAGTGTAT | GCACCAATCTCTGCCTCC | Real-time PCR |
| **CCD7**    | GCGGAGGTACATTCGGACGG | TCGCCACCTTCCCCAGAGACA | Real-time PCR |
| **CCD8-1**  | AACACCGGGGCGGCTCGTCAAAT | CATCCTCGCCACGAGTGACC | Real-time PCR |
| **CCD8-3**  | GCGCAAAATGCTGCTCGGGGC | GTTGTGCTCGCAAGCAATTCC | Real-time PCR |
| **D27**     | TGGTCCAGGAGTCGGGATGG | TACCATCAGGCCGCAGACCT | Real-time PCR |
| **LCD**     | CGTCATCAGCTCGGCGTCCC | CGGGACGTCCGGTGGTTTGA | Real-time PCR |
| **ADH**     | GGGGACGTTGCGGACTACG | ACAATGTTGCAACCTGCGGC | Real-time PCR |
| **UBI**     | TCGACAATGTGAAGGCAAAG | CTGGATCTTTCTCGGCTTGG | Real-time PCR |
**Supplemental Table S3. Carotenoid contents in storage roots**

|       | violaxanthin | cryptoxanthin | 13Z-β-carotene | α-carotene | β-carotene | 9Z-β-carotene | others | Total  |
|-------|--------------|---------------|----------------|-------------|------------|--------------|--------|--------|
| NT    | 0.02 ±0.00   | ND            | ND             | ND          | 0.06 ±0.01 | ND           | 1.01   | ±0.19  | 1.09 ±0.20 |
| WT#2  | 0.07 ±0.01   | ND            | 0.05 ±0.01     | ND          | 0.11 ±0.02 | 0.10 ±0.01   | 3.18   | ±0.55  | 3.52 ±0.60 |
| WT#9  | 0.09 ±0.02   | ND            | 0.07 ±0.01     | ND          | 0.11 ±0.02 | 0.09 ±0.01   | 1.56   | ±0.29  | 1.92 ±0.34 |
| WT#10 | 0.09 ±0.01   | ND            | 0.07 ±0.01     | ND          | 0.11 ±0.02 | 0.07 ±0.01   | 1.55   | ±0.30  | 1.88 ±0.36 |
| R96H#1 | 0.11 ±0.02   | 0.13 ±0.02   | 1.01 ±0.14     | 0.37 ±0.07  | 10.92 ±1.19| 0.23 ±0.02   | 8.66   | ±1.55  | 21.44 ±3.01 |
| R96H#9 | 0.04 ±0.00   | 0.05 ±0.01   | 0.17 ±0.03     | 0.09 ±0.01  | 1.27 ±0.14 | 0.12 ±0.01   | 4.18   | ±0.38  | 5.93 ±0.58  |
| R96H#10| 0.09 ±0.01   | 0.06 ±0.01   | 0.26 ±0.04     | 0.12 ±0.02  | 2.14 ±0.13 | 0.12 ±0.01   | 3.74   | ±0.72  | 6.53 ±0.94  |
Supplemental Table S4. Carotenoid contents in leaves

|         | violaxanthin | lutein     | zeaxanthin | cryptoxanthin | 13Z-β-carotene | α-carotene | β-carotene | 9Z-β-carotene | others | Total     |
|---------|--------------|------------|------------|---------------|----------------|------------|------------|---------------|--------|-----------|
| NT      | 268.0±50.8   | 1527.5±64.1| 58.2±5.2   | 0.08±0.00     | 55.7±1.5       | 149.5±10.8| 801.2±65.1 | 126.0±14.6     | 275.6±40.5 | 3261.8±252.7 |
| WT#2    | 266.8±30.4   | 1557.0±40.6| 53.7±6.6   | 0.07±0.00     | 42.7±5.7       | 158.6±8.9 | 708.2±42.4 | 118.4±9.6      | 251.3±13.5 | 3156.8±157.7 |
| WT#9    | 295.0±36.0   | 1526.5±69.2| 30.0±5.7   | 0.07±0.00     | 43.6±6.0       | 145.0±13.5| 703.2±68.9 | 110.8±11.6     | 250.2±23.0 | 3104.4±234.0  |
| WT#10   | 242.1±31.1   | 1401.4±67.8| 50.6±4.0   | 0.07±0.00     | 41.5±6.6       | 122.9±9.8 | 622.6±28.4 | 101.6±5.2      | 244.7±27.6 | 2827.6±180.5  |
| R96H#1  | 287.7±33.3   | 1732.6±95.4| 58.6±2.0   | 0.07±0.00     | 52.8±5.1       | 209.5±13.3| 777.3±39.9 | 124.6±8.5      | 250.4±43.8 | 3493.6±241.2  |
| R96H#9  | 214.2±6.0    | 1516.1±155.1| 57.6±8.4  | 0.07±0.00     | 46.6±7.1       | 189.1±24.5| 670.7±71.7 | 111.5±12.7     | 231.5±15.0 | 3037.4±300.5  |
| R96H#10 | 242.5±43.8   | 1450.0±170.1| 52.8±5.0  | 0.07±0.00     | 44.9±6.5       | 157.4±16.8| 614.8±61.3 | 119.4±18.3     | 278.5±49.0 | 2960.4±370.8  |