

**Table S7** Heritability of eleven traits in different experiments.

| Trait                       | Random term            | Estimated variance components |                 |           |         |          |         |
|-----------------------------|------------------------|-------------------------------|-----------------|-----------|---------|----------|---------|
|                             |                        | overall experiments           | per experiment* |           |         |          |         |
|                             |                        |                               | 2008F           | 2009F     | 2010G   | 2011F    | 2012F   |
| Twi<br>(Tuber width)        | Accession              | 235. 7                        | 288. 7          | 970. 4    | 551. 4  | 549      | 133. 8  |
|                             | Experiment             | 1429. 2                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 189. 3                        | –               | –         | –       | –        | –       |
|                             | Residual               | 451. 8                        | 542. 7          | 481. 9    | 473. 6  | 523. 4   | 113. 5  |
|                             | Heritability ( $h^2$ ) | 0. 27                         | 0. 35           | 0. 67     | 0. 54   | 0. 51    | 0. 54   |
| Twe<br>(Tuber weight)       | Accession              | 18952                         | –               | 185353    | 19107   | –        | 73726   |
|                             | Experiment             | 325514                        | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 76065                         | –               | –         | –       | –        | –       |
|                             | Residual               | 94104                         | –               | 291720    | 22490   | –        | 64259   |
|                             | Heritability ( $h^2$ ) | 0. 10                         | –               | 0. 39     | 0. 46   | –        | 0. 53   |
| TL<br>(Tuber length)        | Accession              | 826. 2                        | 1770. 5         | 2437. 3   | –       | 1375. 5  | 230. 2  |
|                             | Experiment             | 1069. 4                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 441. 6                        | –               | –         | –       | –        | –       |
|                             | Residual               | 450. 5                        | 663. 8          | 386. 1    | –       | 534. 7   | 58. 25  |
|                             | Heritability ( $h^2$ ) | 0. 48                         | 0. 73           | 0. 86     | –       | 0. 72    | 0. 80   |
| TI<br>(Tuber index)         | Accession              | 0. 15169                      | 0. 2393         | 0. 21523  | –       | 0. 21171 | 0. 1558 |
|                             | Experiment             | 0. 0256                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 0. 03532                      | –               | –         | –       | –        | –       |
|                             | Residual               | 0. 0594                       | 0. 0801         | 0. 04     | –       | 0. 0605  | 0. 0482 |
|                             | Heritability ( $h^2$ ) | 0. 62                         | 0. 75           | 0. 84     | –       | 0. 78    | 0. 76   |
| Tsh<br>(Tuber shoot number) | Accession              | 1. 88                         | –               | 11. 594   | 1. 6738 | 4. 747   | –       |
|                             | Experiment             | 11. 805                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 3. 944                        | –               | –         | –       | –        | –       |
|                             | Residual               | 3. 436                        | –               | 6. 198    | 0. 603  | 3. 827   | –       |
|                             | Heritability ( $h^2$ ) | 0. 20                         | –               | 0. 65     | 0. 74   | 0. 55    | –       |
| FT<br>(Flowering time)      | Accession              | 358. 1                        | 594. 6          | 768. 8598 | 498. 2  | –        | –       |
|                             | Experiment             | 2. 7                          | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 225. 3                        | –               | –         | –       | –        | –       |
|                             | Residual               | 190. 9                        | 118. 5          | 0. 381    | 335. 3  | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 46                         | 0. 83           | 1. 00     | 0. 60   | –        | –       |
| LC<br>(Leaf color)          | Accession              | 4. 33                         | 5. 65           | 4. 77     | 6. 05   | –        | –       |
|                             | Experiment             | 26. 35                        | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 0. 5                          | –               | –         | –       | –        | –       |
|                             | Residual               | 14. 78                        | 18. 28          | 16. 31    | 10. 26  | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 22                         | 0. 24           | 0. 23     | 0. 37   | –        | –       |
| LBL<br>(Leaf blade length)  | Accession              | 0                             | 3. 319          | –         | 6. 638  | –        | –       |
|                             | Experiment             | 4. 726                        | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 4. 621                        | –               | –         | –       | –        | –       |
|                             | Residual               | 8. 027                        | 9. 081          | –         | 6. 42   | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 00                         | 0. 27           | –         | 0. 51   | –        | –       |
| LBW<br>(Leaf blade width)   | Accession              | 3. 52                         | 3. 319          | –         | 1. 285  | –        | –       |
|                             | Experiment             | 305. 16                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 2. 53                         | –               | –         | –       | –        | –       |
|                             | Residual               | 10. 16                        | 9. 081          | –         | 2. 753  | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 22                         | 0. 27           | –         | 0. 32   | –        | –       |
| LI<br>(Leaf index)          | Accession              | 0. 0457                       | 0. 0276         | –         | 0. 0826 | –        | –       |
|                             | Experiment             | 0. 1523                       | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 0. 0032                       | –               | –         | –       | –        | –       |
|                             | Residual               | 0. 1111                       | 0. 156          | –         | 0. 0463 | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 29                         | 0. 15           | –         | 0. 64   | –        | –       |
| PW<br>(Petiole)             | Accession              | 0                             | 0. 0105         | –         | 1. 719  | –        | –       |
|                             | Experiment             | 6. 046                        | –               | –         | –       | –        | –       |
|                             | Accession. Experiment  | 0. 732                        | –               | –         | –       | –        | –       |
|                             | Residual               | 1. 862                        | 0. 0922         | –         | 4. 361  | –        | –       |
|                             | Heritability ( $h^2$ ) | 0. 00                         | 0. 10           | –         | 0. 28   | –        | –       |

\*Experiment code “2008F, 2009F, 2011F and 2012F” stand for four field experiments carried out between 2008 and Code “2010G” means the greenhouse experiment in 2010.