**Table S1.** Previous QTL identified in cultivated peanut for seed and pod traits in other studies. Number of QTL reported, phenotypic variation and population type included.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **QTL number** | **Phenotypic variation (% R2)** | **Population type** | **Reference** |
| 100-pod weight | 3 | 8.2 - 15.39 | F2:3 | Huang et al. 2015 |
| 100-pod weight | 8 | 5.3 - 11.2 | RIL | Chen et al. 2017 |
| 100-pod weight | 21 | 4.12 - 26.82 | RIL | Luo et al. 2017 |
| 100-pod weight | 2 | 5.86 - 14.46 | RIL | Wang et al. 2018b |
| 100-pod weight | 15 | 1.10 - 38.15 | RIL | Luo et al. 2018 |
| 100-seed weight | 1 | 10.17 | RIL | Gomez Selvaraj et al. 2009 |
| 100-seed weight | 3 | 1.69 - 17.88 | F2:3 | Huang et al. 2015 |
| 100-seed weight | 9 | 5.2 - 10.8 | RIL | Chen et al. 2017 |
| 100-seed weight | 6 | 5.17 - 17.95 | RIL | Wang et al. 2018b |
| Number pods/plant | 2 | 11.9 - 12.3 | RIL | Liang et al. 2009 |
| Number pods/plant | 1 | 12.47 | RIL | Gomez Selvaraj et al. 2009 |
| Number pods/plant | 5 | 5.16 - 7.78 | RIL | Chen et al. 2019 |
| Number seed/plant | 1 | 6.8 | Diploids, synthetic, cultivated | Shirasawa et al. 2012 |
| Number seed/pod | 1 | 5.23 | RIL | Wang et al. 2018b |
| Number seed/pod | 8 | 4.58 - 17.36 | RIL | Chen et al. 2019 |
| Number of one seeded pod/plant | 9 | 5.0 - 12.6 | RIL | Chen et al. 2019 |
| Number of two seeded pod/plant | 5 | 5.32 - 11.38 | RIL | Chen et al. 2019 |
| Number of three seeded pod/plant | 15 | 4.05 - 20.47 | RIL | Chen et al. 2019 |
| Ratio of multi-seed pods/plant | 7 | 4.42 - 11.51 | RIL | Wang et al. 2019 |
| Pod length | 1 | 9.19 | RIL | Gomez Selvaraj et al. 2009 |
| Pod length | 1 | 11.23 | F2:3 | Huang et al. 2015 |
| Pod length | 10 | 1.25 - 24.29 | F2:3 | Chen et al. 2016 |
| Pod length | 27 | 3.68 - 27.84 | RIL | Luo et al. 2017 |
| Pod length | 3 | 4.30 - 18.99 | RIL | Wang et al. 2018b |
| Pod length | 15 | 3.12 - 26.46 | RIL | Luo et al. 2018 |
| Pod mass/plant | 3 | 13.1 - 18.3 | RIL | Liang et al. 2009 |
| Pod morphology | 23 | 8.0 - 23.9 | BC | Fonceka et al. 2012 |
| Pod morphology | 10 | 6.9 - 28.2 | Diploids, synthetic, cultivated | Shirasawa et al. 2012 |
| Pod morphology | 32 | 5.4 - 13.2 | RIL | Chen et al. 2017 |
| Pod weight | 7 | 4.17 - 7.23 | RIL | Ravi et al. 2010 |
| Pod width | 2 | 2.11 - 18.70 | F2:3 | Huang et al. 2015 |
| Pod width | 12 | 4.48 - 16.14 | F2:3 | Chen et al. 2016 |
| Pod width | 17 | 5.26 - 14.12 | RIL | Luo et al. 2017 |
| Pod width | 6 | 14.57 - 17.09 | RIL | Wang et al. 2018b |
| Pod width | 14 | 4.36 - 43.63 | RIL | Luo et al. 2018 |
| Length-width ratio of pod | 4 | 4.18 - 4.99 | RIL | Wang et al. 2018b |
| Seed length | 1 | 12.45 | RIL | Gomez Selvaraj et al. 2009 |
| Seed length | 3 | 9.86 - 10.48 | F2:3 | Huang et al. 2015 |
| Seed length | 10 | 3.03 - 20.80 | F2:3 | Chen et al. 2016 |
| Seed length | 12 | 4.03 - 18.21 | RIL | Wang et al. 2018b |
| Seed morphology | 8 | 8.7 - 23.7 | BC | Fonceka et al. 2012 |
| Seed morphology | 2 | 9.7 - 19.1 | Diploids, synthetic, cultivated | Shirasawa et al. 2012 |
| Seed morphology | 31 | 5.4 - 13.2 | RIL | Chen et al. 2017 |
| Seed weight | 5 | 4.18 - 8.22 | RIL | Ravi et al. 2010 |
| Seed width | 4 | 6.39 - 12.20 | F2:3 | Huang et al. 2015 |
| Seed width | 7 | 3.77 - 14.43 | F2:3 | Chen et al. 2016 |
| Seed width | 4 | 15.06 - 15.58 | RIL | Wang et al. 2018b |
| Length-width ratio of seed | 3 | 4.50 - 15.41 | RIL | Wang et al. 2018b |
| Shelling percentage | 3 | 5.6 - 10.9 | RIL | Chen et al. 2017 |
| Yield components | 17 | 9.3 - 20.6 | BC | Fonceka et al. 2012 |

**Table S2.** RILs of the population selected based on extreme values of phenotypic traits. The values represent the average for all the years. The values in bold are the phenotypic values chosen based on the performance in individual years for RIL selection.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **RIL** | **16/64P** | **KP** | **PW (gr)** | **SdW (gr)** | **SP** | **DP** | **PA (mm2)** | **PD (gr/mm2)** |
| **PR F6:7\_594** | 7.2 | 74.1 | 1.897 | **0.726** | 54.167 | 136.667 | 321.105 | **0.00587** |
| **PR F6:7\_600** | 8.5 | **76.0** | 1.656 | **0.663** | 48.000 | 161.500 | 286.019 | **0.00580** |
| **Tif F6:7\_614** | **4.3** | 74.4 | 2.352 | 0.917 | 23.750 | 108.167 | 391.143 | **0.00594** |
| **PR F6:7\_620** | **4.8** | **75.6** | 2.053 | **0.787** | 36.167 | 126.500 | 349.484 | **0.00588** |
| **PR F6:7\_621** | **4.7** | **76.0** | **2.569** | **0.957** | 19.000 | 105.167 | **416.908** | **0.00618** |
| **PR F6:7\_624** | 6.8 | **75.9** | 1.535 | 0.610 | 32.167 | **179.333** | 275.574 | 0.00556 |
| **PR F6:7\_628** | **4.4** | **77.5** | 1.710 | 0.684 | 35.667 | 148.167 | 298.803 | 0.00572 |
| **Tif F6:7\_631** | 7.7 | 73.8 | 1.866 | **0.731** | 45.167 | 144.667 | 320.595 | **0.00584** |
| **PR F6:7\_633** | 6.6 | **76.2** | 1.947 | **0.773** | 30.333 | 148.167 | 351.786 | 0.00554 |
| **Tif F6:7\_641** | 9.4 | **75.8** | 1.494 | 0.603 | 61.500 | **178.833** | 279.197 | 0.00535 |
| **Tif F6:7\_648** | **4.7** | **76.5** | 1.933 | 0.745 | 38.333 | 126.500 | 343.486 | 0.00563 |
| **PR F6:7\_660** | **4.5** | **78.2** | 1.959 | 0.778 | 12.667 | 142.667 | 353.131 | 0.00553 |
| **Tif F6:7\_661** | **4.2** | **77.2** | 1.991 | 0.807 | 20.667 | 134.333 | 354.894 | 0.00561 |
| **PR F6:7\_668** | 8.1 | **76.0** | 1.504 | 0.602 | 26.167 | **177.833** | 279.018 | 0.00538 |
| **PR F6:7\_678** | **4.6** | **77.0** | 2.019 | 0.801 | **12.500** | 134.333 | 394.506 | 0.00513 |
| **PR F6:7\_689** | 7.4 | 72.6 | 1.887 | **0.730** | 34.167 | 128.667 | 333.670 | **0.00565** |
| **PR F6:7\_699** | **5.1** | **75.9** | 1.726 | 0.667 | 31.500 | 149.333 | 310.820 | 0.00556 |
| **PR F6:7\_704** | **4.4** | **76.4** | 2.012 | **0.779** | 17.833 | 129.333 | 356.170 | **0.00567** |
| **Tif F6:7\_724** | 6.8 | **76.9** | 1.856 | **0.732** | 19.500 | 143.500 | 351.058 | 0.00526 |
| **Tif F6:8\_734** | 6.9 | **76.2** | 1.809 | **0.714** | 41.167 | 152.167 | 338.467 | 0.00536 |
| **Tif F6:7\_736** | 7.0 | 75.3 | 1.891 | **0.750** | 32.667 | 149.833 | 320.478 | **0.00591** |
| **Tif F6:7\_757** | 7.0 | **76.0** | 1.903 | **0.762** | 52.167 | 149.000 | 340.033 | 0.00559 |
| **Tif F6:7\_761** | 7.1 | 74.3 | 1.884 | **0.754** | 58.500 | 117.667 | 313.723 | **0.00600** |
| **Tifrunner** | *6.6* | *75.6* | *1.651* | *0.653* | *26.667* | *171.500* | *293.517* | *0.00563* |
| **NC 3034** | *6.7* | *74.4* | *1.973* | *0.770* | *27.833* | *115.167* | *374.835* | *0.00526* |

\*SdW is reported as individual seed by dividing the original value from the weight of the two seeds contained in a pod.

PR and Tif refer Puerto Rico and Tifton indicating the place where the nurseries were advanced.

16/64P, 16/64 percentage as seed size index; KP, kernel percentage; PW, pod weight; SdW, seed weight; SP, single-kernel pods; DP, double-kernel pods; PA, pod area; PD, pod density.