**Table S2.** **ANOVA of primary check values to detect row or column effects.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trait | Year | D.F. Row | Sum Sq. Row | D. F. Col | Sum Sq. Col | D. F. Res | Sum Sq. Res | RE of M1 | RE of M3 |
| Days to Heading 2-Row | 2014 | 3 | 145.1\*\*\* | 6 | 18.0 | 18 | 56.9 | 1.38 | 2.99 |
| Days to Heading 6-Row | 2014 | 3 | 56.0\*\* | 6 | 14.2 | 18 | 41.5 | 1.48 | 1.22 |
| Fifty Kernel Weight 2-Row | 2014 | 3 | 0.9\*\* | 6 | 0.3 | 17 | 0.6 | 0.86 | 1.68 |
| Fifty Kernel Weight 6-Row | 2014 | 3 | 0.4\* | 6 | 0.3 | 18 | 0.7 | 0.99 | 1.07 |
| Plant Height 2-Row | 2014 | 3 | 971.8\*\*\* | 6 | 307.9\* | 18 | 275.4 | 1.21 | 1.85 |
| Plant Height 6-Row | 2014 | 3 | 1327.2\*\*\* | 6 | 156.8 | 18 | 322.3 | 0.95 | 1.35 |
| Seeds Per Spike 2-Row | 2014 | 3 | 48.29 | 6 | 55.6 | 18 | 130.9 | NA | NA |
| Seeds Per Spike 6-Row | 2014 | 3 | 191.1 | 6 | 120 | 18 | 387.4 | NA | NA |
| Stem Diameter 2-Row | 2014 | 3 | 0.8\* | 6 | 0.7 | 17 | 1.1 | 1.09 | 1.30 |
| Stem Diameter 6-Row | 2014 | 3 | 0.4 | 6 | 0.2 | 16 | 0.8 | NA | NA |
| Maximum Tiller Number 2-Row | 2014 | 3 | 93.3\*\*\* | 6 | 7.1 | 18 | 35.7 | 0.51 | 1.01 |
| Maximum Tiller Number 6-Row | 2014 | 3 | 29.9\*\*\* | 6 | 2.9 | 18 | 10.9 | 1.23 | 1.57 |
| Non-productive Tiller Number 2-Row | 2014 | 3 | 20.8\* | 6 | 10.9 | 18 | 37.2 | 1.73 | 1.80 |
| Non-productive Tiller Number 6-Row | 2014 | 3 | 0.9 | 6 | 0.7 | 18 | 3.2 | NA | NA |
| Productive Tiller Number 2-Row | 2014 | 3 | 169.9\*\*\* | 6 | 24.0 | 18 | 43.3 | 0.52 | 1.52 |
| Productive Tiller Number 6-Row | 2014 | 3 | 37.2\*\*\* | 6 | 1.5 | 18 | 12.2 | 0.79 | 1.04 |
| 2 WPE Tiller Number 2-Row | 2014 | 3 | 2.3\* | 6 | 0.7 | 18 | 2.9 | 0.82 | 1.36 |
| 2 WPE Tiller Number 6-Row | 2014 | 3 | 5.8\*\*\* | 6 | 0.7\* | 18 | 0.6 | 1.23 | 1.21 |
| 3 WPE Tiller Number 2-Row | 2014 | 3 | 35.3\*\*\* | 6 | 3.2 | 18 | 6.0 | 1.11 | 1.91 |
| 3 WPE Tiller Number 6-Row | 2014 | 3 | 24.2\*\*\* | 6 | 0.9 | 18 | 3.7 | 1.44 | 2.66 |
| 4 WPE Tiller Number 2-Row | 2014 | 3 | 21.5\* | 6 | 4.6 | 18 | 28.7 | 1.16 | 1.47 |
| 4 WPE Tiller Number 6-Row | 2014 | 3 | 30.7\*\*\* | 6 | 3.8 | 18 | 5.9 | 1.04 | 1.36 |
| 5 WPE Tiller Number 2-Row | 2014 | 3 | 44.6\*\*\* | 6 | 9.8 | 18 | 30.5 | 1.10 | 1.14 |
| 5 WPE Tiller Number 6-Row | 2014 | 3 | 20.9\*\*\* | 6 | 4.4 | 18 | 8.6 | 1.54 | 1.71 |
| 6 WPE Tiller Number 2-Row | 2014 | 3 | 87.2\*\*\* | 6 | 10.3 | 18 | 34.2 | 0.50 | 1.78 |
| 6 WPE Tiller Number 6-Row | 2014 | 3 | 27.3\*\*\* | 6 | 2.9 | 18 | 9.5 | 1.17 | 1.67 |
| 7 WPE Tiller Number 2-Row | 2014 | 3 | 109.0\*\*\* | 6 | 9.4 | 18 | 34.1 | 0.80 | 1.12 |
| 7 WPE Tiller Number 6-Row | 2014 | 3 | 27.6\*\*\* | 6 | 3.1 | 18 | 10.1 | 0.62 | 1.02 |
| Weeks Increasing 2-Row | 2014 | 3 | 9.0\*\* | 6 | 4.2 | 18 | 9.8 | 0.84 | 0.76 |
| Weeks Increasing 6-Row | 2014 | 3 | 2.7 | 6 | 3.4 | 18 | 16.3 | NA | NA |
| Days to Heading 2-Row | 2015 | 3 | 0.6 | 6 | 5.4 | 18 | 17.4 | NA | NA |
| Days to Heading 6-Row | 2015 | 3 | 13.3 | 6 | 11.9 | 18 | 37.5 | NA | NA |
| Fifty Kernel Weight 2-Row | 2015 | 3 | 0.5\* | 6 | 0.3 | 18 | 0.8 | 0.35 | 1.11 |
| Fifty Kernel Weight 6-Row | 2015 | 3 | 0.07 | 6 | 0.08 | 18 | 0.28 | NA | NA |
| Plant Height 2-Row | 2015 | 3 | 17.5 | 6 | 492.5\* | 18 | 500.3 | 0.26 | 1.11 |
| Plant Height 6-Row | 2015 | 3 | 69.7 | 6 | 98.0 | 18 | 889.5 | NA | NA |
| Seeds Per Spike 2-Row | 2015 | 3 | 31.3 | 6 | 68.5 | 18 | 107.4 | NA | NA |
| Seeds Per Spike 6-Row | 2015 | 3 | 282.0 | 6 | 224.7 | 18 | 662.0 | NA | NA |
| Stem Diameter 2-Row | 2015 | 3 | 3.7E-03 | 6 | 3.2E-04 | 18 | 1.1E-02 | NA | NA |
| Stem Diameter 6-Row | 2015 | 3 | 6.9E-04 | 6 | 4.7E-03 | 18 | 1.3E-02 | NA | NA |
| Maximum Tiller Number 2-Row | 2015 | 3 | 26.9 | 6 | 19.8 | 18 | 401.2 | NA | NA |
| Maximum Tiller Number 6-Row | 2015 | 3 | 37.7 | 6 | 41.6 | 18 | 150.3 | NA | NA |
| Non-Productive Tiller Number 2-Row | 2015 | 3 | 64.1 | 6 | 103.2 | 18 | 329.3 | NA | NA |
| Non-Productive Tiller Number 6-Row | 2015 | 3 | 24.2 | 6 | 21.0 | 18 | 148.8 | NA | NA |
| Productive Tiller Number 2-Row | 2015 | 3 | 25.6 | 6 | 64.7 | 18 | 342.9 | NA | NA |
| Productive Tiller Number 6-Row | 2015 | 3 | 1.6 | 6 | 18.4 | 18 | 40.4 | NA | NA |
| 2 WPE Tiller Number 2-Row | 2015 | 3 | 2.8 | 6 | 4.1 | 18 | 10.1 | NA | NA |
| 2 WPE Tiller Number 6-Row | 2015 | 3 | 0.7 | 6 | 1.1 | 18 | 1.7 | NA | NA |
| 3 WPE Tiller Number 2-Row | 2015 | 3 | 11.7 | 6 | 25.5 | 18 | 41.4 | NA | NA |
| 3 WPE Tiller Number 6-Row | 2015 | 3 | 4.1 | 6 | 3.6 | 18 | 7.8 | NA | NA |
| 4 WPE Tiller Number 2-Row | 2015 | 3 | 10.8 | 6 | 10.6 | 18 | 50.7 | NA | NA |
| 4 WPE Tiller Number 6-Row | 2015 | 3 | 3.4 | 6 | 9.4 | 18 | 11.1 | NA | NA |
| 5 WPE Tiller Number 2-Row | 2015 | 3 | 5.2 | 6 | 17.0 | 18 | 198.6 | NA | NA |
| 5 WPE Tiller Number 6-Row | 2015 | 3 | 17.3 | 6 | 22.3 | 18 | 109.2 | NA | NA |
| 6 WPE Tiller Number 2-Row | 2015 | 3 | 8.0 | 6 | 9.4 | 18 | 144.6 | NA | NA |
| 6 WPE Tiller Number 6-Row | 2015 | 3 | 43.1\* | 6 | 37.8 | 18 | 76.2 | 0.63 | 1.00 |
| 7 WPE Tiller Number 2-Row | 2015 | 3 | 21.1 | 6 | 22.7 | 18 | 421.6 | NA | NA |
| 7 WPE Tiller Number 6-Row | 2015 | 3 | 42.0 | 6 | 54.8 | 18 | 94.9 | NA | NA |
| Weeks Increasing 2-Row | 2015 | 3 | 1.3 | 6 | 2.2 | 18 | 5.5 | NA | NA |
| Weeks Increasing 6-Row | 2015 | 3 | 1.3 | 6 | 4.4 | 18 | 8.2 | NA | NA |
| Leaf Width 2-Row | 2015 | 3 | 2.1 | 6 | 7.0 | 18 | 22.5 | NA | NA |
| Leaf Width 6-Row | 2015 | 3 | 8.8 | 6 | 1.6 | 18 | 27.4 | NA | NA |

Method 1 (M1) or Method 3 (M3) corrections were applied if row or column effects were significant (p-value < 0.05 \*, < 0.01 \*\*, < 0.001 \*\*\*) and the relative efficiency (RE) was greater than one, indicating that correction reduced variance of secondary checks. The correction method used for association mapping is shaded in green.