

Figure S1. Map with origin of *Ae. taushii* parents used to develop winter wheat synthetics.

Figure S2. Grain yield (g/m2) of the highest yielding synthetics and checks field tested in Konya, Turkey during 2016, plot size 5 m2.

Table S1. Morphological description, agronomic traits, disease resistance and spike productivity of primary hexaploid synthetics tested across several locations in Turkey during 2016.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2016 plot # | Sakarya | Konya | Ankara | Kast. | Eskisehir | Sakarya | Kastamonu | Sakarya | Kast. | Sakarya | Kast. |
| Glume color | Awns | Grain color | Growth habit | Days to heading | Plant height, cm | Stripe rust, % | Stem rust, % | Common bunt, % | CCN, group | Crown rot, group | BYDV, score | Spike length, cm | Spikelets/spike | Threshibility, % | Grains/spike | Grain weight/spike, gr | 1000 kernel weight, gr |
| Ger. | R | + | W | W | 139 | 93 | 90 | 72 | 51.3 | 4 | 3 | 2.4 | 11.5 | 19.5 | 75.5 | 40.2 | - | 1.31 | - | 32.9 | - |
| Kar. | W | + | W | F | 141 | 109 | 0 | 43 | 0.6 | 3 | 2 | 2.2 | 11.2 | 18.1 | 84.7 | 40.0 | - | 1.63 | - | 40.7 | - |
| C04GH3: AISBERG/AE.SQUARROSA(369) |
| 25 | W | + | R | W | 137 | 105 | 0 | 50 | 10.1 | 2 | 4 | 2 | 13.3 | 22.0 | 28.0 | 48.4 | 27.4 | 2.11 | 0.89 | 44.0 | 32.6 |
| 62 | W | + | R | F | 150 | 90 | 20 | 20 | 15.7 | 4 | 2 | 2 | 11.5 | 18.6 | 57.4 | 44.8 | 15.4 | 2.28 | 0.43 | 50.7 | 28.1 |
| 67 | W | + | R | F | 146 | 100 | 10 | 60 | 5.4 | 3 | 4 | 2 | 13.4 | 23.2 | 11.4 | 56.6 | 22.6 | 1.98 | 0.73 | 35.2 | 32.3 |
| 68 | W | + | R | F | 144 | 105 | 0 | 20 | 11.9 | 2 | 2 | 3 | 12.6 | 21.8 | 31.3 | 52.6 | 30.4 | 2.62 | 1.02 | 49.6 | 33.7 |
| 152 | W | + | R | F | 147 | 100 | 0 | 10 | 0.7 | 1 | 4 | 2 | 13.6 | 24.0 | 8.9 | 46.0 | 23.6 | 1.15 | 0.74 | 25.0 | 31.3 |
| 154 | W | + | W | W | 141 | 105 | 90 | 20 | 5.6 | 2 | 4 | 2 | 13.4 | 23.0 | 44.8 | 50.8 | 34.0 | 1.64 | 1.29 | 32.5 | 37.8 |
| C04GH5: AISBERG/AE.SQUARROSA(511) |
| 81 | R | + | R | W | 145 | 115 | 30 | 5 | 45.3 | 5 | 2 | 2 | 13.6 | 21.8 | 8.5 | 40.0 | 36.2 | 1.51 | 1.36 | 38.7 | 37.6 |
| 113 | W | + | R | S | 142 | 85 | 30 | 0 | 65.9 | 4 | 2 | 1 | 16.6 | 22.2 | 0.8 | 46.6 | 30.4 | 1.72 | 1.25 | 37.0 | 41.1 |
| 144 | B | + | R | W | 140 | 95 | 30 | 30 | 14.2 | 1 | 1 | 1 | 13.2 | 20.2 | 26.3 | 26.2 | 22.6 | 0.77 | 0.86 | 28.5 | 38.2 |
| 156 | W | + | R | S | 145 | 110 | 30 | 5 | 84.7 | 3 | 4 | 3 | 15.5 | 23.8 | 8.3 | 52.4 | 17.2 | 1.62 | 0.63 | 31.2 | 36.6 |
| C04GH10: LEUC 84693/AE.SQUARROSA(409) |
| 14 | W | + | R | W | 139 | 100 | 0 | 40 | 4.7 | 5 | 3 | 4 | 10.1 | 20.8 | 52.3 | 31.0 | 29.8 | 1.80 | 1.34 | 58.1 | 44.8 |
| 26 | W | + | R | W | 138 | 108 | 0 | 40 | 24.1 | 5 | 4 | 1 | 12.2 | 23.4 | 76.8 | 45.0 | 33.4 | 1.77 | 1.54 | 39.9 | 46.0 |
| 60 | W | + | W | F | 144 | 115 | 0 | 30 | 24.6 | 4 | 3 | 1 | 13.0 | 22.8 | 91.3 | 31.6 | 34.6 | 0.90 | 1.24 | 27.1 | 35.8 |
| 162 | W | + | R | W | 143 | 110 | 0 | 20 | 8.7 | 2 | 3 | 3 | 12.3 | 24.0 | 9.8 | 36.4 | 30.0 | 1.33 | 1.16 | 36.2 | 38.8 |
| 163 | B | + | W | W | 143 | 105 | 0 | 10 | 4.9 | 3 | 2 | 3 | 12.2 | 19.4 | 0.0 | 20.8 | 26.8 | 0.40 | 1.19 | 19.2 | 44.3 |
| 164 | W | + | R | W | 141 | 110 | 20 | 20 | 5.3 | 3 | 4 | 2 | 11.9 | 21.6 | 21.3 | 35.4 | 25.0 | 1.03 | 1.15 | 29.0 | 46.2 |
| C04GH22: UKR-OD 761.93/AE.SQUARROSA(392) |
| 51 | R | + | R | W | 146 | 110 | 5 | 30 | 1.4 | 2 | 2 | 2 | 11.4 | 22.0 | 47.3 | 57.6 | 34.0 | 2.42 | 1.65 | 43.1 | 48.6 |
| 131 | B | + | R | F | 138 | 100 | 50 | 10 | 2.2 | 4 | 3 | 4 | 12.0 | 20.0 | 66.7 | 43.2 | 24.4 | 1.91 | 0.90 | 44.4 | 36.9 |
| 142 | R | + | R | W | 142 | 105 | 30 | 40 | 12.0 | 5 | 4 | 4 | 12.0 | 21.4 | 22.7 | 44.2 | 25.2 | 2.43 | 1.16 | 54.0 | 46.0 |
| 168 | W | + | W | F | 139 | 90 | 30 | 5 | 5.2 | 1 | 3 | 4 | 11.8 | 19.0 | 44.6 | 34.8 | 25.0 | 1.35 | 0.90 | 38.5 | 36.1 |
| 169 | W | + | R | F | 144 | 115 | 5 | 10 | 6.8 | 2 | 3 | 3 | 10.5 | 18.6 | 42.5 | 39.4 | 33.6 | 1.30 | 1.14 | 32.4 | 33.9 |
| 170 | W | + | R | W | 145 | 110 | 20 | 10 | 1.5 | 4 | 3 | 4 | 11.0 | 19.6 | 88.1 | 42.4 | 29.2 | 1.48 | 1.03 | 34.8 | 35.4 |
| 171 | W | + | R | W | 139 | 95 | 30 | 5 | 7.8 | 3 | 2 | 3 | 10.8 | 18.2 | 95.1 | 34.2 | 33.6 | 1.50 | 1.18 | 44.2 | 35.0 |
| 173 | R | + | R | W | 146 | 110 | 10 | 40 | 0.8 | 5 | 3 | 2 | 10.4 | 21.2 | 27.7 | 38.6 | 33.2 | 2.05 | 1.23 | 53.2 | 37.0 |
| 174 | W | + | R | W | 143 | 100 | 40 | 30 | 7.0 | 2 | 4 | 3 | 12.9 | 17.2 | 56.4 | 58.6 | 27.4 | 2.09 | 0.74 | 35.3 | 27.0 |
| 177 | R | + | R | W | 147 | 120 | 30 | 30 | 37.3 | 2 | 4 | 3 | 13.1 | 23.0 | 3.7 | 44.2 | 34.0 | 2.20 | 1.45 | 49.9 | 42.6 |
| 178 | W | + | R | W | 147 | 110 | 5 | 30 | 0.0 | 1 | 3 | 3 | 13.8 | 22.4 | 0.7 | 24.6 | 35.0 | 0.89 | 1.54 | 37.5 | 43.9 |
| C04GH61: UKR-OD 952.92/AE.SQUARROSA(1031) |
| 3 | W | - | R | F | 140 | 130 | 0 | 70 | 28.9 | 3 | 1 | 3 | 11.9 | 21.8 | 86.7 | 43.2 | 39.6 | 1.79 | 1.29 | 43.0 | 32.5 |
| 17 | R | - | R | W | 148 | 125 | 0 | 20 | 29.4 | 3 | 3 | 2 | 11.3 | 21.8 | 85.2 | 46.4 | 34.4 | 2.25 | 1.36 | 48.4 | 39.5 |
| 95 | W | - | R | F | 148 | 115 | 0 | 20 | 58.5 | 5 | 3 | 3 | 11.1 | 19.0 | 54.4 | 36.8 | 24.6 | 1.81 | 0.74 | 49.1 | 30.0 |
| 114 | R | - | R | W | 145 | 100 | 10 | 5 | 27.1 | 5 | 3 | 3 | 10.4 | 16.0 | 86.2 | 32.0 | 34.6 | 1.48 | 1.32 | 46.1 | 38.2 |
| 185 | R | - | R | F | 150 | 125 | 10 | 5 | 25.6 | . | 4 | 4 | 10.8 | 21.4 | 52.5 | 28.4 | 28.4 | 1.23 | 1.08 | 43.1 | 38.0 |
| 189 | W | - | R | F | 142 | 115 | 40 | 10 | 52.4 | 1 | 3 | 3 | 11.4 | 21.4 | 35.7 | 41.4 | 38.4 | 1.26 | 1.11 | 30.8 | 28.9 |
| 190 | W | - | R | W | 140 | 115 | 0 | 10 | 59.4 | 2 | 4 | 3 | 11.7 | 18.8 | 40.4 | 42.2 | 33.6 | 1.42 | 1.05 | 34.5 | 31.3 |
| 191 | W | + | R | W | 143 | 115 | 30 | 30 | 44.0 | 3 | 1 | 2 | 11.9 | 21.8 | 25.8 | 29.6 | 24.4 | 1.36 | 1.09 | 45.9 | 44.7 |
| C04GH68S: UKR-OD 1530.94/AE.SQUARROSA(310) |
| 94 | W | + | R | F | 147 | 110 | 40 | 0 | 19.2 | 4 | 3 | 2 | 10.6 | 19.8 | 72.5 | 41.2 | 20.0 | 1.65 | 0.49 | 40.5 | 24.6 |
| 192 | W | + | R | W | 144 | 115 | 40 | 5 | 10.0 | 2 | 3 | 2 | 11.2 | 22.0 | 13.6 | 32.8 | 26.4 | 1.44 | 1.04 | 43.5 | 39.5 |
| 195 | W | + | R | S | 145 | 110 | 0 | 5 | 2.0 | 1 | 2 | 2 | 12.1 | 20.8 | 26.5 | 38.8 | 21.2 | 1.54 | 0.54 | 39.6 | 25.4 |
| C04GH71: UKR-OD 1530.94/AE.SQUARROSA(392) |
| 198 | B | - | R | W | 143 | 105 | 40 | 5 | 0.0 | 3 | 3 | 3 | 10.9 | 23.4 | 42.6 | 40.2 | 31.0 | 1.70 | 1.26 | 42.2 | 40.6 |
| 199 | W | + | R | W | 149 | 115 | 0 | 30 | 0.7 | 4 | 1 | 3 | 9.8 | 21.4 | 34.1 | 33.0 | 31.2 | 1.65 | 1.12 | 50.0 | 35.8 |
| C04GH74: UKR-OD 1530.94/AE.SQUARROSA(458) |
| 84 | W | + | R | F | 139 | 85 | 30 | 30 | 0.0 | 4 | 3 | 3 | 12.3 | 21.6 | 20.4 | 45.2 | 29.4 | 1.78 | 0.97 | 38.7 | 33.1 |
| 203 | W | + | R | W | 141 | 95 | 40 | 5 | 4.8 | 3 | 2 | 3 | 12.8 | 20.8 | 13.3 | 35.2 | 24.0 | 1.02 | 0.71 | 28.7 | 29.7 |
| 204 | W | + | W | W | 146 | 115 | 10 | 5 | 50.4 | 1 | 3 | 3 | 11.5 | 18.8 | 34.7 | 40.0 | 27.8 | 1.33 | 0.80 | 33.4 | 28.6 |
| 207 | W | + | R | W | 139 | 110 | 40 | 5 | 0.0 | 1 | 1 | 3 | 12.0 | 20.6 | 14.4 | 35.4 | 26.2 | 1.16 | 0.31 | 31.7 | 12.0 |
| C04GH76: UKR-OD 1530.94/AE.SQUARROSA(629) |
| 211 | B | + | R | W | 145 | 80 | 40 | 20 | 0.6 | 4 | 3 | 2 | 11.7 | 19.0 | 12.0 | 35.6 | 36.2 | 1.22 | 1.36 | 32.2 | 37.6 |
| 212 | W | + | R | S | 143 | 100 | 30 | 0 | 40.9 | 3 | 4 | 3 | 12.5 | 18.0 | 100 | 39.8 | 23.2 | 1.70 | 0.94 | 42.7 | 40.3 |
| 213 | W | + | R | S | 139 | 95 | 20 | 0 | 23.0 | 3 | 3 | 3 | 12.2 | 18.8 | 57.1 | 41.8 | 33.2 | 1.75 | 1.29 | 42.0 | 38.8 |
| 215 | B | + | R | W | 138 | 105 | 40 | 0 | 10.2 | 1 | 2 | 2 | 13.6 | 21.0 | 4.8 | 35.0 | 35.0 | 1.42 | 1.45 | 40.0 | 41.5 |
| 218 | W | + | R | W | 144 | 110 | 50 | 0 | 1.8 | 1 | 3 | 3 | 10.8 | 18.4 | 44.5 | 34.6 | 24.0 | 1.58 | 0.96 | 46.2 | 39.9 |
| 225 | W | + | R | W | 146 | 100 | 70 | 5 | 13.8 | . | 3 | 3 | 13.5 | 22.6 | 5.1 | 47.8 | 38.2 | 2.34 | 1.42 | 46.6 | 37.2 |
| C04GH78: UKR-OD 1530.94/AE.SQUARROSA(1027) |
| 16 | W | + | W | W | 145 | 120 | 10 | 20 | 2.5 | 1 | 3 | 2 | 7.4 | 24.8 | 90.0 | 47.8 | 37.2 | 2.18 | 1.56 | 46.6 | 41.9 |
| 34 | W | + | R | W | 137 | 97 | 0 | 5 | 4.5 | 2 | 4 | 4 | 9.6 | 15.6 | 93.5 | 25.8 | 3.4 | 1.36 | 0.10 | 53.8 | 28.8 |
| 90 | W | + | W | S | 146 | 95 | 0 | 5 | 0.5 | 5 | 2 | 3 | 12.6 | 19.0 | 9.6 | 35.8 | 23.2 | 1.60 | 0.87 | 43.9 | 37.6 |
| 115 | W | + | R | F | 137 | 90 | 0 | 20 | 0.0 | 1 | 4 | 4 | 12.9 | 17.6 | 12.5 | 29.4 | 31.6 | 1.09 | 1.12 | 37.0 | 35.4 |
| 121 | B | + | W | F | 138 | 95 | 5 | 20 | 0.0 | 3 | 4 | 3 | 12.6 | 17.2 | 7.2 | 41.2 | 30.4 | 1.29 | 1.28 | 30.4 | 42.2 |
| 128 | W | - | R | S | 141 | 115 | 30 | 0 | 0.0 | 5 | 3 | 2 | 13.1 | 22.4 | 4.7 | 39.2 | 25.8 | 1.40 | 0.92 | 35.4 | 35.5 |
| 135 | B | + | W | F | 141 | 105 | 0 | 20 | 25.0 | 4 | 4 | 2 | 13.0 | 20.0 | 10.1 | 41.4 | 28.4 | 1.56 | 1.15 | 37.8 | 40.4 |
| 233 | W | + | R | F | 142 | 105 | 0 | 10 | 0.0 | 1 | 2 | 3 | 10.7 | 15.4 | 24.5 | 37.6 | 15.2 | 1.56 | 0.47 | 41.2 | 30.7 |
| 234 | W | + | R | W | 138 | 105 | 0 | 30 | 1.4 | 2 | 4 | 3 | 11.4 | 18.6 | 7.9 | 37.4 | 24.0 | 1.62 | 0.76 | 43.0 | 31.5 |
| 235 | R | + | W | F | 136 | 105 | 0 | 30 | 1.3 | 3 | 3 | 3 | 11.8 | 20.6 | 4.1 | 35.8 | 20.4 | 1.93 | 0.89 | 55.1 | 43.6 |
| 236 | B | + | R | W | 134 | 115 | 0 | 0 | 34.0 | 3 | 3 | 2 | 10.5 | 19.0 | 0.0 | 24.8 | 23.0 | 0.65 | 0.89 | 24.8 | 38.7 |
| 241 | B | + | W | F | 137 | 95 | 0 | 20 | 36.6 | . | 2 | 2 | 12.3 | 18.8 | 1.5 | 30.2 | 30.4 | 1.13 | 1.26 | 36.0 | 41.4 |
| 246 | B | + | W | W | 147 | 120 | 0 | 5 | 0.0 | . | 3 | 4 | 10.6 | 17.2 | 4.1 | 34.0 | 24.8 | 1.36 | 0.95 | 40.0 | 38.3 |
| 250 | B | + | R | W | 146 | 105 | 0 | 5 | 1.3 | 3 | 3 | 3 | 12.1 | 16.4 | 0.0 | 28.4 | 23.0 | 0.63 | 0.73 | 22.2 | 31.7 |
| 251 | W | + | R | F | 137 | 100 | 0 | 5 | 0.0 | 5 | 2 | 3 | 13.0 | 21.4 | 0.6 | 35.8 | 22.8 | 1.49 | 1.08 | 41.8 | 47.3 |
| 258 | W | + | R | W | 138 | 100 | 0 | 20 | 18.8 | 1 | 3 | 3 | 12.8 | 21.0 | 3.5 | 58.2 | 37.0 | 2.19 | 1.40 | 37.4 | 37.8 |
| 261 | R | + | W | F | 139 | 105 | 0 | 0 | 53.0 | 5 | 2 | 3 | 12.2 | 18.8 | 6.6 | 33.4 | 39.6 | 1.28 | 1.85 | 37.7 | 46.8 |
| C04GH79: PANDUR/AE.SQUARROSA(223) |
| 6 | B | + | R | W | 139 | 105 | 20 | 5 | 8.0 | 3 | 3 | 2 | 12.0 | 20.0 | 1.7 | 22.4 | 19.2 | 1.14 | 0.91 | 49.6 | 47.6 |
| 58 | W | + | W | W | 141 | 110 | 0 | 20 | 5.4 | 3 | 2 | 4 | 13.4 | 20.8 | 82.8 | 36.8 | 24.4 | 1.89 | 1.57 | 51.1 | 64.2 |
| 70 | W | + | R | W | 141 | 110 | 10 | 0 | 7.9 | 5 | 2 | 4 | 12.3 | 19.4 | 25.3 | 40.2 | 24.6 | 1.34 | 0.86 | 31.2 | 34.8 |
| 88 | W | + | R | W | 144 | 105 | 5 | 0 | 25.8 | 5 | 3 | 2 | 11.8 | 20.0 | 8.3 | 42.2 | 31.0 | 1.71 | 1.06 | 40.9 | 34.2 |
| 89 | R | + | R | W | 141 | 95 | 20 | 5 | 1.3 | 5 | 4 | 3 | 13.8 | 20.8 | 23.2 | 47.2 | 20.2 | 2.17 | 0.93 | 45.6 | 45.9 |
| 265 | W | + | R | W | 138 | 95 | 30 | 5 | 6.0 | . | 3 | 4 | 10.9 | 16.2 | 13.0 | 28.0 | 23.6 | 1.12 | 0.95 | 39.1 | 40.3 |
| 267 | W | + | R | W | 145 | 110 | 30 | 10 | 12.7 | 3 | 3 | 3 | 13.7 | 20.6 | 4.1 | 34.8 | 17.6 | 1.91 | 0.86 | 54.8 | 49.1 |
| 268 | W | + | R | W | 141 | 110 | 20 | 30 | 8.6 | 3 | 2 | 3 | 10.1 | 16.4 | 8.3 | 23.6 | 24.6 | 0.90 | 1.20 | 37.8 | 48.9 |
| 269 | W | + | R | W | 138 | 110 | 40 | 20 | 1.7 | 1 | 3 | 3 | 12.6 | 19.6 | 5.3 | 28.0 | 22.6 | 1.26 | 1.09 | 44.9 | 48.4 |
| 270 | R | + | R | F | 141 | 90 | 20 | 20 | 1.3 | 1 | 3 | 3 | 12.9 | 19.4 | 35.6 | 41.2 | 31.0 | 2.03 | 1.31 | 50.1 | 42.1 |
| 272 | R | + | R | W | 142 | 95 | 0 | 30 | 0.0 | 3 | 3 | 2 | 11.5 | 20.0 | 63.1 | 36.8 | 25.4 | 1.60 | 0.85 | 43.7 | 33.6 |
| 273 | B | + | R | W | 144 | 100 | 20 | 30 | 15.9 | 1 | 2 | 2 | 11.3 | 17.8 | 1.0 | 40.6 | 18.6 | 1.54 | 0.71 | 37.8 | 38.2 |
| 276 | R | + | R | W | 138 | 85 | 20 | 20 | 1.3 | 3 | 4 | 3 | 10.2 | 16.6 | 1.4 | 36.0 | 26.4 | 0.72 | 0.83 | 19.6 | 31.5 |
| 319 | W | + | R | W | 144 | 90 | 40 | 5 | 5.1 | 5 | 2 | 3 | 9.9 | 17.8 | 9.0 | 26.4 | 26.2 | 0.99 | 0.95 | 36.7 | 36.3 |
| C04GH81: PANDUR/AE.SQUARROSA(409) |
| 12 | W | - | R | W | 145 | 110 | 10 | 5 | 11.6 | 5 | 3 | 5 | 13.4 | 18.0 | 18.5 | 28.4 | 33.8 | 0.79 | 1.39 | 26.1 | 41.2 |
| 28 | W | + | R | W | 145 | 85 | 20 | 5 | 39.5 | 2 | 2 | 2 | 12.3 | 17.8 | 33.7 | 49.4 | 29.6 | 1.78 | 1.12 | 36.3 | 38.0 |
| 286 | W | - | R | W | 146 | 95 | 30 | 10 | 1.4 | 5 | 3 | 2 | 10.9 | 18.2 | 5.6 | 36.0 | 36.8 | 1.70 | 1.14 | 47.5 | 30.9 |
| 289 | W | + | R | F | 141 | 110 | 30 | 5 | 14.8 | 4 | 3 | 3 | 11.9 | 22.4 | 1.9 | 36.2 | 34.4 | 1.94 | 1.49 | 53.3 | 43.4 |