**Supplementary materials**

**Table S1:** Soil mechanical and chemical analyses of the experimental sites

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| **Properties** | **Sand** **(%)** | **Silt** **(%)** | **Clay** **(%)** | **Texture class** | **Organic matter (%)** | **Available (N) ppm** | **Available (P) ppm** | **Available (K) ppm** | **pH** |
| 2017/2018 | 18.7 | 34.5 | 46.8 | Clay | 1.72 | 44.6 | 9.8 | 378.6 | 8.31 |
| 2018/2019 | 17.5 | 33.6 | 48.9 | Clay | 1.59 | 36.71 | 8.4 | 405.5 | 8.22 |

**Table S2:** Monthly weather data during the field trial at Kafer El-Hamam, Sharkia Governorate

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| **Season** | **2017 /2018** | **2018/ 2019** |
| **Month** | **Rain (mm)** | **RH (%)** | **Tmax (°C)** | **Tmin (°C)** | **Tmean (°C)** | **Rain (mm)** | **RH (%)** | **Tmax (°C)** | **Tmin (°C)** | **Tmean (°C)** |
| November | 0.64 | 64.1 | 26.25 | 15.82 | 20.12 | 0.78 | 56.63 | 26.78 | 15.14 | 14.05 |
| December  | 0.27 | 63.88 | 21.26 | 11.41 | 15.4 | 1.11 | 67.03 | 19.21 | 9.06 | 13.37 |
| January  | 0.58 | 62.77 | 18.6 | 8.07 | 12.41 | 0.09 | 66.63 | 18.4 | 6.91 | 11.74 |
| February  | 0.09 | 57.05 | 24.2 | 9.84 | 16.03 | 0.21 | 62.68 | 20.75 | 8.04 | 13.43 |
| March  | 0.24 | 48.62 | 26.39 | 11.88 | 18.09 | 0.01 | 52.94 | 25.14 | 11.18 | 17.22 |
| April  | 0.08 | 41.15 | 33.16 | 15.22 | 23.33 | 1.38 | 50.24 | 28.62 | 12.93 | 19.96 |

Rain is precipitation (mm day-1), RH is average relative humidity at 2 meters, Tmax is average maximum temperature, Tmin is average minimum temperature and Tmean is temperature average.

**Table S3:** Estimation of stress tolerance indices from the potential yield (Yp) and the stress yield (Ys) data of six populations in two-bread wheat crosses

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| **Cross** | **Generation** | **Yp** **(g. plant-1)** | **Ys** **(g. plant-1)** | **SSI** | **MP** | **TOL** | **GMP** | **STI** | **DRI** |
| I(Line 44 × Shandweel-1) | P1 | 23.1 | 18.21 | 1.02 | 20.66 | 4.9 | 20.51 | 0.54 | 0.79 |
| P2 | 25.4 | 17.58 | 1.48 | 21.50 | 7.8 | 21.14 | 0.57 | 0.69 |
| F1 | 26.2 | 19.02 | 1.31 | 22.59 | 7.1 | 22.30 | 0.63 | 0.73 |
| F2 | 24.9 | 17.72 | 1.39 | 21.33 | 7.2 | 21.03 | 0.56 | 0.71 |
| BC1 | 25.2 | 21.56 | 0.69 | 23.37 | 3.6 | 23.30 | 0.69 | 0.86 |
| BC2 | 28.4 | 20.99 | 1.25 | 24.69 | 7.4 | 24.41 | 0.76 | 0.74 |
| II(Line 20 × Sakha 93) | P1 | 30.7 | 25.16 | 0.86 | 27.92 | 5.5 | 27.78 | 0.98 | 0.82 |
| P2 | 28.0 | 22.16 | 1.00 | 25.09 | 5.9 | 24.92 | 0.79 | 0.79 |
| F1 | 30.6 | 26.02 | 0.72 | 28.30 | 4.6 | 28.21 | 1.02 | 0.85 |
| F2 | 30.3 | 24.12 | 0.98 | 27.21 | 6.2 | 27.03 | 0.93 | 0.80 |
| BC1 | 30.9 | 28.94 | 0.30 | 29.92 | 2.0 | 29.90 | 1.14 | 0.94 |
| BC2 | 32.3 | 24.52 | 1.16 | 28.43 | 7.8 | 28.16 | 1.01 | 0.76 |

SSI is stress susceptibility index, MP is mean productivity, GMP is geometric mean productivity, STI is stress tolerance index, TOL is tolerance, and DRI is drought resistance index.

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| **Figure S1:** Mean of the six populations for days to maturity and spike length in two wheat crosses under two water regimes |

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| **Figure S2:** Mean of the six populations for number of spikes per plant and number of grains per spike in two wheat crosses under two water regimes |

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| **Figure S3:** Mean of the six populations for 1000- grain weight and grain yield per plant in two wheat crosses under two water regimes |