Supplementary Table 1. Genotype means across replications for the assessed traits. Traits estimated through remote sensing: $ET_a$, actual evapotranspiration; T, actual transpiration; H, plant height; $MTVI_2$, LAI surrogate. Numbers after each trait indicate the image acquisition event: 1, April 4th (jointing); 2, April 30th (anthesis); 3, May 22nd (grain filling). Measured traits at ground level: DH, days to heading; DA, days to anthesis; DM, days to maturity; GFD, grain filling duration; PH, plant height; $NSm^2$, number of spikes/$m^2$; NGS, number of grains/spike; TKW, thousand kernel weight; GFR, grain filling rate.

| Genotpe | ETa1 | T1 | H1 | $MTVI_2$1 | ETa2 | T2 | H2 | $MTVI_2$1 | ETa3 | T3 | H3 | $MTVI_2$1 | DH | DA | DM | GFD | Yield | PH | NSm2 | NGS | TKW | GFR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Irrigation treatment 100%Etc | | | | | | | | | | | | | | | | | | | | | |
| 05D278D1be | 4.739 | 2.339 | 0.380 | 1.608 | 6.531 | 4.241 | 0.815 | 3.941 | 6.848 | 4.926 | 0.878 | 4.095 | 131 | 138 | 181 | 43 | 7816 | 95 | 369 | 41.3 | 57.27 | 1.33 |
| 07D057D4fba | 4.946 | 2.576 | 0.354 | 1.476 | 6.894 | 4.405 | 0.721 | 3.935 | 7.320 | 5.523 | 0.834 | 3.986 | 137 | 145 | 185 | 40 | 9942 | 95 | 440 | 39.3 | 60.70 | 1.52 |
| 08D010D10cab | 4.868 | 2.458 | 0.413 | 1.574 | 6.909 | 4.436 | 0.724 | 4.569 | 7.125 | 5.548 | 0.895 | 4.770 | 136 | 143 | 182 | 39 | 9390 | 92 | 707 | 37.7 | 50.73 | 1.30 |
| 09D066D8cab | 4.984 | 2.416 | 0.369 | 1.680 | 6.799 | 4.306 | 0.747 | 4.514 | 7.376 | 5.474 | 0.890 | 4.908 | 138 | 146 | 185 | 39 | 9210 | 97 | 533 | 38.6 | 59.20 | 1.53 |
| 09D069D1dcf | 4.716 | 2.389 | 0.409 | 1.691 | 6.810 | 4.502 | 0.775 | 4.537 | 6.697 | 5.249 | 0.888 | 4.012 | 136 | 144 | 184 | 40 | 9087 | 92 | 542 | 37.5 | 59.20 | 1.49 |
| ANVERGUR | 4.681 | 2.267 | 0.308 | 1.565 | 6.863 | 4.407 | 0.757 | 4.592 | 7.446 | 5.736 | 0.856 | 4.950 | 138 | 147 | 186 | 39 | 10008 | 92 | 436 | 50.1 | 53.57 | 1.36 |
| ATHORIS | 4.833 | 2.556 | 0.349 | 1.998 | 6.776 | 4.547 | 0.724 | 4.682 | 7.259 | 5.612 | 0.779 | 4.521 | 132 | 139 | 181 | 43 | 9449 | 83 | 480 | 43.3 | 53.17 | 1.25 |
| BURGOS | 4.825 | 2.449 | 0.407 | 1.501 | 6.852 | 4.609 | 0.712 | 4.676 | 7.459 | 5.918 | 0.882 | 4.911 | 138 | 147 | 184 | 37 | 9750 | 100 | 653 | 37.2 | 60.73 | 1.63 |
| CALERO | 4.705 | 2.273 | 0.376 | 1.518 | 6.597 | 4.611 | 0.617 | 3.978 | 6.479 | 4.871 | 0.703 | 2.643 | 137 | 143 | 185 | 42 | 8102 | 82 | 289 | 60.3 | 45.47 | 1.08 |
| CARPIO | 4.671 | 2.414 | 0.324 | 1.615 | 6.798 | 4.458 | 0.757 | 4.080 | 7.284 | 5.602 | 0.838 | 4.163 | 134 | 141 | 182 | 41 | 9194 | 93 | 453 | 51.5 | 53.23 | 1.30 |
| CLAUDIO | 5.117 | 2.676 | 0.427 | 2.487 | 6.884 | 4.461 | 0.819 | 5.101 | 7.407 | 5.603 | 0.899 | 5.014 | 136 | 144 | 184 | 40 | 9515 | 98 | 524 | 40.2 | 55.43 | 1.40 |
| DON_RICARDO | 4.859 | 2.544 | 0.419 | 2.137 | 6.746 | 4.506 | 0.842 | 4.505 | 7.162 | 5.481 | 0.928 | 4.317 | 135 | 143 | 181 | 38 | 9022 | 102 | 453 | 42.0 | 62.37 | 1.64 |
| DON_SEBASTIAN | 5.053 | 2.404 | 0.387 | 1.537 | 6.932 | 4.402 | 0.793 | 4.996 | 7.161 | 5.584 | 0.940 | 4.846 | 136 | 146 | 184 | 39 | 8830 | 100 | 498 | 34.3 | 63.17 | 1.63 |
| EUNOBLE | 5.008 | 2.558 | 0.355 | 1.749 | 6.744 | 4.385 | 0.764 | 4.242 | 6.955 | 5.237 | 0.900 | 4.183 | 130 | 138 | 180 | 43 | 8307 | 88 | 471 | 41.4 | 51.13 | 1.20 |
| EURODURO | 5.225 | 2.678 | 0.390 | 2.083 | 6.933 | 4.394 | 0.772 | 4.400 | 7.450 | 5.630 | 0.920 | 4.564 | 135 | 144 | 183 | 38 | 10446 | 95 | 742 | 37.4 | 55.17 | 1.44 |
| GRADOR | 5.060 | 2.501 | 0.412 | 1.980 | 6.843 | 4.324 | 0.817 | 4.297 | 7.349 | 5.445 | 0.905 | 4.208 | 134 | 142 | 182 | 40 | 9981 | 93 | 338 | 36.7 | 64.80 | 1.61 |
| IBERUS | 4.872 | 2.492 | 0.389 | 2.152 | 6.907 | 4.553 | 0.741 | 5.271 | 7.465 | 5.953 | 0.809 | 5.410 | 138 | 145 | 185 | 40 | 8971 | 90 | 538 | 39.1 | 50.37 | 1.25 |
| SCULPTUR | 4.985 | 2.405 | 0.399 | 1.556 | 6.756 | 4.503 | 0.684 | 4.642 | 7.062 | 5.553 | 0.832 | 4.697 | 135 | 142 | 183 | 41 | 9161 | 85 | 516 | 52.0 | 49.30 | 1.20 |
| TUSSUR | 4.617 | 2.225 | 0.340 | 1.463 | 6.537 | 4.407 | 0.676 | 3.735 | 6.457 | 4.914 | 0.794 | 2.484 | 132 | 139 | 182 | 43 | 7274 | 80 | 529 | 40.3 | 55.07 | 1.28 |
| | Irrigation treatment 50%Etc | | | | | | | | | | | | | | | | | | | | | |
| 05D278D1be | 5.407 | 2.465 | 0.391 | 2.054 | 6.211 | 4.316 | 0.753 | 3.260 | 5.184 | 4.136 | 0.979 | 2.949 | 127 | 135 | 175 | 40 | 7011 | 90 | 462 | 34.1 | 55.77 | 1.38 |
| 07D057D4fba | 5.415 | 2.504 | 0.384 | 2.225 | 6.372 | 4.534 | 0.786 | 3.989 | 5.747 | 4.652 | 0.914 | 3.961 | 133 | 140 | 177 | 37 | 7792 | 87 | 400 | 34.3 | 55.77 | 1.49 |
| 08D010D10cab | 5.471 | 2.680 | 0.347 | 2.317 | 6.230 | 4.467 | 0.748 | 3.694 | 5.332 | 4.594 | 0.899 | 3.634 | 131 | 138 | 175 | 37 | 7594 | 90 | 564 | 30.2 | 51.13 | 1.37 |
| 09D066D8cab | 5.483 | 2.453 | 0.406 | 2.327 | 6.393 | 4.396 | 0.714 | 3.767 | 5.604 | 4.627 | 1.019 | 3.314 | 135 | 143 | 178 | 35 | 7896 | 90 | 556 | 32.9 | 56.17 | 1.62 |
| 09D069D1dcf | 5.465 | 2.572 | 0.388 | 2.249 | 6.413 | 4.580 | 0.753 | 3.923 | 5.447 | 4.954 | 0.864 | 3.376 | 132 | 139 | 176 | 37 | 7588 | 87 | 609 | 34.9 | 53.47 | 1.45 |
| ANVERGUR | 5.258 | 2.577 | 0.314 | 2.177 | 6.399 | 4.553 | 0.742 | 4.284 | 5.196 | 4.495 | 0.864 | 3.292 | 135 | 142 | 178 | 36 | 7863 | 90 | 493 | 46.9 | 51.43 | 1.44 |
| ATHORIS | 5.494 | 2.579 | 0.339 | 2.284 | 6.333 | 4.530 | 0.698 | 3.883 | 5.234 | 4.261 | 0.841 | 3.962 | 130 | 137 | 175 | 38 | 8046 | 77 | 529 | 39.0 | 51.50 | 1.36 |
| BURGOS | 5.375 | 2.645 | 0.411 | 2.745 | 6.378 | 4.677 | 0.802 | 4.565 | 5.603 | 4.875 | 0.941 | 3.927 | 136 | 143 | 177 | 35 | 7539 | 88 | 556 | 32.8 | 57.97 | 1.67 |
| CALERO | 5.238 | 2.398 | 0.339 | 1.986 | 6.426 | 4.440 | 0.624 | 3.729 | 5.820 | 4.468 | 0.709 | 2.915 | 133 | 140 | 180 | 40 | 7578 | 80 | 498 | 53.9 | 44.87 | 1.11 |
| CARPIO | 5.096 | 2.421 | 0.384 | 2.077 | 6.452 | 4.478 | 0.744 | 3.954 | 5.329 | 4.509 | 0.958 | 3.008 | 130 | 137 | 177 | 39 | 7749 | 88 | 542 | 41.0 | 52.73 | 1.34 |
| CLAUDIO | 5.533 | 2.630 | 0.375 | 2.500 | 6.720 | 4.624 | 0.754 | 4.406 | 6.003 | 5.005 | 0.863 | 3.376 | 133 | 140 | 178 | 38 | 8469 | 95 | 600 | 35.3 | 51.60 | 1.36 |
| DON_RICARDO | 5.299 | 2.605 | 0.459 | 2.514 | 6.254 | 4.387 | 0.839 | 4.117 | 5.294 | 4.401 | 0.928 | 3.836 | 131 | 138 | 174 | 37 | 7512 | 85 | 387 | 33.0 | 59.37 | 1.62 |
| DON_SEBASTIAN | 5.462 | 2.661 | 0.426 | 2.793 | 6.505 | 4.578 | 0.844 | 4.497 | 5.686 | 4.834 | 0.946 | 4.116 | 131 | 138 | 177 | 39 | 5910 | 95 | 569 | 23.6 | 61.30 | 1.59 |
| EUNOBLE | 5.573 | 2.583 | 0.380 | 2.492 | 6.451 | 4.392 | 0.781 | 3.994 | 5.208 | 3.928 | 0.883 | 2.866 | 128 | 135 | 175 | 40 | 6478 | 83 | 591 | 29.4 | 50.87 | 1.28 |
| EURODURO | 5.482 | 2.642 | 0.357 | 2.490 | 6.337 | 4.425 | 0.734 | 3.883 | 5.431 | 4.302 | 0.915 | 2.660 | 133 | 139 | 176 | 37 | 7844 | 88 | 498 | 30.1 | 54.83 | 1.50 |
| GRADOR | 5.341 | 2.478 | 0.377 | 2.354 | 6.456 | 4.358 | 0.735 | 3.501 | 5.397 | 3.996 | 0.776 | 2.064 | 130 | 137 | 175 | 38 | 7754 | 90 | 564 | 36.1 | 61.23 | 1.61 |
| IBERUS | 5.533 | 2.603 | 0.413 | 2.405 | 6.521 | 4.643 | 0.761 | 4.241 | 6.177 | 4.948 | 0.899 | 4.151 | 134 | 141 | 178 | 37 | 7615 | 82 | 627 | 31.9 | 48.60 | 1.30 |
| SCULPTUR | 5.614 | 2.697 | 0.392 | 2.426 | 6.615 | 4.508 | 0.736 | 4.313 | 5.966 | 5.252 | 0.827 | 3.816 | 131 | 139 | 178 | 39 | 8268 | 85 | 440 | 41.7 | 48.10 | 1.22 |
| TUSSUR | 5.164 | 2.507 | 0.362 | 2.417 | 6.283 | 4.358 | 0.718 | 4.149 | 5.344 | 4.183 | 0.778 | 3.749 | 130 | 137 | 177 | 40 | 6641 | 73 | 458 | 38.8 | 54.30 | 1.35 |
| | Rainfed | | | | | | | | | | | | | | | | | | | | | |
| 05D278D1be | 5.622 | 2.605 | 0.409 | 1.591 | 4.638 | 3.518 | 0.320 | 1.927 | 3.649 | 1.806 | 0.707 | 0.756 | 125 | 134 | 167 | 34 | 4001 | 85 | 404 | 30.1 | 48.80 | 1.45 |
| 07D057D4fba | 5.618 | 2.687 | 0.325 | 2.353 | 4.758 | 3.679 | 0.394 | 2.617 | 3.698 | 1.852 | 0.392 | 0.823 | 130 | 137 | 174 | 37 | 4848 | 82 | 489 | 26.1 | 54.33 | 1.48 |
| 08D010D10cab | 5.803 | 2.634 | 0.475 | 1.250 | 4.982 | 4.017 | 0.396 | 2.301 | 4.033 | 2.336 | 0.705 | 1.176 | 130 | 136 | 171 | 35 | 4875 | 82 | 467 | 26.6 | 47.90 | 1.36 |
| 09D066D8cab | 5.878 | 2.694 | 0.407 | 1.944 | 4.725 | 3.543 | 0.399 | 2.391 | 3.867 | 1.866 | 0.385 | 1.014 | 130 | 136 | 168 | 32 | 4363 | 82 | 476 | 27.1 | 52.33 | 1.64 |
| 09D069D1dcf | 5.708 | 2.760 | 0.373 | 2.074 | 4.753 | 3.659 | 0.357 | 2.549 | 3.783 | 2.064 | 0.380 | 1.286 | 129 | 135 | 169 | 34 | 4617 | 78 | 564 | 25.6 | 51.17 | 1.50 |
| ANVERGUR | 5.172 | 2.518 | 0.367 | 1.092 | 4.503 | 3.637 | 0.356 | 2.551 | 3.682 | 2.191 | 0.687 | 1.492 | 128 | 137 | 173 | 36 | 5194 | 78 | 413 | 38.8 | 49.80 | 1.38 |
| ATHORIS | 5.327 | 2.659 | 0.419 | 1.197 | 4.514 | 3.506 | 0.345 | 2.142 | 3.717 | 1.977 | 0.645 | 1.171 | 126 | 134 | 169 | 35 | 5030 | 78 | 440 | 33.3 | 51.97 | 1.48 |
| BURGOS | 5.594 | 2.588 | 0.573 | 1.160 | 4.742 | 3.574 | 0.490 | 2.330 | 3.913 | 2.165 | 0.525 | 1.500 | 129 | 137 | 169 | 33 | 5086 | 85 | 524 | 24.0 | 52.03 | 1.59 |
| CALERO | 5.120 | 2.488 | 0.331 | 1.780 | 4.255 | 3.212 | 0.395 | 2.251 | 3.620 | 1.583 | 0.406 | 0.773 | 128 | 136 | 172 | 36 | 5126 | 75 | 391 | 35.4 | 45.13 | 1.24 |
| CARPIO | 5.510 | 2.593 | 0.367 | 1.744 | 4.568 | 3.711 | 0.351 | 2.630 | 3.702 | 2.009 | 0.544 | 1.245 | 127 | 134 | 169 | 35 | 4292 | 83 | 404 | 31.9 | 49.17 | 1.39 |
| CLAUDIO | 5.745 | 2.794 | 0.408 | 2.703 | 4.962 | 4.029 | 0.551 | 3.226 | 3.829 | 2.080 | 0.650 | 1.253 | 128 | 136 | 173 | 37 | 5395 | 83 | 476 | 29.8 | 51.60 | 1.41 |
| DON_RICARDO | 5.833 | 2.635 | 0.464 | 1.365 | 4.691 | 3.694 | 0.671 | 2.481 | 3.821 | 2.382 | 0.750 | 1.677 | 127 | 134 | 169 | 35 | 5111 | 82 | 356 | 28.8 | 56.43 | 1.60 |
| DON_SEBASTIAN | 5.975 | 2.741 | 0.378 | 2.469 | 5.181 | 4.075 | 0.668 | 3.082 | 4.241 | 2.923 | 0.665 | 1.618 | 130 | 136 | 172 | 36 | 3905 | 92 | 591 | 15.3 | 58.43 | 1.62 |
| EUNOBLE | 6.046 | 2.814 | 0.436 | 2.636 | 5.288 | 4.193 | 0.545 | 3.142 | 3.845 | 2.165 | 0.614 | 1.269 | 125 | 133 | 172 | 38 | 4301 | 83 | 418 | 23.7 | 51.03 | 1.33 |
| EURODURO | 5.596 | 2.654 | 0.400 | 1.165 | 4.652 | 3.704 | 0.319 | 2.011 | 3.723 | 1.993 | 0.428 | 1.219 | 127 | 135 | 167 | 32 | 4869 | 82 | 467 | 21.9 | 52.87 | 1.64 |
| GRADOR | 5.718 | 2.673 | 0.429 | 2.270 | 4.918 | 3.747 | 0.396 | 2.543 | 3.561 | 1.566 | 0.472 | 0.442 | 125 | 134 | 168 | 34 | 4651 | 82 | 413 | 23.7 | 57.13 | 1.68 |
| IBERUS | 6.095 | 2.901 | 0.381 | 2.568 | 4.975 | 4.178 | 0.435 | 2.715 | 3.752 | 1.993 | 0.563 | 0.757 | 129 | 137 | 171 | 34 | 5208 | 83 | 458 | 24.6 | 47.03 | 1.38 |
| SCULPTUR | 5.803 | 2.690 | 0.428 | 2.032 | 4.687 | 3.700 | 0.556 | 2.571 | 3.849 | 2.424 | 0.635 | 1.312 | 127 | 135 | 171 | 36 | 5972 | 72 | 413 | 37.6 | 49.87 | 1.39 |
| TUSSUR | 5.344 | 2.535 | 0.425 | 1.071 | 4.210 | 3.407 | 0.357 | 2.104 | 3.512 | 1.711 | 0.566 | 0.791 | 124 | 133 | 169 | 36 | 4225 | 75 | 431 | 25.0 | 50.77 | 1.41 |