**Table S1: Phenotypic traits recorded during field trial, harvest and post-harvest**

|  |  |  |
| --- | --- | --- |
| **Trait** | **Level of recording** | **Unit/categories** |
| Days to emergence | Population | Number of days |
| Growth habit | Population | Prostrate, intermediate, erecta |
| Leaf hairiness | Individual | Absent; presenta |
| Stem pigmentation | Individual | Green, purple (basal only), purple (half or more) a |
| Awn type | Individual | Awnless, awnleted, awned, sessile hoods, elevated a |
| Awn barbs | Individual | Smooth, intermediate, rougha |
| Lemma colour | Individual | Amber (=normal), tan/red, purple, black/grey, othera |
| Days from emergence to heading | Individual | Number of days |
| Plant height at harvest | Individual | cm |
| Number of tillers | Individual | Number of tillers |
| Spike length | Individual | cm |
| Spike density | Individual | Lax, intermediate, densea |
| Kernel number per ear | Individual | Number of kernels |
| Kernel row number | Individual | 2, 6a |
| Kernel covering | Individual | Naked, semi-covered, covered a |
| Thousand seed weight (TSW) | Individual | g |
| Seed area | Individual | mm2 |
| Seed width | Individual | mm |
| Seed length | Individual | mm |
| Number of seeds harvested per plant | Individual | Number of seeds |

a According to the IPGRI barley descriptors [IPGRI (2004) *Descriptors for Barley* (Hordeum vulgare L.). Rome, Italy: International Plant Genetic Resources Institute.]

**Table S2: Microsatellite description**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Locus** | **Chromosome** | **Allelic richness 1981** | **Allelic richness 2012** | **Number of alleles 1981** | **Number of alleles 2012** | **PIC 1981** | **PIC 2012** |
| GBM1002 | 1H | 1.234 | 1 | 3 | 1 | 0.031 | 0.000 |
| GBM1013 | 1H | 1 | 1.215 | 1 | 4 | 0.000 | 0.030 |
| GBM1029 | 1H | 2.145 | 1.835 | 4 | 3 | 0.050 | 0.113 |
| GBM1334 | 1H | 1 | 1.126 | 1 | 2 | 0.000 | 0.019 |
| GBM1464 | 1H | 3.861 | 3.332 | 4 | 6 | 0.611 | 0.699 |
| GBM1035 | 2H | 3.147 | 3.252 | 4 | 5 | 0.301 | 0.431 |
| GBM1036 | 2H | 3.254 | 2.931 | 5 | 5 | 0.251 | 0.376 |
| GBM1047 | 2H | 2.8 | 2.239 | 4 | 3 | 0.153 | 0.105 |
| GBM1208 | 2H | 3.883 | 3.717 | 4 | 5 | 0.547 | 0.637 |
| GBM1218 | 2H | 1.94 | 1.236 | 2 | 2 | 0.000 | 0.031 |
| GBM1459 | 2H | 2.027 | 1.739 | 3 | 3 | 0.143 | 0.119 |
| GBM1031 | 3H | 1.939 | 1.131 | 2 | 4 | 0.000 | 0.021 |
| GBM1043 | 3H | 1.892 | 1.597 | 2 | 2 | 0.065 | 0.097 |
| GBM1110 | 3H | 3.019 | 2.086 | 4 | 3 | 0.517 | 0.577 |
| GBM1280 | 3H | 3.462 | 2.993 | 4 | 5 | 0.487 | 0.360 |
| GBM1405 | 3H | 2.605 | 1.211 | 3 | 3 | 0.046 | 0.030 |
| GBM1413 | 3H | 1.939 | 1.044 | 2 | 2 | 0.000 | 0.007 |
| GBM1003 | 4H | 2.709 | 1.25 | 3 | 3 | 0.088 | 0.035 |
| GBM1015 | 4H | 7.843 | 6.909 | 11 | 12 | 1.133 | 1.311 |
| GBM1020 | 4H | 1.807 | 1.389 | 3 | 3 | 0.030 | 0.047 |
| GBM1323 | 4H | 3.919 | 3.074 | 5 | 5 | 0.621 | 0.681 |
| GBM1026 | 5H | 3.02 | 3.009 | 5 | 5 | 0.505 | 0.670 |
| GBM1060 | 5H | 3.088 | 2.972 | 4 | 4 | 0.515 | 0.565 |
| GBM1064 | 5H | 3.958 | 2.956 | 5 | 5 | 0.524 | 0.405 |
| GBM1176 | 5H | 3.416 | 3.276 | 5 | 5 | 0.590 | 0.727 |
| GBM1363 | 5H | 1.996 | 1.894 | 2 | 2 | 0.040 | 0.083 |
| GBM1008 | 6H | 1.958 | 2.021 | 2 | 3 | 0.180 | 0.268 |
| GBM1021 | 6H | 4.072 | 3.548 | 6 | 6 | 0.739 | 0.737 |
| GBM1063 | 6H | 2.972 | 2.462 | 5 | 6 | 0.283 | 0.252 |
| GBM1075 | 6H | 2.78 | 2.841 | 3 | 3 | 0.336 | 0.524 |
| GBM1212 | 6H | 1.983 | 1.328 | 2 | 3 | 0.037 | 0.044 |
| GBM1404 | 6H | 1.153 | 1.448 | 2 | 3 | 0.019 | 0.051 |
| GBM1033 | 7H | 1.363 | 1.364 | 3 | 2 | 0.058 | 0.054 |
| GBM1061 | 7H | 3.033 | 2.293 | 5 | 6 | 0.263 | 0.350 |
| GBM1326 | 7H | 3.393 | 3.164 | 4 | 5 | 0.397 | 0.563 |
| GBM1419 | 7H | 2.363 | 2.935 | 4 | 4 | 0.417 | 0.658 |
| GBM1501 | 7H | 1.878 | 1.419 | 3 | 3 | 0.035 | 0.054 |
| GBM1516 | 7H | 2.302 | 1.171 | 4 | 3 | 0.040 | 0.023 |

**Table S3: Variation of climate variables over time**

|  |  |  |
| --- | --- | --- |
| **Climate variable** | **Variation over time** | **Number of sites in which variation over time is significant based on least square regression** |
| Annual mean temperature | increasing | 20 (p<0.0001) |
| Mean temperature of hottest month | increasing | 20 (p<0.0001) |
| Mean temperature of coldest month | increasing | 12 (p<0.05) |
| Mean temperature of hottest quarter | increasing | 20 (p<0.0001) |
| Mean temperature of coldest quarter | increasing | 20 (p≤0.01) |
| Annual precipitation | decreasing | 12 (p<0.05) |
| Precipitation of driest month | decreasing | 12 (p<0.05) In further 5 sites precipitation was always 0, in 3 sites precipitation was >0 only in 8 of 34 years. |
| Precipitation of wettest month | decreasing | 0 |
| Precipitation of wettest quarter | decreasing | 0 |
| Precipitation of driest quarter | decreasing | 20 (p<0.05) |

**Table S4: Means and variance of phenotypic traits by site and collecting year**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable\Site** | **7574** | **7578** | **7582** | **7572** | **7566** | **7567** | **7594** | **7596** | **7608** | **7618** | **7611** | **7619** | **7613** | **7620** | **7626** | **7622** | **7630** | **7633** | **7635** | **7639** |
| Mean (Days emergence to heading, 1981) | 60.9 | 54.6 | 62.7 | 62.3 | 58.5 | 62.1 | 53.7 | 50.1 | 58.6 | 67.3 | 57.6 | 61.3 | 60.1 | 67.1 | 65.5 | 62.5 | 65.6 | 65.0 | 73.8 | 68.3 |
| Mean (Days emergence to heading, 2012) | 69.0 | 64.2 | 75.2 | 61.6 | 62.8 | 61.4 | 62.5 | 61.1 | 61.8 | 63.7 | 61.8 | 65.0 | 62.9 | 63.3 | 66.1 | 65.8 | 76.1 | 64.9 | 77.8 | 64.4 |
| Variance (Days emergence to heading, 1981) | 39.7 | 15.9 | 67.2 | 147.6 | 33.4 | 35.9 | 51.4 | 26.1 | 33.1 | 51.1 | 53.8 | 46.4 | 22.0 | 14.0 | 148.6 | 80.4 | 79.9 | 134.4 | 278.7 | 209.4 |
| Variance (Days emergence to heading, 2012) | 136.2 | 27.2 | 32.0 | 19.5 | 51.9 | 43.6 | 16.8 | 62.4 | 24.2 | 61.4 | 21.5 | 11.5 | 34.0 | 51.9 | 30.9 | 112.5 | 200.0 | 81.9 | 402.9 | 8.7 |
| Mean (Plant height in cm, 1981) | 63.0 | 60.2 | 73.0 | 73.2 | 70.3 | 63.8 | 59.3 | 64.8 | 74.8 | 56.7 | 57.9 | 57.8 | 71.3 | 62.0 | 61.6 | 76.0 | 61.1 | 76.5 | 74.0 | 61.3 |
| Mean (Plant height in cm, 2012) | 72.1 | 74.2 | 70.4 | 74.0 | 73.7 | 79.3 | 77.2 | 70.2 | 79.1 | 71.4 | 67.3 | 82.6 | 86.7 | 82.1 | 73.3 | 82.8 | 82.8 | 78.9 | 79.9 | 73.8 |
| Variance (Plant height in cm, 1981) | 514.7 | 241.2 | 96.5 | 261.2 | 212.3 | 162.1 | 131.2 | 201.0 | 157.9 | 94.0 | 144.5 | 135.6 | 87.7 | 83.9 | 149.4 | 210.9 | 324.6 | 214.0 | 180.6 | 164.3 |
| Variance (Plant height in cm, 2012) | 218.0 | 315.3 | 66.9 | 301.8 | 118.4 | 122.9 | 276.7 | 174.9 | 289.9 | 240.3 | 180.5 | 362.6 | 184.5 | 175.1 | 185.3 | 268.8 | 137.7 | 247.9 | 362.3 | 201.5 |
| Mean (Number of tillers, 1981) | 10.0 | 6.5 | 9.4 | 14.4 | 12.7 | 7.8 | 3.8 | 1.7 | 12.8 | 8.4 | 6.1 | 8.1 | 10.2 | 7.9 | 10.1 | 9.7 | 7.1 | 12.0 | 11.3 | 12.2 |
| Mean (Number of tillers, 2012) | 14.3 | 7.3 | 7.2 | 13.6 | 10.4 | 14.0 | 12.9 | 8.4 | 13.0 | 12.7 | 10.4 | 13.8 | 17.4 | 13.4 | 9.4 | 21.1 | 10.7 | 12.3 | 18.4 | 10.0 |
| Variance (Number of tillers, 1981) | 135.3 | 27.1 | 21.9 | 102.1 | 59.3 | 47.8 | 8.1 | 2.2 | 250.9 | 68.4 | 10.9 | 18.6 | 37.9 | 33.2 | 38.7 | 59.6 | 36.1 | 111.2 | 139.3 | 101.0 |
| Variance (Number of tillers, 2012) | 225.8 | 30.6 | 21.1 | 82.4 | 40.7 | 115.7 | 119.9 | 32.7 | 63.2 | 92.6 | 68.0 | 71.6 | 129.6 | 153.3 | 28.3 | 109.8 | 108.5 | 85.7 | 137.5 | 69.5 |
| Mean (Spike length in cm, 1981) | 6.7 | 5.9 | 7.9 | 6.9 | 7.7 | 6.4 | 4.3 | 4.2 | 7.0 | 5.3 | 6.5 | 5.8 | 6.6 | 5.8 | 6.6 | 7.8 | 5.2 | 7.3 | 7.6 | 6.5 |
| Mean (Spike length in cm, 2012) | 7.2 | 6.4 | 7.2 | 6.8 | 7.7 | 7.5 | 7.2 | 7.0 | 7.5 | 6.8 | 7.2 | 7.4 | 7.1 | 7.8 | 7.5 | 7.7 | 7.3 | 7.5 | 8.4 | 6.8 |
| Variance (Spike length in cm, 1981) | 5.3 | 3.2 | 0.7 | 3.5 | 2.8 | 3.1 | 0.9 | 0.8 | 1.4 | 2.1 | 1.9 | 2.2 | 1.4 | 0.9 | 1.7 | 3.8 | 3.7 | 4.3 | 2.5 | 3.1 |
| Variance (Spike length in cm, 2012) | 3.0 | 3.4 | 2.3 | 4.0 | 2.4 | 2.4 | 2.6 | 0.9 | 4.0 | 1.5 | 1.2 | 2.8 | 1.5 | 2.2 | 1.7 | 1.5 | 2.5 | 2.6 | 3.1 | 3.9 |
| Mean (Kernel number per ear, 1981) | 12.9 | 13.3 | 16.4 | 13.9 | 15.5 | 12.7 | 20.5 | 19.8 | 14.6 | 11.9 | 11.8 | 10.3 | 13.5 | 11.4 | 14.7 | 17.2 | 9.8 | 15.3 | 16.3 | 15.4 |
| Mean (Kernel number per ear, 2012) | 16.0 | 14.8 | 15.7 | 14.8 | 15.4 | 15.9 | 14.7 | 14.9 | 15.3 | 18.3 | 16.7 | 14.6 | 15.0 | 16.3 | 16.8 | 16.6 | 15.3 | 16.6 | 16.8 | 14.7 |
| Variance (Kernel number per ear, 1981) | 32.0 | 18.4 | 9.1 | 31.7 | 15.1 | 36.0 | 86.4 | 107.3 | 12.0 | 16.6 | 11.8 | 11.5 | 12.3 | 8.9 | 12.8 | 32.3 | 29.3 | 39.9 | 28.2 | 33.1 |
| Variance (Kernel number per ear, 2012) | 24.1 | 28.1 | 24.4 | 42.1 | 13.7 | 11.7 | 12.6 | 23.8 | 22.5 | 21.5 | 13.8 | 22.1 | 11.6 | 7.6 | 12.3 | 17.5 | 18.2 | 26.7 | 24.6 | 20.9 |
| Mean (TSW, 1981) | 57.0 | 53.4 | 48.7 | 53.3 | 57.7 | 52.2 | 48.7 | 53.2 | 55.2 | 48.7 | 51.9 | 55.4 | 55.1 | 57.7 | 50.9 | 48.5 | 50.3 | 51.3 | 49.4 | 44.4 |
| Mean (TSW, 2012) | 51.5 | 52.2 | 49.6 | 53.5 | 55.3 | 58.5 | 52.5 | 55.0 | 49.4 | 52.7 | 54.8 | 55.8 | 52.5 | 55.4 | 53.8 | 53.0 | 50.8 | 53.1 | 49.2 | 51.1 |
| Variance (TSW, 1981) | 39.8 | 46.8 | 38.3 | 28.5 | 18.6 | 89.9 | 35.6 | 43.1 | 19.3 | 21.9 | 59.7 | 54.7 | 28.9 | 42.8 | 83.9 | 34.8 | 70.1 | 94.8 | 25.3 | 111.4 |
| Variance (TSW, 2012) | 85.8 | 29.7 | 31.8 | 22.2 | 44.6 | 28.2 | 31.4 | 22.7 | 104.0 | 27.4 | 19.5 | 64.6 | 13.1 | 52.8 | 34.0 | 52.8 | 81.6 | 100.2 | 63.3 | 30.8 |
| Mean (Seed area, 1981) | 33.3 | 34.4 | 33.3 | 32.5 | 33.0 | 33.2 | 34.7 | 32.8 | 33.1 | 31.6 | 34.1 | 33.2 | 32.9 | 33.6 | 31.7 | 31.3 | 32.6 | 33.4 | 32.9 | 30.2 |
| Mean (Seed area, 2012) | 31.7 | 31.5 | 33.4 | 31.5 | 32.7 | 33.2 | 31.9 | 33.3 | 31.6 | 30.9 | 33.2 | 32.4 | 31.4 | 32.8 | 32.2 | 32.5 | 32.7 | 31.9 | 32.6 | 32.1 |
| Variance (Seed area, 1981) | 2.5 | 8.0 | 2.6 | 4.2 | 3.2 | 6.0 | 3.0 | 4.8 | 4.0 | 7.0 | 4.0 | 8.2 | 3.7 | 5.7 | 7.1 | 4.9 | 9.9 | 5.1 | 5.1 | 5.1 |
| Variance (Seed area, 2012) | 4.3 | 3.1 | 4.9 | 2.1 | 6.4 | 4.2 | 2.7 | 6.9 | 10.1 | 1.9 | 1.7 | 7.5 | 3.6 | 2.1 | 1.3 | 3.6 | 4.2 | 7.1 | 4.5 | 4.0 |
| Mean (Seed width, 1981) | 3.6 | 3.5 | 3.4 | 3.5 | 3.5 | 3.5 | 3.3 | 3.5 | 3.5 | 3.4 | 3.5 | 3.5 | 3.5 | 3.5 | 3.4 | 3.4 | 3.4 | 3.5 | 3.5 | 3.3 |
| Mean (Seed width, 2012) | 3.4 | 3.5 | 3.4 | 3.4 | 3.5 | 3.5 | 3.4 | 3.5 | 3.4 | 3.5 | 3.5 | 3.5 | 3.4 | 3.5 | 3.5 | 3.5 | 3.5 | 3.4 | 3.6 | 3.4 |
| Variance (Seed width, 1981) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Variance (Seed width, 2012) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Mean (Seed length, 1981) | 11.5 | 12.1 | 12.1 | 11.4 | 11.6 | 11.2 | 12.9 | 11.6 | 11.5 | 11.0 | 11.9 | 11.4 | 11.5 | 11.4 | 11.1 | 11.2 | 11.3 | 11.6 | 11.3 | 10.9 |
| Mean (Seed length, 2012) | 11.2 | 11.0 | 12.1 | 11.2 | 11.5 | 11.4 | 11.4 | 11.5 | 11.2 | 10.7 | 11.5 | 11.3 | 11.1 | 11.2 | 11.2 | 11.4 | 11.2 | 11.1 | 11.2 | 11.4 |
| Variance (Seed length, 1981) | 0.2 | 0.7 | 0.1 | 0.3 | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.7 | 0.3 | 0.5 | 0.4 | 0.4 | 0.8 | 0.2 | 0.8 | 0.3 | 0.4 | 0.3 |
| Variance (Seed length, 2012) | 0.1 | 0.3 | 0.5 | 0.1 | 0.6 | 0.3 | 0.4 | 0.5 | 0.6 | 0.2 | 0.2 | 0.4 | 0.3 | 0.1 | 0.1 | 0.3 | 0.2 | 0.6 | 0.6 | 0.2 |
| Mean (Number of seeds harvested per plant, 1981) | 72.0 | 57.3 | 105.1 | 112.8 | 108.4 | 51.9 | 47.2 | 30.2 | 92.1 | 49.3 | 45.6 | 50.7 | 74.5 | 50.4 | 80.7 | 82.8 | 43.4 | 82.4 | 88.8 | 115.2 |
| Mean (Number of seeds harvested per plant, 2012) | 139.5 | 77.3 | 74.4 | 113.1 | 85.2 | 117.9 | 94.7 | 66.6 | 115.5 | 113.1 | 94.3 | 128.8 | 134.9 | 110.2 | 91.9 | 144.3 | 74.1 | 102.6 | 94.4 | 87.3 |
| Variance (Number of seeds harvested per plant, 1981) | 4006 | 3050 | 4525 | 8423 | 5410 | 1879 | 1368 | 751 | 7712 | 1937 | 539 | 875 | 2198 | 1050 | 2101 | 4991 | 2916 | 3603 | 6576 | 11158 |
| Variance (Number of seeds harvested per plant, 2012) | 23907 | 4949 | 3451 | 5816 | 2586 | 9289 | 7858 | 1510 | 5798 | 7445 | 4238 | 9854 | 6521 | 5457 | 2682 | 6373 | 3627 | 6887 | 4118 | 6113 |