|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn | Genotype | Type | Origin | Zone | Sn | Gen | Type | Origin | Zone |  |
| 1 | Kilinto | IMV | Ethiopia | ET\_IM | 34 | Foka | IMV | Ethiopia | ET\_IM |  |
| 2 | Robe | IMV | Ethiopia | ET\_IM | 35 | Ude | IMV | Ethiopia | ET\_IM |  |
| 3 | BICHENA | IMV | Ethiopia | ET\_IM | 37 | 226840 | FVs | Ethiopia | AM\_EG |  |
| 4 | DENBI | IMV | Ethiopia | ET\_IM | 38 | 208482 | FVs | Ethiopia | AM\_NSH |  |
| 5 | ARENDATO | IMV | Ethiopia | ET\_IM | 39 | 208227 | FVs | Ethiopia |  NA |  |
| 6 | TOB-66 | IMV | Ethiopia | ET\_IM | 41 | 238137A | FVs | Ethiopia | TIG\_C |  |
| 7 | WERER | IMV | Ethiopia | ET\_IM | 42 | 222352 | FVs | Ethiopia | AM\_WG |  |
| 8 | BOOHAI | IMV | Ethiopia | ET\_IM | 43 | 208373A | FVs | Ethiopia | OR\_NSH |  |
| 9 | GINCHI | IMV | Ethiopia | ET\_IM | 44 | 215276 | FVs | Ethiopia | AM\_NSH |  |
| 10 | LD-357 | IMV | Ethiopia | ET\_IM | 45 | 222434 | FVs | Ethiopia | OR\_AR |  |
| 11 | YERER | IMV | Ethiopia | ET\_IM | 46 | 208746A | FVs | Ethiopia | OR\_WSH |  |
| 12 | GERARDO | IMV | Ethiopia | ET\_IM | 47 | 206551A | FVs | Ethiopia | TIG\_S |  |
| 13 | Mukiye | IMV | Ethiopia | ET\_IM | 48 | 208309 | FVs | Ethiopia | OR\_NSH |  |
| 14 | Mangudo | IMV | Ethiopia | ET\_IM | 49 | 208286 | FVs | Ethiopia | OR\_NSH |  |
| 15 | 214494 | FVs | Ethiopia | OR\_AR | 52 | 213310 | FVs | Ethiopia | TIG\_S |  |
| 16 | 206576 | FVs | Ethiopia | AM\_SG | 54 | 238528 | FVs | Ethiopia | OR\_ESH |  |
| 17 | Assassa | IMV | Ethiopia | ET\_IM | 56 | 238555A | FVs | Ethiopia | AM\_NSH |  |
| 18 | 5679 | FVs | Ethiopia | OR\_NSH | 57 | 8019 | FVs | Ethiopia | OR\_ESH |  |
| 19 | 228862 | FVs | Ethiopia | OR\_EH | 58 | 8436 | FVs | Ethiopia | SNNP |  |
| 21 | 208474 | FVs | Ethiopia | OR\_ESH | 59 | 238540C | FVs | Ethiopia | AM\_NSH |  |
| 22 | 222736 | FVs | Ethiopia | AM\_NSH | 61 | 226191 | FVs | Ethiopia | OR\_WH |  |
| 23 | 208327 | FVs | Ethiopia | OR\_NSH | 62 | 222360 | FVs | Ethiopia | AM\_EG |  |
| 24 | 208276A | FVs | Ethiopia | OR\_NSH | 63 | 5654 | FVs | Ethiopia | OR\_ESH |  |
| 25 | 228771 | FVs | Ethiopia | OR\_WSH | 64 | 226834B | FVs | Ethiopia | AM\_EG |  |
| 27 | Quamy | IMV | Ethiopia | ET\_IM | 65 | 208486 | FVs | Ethiopia | OR\_NSH |  |
| 29 | Hitosa | IMV | Ethiopia | ET\_IM | 66 | 236286 | FVs | Ethiopia | TIG\_E |  |
| 30 | 206548 | FVs | Ethiopia | TIG\_S | 67 | 8205 | FVs | Ethiopia | AM\_NSH |  |
| 31 | Metaya | IMV | Ethiopia | ET\_IM | 68 | 226834A | FVs | Ethiopia | AM\_EG |  |
| 32 | Megenagna | IMV | Ethiopia | ET\_IM | 69 | 208365 | FVs | Ethiopia | OR\_NSH |  |
| 33 | Selam | IMV | Ethiopia | ET\_IM | 71 | 222859 | FVs | Ethiopia | AM\_NSH |  |

 Table S1. Name, type, origin and collection zone of wheat genotypes included in the study

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn | Gen | type | Origin | Zone | Sn Gen |  type | Origin | Zone |
| 72 | 222541 | FVs | Ethiopia | AM\_SG | 123 | 208151B | FVs | Ethiopia | AM\_EG |
| 74 | 231580 | FVs | Ethiopia | AM\_SG | 124 | 222387 | FVs | Ethiopia | OR\_AR |
| 76 | 222542 | FVs | Ethiopia | AM\_SG | 125 | 204470B | FVs | Ethiopia | OR\_AR |
| 77 | 222856 | FVs | Ethiopia | AM\_WO | 127 | 222432 | FVs | Ethiopia | OR\_AR |
| 78 | 222435 | FVs | Ethiopia | OR\_AR | 128 | 206690 | FVs | Ethiopia | AM\_SG |
| 79 | 222499A | FVs | Ethiopia | AM\_EG | 129 | 215268bl | FVs | Ethiopia | AM\_WO |
| 81 | 222623 | FVs | Ethiopia | AM\_SG | 130 | 222855 | FVs | Ethiopia | AM\_WO |
| 82 | 236291 | FVs | Ethiopia | TIG\_C | 131 | 208293 | FVs | Ethiopia | OR\_NSH |
| 84 | 208310 | FVs | Ethiopia | OR\_NSH | 132 | 210823A | FVs | Ethiopia | AM\_EG |
| 87 | 6856A | FVs | Ethiopia | AM\_NGn | 133 | 238561 | FVs | Ethiopia | AM\_NSH |
| 88 | 208304 | FVs | Ethiopia | OR\_NSH | 134 | 216628A | FVs | Ethiopia | TIG\_C |
| 90 | 212561 | FVs | Ethiopia | AM\_NSH | 137 | 238525B | FVs | Ethiopia | OR\_ESH |
| 91 | 222440 | FVs | Ethiopia | OR\_NSH | 139 | 222326 | FVs | Ethiopia | OR\_BA |
| 92 | 7960 | FVs | Ethiopia | AM\_NSH | 140 | GG2 | FVs | Ethiopia | TIG\_C |
| 93 | 222805 | FVs | Ethiopia | OR\_BA | 143 | 238119 | FVs | Ethiopia | TIG\_C |
| 94 | 222578 | FVs | Ethiopia | OR\_EH | 144 | 8214 | FVs | Ethiopia | AM\_NSH |
| 96 | 236309A | FVs | Ethiopia | AM\_WG | 145 | 223257 | FVs | Ethiopia | TIG\_S |
| 99 | 210806A | FVs | Ethiopia | OR\_ESH | 146 | 222641 | FVs | Ethiopia | AM\_SG |
| 102 | 222197A | FVs | Ethiopia | OR\_WSH | 147 | 234498 | FVs | Ethiopia | AM\_EG |
| 104 | 238567 | FVs | Ethiopia | AM\_NSH | 149 | 222554 | FVs | Ethiopia | OR\_AR |
| 105 | 222408 | FVs | Ethiopia | OR\_AR | 151 | 208288 | FVs | Ethiopia | OR\_NSH |
| 108 | 226273 | FVs | Ethiopia | OR\_AR | 152 | 236295 | FVs | Ethiopia | TIG\_C |
| 110 | 236313 | FVs | Ethiopia | AM\_EG | 153 | 203989 | FVs | Ethiopia | OR\_ESH |
| 111 | 222441A | FVs | Ethiopia | OR\_NSH | 154 | 231572 | FVs | Ethiopia | AM\_EG |
| 112 | 222780 | FVs | Ethiopia | SNNP | 156 | 216625 | FVs | Ethiopia | TIG\_C |
| 115 | 222464 | FVs | Ethiopia | OR\_WSH | 157 | 222190 | FVs | Ethiopia | OR\_ESH |
| 116 | 208192 | FVs | Ethiopia | AM\_EG | 158 | 210821 | FVs | Ethiopia | AM\_EG |
| 117 | 238507 | FVs | Ethiopia | OR\_ESH | 159 | 236312A | FVs | Ethiopia | AM\_EG |
| 119 | 222811 | FVs | Ethiopia | AM\_WO | 160 | 222419 | FVs | Ethiopia | OR\_AR |
| 120 | Flakit | IMV | Ethiopia | ET\_IM | 161 | 226951 | FVs | Ethiopia | AM\_SG |
| 122 | 236303A | FVs | Ethiopia | AM\_NGn | 163 | 236985A | FVs | Ethiopia | OR\_AR |

*Table S1. Continued*

*Table S1. Cont.…*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn | Genotype | Type | Origin | Zone | Sn | Genotype | Type | Origin | Zone |
| 158 | 210821 | FVs | Ethiopia | AM\_EG | 204 | Mossobo | IMV | Ethiopia | ET\_IM |
| 159 | 236312A | FVs | Ethiopia | AM\_EG | 206 | 210812A | FVs | Ethiopia | AM\_EG |
| 160 | 222419 | FVs | Ethiopia | OR\_AR | 207 | 238546 | FVs | Ethiopia | OR\_NSH |
| 161 | 226951 | FVs | Ethiopia | AM\_SG | 208 | 7961A | FVs | Ethiopia | AM\_NSH |
| 164 | 210825 | FVs | Ethiopia | AM\_EG | 209 | 222499B | FVs | Ethiopia | AM\_EG |
| 165 | 208873 | FVs | Ethiopia | SNNP | 210 | 222426 | FVs | Ethiopia | OR\_AR |
| 166 | 238492B | FVs | Ethiopia | OR\_ESH | 214 | 238504A | FVs | Ethiopia | OR\_ESH |
| 167 | 5314 | FVs | Ethiopia | OR\_ESH | 215 | 222816B | FVs | Ethiopia | AM\_WO |
| 169 | 206551 | FVs | Ethiopia | TIG\_S | 216 | 236276 | FVs | Ethiopia | TIG\_S |
| 171 | 222413 | FVs | Ethiopia | OR\_AR | 217 | 228593B | FVs | Ethiopia | AM\_EG |
| 172 | 222346 | FVs | Ethiopia | AM\_WG | 218 | 5611 | FVs | Ethiopia | OR\_NSH |
| 173 | 214877 | FVs | Ethiopia | AM\_WO | 219 | 227542 | FVs | Ethiopia |  AM\_EG |
| 174 | 248478 | FVs | Ethiopia |  NA | 220 | 8208 | FVs | Ethiopia | AM\_NSH |
| 175 | 208234A | FVs | Ethiopia | AM\_EG | 221 | 236297 | FVs | Ethiopia | TIG\_C |
| 176 | 210806B | FVs | Ethiopia | OR\_ESH | 222 | 208242 | FVs | Ethiopia | AM\_EG |
| 177 | 239081A | FVs | Ethiopia | AM\_EG | 223 | 208315 | FVs | Ethiopia | OR\_NSH |
| 179 | 222433 | FVs | Ethiopia | OR\_AR | 224 | 228260A | FVs | Ethiopia | AM\_WO |
| 181 | 208151 | FVs | Ethiopia | AM\_EG | 225 | 208290 | FVs | Ethiopia | OR\_NSH |
| 183 | 238504C | FVs | Ethiopia | OR\_ESH | 227 | 208311 | FVs | Ethiopia | OR\_NSH |
| 185 | 208383B | FVs | Ethiopia | OR\_NSH | 229 | 222752 | FVs | Ethiopia | AM\_EG |
| 186 | 238522 | FVs | Ethiopia | OR\_ESH | 231 | 236271 | FVs | Ethiopia | TIG\_S |
| 187 | 238576 | FVs | Ethiopia | AM\_NSH | 233 | 210798B | FVs | Ethiopia | OR\_WSH |
| 189 | 212564 | FVs | Ethiopia | AM\_NSH | 234 | 238564A | FVs | Ethiopia | AM\_NSH |
| 191 | 236989 | FVs | Ethiopia | OR\_ESH | 235 | 228768 | FVs | Ethiopia | OR\_WSH |
| 194 | 214585 | FVs | Ethiopia | OR\_BA | 236 | 236278 | FVs | Ethiopia | TIG\_S |
| 196 | 238537 | FVs | Ethiopia | AM\_NSH | 237 | 238519 | FVs | Ethiopia | OR\_ESH |
| 198 | 204488 | FVs | Ethiopia | OR\_NSH | 238 | 208279 | FVs | Ethiopia | OR\_NSH |
| 199 | 236987 | FVs | Ethiopia | AM\_NSH | 240 | 231586 | FVs | Ethiopia | AM\_WO |
| 202 | 238579 | FVs | Ethiopia | AM\_NSH | 241 | 231573 | FVs | Ethiopia | AM\_EG |
| 203 | 207058 | FVs | Ethiopia | OR\_BA | 242 | 208283 | FVs | Ethiopia | OR\_NSH |

*Table S1. Continued*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn | Genotype | type | Origin | Zone | Sn | Genotype | type | Origin | Zone |
| 243 | 231565 | FVs | Ethiopia | AM\_NSH | 281 | 208196 | FVs | Ethiopia | AM\_EG |
| 245 | 208253 | FVs | Ethiopia | OR\_NSH | 282 | 204530 | FVs | Ethiopia | OR\_NSH |
| 246 | 206567 | FVs | Ethiopia | AM\_SG | 283 | 204493A | FVs | Ethiopia | OR\_NSH |
| 247 | 229251 | FVs | Ethiopia | AM\_NSH | 284 | 222332 | FVs | Ethiopia | OR\_BA |
| 249 | 208252 | FVs | Ethiopia | OR\_NSH | 285 | 208244 | FVs | Ethiopia | AM\_EG |
| 250 | 238552A | FVs | Ethiopia | AM\_NSH | 286 | 210805A | FVs | Ethiopia | OR\_ESH |
| 251 | 208229 | FVs | Ethiopia | AM\_EG | 287 | 214874 | FVs | Ethiopia | AM\_WO |
| 253 | 8333A | FVs | Ethiopia | AM\_EG | 288 | 208328 | FVs | Ethiopia | OR\_NSH |
| 255 | 208194 | FVs | Ethiopia | AM\_EG | 289 | 236301 | FVs | Ethiopia | AM\_NGn |
| 256 | 208175 | FVs | Ethiopia | AM\_EG | 290 | 231547A | FVs | Ethiopia | OR\_AR |
| 258 | 208146 | FVs | Ethiopia | AM\_EG | 293 | 208155 | FVs | Ethiopia | AM\_EG |
| 259 | 222806 | FVs | Ethiopia | OR\_BA | 294 | 8034A | FVs | Ethiopia | OR\_ESH |
| 260 | 5588 | FVs | Ethiopia | OR\_NSH | 295 | 8034B | FVs | Ethiopia | OR\_ESH |
| 262 | 236300 | FVs | Ethiopia | TIG\_C | 296 | 231591A | FVs | Ethiopia | AM\_WO |
| 263 | 208332A | FVs | Ethiopia | OR\_NSH | 300 | 208131A | FVs | Ethiopia | AM\_EG |
| 264 | 208334 | FVs | Ethiopia | OR\_NSH | 302 | 210820B | FVs | Ethiopia | AM\_EG |
| 265 | 226094 | FVs | Ethiopia | AM\_WO | 303 | 5634 | FVs | Ethiopia | OR\_NSH |
| 267 | 236979A | FVs | Ethiopia | OR\_AR | 304 | 208136 | FVs | Ethiopia | AM\_EG |
| 269 | 208190 | FVs | Ethiopia | AM\_EG | 305 | 226357 | FVs | Ethiopia | OR\_AR |
| 271 | 208780 | FVs | Ethiopia | OR\_ESH | 306 | 208294 | FVs | Ethiopia | OR\_NSH |
| 272 | 236986 | FVs | Ethiopia | AM\_NSH | 307 | 208336 | FVs | Ethiopia | OR\_NSH |
| 273 | 204353 | FVs | Ethiopia | OR\_WSH | 308 | 208173 | FVs | Ethiopia | AM\_EG |
| 274 | 210817B | FVs | Ethiopia | AM\_EG | 311 | 238516 | FVs | Ethiopia | OR\_ESH |
| 275 | 215111 | FVs | Ethiopia | AM\_WO | 314 | 226371 | FVs | Ethiopia | OR\_WSH |
| 276 | 228763A | FVs | Ethiopia | OR\_WSH | 316 | 234514 | FVs | Ethiopia | AM\_WG |
| 278 | 222786 | FVs | Ethiopia | OR\_NSH | 317 | 222327A | FVs | Ethiopia | OR\_BA |
| 279 | 236314B | FVs | Ethiopia | OR\_NSH | 320 | 222655 | FVs | Ethiopia | AM\_SG |
| 280 | 214357 | FVs | Ethiopia | OR\_NSH | 321 | 231524 | FVs | Ethiopia | OR\_WSH |
|  |  |  |  |  | 323 | 238513 | FVs | Ethiopia | AM\_NSH |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn | Genotype | Type | Origin | Zone | Sn | Genotype | Type | Origin | Zone |
| 324 | 234513 | FVs | Ethiopia | AM\_WG | 366 | 208321 | FVs | Ethiopia | OR\_NSH |
| 325 | 208281 | FVs | Ethiopia | OR\_NSH | 367 | 208316 | FVs | Ethiopia | OR\_NSH |
| 327 | 210801 | FVs | Ethiopia | OR\_WSH | 371 | 208262 | FVs | Ethiopia | OR\_NSH |
| 328 | 222854 | FVs | Ethiopia | AM\_WO | 372 | 208243 | FVs | Ethiopia | AM\_EG |
| 329 | 208162 | FVs | Ethiopia | AM\_EG | 373 | 208280 | FVs | Ethiopia | OR\_NSH |
| 330 | 208168 | FVs | Ethiopia | AM\_EG | 375 | 222415 | FVs | Ethiopia | AM\_NSH |
| 333 | 222500 | FVs | Ethiopia | AM\_EG | 376 | 208320 | FVs | Ethiopia | OR\_NSH |
| 334 | 231597 | FVs | Ethiopia | AM\_WO | 377 | 210896 | FVs | Ethiopia | AM\_EG |
| 335 | 6856B | FVs | Ethiopia | AM\_NGn | 378 | 238130 | FVs | Ethiopia | TIG\_E |
| 336 | 222858 | FVs | Ethiopia | AM\_NSH | 379 | 210815 | FVs | Ethiopia | AM\_EG |
| 337 | 222682 | FVs | Ethiopia | AM\_WO | 380 | 214881 | FVs | Ethiopia | AM\_WO |
| 338 | 206666 | FVs | Ethiopia | AM\_NGn | 383 | 214366 | FVs | Ethiopia | AM\_NSH |
| 339 | 208258 | FVs | Ethiopia | OR\_NSH | 387 | 222813 | FVs | Ethiopia | AM\_WO |
| 342 | 226887 | FVs | Ethiopia | OR\_WSH | 388 | 202458 | FVs | Ethiopia | OR\_WSH |
| 344 | 210813 | FVs | Ethiopia | AM\_EG | 389 | 202012 | FVs | Ethiopia | OR\_AR |
| 345 | 228600 | FVs | Ethiopia | AM\_EG | 391 | 227058 | FVs | Ethiopia | OR\_BA |
| 347 | 210795 | FVs | Ethiopia | OR\_WSH | 393 | 208273 | FVs | Ethiopia | OR\_NSH |
| 348 | 226928 | FVs | Ethiopia | OR\_AR | 395 | 5578A | FVs | Ethiopia | OR\_NSH |
| 349 | 238498br | FVs | Ethiopia | OR\_ESH | 396 | 214502 | FVs | Ethiopia | OR\_WH |
| 350 | 238498 | FVs | Ethiopia | OR\_ESH | 397 | 236269 | FVs | Ethiopia | TIG\_S |
| 351 | 238133 | FVs | Ethiopia | TIG\_E | 398 | 236988 | FVs | Ethiopia | OR\_ESH |
| 352 | 238139 | FVs | Ethiopia | AM\_EG |  | ***Abbreviations:*** *ET\_IM, Ethiopian improved, AM\_ (Amhara), OR\_ (Oromiya); TIG\_ (Tigray); SNNP (Southern Nations Nationality and People); LR (Landraces); IM (Improved); AM\_EG (Amhara East Gojjam); AM\_WG (Amhara West Gojjam); AM\_NSH (Amhara North Shoa); AM\_WO (Amhara Wollo); AM\_NGn (Amhara north Gonder);AM\_SGn (Amhara south Gonder); OR\_AR (Oromiya Arsi); OR\_BA (Oromiya Bale); OR\_ESH (Oromiya East Shoa); OR\_NSH (Oromiya north Shoa); OR\_WSH (Oromiya west Shoa); OR\_EH (Oromiya east Harargie); OR\_WH (Oromiya west Harargie); TIG\_E (Eastern Tigray); TIG\_C (Central Tigray); TIG\_S (Southern Tigray)* |
| 353 | 236308 | FVs | Ethiopia | AM\_WG |  |
| 354 | 208200 | FVs | Ethiopia | AM\_EG |  |
| 355 | 210816A | FVs | Ethiopia | AM\_EG |  |
| 356 | 210816B | FVs | Ethiopia | AM\_EG |  |
| 359 | 208931 | FVs | Ethiopia | OR\_WSH |  |
| 360 | 238570 | FVs | Ethiopia | AM\_NSH |  |
| 361 | 208312 | FVs | Ethiopia | OR\_NSH |  |
| 363 | 214303 | FVs | Ethiopia | OR\_WSH |  |
| 364 | 226825 | FVs | Ethiopia | OR\_BA |  |

*Table S1. Continued*

**Table S2.** Means, minimum, maximum and range values with LSD (5%) of the phenological and agronomic traits of durum wheat as a function of genotypes, locations and seasons.

|  |  |  |
| --- | --- | --- |
| Factors group | Statistical values | Traits |
| Genotype (G) | DB | DF | DM | NET | PH | SPL | SPS | BY | GY | TGW |
| 1. FVs(n = 265)
 | Average | 73.52 | 83.35 | 131.94 | 4.47 | 94.95 | 7.24 | 31.21 | 7.35 | 2.38 | 39.66 |
| Minimum | 67.00 | 77.4 | 120.8 | 3.23 | 81.03 | 5.86 | 25.09 | 5.47 | 1.68 | 32.74 |
| Maximum | 82.69 | 92.99 | 141.8 | 6.24 | 110.16 | 10.68 | 39.00 | 9.53 | 3.18 | 49.16 |
| Range | 15.69 | 15.59 | 21.00 | 3.01 | 29.13 | 4.82 | 13.91 | 4.06 | 1.49 | 16.42 |
| 1. IMVs (n = 24)
 | Average | 69.89 | 80.94 | 134.77 | 3.94 | 95.44 | 6.39 | 36.55 | 6.72 | 2.22 | 42.47 |
| Minimum | 66.38 | 76.08 | 129.8 | 3.20 | 80.32 | 5.72 | 30.62 | 5.36 | 1.77 | 37.00 |
| Maximum | 72.98 | 85.56 | 140.7 | 4.84 | 107.62 | 7.17 | 41.06 | 7.95 | 2.81 | 47.08 |
| Range | 6.60 | 9.48 | 10.90 | 1.64 | 27.30 | 1.45 | 10.44 | 2.59 | 1.04 | 10.08 |
| **LSD (5%)** |  | **4.90** | **5.30** | **7.47** | **1.59** | **11.33** | **1.28** | **6.97** | **3.38** | **0.69** | **5.14** |
| Location (L) | Average | 75.51 | 83.08 | 135.97 | 4.37 | 93.45 | 6.96 | 31.49 | 8.05 | 2.68 | 44.33 |
| Geregera (n = 289) | Minimum | 69.15 | 75.7 | 124.1 | 2.45 | 76.87 | 5.24 | 18.26 | 5.03 | 1.53 | 36.72 |
| Maximum | 83.94 | 92.47 | 147.60 | 8.25 | 108.81 | 13.07 | 43.32 | 11.52 | 4.17 | 58.25 |
| Range | 14.79 | 16.77 | 23.50 | 5.80 | 31.94 | 7.83 | 25.06 | 6.50 | 2.64 | 21.53 |
| Average | 71.06 | 83.30 | 128.27 | 4.50 | 96.52 | 7.41 | 31.64 | 6.56 | 2.07 | 35.35 |
| Hagreselam (n = 289) | Minimum | 62.07 | 76.05 | 116.5 | 2.644 | 73.90 | 5.34 | 20.6 | 3.71 | 0.79 | 27.29 |
| Maximum | 84.38 | 95.79 | 139.30 | 6.25 | 114.51 | 9.32 | 45.12 | 11.59 | 3.14 | 44.97 |
| Range | 22.31 | 19.74 | 22.80 | 3.61 | 40.61 | 3.98 | 24.52 | 7.87 | 2.35 | 17.68 |
| **LSD (5%)** |  | **6.90** | **7.36** | **10.46** | **ns** | **15.86** | **0.10** | **ns** | **3.37** | **0.98** | **0.41** |
| Year (Y) | Average | 71.06 | 80.44 | 121.71 | 6.07 | 95.91 | 7.50 | 32.55 | 8.08 | 2.82 | 41.95 |
| 2012 (n = 289) | Minimum | 63.26 | 72.78 | 110.3 | 3.744 | 78.67 | 5.56 | 23.54 | 5.12 | 1.63 | 32.77 |
| Maximum | 80.71 | 91.02 | 132.80 | 9.94 | 110.90 | 13.99 | 42.54 | 11.65 | 4.24 | 50.09 |
| Range | 17.45 | 18.24 | 22.50 | 6.19 | 32.23 | 8.43 | 19.00 | 6.53 | 2.62 | 17.32 |
| 2013 (n = 289) | Average | 75.50 | 85.95 | 142.55 | 2.80 | 94.05 | 6.87 | 30.57 | 6.53 | 1.93 | 37.72 |
| Minimum | 66.69 | 75.70 | 129.00 | 1.72 | 67.29 | 4.62 | 21.06 | 3.63 | 0.98 | 28.24 |
| Maximum | 85.96 | 96.60 | 159.70 | 4.05 | 117.32 | 8.58 | 42.62 | 9.72 | 3.33 | 48.89 |
| Range | 19.27 | 20.90 | 30.70 | 2.33 | 50.03 | 3.96 | 21.56 | 6.09 | 2.33 | 20.65 |
| **LSD (5%)** |  | **6.90** | **7.35** | **10.45** | **ns** | **15.94** | **0.10** | **0.56** | **3.37** | **0.98** | **0.41** |

*n= refers to number of genotypes in each group.*

**Table S3.** Cluster mean values of the investigated traits of durum wheat genotypes, computed as the average of genotypes, locations and years, and the within cluster sum of squares (SS).

|  |  |
| --- | --- |
| Traits | Clusters |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| DB | 70.9  | 69.7  | 71.3  | 72.7  | 72.7  | 74.2  | 75.2 | 69.7  | 76.1  | 78.9  | 73.5 |
| DF | 81.2  | 80.9  | 81.2  | 82.9  | 81.6  | 84.5  | 84.9 | 79.5  | 85.9  | 89.3  | 83.2  |
| DM | 132.9  | 133.9  | 129.0  | 133.3  | 130.6  | 133.1  | 132.9 | 126.3  | 135.9  | 138.3  | 131.3  |
| NET | 4.4  | 4.1 | 4.6  | 4.5  | 5.1  | 4.6  | 4.8 | 4.9  | 4.6  | 4.7  | 4.7  |
| PH | 96.9  | 83.4 | 92.2 | 104.2 | 103.2 | 86.6  | 92.9 | 97.3  | 99.0  | 90.3  | 98.6  |
| SPL | 6.8  | 6.1  | 7.2  | 7.4  | 7.5  | 7.0  | 7.3 | 7.5  | 7.2  | 7.2  | 7.3  |
| SPS | 35.9  | 38.2  | 30.6  | 33.2  | 31.0  | 29.9  | 30.2 | 29.7  | 32.3  | 31.0  | 30.7  |
| BY | 7.3  | 7.2  | 7.3  | 7.3  | 7.3  | 7.3  | 7.3 | 7.3  | 7.4  | 7.3  | 7.3  |
| GY | 2.4  | 2.2  | 2.3  | 2.6  | 2.5  | 2.2  | 2.3 | 2.4  | 2.6  | 2.3  | 2.5  |
| TGW | 41.9  | 40.7  | 38.2  | 43.6  | 37.9  | 38.1  | 39.4 | 38.2  | 41.3  | 39.2  | 40.9  |
| Within cluster SS | 1075.6 | 409.4 | 919.5 | 346.9 | 283.6 | 1053.8 | 1018.7 | 602.7 | 404.5 | 506.0 | 784.9 |

**Table S4**: Spearman’s correlation coefficient of the phenological and agronomic traits of durum wheat from combined data over locations and seasons

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Traits | DB | DF | DM | NET | PH | SPL | SPS | GY | TGW |
| BY | -0.01c | -0.11a | -0.20a | 0.29a | 0.39a | 0.19a | 0.15a | 0.79a | 0.35a |
| DB |  | 0.82a | 0.56a | -0.29a | -0.20a | -0.11a | -0.20a | -0.16a | 0.10a |
| DF |  |  | 0.52a | -0.36a | -0.19a | -0.06a | -0.19a | -0.31a | -0.05a |
| DM |  |  |  | -0.58a | -0.12a | -0.27a | -0.09b | -0.34a | 0.01c |
| NET |  |  |  |  | 0.22a | 0.30a | 0.11a | 0.43a | 0.14a |
| PH |  |  |  |  |  | 0.33a | 0.22a | 0.36a | 0.13a |
| SPL |  |  |  |  |  |  | 0.10a | 0.18a | -0.06a |
| SPS |  |  |  |  |  |  |  | 0.25a | 0.18b |
| GY |  |  |  |  |  |  |  |  | 0.48a |
| TGW |  |  |  |  |  |  |  |  |  |

*a significant at p<0.001, b significant at p<0.01, c non-significant association*

**Table S5.** Mean of top 5% performing genotypes (Gen) across seasons for days to maturity, grain yield and biomass yield. The grand mean (*μ)* for each trait shown at the bottom of the table*. †improved varieties*

|  |
| --- |
| Temporal variation |
| 2012 | 2013 |
| **Gen** | DM | BY | GY | **Gen** | DM | BY | GY |
| **210** | 127.4 | 10.05 | 4.24 | **206** | 140.8 | 9.72 | 3.33 |
| **220** | 122.5 | 10.63 | 3.96 | **280** | 133.2 | 6.42 | 2.96 |
| **186** | 123.4 | 11.37 | 3.80 | **238** | 152.9 | 8.57 | 2.87 |
| **284** | 122.9 | 10.69 | 3.77 | **278** | 140.3 | 9.25 | 2.77 |
| **227** | 119.4 | 10.42 | 3.75 | **368** | 139.2 | 6.49 | 2.73 |
| **44** | 123.3 | 8.56 | 3.66 | **214** | 143.2 | 8.66 | 2.72 |
| **373** | 116.8 | 10.14 | 3.65 | **104** | 143.8 | 9.00 | 2.69 |
| **43** | 121.9 | 9.87 | 3.61 | **161** | 143.7 | 8.27 | 2.67 |
| **65** | 119.1 | 9.97 | 3.58 | **296** | 139.0 | 8.69 | 2.63 |
| **58** | 117.1 | 10.15 | 3.57 | **334** | 133.8 | 7.90 | 2.62 |
| **8†** | 120.9 | 9.85 | 3.56 | **221** | 149.7 | 6.57 | 2.57 |
| **283** | 121.9 | 10.03 | 3.48 | **328** | 138.5 | 8.29 | 2.55 |
| **19** | 123.2 | 11.29 | 3.47 | **283** | 142.9 | 7.39 | 2.54 |
| **45** | 119.4 | 9.25 | 3.47 | **163** | 145.0 | 8.41 | 2.52 |
| **166** | 118.6 | 8.91 | 3.46 | **68** | 141.2 | 7.49 | 2.52 |
| **2†** | 119.0 | 8.74 | 3.44 | **288** | 147.4 | 7.92 | 2.51 |
| **388** | 118.7 | 9.09 | 3.43 | **96** | 143.4 | 8.62 | 2.48 |
| **125** | 124.4 | 9.08 | 3.43 | **38** | 146.3 | 7.27 | 2.47 |
| **41** | 120.6 | 9.33 | 3.43 | **352** | 152.0 | 8.93 | 2.47 |
| **389** | 125.2 | 9.37 | 3.42 | **302** | 133.9 | 8.24 | 2.45 |
| **191** | 125.5 | 9.53 | 3.42 | **140** | 142.2 | 7.44 | 2.45 |
| **280** | 126.0 | 11.65 | 3.40 | **327** | 143.9 | 7.72 | 2.43 |
| **338** | 119.7 | 9.69 | 3.39 | **74** | 140.9 | 8.87 | 2.42 |
| **378** | 121.5 | 7.26 | 3.38 | **336** | 143.5 | 7.84 | 2.42 |
| **369** | 116.8 | 9.16 | 3.38 | **265** | 136.1 | 7.92 | 2.40 |
| **66** | 120.6 | 9.27 | 3.37 | **220** | 140.8 | 7.84 | 2.40 |
| **68** | 121.7 | 8.97 | 3.37 | **345** | 137.9 | 6.29 | 2.38 |
| **15** | 120.0 | 9.83 | 3.35 | **189** | 138.5 | 8.05 | 2.37 |
| **238** | 120.4 | 9.14 | 3.34 | **263** | 141.3 | 7.02 | 2.37 |
|  | *121.75* | *8.08* | *2.82* |  | *142.6* | *6.53* | *1.93* |



Figure S1. Map showing the locations of experimental sites (yellow circles) and points of FVs collection (the green circles)



Figure S2. Graph from amalgamation steps showing the abrupt increase in distance levels and decrease in similarity levels as a cut-off point for determination of the actual cluster numbers for final partitioning of the data. The similarity level dropped from 44.18 to 22.48 and the distance level jumped by 220.7units at amalgamation steps of 278 and 279 (from 11 clusters to 10).

A

 B

Figure S3. Descriptive statistical values of DF and DM (A) and GY and BY of comparing farmer varieties (FVs) and improved varieties (IMVs) of durum wheat. The values are averages of locations and seasons.