Supplementary documents

Table S1. List and type of durum wheat genotypes characterized at two locations over two seasons

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Entry | Accession/variety | Status | Seed source | Region  | Collection zone | Locality  |
| G1 | 206551 | FV | EBI | Tigray | Southern | Enderta |
| G2 | 206556 | FV | EBI | Tigray | Eastern | Ganta Hafeshum |
| G3 | 207058 | FV | EBI | Amhara | East Gojjam | Enarj Enawga |
| G4 | 208150 | FV | EBI | Amhara | East Gojjam | Enarj Enawga |
| G5 | 208173 | FV | EBI | Amhara | East Gojjam | Enarj Enawga |
| G6 | 208175 | FV | EBI | Amhara | East Gojjam | Enarj Enawga |
| G7 | 208196 | FV | EBI | Amhara | East Gojjam | Enarj Enawga |
| G8 | 208227 | FV | EBI | Na | Na | Na |
| G9 | 208253 | FV | EBI | Oromia | North Shoa | Wara Jarso |
| G10 | 208304‡ | FV | EBI | Oromia | North Shoa | Gerar Jarso |
| G11 | 208309 | FV | EBI | Oromia | North Shoa | Gerar Jarso |
| G12 | 208315 | FV | EBI | Oromia | North Shoa | Gerar Jarso |
| G13 | 208322 | FV | EBI | Oromia | North Shoa | Gerar Jarso |
| G14 | 208474 | FV | EBI | Oromia |  East shoa | Lome |
| G15 | 208482 | FV | EBI | Amhara | East shoa |  Minjarna shenokora |
| G16 | 210825 | FV | EBI | Amhara |  East Gojjam |  Dejen |
| G17 | 213310 | FV | EBI | Tigray |  Southern |  Enderta |
| G18 | 214357 | FV | EBI | Oromia | North Shoa | Aleltu |
| G19 | 216796 | FV | EBI | Na | Na | Na |
| G20 | 222360 | FV | EBI | Amhara | East Gojjam | Enaraj Enawga |
| G21 | 226834 | FV | EBI | Amhara | East Gojjam | Dejen |
| G22 | 228763 | FV | EBI | Oromia | West Shoa | Ambo |
| G23 | 228771 | FV | EBI | Oromia | West Shoa | Ambo |
| G24 | 236282 | FV | EBI | Tigray | Southern | Samre |
| G25 | 238567 | FV | EBI | Amhara | North Shoa | Debrebrhan Zuria |
| G26 | 208336bl | FV | EBI | Oromia | North Shoa | Mulona Sululta |
| G27 | 226834B | FV | EBI | Amhara | East Gojjam  | Dejen |
| G28 | 238137A | FV | EBI | Tigray | Central | Tahtay Maychew |
| G29 | 238492B | FV | EBI | Oromia | East Shoa | Ada’a Chukala |
| G30 | 8208 | FV | EBI | Amhara | North Shoa | Matudmezezo Mojana |
| G31 | 8214 | FV | EBI | Amhara | North Shoa | Matudmezezo Mojana |
| G32 | Arendato | IMV | DzARC | - | - | - |
| G33 | Asassa | IMV | DzARC | - | - | - |
| G34 | Mangudo | IMV | DzARC | - - |
|  G35 | Mukiye | IMV | DzARC | - - |
| G36 | Robe | IMV | DzARC | - - |

 ‡ FVs selected for superior performance and registered nationally as variety; FV: Farmers variety or landraces; IMV: improved variety, EBI: Ethiopian Biodiversity Institute; DzARC: Debrezeit Agricultural Research Center

Table S2. Matrix of top 10 performer genotypes due to the three way interactions of G × L × Y for selected traits of durum wheat. The rows list of genotypes across various environments while the column presents genotypes performance within an environment.

|  |  |
| --- | --- |
| Trait | Location/year |
| Ayba | Melfa | Menkere | MU |
| 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| DF (early to late; day) | G19, G35, G34, G26, G29, G36G4, G7, G16, G18(79 – 82) | G35, G29, G16 G36, G8, G7G34,G2,G18 G26(68 – 71) | G36, G29, G35G34, G4, G7G16, G19, G13G25(82.3 -73.2) | G14, G31, G29G34, G26, G16G32, G36, G8G7(69.1 – 72.4) | G36, G4, G35G34, G29, G32G7, G18, G2G16(68.3-78.1) | G36, G35, G34G4, G29, G7G2, G18, G16G19(62.2 – 70.8) | G7, G34, G36G19, G35, G29, G4, G16G8, G15(62.3 – 68.5) | G4, G36, G34G35, G2, G7G18, G16, G32, G29(58 – 63) |
| DM (early to late; day) | G8, **G6**, G33, G2, G34, G27G17, G22, G14 G31(125-129) | G2, G15, G32G23, **G6**, G18G22, G29, G7G25(118 – 122) | **G6**, G15, G34G13, G35, G10G2, G14, G12G7(121-124) | G4, G32, **G6**G9, G33, G15G10, G25, G30G2(105.6 – 111.4) | G10, G32, G9G2, **G6**, G31G22, G1, G30G11(116 – 125) | **G6**, G12, G15G4, G29, G2G17, G14, G22G10(111.7 – 116.4) | **G6**, G35, G34G22, G9, G28G33, G13, G4G29(95.6 – 102.2) | G6, G16, G1G33, G31, G4G28, G9, G35G30(81.2 – 87.4) |
| BY (high to low; t ha-1) | G26, G33, G8, G16, G23, G4G20, G11, G10, G30 | G2, G21, G32G36, G3, G30G22, G4, G16G7(17.7 -14.6) | G12, G24, G16G30, G26, G22G10, G28, G7G4(7.03 – 5.71) | G27, G25, G10G26, G5, G19G10, G36, G6G17(11.7 – 8.45) | G5, G10, G19G36, G14, G16G22, G1, G30G21(10.9 – 8.6) | G4, G16, G29G35, G1, G14G15, G33, G25G6(11.1-8.69) | G30, G14, G19, G25, G11, G29, G24, G6, G16G3(9.66 – 8.49) | G27, G23, G30, G19, G26, G17, G6, G24, G29, G10(11.7 – 7.4) |
| GY (High to low; t ha-1) | G29, G16, G23, G33, G24, G26G12, G10, G22, G20(6.38 -5.19) | G22, G21, G7G30, G12, G31G10, G16, G14G25(6.24 – 4.39) | G33, G26, G30G21, G24, G22G28, G4, G10G27(2.62 – 2.28) | G27, G10, G25G13, G17, G26G22, G16, G6G30(4.3 – 3.17) | G10, G7, G5G19, G36, G11G13, G22, G30G14(3.85 – 3.17) | G15, G16, G30G6, G36, G12G34, G21, G10G29(3.44 – 2.85) | G11, G26, G4G8, G30, G19G13, G21, G10G28(3.47 – 2.86) | G27, G25, G23G13, G30, G10G19, G22, G6G15(3.03 – 2.16) |
| TGW (large to small: g) | G23, G34, G25, G33, G10, G16G29, G13, G35, G30(63.5-51.4) | G30, G22, G34G10, G13, G1G12, G2, G28G5(66.5 – 56.2) | G23, G9, G10G34, G14, G25G30, G3, G33G21(54.6 – 48.2) | G23, G25, G27G33, G14, G10G21, G30, G24G19(56.4 – 49.8) | G23, G14, G13G5, G3, G30G11, G10, G25G8(54.6 – 46.6) | G34, G11, G25G27, G14, G21G35, G8, G13G30(62.2 – 49.9) | G23, G25, G30G14, G13, G11G34, G20, G3G19(50.6 – 39) | G27, G13, G14G5, G8, G25G30, G21, G10G19(44.8 – 37.8) |

Genotypes: G1 – G31 are FVs; G32 – G36 are improved varieties

Genotypes in shade are nationally registered for stable performance and quality grain (data not presented)



Figure S1. Characterization and selection scheme of durum wheat for identification of useful genotypes



Figure S2. Map showing the point location of the four trial locations in Tigray region, Ethiopia



Figure S3. Rainfall amount and distribution trend during the cropping seasons of trial period of the test locations. The sketched value is an average of the two cropping seasons (2015 and 2016).



Figure S4. Maximum and minimum temperature (0c) of the test locations for the months of cropping season. Values are average of the two cropping seasons.



Figure S5. Dendrogram showing the clustering of the genotypes. Nodes designated by green color contained genotypes (G10 and G30) that has shown superior performance and stable performance across locations. Nodes designated by red color contained improved varieties (G32 – G35).