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Environmental changes affect both crop growth and yield due to significant genotype by environment interactions (GEI). The selection of suitable breeding and testing locations is vital to the success of a plant breeding program. In our study, the GGE biplot program was used to analyze the yield and GEI data from a four-year durum wheat trial in the northwestern part of the Amhara Regional State, Ethiopia. The trial involved 21 durum wheat varieties and 39 environments across thirteen durum wheat-producing areas of Amhara. The result of the combined analysis for variance showed a highly significant mean square (p>0.001) for location x genotype, location, and genotypes. Environment (location, year, and location x year) had the highest impact on yield, accounting for 87.13% of the yield variability. The main components (PC1 and PC2) accounted for only 56.22% of the total variation of the grain yield. The low proportion explained by the biplot is an indication of complexity between the genotypes and the genotype-environment interaction. After the study, we were able to divide the Amhara region durum wheat testing location into four mega-environments. 1) Adet, Mota and Bichena; 2) Wonbeerema, Debere Tabor, and Debre Elias; 3) Geregera, Bassoliben, and Gaint, and 4) Enewari and Simada. From this study, for reasonable discrimination of large number of durum wheat genotypes, only four ideal test environments (Mota, Debre Tabor, Gaint, and Mehalmeda) maybe deployed thus saving time and resources.

GGE, Durum wheat, Mega-environment

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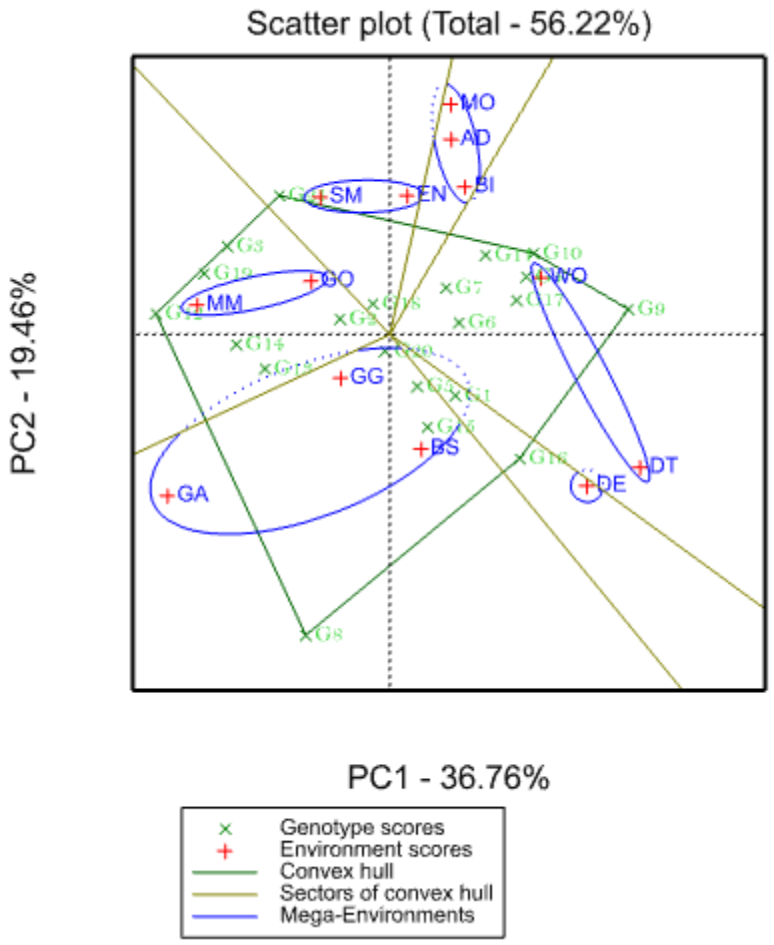
Scatter plot (Total - 56.22%)
PC2 - 19.46%
PC1 - 36.76%
MO
AD
BI
SM
EN
GO
MM
WO
GG
BS
GA
DE
DT
Genotype scores
Environment scores
Convex hull
Sectors of convex hull
Mega-Environments

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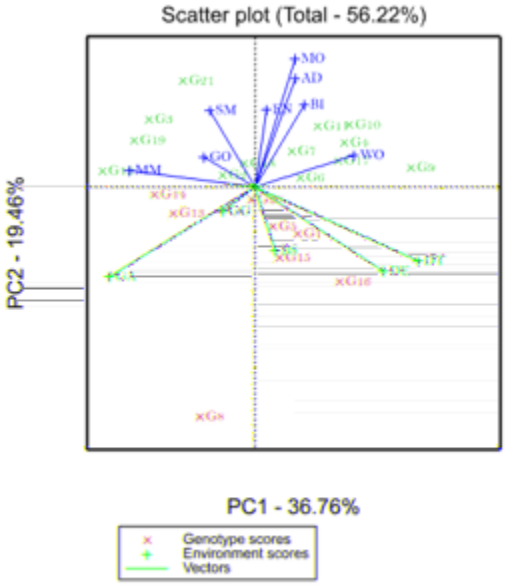
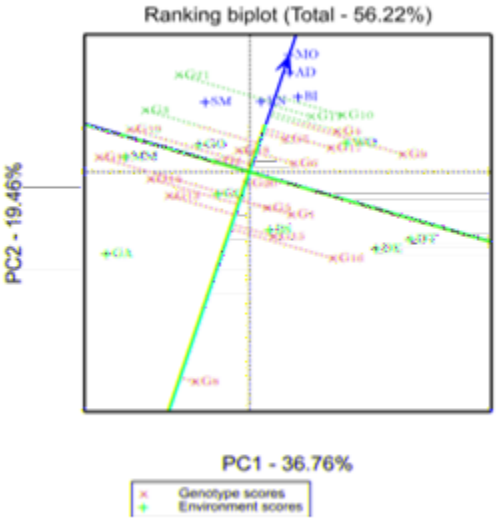

Scatter plot (Total - 56.22%)
PC2 - 19.46%
PC1 - 36.76%
Genotype scores
Environment scores
Vectors

A

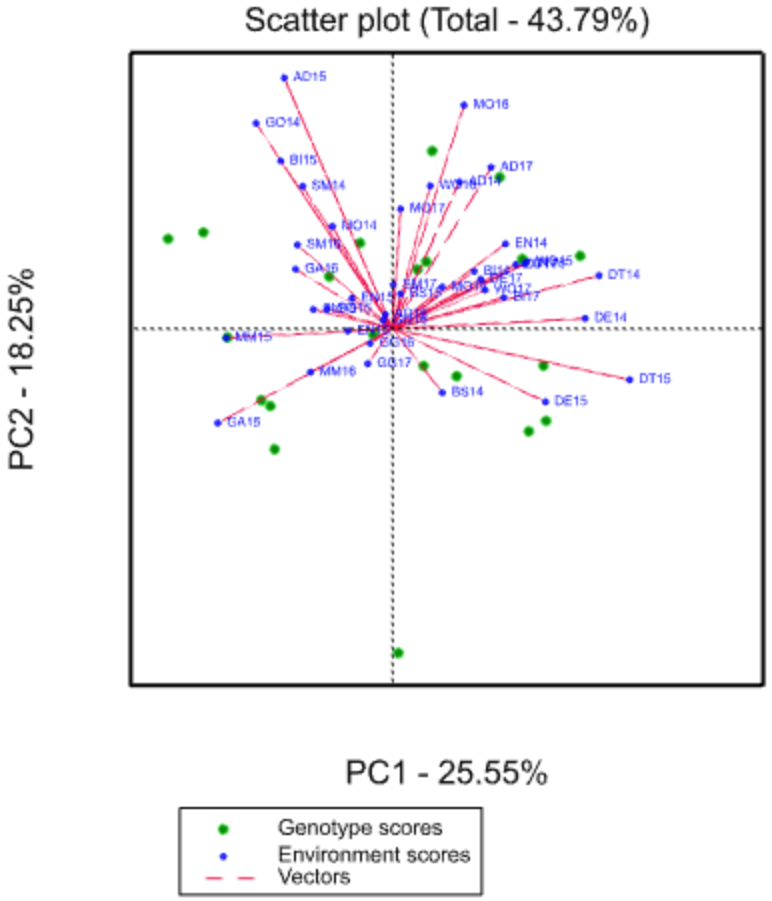

Ranking biplot (Total - 56.22%)
PC2 - 19.46%
PC1 - 36.76%
Genotype scores
Environment scores

B

A

A

A A A


Scatter plot (Total - 43.79%)
AD15
GO14
BI15
SM14
MO14
SM15
GA15
MM15
MM16
GA15
MO16
AD17
AD14
MO17
EN14
DT14
DE14
DT15
DE15
BS14
GO17
PC2 - 18.25%
PC1 - 25.55%
Genotype scores
Environment scores
Vectors

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