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Theme 4. Biodiversity, conservation and genetic improvement of range and forage species
Sub-theme 4.1. Plant genetic resources and crop improvement

Stability analysis in dual purpose maize line

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Introduction

Utilization of maize as dual purpose has increased the economic value of the crop. Dual purpose maize not only meets the demand of grain but also the stover for cattle. The genetic improvement in dual purpose maize should combine breeding for grain with specific needs of forage [Barrière *et al*., 2005]. Stability in dual purpose maize production is an essential component for sustainable production. The selection of dual type maize should be based on the genotype × environment interaction (GEI) and stability/ adaptability. Parametric models, such as Eberhart and Russell (1966) based on simple linear regression analysis are among cultivars, which explain the variance of the regression deviations as to detect cultivar stability and the linear regression coefficient to detect cultivar adaptability. Genotype × environment interactions (GEI) are of major importance for identification and development of superior cultivars. Keeping this in mind, the present study was undertaken with the objective to (i) to quantify the effects of the environmental and genetic variation for grain yield, green fodder yield and stover yield (ii) to identify the consistence performing lines under environmental changes.

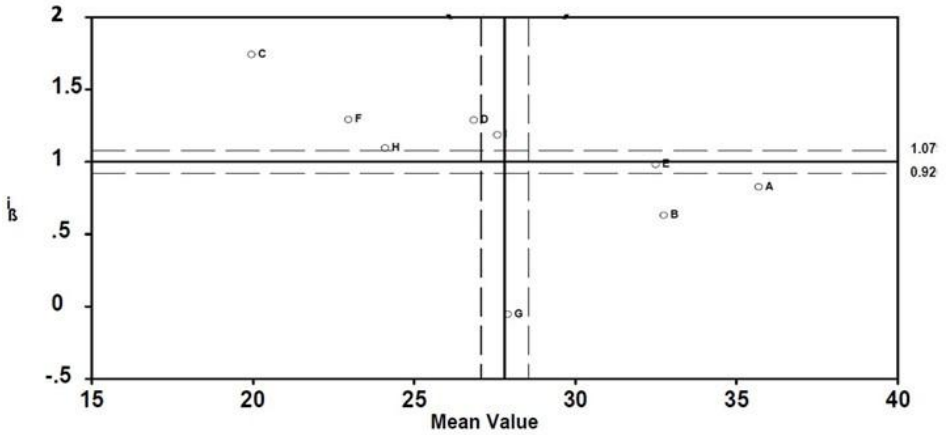
Materials and Methods

Seven promising maize lines were developed from the seven different germplasm stock of maize available at Indian Grassland and Fodder Research Institute, Jhansi, India. These 7 lines along with 2 national forage maize checks (African Tall and J-1006) were evaluated in randomized block design with 3 replications for 4 years (2011 to 2014). Each lines were sown in six rows of 4m length. Observations were recorded on 9 characters in each lines including grain yield, green fodder yield and stover yield. All the data were analyzed using Eberhart and Russell (1966) model by Indostat 7.5.

Results and Discussion

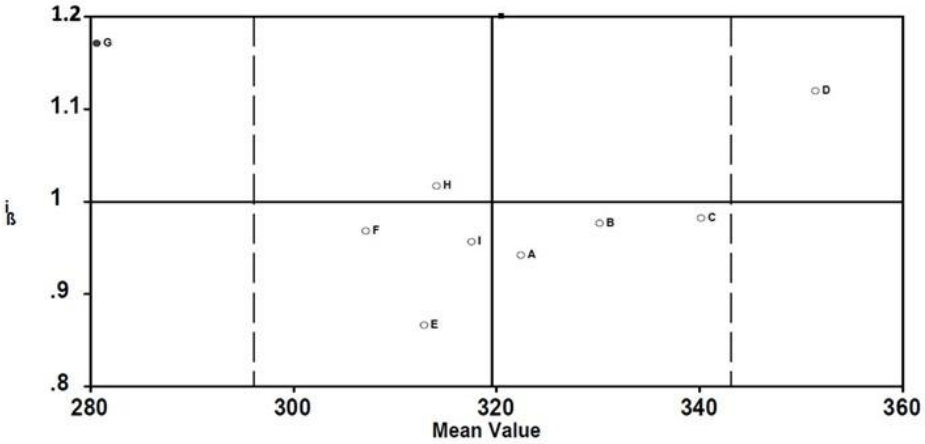
The pooled analysis revealed the significant differences among the genotypes for most of the traits. The Mean Sum of Squares (MSS) due to environment were also significant for almost all the traits indicating that the environments chosen were appropriate in determining the stability. All the lines were found to be stable for grain yield (q/ha), green fodder yield (q/ha) and stover yield (q/ha) except the line IGMF-7 which was stable only for grain yield (q/ha). The stability indicated that the lines have shown a consistence performance over the years and may be recommended for cultivation as dual purpose. The lines IGFM-4, IGFM-3 were the highest producers of green fodder yield (q/ha) (Fig. 1); IGFM-1, IGFM-2 and IGFM-7 were the highest producers of grain yield (q/ha) (Fig. 2) and IGFM-4 and IGFM-1 for stover yield (q/ha) (Fig. 3). These may be utilized under different purpose and future breeding programme. However, the line IGMF-4 was found to be highest yielder for grain and stover along with stability and consistence in performance over years. This line may said to the best and may be utilized for development of improved stable breeding lines.

Fig. 1. Mean, regression coefficient (bi) and deviation from regression (S^2di) of 9 maize lines for grain yield (q/ha)



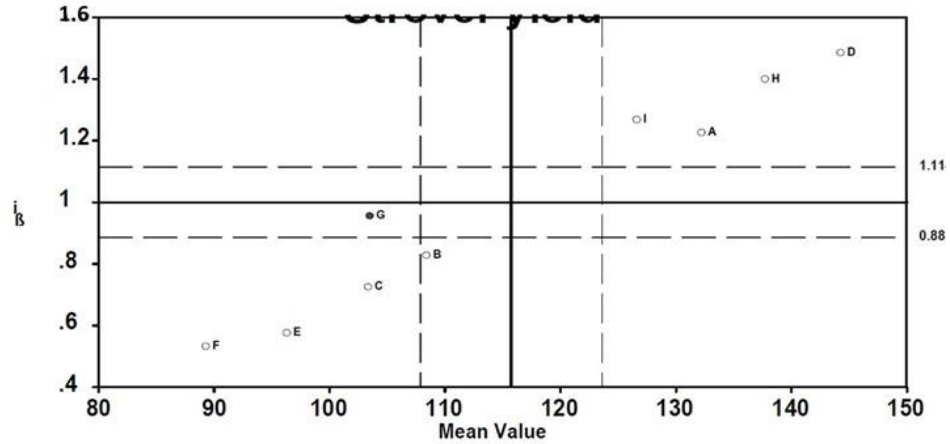
A:IGMF-1, B:IGMF-2, C:IGMF-3, D:IGMF-4, E:IGMF-5, F:IGMF-6, G:IGMF-7, H:African Tall, I:J-1006

Fig. 2. Mean, regression coefficient (bi) and deviation from regression (S^2di) of 9 maize lines for green fodder yield (q/ha)



A:IGMF-1, B:IGMF-2, C:IGMF-3, D:IGMF-4, E:IGMF-5, F:IGMF-6, G:IGMF-7, H:African Tall, I:J-1006

Fig. 3. Mean, regression coefficient (bi) and deviation from regression (S^2di) of 9 maize lines for stover yield (q/ha)



A:IGMF-1, B:IGMF-2, C:IGMF-3, D:IGMF-4, E:IGMF-5, F:IGMF-6, G:IGMF-7, H:African Tall, I:J-1006

Conclusion

Genotypic and environmental variation were observed for most of the traits and the line IGMF-4 was found to be highest yielder for grain and stover along with stability and showed consistence performance over years and recommended for cultivation under wide range of environments for dual purpose use.

References

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