Popular Article

e-ISSN: 2583-0147

Volume 2 Issue 8
Page: 0224 – 0226

Selvakumar Gurunathan
Assistant Professor
Genetics and Plant Breeding
SRM College of Agricultural Sciences
SRM Institute of Science and Technology
Vendhar Nagar
Baburayanpettai
Madhuranthagam Taluk
Tamil Nadu
India

Mahendran Ramachandran
Assistant Professor
Genetics and Plant Breeding
SRM College of Agricultural Sciences
SRM Institute of Science and Technology
Vendhar Nagar
Baburayanpettai
Madhuranthagam Taluk
Tamil Nadu
India

Vanitha Jayaraman
Genetics and Plant Breeding
SRM College of Agricultural Sciences
SRM Institute of Science and Technology
Vendhar Nagar
Baburayanpettai
Madhuranthagam Taluk
Tamil Nadu
India

Corresponding Author
Selvakumar Gurunathan
selvakug@srmist.edu.in;
selvakumaragri@gmail.com

Genotype and Environment

Genes of the crop reacts to the environment and gives the trait expression accordingly. The environment *viz.,* climate, soils, abiotic and biotic factors are influences the total output of the crop traits. Knowledge of the relative contributions of genotype (G), environment (E), and genotype and environment interaction are very important for a breeder to select the superior lines in the breeding programmes. Every plant breeder facing challenges to partition the genotypic and environmental effects and their interaction effects during the breeding programmes to select the heritable traits. The Genotype and environment interaction gives effects on yield and quality of the grain yield in any crop crops.

INTRODUCTION

Improving the yield of the crop plant in a unit area is an inevitable process to manage the food crisis in the near future. The influence of environment on the crop productivity is the major obstacles for the yield improvement as well as quality of food production. Quantitative traits such as grain yield are commonly influenced by genotype, environment and genotype by environment interaction. The presence of genotype and environment interaction slow down the selection process in the plant breeding programmes (Eberhart and Russell, 1966). The genes present in the crops expresses differentially in the different environment and the genes usually have differential interaction with different environmental condition. The presence of predictable and unpredictable erratic environmental condition is the biggest challenge in front of the breeder to select the stable genotypes (Balcha, 2020, Ohunakin, 2021). The yield stability is depending on the stability of the genotype under the different environmental conditions. The field level evaluations of crop plants are inevitable to find out the stable lines in the crops (Zemede and Mekbib, 2021; Akbarzai et al., 2021; Akbarzai and Mohammadi, 2021; Kassa et al., 2021; Zewdu, 2021) to manage the yield loss. The effect of the soil fertility on the expression of the genotype of any crop plants also to be analysed while improving the fertility of the soil by applying

inorganic fertilizers (Momohjimoh and Tanko, 2021) and biofertilizers (Reka and Sridar, 2019). As the yield character is a polygenic nature, the influence of environment is high (Balakrishnan et al., 2016). So the selection process based on the performance of single environment is not an effective method to identify the better crop (Shrestha et al., 2012). Therefore the selection of crop varieties in the multiple environments is the effective method for the selection of any better performing varieties (Islam et al., 2015). Selection of genotypes by considering a wide range of environment for the better survival and adoptability to attain better yield across the different climatic conditions. Selection of climatic specific or regional specific crop varieties with better adoptability and maximum productivity is the importance way to reach the goal.

CONCLUSION

Yield improvement is the prime objective for the any crop improvement research programmes. Since the yield trait is the quantitative character, the influence of environment affects the productivity of the crop plants. The breeders have to develop the new varieties with maximum stability for the yield component in the different environment or have to select the existing variations in the crop plants for the same objective. Hence the selection and development of stable varieties across the environment as well as recommending the regional specific varieties to the farming communities are the best criteria to attain the maximum yield in the crop plants.

REFERENCES

Akbarzai, D. K., & Mohammadi, L.. (2021). On-farm assessment of the improved legumes. Journal of Innovative Agriculture, 8(2), 29-33.

Akbarzai, D. K., Nisar, S. ., & Mohammadi, L.. (2021). Genotype × Environment interaction studies in lentil under Afghanistan environments. Journal of Innovative Agriculture, 8(2), 39-46.

Balakrishnan, D., Subrahmanyam, D., Badri, J., Raju, A. K., Rao, Y. V., Beerelli, K., ... & Neelamraju, S. (2016). Genotype× environment interactions of yield traits in backcross introgression lines derived from *Oryza sativa* cv. *Swarna/Oryza nivara*. Frontiers in plant science, 7, 1530.

Balcha, A. (2020) Genotype by Environment Interaction for Grain Yield and Association among Stability Parameters in Bread Wheat (*Triticum aestivum* L.). American Journal of Plant Sciences, 11, 1-10. doi: 10.4236/ajps.2020.111001.

Eberhart, S.A. and Russell, W.A. (1966) Stability Parameters for Comparing Varieties. Crop Science, 6, 36-40.

Islam, M. R., Sarker, M. R. A., Sharma, N., Rahman, M. A., Collard, B. C. Y., Gregorio, G. B., et al. (2015). Assessment of adaptability of recently released salt tolerant rice varieties in coastal regions of South Bangladesh. Field Crops Res. 190, 34–43. doi: 10.1016/j.fcr.2015.09.012

Kassa, Y., Chakle, S., Ayele, T., Teferra, B., & Ayfokiru, A. (2021). Large scale evaluation of the improved tef (*Eragrostis tef*) technologies. Journal of Innovative Agriculture, 8(2), 22-28.

Ohunakin, A. O. (2021). Genetic analysis and genotype x environment interaction for resistance to northern leaf blight disease in tropical maize (*Zea mays* L.) genotypes. Journal of Innovative Agriculture, 8(2), 67-74.

Reka, P., & Sridar, R. (2019). Effect of Sulphur Oxidizing Bacteria (SOB) on sulphur nutrition in Sesame (*Sesamum indicum*). Journal of Innovative Agriculture, 6(3), 1-7.

Shrestha, S., Asch, F., Dusserre, J., Ramanantsoanirina, A., and Brueck, H. (2012). Climate effects on yield components as affected by genotypic responses to variable environmental conditions in upland rice systems at different altitudes. Field Crops Res. 134, 216–228. doi: 10.1016/j.fcr.2012.06.011

Yusuf Momohjimoh, & Musa Umaru Tanko. (2021). Effect of nitrogen starter dose and phosphorus fertilizer application on growth, yield characters and grain crude protein content of three varieties of cowpea in anyigba, kogi state, Nigeria. Journal of Innovative Agriculture, 8(1), 1-10. https://doi.org/10.37446/jinagri/rsa/8.1.2021.1-10

Zemede, A. ., & Mekbib , F. (2021). Genotype x environment interaction and stability of drought

tolerant durum wheat. Journal of Innovative Agriculture, 8(2), 52-58.

Zewdu, Z. (2021). Genetic divergence of lowland rice (*Oryza sativa* L.) genotypes in Uganda. Journal of Innovative Agriculture, 8(2), 34-38. https://doi.org/10.37446/jinagri/rsa/8.2.2021.34-38