

by **Victor Olugbenga Olumekun, Abiola Toyin Ajayi and Oluwasegun Victor Ibidapo**

In recent times, wheat has gained more acceptance and utilisation over the traditional staples such as tubers and other cereals in Africa as a consequence of increased demand for dietary enhancement due to urbanisation and increased population in regions where staple was predominantly known to come from maize. The pressure on wheat has now risen to the level in which local production is grossly overwhelmed by demand, hence the reliance on importation to cater for the deficit in local supply. Developing nations in general have therefore progressively become significant net importers of wheat, accounting for 43% of their food imports. Africa's wheat importation is anticipated to increase by 23.1 million metric tonnes by 2050 with both the largest rate of population growth and wheat consumption per person.

Wheat provides 20 and 21% of the protein and nourishment calories respectively in human diet to over three billion individuals residing in ninety countries of the world. Global wheat production is estimated to be about 761.5 million tonnes and roughly 21% of the food consumed worldwide depend on wheat as raw material. It serves as a major raw material in cakes, animal feeds, pasta, bread, spaghetti, biscuits, semovita and macaroni. The stalks after harvest are used in mulching, construction and bedding for animals. In Nigeria, wheat cultivation has been going on for millennia, and there are reports that its cultivation started before 200 BC, although the present cultivated varieties are comparatively latest introductions.

In spite of the heavy consumption pattern, national wheat production in Nigeria has been limited because of restrictions arising from climatic demands, agronomic procedures and the preference for vegetable cultivation in the majority of the wheat producing regions. Introduction of better agronomic procedures, appropriate land preparation, and other cultural practices revolving around sowing, nourishment, watering regime, crop protection, crop yield and post yield technology have been the main focus of workers.

Despite the importance of wheat in Nigeria, its productivity can be stunted by drought which

according to Ajayi et al. in 2018, drought is a state of persistent insufficiency in soil moisture preventing effective crop growth and development, hence significantly reducing yield. Advancement of climatological techniques make it possible to predict an upcoming drought, nevertheless, its overwhelming effect on the economy persists. Adaptation and survival of plants under drought condition requires that plants possess inherent ability to deploy diverse mechanisms which can be morphological, physiological and molecular.

Rapid decrease in wheat productivity is a consequence of impeded growth caused by drought. The main cropping season of wheat in Nigeria falls between November and March (the dry season) hence there is a heavy dependence on irrigation which could be expensive to deploy. The drier Northern region is favourable to wheat cultivation being a temperate crop, but unfortunately this region is characterised by poor rainfall distribution during the cropping season.

Information on genetic variation and heritability of yield characteristics in wheat under drought stress is limited in Nigeria. Adequate genetic information about crop yield characters of wheat will make a positive contribution to its productivity. Grain yield determination under drought stress is hard because its manifestation is a consequence of interactions between many other contributing characters.

Therefore, the choice of genotypes based on yield traits might be more efficient than the direct selection for yield. Its selection under drought stress is also laborious and time consuming requiring many decades of work and evaluation in multiple environments because of its propensity to influence the genotype by environment interaction. Correlation offers information on the linkage between morphological characters and economic characters that allow indirect selection.

The Principal Component Analysis (PCA) is an additional multivariate process effective for the analysis of relative contribution of individual features under prevailing conditions. This technique identifies a tiny set of variables which represent a big percentage of the complete variance in the original variable. Correlation and PCA have been used successfully to select

drought tolerant genotypes of many crop species.

Many criteria have been used in crop species for selection under drought stress. Notable among these are markers assisted selection (MAS), expression profiling of drought responsive genes, biochemical and molecular traits, physiological traits, morphological traits, root phenotype and architecture, and stress tolerance index (STI) of yield traits. STI was highly appropriate for selecting high yielding tolerant wheat and cowpea genotypes under stress and well-watered conditions. In Nigeria, however, there is restricted data on the use of STI for assessment of drought tolerance in wheat genotypes, and no report exists that utilises STI of quantitative traits in selection of wheat genotypes for drought tolerance.

The study, aimed to evaluate the amount of genetic variation for drought tolerance among genotypes; heritability of suitable characteristics for choice, and association among stress tolerance indices of yield traits which should be useful tools in establishing a breeding programme for drought tolerance in wheat, has been carried out by the authors. The result gotten and the information provided in the study would be useful for effective selection of wheat genotypes for drought-prone environments in future breeding programs

## References

Victor Olugbenga Olumekun, Abiola Toyin Ajayi and Oluwasegun Victor Ibidapo. Genetic variation and tolerance indices interactions among wheat (*Triticum aestivum* L.) accessions under drought stress. Journal of Pure and Applied Agriculture (2020) 5(3): 91-101 ISSN (Print) 2617-8672, ISSN (Online) 2617-8680

[Facebook Comments](#)

**Share:**

[Facebook](#)

[LinkedIn](#)

[WhatsApp](#)

Twitter