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Original Research Article

Field Evaluation of Okra (Abelmoschus Esculentus [L.] Moench) Genotypes for Yield and Yield Component Characters in Jalingo, Taraba State

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Abstract: Okra is an important fruit vegetable in Nigeria. Production is challenged by low yielding varieties particularly in the northern Guinea savanna agro-ecology. A field experiment was conducted at the Teaching and Research Farm, Taraba State University, Jalingo during the 2023 rainy season to evaluate pod yield and yield component traits of five okra genotypes. The experiment was laid out in a randomized complete block design (RCBD) and replicated three times. Data were collected on both growth and yield traits and subjected to statistical analysis (ANOVA) and significant means separated by Duncan Multiple Range Test (DMRT) at 5% level of probability. Results showed that significant variation in pod yield and yield component traits exist among the genotypes. However, NHAE-47 outperformed other genotypes for days to 50% flowering, number of pods per plant (36), number of pods per plot (225.3), pod weight per plant (3.8g), pod weight per plot (1.9kg) and pod weight per hectare (2111.1kg). The genotype, NHAE-47 is recommended for cultivation by okra farmers in Jalingo.

Keywords: Abelmoschus esculentus, pod yield, pod/plant and commercial varieties.

INTRODUCTION

Okra (Abelmoschus esculentus [L.] Moench) is a warm season vegetable crop belonging to the family Malvaceae and it is known with different names such as ladies' finger, ochro or gumbo. The crop is cultivated in tropical and sub-tropical regions of the world including Nigeria where about 2.1 million tons was produced in 2017 (representing 21.4% of the world total production) being second to India (FAOSTAT, 2018). Okra is mainly cultivated for their green pod which is an important soup condiment that forms part of the curry dishes in most African countries such as Nigeria, Egypt and Sudan (Okon *et al.,* 2013). In Nigeria, okra is mostly sold by women in nearly every food markets because of its ability to grow and thrive across the different agro-ecologies of the country (Saidu *et al.*, 2017). In Nigeria and most parts of sub-Saharan Africa, okra is considered an important vegetable as it provides nutrients for rural dwellers (Street *et al.*, 2016). It is rich in vitamins, minerals and protein that plays an important role in human diet that helps in building muscle tissue and component of enzymes that controls hormones of the various organs. The soluble fibre in okra helps in lowering serum cholesterol and reduces the risk of heart disease while the insoluble fibre helps to keep the intestinal tract healthy thereby decreasing the risk of some form of cancer especially colorectal (Hamon and Charrier, 1997). Okra is also a good source of calcium which helps to keep bones strong and lessen the chance of fractures (Grubben and Denton, 2004). Sometimes okra is used as soup thickening agent and can be served with rice and other food types. The crude fibres from matured okra stems are useful in paper production and making of ropes while the attractive flowers are sometimes used in decorating rooms (Schippers, 2000). Okra is adapted to wide varieties of soils, but a deep fertile sandy loam with good drainage and a pH of about 6.0 to 6.8 is ideal for its production. A moderately well distributed rainfall of 800- 1000mm enhances the production of young edible pods. An average monthly temperature of between 20°c and30°c may be optimum for okra growth, flowering and fruiting (Tindall *et al.,* 1986). There are many varieties of okra including the popular ladies' finger which is a little above 2m in height and the pods are as long as human finger and the dwarf which is early maturing and highly branched with short to medium pods. The pods also vary in shape and pigmentation depending on the variety. To obtain new okra cultivars, studies on genetic divergence are necessary to evaluate the diversity existing in varieties and those that perform well in a particular agro-ecology will be selected for adoption. In addition, improved cultivars carrying genes capable of expressing high pod yield and wide adaptation to adverse biotic and abiotic stresses are usually the most important attributes to the efficiency of okra production. Different okra varieties have successfully been selected for specific agro-ecologies on the environmental conditions such as duration of rainfall, soil type and temperature. In order to meet the high demand of okra pods in Jalingo metropolis, it is imperative to evaluate the variability for pod yield and yield component traits among the commercial varieties and farmers' cultivars to select superior genotype for pod yield. Generally, okra production in Nigeria and Jalingo in particular is known to be low because it is challenged by environmental factors and low pod yielding varieties (Ibrahim *et al.,* 2012). The study was initiated to evaluate pod yielding potentials of some okra varieties in Jalingo, northern guinea savanna agro-ecology

MATERIALS AND METHODS

Materials for the experiment consisted three commercial varieties of okra (NH4-45, NHAE 47 and LD88) and a popular local cultivar (Dogo was sourced locally from local jalingo town farmers, Taraba State.) all sourced from the National Horticultural Research Institute (NIHORT), Ibadan and from a farmer in Jalingo, respectively. Field experiment was carried out at the Teaching and Research farm of Taraba State University, Jalingo (Lat. 11° 52'N and Long. 11˚ 57'E) in 2020 cropping season. The site of the experiment lies within the Northern Guinea Savanna agro-ecology of Nigeria. Experimental Design, land preparation and data analysis The Experiment was laid out in a randomized complete block design (RCBD) and replicated three times. A plot size of 3m x 3m (9m2) was marked out using measuring tape with a space of 0.5m within plot and 1m between replicates. Three seeds per stand were sown at the spacing of 60cm x 40cm and were later thinned down to two plants per stand. The land was cleared of previous crop residues, ploughed and marked out into plots. Weeding was carried out manually using handheld hoe as at when necessary to keep the field free of weeds. Nitrogenous fertilizer (NPK 15:10:10) was applied at the rate of 150 kg per hectare as ring application at four (4) after seedling emergence. The plant height was measured using a meter rule at 4, 8, 12 and 16 weeks after planting (WAP), number of branches was counted at 4, 8, 12 and 16 WAP, Data were collected from five (5) randomly selected plants from each plot on growth and yield parameters and average computed on varietal basis. The data were later analyzed by simple analysis of variance (ANOVA) using SAS statistical package and means were compared using the least significant difference (LSD) at 5% level of probability.

RESULTS AND DISCUSSION

Results of mean heights of the cultivars (Table 1) revealed that there was no significant variation across the weeks, except at twelve weeks after sowing (12WAS) where Clemson differed significantly (breeders as selection of such superior genotypes will enhance the chance of okra improvement in the future. The highest number of branches observed in Dogo compared to other genotypes affirms the report of Mshelia and Mohammed (2018) where dogo recorded the highest number of branches (12.67) under irrigation conditions in Kashere (Gombe State), though far less than what is reported in this study (Jalingo, Taraba State). This observation shows that the same genotype can perform differently in different environments (locations) even in the same agro-ecology. Mean number of days to 50% flowering and yield component traits (Table1) showed significant variation for of days to 50% flowering. This ranged from 61 in NHAE-47 (a commercial variety) to 84 in dogo (a farmer cultivar), indicating that number of days to flowering in okra is genotype dependent. This observation is in agreement with the report of Ayoub and Afra (2014) who attributed differences in number of days to 50% flowering in okra to genetic factors. Earliness in okra is important to have three to four cycles of production annually. The okra genotypes varied for number of pods per plant, the genotype NH4- 45 recorded the least (16 pods) while NHAE-47 had the highest (36 pods). In a separate study, LD88 spineless hah high number of pods per plant (Aliyu and Ajala, 2016 handing *et al.,* 2022) compared to other genotypes. The number of pods per plot also followed the same trend as that of number of pods per plant. Significant variations were also observed within the genotypes in respect of pod yield and yield component traits such as pod weight per plant (g), pod weight per plot (g) and pod yield per hectare (kg). However, these traits were comparable between LD88 and dogo. The highest pod yield and yield component traits by the genotype, 'NHAE-47' is in agreement with previous report of Mshelia and Mohammed (2018) where it recorded the highest fresh pod weight of 1230.0kg per hectare which is contrary to the present finding (2111.1kg/ha). Generally, okra growers are interested in high pod yielding. The agronomic performance of the genotype 'dogo' in the study location and elsewhere (fakai *et al.,* 2022; Mselia and Mohammed, 2018) suggest that with improved agronomic practices, high pod yield may be attained in Jalingo.

CONCLUSION

The four okra genotypes showed variation for phenological, pod yield and yield component traits, this is important for sustainable production in this agroecology. To increase pod yield farmers are encouraged to grow 'NHAE 47' while 'dogo' is recommended for further research.

Table 1: Mean performance of okra genotypes on plant height (cm)

Genotype	4WAS	8WAS	12WAS	16WAS
NH4-45	7.39a	17.86a	26.62a	39.87a
NHAE-47	6.10a	16.18a	22.35a	29.93a
LD88	7.42a	20.20a	35.82b	47.73a
dogo	7.56a	20.84a	31.84a	42.73a
Mean	7.12	18.77	29.16	40.06
LSD (0.05)	4.03	11.68	18.80	26.78

Means with same letters are not significantly different.

Table 2: Mean performance of okra genotypes on number of branches per plant

Genotype	4WAS	8WAS	12WAS	16WAS
NH4-45	2.26a	6.43a	11.23a	16.63a
NHAE-47	2.26a	7.06a	10.93a	16.76a
LD88	2.56a	6.90a	11.53a	17.20a
dogo	3.40a	7.60a	11.60a	17.4 6a
Mean	2.71	7.00	11.32	17.01
LSD (0.05)	3.00	3.08	3.70	4.72

Means with same letters are not significantly different.

Table 3: Mean performance of okra genotypes on yield and yield related traits

Genotype	DF	NNP	NNP1	PWP(g)	PWP1(kg)	PY(kg/ha)
NH4-45	70.0c	16.7c	127.3b	2.3c	1.2c	1296.3c
NHAE-47	61.0d	36.0a	225.3a	3.8a	1.9a	2111.1a
LD88	80.0a	21.3b	142.3b	3.2b	1.6b	1777.7b
Dogo	84.0a	23.0b	142.3b	3.6ab	1.8a	2000.0ab
Mean	73.75	24.3	159.3	3.2	1.6	179.26
LSD (0.05)	0.00	4.06	24.14	0.05	0.23	293.68

Means with same letters are not significantly different ($p < 0.05$). DF=days to 50% flowering, NPP=number of pods per plant, NPP1=number of pods per plot, PWP=pod weight per plant, PWP1=pod weight per plot, PY=pod yield

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