



Performance of some Okra (*Abelmoschus esculentus* L.) Cultivars under Rain-fed Conditions in the Blue Nile State, Sudan

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Abstract

The study was conducted to investigate the performance of three okra cultivars under rain-fed conditions in the Blue Nile State during *khariif* seasons of 2013 and 2014. Three okra cultivars (Pusa Sawani, Clemson Spineless and Khrtoumeia) were used in this study. Randomized Complete Block Design with four replications was used. The data collected included growth and yield parameters. The data collected from the experiments was subjected to analysis of variance (ANOVA) using the Genstat computer package. Results showed that all cultivars were varied in growth and yield parameters. the highest plant height obtained by Pusa sawani and Clemson Spineless, the highest number of branches plant⁻¹ obtained by khrtoumeia and Clemson Spineless, while the highest number of pods plant⁻¹ was obtained by Pusa sawani, the highest yield tons ha⁻¹ was recorded by the cultivars Pusa sawani and khrtoumeia.

Keywords: rain-fed, Blue Nile State, Pusa sawani, Clemson spineless, Khrtoumeia.

Introduction

Okra (*Abelmoschus esculentus* L. (Moench)) is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. World okra production in 2010 was 6.9 million tons, while in the Sudan okra production was estimated to be amounted 2.6 million tons (FAOSTAT, 2010). The crop is suitable for cultivation as a garden crop as well as on large commercial farms (Tripathi *et al.*, 2011). Okra originated in East Africa, while quite possibility in Ethiopia (Doymaz, 2005). The nutritional composition of okra includes calcium, protein, oil and carbohydrates, iron, magnesium and phosphorus (Omotoso and Shittu, 2007) Pod yield of okra varied among the varieties (Martin and Rhodes 1999).

It is consumed by almost all the Sudanese people either as green immature pods (fried or cooked or in soup or stews) or sun dried and ground into a powdery form locally known as *wieka* which is used as an ingredient in the preparation of a favorable Sudanese *molah* (Osman, 2005). The local cultivars in traditional rain-fed areas are known as *Baladi* and each one is named after the area from it was collected. These cultivars show a lot of variability in many characters such as yield, plant height, pod shape and colour. Most of the local cultivars are characterized by the presence of spines and high mucilage content therefore used as powdery form locally known *wieka*. No research was done on the performance of okra under rain-fed conditions in the Blue Nile State.

The present study was undertaken to evaluate the performance of the three okra cultivars raised under rain-fed conditions in the Blue Nile State

Materials and Methods

The experiment was conducted at Damazin Research Farm during the *khariif* of 2013 and 2014 seasons, to evaluate the performance of okra cultivars under rain-fed conditions. The cultivars examined were (Pusa Sawani, Clemson Spineless and Khrtoumeia). The treatments were arranged in randomized complete block design, replicated four and three times in 2013 and 2014, respectively. The land was first disc harrowed and then divided into 80 cm ridges. Experimental units were formed to include four ridges x 4 m long with a net area of 12.8 m². Sowing dates were on 24th and 19th July during 2013 and 2014 seasons, respectively. Three or four seeds were planted on the top of the ridges and then thinned to two plant hole⁻¹ two weeks after sowing. Two doses of urea were applied at 4 and 8 weeks after sowing, Chemical spraying (Folimate) against insects were aimed when at necessary. Rainfall records were obtained from the Ministry of Agriculture and Natural Resources, of the Blue Nile State. The data collected included growth and yield parameters of okra. Five plants were taken randomly to measure growth parameters at the 50% flowering stage and the end of season. Growth parameters include plant height, number of branches and leaves plant⁻¹. Harvesting started 45 days after sowing Yield assessment number of pods plant⁻¹ and total yield (tons ha⁻¹). The data collected from the experiments were subjected to ANOVA analysis using the GenStat computer package using the procedure described by Buysse *et al.*, (2004) homogeneity test between two seasons was done.

Results

Figure 1 shows meteorological data of rainfall (mm) at both seasons in Damazin Research Station. Rainfall recorded in season 2014 was higher than that of 2013 and covered a long period.

Table 2 shows highly significant (≤ 0.001) varied between okra cultivars on plant height in both seasons. The tallest plants were obtained by Pusa Sawani and Clemson Spineless in both seasons.

Results shows highly significant (≤ 0.001) varied between okra cultivars on number of branches plant⁻¹. The highest number of branches was recorded by Clemson Spineless in season one and Khartoumeia with Clemson Spineless in season two (Table 2).

Results shows highly significant (≤ 0.001) varied between okra cultivars on number of leaves plant⁻¹. The largest number of leaves plant⁻¹ in season one was recorded by Clemson Spineless cultivar while in two was recorded by Khartoumeia cultivar (Table 2).

Table 3 shows highly significant (≤ 0.001) varied between okra cultivars on number of pods plant⁻¹ in both seasons. The highest number of pod plant⁻¹ was obtained by Khartoumeia and Pusa Sawani cultivars in season one and Pusa Sawani cultivar in season two.

Results shows highly significant (≤ 0.001) varied between okra cultivars on okra yield (t/ha) during season two and combine analysis while in season one were not varied. Okra yield was higher in season two than in season one. Both Khartoumeia and Pusa Sawani produced higher yield than Clemson (Table 3).

Discussion

Plant height varied significantly among the cultivars, Muhammad *et al.* (2001) reported similar results in case of variety Akra Anamikca. Singh *et al.* (2008) reported that branch production changed due to changes in both environment and varieties.

Number of branches plant⁻¹ varied significantly among the cultivars, Singh *et al.* (2008) reported that branch production changed due to changed in both environment and varieties.

Number of pods plant⁻¹ differed significantly among the cultivars, which is similar to the finding of Shridhar (1996) who found that variety Annie Oakley produced maximum number of pods plant⁻¹. Similar results were also reported by Singh *et al.* (1996) in case of the variety Annie Oakley.

Okra yield was higher in season two than in season one. It is due to favorable environmental condition. Plants get more nutrients from soil and other natural resources from environment which facilitated proper development of pods.

The highest and the lowest pod yield (tons ha⁻¹) were obtained by cultivars Khartoumeia and Clemson Spineless, respectively. Martin and Rhodes (1999) reported that pod yield varied among varieties. Mishra *et al.* (2001) reported that pod weight varied significantly among different varieties of okra.

Summary and Conclusion

- Okra cultivars were varied in growth and yield parameters.
- Use of Pusa sawani and Khartoumeia okra cultivars.

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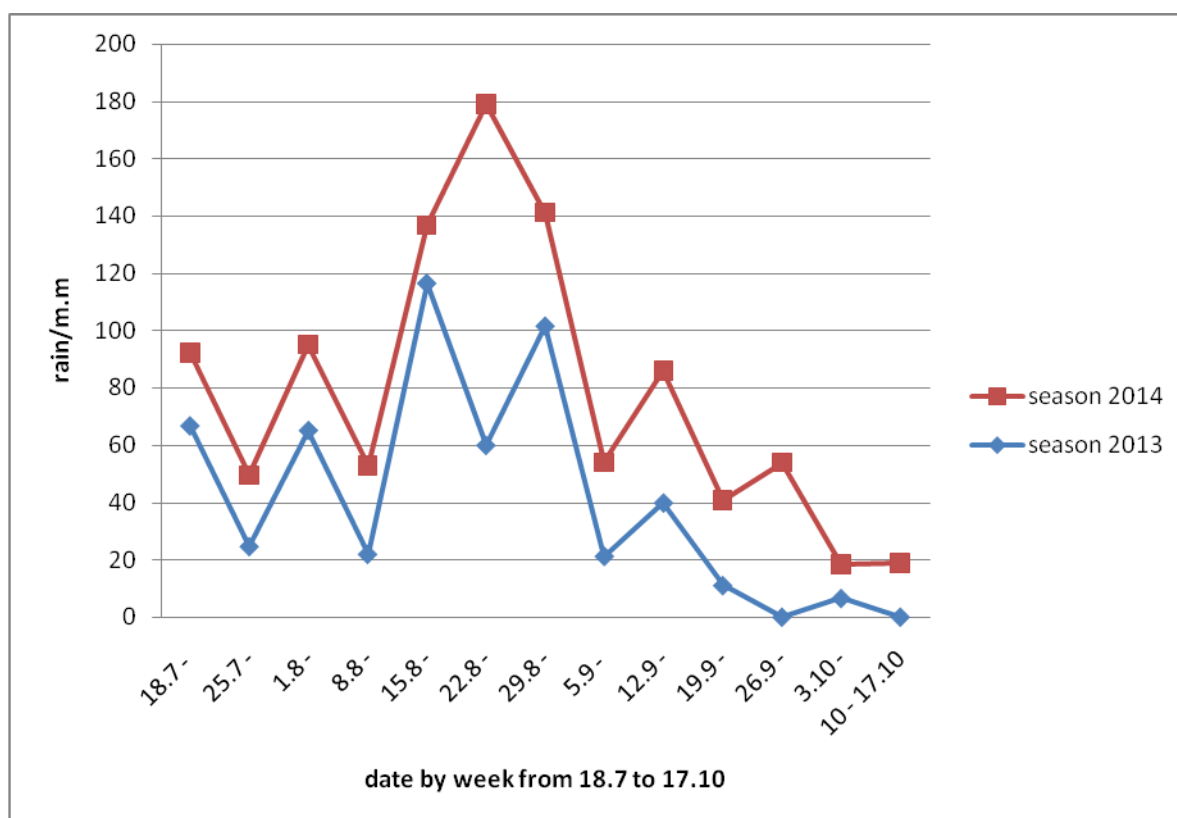


Fig. 1 metrological data of rainfall (mm) at two seasons in Damazin Research Station Ministry of Agriculture and Natural Resource at the Blue Nile State.

Table 1. Performance of okra cultivars on growth parameters under rain-fed conditions in the two seasons (2013 and 2014)

Cultivar	Plant height (cm)		number of branches plant ⁻¹		number of leaves plant ⁻¹	
	2013	2014	2013	2014	2013	2014
Ps.	71 ^a	110 ^a	4.7 ^b	3.8 ^b	41 ^b	41 ^c
Cl.	74 ^a	113 ^a	5 ^a	4.7 ^a	43 ^a	43 ^b
Kh.	61 ^b	97 ^b	4.3 ^b	5 ^a	38 ^c	45 ^a
<i>Statistic</i>						
Sig. level	***	***	***	***	***	***
SE±	1.9	0.9	0.1	0.1	0.5	0.5
CV%	2	6	6	6	3.4	6

Ps. = Pusa Sawani, Cl. = Clemson Spineless Kh. = Khrtoumeia. *** = highly significant. NS = no significant.

Table 2. Performance of okra cultivars on yield parameters under rain-fed conditions in the two seasons (2013 and 2014)

Cultivar	Number of pods plant ⁻¹		yield tons ha ⁻¹		
	2013	2014	2014	2013	Combined
Ps.	4.4 ^a	17 ^a	4.6	13.1 ^a	8.9
Cl.	3.8 ^b	16 ^b	4.0	12.3 ^b	8.1
Kh.	4.5 ^a	16 ^b	4.7	13.4 ^a	9.0
<i>Statistic</i>					
Sig. level	***	***	NS	***	***
SE±	0.07	0.3	-	0.16	0.11
CV%	3.4	6	5	6	4

Ps. = Pusa Sawani, Cl. = Clemson Spineless Kh. = Khrtoumeia. *** = highly significant. * = significant. NS = no significant.