



Research Paper

**EFFECT OF PRUNING ON GROWTH AND FRESH FRUIT YIELD OF OKRA
(*Abmoschus esculentus* (L./MOENCH) IN SOKOTO, NIGERIA**

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Abstract

Field trails to study the effect of pruning on growth and fresh fruit yield of Okra were carried out at Usmanu Danfodiyo University, Sokoto Fadama Teaching and Research farm, Kwalkwalawa village, Sokoto, Nigeria 12°0'N and 13°58'N and longitude 4°08'E and 6°54'E and altitude of about 350m above sea level during 2010/2011 and 2011/2012 dry seasons. Treatments consisted of pruning and no pruning laid out in a Randomized Complete Block Design (RCBD) with three replications. Data were collected on growth and yield parameters (Days to 5% flowering, number of leaves per plant, number of fresh fruits per plant, and total fresh fruit yield (t ha^{-1}). Result obtained indicated that growth and fresh fruit yield of okra were higher in pruned okra. Pruning significantly influence growth and yield performance of okra. On average, fresh fruit yield of okra was 10 t ha^{-1} where pruning treatment was carried out and the control recorded 6 t ha^{-1} . Based on the findings of this research, it could be concluded that pruning delay flowering but increased yield performance of okra. Thus, pruning could be recommended as one of the most suitable practice for increasing the productivity of okra in the study area.

Key words: Okra, Growth, Freshfruit, Yield, Pruning.

INTRODUCTION

Okra (*Abelmoschus esculentus* (L.) Moench) belongs to the family Malvaceae. It is an important soup condiment in Nigeria that forms part of the Nigerian curry dishes (Okon *et al.*, 2013). It is rich in vitamins, minerals and has several medicinal values. Okra is cultivated through the tropical and warm temperate regions of the world for its fibrous fruit content (Kabir, 2010), but yields are usually low ($2\text{-}4 \text{ t ha}^{-1}$) as a result of non intensive growing methods (Schippers, 2003). In developing countries like Nigeria, the population growth rate is so high that improved technologies including rational use of pruning crops must be employed to meet the food demand of the people. Schippers (2000) reported that a vegetable yield of 10 t ha^{-1} of okra can be considered a good harvest, but yields of over 40 t ha^{-1} can be realized under optimal condition. Apical debudding and branch pruning are the most important contributor to young leaf and immature pod yield (Olasantan and Salau, 2008). Pruning is the removing of the growing part of a plant to encourage lateral branching. Malik (1994) reported that the objective or pruning is to produce maximum fruit for good quality by maintaining the balance between fruiting and vegetative hood. Pruning delay fruiting in okra and usually

gives more, larger and desirable percentage of good quality fruits (Kabir, 2010). This study was undertaken to investigate the effect of pruning on growth and fresh fruit yield of okra.

MATERIALS AND METHODS

Field trials were carried out during the 2010/2011 and 2011/2012 dry seasons at the Usmanu Danfodiyo University, Sokoto Fadama Teaching and Research Farm located at Kwalkwalawa Village, located in the Sudano-Sahelian agro ecological zone of Nigeria between latitude 12°0'N and 13°58'N and longitude 4°8'E and 6°54'E and altitude of about 350m above sea level (ASL) (Mamman *et al.*, 2000). The climate is semi arid with annual rainfall range of 550mm-700mm, temperature ranges from 15°C to 14°C and relative humidity from 20-35% in the dry season and 43-78% in the rainy season (SERC, 2003).

Composite soil samples were taken at 0-30cm soil depth at random from different locations of the experimental site using soil auger at land preparation in each trial. The samples were bulked, air-dried and sieved through 2mm sieve in the laboratory for physical and chemical soil analysis.

Treatments comprises of pruning and no pruning using Jokoso okra variety. The treatments were randomly assigned and laid out in a Randomized Complete Block Design (RCBD) and replicated three times.

Plot size of 3m x 4m (12m²) each were constructed with water channels. Organic fertilizer was basally applied and thoroughly mixed into the soil at land preparation.

Seeds were subjected to viability test, soaked in cold water for 6hrs, air-dried and treated with apron star at the rate of 10mg per 3kg seeds prior to sowing to protect the seed against soil pathogens and pests. Three seeds were dibbled at a spacing of 0.5m to 0.6m (intra-row and inter-row respectively), germinated seedlings were later thinned to one plant per stand at two weeks after sowing. Apart from the control, all other plants were pruned by removing the apical bud of the main stem with a sharp knife at 4 WAS. Primary branches that emerged from auxiliary buds of the nodes were removed subsequently from the decapitated main stems between 5 and 6WAS to maintain only the lower branches. Data collected were subjected to analysis of variance (ANOVA) procedure, using statistical analysis system (SAS, 2003). Significant means of treatments were further separated using Duncan's New Multiple Range Test (DNMRT) at 5% level of probability ($P \leq 0.05$).

RESULTS AND DISCUSSION

The physicochemical properties of the soil reaction of the experimental site during the trials are shown in Table 1. The results showed that the soil was sandy loam and soil reaction was slightly acidic.

Results from Table 2 shows that there was significant effect ($P \leq 0.05$) of pruning on number of leaves per plant at 12 WAS during both 2010/2011 and 2011/2012 dry seasons. Pruned okra showed significantly higher number of leaves (22 and 24) in 2010/2011 and 2011/2012 than those from control plots (10 and 11) during both season respectively. This was because pruning stimulates leaf production and leaf development for efficient photosynthetic activities to take place. Olasantan and Salau (2008) reported that pruning significantly reduced plant height and increased the number of secondary branches and leaves.

Pruning also had a significant effect on days to 50% flowering of okra. Pruned okra took longer number of days (73 during 2010/2011 and 75 during 2011/2012) to obtain 50%

flowering when compared to the unpruned ones which flowered at 63 and 64 DAS respectively during both years. This was a result of apical debudding that retarded their growth for some period before the development of new shoots. This confirms the result of Olasantan and Salau (2008) that the number of days from planting to flowering or harvesting and length of harvest duration consistently increased with proportions of pruning. Pruning had a significant effect on the number of fresh fruits per plant during both seasons. Pruned okra plant in both years produced significantly more number of fruits 24 per plant than un-pruned ones which was 13 fruits per plant. This agreed with report of Kabir (2010) that pruning treatment delayed fruiting and increased fruit yield. Also, Olasantan and Salau (2008) reported that pruning significantly ($P \leq 0.05$) increased number of pods/plant by 10-40% more than the control plants.

Results from Table 3 showed that pruning had significant effects on fresh fruit weight, dry fruit weight and total fresh fruits yield respectively. Highest fresh and dry fruits weight of okra was recorded from pruned okra plants. This indicates that pruning promotes partitioning of photosynthetic products than unpruned okra plants. This agreed with the result of Kabir (2010) that the weight of okra fruits produced on main stem was significantly greater than the control. Results showed that pruned okra plants produced significantly higher yield (10 t ha^{-1}) than the control (6 t ha^{-1}). Hence pruning facilitates opening of leaves to sunlight and prevent shading, partitioning of assimilates was high in pruned plants and therefore more pods produced. Olasantan and Salau (2008) reported similar result that pruning a quarter and half of the foliage increased okra pod yields by 29 and 36% respectively, compared to the un-pruned plants.

Table 1: Physical and chemical characteristics of the soil (0-30cm) at the experimental site during 2010/2011 and 2011/2012 dry sea sons at Fadama farm, Kwalkwalawa Village, Sokoto.

Soil properties	Year	
	2010/2011	2011/2013
Soil (texture)	Sandy loam	Sandy loam
pH (H ₂ O)	5.7	5.4
Total N (g kg ⁻¹)	0.67	0.91
Organic carbon (g kg ⁻¹)	5.39	6.18
Available P (mg kg ⁻¹)	0.32	0.46
Exchangeable bases (cmol kg ⁻¹)		
Ca	0.4	0.3
Mg	0.4	0.6
K	0.26	1.23
Na	0.35	0.74
CEC	2.48	3.16

Table 2: Days to 50% flowering, number of leaves per plant, number of fresh fruits per plant and total fresh fruit yield ($t\ ha^{-1}$) of okra as influenced by pruning during 2010/2011 and 2011/2012 dry seasons at the Usmanu Danfodiyo University Fadama Teaching and Research Farm, Kwalkwalawa village, Sokoto.

Treatment	Days to 50% flowering		Number of leaves per plant		Number of fresh fruits per plant	
	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12
Pruning	73 ^a	75 ^a	22.94 ^a	24.89 ^a	24.57 ^a	24.91 ^a
No pruning	63 ^b	64 ^b	10.22 ^b	11.39 ^b	13.78 ^b	13.96 ^b
SE +	0.82	0.64	0.46	0.32	0.11	0.10
Significance	*	*	*	*	*	*

Mean followed by same letter (s) are not significantly different using Duncan's Multiple Range Test (DMRT) at 5% level of probability. ns=not significant, *= significant

Table 3: Fresh fruit weight (g), dry fruit weight (g) and total fresh fruit yield of okra as influenced by pruning during 2010/2011 and 2011/2012 dry seasons at the Usmanu Danfodiyo University Fadama Teaching and Research Farm, Kwalkwalawa village, Sokoto.

Treatment	Fresh fruit weight (g)		Dry fruit weight (g)		Total fresh fruit weight (ha^{-1})	
	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12
Pruning	18.51 ^a	19.43 ^a	1.86 ^a	1.91 ^a	9.65 ^a	9.95 ^a
No pruning	12.54 ^b	14.42 ^b	1.45 ^b	1.59 ^b	5.76 ^b	5.85 ^b
SE +	0.38	0.29	0.02	0.04	0.10	0.07
Significance	*	*	*	*	*	*

Mean followed by same letter (s) are not significantly different using Duncan's Multiple Range Test (DMRT) at 5% level of probability. ns=not significant, *= significant

CONCLUSION

From the results of this study, it could be concluded that pruning treatment produced best results in terms of growth and fresh fruit yield of okra and therefore, could be recommend as suitable crop management practice for increased okra okra yield.

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