Effects of Tillage Operations on the Yield Components of Okra

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Abstract

Introduction

Okro farming is quite lucrative due to the popular demand for this vegetable in the Nigeria. The crop can be cultivated at the backyard and the farming of the crop is not capital intensive and it is very lucrative. There is a readily available market for both the pods and seeds. Okro farming requires proper planning, commitment, dedication and good cultural practices to generate a good yield. The main aim of this study was conducted to evaluate the effect of tillage operations on the yield components of Okro.

Materials and Methods

Field experiment were conducted on the Savannah Ectone of Nigeria to determine the effects of five tillage systems: Ploughing (P), Harrowing (H), Ploughing plus Ridging (PR), Ploughing plus Harrowing (PH) and Ploughing plus Harrowing plus Ridging (PHR), in combination with application rates of 0, 80 and 150 kg/ha of NPK fertilizers on the growth and yield components of Okro (*Abelmoscus esculentus*). Soil properties including moisture content, bulk density, porosity, and soil strength were measured at soil depth of 0, 5 and 10 cm. A week before land preparation and 8 weeks after planting according to standard procedure (IITA, 2000). Growth indices such as number of leaves (NL), plant height (PHT), stem diameter (SD) and leaf area (LA) were measured and fruit yield (YLD) of the crop were determined.

Results and Discussion

The result of the tillage effect on soil physical properties, growth parameters at 8 weeks after planting, fresh weight and dry matter accumulation were presented in Table 1. The values of the bulk density, moisture content and soil strength were influenced by the number of tillage operation in an inverse order of magnitude. The values of the porosity increase with the number of operations. This could be attributed to the influence of extensive tillage resulting at reduced soil bulk density compared with less tilled soil. This could be adduced to the loosening effects of tillage (Samuel and Ajav, 2010). The height of the Okro plants increases with rate of fertilizer application. This could be due to higher Nitrogen which induced higher plant height, number of leaves, leaf area, and stem diameter. This is in agreement with findings of Omotoso and Shittu (2007) who reported that an optimum plant height is claimed to be positively correlated with productivity of plant. The observed fruiting pattern, yield, fresh and dry matter accumulation of Okro increase correspondingly to the rate of fertilizer application from 0 to 150 kg/ha. The tillage treatment, Ploughing plus Ridging (PR) gave significant difference ($P<0.05$) at Okro yield and fresh fruit weight per plant. The results indicated that the Okro yield is greatly influenced with the cultural practices.

Conclusion

The rate of fertilizer application has corresponding influence on the growth parameters of Okro plant and the yield is considerably influenced by the tillage operations. This revealed that adoption of appropriate cultural practices directly affects the performance of Okro in the savannah ectone of Nigeria.

Table 1. Tillage effect on soil physical properties (0 - 15 cm depth) and growth parameters at 8 Weeks after Planting.

Properties	Soil Depth and NPK application	Treatment					
		P	H	PR	PH	PHR	Mean

		rate						
Soil Physical Characteristics (0-15 cm depth)	Moisture content (%)	0	10.8b	10.7b	9.3a	9.7a	9.4a	
		5	11.9b	10.8b	9.5a	10.0b	9.6a	
		10	10.4b	10.5b	9.0a	9.4a	9.1a	
	Bulk density (Mgm^{-3})	0	1.52b	1.48a	1.55b	1.42a	1.40a	
		5	1.46a	1.42a	1.65b	1.44a	1.46a	
		10	1.45a	1.50b	1.67b	1.42a	1.40a	
	Porosity (%)	0	45.60a	46.10a	47.60a	48.20a	49.40b	
		5	47.60a	44.10a	46.10a	46.80a	46.80b	
		10	44.80a	43.40a	45.20a	45.50a	46.60b	
	Soil strength (MPa)	0	0.840a	0.740a	0.920b	1.000b	0.730a	
		5	0.870a	0.860a	0.880b	1.100b	0.700a	
		10	0.920b	0.870a	0.910b	1.120b	0.700a	
Growth Parameters at Three Levels of NPK Fertilizer Rates (0, 80, 150 kg/ha)	Height ($mx10^{-2}$)	0	132.6a	136.4a	159.6c	138.5a	142.8a	
		80	140.2b	144.3b	169.8c	142.7b	140.2b	
		150	144.2b	148.7b	174.8c	150.6b	152.4b	
	Fruiting Pattern	0	5.0a	6.0a	7.5b	6.0a	7.0a	
		80	6.0a	5.0a	9.0b	7.0a	7.0a	
		150	6.5a	7.0a	8.5b	7.0a	8.0a	
	Stem Diameter ($m \times 10^{-2}$)	0	1.80a	2.10b	2.38b	2.30b	2.34b	
		80	2.00b	2.20b	2.40b	2.70b	2.32b	
		150	1.90a	2.20b	2.42b	2.32b	2.30b	
	Yield (t/ha)	0	0.52a	0.62a	0.73b	0.63a	0.73b	
		80	0.62a	0.52a	0.94b	0.73b	0.67a	
		150	0.60a	0.73b	0.83b	0.76b	0.83b	
	Number of Leaves	0	8.0b	5.0b	4.0a	6.0b	9.0b	
		80	7.0b	7.0b	5.5a	7.0b	8.0b	
		150	9.0b	6.0b	5.5a	6.0b	10.0b	
	Leaf Area ($m \times 10^{-2}$)	0	158.80a	162.40a	238.00c	180.20a	230.80b	
		80	180.40a	180.80a	240.00c	200.80b	232.40b	
		150	190.20b	200.20b	242.00c	210.40b	230.40b	

* Means carrying the same letters are not significantly different (P = 0.05) according to Duncan's Multiple Range Test

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