EFFECT OF DIFFERENT WEEDING REGIMES ON THE GROWTH AND YIELD OF OKRA (*Abelmoschus esculentus*) IN SOUTHEAST NIGERIA.

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Abstract
Field experiments were carried out in the early seasons of 2011 and 2012 at the Research and Teaching Farm of the Federal College of Agriculture Ishiagu Ebonyi State, to determine the effect of weeding regimes on the performances of Okra (*Abelmoschus esculentus).* The weeding treatments consisted of 5 (five) weeding regimes - control (no weeding), weeding at 3 weeks intervals after planting, weeding at 3 weeks only after planting, weeding at 4 weeks intervals after plant and weeding at 4 weeks only after planting. The treatments were arranged in a Randomized Complete Block Design (RCBD) with three (3) replications. Data were collected on plant height (cm), number of leaves, at 7, 9, and 11 weeks after planting, number of fresh fruits per treatment at harvest and weight (g) of fresh fruits per treatment at harvest. The data obtained in both years were summed up and averaged over the years and subjected to analysis of variance (ANOVA). Significant treatment means were separated using least significant difference at 5% level of probability. Weeding at 4 weeks interval gave the highest optimal weight (g) of okra fruit (15.67g), number of fresh fruit (0.99), and highest number of leaves (15.73) at 11 WAP. Weeding at 4 weeks interval is therefore recommended for optimum yield of Okra pod and to reduce the cost of production in Southeastern Nigeria.
Keywords: okra; weeding regime; optimum yield.

Introduction

Okra (*Abelmoschus esculentus*) belong to the family *Malvaceae*. It is a widely grown fruit vegetable not only in Nigeria but also in the temperate and sub-tropical region of the world. It is one of the leading fruits and vegetables in Nigeria (Jayapirah and Sivakimar, 2010). The plant is popular both as a separate and fried side clash and added into soup. The fresh edible immature pods provide human supplementary vitamins such as vitamin C, A, B-complex, iron and calcium (Eke *et al*, 2008). The immature fruit and young leaves are used in preparing soup while the mature pods mucilage has its medicinal properties as an emollient laxative and expectorant. Okra plants contain 20% edible oil and fiber (Adenekan *et al*; 2008). Weeds are importance limiting factors in tropical crops production climate. They grow very rapidly and obnoxiously in raining season competing strongly with the Okra plant for water, nutrients, space, light and act as alternate host to pest and disease. Weeds are a major constraints to yields production in okra. Uncontrolled weeds growth throughout the crops life cycle reduce Okra fresh pod yield by 88% to 93% (Melifonwu, 1999), compared to weed free crop.

However, practical weeding regimes depends not only on ecological conditions and crop growth habit but also on land preparation exerts variable complicated efforts on weed emergence, particularly reducing the weed seed bank by stimulating germination including dormancy and promoting seed longevity through weed seed burial (Smith and Akinnola, 2004). According to Liebman and Davis (2000) variation in crop and weed response to soil fertility regimes indicate the need for a better understanding of interaction between management practices and species specific physiological and morphological characteristics. The timing of nutrient availability relative to crop and weed demands upon nutrients supplies appear to be especially important for determining the outcome competitive interactions.

Weed infestation is one of the problems in the production of Okra. It increases competition for available plant nutrients in the soil thereby affecting adversely the growth and yield parameters of okra. Weed control in Okra farm increases labour and production costs thereby limiting farmer's income. Frequency of manual weed control amongst local farmers occasioned by the prohibitive cost of chemical herbicide justifies the needs to verify the best weeding regimes in okra farm to save labour and production costs. The objective of the study was to determine the best weeding regime for optimum performance of okra.

Materials and Methods

The experiment was carried out at the research and teaching farm of the Federal College of Agriculture Ishiagu Ebonyi State during the 2011 and 2012 cropping seasons. Ishiagu is situated at latitude 0.5^0, 56'N, longitude of 07^0 31'E and at an elevation of 150 m above the sea level with an average annual temperature and rainfall of 29.4^0 C and 1735.7mm respectively.

Experimental Design

The experimental design that was used is Randomized Complete Block Design (RCBD) with three replications. The plot size was 2.5 m x 1.5 m (3.75 m^2).

Experimental Layout

The land was cleared manually and beds were made thereafter to improve soil tilt. The land

area used 9.5 m X 9.5 m (90.25 m^2). It was divided into (3) three equal blocks at 1m apart with five (5) plots each in a block to give a total of 15 plots. The size of the each plot was 2.5m X 1.5m (3.75m^2) and 0.5m apart between the plots.

Planting and Weeding

Okra seeds (Lady's finger) obtained from the seeds store of Federal College of Agriculture Ishiagu were sown directly to the prepared beds at the depth of 20 cm deep. The planting spacing used for dwarf, Okra was 30 cm X 30 cm with 2 seed/hole and was later thin down to one two weeks after emergence. The following weeding regimes were employed: control (no weeding), Weeding at 3 weeks interval after planting, Weeding at 3 weeks only after planting, Weeding at 4 weeks interval after planting and Weeding at 4 weeks only after planting. Weeding was done by using hoe and hand pulling. During this operation soil was heaped at the base of the component crop in order to help it to stabilize properly in the soil.

Data Collection

Five (5) stands of Okra plant were randomly sampled from the inner rows and tagged. Data were taken on the following parameters.

- Plant height (cm) per treatment at 7, 9 and 11 week after planting.
- Number of leaves per treatment at 7, 9, and 11 weeks after planting
- Number of fresh fruits per treatment at harvest.
- Weight (g) of fresh fruits per treatment at harvest.

Data Analysis

The data collected obtained in the two years were summed up and averaged over the years and subjected to analysis of variance (ANOVA) according to the procedure for Randomized Complete Design (RCBD) as outlined in Obi (2002)

Results and Discussion

The identified weeds in the study area shows that the area was predominantly occupied by *Acroceras zizanioides* infesting 70% of the total land area (Table 1). Other weeds identified were *Paspalum scrobiculatum* (Linn.) and *Sacciolepis africanna (*Hub).

Table 1: Estimated occurrence(%) of some weeds identified in the study area

Grasses	Families	Occurrence (%)
1. *Acroceras zizanioides*	*Poaceae*	70
2. *Paspalum scrobiculatum* (Linn.)	*Poaceae*	18
3. *Sacciolepis africanna (*hub.*)*	*Poaceae*	12

The results in Table 2 indicate that the weeding regimes had no significant ($P > 0.05$) effect on the plant height at 7, 9 and 11WAP. This reveals that weed infestation do not actually affect okra plant height. However, weeding at 4 weeks only can improve the height. At this weeding regime weed interference at this period had no adverse effect on the metabolic processes of this crop (Oworu, 2007).

Table 2 : Effect of weeding regime on the plant height (cm) at 7, 9 and 11 weeks after planting (WAP)

Weeding regime (weeks)	Plant height (cm)		
	7WAP	9WAP	11WAP
Control (no weeding)	31.97	49.60	65.76
Weeding at 3 weeks intervals	19.16	37.60	58.10
Weeding at 3weeks only	22,49	57.43	63.66
Weeding at 4weeks intervals	19.33	44.67	63.00
Weeding at 4 weeks only	25.15	57.97	76.20
$LSD_{0.05}$	NS	NS	NS

NS = Not significant

The result in the table 3; shows that the weeding regimes had significant effect ($P < 0.05$) on the number of leaves at 7 and 11 WAP after planting. It was observed that number of leaves increases with various weeding regimes. The control plots had the lowest number of leaves. Weeding at 4 weeks only produced plant with highest number of leaves (10.47, 15.13, 15.73cm) across the weeks. While, the control plot produced the plant with the lowest number of leaves (6.67, 7.40, 7.66cm). This could be as result of

weed interference and, the stress experienced by the plants due to frequent weeding. This finding agrees with the report of Akanbi (2002).

Table 3 : Effect of weeding regime on the number of leaves at 7, 9 and 11 weeks after planting

Weeding regime (weeks)	Number of leaves		
	7WAP	9WAP	11WAP
Control (no weeding)	6.67	7.40	7.66
Weeding at 3 weeks interval	8.27	14.86	15.06
Weeding at weeks only	10.40	14.67	9.06
Weeding at 4 weeks interval	7.60	15.13	15.73
Weeding at 4 weeks only	10.47	19.20	11.46
$LSD_{0.05}$	2.12	NS	4.13

NS – Not significant

The table 4 reveals that the weeding regimes did not have any significant ($P > 0.05$) effect on the number of fresh fruits produced at harvest. The weeding regimes however affected significantly ($P < 0.05$) the weight of fresh fruits. The highest weight of fresh fruits 19.70g was obtained from the plants in the plot that was weeded at 4 weeks interval which differed significantly ($P < 0.05$) from the weight obtained from the plants in the plots that were weeded at 3 weeks interval. The lowest fresh fruits weight of 13.14 g was obtained from the plants in the control plots. Similar findings were obtained by Chowdbury *et al* (2007) in cotton where weed free regime gave the highest yield than no weeding regime.

Table 4: Effect of weeding regime on the number and weight (g) of fresh fruits at harvest

Weeding Regimes (weeks)	Number of Fresh Fruits	Weights (g) of Fresh Fruits
Control (no weeding)	0.70	4.4
Weeding at 3 weeks interval	0.93	14.2
Weeding at 3 weeks only	0.91	8.67
Weeding at 4 weeks interval	0.99	15.67
Weeding at 4 week only	0.96	9.73
$LSD_{0.05}$	NS	5.38

NS = Not significant

The experiment revealed that weeding has significant positive effect on the growth and yield of okra. Weeding okra at four (4) weeks intervals was found to improve the performance of okra. Martin *et al*., (2001) posited that the knowledge of critical period of weed competition is a pre-requisite for good harvest. The critical period of weed is the portion of the life cycle of a crop during which it must be kept weed-free to prevent yield loss due to weed interference. Plant height, leaf number, number and weight of fresh fruits were found to be higher when weeded at 4 weeks interval. Frisen (2006) reported that the tomato crop kept weed free for 36 days or weed infected for 34 days after transplanting gave yield equal to those kept weed free throughout the crop growth. It can be concluded therefore, that weeding at 4 weeks interval after planting is necessary to reduce the rate of weed interference, stress on plants and to get the optimum yield benefits.

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