GROWTH AND YIELD OF OKRA AS INFLUENCED BY LIVE MULCH IN SAMARU, ZARIA

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ABSTRACT
Two field experiments were conducted at the Teaching and Research Farm of the Institute for Agricultural Research; Ahmadu Bello University Zaria located on latitude $11^0$11'N, longitude $7^0$38'E and 686m above sea level in the Northern Guinea Savannah Ecological Zone of Nigeria in 2010 and 2011 cropping seasons. The objective of the study was to compare the yield of okra grown under different weed management strategies. The experiment consisted of four treatments namely: control, cucumber, watermelon and pumpkin. The experiment was laid out in a completely randomised block design (RCBD) with three replications. From the results so far obtained, pumpkin significantly gave higher mean values in both growth and yield characters measured, whereas the control treatment, significantly gave lower mean values of both growth and yield parameters throughout the period of assessment.

Key words: **Live mulch, weed control and okra**

INTRODUCTION

Amongst many important vegetable crops, green okra (*Abelmoschus esculentus* L.) supplies nutritive value to human daily diets. This crop can perform very well in most tropical and provides human supplementary vitamins such as A, B-Complex, C, iron and calcium (Akanbi *et al*., 2010; Jaibir, *et al*., 2004). The mucilage has its medicinal properties as an emollient, laxative and expectorant (Khan *et al*., 2000). Edible fresh pods could be used for fat extraction in making brownies. The dry pods are used in preparation of soups, candies and salad dressing (Mathew and Screenivasan, 1998). Despite the numerous uses of okra, its production is very low in most developing countries because of the dependence on natural fertility of

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the soil and in addition, dependence on labour which is usually very costly and not economically profitable (Muhammad *et al.*, 2007 and Schippers, 2000). Cover crops can improve soil fertility and reduce weed problem (Schippers, 2000). It will also provide a source of nutrition, reduce erosion, run-off and contamination of soil water otherwise be lost to leaching, improve soil physical properties, and reduce cost of weed management (Schippers, 2000). Studies in the developed countries has shown that using cover crops as an alternative in weed management systems, results in higher yield of crops, since without them; soil deterioration could be most rapid due to high leaching rate of soil nutrients (Akintoye, *et al.*, 2011; Parasuraman, 2000; Silva *et al.*, 2003). One way to improve soil condition is to add cover crops to the soil (Akintoye *et al.*, 2011). Therefore, these cover crops were intercropped along side with okra in order to evaluate their abilities in controlling weeds as well as improving the nutritional status of the soil with particular reference to growth and yield of okra in Zaria.

MATERIALS AND METHODS

The experiments were carried out in the rainy seasons of 2010 and 2011 at the Teaching and Research Farm of the Institute for Agricultural Research Ahmadu Bello University Zaria located on latitude $11^0$11'N, longitude$7^0$38'E and 686m above sea level in the Northern Guinea Savannah Ecological Zone of Nigeria. The land was ploughed twice and harrowed once. The plot size was 2m x 3m = ($6m^2$) with a path of 1m between plots. The trial was laid out in a randomised complete block design (RCBD), consisting of four treatments namely; the control as T1, cucumber as T2, watermelon as T3 and pumpkin as T4, replicated three times all serving as live mulches intercropped with okra variety of Clemson spineless to evaluate their abilities in controlling weeds with particular emphasis on growth and yield of okra. The live mulches were planted simultaneously with okra except the control, the same days of 24^{th} June, 2010 and 27^{th} June, 2011 respectively. Visual identification of weeds was carried out at 3WAP and 6WAP. Weeds such as *Cyperus rotundus, Cynodon dactylon, Echinochloa colona, Ageratum conyzoides* and *Eleusine indica* were the major weeds identified on the experimental plots. Using a quadrant of ($1m^2$), weeds within it per plot were harvested, oven dried at 75^0C for two days. Their respective weights were then taken to determine the effectiveness of different live mulch in weed suppression. Fruits were harvested nine days after flowering and subsequently at four days interval; up to last harvest. All data collected were analysed statistically using analysis of variance procedure at 5% level of probability.

RESULTS AND DISCUSSION

Plant height, number of leaves/plant, number of branches/plant and leaf area/plant

Many farmers in Nigeria are confronted with problem of weeds, soil degradation, soil erosion and crop failure during drought. Pressure on land has as a result of population growth has made traditional bush fallow system no longer effective in combating these problems and have given rise to research into the use of cover crop as a viable alternative to weed and soil protection. In addition to improving soil condition, live mulches also play major role in reducing cost of weed management. Weed control is very expensive, time consuming operation as most farmers practice hand hoeing which in most cases the frequency of weeding required by most crops are not met (Akintoye *et al*., 2011). Whereas when herbicides are used, their inappropriate application results in phytotoxicity and environmental hazards. Looking at (Table 1), it could be observed that there was a significant difference among the mean values of treatments due to weed control methods in both 2010 and 2011 cropping seasons at P = 0.05. Pumpkin significantly gave higher mean values on plant height, number of leaves/plant and number of branches/plant at P = 0.05 in both seasons. However, the control treatment significantly gave lower mean values at P = 0.05 on the same parameters. An increase in a treatment significantly increased the mean values up to higher mean values observed in pumpkin. This observation is in line with the work of Akintoye *et al.* (2011) who earlier reported that live mulches have differences in their ability to control weeds which means that pumpkin significantly reduced weed problem in all plots under it than the rest of the treatments. This ability of pumpkin to reduce weeds better than other treatments, significantly gave higher growth parameters of plant height, number of leaves/plant and number of branches/plant by reducing weed population and weed dry matter in okra grown fields. There was no significant difference among the treatment values due to weed control methods on leaf area. Though pumpkin gave higher mean values than other live mulches, they were not significantly different at P = 0.05.

Number of pods/plant, number of seeds/pod, 100- pod weight/plot and pod yield ha^{-1}

Table 1 shows the significant increase in number of pods/plant, number of seeds/pod and pod yield ha^{-1} in both 2010 and 2011 cropping seasons. Pumpkin significantly gave higher mean values of number of pods/plant, number of seeds/pod and pod yield ha^{-1} at P = 0.05. 100 – Pod weight/plot was not significantly affected by treatments at P = 0.05. The control treatment gave lower mean values, while pumpkin gave higher mean values but they were not

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significantly different at P = 0.05. This observation is in line with the works of Kobayashi *et al.* (2003) who earlier reported that thick cover crops are able to compete well with weeds because they can prevent germinated weed seeds from completing their life cycle and reproducing. This is as a result of the fact that the weeds usually run out stored energy for growth before building the necessary structural capability to compete with the mulch layer a term referred to as cover crop smother effect.

Weed density (m2)

Table 2 shows a significant difference at P = 0.05 on weed density due to weed control methods among the treatments. The control treatment significantly gave higher mean values than the rest of the treatments. On the other hand, pumpkin significantly gave lower mean values of weed density than the other treatments. This means that pumpkin significantly controlled weed population in all plots under this treatment. This observation is in agreement with works of Mathew and Screenivasan (1998) and Patel *et al.* (2003). Who earlier reported that the presence of weeds reduced yields by 82 % and significant yield increases in pod was noted by controlling weeds up to 45 days of sowing. Also, Silva *et al.* (2003) earlier reported that the use of live mulch in okra to control weeds appears to be useful and considered to be more effective against weeds.

Weed biomass (gm/m^2)

Table 3 shows a significant difference on weed biomass among treatment means at P = 0.05. The control treatment significantly gave higher weed biomass than the rest treatments, while pumpkin significantly gave lower mean values on weed biomass at P = 0.05 in all the two cropping seasons. This observation may mean that there was less competition between the crop and weeds since pumpkin grew vigorously out smarting the weeds by producing a close canopy that denied the weeds from getting adequate solar radiation for normal photosynthesis thus, it succeeded in eliminating most of the weeds and this resulted into a lower competition between the crop and weeds for nutrients, space, light, water and carbon dioxide giving the crop the advantage over weeds in getting these resources. However, in the control treatment which had no live mulch, gave the weeds the advantage to supersede the crop in getting these raw materials for normal photosynthetic processes. This has resulted in a higher population of weeds in all plots under this treatment over other treatments that were treated with live mulch and hence, higher biomass production in the control over others. This observation is in agreement with the report of Akintoye *et al.* (2011) that competition between weeds and crop starts right from germination of the crop up to harvest affecting both growth and yield parameters adversely.

REFERENCES

Akanbi, W. B. Togun, A. O. Adediran, J. A. and Ilupeju, E. A. O.(2010). Growth, Dry matter and Fruit Yield components of okra under organic and inorganic sources of nutrients. *American- Eurasian Journal of Sustainable Agriculture*, 4(1): 1-13.

Akintoye, H. A. Adebayo, A. G. and Aina, O. O. (2011). Growth and yield response of okra intercropped with live mulch. *Agricultural research*, 5:146 – 153.

Duncan, D. B. (1955). Multiple range and F test. *Biometrics* 1- 42.

Jaibir, T. Singh, H. B. Vivek and Tripathi, S. S. (2004). Integrated weed management in intercropping of mungbean (*Vigna radiata*) and cowpea fodder (*Vigna unguiculata*) with pigeon pea (*Cajanus cajan*) under western U.P. condition. *Indian Journal of Weed Science,* 36: 133 -134.

Khan, B. M. Asif, M. Hussain, N. and Iqbal, (2000). Agronomic economic impact of different weed control strategies in wheat. *J. Res. Sci.*, 11: 46 – 49.

Kobayashi, Y. Ito, M. and Suwanarak, K. (2003). Evaluation of smothering effect of four legume cover: *Weed Biol. Management*, 3: 222 – 227.

Mathew, G. Srceenivasan, E. (1998). Effect of weed control methods on yield and yield economics of rain fed and rice fallow summer cowpea. *Madras Agric. J.*, 85: 50 – 52.

Muhammad, R. C. Muhammad, J. Tahira, Z. M. (2007). Yield and yield components of cowpea as affected by various weed control methods under rain fed conditions of Pakistan. *International Journal of Agriculture and Biology*, 1560-8530/2007/09-1-120-124.

Parasuraman, P. (2000). Weed management in rain fed cowpea (*Vigna unguiculata*) and greengram (*Phaseolus radiatus*) under North West Agro climatic zone of Tamil Nadu. *Indian J. Agrn.*, 45: 732 – 736.

Schippres, R.R. (2000). African indigenous vegetables and overview of cultivated species. *Natural Resources Institute*, Chathaam, UK pp 89 – 98.

Silva, J. B. F. Pitombeira, J. B. Nunes, R. F. Pinho, J. L.N. (2003). Weed control in cowpea under no till system. *Planta Daninha*, 21: 151 – 157.

Table 1: Growth and Yield of Okra as Influenced by Weed Control Methods at Samaru, Zaria in 2010 and 2011 Cropping Seasons

Treatments	Plant height (cm)		Number of leaves per plant		Number of branches per plant		Leaf area (cm^2)		Number of pods per plant		Pod yield per plot (kg)		Pod yield per ha^{-1} (t)	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
0	44.90c	42.78c	10.45d	10.24c	7.02b	6.94b	47.88a	47.70a	5.80c	4.78c	1.35b	1.42b	1135.20c	1133.70c
1	51.10b	49.65b	12.54c	11.15c	8.10a	7.87ab	48.56a	48.57a	6.10b	6.65b	1.98b	2.08b	2145.80b	2138.58b
2	54.89a	53.74a	19.10b	18.25b	8.90a	8.77ab	49.22a	48.96a	7.86a	7.74a	2.25ab	2.57ab	2198.80b	2318.96b
3	56.45a	55.48a	22.70a	19.18a	8.60a	7.85a	51.25a	50.15a	9.35a	9.48a	2.88a	3.16a	3211.00a	3219.15a

Means with the same letter (s) within a column are not significantly different at P = 0.05 Duncan's' Multiple Range Test (DMRT).

Table 2: Density per (m^2) of Weed Species in Okra as Influenced by Weed Control Methods at Samaru, Zaria in 2010 and 2011

Treatments	*Cynodon dactylon*		*Echinochloa colona*		*Cyperus rotundus*		*Ageratum conyzoides*		*Eleusine indica*	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
0	140.50a	144.30a	101.45a	94.14a	27.42a	26.84a	15.22a	13.70a	13.00a	14.11a
1	23.10b	24.65b	29.44b	10.35d	17.10b	15.87b	07.12b	06.37c	09.12b	10.12b
2	25.89b	26.74d	27.10b	15.45c	13.60c	14.57c	08.16b	08.42b	06.78c	07.24c
3	27.45b	28.48c	21.60c	19.18b	12.60c	13.85d	07.37b	06.48c	08.13b	08.10bc

0 = Control 1 = Cucumber 2 = Watermelon 3 = Pumpkin Means with the same letter (s) within a column are not significantly different at P = 0.05 Duncan's' Multiple Range Test (DMRT).

Table 3: Weed Dry matter in (gm/m^2) of Weed Species in Okra as Influenced by Weed Control Methods at Samaru, Zaria in 2010 and 2011

Treatments	*Cynodon dactylon*		*Echinochloa colona*		*Cyperus rotundus*		*Ageratum conyzoides*		*Eleusine indica*	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
0	31.18a	32.10a	33.45a	31.22a	16.31a	18.94a	15.22a	13.70a	13.00a	14.24a
1	12.10b	12.12b	12.54b	1014b	08.14b	08.87b	07.12b	06.37c	10.12b	14.18a
2	10.82b	10.14b	09.10b	10.13b	07.61b	06.87c	08.16b	08.42b	08.78c	10.16b
3	09.32b	10.25b	10.70b	09.84b	07.22b	05.85b	07.37b	06.48c	08.12b	08.14c

0 = Control 1 = Cucumber 2 = Watermelon 3 = Pumpkin. Means with the same letter (s) within a column are not significantly different at P = 0.05 Duncan's' Multiple Range Test (DMRT).