Available online: www.notulaebiologicae.ro
Print ISSN 2067-3205; Electronic 2067-3264
Not Sci Biol, 2019 11(3):429-435. DOI: 10.15835/nsb11310448
Original Article

Effects of Weed Density and Distance on the Growth and Yield of Two Okra (*Abelmoscus esculentus*) Varieties

Wasiu Olanrewaju OPADOKUN*, Kehinde Stephen OLORUNMAIYE

*University of Ilorin, Faculty of Life Sciences, Department of Plant Biology, Nigeria; Waseopas@gmail.com (*corresponding author)*

Abstract

A field experiment was conducted at the botanical garden of the University of Ilorin to determine the effects of weed density and distance on the growth and yield of two varieties of okra (NHAe-40 days and Kirikoi). The experiment was a complete randomized block design with eleven treatments and three replicates. The treatment details include T_0 = No weed, T_1 = One weed per plant T_2= Two weeds per plant, T_3 = Three weeds per plant, T_4 = Four weeds per plant, T_5 = Five weeds per plant, T_6 = Six weeds per plant, T_7 = Seven weeds per plant, T_8 = Eight weeds per plant, T_9 = Nine weeds per plant and T_{10} = Ten weeds per plant. Data were collected on plant height, number of leaves, stem girth, shoot Fresh and dry weight as well as yield parameters was carried out at the end of the experiment. The result depicts a significant decrease in the vegetative growth and yield parameters with increasing weed density in both varieties. Irrespective of the weed distance, all yield parameters decreased significantly with increasing number of co-habiting weeds except for plant co-habited with one weed at 20 cm and 30 cm weed distance which was significantly the same with the control in both varieties. The result is an indication that absence of weed or early control of weed should be done at the early weeks of growth before the onset of flowering if maximum production is expected.

Keywords: competition; density; distance; okra; weed

Introduction

Okra (*Abelmoscus esculentus* (L). Moench) is an economically important vegetable crop grown in tropical and subtropical part of the world including India, Sudan, Parkistan, Ghana, Egypt, Benin Saudi Arabia, Mexico and Cameroon with the largest area in India followed by Nigeria (Saifullah and Rabbani, 2009). It belongs to the Malvaceae family (Kashif *et al*., 2008). Globally, it is grown for its immature pods consumed as fried or boiled vegetable or may be added to salad, soups and stew (Kashif *et al*., 2008). In Nigeria, the fruits are used in making soup, salad and for flavoring when dried and powdered. The tender fruits contain minerals especially calcium, magnesium, Iron and phosphorus, protein, vitamin A and C including riboflavin as well as high mucilage (Poggio, 2005). Mature okra seed are good sources of protein and oil and it has been known for its high nutritional quality. Okra cultivation is often limited by several factors including inadequate soil fertility, pest and diseases infestation, weed competition and poor agronomic practices such as sub-optimal plant density, inappropriate planting date to mention but a few (Chadha, 2002) however, of all the constraint to its production, weed competition constitute a major case of yield loss in okra. *Euphorbia heterophylla* is a perennial herb which has been identified as an important weed for most waste and farmlands, railway banks throughout the tropical and subtropical regions of the world (Falodun *et al*., 2006). In Nigeria the weed have been reported in association with cowpea (Olorunmaiye and Ogunfolaji, 2002), popcorn maize (Saka *et al*., 2013) and several vegetable crops including okra (Panthinige *et al*., 2008). It has been reported that optimum weed control is the key element for higher yield in okra plant growth and yield are affected by weed competition (Amjad *et al*., 2002). The present study therefore seeks to examine the effects of *E. heterophylla* weed distance from the crop of interest as well as the weed density on the growth and yield of two okra varieties (*Abelmoschus esculentus*).

Materials and Methods

The experiment was carried out at University of Ilorin Botanical garden which lies in the southern guinea savanna belt of Nigeria with an annual rainfall of 1200 mm and temperature range of 33-34 °C and a distinct dry season. The experimental soil is sandy loam with a pH of 7.8 The experimental design is a split plot completely randomized block design with two main plots and three sub-plots, each sub-plot comprises of eleven treatments and three

Received: 21 Feb 2019. Received in revised form: 21 Aug 2019. Accepted: 16 Sep 2019. Published online: 30 Sep 2019.

replicates including T_0 = No weed, T_1 = 1 weed per plant, T_2 = 2 weeds per plant, T_3 = 3 weeds per plant, T_4 = 4 weeds per plant, T_5 = 5 weeds per plant, T_6 = 6 weeds per plant, T_7 = 7 weeds per plant, T_8 = 8 weeds per plant, T_9 = 9 weeds per plant, T_{10} = 10 weeds per plant. Five seeds each of the two varieties of Okra ('NHAe-40 days' and 'Kirikoi') procured from an Agricultural store in Ilorin, were sown per hole with 1 to 10 *E. heterophylla* seeds planted at 20 cm away from the okra. The same procedure as above were used for the 30 cm *E. heterophylla* distance while the same were also done for the weed density however, for this group, the weeds were planted in a concentric manner around the crop irrespective of their distance from the crop. All weeds found on the experimental field were removed on site except for *E. heterophylla*.

Morphological growth attributes such as plant height, number of leaves, stem girth and leaves area were estimated at an interval of two weeks throughout the period of cultivation. Reproductive parameters including average number of fruit, average groove number, average pod length, pod girth and fresh and dry pod weight were determined at harvest. Data collected were subjected to analysis of variance (ANOVA) using Statistical Package of Social Science (SPSS) and means were separated using Duncan's Multiple Range Test (DMRT) at 5% level of probability.

Results and Discussion

Euphorbia heterophylla weed density and distance significantly ($p<0.05$) affect the plant height of the two varieties of okra considered in this study (Table 1). Significant highest plant height was observed in weed free check (control) and those cohabited with one weed. There was a progressive reduction in plant height of okra as the density of weeds increased in the two varieties when compared to the control treatment with the shortest plants obtained in those co-habited with ten weeds irrespective of the distance (Table 1). The tallest plants obtained in the control and those co-habited with one weed could be attributed to less weed competition with the okra plant for nutrients, light, water and space (Reddy and Whiting, 2000; Odelaye *et al*., 2007). The general reduction in plant height with increasing weed density could be attributed to an intense weed competition with increasing number of weed per plant stand (Barrentine and Oliver, 1977; Rao, 2000). This result also agrees with findings of Ayeni and Oyenka (1992) that attributed the stronger depressive effects of weed on soybean plant to a longer duration of weed interference. Number of leaves increased steadily with the age of okra plants from 4-6WAP beyond which a decrease in leaf number was observed till harvest. The reduction in the number of leaf of both varieties could be attributed to an increase in the number and density of weed (*E. heterophylla*) which ultimately result in a reduction in the photosynthetic activities of the crop due to competition. This is aligns with the work of (RIzzardi, 2004; Carvalho *et al*., 2010) who reported a significant decrease in growth parameters such as plant height, number of leaves, dry matter accumulation and macronutrient accumulation in soybean co-habited with *E. .heterophylla* were reduced with increasing weed density. Significant highest stem girth in both okra varieties were observed in the control treatment followed by those cohabited with one weeds with the lowest stem diameter was recorded in those cohabited with ten weeds. The present findings was in consonance with (Smith and Ojo, 2007) they observed the maximum stem diameter of okra where weeding was done at early week of planting. In both varieties weed free check (control) recorded a significant highest ($p<0.05$) leaf area when compared to all other plants co-habited with *E. heterophylla* weed. The highest leaf area of the two varieties in the control treatments in both varieties could be adduced to increased cell division and elongation on an account of efficient utilization of available resources since there was no weed competition at all. Ibe *et al*. (2005) reported efficient resources utilization in weed free plants which resulted in higher yield. Askew *et al*. (2002) conducted field trial and reported that controlling weeds and leaser competition within the plant community could result in utilization of the available resources efficiently. Similarly, significantly higher dry biomass accumulation was observed in the Weed free check (control) This is in tandem with the work of (Rizzardi 2004; Carvalho *et al*., 2010) in a soybean study in co-existence with *E. heterophylla,* they reported a reduced growth (plant height, number of leaves, dry matter accumulation) and macronutrient accumulation of in soybean plant with increasing *E. heterophylla* weed density.

In both varieties of okra, reproductive performance of the various weed treatments of 20 and 30 cm weed distance and weed density was considered and the control treatment recorded the highest yield attributes (Tables 6 and 7) such as in number of fruits, groove number, pod length, pod girth and the pod fresh and dry weight. The densities of *E. heterophylla* reduced the yield of okra in both varieties compared with the control in terms of number of fruits, number of groove, pod length, pod girth, fresh and dry pod weight. This observed reduction in yield agreed with the finding of Olorunmaiye and Ogunfolaji (2002) who reported reduction in cowpea yield with increase in *E. heterophylla* population. Askew *et al*. (2002) conducted field trial and reported that controlling weeds and leaser competition within the plant community could result in utilization of the available resources efficiently, which is in turn reflected in higher yield. Moreover, the availability of adequate soil moisture, nutrients and other growth factors due to less weed competition also contributed to optimum okra yield, which is similar to the study conducted by Reddy and Whiting (2002).

Conclusions

The decrease in growth and yield characteristics of okra is a function of increasing number of *Euphorbia heterophylla* stands co-habited with the okra plant. It should be noted that plant co-habited with one stand of *E. heterophylla* weed irrespective of the distance from the plant had significantly the same effect on the growth and yield performance of okra when compared to the weed free check. Therefore, *E. heterophylla* weed co-existence should be completely avoided where possible for optimum growth and yield of okra plant, where a complete removal of the weed is economically not feasible, the weed density should not exceed one weed per plant stand and the weed distance from the plant should not be less than 30 cm away from the plant

Conflict of Interest

The authors declare that there are no conflicts of interest related to this article.

Table 1. Effects of *E. heterophylla* weeds density and distance on the plant height of *A. esculentus* (Var. 'Kirikoi' and 'NHAe-40days')

	Treatments	Var. 'Kirikoi'				Var. 'NHAe-40 days'			
		2 WAP	4 WAP	6 WAP	8 WAP	2 WAP	4 WAP	6 WAP	8 WAP
20 cm weed distance	T_0	7.83±0.17^{a}	15.53±0.91^{a}	32.33±1.67^{a}	37.67±1.09^{a}	8.07±0.46^{a}	15.83±0.44^{a}	25.13±0.55^{a}	32.57±0.83^{a}
	T_1	6.13±0.59^{b}	15.67±0.73^{a}	31.20±1.85^{a}	33.13±1.54^{b}	7.70±0.21^{ab}	15.33±0.12^{ab}	24.63±0.27^{ab}	31.87±0.28^{ab}
	T_2	7.00±0.29^{ab}	15.67±1.01^{a}	29.67±1.20^{a}	31.93±2.08^{bc}	3.70±0.38^{f}	10.90±0.42^{de}	19.70±0.72^{f}	27.07±0.75^{ef}
	T_3	6.53±0.26^{b}	15.23±0.67^{a}	28.93±1.19^{a}	32.37±1.50^{bc}	7.07±0.09b^{c}	14.67±0.17^{c}	23.30±0.44^{bc}	30.13±0.58^{bc}
	T_4	6.70±0.21^{ab}	13.53±1.22^{ab}	21.83±1.09^{bc}	31.10±1.47^{bc}	7.07±0.24b^{c}	14.37±0.13^{bc}	22.83±0.17^{cd}	29.70±0.36^{cd}
	T_5	6.73±0.64^{ab}	12.60±1.07b^{c}	21.03±2.04^{bc}	30.13±1.70^{bcd}	6.63±0.24^{c}	13.40±0.59^{c}	21.50±0.87^{de}	28.17±1.10^{cde}
	T_6	4.33±0.33^{bc}	12.53±0.32b^{c}	19.53±1.35^{c}	28.07±1.01^{cde}	6.73±0.27^{c}	13.47±0.32^{c}	21.27±0.15^{e}	27.80±0.17^{de}
	T_7	4.93±0.47^{c}	10.63±0.95^{cd}	24.83±0.73^{b}	26.30±1.20^{ef}	5.37±0.52^{d}	11.67±0.33^{d}	19.27±0.12^{f}	25.73±0.13^{fg}
	T_8	4.33±0.44^{cd}	10.73±0.27^{cd}	19.90±0.86^{c}	26.47±0.84^{def}	5.17±0.32^{d}	10.77±0.39^{de}	18.30±0.20^{fg}	24.57±0.38^{g}
	T_9	4.37±0.30^{cd}	9.57±0.78^{e}	19.50±0.76^{c}	24.47±0.69^{ef}	4.73±0.07^{de}	10.50±0.29^{e}	17.63±0.63^{gh}	23.77±0.86^{gh}
	T_{10}	3.37±0.19^{d}	7.20±0.23^{e}	18.63±0.73^{c}	23.23±1.65^{f}	4.10±0.12^{f}	9.33±0.34^{f}	16.27±0.62^{h}	22.30±0.83^{h}
30 cm weed distance	T_0	6.57±0.15^{a}	15.33±0.33^{ab}	26.00±1.50^{a}	35.93±0.92^{a}	8.57±0.34^{a}	16.33±0.42^{a}	25.63±0.73^{a}	33.07±0.80^{a}
	T_1	5.90±0.35^{a}	12.67±0.60^{bc}	25.83±1.74^{a}	31.73±0.73^{ab}	7.80±0.42^{ab}	15.43±0.66^{ab}	24.73±0.74^{ab}	31.97±0.72^{ab}
	T_2	5.97±0.23^{a}	15.50±0.76^{a}	21.53±2.11^{b}	31.20±2.84^{ab}	7.17±0.09^{bc}	14.37±0.23^{bcd}	23.17±0.41^{bc}	30.53±0.47^{bc}
	T_3	6.13±0.12^{a}	12.67±0.93^{bc}	21.03±0.53^{b}	31.10±1.22^{ab}	6.90±0.26^{bcd}	14.50±0.40^{bc}	23.13±0.52^{bc}	29.97±0.69^{bc}
	T_4	6.20±0.50^{a}	11.83±0.44^{cd}	19.23±0.50^{bc}	28.97±1.18^{abc}	6.30±0.06^{cde}	13.60±0.15^{cde}	22.07±0.12^{cd}	28.93±0.54^{cd}
	T_5	6.00±0.15^{a}	13.23±0.90^{abc}	20.67±0.93^{b}	27.63±1.41^{abc}	6.17±0.59^{cde}	12.93±0.87^{de}	21.03±1.18^{de}	27.70±1.39^{de}
	T_6	5.77±0.35^{a}	13.00±1.32^{abc}	18.73±1.77^{bc}	25.77±1.39^{bc}	5.97±0.34^{de}	12.70±0.70^{e}	20.50±0.57^{de}	27.03±0.39^{de}
	T_7	6.10±0.40^{a}	12.10±1.16^{c}	16.17±1.20^{c}	26.20±0.92^{bc}	5.77±0.32^{e}	12.07±0.62^{e}	19.67±0.64^{ef}	26.13±0.82^{ef}
	T_8	4.13±0.12^{b}	10.83±1.17^{cde}	15.20±0.85^{d}	27.30±1.63^{abc}	4.70±0.32^{f}	10.30±0.23^{f}	17.83±0.38^{fg}	24.10±0.20^{fg}
	T_9	4.00±0.20^{b}	9.40±0.42^{de}	16.33±0.33^{c}	22.93±1.56^{cd}	4.63±0.20^{f}	10.40±0.21^{f}	17.53±0.57^{g}	23.67±0.78^{g}
	T_{10}	4.20±0.56^{b}	9.17±0.44^{e}	11.70±1.40^{d}	19.30±0.93^{d}	4.57±0.17^{f}	9.80±0.30^{f}	16.73±0.47^{g}	22.77±0.62^{g}
Weed density	T_0	5.77±0.33^{a}	11.00±0.92^{a}	18.17±0.60^{a}	19.80±0.17^{a}	7.87±0.12^{a}	15.63±0.12^{a}	24.93±0.43^{a}	32.37±0.57^{a}
	T_1	5.13±0.22^{b}	10.83±0.60a	17.40±0.70^{a}	18.77±0.89^{ab}	5.90±0.21^{b}	13.53±0.39^{b}	22.83±0.52^{b}	30.07±0.52^{b}
	T_2	4.83±0.23^{bc}	11.00±1.00^{a}	16.00±0.58b^{c}	18.50±0.83^{ab}	5.47±0.27^{bc}	12.67±0.42^{bc}	21.47±0.39^{bc}	28.83±0.50^{bc}
	T_3	4.90±0.06^{bc}	9.83±0.33^{ab}	15.97±0.03b^{c}	17.60±0.32^{ab}	5.23±0.26^{c}	12.83±0.24^{bc}	21.47±0.69^{bc}	28.30±0.78^{bcd}
	T_4	4.73±0.12^{bcd}	9.80±0.61^{ab}	15.33±0.44^{c}	16.93±1.62^{bcd}	5.10±0.12^{cd}	12.40±0.00^{bc}	20.87±0.03^{cd}	27.73±0.42^{cde}
	T_5	4.53±0.15^{bcd}	9.83±0.44^{ab}	14.33±0.44^{c}	15.90±0.95^{cde}	5.07±0.09^{cde}	11.83±0.39^{cd}	19.93±0.66^{cde}	26.60±0.90^{def}
	T_6	4.80±0.26^{bcd}	10.00±0.29^{ab}	13.50±0.29^{de}	4.90±0.90^{de}	5.00±0.29^{cde}	11.73±0.55^{cd}	19.53±0.54^{de}	26.07±0.64^{ef}
	T_7	4.57±0.09^{bcd}	9.67±0.44^{ab}	12.73±0.62^{de}	14.33±0.35^{def}	4.50±0.17^{def}	10.80±0.38^{de}	18.40±0.35^{ef}	24.87±0.54^{fg}
	T_8	4.43±0.07^{cd}	8.57±0.55^{c}	13.07±0.57^{de}	14.30±0.40^{def}	4.43±0.27^{ef}	10.03±0.49ef	17.57±0.44^{f}	23.83±0.38^{gh}
	T_9	4.40±0.12^{bc}	8.20±0.15^{c}	12.67±0.67^{de}	13.37±0.33^{ef}	4.03±0.13^{g}	9.80±0.25^{ef}	16.93±0.62^{fg}	23.07±0.84^{gh}
	T_{10}	4.20±0.15^{d}	8.27±0.39^{c}	11.83±0.67^{e}	12.13±0.97^{f}	3.70±0.15^{g}	8.93±0.39^{f}	15.87±0.67^{g}	21.90±0.87^{h}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}.

Table 2. Effects of *E. heterophylla* weeds density and distance on the number of leaves of *A. esculentus* (Var. 'Kirikoi' and 'NHAe-40 days')

	Treatments	Var. 'Kirikoi'				Var. 'NHAe-40days'			
		2 WAP	4 WAP	6 WAP	8 WAP	2 WAP	4 WAP	6 WAP	8 WAP
20 cm weed distance	T_0	4.00±0.00^{a}	6.00±0.00^{a}	7.33±0.33^{a}	6.33±0.33^{a}	3.33±0.33^{a}	4.67±0.67^{a}	7.33±0.33^{a}	5.67±0.33^{a}
	T_1	3.67±0.33^{ab}	5.67±0.33^{ab}	7.00±0.58^{ab}	5.33±0.33^{b}	3.33±0.33^{a}	4.67±0.33^{a}	7.33±0.33^{a}	5.33±0.33^{ab}
	T_2	3.33±0.33^{abc}	5.33±0.67^{ab}	6.33±0.67^{abc}	5.33±0.33b	3.33±0.33^{a}	4.67±0.33^{a}	7.00±0.00^{ab}	5.00±0.00^{abc}
	T_3	3.67±0.33^{ab}	5.33±0.67^{ab}	6.33±0.88^{abc}	5.33±0.33^{b}	3.00±0.00^{a}	4.33±0.33^{ab}	7.00±0.00^{ab}	5.00±0.00^{abc}
	T_4	3.33±0.67^{abc}	5.33±0.33^{ab}	5.67±0.33^{abcd}	4.67±0.33^{bc}	3.33±0.33^{a}	5.00±0.00^{a}	6.33±0.33^{bc}	4.67±0.33^{bcd}
	T_5	3.33±0.33^{abc}	4.67±0.33^{abc}	6.00±0.00^{abcd}	4.67±0.33^{bc}	2.67±0.33^{a}	4.33±0.33^{ab}	6.33±0.33^{bc}	4.33±0.33^{cde}
	T_6	3.33±0.33^{abc}	5.00±0.00^{ab}	5.67±0.33^{abcd}	4.67±0.33^{bc}	3.00±0.00^{a}	4.33±0.33^{ab}	6.00±0.00^{cd}	4.33±0.33^{cde}
	T_7	3.00±0.00^{abc}	5.00±0.00^{ab}	5.33±0.67^{bcd}	4.33±0.33^{bc}	2.67±0.33^{a}	4.00±0.00^{ab}	5.67±0.33^{cde}	4.00±0.00^{de}
	T_8	3.00±0.00^{abc}	5.00±0.00^{ab}	5.33±0.33^{bcd}	4.00±0.00c	2.67±0.33^{a}	4.00±0.00^{ab}	5.33±0.33^{def}	4.00±0.00^{de}
	T_9	2.67±0.33^{bc}	4.33±0.33^{bc}	5.00±0.00^{cd}	4.00±0.00^{c}	2.33±0.33^{a}	4.00±0.00^{ab}	5.00±0.00^{ef}	3.67±0.33^{ef}
	T_{10}	2.33±0.33^{c}	3.67±0.67^{bc}	4.33±0.67^{bc}	3.67±0.33^{c}	2.33±0.33^{a}	3.33±0.33^{b}	4.67±0.33^{f}	3.00±0.00^{f}
30 cm weed distance	T_0	4.00±0.00^{a}	6.33±0.33^{a}	7.33±0.33^{a}	5.00±0.00^{a}	8.57±0.34^{a}	3.67±0.33^{a}	5.33±0.67^{ab}	8.00±0.58^{a}
	T_1	4.00±0.00^{a}	5.67±0.33^{ab}	7.33±0.33^{a}	4.33±0.33^{ab}	7.80±0.42^{ab}	3.67±0.33^{a}	5.67±0.33^{a}	8.33±0.33^{a}
	T_2	3.67±0.33^{ab}	5.67±0.33^{ab}	6.67±0.33^{ab}	4.67±0.33^{ab}	7.17±0.09^{bc}	3.33±0.33^{ab}	5.33±0.33^{ab}	7.67±0.67^{ab}
	T_3	4.00±0.00^{a}	5.67±0.33^{ab}	6.33±0.33^{abc}	4.67±0.33^{ab}	6.90±0.26^{bcd}	3.33±0.33^{ab}	5.00±0.00^{abc}	7.67±0.33^{ab}
	T_4	3.33±0.33^{abc}	4.67±0.33^{bc}	5.67±0.33^{bcd}	4.33±0.33^{ab}	6.30±0.06^{cde}	3.33±0.33^{ab}	5.00±0.58^{abc}	6.33±0.88^{abc}
	T_5	3.33±0.33^{abc}	4.33±0.33^{cd}	5.00±0.58^{de}	4.33±0.33^{ab}	6.17±0.59^{cde}	3.00±0.00^{abc}	3.67±0.33^{c}	5.67±0.88^{bc}
	T_6	3.00±0.00^{bc}	4.00±0.58^{cd}	4.67±0.33^{ef}	4.33±0.33^{ab}	5.97±0.34^{de}	3.00±0.00^{abc}	4.00±0.00^{bc}	5.67±0.33^{bc}
	T_7	2.67±0.33^{c}	4.67±0.33^{bc}	5.33±0.33^{cd}	4.00±0.00^{b}	5.77±0.32^{c}	3.00±0.00^{abc}	4.00±0.58^{bc}	5.67±0.88^{bc}
	T_8	3.33±0.33^{abc}	3.33±0.33^{d}	4.00±0.00^{ef}	4.00±0.00^{b}	4.70±0.32^{f}	2.67±0.33^{bc}	3.67±0.33^{c}	5.00±0.58^{c}
	T_9	3.67±0.33^{ab}	3.67±0.33^{cd}	3.67±0.33^{f}	4.00±0.00^{b}	4.63±0.20^{f}	2.67±0.33^{bc}	4.00±0.58^{bc}	5.00±0.58^{c}
	T_{10}	3.33±0.33^{abc}	4.00±0.00^{cd}	3.67±0.33^{f}	4.00±0.00^{b}	4.57±0.17^{f}	2.33±0.33^{c}	3.67±0.33^{c}	5.00±0.58^{c}
Weed density	T_0	2.67±0.33^{a}	6.00±0.00^{a}	6.67±0.33^{a}	5.67±0.33^{a}	3.67±0.33^{a}	5.67±0.33^{a}	8.00±0.58^{a}	6.33±0.88^{a}
	T_1	3.00±0.00^{a}	5.33±0.33^{ab}	6.00±0.00^{ab}	5.33±0.33^{ab}	3.33±0.33^{ab}	5.33±0.33^{a}	8.33±0.33^{a}	6.33±0.33^{a}
	T_2	3.00±0.00^{a}	5.00±0.00^{abc}	6.00±0.58^{ab}	5.33±0.33^{ab}	3.00±0.00^{abc}	5.33±0.33^{a}	7.67±0.67^{ab}	5.67±0.67^{ab}
	T_3	2.67±0.33^{a}	4.00±0.58^{c}	5.67±0.33^{abc}	5.00±0.00^{ab}	3.00±0.00^{abc}	5.00±0.00^{ab}	7.67±0.33^{ab}	5.67±0.33^{ab}
	T_4	2.33±0.33^{a}	5.00±0.00^{abc}	6.00±0.00^{ab}	4.67±0.33^{abc}	2.67±0.33^{bc}	4.33±0.33^{bc}	6.33±0.88^{abc}	4.67±0.33^{abc}
	T_5	3.00±0.00^{a}	4.33±0.33^{bc}	5.33±0.33^{bcd}	4.33±0.33^{bcd}	3.00±0.00^{abc}	4.00±0.00^{cd}	5.67±0.88^{bc}	3.67±0.33^{bc}
	T_6	2.33±0.33^{a}	4.00±0.58^{c}	5.33±0.33^{bcd}	4.33±0.33^{bcd}	2.67±0.33^{bc}	4.00±0.00^{cd}	5.67±0.33^{bc}	4.00±0.58^{bc}
	T_7	3.00±0.00^{a}	4.33±0.33^{bc}	5.33±0.33^{bcd}	4.33±0.33^{bcd}	2.67±0.33^{bc}	3.67±0.33^{cd}	5.67±0.88^{bc}	4.00±0.58^{bc}
	T_8	3.00±0.00^{a}	4.67±0.33^{bc}	4.67±0.33^{cde}	3.67±0.33^{cd}	2.33±0.33^{c}	3.67±0.33^{cd}	5.00±0.5^{bc}	3.67±0.33^{c}
	T_9	2.67±0.33^{a}	4.00±0.00^{c}	4.33±0.33^{de}	3.67±0.33^{cd}	2.33±0.33^{c}	3.67±0.33^{cd}	5.00±0.58^{c}	3.67±0.67^{c}
	T_{10}	3.00±0.00^{a}	4.67±0.33^{bc}	4.00±0.00^{e}	3.33±0.33^{d}	2.33±0.333^{c}	3.33±0.33^{d}	5.00±0.58^{c}	3.33±0.67^{c}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}.

Table 3. Effects of *E. heterophylla* weeds density and distance on the stem girth of *A. esculentus* (Var.'Kirikoi' and 'NHAe-40days')

	Treatments	Var. 'Kirikoi'				Var. 'NHAe-40days'			
		2 WAP	4 WAP	6 WAP	8 WAP	2 WAP	4 WAP	6 WAP	8 WAP
20 cm weed distance	T_0	0.46±0.03^{a}	0.80±0.02^{a}	1.60±0.06^{a}	1.93±0.03^{a}	0.43±0.07^{a}	1.40±0.10^{a}	1.70±0.15^{a}	2.20±0.21^{a}
	T_1	0.44±0.03^{ab}	0.73±0.03^{ab}	1.41±0.10^{ab}	1.90±0.00^{a}	0.40±0.06^{ab}	1.20±0.06^{ab}	1.47±0.09^{ab}	1.90±0.10^{ab}
	T_2	0.37±0.03^{abc}	0.67±0.03^{bc}	1.33±0.15^{ab}	1.90±0.00^{a}	0.33±0.03^{abc}	1.03±0.09^{bc}	1.27±0.12^{bc}	1.63±0.15^{bc}
	T_3	0.37±0.07^{abc}	0.63±0.03^{c}	1.37±0.12^{ab}	1.90±0.00^{a}	0.33±0.03^{abc}	1.00±0.06^{bc}	1.20±0.06^{bc}	1.57±0.09^{bc}
	T_4	0.35±0.03^{abc}	0.60±0.00^{cd}	1.43±0.02^{ab}	1.90±0.00^{a}	0.33±0.03^{abc}	1.03±0.09^{bc}	1.27±0.12^{bc}	1.63±0.15^{bc}
	T_5	0.33±0.03^{bc}	0.53±0.03^{de}	1.43±0.03^{ab}	1.90±0.00a	0.33±0.03^{abc}	0.97±0.07^{bc}	1.17±0.07^{bcd}	1.50±0.10^{bc}
	T_6	0.27±0.03^{c}	0.50±0.00^{e}	1.40±0.06^{ab}	1.90±0.00^{a}	0.30±0.00^{bc}	0.97±0.03^{bc}	1.17±0.03^{bcd}	1.53±0.07^{bc}
	T_7	0.27±0.03^{c}	0.53±0.03^{de}	1.33±0.09^{ab}	1.90±0.00a	0.30±0.00^{bc}	0.90±0.00^{cd}	1.10±0.00^{cd}	1.40±0.00^{cd}
	T_8	0.27±0.03^{c}	0.53±0.03^{de}	1.20±0.15^{b}	1.90±0.00a	0.27±0.33^{c}	0.83±0.07^{cd}	1.03±0.07^{cd}	1.30±0.10^{cd}
	T_9	0.30±0.00^{c}	0.47±0.03^{e}	1.21±0.06^{b}	1.90±0.00^{a}	0.27±0.03^{c}	0.80±0.10^{cd}	0.97±0.13^{cd}	1.23±0.17^{cd}
	T_{10}	0.33±0.03^{bc}	0.47±0.03^{e}	1.27±0.15^{ab}	1.90±0.00^{a}	0.23±0.03^{c}	0.70±0.06^{d}	0.87±0.09^{d}	1.07±0.09^{d}
30 cm weed distance	T_0	0.40±0.06^{a}	1.47±0.09^{a}	3.60±0.12^{a}	1.90±0.00^{a}	0.47±0.03^{a}	1.43±0.12^{a}	2.23±0.35^{a}	2.23±0.23^{a}
	T_1	0.40±0.00^{a}	1.03±0.09^{b}	1.63±0.09^{b}	1.90±0.00^{a}	0.40±0.06^{ab}	1.20±0.12^{b}	1.87±0.15^{ab}	1.90±0.17^{ab}
	T_2	0.33±0.03^{ab}	0.97±0.09^{bc}	1.50±0.06^{bc}	1.90±0.00a	0.40±0.00^{ab}	1.10±0.06^{bc}	1.63±0.15^{bc}	1.70±0.12^{bc}
	T_3	0.33±0.03^{ab}	1.03±0.09^{b}	1.47±0.26^{bc}	1.90±0.00^{a}	0.33±0.03^{bc}	1.00±0.00^{bcd}	1.53±0.07^{bcd}	1.57±0.03^{bcd}
	T_4	0.33±0.03^{ab}	0.97±0.12^{bc}	1.30±0.10^{bcd}	1.90±0.00^{a}	0.30±0.06^{bc}	1.00±0.06^{bcd}	1.63±0.15^{bc}	1.60±0.10^{bcd}
	T_5	0.33±0.03^{ab}	0.83±0.03^{bc}	1.27±0.12^{bcd}	1.90±0.00^{a}	0.33±0.03^{bc}	0.97±0.03^{cd}	1.47±0.07^{bcd}	1.50±0.06^{cd}
	T_6	0.33±0.03^{ab}	0.77±0.03^{cd}	1.23±0.13^{cd}	1.90±0.00^{a}	0.33±0.03^{bc}	1.00±0.06^{bcd}	1.53±0.07^{bcd}	1.57±0.09^{bcd}
	T_7	0.30±0.00^{ab}	0.77±0.03^{cd}	1.07±0.07^{d}	1.90±0.00^{a}	0.30±0.00^{bc}	0.90±0.00^{cde}	1.40±0.00^{bcd}	1.40±0.00^{cde}
	T_8	0.30±0.00^{ab}	0.57±0.03^{de}	1.07±0.07^{d}	1.90±0.00^{a}	0.27±0.03^{c}	0.83±0.03^{de}	1.33±0.07^{cd}	1.30±0.06^{de}
	T_9	0.27±0.03^{b}	0.53±0.03^{e}	1.03±0.03^{d}	1.90±0.00a	0.27±0.03^{c}	0.80±0.06^{de}	1.23±0.17^{cd}	1.23±0.12^{de}
	T_{10}	0.27±0.03^{b}	0.50±0.05c	1.07±0.03^{d}	1.90±0.00^{a}	0.23±0.03^{c}	0.70±0.06e	1.10±0.10^{d}	1.07±0.09^{e}
Weed density	T_0	0.50±0.00^{a}	0.83±0.09a	1.60±0.20^{ab}	1.90±0.00^{a}	0.47±0.09^{a}	1.93±0.29^{a}	2.23±0.35^{a}	2.73±0.41^{a}
	T_1	0.37±0.03^{a}	0.77±0.03^{ab}	1.67±0.12^{a}	1.81±0.03^{ab}	0.47±0.03^{a}	1.60±0.12^{ab}	1.87±0.15^{ab}	2.30±0.17^{ab}
	T_2	0.37±0.03^{a}	0.70±0.06^{abc}	1.57±0.12^{abc}	1.77±0.01^{ab}	0.40±0.00^{ab}	1.40±0.12^{bc}	1.63±0.15^{bc}	2.00±0.17^{bc}
	T_3	0.37±0.03^{a}	0.67±0.07^{bcd}	1.33±0.17^{abcd}	1.58±0.05^{cd}	0.37±0.03^{ab}	1.33±0.07^{bcd}	1.53±0.07^{bcd}	1.90±0.10^{bc}
	T_4	0.33±0.03^{bc}	0.63±0.03^{bcde}	1.30±0.10^{bcd}	1.71±0.02^{bc}	0.37±0.03^{ab}	1.40±0.12^{bc}	1.63±0.15^{bc}	2.00±0.17^{bc}
	T_5	0.30±0.00^{bcd}	0.53±0.03^{de}	1.07±0.07^{d}	1.74±0.13^{b}	0.33±0.03^{bc}	1.27±0.07^{bcd}	1.47±0.07^{bcd}	1.80±0.10^{bcd}
	T_6	0.30±0.00^{bcd}	0.60±0.06^{cde}	1.23±0.07^{cd}	1.51±0.01^{d}	0.33±0.03^{bc}	1.33±0.07^{bcd}	1.53±0.07^{bcd}	1.90±0.10^{bc}
	T_7	0.27±0.03^{cde}	0.57±0.03^{cde}	1.13±0.09^{d}	1.55±0.01^{d}	0.30±0.00^{bcd}	1.20±0.00^{bcd}	1.40±0.00^{bcd}	1.70±0.00^{cd}
	T_8	0.27±0.03^{cde}	0.53±0.03^{de}	1.10±0.06^{d}	1.56±0.01^{d}	0.30±0.00^{bcd}	1.13±0.07^{cd}	1.33±0.07^{cd}	1.60±0.10^{cd}
	T_9	0.23±0.03^{de}	0.53±0.03^{de}	1.03±0.03^{d}	1.51±0.02^{d}	0.23±0.03^{cd}	1.07±0.13^{cd}	1.23±0.17^{cd}	1.50±0.20^{cd}
	T_{10}	0.20±0.00^{e}	0.50±0.00^{e}	1.00±0.06^{d}	1.47±0.02^{d}	0.20±0.00^{d}	0.93±0.07^{d}	1.10±0.10^{d}	1.30±0.10^{d}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}

Table 4. Effects of *E. heterophylla* weeds density and distance on the leaves area (cm^2) of *A. esculentus* (Var.'Kirikoi' and 'NHAe-40days')

	Treatments	Var. 'Kirikoi'				Var. 'NHAe-40days'			
		2 WAP	4 WAP	6 WAP	8 WAP	2 WAP	4 WAP	6 WAP	8 WAP
20 cm weed distance	T_0	16.25±0.40^{a}	31.58±1.09^{a}	45.80±1.61^{a}	39.76±2.53^{a}	13.15±0.55^{a}	24.88±0.74^{a}	48.34±1.51^{a}	36.61±1.10^{a}
	T_1	13.68±0.23^{b}	30.36±1.03^{ab}	44.49±0.50^{a}	40.20±0.23^{a}	13.14±1.11^{a}	24.52±1.11^{a}	47.26±1.34^{a}	35.89±1.19^{a}
	T_2	13.41±0.39^{bc}	28.21±1.21^{bc}	45.67±1.06^{a}	38.48±1.50^{ab}	11.98±0.97^{ab}	22.57±1.10^{ab}	43.77±1.48^{ab}	33.17±1.28^{ab}
	T_3	12.46±0.32^{c}	27.54±0.91^{bc}	42.15±1.57^{ab}	38.08±0.78^{ab}	10.80±0.65^{bc}	20.52±0.91^{bc}	39.96±1.45^{bc}	30.24±1.18^{bc}
	T_4	9.71±0.01^{c}	25.92±0.64^{cd}	39.84±1.99^{c}	37.78±3.40^{ab}	10.16±0.58^{bcd}	20.82±1.37^{bc}	42.14±3.17^{b}	31.48±2.26^{b}
	T_5	9.18±0.06^{d}	23.07±1.05^{d}	34.91±0.44^{c}	35.97±0.94^{ab}	9.02±0.73^{cde}	18.17±1.10^{cd}	36.47±2.37^{cd}	27.32±1.70^{cd}
	T_6	6.56±0.42^{e}	19.83±0.78^{e}	33.10±1.62^{cd}	33.82±1.04^{bc}	8.68±0.56^{cdef}	17.24±0.71^{de}	34.35±1.04^{de}	25.80±0.88^{de}
	T_7	3.64±0.29^{f}	19.67±0.55^{e}	30.39±1.62^{de}	29.38±1.34^{cd}	8.42±0.37^{def}	16.17±0.47^{def}	31.67±0.97^{def}	23.92±0.70^{def}
	T_8	3.96±0.40^{f}	16.11±0.98^{f}	26.59±1.53^{e}	25.05±0.99^{de}	7.77±0.87^{ef}	15.14±0.96^{efg}	29.90±1.14^{efg}	22.52±1.05^{efg}
	T_9	4.17±0.35^{f}	15.58±1.09^{f}	22.30±1.64^{f}	24.44±1.39^{e}	6.66±0.29^{f}	13.51±0.36^{fg}	27.21±0.51^{fg}	20.36±0.43^{fg}
	T_{10}	4.55±0.41^{f}	13.35±1.24^{f}	20.75±0.36^{f}	19.17±0.66^{f}	6.53±0.11^{f}	12.69±0.03^{g}	25.03±0.16^{g}	18.86±0.07^{g}
30 cm weed distance	T_0	14.75±1.59^{a}	28.20±1.35^{a}	42.95±2.54^{a}	38.59±1.50^{a}	16.28±0.67^{ab}	28.01±1.06^{a}	51.47±1.92^{a}	39.74±1.48^{a}
	T_1	12.47±0.40^{b}	28.22±1.37^{a}	41.64±3.14^{a}	35.63±2.31^{ab}	16.96±0.39^{a}	28.33±0.52^{a}	51.08±1.04^{a}	39.70±0.76^{a}
	T_2	8.72±0.47^{c}	26.79±0.37^{a}	40.72±1.26^{ab}	38.77±1.01^{a}	16.14±0.42^{ab}	26.74±0.47^{ab}	47.93±0.88^{ab}	37.33±0.65^{ab}
	T_3	8.45±1.04^{cd}	26.99±0.58^{a}	39.10±1.04^{ab}	35.66±1.59^{ab}	15.38±0.29^{ab}	25.10±0.43^{ab}	44.54±0.91^{b}	34.82±0.66^{b}
	T_4	7.74±0.22^{cde}	25.77±1.79^{ab}	38.00±2.17^{ab}	30.76±1.56^{bc}	13.70±0.51^{bc}	24.36±0.48^{b}	45.68±2.29^{b}	35.02±1.38^{b}
	T_5	8.24±0.57^{cd}	27.18±1.40^{a}	38.39±1.32^{ab}	33.72±2.14^{abc}	11.55±0.6^{bc}	20.70±0.71^{c}	39.00±1.92^{c}	29.85±1.27^{c}
	T_6	7.25±0.31^{cde}	21.97±0.66^{cd}	37.40±0.57^{ab}	30.72±0.74^{bc}	11.64±1.87^{c}	20.20±2.05^{c}	37.31±2.39^{cd}	28.75±2.22^{c}
	T_7	6.20±0.55^{de}	22.56±1.59^{bc}	38.73±1.03^{ab}	32.99±2.39^{bc}	11.52±0.87^{c}	19.27±1.12^{c}	34.77±1.68^{cde}	27.02±1.39^{cd}
	T_8	5.92±0.45^{e}	21.29±1.21^{cd}	36.65±2.34^{ab}	31.91±1.80^{bc}	11.34±1.36^{c}	18.72±1.41^{c}	33.47±1.53^{de}	26.10±1.47^{cd}
	T_9	5.78±0.49^{e}	18.80±0.39^{e}	36.66±1.48^{ab}	29.66±1.06^{c}	10.74±1.41^{cd}	17.59±1.50^{c}	31.29±1.67^{ef}	24.44±1.59^{d}
	T_{10}	3.26±0.46^{f}	17.54±0.65^{e}	34.85±2.28^{b}	30.01±1.72b^{c}	8.15±0.62^{d}	14.31±0.59^{d}	26.65±0.55^{f}	20.48±0.56^{e}
Weed density	T_0	10.13±0.25^{a}	22.94±0.44^{a}	36.86±1.71^{a}	33.43±0.92^{a}	13.34±0.73^{a}	25.07±0.99^{a}	48.53±1.76^{a}	36.80±1.35^{a}
	T_1	8.77±0.66^{ab}	22.45±0.91^{ab}	35.08±1.40^{ab}	32.44±1.23^{ab}	12.83±0.50^{ab}	24.20±0.30^{a}	46.95±0.57^{a}	35.57±0.34^{a}
	T_2	8.81±0.60^{ab}	21.49±1.60^{ab}	34.78±0.91^{ab}	31.13±0.69^{abc}	10.52±0.94^{cd}	21.12±0.71^{b}	42.31±0.44^{b}	31.72±0.53^{b}
	T_3	8.28±0.59^{c}	21.60±1.48^{ab}	34.25±1.55^{ab}	30.23±1.13^{abc}	11.06±0.68^{bc}	20.78±0.65^{b}	40.22±0.88^{b}	30.50±0.72^{b}
	T_4	6.03±0.45^{c}	21.17±0.40^{ab}	34.32±1.64^{ab}	29.14±1.24^{bcd}	10.80±0.54^{c}	21.46±0.74^{b}	42.78±2.47^{b}	32.12±1.58^{b}
	T_5	5.41±0.41^{cd}	19.93±0.74^{bc}	32.28±0.85^{bc}	29.24±1.10^{bcd}	8.20±0.70^{c}	17.35±1.36^{c}	35.65±2.75^{c}	26.50±2.05^{c}
	T_6	5.28±0.74^{cd}	19.83±0.68^{bc}	29.75±1.35^{c}	28.50±1.62^{cd}	8.81±0.33^{dc}	17.36±0.45^{c}	34.48±0.75^{c}	25.92±0.60^{c}
	T_7	5.01±0.72^{cd}	17.55±1.17^{bc}	28.99±0.42^{cd}	26.30±0.42^{d}	8.49±0.73^{c}	16.24±1.03^{cd}	31.74±1.64^{cd}	23.99±1.33^{cd}
	T_8	5.25±0.20^{cd}	17.49±0.40^{bc}	25.88±0.80^{de}	20.94±1.38^{e}	6.80±0.73^{c}	14.18±0.65^{de}	28.93±0.53^{de}	21.55±0.59^{de}
	T_9	4.22±0.12^{d}	17.64±0.54^{bc}	25.46±1.05^{de}	20.81±1.21^{e}	7.08±0.06^{c}	13.93±0.09^{de}	27.63±0.25^{de}	20.78±0.17^{de}
	T_{10}	4.09±0.13^{d}	15.82±0.19^{d}	23.98±0.41^{e}	19.58±0.56^{e}	7.18±0.53^{c}	13.35±0.51^{e}	25.68±0.51^{e}	19.51±0.50^{e}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}.

Table 5. Effects of *E. heterophylla* weeds density and distance on the shoot dry weight of *A. esculentus* (Var.'Kirikoi' and 'NHAe-40days')

	Treatments	Var. 'Kirikoi'				Var. 'NHAc-40days'			
		2 WAP	4 WAP	6 WAP	8 WAP	2 WAP	4 WAP	6 WAP	8 WAP
20 cm weed distance	T_0	0.28±0.04^{a}	1.37±0.01^{a}	4.23±0.17^{a}	6.69±0.17^{a}	0.23±0.02^{a}	0.73±0.02^{a}	2.18±0.05^{a}	2.91±0.07^{a}
	T_1	0.19±0.02^{b}	1.40±0.25^{a}	4.20±0.37^{a}	6.59±0.49^{a}	0.21±0.02^{a}	0.65±0.04^{ab}	1.96±0.12^{ab}	2.61±0.16^{ab}
	T_2	0.20±0.01c	1.14±0.06^{ab}	3.76±0.14^{ab}	5.90±0.24^{b}	0.17±0.01^{b}	0.61±0.01^{b}	1.84±0.04^{b}	2.45±0.06^{b}
	T_3	0.12±0.01^{cd}	0.99±0.06^{bc}	3.35±0.08^{b}	5.31±0.17^{b}	0.15±0.00^{bc}	0.50±0.04^{cd}	1.51±0.13^{cd}	2.01±0.17^{cd}
	T_4	0.09±0.01cd	0.92±0.10^{bcde}	2.77±0.10^{c}	4.47±0.09^{c}	0.13±0.01^{bcd}	0.52±0.04^{c}	1.56±0.11^{c}	2.08±0.14^{c}
	T_5	0.12±0.05^{c}	0.96±0.07^{bcd}	2.74±0.15^{c}	4.35±0.26^{c}	0.12±0.02^{cde}	0.49±0.04^{cde}	1.46±0.11^{cde}	1.95±0.15^{cde}
	T_6	0.06±0.01^{de}	0.82±0.03^{cde}	2.61±0.14^{c}	4.04±0.26^{cd}	0.11±0.01^{cde}	0.42±0.01^{def}	1.26±0.03^{def}	1.68±0.04^{def}
	T_7	0.05±0.01^{de}	0.70±0.03^{cde}	2.34±0.06^{cd}	3.83±0.08^{cd}	0.10±0.01^{de}	0.47±0.03^{cde}	1.40±0.10^{cde}	1.87±0.13^{cde}
	T_8	0.03±0.01^{de}	0.74±0.08^{cde}	2.35±0.18^{cd}	3.97±0.16^{cd}	0.09±0.01^{ef}	0.43±0.02^{def}	1.28±0.07^{def}	1.71±0.09^{def}
	T_9	0.03±0.01^{de}	0.65±0.05^{de}	2.22±0.14^{cd}	3.75±0.19^{cd}	0.05±0.01^{f}	0.41±0.01^{ef}	1.22±0.04^{ef}	1.63±0.06^{ef}
	T_{10}	0.02±0.00^{e}	0.61±0.04^{e}	2.00±0.10^{d}	3.41±0.06^{d}	0.05±0.01^{f}	0.36±0.02^{f}	1.08±0.07^{f}	1.44±0.09^{f}
30 cm weed distance	T_0	0.25±002^{a}	1.34±0.03^{a}	4.20±0.18^{a}	6.66±0.17^{a}	0.26±0.01^{a}	0.76±0.05^{a}	2.27±0.14^{a}	3.03±0.19^{a}
	T_1	0.09±0.04^{b}	1.30±0.25^{a}	4.10±0.37^{bc}	6.49±0.48^{a}	0.26±0.01^{a}	0.70±0.06^{ab}	2.09±0.19^{ab}	2.79±0.25^{ab}
	T_2	0.07±0.02^{b}	1.02±0.06^{b}	3.63±0.11^{c}	5.77±0.22^{b}	0.24±0.01^{ab}	0.68±0.03^{ab}	2.05±0.10^{ab}	2.73±0.13^{ab}
	T_3	0.11±0.02^{b}	0.98±0.07^{bc}	3.34±0.09^{bc}	5.30±0.19^{b}	0.23±0.01^{ab}	0.59±0.04^{bc}	1.76±0.12^{bc}	2.35±0.16^{bc}
	T_4	0.11±0.02^{b}	0.94±0.08^{bc}	2.79±0.08^{c}	4.49±0.10^{c}	0.21±0.01^{bc}	0.60±0.03^{bc}	1.80±0.10^{bc}	2.40±0.14^{bc}
	T_5	0.13±0.03^{b}	0.97±0.03^{bc}	2.75±0.18^{c}	4.36±0.27^{c}	0.19±0.01^{c}	0.56±0.06^{cd}	1.67±0.19^{cd}	2.23±0.25^{cd}
	T_6	0.12±0.04^{b}	0.88±0.03^{bc}	2.67±0.10^{c}	4.10±0.21^{cd}	0.15±0.01^{d}	0.45±0.02^{de}	1.36±0.07^{de}	1.81±0.09^{de}
	T_7	0.08±0.01^{b}	0.73±0.02^{bc}	2.37±0.08^{de}	3.85±0.09^{cd}	0.14±0.01^{d}	0.50±0.03^{cde}	1.51±0.10^{cde}	2.01±0.14^{cde}
	T_8	0.11±0.03^{b}	0.81±0.06^{bc}	2.43±0.15^{de}	4.04±0.15^{cd}	0.14±0.01^{d}	0.48±0.03^{cde}	1.43±0.08^{cde}	1.91±0.11^{cde}
	T_9	0.13±0.04^{b}	0.75±0.02^{bc}	2.31±0.12^{de}	3.84±0.16^{cd}	0.09±0.01^{e}	0.45±0.01^{de}	1.34±0.03^{de}	1.79±0.04^{de}
	T_{10}	0.12±0.05^{b}	0.71±0.01^{c}	2.10±0.05^{c}	3.51±0.03^{d}	0.08±0.02^{e}	0.39±0.02^{e}	1.18±0.05^{e}	1.57±0.07^{e}
Weed density	T_0	0.05±0.02^{a}	1.14±0.07^{ab}	4.00±0.21^{a}	6.46±0.19^{a}	0.23±0.02^{a}	0.73±0.05^{a}	2.19±0.15^{a}	2.92±0.20^{a}
	T_1	0.05±0.01^{a}	1.26±0.26^{a}	4.06±0.38^{a}	6.45±0.49^{a}	0.22±0.01^{ab}	0.66±0.05^{a}	1.97±0.14^{a}	2.63±0.19^{a}
	T_2	0.09±0.03^{a}	1.03±0.06^{abc}	3.65±0.10^{ab}	5.79±0.20^{ab}	0.19±0.01^{bc}	0.63±0.02^{ab}	1.89±0.05^{ab}	2.52±0.07^{ab}
	T_3	0.06±0.01^{a}	0.93±0.06^{bcd}	3.30±0.07^{b}	5.25±0.16^{c}	0.16±0.01^{cd}	0.51±0.05^{cd}	1.54±0.14^{cd}	2.05±0.19^{cd}
	T_4	0.07±0.00^{a}	0.90±0.09^{bcd}	2.74±±0.09^{c}	4.45±0.09^{c}	0.15±0.01^{de}	0.53±0.04^{c}	1.60±0.13^{bc}	2.13±0.18^{bc}
	T_5	0.08±0.02^{a}	0.93±0.03^{bcd}	2.71±0.16^{c}	4.32±0.27^{c}	0.13±0.02^{def}	0.49±0.04^{cd}	1.48±0.13^{cd}	1.97±0.18^{cd}
	T_6	0.08±0.03^{a}	0.85±0.05^{bcd}	2.63±0.14^{c}	4.07±0.26^{cd}	0.10±0.01^{fg}	0.41±0.01^{de}	1.22±0.13^{de}	1.63±0.06^{de}
	T_7	0.09±0.03^{a}	0.74±0.06^{cd}	2.38±0.08^{cd}	3.86±0.11^{cd}	0.11±0.02^{efg}	0.48±0.06^{cde}	1.43±0.17^{cde}	1.91±0.23^{cde}
	T_8	0.05±0.00^{a}	0.75±0.08^{cd}	2.37±0.17^{cd}	3.98±0.16^{cd}	0.08±0.01^{gh}	0.42±0.02^{cde}	1.25±0.07^{cde}	1.67±0.09^{cde}
	T_9	0.08±0.02^{a}	0.70±0.06^{d}	2.26±0.13^{cd}	3.79±0.20^{cd}	0.05±0.00^{h}	0.41±0.01^{de}	1.22±0.03^{de}	1.63±0.04^{de}
	T_{10}	0.05±0.00^{a}	0.64±0.04^{d}	2.03±0.10^{d}	3.44±0.06^{d}	0.05±0.00^{h}	0.36±0.03^{e}	1.09±0.08^{e}	1.45±0.10^{e}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}.

Table 6. Effects of *E. heterophylla* weeds density and distance on the yield of *A. esculentus* (Var.'Kirikoi')

	Treatment	Average Fruit Number	Average Groove Number	Average Pod Length (cm)	Average Pod Girth (cm)	Average Fresh Pod Weight Weight (g)	Average Dry Pod Weight (g)
20 cm weed distance	T_0	5.67±0.33^{a}	45.00±3.06^{a}	39.03±4.07^{a}	22.17±1.34^{a}	37.11±1.03^{a}	15.90±0.44a
	T_1	5.00±0.58^{ab}	36.33±1.20^{b}	28.20±1.44^{b}	19.67±1.16^{ab}	31.99±2.26^{b}	13.71±0.97^{b}
	T_2	4.67±0.67^{abc}	34.00±2.31^{b}	26.93±1.68^{bc}	18.70±0.71^{b}	32.64±1.73^{b}	13.99±0.74^{b}
	T_3	4.67±0.33^{abc}	30.67±0.67^{bc}	21.97±1.60^{cd}	16.80±1.07^{cb}	27.41±2.03^{c}	11.75±0.87^{c}
	T_4	4.33±0.33^{bcd}	35.67±1.86^{b}	19.37±2.58^{de}	14.00±1.16^{c}	24.88±0.73^{cd}	10.66±0.31^{cd}
	T_5	4.00±0.00^{bcd}	26.67±1.67^{cde}	17.03±1.81^{def}	12.37±0.88^{cde}	24.62±1.41^{cd}	10.55±0.60^{cd}
	T_6	3.67±0.33^{cd}	27.67±1.86^{cd}	19.70±1.34^{de}	13.87±1.03^{cd}	24.84±0.67^{cd}	10.65±0.29^{cd}
	T_7	3.33±0.33^{d}	21.67±1.20^{def}	15.23±1.21^{ef}	12.53±0.70^{cde}	22.00±1.83^{de}	9.43±0.78^{de}
	T_8	3.67±0.33^{cd}	21.00±2.65^{ef}	13.87±1.77^{ef}	10.93±0.57^{def}	22.41±1.28^{de}	9.61±0.55^{de}
	T_9	3.33±0.33^{d}	19.33±1.86^{f}	13.23±0.98^{ef}	10.43±0.79^{ef}	20.68±1.09^{de}	8.86±0.47^{de}
	T_{10}	3.33±0.33^{d}	16.00±2.00^{f}	11.47±1.13^{f}	8.63±0.59^{f}	19.50±1.37^{e}	8.36±0.59^{e}
30 cm weed distance	T_0	7.00±0.58^{a}	45.00±2.00^{a}	38.77±4.23^{a}	25.53±1.73^{a}	37.30±1.07^{a}	15.99±0.46^{a}
	T_1	6.67±0.33^{ab}	41.00±3.00^{ab}	23.10±1.93^{bcd}	17.17±2.22^{abc}	36.35±0.43^{ab}	15.58±0.18^{ab}
	T_2	5.67±0.33^{bc}	38.67±3.18^{bc}	32.70±4.84^{ab}	26.47±4.40^{a}	32.84±1.06^{c}	14.08±0.46^{c}
	T_3	5.67±0.33^{bc}	34.00±2.52^{cde}	25.73±1.77^{bc}	20.57±1.19^{ab}	33.45±0.80^{bc}	14.34±0.34^{c}
	T_4	5.67±0.33^{bc}	36.00±2.00^{bcd}	22.43±3.43^{cd}	17.07±4.25^{abc}	31.94±0.64^{c}	13.69±0.27^{c}
	T_5	5.33±0.33^{cd}	30.67±1.33^{de}	15.33±3.54^{de}	10.67±5.16^{bcd}	31.87±0.60^{c}	13.66±0.26^{c}
	T_6	5.00±0.00^{cde}	28.33±1.45^{ef}	9.77±3.27^{e}	3.93±2.96^{d}	27.32±1.56^{d}	11.71±0.67^{d}
	T_7	5.00±0.00^{cde}	24.00±1.00^{fg}	16.90±2.19^{cde}	14.20±1.29^{bc}	26.75±1.54^{d}	11.46±0.66^{d}
	T_8	4.67±0.33^{cde}	23.00±1.53^{fg}	21.70±0.91^{cd}	18.77±0.48^{abc}	24.80±1.65^{de}	10.63±0.71^{de}
	T_9	4.33±0.33^{de}	24.33±0.83^{fg}	11.23±3.85^{e}	8.43±4.05^{cd}	22.31±1.13^{ef}	9.56±0.48^{ef}
	T_{10}	4.00±0.00^{e}	20.00±0.00^{g}	14.40±2.17^{de}	11.57±2.52^{bcd}	20.72±1.03^{f}	8.88±0.44^{f}
Weed density	T_0	6.33±0.33^{a}	42.00±1.53^{a}	36.03±2.70^{a}	19.17±2.76a	36.66±0.91^{a}	15.71±0.39^{a}
	T_1	4.67±0.33^{b}	35.00±1.53^{b}	26.87±4.01^{b}	18.33±3.76^{a}	35.00±1.44^{a}	15.00±0.62^{a}
	T_2	4.33±0.33^{bc}	33.33±1.45^{bc}	26.27±4.13^{b}	18.03±4.09^{a}	30.44±1.32^{b}	13.05±0.57^{b}
	T_3	4.00±0.00^{bcd}	30.67±1.76^{bcd}	21.97±0.92^{bc}	16.80±1.35^{ab}	30.83±1.04^{b}	13.21±0.45^{b}
	T_4	3.67±0.33^{cde}	29.33±1.67^{cde}	13.03±2.29^{d}	7.67±3.37^{c}	27.91±1.00^{b}	11.96±0.43^{b}
	T_5	3.67±0.33^{cde}	27.67±0.88^{de}	18.03±1.75^{cd}	13.37±0.76^{abc}	24.57±0.71^{c}	10.53±0.30^{c}
	T_6	3.33±0.33^{de}	25.00±0.58^{ef}	17.03±0.12^{cd}	11.20±0.44^{abc}	24.26±1.26^{c}	10.40±0.54^{c}
	T_7	3.00±0.00^{ef}	23.00±1.53^{f}	16.57±2.99^{cd}	13.97±2.35^{abc}	22.33±1.17^{c}	9.57±0.50^{c}
	T_8	2.33±0.33^{fg}	18.00±1.15^{g}	10.87±2.14^{d}	7.93±1.67^{c}	19.11±0.64^{d}	8.19±0.27^{d}
	T_9	2.33±0.33^{fg}	17.67±1.76^{g}	11.57±1.99^{d}	8.77±2.18^{bc}	18.79±0.85^{d}	8.05±0.36^{d}
	T_{10}	2.00±0.00^{g}	14.00±1.53^{g}	11.13±1.15^{d}	9.53±0.52^{bc}	17.79±0.88^{d}	7.62±0.38^{d}

Values represent Means ± SEM, n =3, values with same superscript along the column are significantly the same at p<0.05; T_0=control, T_1= 1 weed, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}

Table 7. Effects of *E. heterophylla* weeds density and distance on the yield of *A. esculentus* (Var. 'NHA-e 40days')

	Treatment	Fruit Number	Average Groove Number	Average Pod Length (cm)	Average Pod Girth (cm)	Average Fresh Pod Weight (g)	Average Dry Pod Weight (g)
20 cm weed distance	T_0	5.33±0.33^{a}	39.67±1.76^{a}	35.26±1.57^{a}	27.42±1.22^{a}	28.51±1.58^{a}	12.22±0.68^{a}
	T_1	5.00±0.00^{a}	35.67±1.45^{ab}	31.70±1.29^{ab}	24.66±1.01^{ab}	28.18±1.15^{ab}	12.08±0.49^{ab}
	T_2	4.67±0.33^{ab}	31.67±2.40^{bc}	28.15±2.14^{bc}	21.89±1.66^{bc}	25.02±1.90^{abc}	10.72±0.81^{abc}
	T_3	4.67±0.33^{ab}	29.33±1.86^{bc}	26.07±1.65^{c}	20.28±1.28^{bc}	23.17±1.47^{bc}	9.93±0.63^{bc}
	T_4	4.67±0.33^{ab}	26.67±2.19^{c}	23.70±1.95^{c}	18.43±1.51^{c}	21.07±1.73^{c}	9.03±0.74^{c}
	T_5	4.00±0.00^{bc}	27.00±1.53^{c}	24.00±1.36^{c}	18.67±1.06^{c}	21.33±1.21^{c}	9.14±0.52^{c}
	T_6	3.67±0.33^{cd}	28.33±0.33^{c}	25.19±0.29^{bc}	19.59±0.23^{c}	22.38±0.26^{c}	9.59±0.11^{c}
	T_7	3.33±0.33^{cd}	31.33±3.76^{bc}	27.85±3.34^{bc}	21.66±2.60^{bc}	24.75±2.97^{abc}	10.61±1.27^{abc}
	T_8	3.33±0.33^{cd}	18.67±1.76^{d}	16.59±1.57^{d}	12.90±1.22^{d}	14.75±1.39^{d}	6.32±0.60^{d}
	T_9	3.00±0.00^{d}	17.00±1.53^{d}	15.11±1.36^{d}	11.75±1.06^{d}	13.43±1.21^{d}	5.76±0.52^{d}
	T_{10}	3.00±0.00^{d}	12.33±2.33d	10.96±2.07^{d}	8.52±1.61^{d}	9.74±1.84^{d}	4.18±0.79^{d}
30 cm weed distance	T_0	5.67±0.33^{a}	39.33±1.20^{a}	34.96±1.07^{a}	27.19±0.83^{a}	28.38±2.15^{a}	12.16±0.92^{a}
	T_1	5.33±0.33^{a}	31.33±1.76^{c}	27.85±1.57^{c}	21.66±1.22^{c}	24.75±1.39^{a}	10.61±0.60^{b}
	T_2	5.33±0.33^{a}	35.67±0.88^{b}	31.70±0.78^{b}	24.66±0.61^{b}	28.18±0.70^{a}	12.08±0.30^{a}
	T_3	5.33±0.33^{a}	29.33±0.88^{cd}	26.08±0.78^{cd}	20.28±0.61^{cd}	23.17±0.70^{bc}	9.93±0.30^{bc}
	T_4	5.00±0.00^{ab}	29.67±1.76^{cd}	26.37±1.57^{cd}	20.51±1.22^{cd}	23.44±1.39^{b}	10.04±0.60^{b}
	T_5	5.00±0.00^{ab}	28.33±1.45^{cde}	25.19±1.29^{cde}	19.59±1.00^{cde}	22.38±1.15^{bcd}	9.59±0.49^{bcd}
	T_6	4.33±0.33bc	29.67±1.20^{cd}	26.37±1.07^{cd}	20.51±0.83^{cd}	23.44±0.95^{b}	10.05±0.41^{b}
	T_7	4.33±0.33bc	28.67±0.88^{cd}	25.48±0.78^{cd}	19.82±0.61^{cd}	22.65±0.70^{bcd}	9.71±0.30^{bcd}
	T_8	4.33±0.33^{bc}	26.67±0.67^{def}	23.70±0.59^{def}	18.44±0.46^{def}	21.07±0.53^{bcd}	9.03±0.23^{bcd}
	T_9	4.00±0.00^{c}	24.67±1.33^{ef}	21.93±1.18^{ef}	17.06±0.92^{ef}	19.49±1.05^{cd}	8.35±0.45^{cd}
	T_{10}	3.67±0.33^{c}	24.00±1.15^{f}	21.33±1.02^{f}	16.59±0.80^{f}	18.96±0.91^{d}	8.13±0.39^{d}
Weed density	T_0	5.33±0.33^{a}	38.67±1.76^{a}	34.37±1.57^{a}	26.73±1.22^{a}	28.05±3.09^{a}	12.02±1.32^{a}
	T_1	4.67±0.33^{ab}	33.33±0.33b	29.63±0.30^{b}	23.04±0.23^{b}	26.33±0.26^{ab}	11.28±0.11^{ab}
	T_2	4.00±0.58^{bc}	31.00±1.53^{bc}	27.56±1.36^{bc}	21.43±1.06^{bc}	24.49±1.21^{abc}	10.50±0.52^{abc}
	T_3	3.67±0.33^{bcd}	30.00±1.15^{bc}	26.67±1.02^{bc}	20.74±0.80^{bc}	23.70±0.91^{bc}	10.16±0.39^{bc}
	T_4	3.33±0.33^{cde}	29.00±0.58^{cd}	25.78±0.51^{cd}	20.05±0.40^{cd}	22.91±0.46^{bcd}	9.82±0.20^{bcd}
	T_5	3.33±0.33^{cde}	26.33±0.88de	23.41±0.78^{de}	18.21±0.61^{de}	20.80±0.70^{cde}	8.92±0.30^{cde}
	T_6	3.33±0.33^{cde}	25.00±1.53^{ef}	22.22±1.36^{ef}	17.29±1.06^{ef}	19.75±1.21^{def}	8.46±0.52^{def}
	T_7	3.00±0.00^{cde}	24.67±0.67^{ef}	21.92±0.59^{ef}	17.05±0.46^{ef}	19.49±0.53^{def}	8.35±0.22^{def}
	T_8	2.67±0.33^{de}	21.00±0.58^{g}	18.67±0.51^{g}	14.52±0.40^{g}	16.59±0.46^{f}	7.11±0.20^{f}
	T_9	2.67±0.33^{de}	22.67±0.88^{fg}	20.15±0.78^{fg}	15.67±0.61^{fg}	17.91±0.70^{ef}	7.68±0.30^{ef}
	T_{10}	2.33±0.33^{e}	20.67±1.20g	18.37±1.07^{g}	14.29±0.83^{g}	16.33±0.95^{f}	7.00±0.41^{f}

Values represent Means±SEM, n =3, values with same superscript along the column are significantly the same at $p<0.05$; T_0=control, T_1= 1 weed plant^{-1}, T_2= 2 weeds plant^{-1}, T_3= 3 weeds plant^{-1},T_4= 4 weeds plant^{-1}, T_5= 5 weeds plant^{-1}, T_6= 6 weeds plant^{-1}, T_7= 7 weed plant^{-1}, T_8= 8 weed plant^{-1}, T_9= 9 weed plant^{-1}, T_{10}= 10 weed plant^{-1}

References

Amjad A, Anjum MA, Hussain S (2002). Effect of different sowing dates and various doses of fertilizers on juvenility and productivity of okra. Pakistan Journal of Agricultural Science 38(1-2):29-32.

Askew SD, Wilcut JW, Cranmer JR (2002). Cotton (*Gossypium hirsutum*. L.) and weed response to flumioxazin applied pre-plant and post-emergence directed. Weed Technology 16(1):184-190.

Ayeni AO, Oyekan PO (1992). Weed control in soybean (*Glycine max*L.) (Merr) in Nigeria. Tropical Oil Seed Journal 1:43-52.

Barrentine WL, Oliver LR (1997).Competitive threshold levels and control of common cocklebur in soybean. Mass Agricultural Experimental Station and Arkansans Agricultural Experimental Station Bull. McGuire. No 83, pp 27.

Carvalho LB, Binaco S, Guzzo CD (2010). Interference of *Euphorbia heterophylla* in the growth and macro nutrient accumulation of soybean. Planta Daninha 28(1):33-39.

Chadha KL (2002). Hand book of horticulture. Indian Council of Agricultural Research pp 427.

Falodun EJ, Ogedegbe SA (2006). Effects of planting spacing and harvest intervals on growth, yield and quality of okra (*Abelmoschus esculentus* (L) Moench).). Pakistan Journal of Science and Industrial Research 39(5):225-308.

Ibe AO (2005). Effects of NPK fertilizers on quality of okra (*Abelmoschus esculentus* (L.) Moench) in an ultisol, Southern Nigeria; Unpublis he d Ph.D. Thesis, Department of Crop/Science, Rivers State University of Science and Technology, Port Harcourt, Nigeria.

Kashif SR, Yasee M, Arshad M, Ayub M (2008). Response of okra (*Hibiscus esculentus* L.) to soil given encapsulated calcium carbide. Pakistan Journal of Botany 40(1):175-181.

Odeleye FO, Odeleye OMO, Dada OA (2007). The performance of soybean (*Glycine max* L.) under varying weeding regimes in South Western Nigeria. Department of Crop Protection and Environmental Biology, University Of Ibadan, Ibadan, Nigeria; National Horticultural Research Institute, Jericho,Idi-Ishin, Ibadan, Olabisionabanjo.

Olorunmaiye KS, Ogunfolaji RT (2002). Effect of density and duration of *Euphorbia heterophylla* L. on the performance of cowpea *Vigna unguiculata* Walp. Journal of Nigeria Society for Experimental Biology 2(1):17- 22.

Paththinige SS, Upashantha PSG, Banda RMR, Fonseka RM (2008). Effect of plant spacing on yield and fruit characteristics of okra (*Abelmoschus esculentus*). Tropical Agricultural Research 28:336-342.

Poggio SL (2005). Structure of weed communities occurring in monoculture and intercropping of field pea and barley. Agricultural Ecosystem and Environment 109(1-2):48-58.

Rao VS (2000). Weed management in crop and plantation crops. Principles of weed science (2nd edition) pp 211-216.

Reddy KN, Whiting KM (2002). Weed control and economic comparisons in soybean planting systems. Journal of Sustainable Agriculture 21(2):21-35.

Reddy KN, Whiting KM (2000). Weed control and economic comparisons of Glyphosate resisitant, sulfonylena-tolerant, and conventional soybean (*Glycine max*) systems. Weed Technology 14(1):204-211.

Rizzardi MA (2004). Interference of populations of *Euphorbia heterophylla* and *Ipomoea ramosissima* isolated or in mixture in soybean crop. Planta Daninha 22(1):29-34.

Saifullah M, Rabbani MG (2009). Evaluation and characterization of okra (*Abelmoschus esculentus* L. Moench.) genotypes. Journal of Agriculture 7(1):92-99.

Saka HO, Hassan OU, Adekola FO, Olorunmaiye KS (2013). Effect of weed density (*Euphorbia heterophylla*) on the performance of popcorn maize (*Zea mays* var. *everta*). Agronomski glasnik 75(5-6):267-278.

Smith MAK, IK Ojo (2007). Influence of intra-row spacing and weed management system on colonization of weed, pot yield and quality in okra. African Crop Science Conference Proceeding 8(1):313-317.