Performance Of Groundnut [Arachis Hypogaea (L.)] Varieties As Influenced By Weed Control Treatments In Kano State Of Nigeria

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ABSTRACT: A field experiment was carried out during 2012 rainy season at the Research Farm of Bayero University, Kano (11^0 58' N, 8^0 26'E and 475m above sea level) and National Horticultural Research Institute Bagauda sub-station Bebeji local Government area of Kano State (11^0 33'N 8^0 23'E and 481m above sea level) to find out the performance of varieties and weed control treatments on growth and development of groundnut (*Arachis hypogaea* L.). The experiment consisted of two groundnut varieties (SAMNUT-22 and SAMNUT-23) and 12 weed control treatments (Metolachlor at 2 levels of 1.0 and 2.0kg a.i. /ha, Fluazifop-p butyl at 2 levels of 1.0 and 1.5 kg a.i. /ha at pre or post-emergence, or combined with hoe weeding at 15 days after sowing or supplementary hoe weeding at 30 days after sowing while weed free check at 15 and 30 days after sowing and weedy check were included as control. The treatments were laid out using split plot design with variety assigned to the main and weed control to the sub plot. The result showed that SAMNUT-22 out yielded SAMNUT-23 and exhibited superior growth and yield components such as stand count, canopy height, number of branches, leaf area index, plant dry weight. The application of Metolaclor at 1.0 kg a.i. /ha followed by Fluazifop-p butyl at 1.0 kg a.i. /ha as well as Metolaclor at 1.0 or 2.0 kg a.i. /ha followed by supplementary hoe weeding produced significantly higher number of pods per plant, and pod yield per hactare. Leaf area index and number of pod per plant were significantly and positively correlated with pod weight. Thus, SAMNUT-22 can be recommended for the two study areas. Similarly application of Metolaclor at 1.0 kg a.i. /ha followed by Fluazifop-p butyl at 1.0 kg a.i. /ha and Metolaclor at 1.0 or 2.0 kg a.i. /ha followed by supplementary hoe weeding could be recommended for weed control in groundnut in the study area.

Key word: Groundnut, pre- and post-emergence herbicides, Weeds, growth and development.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) was introduced into Nigeria in the 16th century, and the leading producing states in Nigeria are Niger, Kano, Jigawa, Zamfara, Kebbi, Sokoto, Katsina, Kaduna, Adamawa, Yobe, Borno, Taraba, Platuea, Nasarawa, Bauchi and Gombe (Taru *et al.,* 2008). The crop originated in South America where it was cultivated as early as 1000 B.C. It is grown in areas between 40^0 South and 40^0 North of the equator, where average rainfall is 500 to 1200mm per annum and temperatures are moderately warm and relatively stable during the growing season at 20-25 ºC. Groundnut is grown in 26.4 million hectares across the globe with a total production of 37.1 million metric tons with average production of 1.4 metric t/ha (FAO, 2006). It is estimated that over 2 million hactares are planted to groundnut in Nigeria. The crop is mostly intercropped with cereals or can be planted sole in the tropics and sub-tropics (Nigam *et al*., 1991).

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It is an annual legume which is also known as peanuts, earthnut, monkeynut and goobers. It is the 13th most important food crop and 4th most important oil seed crop of the world. Groundnut seeds (kernels) contain 48-50% oil, 26-28 % protein and are a rich source of dietary fibre, minerals and vitamins. Groundnut kernels are consumed directly as raw, roasted or boiled kernels while the oil extracted from the kernel is used as culinary oil. It is also used as animal feed and industrial raw material. These multiple uses of groundnut plant make it excellent cash crop and for foreign trade in the world and haulm is the most important of its by-products that can be used to supply feed to livestock. Arslan, (2005). The aim of these pepper was to evaluate the growth and development of groundnut varieties as affected by weed control treatments in Kano state of Nigeria.

MATERIALS AND METHODS

The Experiments was conducted during the 2012 rainy season at two different locations. Location 1 is the Research Farm of Faculty of Agriculture, Bayero University Kano (11^0 58`N, $8^0$ 26`E and 475m above sea level). Location 2 is the National Horticultural Research Institute, Bagauda sub-station Bebeji Local Government Area of Kano State, (11^0 33 N, 8^0 23 E and 481m above Sea level). The soil samples from the experimental site were collected and analysed for some physical and chemical characteristics before the establishment of the trial (Table 8). Data on rain fall, Temperature and Relative Humidity were also presented (Table 9). The experiment consists of 2 ranges each of pre emergence and post emergence herbicide that was applied as spray; two groundnut varieties (SAMNUT-22 and SAMNUT-23) were used. The two varieties were factorial combination with herbicides rates including weed free and weed free check as control. The experiment was laid out in a factorial combination using split plot design. The groundnut varieties were allocated to the main plot while weed control treatment were placed in the sub-plots they were then replicated three times. The gross plots consist of eight ridges, 0.75m apart and 4m long given a

total area of 24m^2, while the net plot consist of four inner rows, given a total area of 12m^2 each, an alley of 0.5m was left between the plots and 1m between the replications. The seed were sown at the spacing of 0.75cm x 30cm inter and intra row respectively using two seeds per hole. The herbicides were applied on treatment basis using a Cp3 knapsack sprayer fitted with a green deflector nozzle at a pressure of 2.1 kg/com^2 using a sprayer volume of 200l/ha, Fertilizer was applied before sowing to each plot at 20 kg N, 54 kg P_2O_5 and 20 kg K_2O/ha inform of NPK (15:15:15) and 34 kg P_2O_5 was added using SSP fertilizer. Hoe weeding and supplementary hoe weeding was done on the treatment basis. Harvesting was done by cutting the plant below the level of the pods in the soil with hoe and lifted manually by hand and put on the ridges upside down which makes it to sun dry. Shelling was done by carefully removing the pods and to obtain the kernels then followed by winnowing to remove the shell and broken seeds. The data for crop growth and development were collected using agronomic procedures that included stand count at 2 WAS, canopy hieght, canopy spread number of branches, leaf area index, crop vigour, crop injury score at 4, 6 8 and 10 WAS, and plant dry weight at 4, 8 and 12 WAS; number of pods/plants, pod weight/ha and 100-seed weight. All data collected and recorded were subjected to statistical analysis of variance as described by Snedecor and Cochran (1967). And treatment means were compared using the Duncan's Multiple Range Test (DMRT) (Duncan, 1955).

RESULTS AND DISCUSSION

The canopy height of groundnut varieties was significantly different at 4 and 6 WAS at B.U.K and at all sampling stages at Bagauda (Table 1). In all the cases SAMNUT-22 was taller than SAMNUT-23. The effect of weed control treatment on canopy height was significant at 6 to 10 WAS at B.U.K, and 6 WAS at Bagauda (Table 1)**.** Application of Metolachlor at 1.0 kg a.i. /ha followed by Fluazifop-p butyl at 1.0 kg a.i. /ha at all sampling stages produced the shortest canopy height while weedy check produced the tallest canopies throughout the sampling stages as well as the locations. Similar findings were reported by Lagoke *et al.* (1981). The canopy spread of the two groundnut varieties as influenced by weed control treatments is presented in Table 2. Across the two locations and the sampling stages, SAMNUT-22 had significantly wider canopy spread compared with SAMNUT-23 at all of the sampling stages as indicated by Richburg *et al.* (2006). However, sampling at 6 and 8WAS at BUK and 6 to 10WAS at Bagauda showed that application of Metolachlor at 1.0 kg a.i./ha followed by Fluazifop-p butyl at 1.0 kg a.i./ha plants with wider canopy spread which is statistically similar with some other treatments at those respective sapling stages. The narrowest canopies were recorded by weedy check plots as contain in a related study by Lagoke *et al.* (1981). Table 3 presents the leaf area index of the two groundnut varieties at both location indicated that SAMNUT-22 was significantly having higher leaf area index compared with SAMNUT-23 at 4 and 6 WAS in BUK and 4 and 8 WAS at Bagauda as described by earlier report of Lagoke *et al.* (1981). The effects of weed control treatment was significant at 4 to 10 WAS at BUK and 4 to 8 WAS at Bagauda with Metolachlor at 1.0 kg a.i./ha followed by Fluazifop-p butyl at 1.0 kg a.i./ha produced plants with higher leaf area index which could be due to the ability of Metolachlor in preventing weed emergence and the effects of Fluazifop in suppressing weed growth. The lower mean values recorded at weed check was because of the higher weed density recorded as reported by Dadari *et al.* (2005) and Bailey *et al.* (2000). The number of branches of the two groundnut varieties as influenced by weed control treatments is significantly different at all locations and across all of the sampling stages (Table 4). In all cases SAMNUT-22 had higher number of branches than SAMNUT-23 the result corroborated with the finding of Richburg *et al.* (2006) who pointed that SAMNUT-22 plants produced significantly wider crop canopies than plants of SAMNUT-23. The effect of weed control treatment was significant at 6 to 10 WAS at BUK and 4 to 10 WAS at Bagauda (Table 4). Metolachlor at 1.0 kg a.i. /ha followed by application of Fluazifop-p butyl at 1.0 kg a.i. /ha, weed free check and Metolachlor at 1.0 and or 2.0 kg a.i. /ha followed by supplementary hoe weeding produced statistically similar and higher number of branches compared with the other weed control treatment at their respective sampling stages. However, the weedy check significantly recorded the least number of branches, signifying the relative importance of controlling weeds to the crop. In a related development made by Ishaya *et al.* (2008) found consistency in better growth, and seed yield were recorded in chemical weed control. The crop vigour scores of groundnut varieties as influenced by weed control treatment is shown in Table 5. At 6 WAS at Bagauda SAMNUT-22 was superior over SAMNUT-23. A similar report were made by Bailey *et al.* (2000) which he said it was as a result of inherent genetic variability and the ability of the plant to utilized nutrients in the soil effectively. The effect of weed control treatment was significant at 6 and 8 WAS at Bagauda. Application of Metolachlor at 1.0 kg a.i./ha followed by Fluazifop-p butyl at 1.0 kg a.i./ha was significantly higher at both sampling stages compared with the weedy check that have similar and lower values. In a related study by Lagoke *et al.* (1981) indicating that uncontrolled weeds suppressed the growth of the crops in weedy check plots. Table 6 present the plant dry weight of the two groundnut varieties as influenced by weed control treatments and were significantly different at 4 WAS at B.U.K and 4, 8 and 10 WAS at Bagauda in all cases SAMNUT-22 had more dry weight compared to SAMNUT-23. This report is in conformity with findings of Arslan, (2005). The effect of weed control treatment was significant at 4 WAS at B.U.K and at 4, 8 and 10 WAS at Bagauda with application of Metolachlor at 1.0 kg a.i. /ha followed by Fluazifop-p butyl at 1.0 kg a.i. /ha producing the highest dry weight which is statistically similar with Metolachlor at 1.0 or 2.0 kg a.i. /ha followed by supplementary hoe weeding compared with the weedy check that produced the least value. A similar result was observed by Hassan and Metwally (2001). That, herbicides tested on peanut increase the dry weight of the plant and resulted in yield increased of the crop. The crop injury scores of the groundnut varieties as influenced by weed control treatment were presented in Table 7. Significantly different were observed at 4, 6 and 8 WAS at Bagauda with SAMNUT-22 been superior over SAMNUT-23, while SAMNUT-23 had more injury than SAMNUT-22 at 8 WAS. In related study by Hassan and Metwally (2001), indicating that S-Metolachlor combined with Diclosulam resulted in a mild injury. The effect of weed control treatment was significant at 4 and 10 WAS at BUK and 6 and 8 WAS at Bagauda. Weedy check and application of Fluazifop at 1.5kg a.i/ha alone was significantly higher and produced more crop injury compared with Metolachlor at 1.0 kg a.i./ha followed by Fluazifop at

1.0kg a.i/ha and weed free check 15 and 30 (DAS) that have least values which is statistically similar with Metolachlor at 1.0 or 2.0 kg a.i./ha followed by supplementary hoe weeding. Similar reported were made by Grichar. (1997) and James *et al.* (2008), that Lactofen caused peanut leaf bronzing spotting and no reduction in peanut grade or yield following Imazapic treatments. Conclusively, based on the observation and results obtained from this experiment it is supported that SAMNUT-22 significantly recorded superior growth attribute and could therefore be recommended to farmers in the study areas. Application of Metolachlor at 1.0 kg a.i./ha followed by Fluazifop at 1.0 kg a.i/ha gave higher suppressing of weeds in groundnut and these rate could also be recommended for increased groundnut production in the study areas.

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Table 1. *Effect of weed control treatment on canopy height of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	18.05a	24.55a	31.06	37.39	20.69a	24.78a	33.78a	37.28a
SAMNUT-23	13.81b	20.53b	29.97b	36.58	15.22b	20.69b	28.78b	34.69b
SE±	0.16	0.48	0.55	0.52	0.30	0.41	0.67	0.83
Weed control treatment								
Fluazifop@1.0kg a.i/ha	16.33	23.00a	30.17bc	40.00b	17.83	23.33ab	31.00	36.50
Fluazifop 1.5kg a.i/ha	15.53	23.08a	31.67bc	35.17bc	18.17	24.00b	31.67	33.00
Hoe weeding + Fluazifop 1.0kg a.i/ha	15.07	22.33ab	32.67ab	37.50bc	16.83	21.83b	31.83	33.67
Hoe weeding + Fluazifop 1.5kg a.i/ha	16.20	24.33ab	30.17bc	39.00b	18.67	22.50ab	30.00	38.50
Metolachlor 1.0kg a.i./ha	15.97	22.83ab	32.50b	39.67b	18.00	24.17ab	31.00	32.17
Metolaclor 1.0+ Fluazifop 1.0kga.i./ha	15.48	19.17b	21.33c	32.17d	19.00	21.83b	27.33	33.33
Metolaclor 1.0kg a.i/ha + SHW	16.43	22.33ab	28.00bc	33.69cd	17.67	22.00b	30.50	37.67
Metolaclor 2.0kg .a.i./ha	16.37	21.67ab	30.67bc	37.17bc	18.17	23.67ab	31.17	36.00
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	16.20	21.67ab	28.50c	35.83cd	16.67	20.67ab	30.17	37.83
Metolaclor 2.0kg a.i./ha + SHW	16.53	20.87ab	31.50c	34.17cd	18.83	22.33ab	30.00	35.67
Weedy checks	14.93	24.00a	34.67a	43.67a	16.50	25.33a	33.67	40.50
Weed free checks @ 15 & 30DAS	16.01	19.27b	30.00bc	35.83cd	19.17	22.17b	31.83	37.00
SE±	0.34	1.18	1.34	1.25	0.65	1.00	1.65	2.03
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 2. *Effect of weed control treatment on canopy spread of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	15.1a	19.9a	26.9a	30.8a	13.3a	17.5a	23.7a	27.7a
SAMNUT-23	10.9b	15.7b	23.2b	27.7b	9.7b	14.6b	19.4b	24.0b
SE±	0.6	0.5	0.4	0.5	0.3	0.5	0.5	0.7
Weed control treatment								
Fluazifop@1.0kg a.i/ha	13.4ab	16.1b	23.0c	28.0b	10.7	14.3b	17.7c	22.0bc
Fluazifop 1.5kg a.i/ha	12.3bc	16.2bc	22.7c	28.0b	11.5	14.3b	18.2c	25.2bc
Hoe weeding + Fluazifop 1.0kg a.i/ha	13.1bc	17.0bc	25.5bc	25.7b	11.0	17.3ab	17.8c	22.3bc
Hoe weeding + Fluazifop 1.5kg a.i/ha	12.8bc	18.2ab	26.3b	29.2ab	11.3	14.5b	20.8bc	28.3ab
Metolachlor 1.0kg a.i./ha	12.7bc	17.5bc	23.0c	31.5ab	11.5	15.7b	20.3bc	23.2bc
Metolaclor 1.0+ Fluazifop 1.0kga.i./ha	13.6ab	21.6a	29.2a	27.7b	12.5	19.3a	27.0a	31.3a
Metolaclor 1.0kg a.i/ha + SHW	14.4a	18.3ab	28.5ab	33.0a	12.3	15.2b	26.0ab	31.0a
Metolaclor 2.0kg .a.i./ha	12.8bc	16.7bc	24.5bc	33.3a	11.8	17.5ab	18.2c	21.2c
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	13.0ab	18.2ab	26.5b	28.7b	10.7	14.8b	26.8a	28.5ab
Metolaclor 2.0kg a.i./ha + SHW	13.3ab	19.3ab	26.7b	32.0ab	11.8	15.8b	25.2ab	25.8ab
Weedy checks	11.9c	14.5c	18.8d	21.0c	10.2	14.2b	17.3c	21.2c
Weed free checks @ 15 & 30DAS	13.6ab	20.0ab	27.0ab	32.7ab	12.2	20.0a	23.3b	29.83ab
SE±	0.6	1.2	1.0	1.3	0.64	1.6	1.2	1.6
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 3. *Effect of Weed Control treatment on leaf area index of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	0.31a	0.43a	0.6	1.0	0.5a	0.50	0.7a	1.2
SAMNUT-23	0.25b	0.37b	0.5	0.9	0.4b	0.48	0.6b	0.9
SE±	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.2
Weed control treatment								
Fluazifop@1.0kg a.i/ha	0.24b	0.36b	0.47bc	0.79c	0.42c	0.47c	0.57c	0.69
Fluazifop 1.5kg a.i/ha	0.26b	0.36b	0.47bc	0.95bc	0.40c	0.45c	0.58c	0.73
Hoe weeding + Fluazifop 1.0kg a.i/ha	0.30ab	0.40ab	0.53b	0.79c	0.39c	0.44c	0.59c	0.70
Hoe weeding + Fluazifop 1.5kg a.i/ha	0.27ab	0.39b	0.54b	0.84c	0.43c	0.47c	0.57c	0.78
Metolachlor 1.0kg a.i/ha	0.26b	0.43ab	0.52b	0.91c	0.39c	0.47c	0.62c	0.75
Metolaclor 1.0 + Fluazifop 1.0kg a.i/ha	0.34a	0.47a	0.72a	1.31a	0.56a	0.63a	0.77ab	2.68
Metolaclor 1.0kg a.i/ha + SHW	0.33a	0.46a	0.59ab	1.21ab	0.53a	0.60a	0.85a	1.22
Metolaclor 2.0kg a.i/ha	0.24b	0.38b	0.51b	0.79c	0.39c	0.44c	0.55c	0.76
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	0.28ab	0.41ab	0.49b	1.08b	0.41c	0.52bc	0.72bc	1.18
Metolaclor 2.0kg a.i/ha + SHW	0.31ab	0.44ab	0.46bc	0.99bc	0.45bc	0.55b	0.75ab	1.03
Weedy checks	0.21b	0.28c	0.35c	0.58d	0.26d	0.33d	0.43d	0.64
Weed free checks @ 15 & 30DAS	0.30ab	0.44ab	0.57ab	1.07b	0.48b	0.51bc	0.69bc	1.04
SE±	0.02	0.03	0.05	0.05	0.02	0.02	0.03	0.49
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 4. *Effect of weed control treatment on number of branches of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	48.0a	81.0a	109.0a	158.0a	37.0a	58.0a	96.0a	123.0a
SAMNUT-23	38.0b	65.0b	81.0b	117.0b	33.0b	46.0b	69.1b	107.0b
SE±	0.9	1.7	2.4	4.5	0.6	1.6	2.1	2.6
Weed control treatment								
Fluazifop@1.0kg a.i/ha	42.2	70.2b	90.3b	126.5b	32.5b	48.2b	71.0bc	94.8c
Fluazifop 1.5kg a.i/ha	39.2	66.5bc	85.2b	128.2b	31.5b	51.7ab	80.7b	104.5bc
Hoe weeding + Fluazifop 1.0kg a.i/ha	42.5	67.3bc	95.2ab	117.8b	33.7ab	54.2ab	73.0bc	108.0bc
Hoe weeding + Fluazifop 1.5kg a.i/ha	40.3	67.8b	95.5ab	130.0b	36.3ab	49.0b	77.0bc	107.7bc
Metolachlor 1.0kg a.i/ha	41.5	70.8b	85.7b	105.2b	36.2ab	47.8b	77.5b	114.7b
Metolaclor 1.0 + Fluazifop 1.0kg a.iha	44.2	86.0ab	112.8a	180.8a	37.2a	58.8ab	75.8bc	141.3a
Metolaclor 1.0kg a.i/ha + SHW	45.8	80.6ab	107.8a	168.2a	37.3a	61.0a	97.3a	143.2a
Metolaclor 2.0kg a.i/ha	42.2	79.8b	87.3ab	126.8b	26.7ab	49.8b	71.0bc	102.8bc
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	43.5	71.8	96.3ab	150.5ab	36.2ab	55.3ab	91.2ab	118.2b
Metolaclor 2.0kg a.i/ha + SHW	42.8	70.8b	103.7ab	159.8ab	34.7ab	50.0ab	88.8ab	129.2ab
Weedy checks	39.2	56.5c	74.7b	100.3b	29.5b	48.8b	62.8c	81.5c
Weed free checks @ 15 & 30DAS	46.0	86.3a	106.2ab	155.7ab	38.2a	54.7ab	100.3a	128.0ab
SE±	2.1	4.0	5.8	11.0	1.4	3.8	5.1	6.3
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 5. *Effect of weed control treatment on crop vigour scores of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	15.1	2.2	1.9	1.7	2.1	1.9a	1.7	1.6
SAMNUT-23	10.9	2.1	1.8	1.7	2.0	1.5b	1.9	1.5
SE±	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Weed control treatment								
Fluazifop@1.0kg a.i/ha	13.3	2.5	1.2	1.7	2.0	1.5b	2.0b	1.5
Fluazifop 1.5kg a.i/ha	12.3	2.0	1.8	2.0	2.0	1.5b	1.2c	1.3
Hoe weeding + Fluazifop 1.0kg a.i/ha	11.9	1.8	2.0	1.7	2.0	1.5b	2.0b	1.3
Hoe weeding + Fluazifop 1.5kg a.i/ha	12.3	1.8	1.8	1.0	2.0	1.5b	1.5bc	1.3
Metolachlor 1.0kg a.i/ha	12.7	2.0	1.7	1.3	1.8	1.5b	2.0b	1.5
Metolaclor 1.0 + Fluazifop 1.0kg a.i/ha	14.4	2.7	2.3	2.2	2.3	2.2a	2.7a	2.0
Metolaclor 1.0kg a.i/ha + SHW	13.6	2.0	2.2	1.8	2.2	2.0ab	2.2ab	1.5
Metolaclor 2.0kg a.i/ha	11.9	2.0	1.5	1.8	2.0	1.4b	1.5bc	1.5
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	13.6	2.2	2.0	1.7	2.2	1.8ab	2.3ab	2.0
Metolaclor 2.0kg a.i/ha + SHW	13.1	2.2	1.7	1.5	2.0	1.7ab	1.3bc	1.7
Weedy checks	10.8	1.7	1.5	2.0	1.8	1.3b	1.2c	1.0
Weed free checks @ 15 & 30DAS	12.8	2.5	1.8	1.5	2.2	1.7ab	1.8b	1.8
SE±	0.9	0.4	0.2	0.3	0.1	0.2	0.2	0.3
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 6. *Effect of weed control treatment on plant dry weight of groundnut varieties in at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)			Bagauda (WAS)		
	4	8	10	4	8	10
Variety						
SAMNUT-22	12.47a	61.10	108.20	12.86a	51.70	91.60a
SAMNUT-23	10.22b	51.20	112.20	10.28b	44.00b	77.20b
SE±	0.43	5.07	2.43	0.56	2.17	4.90
Weed control treatment						
Fluazifop@1.0kg a.i/ha	9.50b	49.00	102.70	9.83b	44.20b	64.30b
Fluazifop 1.5kg a.i/ha	11.17b	54.50	119.00	11.01b	46.80b	83.00b
Hoe weeding + Fluazifop 1.0kg a.i/ha	11.67b	52.20	110.70	8.67b	37.70b	70.30b
Hoe weeding + Fluazifop 1.5kg a.i/ha	9.17b	49.20	95.00	10.33b	44.20b	88.80ab
Metolachlor 1.0kg a.i/ha	10.67b	52.20	107.80	10.00b	37.00b	64.30b
Metolaclor 1.0 + Fluazifop 1.0kg a.i/ha	16.33a	66.70	130.20	16.00a	66.70a	125.50a
Metolaclor 1.0kg a.i/ha + SHW	12.83b	64.80	116.00	15.50a	66.30a	115.20ab
Metolaclor 2.0kg a.i/ha	11.17b	54.30	113.20	10.83b	38.20b	69.70b
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	11.33b	65.30	109.50	12.83ab	55.70ab	90.70ab
Metolaclor 2.0kg a.i/ha + SHW	11.83b	61.17	112.30	12.17ab	50.30ab	87.20ab
Weedy checks	9.17b	41.50	95.00	8.33b	34.00b	56.20b
Weed free checks @ 15 & 30DAS	11.33b	62.30	110.70	13.33ab	57.80ab	102.80ab
SE±	1.06	12.42	5.93	1.40	5.31	11.25
Interaction						
V X WCT	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 7. *Effect of weed control treatment on crop injury scores of groundnut varieties at BUK and Bagauda, 2012.*

Treatment	BUK (WAS)				Bagauda (WAS)			
	4	6	8	10	4	6	8	10
Variety								
SAMNUT-22	2.2	2.39	2.47	1.89	2.28a	1.70a	1.89b	1.75
SAMNUT-23	2.2	2.64	2.41	1.81	2.08b	2.1b	1.97a	1.56
SE±	0.1	0.12	0.14	0.10	0.07	0.09	0.10	0.11
Weed control treatment								
Fluazifop1.0kg a.i/ha	2.33ab	2.83	3.00	2.33b	2.33	2.17ab	2.17ab	1.83
Fluazifop 1.5kg a.i/ha	3.00a	3.00	2.50	2.17b	2.17	2.00ab	2.50a	2.17
Hoe weeding + Fluazifop 1.0kg a.i/ha	2.50ab	2.17	2.83	1.83bc	2.17	2.00ab	2.00ab	1.33
Hoe weeding + Fluazifop 1.5kg a.i/ha	2.00b	2.67	2.67	1.67bc	2.33	1.67b	2.33ab	2.17
Metolachlor 1.0kg a.i/ha	2.00b	2.33	2.00	1.67bc	2.00	2.17ab	2.17ab	1.67
Metolaclor 1.0 + Fluazifop 1.0kg a.i/ha	1.67b	2.00	2.50	1.00c	2.00	1.50b	1.00c	1.17
Metolaclor 1.0kg a.i/ha + SHW	1.83b	2.50	1.67	1.17bc	2.17	1.50b	1.50bc	1.17
Metolaclor 2.0kg a.i/ha	2.33ab	2.67	2.33	2.00bc	2.50	2.17ab	2.17ab	1.67
Metolaclor 2.0 + Fluazifop 1.5kg a.i/ha	1.34b	2.50	2.00	1.67bc	2.00	1.50b	1.83b	2.00
Metolaclor 2.0kg a.i/ha + SHW	1.83b	2.33	2.67	1.21c	2.00	1.67b	1.50bc	1.67
Weedy checks	3.17a	3.17	2.67	3.17a	2.33	2.50a	2.67a	2.17
Weed free checks @ 15 & 30DAS	1.33b	2.00	2.50	1.33c	2.17	1.67b	1.33bc	1.50
SE±	0.27	0.29	0.34	0.24	0.16	0.26	0.23	0.27
Interaction								
V X WCT	NS	NS	NS	NS	NS	NS	NS	NS

Means with the same letter(s) in the same column are not significantly different (P < 0.05%) using D.M.R.T. SHW = Supplementary hoe weeding, NS = not significant, WAS = weeks after sowing, WCT Weed Control Treatment.

Table 8: *Physico-chemical Properties of the soil at Experimental site, 2012.*

Soil Properties	BUK 0-30cm	Bagauda 0-30cm
Physical (%)		
Sand	75	52
Clay	13	26
Silt	12	22
Textural Class	Sandy clay	Sandy clay loam
Chemical		
pH (H_2O)	7.10	7.30
Organic Carbon (gkg^{-1})	8.1	12.3
Total Nitrogen (gkg^{-1})	0.1	0.3
Available P ($mgKg^{-1}$)	12.1	21.25
Exchangeable base (mol (+) kg^{-1})		
Ca	4.40	5.10
Mg	0.63	2.34
K	0.33	0.15
Na	0.64	0.63
CEC	6.30	9.70

Table 9: *Meteorological data covering the Experimental Period at Kano, 2012.*

Month	Rainfall (mm)	Temperature (0^c)		Relative Humidity (%)	
		Min	Max	Min	Max
May	21.1	21	43	21	86
June	229.3	20	37	44	80
July	231.0	20	34	41	86
August	384.2	20	34	54	95
September	73.2	20	37	45	91
October	1.0	19	38	23	8

Source: *Ahmadu Bello University Agricultural Research Station Kano, Department of Meteorological Services.*