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INFLUENCE OF VARIETY, INTRA-ROW SPACING AND IRRIGATION INTERVAL ON GROWTH AND YIELD OF GROUNDNUT (*Arachis hypogaea* L.) AT SUDAN SAVANNAH ZONE OF NIGERIA

***Ibrahim, A. M., Sanusi, J. and Adesoji, A. G.**

[1]Department of Crop Production and Protection, Federal University Dutsin-Ma Katsina State, Nigeria

*Corresponding author's email: ibrahimmani01@yahoo.com +2348035915280

ABSTRACT
Multi location field trials were conducted during the 2019/2020 dry season at Teaching and Research Farm of Federal University Dutsin-Ma (Badole) 11058`N, 80 26`E and 475m above sea level and Kugado Fadama site (110 33 N, 80 23 E and 481m above Sea level). Treatments consisted of three varieties of groundnut (SAMNUT 24, SAMNUT 25 and SAMNUT 26), 3 intra-row spacing (15, 20 and 25cm), and three irrigation intervals (3, 6 and 9days) replicated three times. The treatments were factorized and laid out in a randomized complete block design (RCBD). Results from the study revealed that groundnut variety had significant (P≤0.05) effect on the performance of groundnut at the two locations. SAMNUT 24 significantly (P≤0.05) outperformed SAMNUT 26 and 25 respectively in terms of stand establishment count, plant height, canopy spread, pod number per plant, pod weight per plant, and haulms weight per plant at the two locations. Intra-row spacing of 15cm significantly (P≤0.05) outperformed 20 and 25cm respectively however, 6days irrigation interval on growth and 3days irrigation interval on yield parameters recorded a significant (P≤0.05) effect at Badole while at Kugado 6days for growth and 9days irrigation interval for yield parameters was significant. The study revealed that SAMNUT 24, intra-row spacing of 15cm, 6days irrigation interval on growth and 3 days on yield parameters at Badole and Kugado SAMNUT 24, intra-row spacing of 15cm, 6days irrigation interval on growth and 9days irrigation interval on yield component proved to be most effective.

Keywords: Groundnut Varieties, growth, intra-row spacing, irrigation interval, yield

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop in Nigeria; it is widely grown in the tropics and sub-tropics Nigam, *et al*., (1991). Groundnut is unique because the plant and its produce have a wide range of uses in the daily life of the people as well as in the various industries. The roots of the plant help to enrich the soil and the vines serve as excellent fodder for cattle. The nuts, in addition to being the most consequential source of edible oil, are useful in numerous ways. It is one of the most important crops that have the ability to thrive on newly reclaimed sandy soils as a legume of high nutritive value as well as being a source of edible oil Desire, *et al*., (2010). Although groundnut is grown mainly for its seed, with some 40-50% oil content, all other plant parts are useful as food or animal feed Ahmad, *et al*., (2007). However, Arslan, (2005) considered groundnut haulm as the most important of its by-products that can be used to supply feed to livestock and its hay providing extra income to small holder farmers. Groundnut is grown in 26.4 million hectares across the globe, with a total production of 37.1 million metric tons and average production of 1690 kg/ha (FAO, 2006). The production of groundnut is concentrated in Asia and Africa, where the crop is grown mostly by smallholder farmers under rain-fed conditions with limited inputs. Nigeria is the third largest producer of groundnut with annual production of 3.4 MT after China 15.7 MT and India 6.5 MT Vabi, *et al.*, (2019) Groundnut (*Arachis hypogaea* L.) is grown in Nigeria at Sudan Savanna Zone and the leading producing states in Nigeria are Kano, Katsina, Niger, Jigawa, Zamfara, Kebbi, Sokoto, Kaduna, Adamawa, Yobe, Borno, Taraba, Nasarawa, Bauchi and Gombe (Taru, *et al.*, 2008).The country contributes 10% of total global production and 39% that of Africa,. The Sudan Savanna has the required soil, sunshine and temperature for groundnut production; therefore, groundnut can be grown under irrigation condition to supplement rainy season production (Mukhtar, 2009). However, the average yield of grain crops in the zone stood at 1.7 t ha^{-1} compared to advance countries groundnut production can reach up to 3.5tons ha^{-1} (Tran, 2003). Despite the availability of improve groundnut

varieties which are high yielding, early maturing (80-90 days), high in oil content of about (46-49%) and disease/drought resistant varieties farmers in Nigeria still use local/unimproved varieties, thus resulting in low yield of groundnut, poor use of agronomic practice such as inter and intra-row spacing as well as non- usage of irrigation method for groundnut production may result in low productivity. Therefore non usage of irrigation condition and irrigation interval, poor soil fertility and use of unimproved groundnut varieties are some of the limiting factors in achieving desirable groundnut yield. However, this trial was carried-out to investigate the effect of variety, intra-row spacing and irrigation interval on the performance of groundnut (*Arachis hypogaea* Linn.) at Sudan Savannah zone of Nigeria.

MATERIAL AND METHODS

Description of the Experimental Site

Multi-location field experiments were conducted under irrigated conditions during the 2019/2020 dry season at the Teaching and Research Farm of the Federal University Dutsin-Ma, Katsina State (11058`N, 80 26`E and 475m above sea level) and Kugado Fadama Site at Mani Local Government area Katsina State (110 33 N, 80 23 E and 481m above Sea level) both in Sudan Savannah Zone of Nigeria. The highest air temperature occurs in April/May and the lowest in December to February (Nigerian Meteorological Agency, 2020). The soil is sandy in nature while the vegetation is Sudan Savanna type which combines the characteristics and species of both the Guinea and Sahel Savanna. Sowing was done manually (Late December when the temperature was cold). The soil samples from the two experimental sites were collected randomly at 0 – 30 cm soil depths diagonally across the field from the experimental sites before establishing the trial. A tubular auger was used in taking the samples at the two locations from different points. The composite sample was analyzed for some physical and chemical properties using standard procedures as described by (Black, 1968). The soil textures collected from the two sites are sandy loamy with pH of 6.50 and 6.16 and organic carbon of 4.60 and 1.8 respectively.

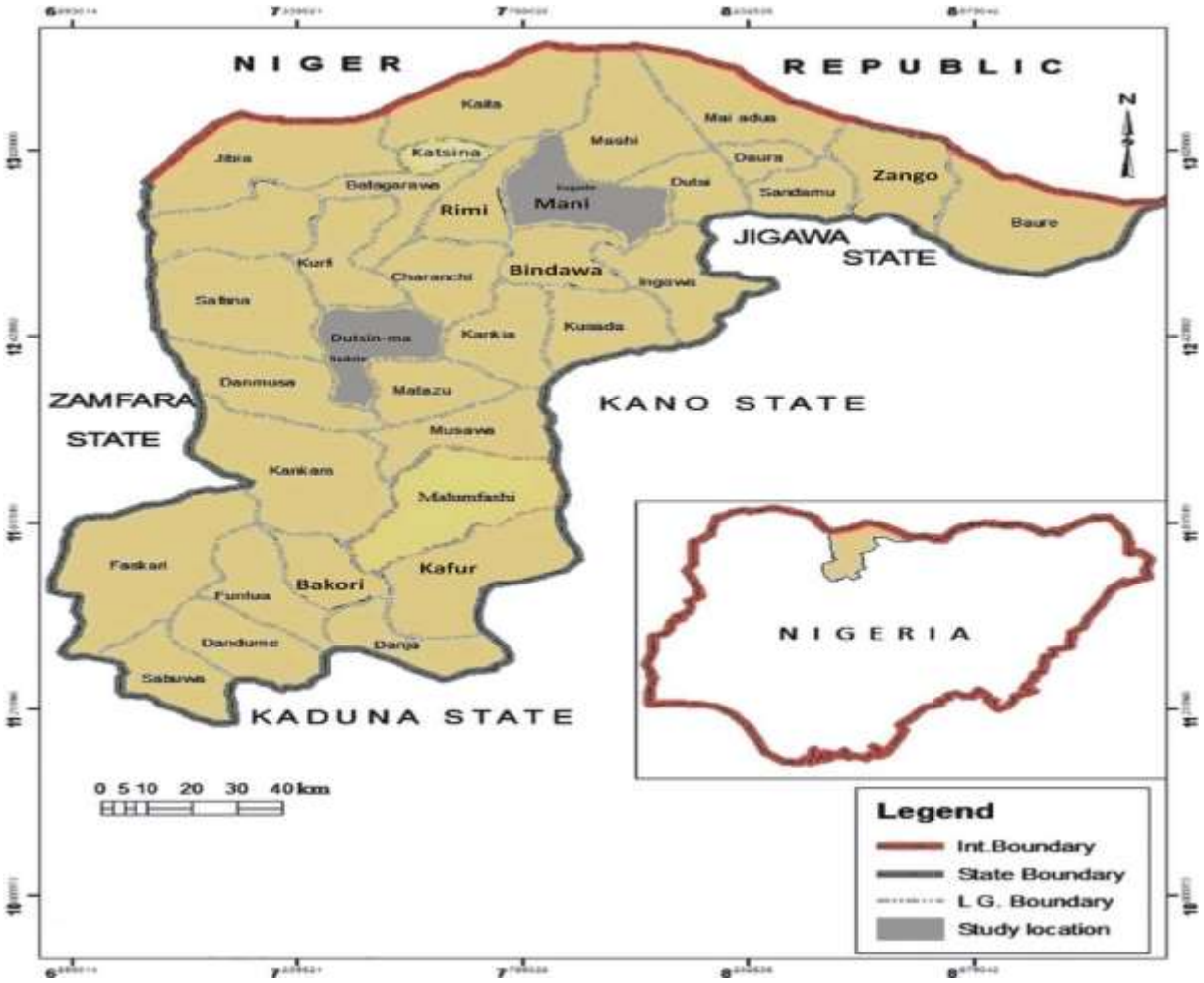

Figure 1 Map of Katsina state showing study area (Badole and Kugado)

Field management and Experimental Design

The field was cleared, double harrowed and ridged. The ridges were subdivided into plots of four ridges per plot at 2 meters length (2m x 3m =6m^2) and irrigation channels were constructed to convey water to the furrows. The net plot consists of two inner rows at spacing of 0.75m x 2 = 1.5 x 2, giving a total of 3m^2 while the gross plot was 0.75 x 4 = 3 x 2 (6m^2) giving a total area of 6 x 27m x3 (486m^2). A lee of 1m was made between the demarcated experimental site and 1m between the replications. After the seedbed preparation water was applied two times prior to sowing; the seeds of groundnut were treated with Apron star @10g/4kg of seed and sown manually according to treatment at the depth of 5cm. The seeds were sown on 22nd and 23rdDecember, 2019 for Badole and Kugado respectively at the spacing of 15, 20 and 25cm respectively as per treatment by using two seeds per stand. Irrigation was administered immediately after sowing. Subsequently, the plots were irrigated to field capacity twice a week for the first 3 weeks to enable the plant to be fully established. Irrigation interval (3, 6 and 9days) as a factor was imposed three weeks after sowing. 1st and 2ndweeding were conducted manually with hoe at 4 and 8WAS to control weeds and improve soil aeration. Inorganic fertilizer in form of NPK (15:15:15) was applied 3weeks after sowing at the rates of $N_2$30, $P_2O_5$30and K_2O/30kgha-^{1} to all the plots. Apid pest (*Aphis craccivora* Koch were observed and controlled by application of cypermethrine 30EC at 850 ml ha^{-1}. Harvesting was done manually at full maturity (browning of leaves, drying of pods, full coloration of kernel and darkening of inner part of the pod). The data on plant growth was collected at 3, 6 and 9WAS from five (5) sample plants per plot while the yield was computed from the entire net plot area. The harvested groundnut were lifted out and laid on the ridges to sundry for 7days. Shelling was done by carefully removing the pods to obtain the kernels. All data collected and recorded were subjected to statistical analysis of variance (ANOVA) as described by (Gomez and Gomez, 1984) and treatment means were compared using the Duncan's Multiple Range Test (DMRT) (Duncan, 1955) at 5% level of probability (P≤0.05) to find out the difference between the treatments and their interactions.

RESULTS

The result on growth parameters as presented in (Table 1) indicated that Plant height had significant effect (P<0.05) on variety, intra-row spacing and irrigation interval on plant height at 3, 6 and 9WAS during the 2019/2020 dry season. Plant height progressively increases from 3 to 9WAS at the two locations and SAMNUT 24 significantly outperformed (P<0.05) SAMNUT 26 and SAMNUT 25 respectively. Intra-row spacing of 15cm has significant effect (P<0.05) on plant height at 3, 6 and 9WAS at the two locations and Irrigation interval of 6 days resulted in significant effect (P<0.05) at 6WAS at the two locations. However, at 9WAS 3 days irrigation interval of (12.6cm) recorded the highest plant height at Badole while at Kugado 9days irrigation interval of (13.3cm) significantly outperformed 6 and 9days irrigation interval. The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) at the two locations.

Canopy spread was significantly affected by variety (P<0.05), intra-row spacing and irrigation interval at 3, 6 and 9WAS as presented in (Table 2) SAMNUT 24 significantly outperformed SAMNUT 26 and 25 respectively at the two locations. Intra-row spacing of 15cm has significant effect (P<0.05) on canopy spread at 3, 6 and 9WAS at the two locations. There was no significant effect (P>0.05) on irrigation interval at 3 and 6WAS at the two locations. However, at 9WAS 6 days irrigation interval of (11.4cm) significantly outperformed 3 and 9days irrigation interval respectively (P<0.05). The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) at the two locations.

Result from (Table 3) indicated that Plant establishment count was significantly affected (P<0.05) by variety, intra-row spacing and irrigation interval at the two locations. SAMNUT 24 recorded the highest plant establishment count at the two locations with 44 for Badole and 41 for Kugado respectively. Intra-row spacing of 15cm recorded the highest plant establishment count of (30) and the least was obtain from 25cm with (24). There was no significant effect (P>0.05) on irrigation interval on stand establishment count recorded at the two locations. The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) at both two locations.

Result on yield parameters as presented in (Table 3) indicated that variety, intra-row spacing and irrigation interval had significant effect (P<0.05) on all the parameters tested at the two locations**.** SAMNUT 24 produced higher number of pods/plant at Badole (23.5) and Kugado (40.1) than SAMNUT 26 and 25 respectively. Intra-row spacing of 15cm (19.51) out performed better than 20 and 25cm (19.58 and 18.85) which are statistically the same on number of pods per plant at Badole. Irrigation interval of 3days produced the highest value of (22.8) on number of pods per plant the least value of (17.0) was obtained from 9days irrigation interval at Badole. The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) on number of pods per plant at the two locations.

The result on pods weight per plant as presented on (Table 4) indicated that variety, intra-row spacing and irrigation interval had significant effect (P<0.05) on pods weight per plant**.** The highest value of pods weight per plant (36.7g) were recorded by SAMNUT 24 which was significantly higher by (5.3g) compared with lowest (32.1g) obtained from SAMNUT 25 at

Kugado. However there was significant difference in pod weight per plant between the two locations and Badole recorded the lowest pods weight per plant of (21g) which was lower than Kugado by 15.7g. Intra-row spacing of 20cm significantly (P<0.05) outperformed 25 and 15cm on pods weight per plant at the two locations. Irrigation interval of 3days recorded the highest pods weight per plant of (22.6g) at Badole than 6 and 9days irrigation interval with 19.35 and 19.26g respectively. The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) on pods weight per plant at the two locations.

Haulms weight per plant was significantly affected (P<0.05) by variety, intra-row spacing and irrigation interval at the two locations. At Kugado SAMNUT 24 produced the highest haulms weight per plant with (51.1g) and the least was recorded by SAMNUT 25 with (47.4g). Intra-row spacing of 15cm recorded the highest haulms weight per plant (41.8g) followed by 20cm (41.1g) and 25cm (38.5g) at Badole. Irrigation interval of 3days recorded the highest haulms weight per plant (43.7g) which was higher by 6.3g and 8.4g compared to 6 and 9 days irrigation interval at Badole while at Kugado 9days irrigation interval recorded the highest haulms weight per plant with (54.6g) the least haulms weight per plant of (46.1g) was obtain by 3days irrigation interval. The interaction between variety, intra-row spacing and irrigation interval was not significant (P>0.05) on haulms weight per plant at the two locations (Table 4).

Table 1: - Growth components of groundnut as affected by variety, spacing, irrigation interval and their interactions at Badole and Kugado during the 2019/2020 dry seasons.

	Plant height per plant (cm)					
	3WAS		6WAS		9WAS	
Treatments	**Badole**	**Kugado**	**Badole**	**Kugado**	**Badole**	**Kugado**
Varieties (V)						
SAMNUT 24	5.8[a]	6.4[a]	8.7[a]	9.6[a]	14.1[a]	14.0[a]
SAMNUT 25	5.2[b]	4.2[b]	6.7[b]	6.6[b]	11.1[b]	11.8[b]
SAMNUT 26	5.4[b]	5.2[b]	7.4[b]	7.0[b]	13.3[b]	10.3[b]
S.E(±)	0.22	0.34	0.42	0.43	0.62	0.58
Significance	*	*	*	*	*	*
Spacing (cm)						
15	6.1[a]	5.6[a]	7.9[a]	8.0[a]	14[a]	12.7
20	5.4[b]	5.5[a]	7.4[a]	7.8[a]	15[a]	11.9
25	5.2[b]	4.4[b]	6.1[b]	6.3[b]	12.1[b]	13.4
S.E(±)	0.22	0.34	0.42	0.43	0.62	0.58
Significance	*	*	*	*	*	NS
Irrigation interval (Days)						
3	5.2	5.1	6.0[c]	7.4[b]	12.6[a]	11.1[b]
6	5.5	5.5	7.6[a]	9.4[a]	11.7[a]	12.9[b]
9	5.7	5.2	7.3[b]	7.7[b]	9.7[b]	13.3[a]
S.E(±)	0.22	0.34	0.42	0.43	0.62	0.58
Significance	NS	NS	*	*	*	*
Interactions						
V x S	NS	NS	NS	NS	NS	NS
V x I	NS	NS	NS	NS	NS	NS
S x I	NS	NS	NS	NS	NS	NS
V x S x I	NS	NS	NS	NS	NS	NS

Note: Means followed by the same letter(s) in each column, under each variety are not significantly different 5% level of significance (P < 0.05), using DMRT. *= Significant, NS= Not Significant at 5% level of probability.

Table 2:-Effect of variety, spacing, irrigation interval and their interactions on canopy spread of groundnut at Badole and Kugado during the 2019/2020 dry seasons.

	Canopy spread per plant (cm)					
	3WAS		6WAS		9WAS	
Treatments	**Badole**	**Kugado**	**Badole**	**Kugado**	**Badole**	**Kugado**
Varieties (V)						
SAMNUT 24	5.4[a]	5.4[a]	6.3[a]	7.2[a]	11.5[a]	11.9[a]
SAMNUT 25	4.7[b]	3.7[b]	5.1[b]	5.2[b]	9.2[c]	8.2[b]
SAMNUT 26	4.7[b]	4.1[b]	5.4[b]	5.5[b]	10.8[b]	7.4[b]
S.E (±)	0.19	0.41	0.29	0.27	0.51	0.63
Significance	*	*	*	*	*	*
Spacing (cm)						
15	5.1[a]	5.1[a]	5.9	6.8[a]	10.8[a]	13.3[a]
20	4.9[b]	4.7[b]	6.1	6.5[a]	10.2[b]	11.8[b]
25	4.3[c]	3.4[c]	5.7	5.6[b]	8.6[c]	9.3[c]
S.E(±)	0.19	0.41	0.29	0.27	0.51	0.63
Significance	*	*	NS	*	*	*
Irrigation interval (Days)						
3	4.8	4.7	5.6	5.8	10.6[a]	9.4[b]
6	5	4.7	6.0	6.2	10.9[a]	11.4[a]
9	5	4.3	5.9	6.0	9.1[b]	9.2[b]
S.E(±)	0.19	0.41	0.29	0.27	0.51	0.63
Significance	NS	NS	NS	NS	*	*
Interactions						
V x S	NS	NS	NS	NS	NS	NS
V x I	NS	NS	NS	NS	NS	NS
S x I	NS	NS	NS	NS	NS	NS
V x S x I	NS	NS	NS	NS	NS	NS

Note: Means followed by the same letter(s) within a treatment group in each column, are not significantly different 5% level of significance ($P < 0.05$), using Duncan's New Multiple Range Test (DMRT). *= Significant, NS= Not Significant at 5% level of probability.

Table 3: - Growth and yield components of groundnut as affected by variety, intra-row spacing, irrigation interval and their Interaction at Badole and Kugado during the 2019/2020 dry season.

	Plant establishment count		Number of pod per plant	
Treatments	**Badole**	**Kugado**	**Badole**	**Kugado**
Varieties (V)				
SAMNUT 24	44[a]	41[a]	23.5[a]	40.1[a]
SAMNUT 25	20[c]	19[c]	18.4[b]	29.7[b]
SAMNUT 26	27[b]	23[b]	19.0[b]	30.1[b]
S.E(±)	0.38	0.47	1.03	3.10
Significance	*	*	*	*
Spacing (cm)				
15	31	30[a]	19.51	38.0
20	31	29[b]	18.85	28.9
25	29	24[c]	19.58	33.0
S.E(±)	0.38	0.47	1.03	3.10
Significance	NS	*	NS	NS
Irrigation interval (Days)				
3	31	27	22.8[a]	35.0
6	30	28	18.1[b]	31.2
9	30	28	17.0[b]	33.7
S.E(±)	0.38	0.47	1.03	3.10
Significance	NS	NS	*	NS
Interactions				
V x S	NS	NS	NS	NS
V x I	NS	NS	NS	NS
S x I	NS	NS	NS	NS
V x S x I	NS	NS	NS	NS

Note: Means followed by the same letter(s) in each column, under each variety are not significantly different 5% level of significance ($P < 0.05$), using DMRT. *= Significant, NS= Not Significant at 5% level of probability.

Table 4: - Yield components of groundnut as affected by variety, spacing, irrigation interval and their Interaction at Badole and Kugado during the 2019/2020 dry season.

	Pod weight per plant (g)		Haulms weight per plant (g)	
Treatments	**Badole**	**Kugado**	**Badole**	**Kugado**
Varieties (V)				
SAMNUT 24	21.0[a]	36.7[a]	39.9	51.1[a]
SAMNUT 25	17.7[b]	31.4[b]	37.8	47.4[b]
SAMNUT 26	18.3[b]	32.1[b]	38.7	49.6[a]
S.E(±)	0.83	1.46	0.95	1.03
Significance	*	*	NS	*
Spacing (cm)				
15	20.2[c]	30.4[c]	41.8[a]	54.7[a]
20	23.3[a]	36.6[a]	41.1[a]	50.3[b]
25	20.7[b]	34.8[b]	38.5[b]	46.1[c]
S.E(±)	0.83	1.46	0.95	1.03
Significance	*	*	*	*
Irrigation interval (Days)				
3	22.60[a]	32.0	43.7[a]	46.1[c]
6	19.35[b]	34.8	37.4[b]	50.4[b]
9	19.26[b]	36.1	35.3[c]	54.6[a]
S.E(±)	0.83	1.46	0.95	1.03
Significance	*	NS	*	*
Interactions				
V x S	NS	NS	NS	NS
V x I	NS	NS	NS	NS
S x I	NS	NS	NS	NS
V x S x I	NS	NS	NS	NS

Note: Means followed by the same letter(s) in each column, under each variety are not significantly different 5% level of significance ($P < 0.05$), using DMRT. *= Significant, NS= Not Significant at 5% level of probability.

DISCUSSION

Growth Parameters

SAMNUT 24 significantly outperformed SAMNUT 25 and SAMNUT 26 respectively on plant height; canopy spread and stands establishment count across all sampling periods in the two locations. This could be due to the genetic compositional makeup of the varieties. However, a significant difference recorded at the two locations on growth parameters of groundnut could be attributed to soil variation and gene interaction with environment. This result is in line with findings of Aliyu, (2019) that SAMNUT 24 produced tallest plant in all stages of plant growth. This indicates that SAMNUT 24 respond more favorably to the growing condition of the study area. Intra-row spacing of 15cm significantly outperformed 20 and 25cm respectively at the two locations. This could be due to higher number of stand establishment count recorded at intra-row spacing of 15cm which means number of standing plant has effect on nutrient and photosynthesis (sunlight and temperature) on which growth and development of plant depend on. However, close spacing of 15cm will lead to complete and early canopy closure. This result is in conformity with findings of Mukhtar, *et al.,* (2011) who confirmed that the taller plants observed at higher plant density (15cm) is attributed to competition by crops to intercept radiation. In addition, plants at high density tend to increase stem growth at the expense of assimilate partitioning to reproductive tissue while the shortest plant height and canopy spread measured with lower plant density (25cm) might be due to wide spacing arrangement which supported wider canopy sizes probably as a result of more available space for horizontal growth compared to the space available to closely spaced crop. Gilbert, *et al*., (2020) also record a significant effect of intra-row spacing and confirmed that tallest plants was observed at 160,000 plants/ha might be due to mutual shading of the plants with increased competition for light, thereby forcing the plants to grow taller by increasing the inter nodal length in search of light. The significant effect of Irrigation interval recorded on plant height and canopy spread at the two locations could be attributed to climatic change and soil variation. Similar finding were earlier reported by Collino, *et al.,* (2001) that supplement of water to crops becomes more important as a limiting factor for crop growth and yield. Vabi, *et al.,* (2019) also reported that groundnut productivity is hampered by varietal effect, nutrient and moisture content and Maintenance of optimum soil moisture at critical growth stages is the key factor for achieving higher yields. Bhagsari, *et al.,* (1976) also observed large reductions in photosynthesis and stomata conductance as the relative water content of groundnut leaves decreased from 80 to 75. Gibbons, (1980) also reported that Moisture variability is a key cause of yield variability while drought and flood can result in crop failures.

Yield Parameters

The higher number of pods per plant, in terms of varietal performance was significantly affected with SAMNUT 24 producing the highest at the two locations. The significant differences among the varieties could be attributed to genotypic make up of groundnut variety. When combined a significant differences were also recorded and SAMNUT 24 significantly outperformed SAMNUT 26 and 25 respectively. This could be attributed to varietal difference and their response to adverse environmental effects. Similar findings were reported by Yusuf, (2015) that the ability of the groundnut variety to out yield the other variety in two different locations shows that the factors controlling yield in the variety is genetically stable. Irrigation interval of 3days significantly outperformed 6 and 9days irrigation interval on number of pods per plant at Badole. This could be due to changes in temperature, soil variation and their interaction with moisture; probably soil and moisture content significantly affect vegetative growth. Similar findings were reported by Wright, (1992) that water stress affects numerous physiological processes which contribute to plant growth and yield.

Pods weight per plant the significant difference recorded at the two locations from 3 varieties of groundnut could be attributed to their seeds size. SAMNUT 24 weighed higher than SAMNUT 25 and SAMNUT 26 respectively. This means seeds size of SAMNUT 24 are larger in size than SAMNUT 25 and 26 respectively. Similar finding was also reported by Konlan, *et al.,* (2013) who obtained differences in the performance of four varieties of groundnut in Ghana and concluded that the large seeded varieties outperformed the small seeded in both wet and dry seasons. However, intra-row spacing of 20cm recorded the higher pod weight per plant at the two locations this means by increasing plant spaces from 15 cm to 25 cm, increased pod weight per plant. This could be due to the fact that wider spacing enables plant to utilize available nutrient, light and water than narrow spacing. That means the narrower the spacing the more competition and less resources available to individual plant consequently the lighter the pod weight. This report is in conformity with findings by Bihter, *et al.,* (2016) that The greatest pod weight per plant was recorded at intra-row spacing of 25cm whereas the lowest pod weight per plant was recorded at the intra-row spacing of 5cm. therefore decreasing plant density provides higher photosynthesis per plant. Gilbert, *et al*., (2020) also reported that plant density have significant effect on pod weight per plant and might be due to the competition for light, water and other essential requirements among the plants. Increased competition for growth resources per unit area at higher plant population was the major reason for decreased pod weight due to poor translocation of photosynthates from vegetative parts to pods at the time of maturity Gilbert, *et al*., (2020). Analysis of our results indicated that 3 days irrigation interval recorded the heaviest pod weight per plant at Badole and this may be due to the fact that moisture is a key factor for yield development.

Similar finding was also reported by Wright, (1992) who reported that moisture stress can reduce the performance of groundnuts. Arash, *et al.,* (2015) also reported that shortage of water decreases the performance of groundnut yield. This means that any increase in number of days from 3days irrigation interval to 9days irrigation will significantly affect the pod weight per plant.

Haulms weight per plant the highest value of haulms weight per plant was recorded by SAMNUT 24. This could be due to genetic makeup of the variety. Similar finding was also reported by Gabasawa, *et al.,* (2011) that the significant difference obtained from haulms weight may be due to anatomical, physiological and morphological differences in the genotypes of the varieties tested. Intra-row spacing of 15cm also had significant effect on haulms weight per plant at the two locations. These variations in haulms weight per plant may probably attributed to genetic differences between varieties and stand establishment count recorded which was higher at intra-row spacing of 15cm than 20 and 25cm respectively. This result is in conformity with another finding of Mukhatar, *et al*., (2013) that plant population may indirectly affect the amount of dry matter due to its relationship with number of plant per unit area. Irrigation interval of 3days for Badole and 9days irrigation for Kugado recorded the highest haulms weight per plant. This could be attributed to temperature and soil variations in the two locations. Similar finding was reported by Gabasawa, *et al.,* (2011) that the large variation in haulms recorded from the two locations may be attributed to differences in genetic material, ecological zones and probably cultural practices adopted and the inherent soil properties obtain at the savannah zone of Nigeria where that trial was conducted

CONCLUSION

The varietal differences recorded in this research indicated that SAMNUT 24 had a better performance on growth and yield parameters measured than SAMNUT 26 and SAMNUT 25 respectively. Intra-row spacing of 15cm produced the highest stand establishment count, plant height, canopy spread and number of pod per plant than 20 and 25cm while pod weight per plant and haulms weight per plant performed better when plant are spaced at intra-row spacing of 20cm at the two locations. 6days irrigation interval on growth and 3 days on yield parameters at Badole and 6days irrigation interval on growth and 9days irrigation interval on yield component proved to be most effective at Kugado. Therefore, intra-row spacing of 15cm, 3days irrigation interval for Badole and 6days irrigation interval for Kugado is adequate for the growth and yield of SAMNUT 24 in the study area.

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