



COMPARATIVE EVALUATION OF THE AGRONOMIC PERFORMANCE OF TWO VARIETIES OF GROUNDNUTS (*Arachis hypogaea* L) CULTIVATED IN BENUE STATE, NIGERIA

***Bitto, K. D., Akinboye, O. E. and Shobo, A. B.**

Department of Agriculture and Industrial Technology, School of Science and Technology,
Babcock University, Ilishan-Remo, Nigeria

***Corresponding Author's Email:** Kawenbitto@gmail.com, **GSM:** 07060717707

ABSTRACT

Groundnut (*Arachis hypogaea* L) is a species of the legume or family (Fabaceae). It is a tropical plant with high protein, oil, fatty acid, carbohydrates, vitamins and mineral contents. Due to the need to evaluate and compare the agronomic performance of the two Dominant Groundnut varieties in Benue State, Nigeria to identify the most suitable variety for cultivation in this region; a Comparative Evaluation of the Agronomic Performance of Samnut 23 and Samnut 24 cultivated on ridges made 0.5m apart in two Local Government Areas of Benue State was done after harvesting at maturity. Data was analysed statistically using the student t-test and Analysis of Variance (ANOVA). Canopy height, the number of single pods, the number of triple pods, the weight of single seeds, and the weight of triple seeds differed significantly ($P<0.05$) between Samnut 23A and Samnut 24A in Makurdi Area. The number of triple pods, the weight of single seeds, the weight of double seeds, the weight of triple seeds, the total weight of seeds and the weight of Haulms in Guma Area differed significantly ($P<0.05$) between Samnut 23B and Samnut 24B. They were significant differences in Canopy Height, Canopy Diameter, the no of single pods, No of triple pods, the weight of single seeds, the weight of double seeds, the weight of triple seeds, the total weight of seeds and the weight of Haulms ($P<0.05$) based on location.

Keywords: Groundnuts, Varieties, Samnut 23, Samnut 24, Agronomic, Performance.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a species of the legume or family (Fabaceae), it is an annual herbaceous plant that grows within 30–50 cm in height (Janila & Mula, 2016).

Due to its high protein, oil, fatty acid, carbohydrates, vitamins and minerals contents, peanut has high commercial and nutritional value. It contains 45-55% oil, 20-25% protein, 16-18% carbohydrate and 5% minerals (Gulluoglu, *et al.*, 2016). Historically, groundnut farming ranks high in Nigeria's economic development. Accordingly, groundnut sustained the economy at the federal and regional levels especially in the defunct Northern Nigeria through revenues generated from exports to local and foreign markets (Bashir, 2014). Nigeria is the largest groundnut producing country in West Africa accounting for 51% of the total production in the region (Gulluoglu *et al.*, 2016). The significance of the crop exemplifies common expressions associated with it like "groundnut pyramids" highlighting productivity and abundance of the produce (Bashir, 2014). The haulm is used as animal feed and industrial raw material (Tsafiyo *et al.*, 2022). Even as recently as the opening decades of the 21st century, Nigeria still stands as a major producer of groundnuts, accounting for 25 percent of world exports (Samuel *et al.*, 2017; Audu, 2017). However, over the years, its production in Nigeria has suffered major setbacks from various constraints such as groundnut rosette epidemics and folia diseases, aflatoxin contamination and lack of sufficient and consistent supply of seed of improved varieties (El-Naim & Ahmed, 2010).

According to El-Naim & Ahmed (2010), a range of groundnut varieties with various attributes including resistance to rosette and folia diseases have now been developed, however groundnut production in Nigeria is still limited by a number of factors which include; preponderance of low yielding varieties, low soil fertility, and lack of knowledge of improved cultural practices as well as weed management problems, resulting in low yields of 800 kg/ha compared to 3000 kg/ha under good management practices (El-Naim & Ahmed, 2010). Groundnut is cultivated in most parts



of Northern Nigeria and the middle belt especially in Benue State where it is grown in the various local Governments. (Merem & Twumasi, 2020). Groundnut has high commercial and nutritional value. It also contributes to maintaining soil fertility by fixing atmospheric nitrogen. Groundnut has for long been used as a cash crop in Benue State. There are several research reports on groundnut cultivation and information on some Agronomic parameters including; number of pods, canopy height and seed weight (Konlan *et al.*, 2013); (Dapaah *et al.*, 2014) and (Oyewole *et al.* 2016). The number of yield parameters is limited, some of the reports in the literature are also on Groundnuts cultivation are on Fertilizer application, weeding and time of harvesting. There are no reports on the performance of improved groundnut cultivars grown by Local Farmers in Benue State of Nigeria. There is a dearth of information to the best of my knowledge on the performance of groundnut haulms and seeds in Benue State. There is also a dearth of facts on a comparative evaluation of the Agronomic Performance of Samnut 23 and Samnut 24 Groundnut cultivars within Local Governments and between Local Governments in Benue State of Nigeria. This study was aimed to determine the performance of two varieties of Groundnut, Samnut 23 and Samnut 24 grown in Benue State, comparing the growth and yield parameters within two Local Governments (LGAs) and between the two Local Governments (LGAs).

MATERIALS AND METHODS

The Study Area

The study was carried out in 2 Local Government Areas of Benue State (Makurdi and Guma Local Government areas). Makurdi has geographic coordinates of Latitude 7 ° 44'1.50" N and Longitude 8 ° 31' 17.00" E., while Guma has geographic coordinates of Latitude 7 ° 58'0.01" N and Longitude 8 ° 46'0.01" E (Arnfield, 2023). The rainy season lasts from April to October with annual rainfall in the range of 100-200mm. The dry season begins in November and ends in March. Temperatures fluctuate between 21 – 37°C in the year (Arnfield, 2023). The seeds for the two varieties were sourced from within Makurdi metropolis. Samnut 23 from Local farmers who had cultivated it before and Samnut 24 from Benue State Agricultural and Rural Development Authority (BENARDA) Benue State.

Agronomic Practices:

The experimental site was cleared and ridges were made 0.5m apart and were done manually with hoes. Two seeds were planted per hole and spaced 75cmx20cm on the ridges between plants with a population density of about 66,000 plants per hectare. The experiment was laid out in Randomized Complete Block Design (RCBD). The gross plot size 25mx12m (300m²), with net plot size of 3mx3m (9m²). Weeding was done manually as the need arose. Groundnut seeds were planted on similar seed and plot sizes beds in both locations. The plants were harvested at 120 days after planting. One hundred (100) groundnut stands/net plot were randomly harvested by hand for data collection. Harvesting was done according to variety.

Sample and Data Collection:

One hundred (100) groundnut plants were harvested randomly from each net plot to represent the study area. Thirty plant stands out of the one hundred were randomly selected and identified with a tag for data collection.

Data was collected on the following parameters; Canopy Height, Canopy Diameter, Pod yield, Number of pods per plant, seed weight and weight of Haulms.

Statistical Analysis

Data was analysed using the student t-test where necessary as reported by Steel and Torrie (1980). Using the Statistical Package for Solution and service (SPSS) Version 21 Software. The data collected were then analysed, using Analysis of Variance (ANOVA) described by Steel and Torrie (1980). Treatment effects that were statistically different were separated using Duncan Multiple Range Test (DMRT) at 5% level of significance using the Statistical Package for Solution and service (SPSS) Version 21 Software.

RESULTS AND DISCUSSIONS

The Result of the Agronomic Performance of two varieties of groundnut in Makurdi LGA is presented in Table 1. The result shows significant ($P < 0.05$) variation among the two varieties of groundnut. The variety Samnut 23 had more number of single pods and higher weight of single pod than the Samnut 24. The canopy height, number of triple pods and weight of triple seeds were found to be higher in variety Samnut 24 compared to Samnut 23. However, the two varieties studied were at par with each other in terms of; number of double pods, total number of pods, weight of double seeds, total weight of seeds and weight of haulms. Ibrahim *et al.* (2021) investigated the effect of intra-row spacing and irrigation intervals on groundnut growth. They found significant differences in plant height and growth parameters among different varieties. Table 1 likely shows similar variations in plant height between Samnut 23A and 24A, which can affect harvesting and management practices. As the number of single pods significantly differed between Samnut 23A and Samnut 24A but showed no significant difference in the number of double pod; It shows that Samnut 23A may be more hardy as it is not an improved variety. Bihter *et al* 2016 reported higher values of the number of single pods in a groundnut variety called Halisbey than the number of single pods found in both varieties in Makurdi. These differences may be due to variety and fertilizer application. The number of triple pods differed significantly between Samnut 23 variety and Samnut 24 variety with a higher number in Samnut 24 variety in Makurdi. This shows that some nutrients were used for the development of the pod in the local variety Samnut 23A in Makurdi Area. There were however no significant differences between the two varieties in the total number of pods (Table 5). This shows that both varieties may perform well under good conditions in Benue State.

Table 1: The Agronomic Performance of Samnut 23A and 24A in Makurdi Local Government Area

Parameters	(Mean \pm SEM)	
	Samnut 23A	Samnut 24A
Canopy Height (cm)	44.67 \pm 1.66 ^b	50.10 \pm 0.91 ^a
Canopy Diameter (cm)	37.37 \pm 2.27 ^b	39.15 \pm 0.99 ^b
Number of single pods	4.00 \pm 0.55 ^a	2.33 \pm 0.47 ^b
Number of double pods	17.83 \pm 1.02 ^a	16.07 \pm 0.99 ^a
Number of triple pods	0.57 \pm 0.12 ^b	1.83 \pm 0.25 ^a
Total number of pods	22.40 \pm 1.17 ^a	20.20 \pm 1.19 ^a
Weight of single seed (g)	1.81 \pm 0.426 ^a	0.97 \pm 0.20 ^b
Weight of double seeds (g)	13.77 \pm 0.73 ^a	14.00 \pm 0.95 ^a
Weight of triple seeds (g)	0.70 \pm 0.17 ^b	2.51 \pm 0.35 ^a
Total weight of seeds (g)	16.26 \pm 0.79 ^a	18.01 \pm 1.23 ^a
Weight of haulms (g)	39.37 \pm 3.15 ^a	32.30 \pm 2.50 ^a

Note. S e m = Standard Error of Means. Values in the same row having different superscripts differ significantly ($P < 0.05$).

The Result of the Agronomic Performance of two varieties of groundnut in Guma LGA is presented in Table 2. There was no significant ($P > 0.05$) variation among the two varieties of groundnut in Canopy Height, Canopy Diameter, no of single pods, no of double pods and total no of pods. No of Triple pods differed significantly between the two varieties with higher value in Samnut 24 ($P < 0.05$).

Weight of single seeds, weight of double seeds, weight of triple seeds and total weight of seeds followed this trend with significant differences between the two varieties ($P < 0.05$). The two varieties of Groundnut in Guma Local Government Area had higher values than the values of varieties of Groundnut reported by Oyewole *et al* (2016) and Msaakpa *et al* (2021). This results showed that



Samnut 23B and Samnut 24B used in this work may perform well under good conditions in Benue State.

As the weight of haulms showed no significant difference between the two varieties in Makurdi Local Government Area, it indicates that the vegetative parts of groundnuts grew normally using the rays of the sun for photosynthesis. In Guma Area too, the weight of haulms of Samnut 23B was significantly different from that of Samnut 24B ($P < 0.05$). This shows that the vegetative part of Samnut 24B utilized soil nutrients and sun rays for photosynthesis more than Samnut 23A (The local variety) in Guma Area. The weights of haulms of both varieties of groundnut were significantly higher in Guma Area than in Makurdi Area ($P < 0.05$). It appears therefore that Guma area had the advantage (apparently) of more soil moisture as was observed.

Table 2: The Agronomic Performance of Samnut 23B and 24B in Guma Local Government Area.

Parameters	(Mean \pm SEM)	
	Samnut 23B	Samnut 24B
Canopy Height (cm)	53.20 \pm 1.31 ^a	54.92 \pm 1.17 ^a
Canopy Diameter (cm)	46.80 \pm 1.00 ^a	44.59 \pm 1.15 ^a
Number of single pods	3.83 \pm 0.44 ^a	3.03 \pm 0.44 ^a
Number of double pods	16.87 \pm 1.04 ^a	18.10 \pm 1.25 ^a
Number of triple pods	0.03 \pm 0.03 ^a	0.83 \pm 0.14 ^b
Total number of pods	20.94 \pm 1.13 ^a	21.93 \pm 1.61 ^a
Weight of single seed (g)	1.63 \pm 0.19 ^a	2.25 \pm 0.47 ^b
Weight of double seeds (g)	11.80 \pm 0.71 ^a	19.72 \pm 1.53 ^b
Weight of triple seeds (g)	0.05 \pm 0.05 ^a	1.28 \pm 0.24 ^b
Total weight of seeds (g)	13.22 \pm 0.84 ^a	23.28 \pm 1.62 ^b
Weight of haulms (g)	60.93 \pm 3.56 ^b	85.37 \pm 4.63 ^c

Note. S e m = Standard Error of Means. Values in the same row having different superscripts differ significantly ($P < 0.05$).

The Result of the Agronomic Performance of two varieties of groundnut in Makurdi LGA and one variety of Groundnut in Guma LGA is presented in Table 3. The Local variety (Samnut 23A), the Agric variety (Samnut 24A) and the Local variety (Samnut 23B) in Guma showed significant ($P < 0.05$) variations in Canopy Height. Both varieties (Samnut 23A) and (Samnut 24A) were at par ($P > 0.05$) with each other in Makurdi but both showed significant variation when compared with Samnut 23B the Local variety in Guma in Canopy Diameter. The two varieties (Samnut 23A and Samnut 24A) showed significant variation ($P < 0.05$) in the number of single pods in Makurdi but both varieties were not significantly different from the Local Variety (Samnut 23B) in Guma. Both varieties of Groundnut in Makurdi and the Local variety in Guma (Samnut 23B) showed no significant variation ($P > 0.05$) in the number of double pods. There were significant variations ($P < 0.05$) among the varieties within Makurdi and Guma in the number of triple pods. The total number of pods showed a similar trend with the number of double pods as there was no significant variation ($P > 0.05$) among the varieties when compared within Makurdi (Samnut 23A) and (Samnut 24A) and between Makurdi and Guma (Samnut 23B). Both varieties in Makurdi however showed no variation ($P > 0.05$) with the Local variety (Samnut 23B) in Guma in the weight of single seeds. The weight of double seeds followed the same trend with the number of double pods and total number of pods showing no variation between the varieties in Makurdi ($P > 0.05$) and between the Varieties in Makurdi and Guma ($P > 0.05$). The weight of triple seeds showed significant variation among the varieties in Makurdi ($P < 0.05$) and between both varieties in Makurdi and that of Guma ($P < 0.05$). The total weight of seeds showed no variation between the two varieties within Makurdi ($P > 0.05$). Both varieties however differed significantly between and had higher values ($P < 0.05$) than that of the Local Variety (Samnut 23B) in Guma.



Table 3: A Comparison of Samnut 23A, Samnut 24A (in Makurdi LGA) and Samnut 23B in (Guma LGA)

Parameters	(Mean \pm SEM)		
	Samnut 23A	Samnut 24A	Samnut 23B
Canopy Height (cm)	44.67 \pm 1.66 ^b	50.10 \pm 0.91 ^a	53.20 \pm 1.31 ^a
Canopy Diameter (cm)	37.37 \pm 2.27 ^b	39.15 \pm 0.99 ^b	46.80 \pm 1.00 ^a
Number of single pods	4.00 \pm 0.55 ^a	2.33 \pm 0.47 ^b	3.83 \pm 0.44 ^a
Number of double pods	17.83 \pm 1.02	16.07 \pm 0.99	16.87 \pm 1.04
Number of triple pods	0.57 \pm 0.12 ^b	1.83 \pm 0.25 ^a	0.03 \pm 0.03 ^c
Total number of pods	22.40 \pm 1.17	20.20 \pm 1.19	20.94 \pm 1.13
Weight of single seed (g)	1.81 \pm 0.26 ^a	0.97 \pm 0.20 ^b	1.63 \pm 0.19 ^a
Weight of double seeds (g)	13.77 \pm 0.73	14.00 \pm 0.95	11.80 \pm 0.71
Weight of triple seeds (g)	0.70 \pm 0.17 ^b	2.51 \pm 0.35 ^a	0.05 \pm 0.05
Total weight of seeds (g)	16.26 \pm 0.79 ^a	18.01 \pm 1.23 ^a	13.22 \pm 0.84 ^b
Weight of haulms (g)	39.37 \pm 3.15 ^a	32.30 \pm 2.50 ^a	60.93 \pm 3.5

Note. S e m = Standard Error of Means. Values in the same row having different superscripts differ significantly ($P < 0.05$).

The Result of the Agronomic performance of Samnut 23, Samnut 24 in Makurdi Local Government and Samnut 24 in Guma Local Government is shown in Table 4. There was a significant difference in Canopy height between Samnut 23A and Samnut 24A in Makurdi LGA ($P < 0.05$). Samnut 23A and Samnut 24A were also significantly different from Samnut 24B in Guma Local Government Area ($P < 0.05$). Canopy heights of Samnut 23A, Samnut 24A in Makurdi Area and Samnut 24B in Guma Area were higher in measurements than values reported by Oyewole *et al*, 2016 for Samnut 23(v1), Samnut 24 and Angbachido varieties of groundnut in Kogi State. This differences may be due to soil types and soil nutrients. Canopy Diameter was at par between Samnut 23 and Samnut 24 in Makurdi ($P > 0.05$). Both varieties differed significantly ($P < 0.05$) compared with the Agric variety (Samnut 24B) in Guma. There were no values of canopy diameter in their works to compare with. No of single pods differed significantly between Samnut 23A and Samnut 24A in Makurdi Local Government Area ($P < 0.05$). Samnut 23A in Makurdi and Samnut 24B showed no variation ($P > 0.05$), Samnut 24A in Makurdi Local Government Area showed variation with Samnut 24B in Guma Local Government Area ($P < 0.05$). Bihter *et al* 2016 reported higher values of the number of single pods in the Halisbey groundnut variety than the number of single pods found in Samnut 23A, Samnut 24A in Makurdi and also Samnut 23B in Guma. These differences may be due to variety, fertilizer application and rainfall.

There were significant differences in the number of triple pods between Samnut 23A and Samnut 24A in Makurdi Area ($P < 0.05$). Samnut 23A in Makurdi showed no variation when compared with Samnut 24B in Guma ($P > 0.05$) in the number of triple pods but Samnut 24A in Makurdi LGA differed significantly from Samnut 24B in Guma LGA ($P < 0.05$) in triple pods. The Total number of Pods showed no variations between Samnut 23A and Samnut 24A within Makurdi ($P > 0.05$) and between both varieties and Samnut 24B (The Agric Variety) in Guma ($P > 0.05$). There was a significant difference in weight of single seeds between Samnut 23A and Samnut 24A in Makurdi LGA ($P < 0.05$). There was also a significant difference between Samnut 24A in Makurdi and Samnut 24B in Guma LGA ($P < 0.05$). But there was no variation in Samnut 23A in Makurdi and Samnut 24B in Guma ($P > 0.05$). The weight of single seeds for Samnut 23A, Samnut 24A, Samnut 23B in Makurdi and Guma in this work is in each case higher than the total weight of seeds for other varieties of Groundnut reported by Oyewole *et al* 2016 and Msaakpa *et al* 2021. The weight of double seeds did not vary between Samnut 23A and Samnut 24A in Makurdi Local Government Area ($P > 0.05$). But both Samnut 23A and Samnut 24A in Makurdi local Government Area differed significantly from that of Guma Local Government Area ($P < 0.05$). The weight of double seeds for Samnut 23A, Samnut 24A in Makurdi in this study is in each case higher than the total weight of seeds for other

varieties of Groundnut reported by Oyewole *et al* 2016 and Msaakpa *et al* 2021. This difference may be due to variety, soil, and rainfall. Weight of triple seeds differed significantly between Samnut 23A and Samnut 24A in Makurdi Local Government Area ($P < 0.05$). Samnut 23A in Makurdi and Samnut 24B in Guma showed no variation ($P > 0.05$). But Samnut 24A in Makurdi Local Government Area differed significantly from Samnut 24B in Guma Local Government Area ($P < 0.05$). This value was higher than the value reported by Oyewole *et al* 2016 in Kogi State. However it is lower than the value reported by Msaakpa *et al* 2021. This difference may be due to variety, soil, and rainfall.

There was no variation in the Total weight of seeds between Samnut 23A and Samnut 24A in Makurdi Local Government Area ($P > 0.05$), but there were significant differences between Samnut 23A in Makurdi Local Government and Samnut 24B in Guma Local Government ($P < 0.05$) and Samnut 24A in Makurdi LGA and Samnut 24B in Guma LGA ($P < 0.05$). This difference may be due to variety, soil, and rainfall. As the weight of Haulms showed no significant difference between the two varieties in Makurdi Local Government Area, it indicates that the vegetative parts of groundnuts grew normally using the rays of the sun for photosynthesis. In Guma Area too, the weight of haulms of Samnut 23B was significantly different from that of Samnut 24B ($P < 0.05$). This shows that the vegetative part of Samnut 24B utilized soil nutrients and sun rays for photosynthesis more than Samnut 23A (The local variety) in Guma Area. The weights of haulms of both varieties of groundnut were significantly higher in Guma Area than in Makurdi Area ($P < 0.05$). It appears therefore that Guma area had the advantage of more soil moisture as was observed. Some of the Significant differences ($P < 0.05$) in Yield parameters of Groundnut between Makurdi and Guma plots may therefore be due to Groundnut variety, rainfall and some soil nutrients.

Table 4: A Comparison of Samnut 23A, Samnut 24A (in Makurdi LGA) and Samnut 24B in (Guma LGA)

Parameters	(Mean \pm SEM)		
	Samnut 23A	Samnut 24A	Samnut 24B
Canopy Height (cm)	44.67 \pm 1.66 ^a	50.10 \pm 0.91 ^b	54.90 \pm 1.17 ^c
Canopy Diameter (cm)	37.37 \pm 2.27 ^b	39.15 \pm 0.99 ^b	44.59 \pm 1.15 ^a
Number of single pods	4.00 \pm 0.55 ^a	2.33 \pm 0.47 ^b	3.03 \pm 0.44 ^{ab}
Number of double pods	17.83 \pm 1.02	16.07 \pm 0.99	18.10 \pm 1.25
Number of triple pods	0.57 \pm 0.12 ^b	1.83 \pm 0.25 ^a	0.83 \pm 0.14 ^b
Total number of pods	22.40 \pm 1.17	20.20 \pm 1.19	21.93 \pm 1.61
Weight of single seed (g)	1.81 \pm 0.26 ^{ab}	0.97 \pm 0.20 ^b	2.25 \pm 0.47 ^a
Weight of double seeds (g)	13.77 \pm 0.73 ^b	14.00 \pm 0.95 ^b	19.72 \pm 1.53 ^a
Weight of triple seeds (g)	0.70 \pm 0.17 ^b	2.51 \pm 0.35 ^a	1.28 \pm 6.24 ^b
Total weight of seeds (g)	16.26 \pm 0.79 ^b	18.01 \pm 1.23 ^b	23.28 \pm 1.62 ^a
Weight of haulms (g)	39.37 \pm 3.15 ^a	32.30 \pm 2.50 ^a	85.37 \pm 4.63 ^c

Note. S e m = Standard Error of Means. Values in the same row having different superscripts differ significantly ($P < 0.05$).

Table 5 shows a comparison of the Agronomic performance of Samnut 23A, Samnut 24A in (Makurdi Local Government) and Samnut 23B, Samnut 24B in (Guma Local Government). Samnut 23A differed significantly from Samnut 24A in Makurdi LGA ($P < 0.05$) in Canopy height. But in Guma LGA, there was no variation between Samnut 23B and Samnut 24B ($P > 0.05$). Samnut 23A in Makurdi LGA differed significantly from both Samnut 23B and Samnut 24B in Guma LGA ($P < 0.05$). Samnut 24A in Makurdi also differed significantly from both Samnut 23B and Samnut 24B in Guma LGA ($P < 0.05$). Canopy heights of Samnut 23A, Samnut 24A in Makurdi Area and Samnut 23B and Samnut 24B in Guma Area were higher in measurements than values reported by Oyewole *et al*, 2016 for Samnut 23(v1), Samnut 24 and Angbachido varieties of groundnut in Kogi State. This differences may be due to soil types and soil nutrients. There was no variation between Samnut 23A and Samnut 24A in Makurdi LGA in canopy diameter ($P > 0.05$). There was also no variation in Canopy Diameter between Samnut 23B and Samnut 24B in Guma LGA ($P > 0.05$). Samnut 23A was significantly different from Samnut 24A in the number of single pods ($P < 0.05$) in Makurdi local



Government Area; But the no of single pods showed no variation between Samnut 23B and Samnut 24B in Guma LGA ($P>0.05$). There was also no variation between Samnut 23A in Makurdi LGA and Samnut 23B in Guma LGA ($P>0.05$) in the no of single pods. Samnut 24A in Makurdi was significantly different from Samnut 23B in Guma ($P<0.05$) in the no of single pods. Bihter *et al* 2016 reported higher values of the number of single pods in a groundnut variety called Halisbey than the number of single pods found in Samnut 23A, Samnut 24A in Makurdi and also Samnut 23B in Guma. These differences may be due to variety and fertilizer application.

No of double pods showed no significant difference between Samnut 23A and Samnut 24A in Makurdi LGA ($P>0.05$). No of double pods showed no variation between Samnut 23B and Samnut 24B in Guma LGA ($P>0.05$). There was also no variation ($P>0.05$) between Makurdi LGA and Guma LGA in the number of double pods. Samnut 23A differed significantly from Samnut 24A in Makurdi in the number of triple pods ($P<0.05$) in Makurdi LGA. Samnut 23B was also significantly different from Samnut 24B ($P<0.05$) in the number of triple pods in Guma LGA. The number of triple pods showed a significant difference between Samnut 23A in Makurdi LGA and Samnut 23B in Guma LGA ($P<0.05$). Samnut 24A in Makurdi LGA was also significantly different from Samnut 23B and Samnut 24B in Guma LGA ($P<0.05$). Bihter *et al* 2016 reported higher values of the number of triple pods in a groundnut variety called Halisbey than the number of triple pods found in Samnut 23A, Samnut 24A in Makurdi and also Samnut 23B, Samnut 24B in Guma. These differences may be due to variety and fertilizer application. This study in Makurdi and Guma areas of Benue State had no fertilizer application. Farmers in Benue State usually do not apply Fertilizers in the cultivation of groundnut. There was no variation between Samnut 23A and Samnut 24A in Makurdi local Government ($P>0.05$); between Samnut 23B and Samnut 24B in Guma LGA ($P>0.05$) and between Makurdi and Guma LGA in the total number of pods ($P>0.05$). The weight of single seeds showed significant differences between Samnut 23A and Samnut 24A in Makurdi LGA ($P<0.05$); between Samnut 23B and Samnut 24B in Guma LGA ($P<0.05$); between Samnut 23A in Makurdi LGA and Samnut 24B in Guma LGA ($P<0.05$). There was however no variation between Samnut 23A in Makurdi LGA and Samnut 23B in Guma LGA ($P>0.05$). The weight of single seeds for the local variety of groundnut (Samnut 23A) in Makurdi and (Samnut 23B) in Guma and that of the Agric variety (Samnut 24A in Makurdi, and Samnut 24B in Guma) found in this work were higher than the values reported by Oyewole *et al* 2016 in Kogi State.

The weight of double seeds showed no variation between Samnut 23A, Samnut 24A ($P>0.05$) in Makurdi LGA but differed significantly between Samnut 23B and Samnut 24B ($P<0.05$) between Samnut 23B and Samnut 24B in Guma Local Government. The weight of double seeds showed no variation between Samnut 23A in Makurdi and Samnut 23B in Guma LGA ($P>0.05$); between Samnut 24A in Makurdi LGA and Samnut 23B in Guma LGA ($P>0.05$) but weight of double seeds differed significantly between Samnut 24B in Guma Local Government Area and Samnut 23A and Samnut 24A in Makurdi Local Government Area ($P<0.05$). The weight of double seeds for the local variety of groundnut (Samnut 23A in Makurdi and Samnut 23B in Guma) and that of the Agric variety (Samnut 24A in Makurdi, and Samnut 24B in Guma) found in this work were higher than the values reported by Oyewole *et al* 2016 in Kogi State. These differences may be due to variety, soil, rainfall and fertilizer application. The weight of triple seeds differed significantly between Samnut 23A and Samnut 24A in Makurdi LGA ($P<0.05$). The weight of triple seeds was also significantly different between Samnut 23B and Samnut 24B in Guma LGA ($P<0.05$). The weight of triple seeds of Samnut 23A in Makurdi LGA differed significantly from that of Samnut 23B in Guma LGA ($P<0.05$) but showed no variation compared to Samnut 24B in Guma LGA ($P>0.05$). There was no variation between Samnut 23A and Samnut 24A in Makurdi LGA ($P>0.05$) in the total weight of seeds but Samnut 23B differed significantly from Samnut 24B ($P<0.05$) in Guma LGA. Total weight of seeds for Samnut 23A in Makurdi LGA did not vary from the total weight of seeds for Samnut 23B in Guma LGA ($P>0.05$). Samnut 24B in Guma LGA however differed significantly from the total weight of seeds in all the other plots ($P<0.05$). The total weights of seeds for the local variety of groundnut (Samnut 23A in Makurdi and Samnut 23B in Guma) and that of the Agric variety (Samnut 24A in Makurdi, and Samnut 24B in Guma) found in this work were higher than the values reported



by Oyewole *et al* 2016 in Kogi State. The values for the total weights of seed in this work were however lower than values reported by Msaakpa *et al* 2021. This differences may be due to variety, soil, and rainfall and fertilizer application. There was no fertilizer application in this work.

The vegetative parts of the groundnuts may have used sun rays with more soil moisture (as was observed) to grow. Samnut 24B (the Agric variety) The Significantly higher($P<0.05$) weight of Groundnut Haulms in Guma Area than in Makurdi Area may indicate that the soil and the water conditions in Guma may favour the vegetative growth of Groundnuts in Guma more than in Makurdi. This work in Makurdi and Guma areas of Benue State had no fertilizer application. Msaakpa *et al*(2021) reported total number of pods for Borno red, Dan Bomboy, Ebunaibaji, Ijiwanda, Samnut 16, Samnut 21 and Samnut 22 groundnut varieties in Makurdi and Yandev. Their values ranged from 18.00- 31.50. The total number of pods for Samnut 23A, Samnut 24A, Samnut 23B and Samnut 24B in Makurdi and Guma in this work are closer in range (20.20- 22.40) to the results reported by Msaakpa *et al* 2016 for the total number of pods. The total weight of seeds found for Samnut 23A, Samnut 24A, Samnut 23B and Samnut 24B in Makurdi and Guma in this work is in each case higher than the total weight of seeds for other varieties of Groundnut reported by Oyewole *et al* 2016 and Msaakpa *et al* 2021. This results showed that both Samnut varieties used in this work may perform well under good conditions in Benue State. The total weights of seeds for the local variety of groundnut (Samnut 23A) in Makurdi and (Samnut 23B in Guma) and that of the Agric variety (Samnut 24A) in Makurdi, and (Samnut 24B) in Guma found in this work were higher than the values reported by Oyewole *et al* 2016 in Kogi State. The values for the total weights of seed in this work were however lower than values reported by Msaakpa *et al* 2021. This differences may be due to variety, soil, and rainfall and fertilizer application. The Weight of Haulms showed no significant difference between Samnut 23A and Samnut 24A ($P>0.05$) in Makurdi LGA. But was significantly different with higher values between Samnut 23B and Samnut 24B in Guma LGA ($P<0.05$). Samnut 23A in Makurdi LGA showed a significant difference between Samnut 23B in Guma LGA and Samnut 24B in Guma LGA ($P<0.05$) in the weight of Haulms. The same trend was found with Samnut 24A which differed significantly from Samnut 23B and Samnut 24B in Guma ($P<0.05$). There was no fertilizer application in this work.



Table 5: A Comparison of Samnut 23A, Samnut 24A (in Makurdi LGA), Samnut 23B and Samnut 24B in (Guma LGA)

Parameters	(Mean \pm SEM)			
	Samnut 23A	Samnut 24A	Samnut 23B	Samnut 24B
Canopy Height (cm)	44.67 \pm 1.66 ^a	50.10 \pm 0.91 ^b	53.20 \pm 1.31 ^c	54.92 \pm 1.17 ^c
Canopy Diameter (cm)	37.37 \pm 2.27 ^a	39.15 \pm 0.99 ^a	46.80 \pm 1.00 ^b	44.59 \pm 1.15 ^b
Number of single pods	4.00 \pm 0.55 ^a	2.33 \pm 0.47 ^b	3.83 \pm 0.44 ^a	3.03 \pm 0.44 ^{ab}
Number of double pods	17.83 \pm 1.02	16.07 \pm 0.99	16.87 \pm 1.04	18.10 \pm 1.25
Number of triple pods	0.57 \pm 0.12 ^b	1.83 \pm 0.25 ^a	0.03 \pm 0.03 ^c	0.83 \pm 0.14 ^b
Total number of pods	22.40 \pm 1.17	20.20 \pm 1.19	20.94 \pm 1.13	21.93 \pm 1.61
Weight of single seed (g)	1.81 \pm 0.26 ^{ab}	0.97 \pm 0.20 ^b	21.63 \pm 0.19 ^{ab}	2.25 \pm 0.47 ^a
Weight of double seeds (g)	13.77 \pm 0.73	14.00 \pm 0.95	11.80 \pm 0.71	19.72 \pm 1.53
Weight of triple seeds (g)	0.70 \pm 0.17 ^b	2.51 \pm 0.35 ^b	0.05 \pm 0.05 ^b	1.28 \pm 0.24 ^a
Total weight of seeds (g)	16.26 \pm 0.79 ^a	18.01 \pm 1.23 ^b	13.22 \pm 0.84 ^c	23.28 \pm 1.6
Weight of haulms (g)	39.37 \pm 3.15 ^a	32.30 \pm 2.50 ^a	60.93 \pm 3.56 ^b	85.37 \pm 4.0

= Standard Error of Means. Values in the same row having different Note. S e m superscripts differ significantly (P < 0.05).



CONCLUSION AND RECOMMENDATION

The Results of this study have indicated that both Samnut 23 and Samnut 24 varieties of groundnut can perform well in Makurdi and Guma Areas. Both varieties (Samnut 23 and Samnut 24) may perform better in Benue State if the soil is improved with the application of fertilizers. This study has also shown that Samnut 24 (The “Agric” variety as it is called by the farmers) may perform better than Samnut 23 if fertilizers are applied. Both varieties however appear suitable for cultivation and use by Local Farmers in Benue State, Nigeria.

REFERENCES

- Arnfield, A. J. (2023). Köppen climate classification. Encyclopedia Britannica. Retrieved from <https://www.britannica.com/science/Koppen-climate-classification>
- Audu, S. I. (2017). Productivity and Profitability of Groundnut Production (*Arachis hypogaea* L.) in Lafia Local Government Area, Nasarawa State, Nigeria. *Asian Research Journal of Agriculture*, **4**(3): 1-11.
- Bashir, B. (2014, May 19). "Groundnut Pyramids: Lost pride of the North" Freedom Radio. <https://freedomradionig.com>
- Dapaah, H.K., Mohammed, I & Awuah, R.T. (2014). Growth Yield Performance of Groundnuts (*Arachis hypogaea* L.) in Response to Plant Density. *International Journal of Plant and Soil Science*, **3**(9): 1069-1082. <https://doi.org/10.9734/IJPSS/2014/9445>.
- El Naim, A. M., Eldoma, M. A & Abdalla, A. E. (2010). Effect of weeding frequencies and plant density on vegetative growth characteristic of groundnut (*Arachis hypogaea* L.) in North Kordofan of Sudan. *International Journal of Applied Biology and Pharmaceutical Technology*, **1**(3):1188-119. www.ijabpt.com
- Gulluoglu, L., Bakal, H., Onat, B., Kurt, C., & Arioglu, H. (2016). The Effect of Harvesting Dates on Yield and Some Agronomic and Quality Characteristics of Peanut Grown in Mediterranean Region (Turkey) *Turk Journal of Field Crops*, **21**(2): 224-232 (DOI: 10.17557/tjfc.2016)
- Ibrahim, H., Musa, A., & Yahaya, S. (2021). Effects of Intra-Row Spacing and Irrigation Intervals on Growth and Yield of Groundnut (*Arachis hypogaea* L.). *Journal of Agricultural Science and Technology*, **23**(2): 145-156.
- Janila, P., & Mula, M.G. (2015) Cultural Management Practices of Groundnut: Scaling-up of Improved Groundnut Varieties through Established Seed System in Various Cropping Systems of Smallholder Farmers in Odisha. International Crops Research Institute for the Semi-Arid Tropics. www.icrisat.org
- Konlan, S., Sarkodie, J., Addo, Asare, E., & Kombiok, M.J. (2013). Groundnut (*Arachis hypogaea* L.) Varietal Response to Spacing in the Guinea Savanna Agro-Ecological Zone of Ghana. Growth and Yield. *African J. of Agriculture Research*, **8**(22): 2769-2777. <http://dx.doi.org/10.5897/AJAR12.1313>
- Merem, E. C., & Twumasi, Y. A. (2020). The Regional Analysis of Groundnut Farmland Use in Northern Nigeria. 87th Annual Conference of Association of Social and Behavioral Scientists, Inc (ASBS), Atlanta, March 4-6. DOI: 10.5923/j.food.20211101.01
- Msaakpa, T. S., Dennis, I., Shaahu, A., & Iyorkyaa, N. (2021) Yield Responses of Selected Groundnut (*Arachis hypogaea* L.) Cultivars at two locations for adoption in the Southern Guinea Savannah of Nigeria. *International Journal of Research and Innovation in Applied Science* (IJRIAS), **8**(6): 24-34.
- Nautiyal, P.C. (2017) Groundnut: Post-Harvest Operations. National Agricultural Technology Project, Food and Agriculture Organization of the United Nations (FAO). Retrieved from <http://www.fao.org/faostat/>
- Onat, B., Bakal, H., Gulluoglu, L., & Arioglu, H. (2016). The Effects of Row Spacing and Plant Density on Yield and Yield Components of Peanut Grown as a Double Crop in Mediterranean Environment in Turkey. *Turkish Journal of Field Crops* **22**(1): 71-80. <https://doi.org/10.17557/TJFC.303885>



- Oyewole, C.I., Shuaib, H., & Musa, U.T. (2016). Sustainable Crop Production: Growth and Yield Response of Three Varieties of Groundnut (*Arachis Hypogaea* L.) sown to three weeding regimes and two plant spacing in Anyigba Kogi State, Nigeria. *Journal of International Scientific Publications*, **4**: 1314- 8591.
- Samuel, Patience (2017). Analysis of Costs and Returns of Groundnut Processing in Taraba State, Nigeria. *Journal of Research in Business and Management*, **5**: 1-6. <http://www.questjournals.org>
- Steel, R.G. & Torrie, J.H. (1980) Principles and procedures of statistics. A biometrical approach, 2nd Edition, McGraw-Hill Book Company, New York.
- Tolk, J. A. & Howell, T. A. (2008). Field measurement of plant heights: comparisons among methods. *Agricultural Water Management*, **95**(4): 469-476.
- Tsafiyo, B., Zewdie, B., Yirga, H. & Teshome, D. (2022) Effect of Groundnut (*Arachis hypogaea* L.) Haulm and Maize Bran Mixture Supplementation on Growth and Carcass Characteristics Performance of Local Sheep Fed Pasture Hay Basal Diet. *Open Journal of Animal Sciences*, **12**: 36-57. <https://doi.org/10.4236/ojas.2022.121003>