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Effects of Sowing Date on Yield and Yield Parameters of Some Groundnut (*Arachis hypogaea* L.) Cultivar Under Rainfed Condition in Ogbomoso, Nigeria

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ABSTRACT

The study examined the variation in number of flowers, number of nodules, number of pods and seed yield of some groundnut cultivar as affected by planting date in Ogbomoso, Oyo state, Nigeria under rainfed condition. This is necessary to determine when moisture availability will be at optimum starting from the onset of rainfall, to avert loss which could arise from improper timing of planting. Teaching and Research Farm of Ladoke Akintola University of Technology Ogbomoso with average annual rainfall of 1000 mm and temperature ranging from 28 to 33 ºC was used for the experiment. A 4 by 4 factorial experiment with four varieties of groundnut (three improved varieties Samnut-10, Samnut-23, Samnut-22 and *Kampala* (local variety)) and four planting dates of a week interval (29th April, 6th May, 13th May and 20th May, 2016) were tried without chemical amendment. All the parameters evaluated were affected by the planting date. Samnut-23 and Samnut-10 planted on 29th April produced the highest mean number of flowers (15.67) and number of nodules (116.00) respectively which were significantly higher than others. Cultivar type did not have significant influence ($p \leq 0.05$) on the growth parameters. However, number of pods and seed yield was influenced by the cultivar. The highest number of pods (103.00) from this study was produced by Samnut-23 planted on 29th April. It was observed that the high number of pods produced by Samnut-23 did not translate to seed yield because Kampala produced the highest seed yield (73.51 g/plot) which was significantly higher than yield from other cultivars tried. Groundnut cultivars responded differently to planting date tried, with best planting period being early month of May. It was observed that all the cultivars produced their least seed yield when planted towards the end of month of May, therefore, should be discouraged for the tried cultivars at the trial location.

KEYWORDS: Sowing date, Rainfed, Pod, Seed yield and Groundnut Production
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INTRODUCTION

Groundnut (*Arachis hypogaea* L.) plays a key role in the Nigerian Economy. It is the principal source of dietary protein, oil and vitamins such as thiamine, riboflavin and niacin. Groundnut cake and haulms are used as livestock feed, helping to maintain livestock productivity. Groundnut is one of the most popular commercial crops in Nigeria which accounted for 70% of the total Nigeria export earning between 1956 and 1967 but declined in 1980s due to combine effect of drought and disease (Misari *et al.,* 1980). Also, discovery of petroleum in the southern part of Nigeria and lack of organized inputs and marketing (Misari *et al*., 1988) contributed to the decline. During the period, groundnut area in Nigeria declined to almost half of 1.7 million hectares cultivated earlier (Okolo and Utoh, 1999), which Larinde (1999) estimated to yield in the range of 500 – 3000 kg/ha.

The total water use by groundnut crop is controlled by climatic conditions besides agronomic and varietal factors. It is therefore important to plan planting at the time when groundnut water use will be at optimum. Larinde (1999) reported that the rainfall should be well distributed during the flowering and pegging of the crop. He spread the moisture requirement distribution as amount required for pre-sowing operations (100 mm), for sowing (150 mm) and for flowering and pod development, an evenly distributed rainfall of 400-500 mm is required. There are two main cultivars grown in Nigeria; long season maturing in 130 to 145 days and short-season maturing in 90 to 100 days. Earlier findings by Debjani and Halder (2014) revealed that shifting of sowing dates has significant effects on growth, yield and yield parameters of groundnut.

The persistent decline in groundnut production over years caused Nigeria Government great concern and has devised various means of revitalizing the production through research for impaired yields. Amongst these is the release of improved varieties by government and non-government agencies, which may require location trials. This study was done to determine the best sowing date(s) of some released improved groundnut cultivars

recommended by Groundnut Seed Project in comparison with a local cultivar that has also been recommended by Taru *et al*., (2010) for optimum pod yield in the study area.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the Teaching and Research Farm of Ladoke Akintola University of Technology, (LAUTECH) Ogbomoso (latitude 8^o10^1 N and longitude 4^o 10^1 E). The climate is hot humid tropic with two distinct seasons; the dry season which spans between November and February, and rainy season, usually from March to November and marked with a short period of harmattan between December and January. The rainy season has two peak periods referred to as bimodal rainfall pattern in June and September. The average annual rainfall was 1000 mm and temperature ranges from 28 to 33ºC. Mean annual relative humidity was recorded to be 74%. The soil textural class is sandy loam. The soil is well drained and belongs to the Gambari series (USDA - Udic Paleustalfs; FAO/UNESCO - Eutric Planosol). The parent material is basement complex. The slope of the land is 0-5% straight, depth of water table >190 cm, soil surface form is flat with an effective soil depth of >190 cm (Olatunji, 2011).

Experimental Design and Field Layout

A 4 by 4 factorial experiment laid out in randomized complete block design was used. The factors are four varieties of groundnut (Samnut-10, Samnut-23 and Samnut-22 and Kampala) and four planting dates (29th April, 6th May, 13th May and 20th May, 2016). The Samnut are product of the Institute of Agriculture, Samaru, an affiliate of Ahmadu Bello University, Zaria, while Kampala is a locally available variety. This gave a total number of 16 treatment combinations which was replicated three times. Each treatment plot measured 2.5 x 2 m with space of 1 m between the treatment plots and 2 m between replicates. Groundnut planting space was 50 x 25 cm and a total of 54 plant stands per treatment plot.

Data Collection

Weather parameters data collected are: solar radiation ($MJ/m^2/d$), maximum air temperature (ºC), minimum air temperature (ºC), precipitation (mm), and wind velocity (km/hour) were recorded using HOBO automatic weather station stationed in LAUTECH. Agronomic parameters evaluated are: number of flowers, number of nodules, number of pods and seed yield.

Statistical Analysis

Collected data on agronomic parameters were subjected to analysis of variance and means were separated using Least Significant Difference at 5%.

RESULTS AND DISSCUSSION

Climatic Condition

The average monthly solar radiation, maximum and minimum temperature, and rainfall distribution and wind velocity data is presented in Table 1. The mean monthly solar radiation ranged from 15.2 to 22.03 $MJ/m^2/d$ in the months of august and February respectively. The maximum air temperature was between 27.11 and 30.12 °C while the minimum air temperature was between 22.64 and 25.40 °C. The total amount of rainfall for the year was 1608.2 mm distributed across the months. The bimodal rainfall pattern was peaked during the months of June and September. The wind velocity was highest during the month of August

Number of flowers produced by each variety was significantly influenced by planting date (Table 2). Samnut-23 planted on 29th April produced the highest number of flowers (15.67), which was not significantly different compared with 12.33 counted from same planted on 6th May. Generally, planting on 6th May produced higher number of flowers by the Samnut varieties. Production of nodules was influenced significantly by both varietal type and planting date (Table 3). Highest number of pods (116) produced Samnut-10 planted on 29th April was significantly higher than number of nodules produced by other varieties and Samnut-10 planted on other planting dates. Furthermore, number of pods produced was also significantly influenced by planting date and varietal type (Table 4). Highest number of pods (103) was counted from Samnut-23 planted on 29th April, which was significantly higher than harvest form Samnut-23 planted on other dates and other varieties planted on the same date. The least average number of pods (19.33) was obtained from Kampala planted on 20th May, which was not significantly different compared with Samnut-23 planted on the same date. In the same vein, seed weight was also significantly influenced ($p \leq 0.05$) by planting date and varietal type (Table 5). Kampala planted on 13th May produced the highest seed yield (73.51 g/plot) which was not significantly different compared with Kampala and Samnut-22 planted on 6th May, this accounted for high profitability recorded for Kampala by Taru et al. (2010). The significant difference in performance and yield of the tried cultivars confirmed the earlier findings of Debjani and Halder (2014) that shifting of sowing dates has significant effects on growth, yield and yield parameters of groundnut.

Table 1: Monthly weather parameters of Ogbomoso in 2016

MONTH	Solar Radiation MJ/m^2/d	Maximum Air Temperature (°C)	Minimum Air Temperature (°C)	Rainfall (mm)	Wind Velocity (km/hour)
January	20.74	28.96	23.52	11.60	2.30
February	22.03	30.12	24.49	88.50	2.91
March	20.86	29.40	25.10	86.70	2.62
April	20.60	29.72	25.40	170.50	2.83
May	18.48	28.80	25.02	158.70	2.64
June	17.78	27.11	23.92	174.80	2.76
July	16.50	27.23	22.64	141.70	3.34
August	15.20	27.54	22.81	193.20	3.54
Septmber	17.50	27.59	23.12	241.70	2.75
October	18.41	27.97	23.50	222.90	2.38
November	19.98	28.33	23.73	89.00	2.17
December	20.09	29.25	23.49	28.90	1.94

Table 2: Effects of sowing date and varietal type on number of flowers of selected groundnut

Sowing Date	Variety				LSD Sowing date (0.05)
	Samnut-10	Samnut-23	Samnut-22	Kampala	
29th April	5.67	15.67	7.67	4.67	3.21
06th May	8.33	12.33	14.00	4.67	2.69
13th May	2.33	2.33	5.33	8.67	2.01
20th May	4.00	3.00	3.33	9.33	2.62
LSD Variety (0.05)	2.60	3.41	3.61	3.01	

Table 3: Effects of sowing date and varietal type on number of nodules of selected groundnut

Sowing Date	Variety				LSD Sowing date (0.05)
	Samnut-10	Samnut-23	Samnut-22	Kampala	
29th April	116.00	56.67	87.67	78.67	17.23
06th May	41.33	49.67	62.67	54.00	11.12
13th May	18.67	31.33	52.00	20.67	18.21
20th May	49.33	38.00	59.33	48.33	13.23
LSD Variety (0.05)	7.01	6.96	4.23	10.21	

Table 4: Influence of varietal type and sowing date on number of pods of selected groundnut

Sowing Date	Variety				LSD Sowing date (0.05)
	Samnut-10	Samnut-23	Samnut-22	Kampala	
29th April	56.33	103.00	82.00	50.67	16.01
06th May	59.00	37.33	59.67	27.00	13.21
13th May	93.00	79.33	63.67	34.00	21.20
20th May	77.33	28.67	52.33	19.33	19.21
LSD Variety (0.05)	17.12	21.22	12.31	13.01	

Table 5: Influence of varietal type and sowing date on seed weight (g/plot) of selected groundnut

Sowing Date	Variety				LSD Sowing date (0.05)
	Samnut-10	Samnut-23	Samnut-22	Kampala	
29th April	32.00	21.80	44.61	60.53	18.21
06th May	44.14	26.28	60.50	58.17	19.23
13th May	54.71	33.09	45.71	73.51	20.12
20th May	14.43	19.63	21.61	18.53	6.14
LSD Variety (0.05)	16.01	6.91	12.23	14.01	

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