

Vegetables Cowpea Performance As Influenced By Sowing Dates In South- South, Nigeria

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Abstract

Studies to determine performance of vegetables cowpea as influenced by sowing dates were conducted in 2020 and 2021 cropping seasons in Cross River University of Technology Obubra, Teaching and Research farm, Agronomy Department. Experimental design was randomized complete design treatments were seven sowing dates (10th March, April, May, 3th June, August, September, and October) with four replications. Data were collected on growth and yield parameters. Result showed that difference sowing dates significantly affected growth and yield of cowpea. Early sowing dates of 10th March and April gave higher vegetative growth (leaves, branches, taller plant heights and dry matter of plant fractions) than late sowing. Pods and seed yields per plant and per hectare were significantly higher in late planting of August and September 2020 and 2021 cropping seasons. The highest seed yield of (in 2020 and in 2021) per hectare and 100 seed weight (in 2020 and in 2021) were produced by cowpea planted in 3th August. Farmers are advised to cultivate cowpea on 3th August for optimal growth and yield in South, South agro ecological zone.

Date of Submission: 01-03-2022

Date of Acceptance: 12-03-2022

I. Introduction

Cowpea (*Vigna unguiculata*) L. Walp) is of fabacea family can be cultivated as grain or vegetable crop depending on time of harvest and usage (Kamai *et al* (2014) Olusanya *et al* (2016). The crop has high economic importance: its leaves, shoots are used as vegetables, grain for food, forage and hay.

Cowpea performs an essential role in man, livestock and soil fertility improvement due to its high content of proteins (23.2%) that is higher than most cereal crops (Islam *et al*, 2006.)

It is a valuable crop to farmers, Agronomists, and most rural poor masses who use it as an important source of animal protein supplement, fodder, green manure, cover crop, erosion resisting or control and soil fertility maintenance.

The crop is cultivated in some savannah regions of Africa especially West Africa as sole or inter cropping with cereals such as maize, millet, yam, cassava and others (Agbogidi and Egho, 2005).

In most West African countries such as Nigeria, large scale commercial cultivation of cowpea is restricted to northern states where the climate and weather conditions are favorable for cowpea growth and yield. (Agbogidi and Egho, 2005)

Lane (2015) reported that climatic and weather factors such as rainfall temperature, relative humidity, day length among others are the determinant factors of cowpea growth and yield in the tropics.

In South – South Nigeria especially Cross River State cowpea cultivation growth and yield is low.

Most rural farmers are ignorant of the appropriate season.

(Planting dates) of cowpea

Some farmers plant the crop at late season of August to October while others in June and July. Thus resulting in yield uncertainty (Asiwe, 2006).

In Cross River State, most farmers do not cultivate cowpea in large commercial scale. This could be due to low seed yield and ignorance of the appropriate planting date (s) of cowpea.

Thus, this study was conducted to determine the effects of sowing dates on the growth and yield of cowpea in Cross River State, South – South Nigeria.

II. Materials And Methods

2.1 Experimental Site:

The experiment was conducted in the Teaching and Research Farm, Agronomy Department, Faculty of Agriculture and Forestry, Obubra, Cross River University of Technology, Cross River State, South – South, Nigeria. Obubra lies within longitude (08° 16' E) and latitude (05° 59' N). The area is a derived savannah with

annual rainfall (2200- 2500mm), and temperature range (25 - 32⁰) and relative humidity (76.8-87.6 %) respectively (CRADP 2000).

2.2. Land preparation :

The site was cleared, trash packed, ploughed manually using cutlass, rake and hoe. Soil samples were collected at random with steel urger from depth of 0 -40cm, bulked, mixed thoroughly, composite sample was collected for laboratory analysis to determine physical and chemical properties of the site using standard laboratory procedures (Islam *et al*; 2006).

The land was divided into four blocks that were sub – divided into six plots of 4m x 4m (16m²). Blocks were separated with 1.0m and 0.5m path were between the plots.

2.3 Experimental Design:

The design of the experiment was a randomized complete block design (R C B D). Different sowing dates : 10th march, 10th April, 10th May, 10th June, 10th August and September October , 2020 comprised the treatment replicated four times.

This experiment with the same number of treatments and design were repeated in 2021 cropping season.

2.4. Planting

Mature improved cowpea variety “SAMPEA 14” used as vegetables and grain cowpea was collected from Institute of Agriculture Research Samaru, Zaria , Kaduna, Northern Nigeria. It was planted according to the schedule sowing dates of this experiment. Two seeds were sown per hole and later thinned to one seedling per stand

2.5. Cultural Practices.

Weed control:

Weeding of the plots was done manually using hoe at three times (4, 8 and 12 weeks after planting) to keep the pots weed free.

Pests and diseases control.

Pests and diseases control was done by spraying karate 2.5 EC insecticides at 2.mls in 16 liters of water every three weeks. This was stopped two weeks to harvesting of cowpea pods.

Harvesting:

Harvesting of cowpea was done at physiological maturity when pod were green, soft and complete maturity when pods & seeds were dried.

2.6. Data Collection:

Data were collected on plant height measured as main vine length (cm), number of leaves and branches per plant, shoot dry weight, pod number and weight per plant and hectare.

2.7. Statistical Analysis ;

Collected data were statistically analyzed using analysis of variance (ANOVA) procedure as described by Gomez (1986). Fishers, least significant difference (F-LSD) was used to separate treatment means that were significant at 0.05 probability level according to Obi, 2002.

III. Results and discussion:

The results of the pre-planting soil analysis of physical and chemical properties of experimental site is presented in Table 1. The soil is sandy loam, slightly acidic, low in organic matter, nitrogen and other nutrients exchangeable bases and cations.

This probably implies that the soils are poor in nutrients and of low productivity status.

Results indicated that early planting significantly increased growth components such as number of leaves, branches per plant, main vain length, higher than late planting season (Table 2).

Growth component increased significantly with advancement in planting dates to may 10th. Thereafter they began to decreased from June 3 to October 3th in both 2020 and 2021 cropping seasons respectively. However number of branches and nodule per plant were not significantly affected by planting date at four weeks after planting.

Other growth components, leaf area, main vine length and even branches and nodules at 8 and 12 weeks after planting produced the higher growth on may 10th sowing date. The high significant vegetative growth in cowpea leaves, branches and main vein length recorded in this experiment corroborate the work of Agbogidi and Eghog. 2015. They reported higher numbers of leaves, branches and taller plants as result of early panting of cowpea in Sudan Savannah of Northern Nigeria.

Responses of cowpea growth components to planting dates presented in Table 2, revealed similar trend to that shown in Table 1 with early planting dates expressing significantly higher leaf, shoot and nodule dry weight and growth rates.

This increased in growth component observed in this study agreed with the findings of Ezeaku, (2015) who reported that early planting date produced high vegetative growth in cowpea cultivars planted in April and May. This view was supported by Shegro *et al*; (2010) who noted that early season planting assist plants to get enough moisture supply by early rains and adequate relative humidity needed for optimum growth and development of vegetative growth components of cowpea.

Planting dates significantly affected flowering period of cowpea as schematics in (Table 3). Plants sown during late from August to September season flower earlier than those planted early March to June.

The plants planted on 3th September flower earlier than other dates. This 3th September plants took 85.23 days and 96.13 days in 2020 and 89.14 and 98.21 in 2021 days to first and 50% flowering in 2020 and 2021 cropping seasons respectively.

This date was closely followed by those planted on 3th August, (95.12 and 98.25) days to first and 50% flowering in both 2020 and 2021 seasons respectively.

This findings is in accordance with Akande *et al*; (2009) who reported that planting dates affect flowering of cowpea.

Similarly, - Moosawi *et al*; (2011) (2015) reported high significant difference in response to days to 50% flowering in cowpea sown on difference dates. This confirm the work of shegero *et al* (2010) that had delayed in flower due to early planting seasons on months of April and May respectively.

Table 4 showed that planting dates had significant effects on cowpea yield components. Late planting dates of August and September produced higher pods and seed yield than early planting dates.

Plant sown on 3th August produced the highest seed yield per hectare (1.0862 and 1.0948 t/ha in 2020 and 2021 seasons respectively.

The weight of 100 seeds closely followed the same trend as seen in effect of planting date on seed yield per hectare with 3th August sowing date recorded the best 100 seed weight of 22.18g in 2020 and 35.47g in 2021.

The higher yield of cowpea seed per hectare and 100 seed weight observed in this study is supported by Singh *et al* (2017) who showed that late planting of cowpea between months of late July to August gave higher yield than other dates. This is probably due to availability of adequate rainfall sun light and relative humidity that were appropriate for high flowering and pod set and seed yield in cowpea.

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Table 1. Soil physical and chemical properties of the experimental soil of study site before planting

Characteristics	Value	
Physical properties	2020	2021
Sand %	77.22	79.08
Slit (%)	15.26	18.13
Clay (%)	11.36	12.24
Textural class	sandy loam	sandy loam
Chemical properties		
pH in H ₂ O(1:2.5)	5.31	5.41
pH in CaCl ₂ (0.01)	4.30	4.31
Total Nitrogen (%)	0.069	0.078
Potassium (cmol/kg)	0.79	0.77
Organic carbon (%)	1.25	1.34
Organic matter (%)	2.03	2.15
Exchangeable Bases (cmol/kg/kg)	Exchangeable Bases (cmol/kg/kg)	Exchangeable Bases (cmol/kg/kg)
Calcium (cmol/kg)	3.41	3.23
Magnesium (cmol/kg)	1.07	1.05
Sodium	0.13	0.14
Hydrogen (cmol/kg)	0.41	0.31
Aluminum (cmol/kg)	1.33	1.44

Table 2. Effects of sowing dates on number of leaves, branches, nodules and main vine length (cm) of cowpea in 2020 and 2021 cropping seasons.

Treatments	Number of Leaves per Plant			Number of Branches per Plant			Main vine Length per Plant (cm)			Nodule Number Per Plant					
	4WAP	8WAP	12WAP	4WAP	8WAP	12WAP	4WAP	8WAP	12WAP	8WAP	12WAP				
2020 cropping season															
March 10 th	4.12	8.21	16.31	0.11	2.11	4.22	28.95	98.68	187.78	1.01	4.13				
April 10 th	5.13	11.31	32.22	0.10	2.12	6.12	24.47	86.49	165.39	1.12	6.02				
May 10	5.21	10.13	27.14	0.11	3.02	5.13	21.35	77.72	153.27	2.23	7.11				
June 3 th	4.11	8.22	20.12	0.10	2.13	4.11	17.65	55.87	136.48	2.11	5.21				
August 3	4.10	7.31	16.23	0.11	2.21	3.03	15.37	34.72	103.87	3.04	5.32				
September 3	3.11	6.11	10.11	0.10	1.23	2.22	12.49	27.66	78.57	1.33	3.22				
October 3	2.01	5.12	8.02	0.01	1.11	1.33	9.85	20.14	67.83	1.01	2.23				
LSD(0.05)	0.001	0.04	0.21	NS	0.001	0.01	0.31	1.02	2.11	0.001	0.03				
2021 cropping season															
March 10 th	4.21	8.21	16.31	0.11	2.11	4.22	28.95	98.68	187.78	1.02	4.13				
April 10 th	6.13	11.31	32.22	0.10	2.12	6.12	24.47	86.49	165.39	1.12	6.02				
May 10	6.21	10.13	27.14	0.11	3.02	5.13	21.35	77.72	153.27	2.23	7.11				
June 3 th	5.11	8.22	20.12	0.10	2.13	4.11	17.65	55.87	136.48	2.11	5.21				
August 3	5.10	7.31	16.23	0.11	2.21	3.03	15.37	34.72	103.87	3.04	5.32				
September 3	4.11	6.11	10.11	0.10	1.23	2.22	12.49	27.66	78.57	1.33	3.22				
October 3	3.01	5.12	8.02	0.01	1.11	1.33	9.85	20.14	67.83	1.01	2.23				
LSD(0.05)	0.001	0.04	0.21	NS	0.001	0.01	0.31	1.02	2.11	0.001	0.03				

Table 3. Effects of sowing dates on dry matter of cowpea leaves, vine, shoots, nodule dry weight per plant (g) in 2020 and 2021 cropping seasons.

Treatments	Leaf Dry weight per plant(g)		Vine dry weight per plant(g)		Shoot dry weight per plant(g)		Nodule dry weight per plant (g)		Nodule growth Rate plant (g/m ² /day)		
	8WAP	12WAP	8WAP	12WAP	8WAP	12WAP	8WAP	12WAP	4-8WAP	8-12WAP	
2021 Cropping season											
March 10 th	3.02	12.69	15.25	37.44	9.33	20.51	0.012	1.0313	0.0011	0.0057	
April 10 th	4.13	17.48	21.79	64.35	19.79	41.39	0.023	2.121	0.0023	0.0078	
May 10	3.45	13.57	17.38	46.47	15.36	30.21	0.0421	3.0343	0.0082	0.0095	
June 3 th	2.36	10.36	14.85	31.63	13.84	26.47	0.0332	4.1671	0.0065	0.0216	
August 3 th	2.73	8.39	10.46	20.25	10.37	19.98	0.0253	2.243	0.0041	0.0613	
September 3 th	1.24	5.81	7.54	16.76	8.75	16.46	0.0162	2.051	0.0021	0.0249	
October 3 th	0.38	3.78	4.27	13.91	5.47	12.19	0.0021	1.0421	0.0013	0.0124	
LSD(0.05)	0.003	0.52	1.02	1.11	1.23	0.51	0.0001	0.03	0.001	0.002	
2021 Cropping season											
March 0 th	4.11	14.54	16.17	42.28	9.33	25.36	0.023	1.0425	0.0024	0.0074	
April 10 th	5.21	19.39	24.68	73.15	19.79	52.27	0.031	2.3412	0.0034	0.0089	
May 10	6.32	15.72	18.56	52.68	15.36	42.56	0.0561	3.2007	0.0136	0.0146	
June 3 th	3.17	12.42	16.45	43.19	13.84	29.35	0.0453	4.4280	0.0217	0.0345	
August 3	3.21	9.27	13.39	24.25	10.37	17.69	0.0341	5.1032	0.0453	0.0784	
September 3 th	2.34	6.29	9.27	18.27	8.75	14.74	0.0250	2.3681	0.0032	0.0323	
October 3	1.45	4.65	5.13	15.63	5.47	11.43	0.0018	1.3031	0.0021	0.0215	
LSD(0.05)	0.004	0.41	1.1	1.22	1.23	0.42	0.0001	0.001	0.001	0.002	

Table 4. Effects of sowing dates on cowpea pod and seed yield in 2020 and 2021 cropping seasons.

Treatments	Number of Pods per plant		Pod weight per plant(g)		No. of seeds per pod		Seed weight per plant(g)		Seed weight per hectare (t/ha)		100 Seed weight (g)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Seasons												
March 10 th	4.23	5.1	25.51	27.19	2.12	2.12	11.34	13.51	0.0121	0.0134	10.21	12.13
April 10 th	7.11	8.21	37.36	40.41	2.23	2.21	14.79	15.25	0.0134	0.0263	13.35	15.19
May 10	8.12	10.32	47.64	51.27	2.11	3.11	17.48	18.36	0.0252	0.0341	16.43	21.28
June 3 th	9.32	11.12	66.35	68.61	3.33	3.23	21.96	25.85	0.1272	0.1325	18.67	22.15
August 3	11.21	13.22	87.49	90.53	3.13	3.11	38.63	41.74	1.0862	1.0948	22.18	35.47
September 3 th	9.13	10.32	71.83	78.62	2.31	2.11	27.28	30.16	0.1543	0.1675	15.45	18.38
October 3	4.01	5.11	20.68	24.39	1.13	1.13	12.42	14.57	0.0432	0.2687	10.1	12.42
LSD(0.05)	0.002	0.003	2.11	2.31	NS	NS	0.04	0.05	0.0001	0.001	0.02	0.05

AGBA, O. A., ONUGU, ONA ONA, et. al. "Vegetables Cowpea Performance As Influenced By Sowing Dates In South- South, Nigeria." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 15(03), 2022, pp. 49-53.