

FULL LENGTH RESEARCH ARTICLE

**ASSESSING THE POTENTIALS OF GROWING SAMCOT 9
COTTON VARIETY IN KANO STATE, NIGERIA**

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ABSTRACT

A Completely randomized field experiment with nine replications was conducted in the North, South and Central Agricultural zones of Kano State during the 2004 cotton growing season with a control in Katsina state, a cotton producing area, with the object of assessing the potentials of the profitable production of the SAMCOT 9 cotton variety in Kano State. A number of growth and yield parameters, which included plant height, stem circumference and seed cotton yield, were measured during the study. The trial involved a systematic composite soil sampling and analysis which indicated that the soils of the four regions were generally acidic and sandy-loam with low nitrogen and carbon contents. The mean available K⁺ was 0.22me/100g with the lowest recorded from Katsina State. Generally, there were low concentrations of phosphorus in all the zones with the lowest recorded in Katsina State (15.20ppm). The height of the Plants from the four sites showed a significant ($p < 0.001$) linear increase throughout the active growing period with the highest height was obtained in site B (Kano south) and the lowest from site D (Katsina State). The difference in the height of the plants between the 4 study sites was significant ($p < 0.001$). There was a consistent increase in the stem circumference up to wk 12 after germination which was significantly different ($p < 0.001$) between the four sites: the highest value was obtained in site C (Kano State) and the lowest in site D (Katsina State). The total yield showed site C producing the highest seed cotton of 800.20kg/ha. The yield of seed cotton throughout the study areas was consistently low probably because the rainy season ended early in September, 2004. Higher yield could be expected if rainfall and other ecological factors are favorable. This indicated that Kano State has the potential for the production of Samcot 9 cotton variety.

Keywords: Cotton, agricultural zones, soil, growth, yield

INTRODUCTION

Cotton belongs to the family Malvaceae and the genus *Gossypium*. It is represented by about fifty species which includes the four widely cultivated species of *G. hirsutum* Linn. 1763, *G. barbadense* Linn. 1763, *G. herbaceum* Linn. 1763 and *G. arboreum* Linn. 1763. Classification of the genus *Gossypium* was solely based on the chromosome size and structure.

Agronomically, the growth of upland cotton comprises of three different developmental stages namely; Planting and seedling establishment, leaf and branch formation and flower and boll production. All these stages take place within 15-17 wks depending on temperature and other environmental variables. The crop places a high demand on weather elements and other ecological factors which determine the part of the world where it can be grown

commercially. A number of climatic factors such as rainfall, temperature, sunshine etc. confer different influences on the growth and consequent yield of cotton and therefore determine the potentiality of its production.

About twenty years ago, Kumar & Ogunlela (1985) estimated that Nigeria required about 950,000 bales of lint by the year 1990 in place of the 230,000 bales of lint produced annually at that time to become self sufficient. This connotes that about double of the expected yield in 1990 would be required by the year 2010 since the population will be expected to double by that year. However, a major expansion of the cotton growing areas is not envisaged due to falling crop yields (Kuchinda *et al.* 2002). It is also known that within the north-western sub-region of Nigeria where cotton is grown in large quantity, most of it comes from States of Kaduna, Katsina, Zamfara, Sokoto and Kebbi. The aim of this research is to assess the potentials of profitable production of SAMCOT 9 cotton variety in Kano State, a non-cotton producing area of Nigeria.

MATERIALS AND METHODS

Study Sites: Field experiments were conducted in a completely randomized design in one location within each of the three geo-political zones of Kano State namely; A Kano North (Gwarzo), B Kano South (Kuru), C Kano Central (Gaida) and one location D in Katsina State, (Daji), a known cotton growing area.

Research Methods: Field trials were carried out in one acre in each of the locations (A–D). Composite soil was sampled and analysed for the following physico-chemical properties: (pH, organic carbon, particle size distributions, nitrogen, potassium and phosphorus contents). The soil samples were collected from a depth of 0-30cm in cultivated areas of each local Government. The various samples collected from each LGA were bulked up to form one composite sample of a zone and labelled according to the zone. The various composite samples labelled A–D were air-dried in the laboratory and analysed following the recommendations of the National Fertilizer Center for soil fertility investigations in Nigeria (NFC 1988; FMANR 1990)

Collection and planting of seed and other Agronomic Practices:

An improved cultivar, Samcot 9, was collected from Fiber Breeding Unit at the Institute for Agricultural Research, (IAR) Samaru, Nigeria in May, 2004. The seeds were dressed with 45% cowper powder and planted in mid-June on ridges at the rate of 4–6 seeds per hole and 45cm between stands. Thinning was done immediately after germination and only 2 plants per stand were allowed to grow. Cipermethrine pesticide in the form of 'Cymbush' was sprayed 3 times every 2 wks beginning from wk 6 after germination. Growth parameters were measured fortnightly beginning two weeks after germination through the season. The total yields of the individual sites were obtained after harvest

RESULTS

The results of the physico-chemical analysis of the composite samples, shown in Table 1 indicated that the soils of the four regions were generally acidic, sandy-loam with low nitrogen and carbon contents.

TABLE 1: PHYSICO-CHEMICAL PROPERTIES OF THE VARIOUS COMPOSITE SOIL SAMPLES.

Sample	pH	Organic Carbon %	Available Phosp (ppm)	Total Nitrogen %	K- content me / 100g	Particle Size Distribution		
						Clay %	Silt %	Sand %
A. Kano North	6.30	0.55	16.10	0.03	0.19	3.04	6.00	91.96
B. Kano South	5.70	0.40	18.30	0.02	0.25	6.04	10.00	83.96
C. Kano Central	6.20	0.30	15.50	0.03	0.23	3.04	4.00	92.96
D. Katsina	6.60	0.50	15.20	0.04	0.11	2.04	7.00	91.96

The mean available K⁺ was 0.22me/100g with the lowest recorded from Katsina State. Generally, there were low concentrations of phosphorus (ppm) in all the zones with the lowest from Katsina State (15.20ppm).

The height of the Plants from the four sites showed a significant (p<0.001) linear increase throughout the active growing period (Table 2). There was no further increase in height beyond wk 12 after germination. Highest plant height was obtained in site B (Kano south) and the lowest from site D (Katsina State). The difference in the height of the plants between the 4 study sites was significantly different (p<0.001).

Table 2 also showed a consistent increase in the stem circumference up to wk 12 after germination which was significantly different (p<0.001) between the four sites. The highest value was obtained in site C (Kano State) and the lowest in site D (Katsina State). There was a positive correlation between plant height and Stem circumference (Table 2).

The results of the total yield showed site C producing the highest seed cotton (seed plus lint) of 800.20kg/ha, followed by site B with 777.0kg/ha with site D producing (700.00kg/ha) (Table 3)

DISCUSSIONS

The results from these studies showed that the physico-chemical properties of the soils on which cotton is grown in both Kano and Katsina States are generally poor and require replenishment for proper growth and high yield. This is similar to the report of Lekwa & Nto (1982) who demonstrated that the soils in the cotton growing areas of northern Nigeria were generally sandy loam or loam sandy, acidic with low humus contents and low nitrogen. This might be one of the major causes for the consistently low yield of seed cotton in the area, similar observations were made by Kuchinda *et al.* (2002) and also by Lekwa & Nto (1982), that adherence to fertilizer recommendations for specific soil type and crop will produce high yield in the area.

The progressive increase in plant height observed might not be unconnected with the time when the variety was planted and the sum total effect of nitrogen level present in the soil added in form of nitrate during the study period. Marples & Frizzel (1985) observed that high nitrogen in the soil stimulated vegetative growth parameters such as height, formation of branches and internodes in tall cotton varieties but not in short varieties. Similarly, Brown *et al.*

(1992; 1993; 1994 & 1995) have shown that planting date not only effluence growth, development and yield of the crop but also affect the infestation by insect pests. The report of Kumar & Ogunlela (1985) further supports the effect of planting time in Nigeria. Kuchinda *et al.* (2002) also reported that sowing cotton in the mid-June and early July resulted in higher plant height, boll numbers, percent mature bolls and seed cotton yield than planting it late.

The small stem size per cotton plant observed could have been due to the low level of exchangeable potassium in the sites. Lombin & Mustapha (1981) have tried to assess the critical level of available potassium in solving the problems of soils in cotton production and showed that soils that contain 0.19me/100g exchangeable K⁺ may require no application of K-fertilizer while the soil with exchangeable K- value of 0.11 or less may require about 50 kg K₂O/ha for maximum growth and yield.

It was observed that the yield per hectare of seed cotton obtained in this study was generally low. This could be attributed to the early ending of the rainy season in September, 2004 which did not benefit the newly formed cotton bolls. Earlier reports (Kittock *et al.* 1985) indicated that the response of cotton to planting date is site and year specific and that lower yield obtained by planting later than the optimum date were due to short growing season.

It is concluded that subject to further detailed investigations, the Samcot 9 variety used in these trials could produce higher yield under the biotic and abiotic conditions prevailing in the State depending on the distribution of rainfall.

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TABLE 2: MEAN PLANT HEIGHT (CM) AND STEM CIRCUMFERENCE (CM) OF COTTON AS AFFECTED BY GEOGRAPHICAL LOCATION

Period	Wk 2		Wk 4		Wk 6		Wk 8		Wk 10		Wk 12		Wk 14		Wk 16	
Planting site	Ah	Bs	Ah	Bs	Ah	Bs	Ah	Bs	Ah	Bs	Ah	Bs	Ah	Bs	Ah	Bs
A. Kano North (Gwarzo)	41.18	1.40	53.67	1.60	62.35	2.22	76.64	2.30	105.4	2.48	111.41	2.74	111.30	2.74	111.30	2.74
B. Kano South (Kiru)	24.58	1.11	39.54	1.62	54.68	1.96	81.77	2.50	106.23	3.00	112.34	3.34	112.33	3.36	112.31	3.36
C. Kano Central (Gaida)	27.36	1.21	44.58	1.80	75.20	2.76	88.95	3.14	104.63	3.70	107.27	3.72	107.24	3.72	107.20	3.72
D. Katsina State (Dayi) control.	24.52	1.14	42.12	1.46	57.97	2.00	77.73	2.34	83.27	2.66	84.12	2.76	84.08	2.74	84.03	2.74
LSD 5%	Period		Plant height				Stem circumference									
	Site		11.96				0.325									
	Interaction		4.524				0.121									
			4.616				0.13									

TABLE 3 : WEIGHTS OF SEED COTTON/ HECTARE (KG) OBTAINED AT HARVEST AT VARIOUS GEOGRAPHICAL LOCATIONS.

Planting site	Weight of seed cotton (kg)
A. Kano North (Gwarzo)	728.0
B. Kano South (Kiru)	777.2
C. Kano Central (Gaida)	800.2
D. Katsina (Dayi) Control	700.0

LSD 5% 6.44

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