HP
JAESR2024
Hummingbird Publications
Journal of Agricultural & Env. Sci. Research
www.hummingbirdjournals.com
© August, 2024
Vol. 5 No. 1

Effect of Climatic Variables on the Growth Stages of Sugarcane at Babare Ganye 1 Ward Area of Ganye Local Government, Adamawa State, Nigeria

*A. I. Medugu; **E. D. Sini; ***P. Headboy; ***L.Y. Tarimbuka; & ***A. I. Vahyella

*Adamawa State college of Agriculture department of Agricultural Extension and management, Adamawa state college of Agriculture Ganye, department of Basic Sciences. **Adamawa State University, Department of Geography. ***Modibbo Adama University Yola.

Keywords:
Sugarcane, Rainfall, Relative Humidity, Temperature, Wind, Ganye, Corellation

Abstract

The study examines the effect of climatic variables on the growth stages of sugarcane in Ganye local government area of Adamawa state Nigeria. To achieve this 50 by 100 meter of land was established in Babare area of Ganye, the land was plough using traditional hoe, 14 row and column ridges were raised. The sugarcane seed was planted in between the ridges, data on the height (cm), number of leaves and number of stems was taking on a selected stand of sugarcane crop on each row on monthly basis. The experiment was conducted for the period of eleven months from September 25th, 2022 to August 25th, 2023. Data on sugarcane were collected from the practical farm in Ganye local government area and climatic data were collected from Adamawa state college of agriculture Ganye meteorological weather station. Data obtained were analyzed using correlation coefficient to determine the relationship between the climatic elements and the growth stages of sugarcane. The result shows that rainfall and relative humidity shows highly significant relationship at 0-810 and 0.878 respectively at each growing stage of sugarcane, while temperature and wind at 0.431 and 0.466 shows weaker relationship and also radiation shows negative relationship. Variation of climatic elements on the growth of sugarcane reveals that low rainfall and moisture shows shorter stems and wilting of leaves, while high temperature and radiation shows slim, brownish color and wilting of sugarcane crops and also high wind bend and brakes sugarcane stand. Farmers are advice to adhere to adequate and reliable knowledge of weather and climate, farmers should also plant different varieties not adopting to single variety, farmers should also provide another means of supplying water to their crops not relaying of rainfall and also government should provide soft loans and incentives at appropriate times.

Introduction

Sugarcane (sucharrum officenarum L.) is an important crop for sugar and bio energy world wide the increasing green house gasses emission and global worming during climate change result on the increase frequency and intensity of extreme weather events, climate change is expected to have consequences for sugarcane production in the world especially in the developing countries because of relatively low adaptive capacity, high vulnerability to natural hazards and poor forecasting systems and mitigating strategies. Sugarcane may have being negatively affected and will continue to be considerably affected by increase in the frequency and intensity of extreme environmental conditions due to climate change.(Gawander, 2017).

The degree of climate change impact on sugarcane is associated with geographical location and adaptive capacity (Neumiester, 2010).

Sugarcane plants respond to various stress differently, depending upon the stress severity and the developmental stages. Among various aforementioned stress, high temperature and water stress in sugarcane are of key important as it may cause drastic impact during germination, early growth season, and flowering and maturity stage (Tao et al, 2006, Sanghera and Kumar 2018) as the change in global climate is inclined to cause increase in average temperature, therefore, high temperature may impact the crop in the form of longer growing season more or fewer rainfalls, and thus a shorter growing period. Whereas low temperature during the planting time impairs the germination process oppositely high temperature is also an understandable feature during planting type.

Every plant has specific climatic condition in which it strives well, same as sugarcane (Mondale, 2017) asserted that sugarcane is a long duration crop and requires 10 to 18 months to mature, depending on the geographical condition, it require hot and humid climate with average temperature of 21° C to 27° C and 750 to 1500 mm rainfall. (Letsalkagric, 2017) also pointed out some climatic conditions for sugarcane production. That, the temperature should range from 20° C to 27° C throughout the year. Dry sunny condition are of great advantage as the promote sugar accumulation. In terms of rainfall, it requires 1200 to 1500mm will be appropriate.

This study when put in use by the farmer will provide high yield not only to sugarcane but also other crops that are weather dependant.

In this paper we briefly reviewed the effect of climatic variables on the growth stages of sugarcane in Babare area of Ganye local government Adamawa State.

Study Area

Ganye local government area is located about 150km south west of Yola, it has a total land area of about 2291.4 square kilometer. It shears international boundary with Cameroon republic to the east and to the south wert by Sardauna and Bali local government area of Taraba state. It also shear a boundry to the north with Jada and Mayo Belwa local government area respectively. The area is located between latitude 8° 15 N and 8° 30 Nand longitude 12 ° 00 E and 12° 15 E. it has a total population of about 164.087 people within a density of 150 per square kilometer concentrated in seven wards (2006) population census. Land used pattern is dominated by agricultural activities, apart from this the rest of the land used are residential, commercial, religious and few government reservation area. The vegetation of the area is savannah type, it is characterized by finer tall grasses during rainy season and has fairly tick vegetation cover. The

climate, Ganye falls within the northern guinea climatic zone characterized by two main seasons annually. The dry season lasting from November to Febuary and wet season falls from March to October and has a mean annual rainfall of about 1300 to 1400mm the maximum temperature varies between 29° C and 41° C while the minimum temperature is 14° C (Adeboye et al, 1999)

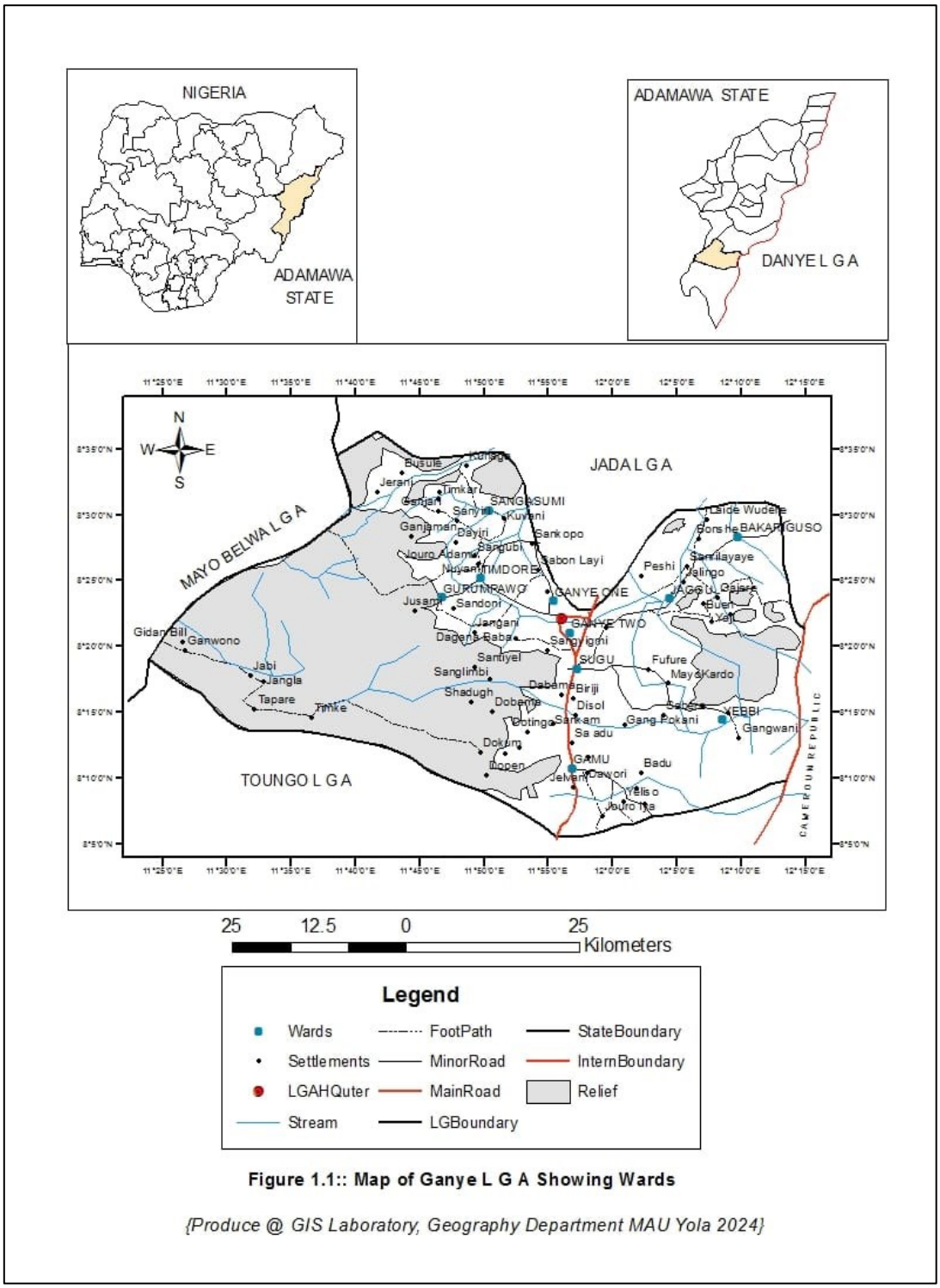

Figure 1.1:: Map of Ganye L G A Showing Wards

{Produce @ GIS Laboratory, Geography Department MAU Yola 2024}

Methodology

Experimental design

The experiment is carried out in Babare area of Ganye local government. 50 by 100 meter square of land was established, which contain 14 row and column of ridges were separated.

The seed was obtained from the head of the matured sugarcane stand, the ridges was raised using traditional hoe, the seed was planted in-between the ridges. The seed was planted on the 25th September, 2022.

Source of Data

Climatic data like temperature, humidity, rainfall, solar radiation and wind were collected on monthly basis from Adamawa state college of agriculture meteorological weather station Ganye and agronomy data were collected from the practical farm, data on length or height in (cm), number of stems and number of leaves were taking on monthly basis. Statistical analysis such as correlation coefficient was used to find out whether there is a relationship between the climatic variables and the growth stages of sugarcane at each month of growing season.

Table 1 CLIMATIC DADA

RAIN FALL	TEMPERATURE	RADIATION	WIND SPEED	R. HUMIDITY
68	30	11	17	65
0	29	21	103	48
0	28	16	73	35
0	31	19	103	30
0	31	18	88	43
7	36	19	119	53
48	37	20	121	77
103	32	17	91	89
162	34	18	102	93
300	29	17	111	94
210	25	11	99	95

Table 2 SUMMARIES OF AGRONOMIC DATA

MONTHS	PLANT HEIGHT	NUMBER OF LEAVES	NUMBER OF STEM
OCTOBER	4	3	0
NOVEMBER	8	5	0
DECEMBER	23	6	0
JANUARY	36	8	0
FEBRUARY	56	9	2
MARCH	81	7	4
APRIL	113	8	6
MAY	169	8	12
JUNE	174	5	14
JULY	179	4	16

AUGUST	188	4	19

Table 3 CORRELATION COEFFICIENT BETWEEN SOME CLIMATIC ELEMENTS AND SUGARCANE GROWTH PARAMETERS

	RAINFALL	TEMP.	RADIATION	WINDSPEED	R.HUMIDITY
PLANT HEIGHT	0.810**	0.431	-0.141	0.466	0.878**
NO OF LEAVES	-0.560	0.605*	0.608*	0.418	-0.418
NO OF STEM	0.894**	-0.166	-0.301	0.353	0.904**

*Correlation is Significant at the 0.05 level (2-tailed)

**Correlation is Significant at the 0.01 level (2-tailed)

Figure 1 Ridges rose with traditional hoe

Figure 3 Germination of Sugarcane Seed

Figure 4 Fully establish of Sugarcane crop or stand

Figure 5 Stem Formation of Sugarcane crop

Figure 6 fully stem formation

Figure 7 Maturing stage

Figure 8 Matured sugarcane crop ready for harvest

Results and Discussion

Correlation was used to determine the relationship between the climatic variable and the growth stages of sugarcane

Rainfall

Rainfall is one of the most important climatic variables that crops required for the growth and yield, whenever there is rainfall deficit it will reflect on the crop, like wilting or shorter stems as in the case of sugarcane. The correlation result in (table 3) shows that there is highly significant relationship between the rainfall and the growth of sugarcane. This reveals that sugarcane grows and yielded better when there is constant rainfall throughout the growing season, the results also reveals that the sugarcane shows shorter stem and wilting of leaves if there is no artificial supply of water during the drought period of growing season,. (See figure 5)

Radiation

Radiation is also necessary for the establishment, tellering growth and yield of sugarcane, but when it is high as in the case of this year it affects the yield of sugarcane.

Sugarcane requires certain intensity and duration of solar radiation to undergo the process of photosynthesis like any other crops. The result in (table 3) there is weaker positive relationship between the solar radiation and the growth of sugarcane. This reveals that higher solar radiation slims and dries up the leaves of sugarcane crops in the study area.

Relative Humidity

Moisture content is a determining climatic condition for the growth of sugarcane, if there is high relative humidity during the growing season of sugarcane, the yield will also be high.

The result in (table 3) shows a highly positive relationship between the relative humidity and the growth stages of sugarcane. This is because, the soil in the study area retain moisture for long time which favors the sugarcane crop to grow tall and yielded better. (See figure 7).

Wind

Wind is also an important climatic variable that aid the growth and yield of crops. The result in (table 3) shows a negative relationship between the wind and the growth of sugarcane, this reveals that the wind blows during the maturity stage in the study area bends and breaks the sugarcane stand, this is as a result of high rainfall and wind that blows during ember month.

Temperature

Temperature is also one of the most important climatic elements that determine the growth of crops from planting to the yield. The result in (table 2) shows that there is weak positive relationship between the temperature and the growth of sugarcane. This is because low temperature delayed the establishment and tillering of sugarcane crop and high temperature cause slim stems, drying leaves and turn the sugarcane stand to be brownish in color (see figure 8)

Conclusion and Recommendation

This study indicate that the variation of climatic variables on the growth stages of sugarcane reveals that low rainfall and moisture shows shorter stems and wilting of leaves, while high temperature and radiation shows slim stems, brownish color and also wilting of leaves and high wind bend and brake the sugarcane crop. This is to say that climate influence the growth and yield of sugarcane in the study area, in as much all the climatic factors are essential in the production of sugarcane.

In the study area farmers harvest their sugarcane earlier than the maturity state and the sugarcane is not fully matured, this is because of the poverty level of the farmers as they are in hest to get money to supplement their family need. In this case farmers are advice to plant early maturing crop not adapting to traditional varieties, climate authorities such as NIMET should provide seasonal climate prediction and early warning on the expected prevailing seasons. Stake holders in the business of sugarcane cultivation should always adhere to their advice when planning to cultivate high yield of crops. Since increase in the amount of rainfall will lead to increase in the yield of sugarcane vice versa, farmers are also advice to diversify to irrigation farming as most of them rely on rain fed; government should provide soft losans and incentives to the farmers at appropriate time to the prospective farmers to enable them withstand all the challenges for bumper harvest.

References

Adeboye, A. A and Tukur, A. L (1999) Eds . Adamawa state in maps Geography FUTY Yola Pp 20- 25

Gawander J. (2017) Impact of climate change on sugarcane production in Fiji WMO Buletin Vol. 56 Pp 34-49

Letstalkagrik (2017) Sugarcane farming guide. Retrieved fromhttp://www.lestalkagaric.com/crops/sugarcane-farming-information-guide

Mondale, P. (2017) Sugarcane cultivation in India: Conditions, production and distribution Retrieved from http://www.yourarticlelibrary.com/cultivation/sugarcane-cultivation-in India-condition-production-and distribution/20945

Neumeister, I. (2010) Crop production anything can happen PAN Asia and the Pacific Penang Malaysia

Sanghera, G. S, Kumar A. (2018) Recent perspective towards enhancing drought tolerance in S. C. Jour. Plsc Res 34 (1) 23- 24

Taq F., Yokozawa M., Xu, Y. Hayashi, Y. and Zang, Z. (2006) Climate change and trends in Phonology and yield of field crops in China, 1981- 2000 Agriculture and forest Meteorology 138, 82- 92

HP JAESR2024
Hummingbird Publications
Journal of Agricultural & Env. Sci. Research
www.hummingbirdjournals.com
© August, 2024
Vol. 5 No. 1

Quantitative and Species Analysis of Wood Sold in Major Commercial Fuelwood Depots in Fika Local Government Area, Yobe State

Akwarandu, K. E.; Ibrahim, S.; Mohammed, Y. A.; Ahmed, M. A.; & Ahmed, B.G[1].

[1]Forestry Technology Department, Yobe State College of Agriculture, Science and Technology, Gujba.
Corresponding Author: akwarandukc@gmail.com

Keywords: Fuelwood, Firewood, Fika, Pick-up truck, Species, Household

Abstract

This study was carried out to identify the quantities and species of trees being exploited, and sold in major commercial fuelwood depots in Fika Local Government Area of Yobe State. It focused on major commercial fuelwood Depots in Janga Siri, Janga Dole and Nahuta, all within Fika Local Government Areas of the state based on purposive selection as population sample. The methodology used for the data collection was consistent direct observation of number of fuelwood-laden pick-up trucks of known capacities, and identification of tree species they bear for fuelwood over a period of two weeks, while the cumulative weigh of each species was obtained by summation. The results obtained were analyzed using a one-way ANOVA to compare the mean of the species of trees most preferred and the quantity of fuel wood extracted per species per location (Depots). Check list of species across depots was prepared to show species of fuel wood present or absent. It was observed that while Combremtum mollei of the family Combretaceae had the least harvest rate (4.2, Anogeisoussus leocarpus a member of the Annonaceae family had 228, thus, the most harvested. Preference for a lot of tree species felled daily for fuelwood in the study location is perhaps due to combustibility, availability or accessibility of such species.

Introduction

Fuelwood use in developing regions of Africa, Asia and Latin America was believed to be a key factor in tropical deforestation, and the loss of forest was projected to result in wide-spread fuelwood shortages. In Nigeria, the population uses fuelwood either for cooking or heating. Both household and non-household

sectors in all the ecological zone of the country demand fuel wood. In the household sector, fuelwood is the domestic energy for cooking and to a lesser extent, for space heating especially during the cold season as is the case in the northern Nigeria. The non-household sector consists of institutions (hospitals, prisons and schools), food industries (restaurants, bakeries) and craft Industries (pottery, blacksmith, burnt brick factories), and this sector consumes a significant proportion of fuelwood (Adegbelin, 2001; Gundimeda and Kohlin, 2003). The FOA had compared fuelwood extraction and the rates of annual growth in biomass from existing forest resources. In those cases where demand exceeded growth, it was assumed that the difference was being met by over cutting and depletion of forests. In addition fuelwood extraction was projected to grow at roughly the same rate as population, with many studies predicting a growing gap between declining fuelwood supply and raising demand (Bhaffarai, 2001; Anorld *et al,* 2009; www.scialert.net 2009).

The choice of these areas was primarily because they have seldom been examined in the previous literature on vegetation degeneration in Yobe state, despite being one of the most densely populated areas in the region. This may be because researchers felt that the area, despite its large population, was less prone to desertification than the northern parts. Yobe state is covered by two vegetation zones; Sahel Savanna to the north and Sudan Savanna to the south. Many commercial fuelwood depots exist in Fika LGA and indeed Yobe State where truckloads of fuelwood are seen on a daily basis transporting wood from the forest to those depots and residence, but the species most exploited and the quality of wood being removed are not known. Domestic fuelwood consumption is a common phenomenon in the rural area of Nigeria. Supply are more often obtained from commercial fuelwood depots with small household sellers scattered around. Supplies are also based on the availability without recourse to the quality. This further compromise their other uses such as for fertilizer and animal fodder, and could lead to severe reduction in agriculture out at a time when even greater production is expected in the sector (Mekonnen, 1996; Bensel, 2008). Research has shown that new global and local trends as regards energy use and supply patterns have great impact on the future society and environment.

This study was initiated with the aim to assess the species and quantity of wood being sold in major commercial fuelwood depot in Fika Local Government Area. There is enough evidence that the whole world is facing an environmental crisis on account of heavy fuelwood extraction, for several years, there has been tremendous destruction, which must be put under control to avoid some bad consequences associated with deforestation. Data is often imprecise and subject to differing interpretations. Many commercial fuelwood depots exist in Fika L.GA and indeed Yobe State where truckloads of fuelwood s are seen on a daily basis transporting wood from the forest to those depots and residence, but the types of species most exploited and the exact quantity of wood being removed is not known. Domestic fuelwood consumption is a common phenomenon in the rural area of Nigeria. Supply are more often obtained from commercial fuelwood depots with small household sellers scattered here and there. Although all people have a legitimate right to and need for energy services which are affordable, healthy, retailable and sustainable energy issues are particularly challenging for developing counties where high energy costs exert

tremendous pressure on fragile ecosystems and economies that have little capacity to adapt to change (IUCN, 2007).

AIM AND OBJECTIVE OF STUDY

The aim of this is to identify the species of trees being exploited and the quantity of wood being sold in major commercial fuelwood depots in Fika Local Government Area, Yobe State. The specific objectives of the project; are

i. Identify tree species mostly exploited and sold as a fuelwood in the study area.
ii. To determine the quantity of such woods brought to the study area per day.

The use of fuelwood as a source of energy is an important source of livelihood to both rural and urban dwellers and the over exploitation of these trees for fuelwood pose a great threat to the environment and the people as the exploitation is more often based on availability rather than heating value. It is therefore important that the tree species being sold are known and the quantity of such species evaluated. Knowing the most exploited and the amount of biomass removed will be valuable information to conserving with regard to the choice of species for conservation and estimation of wood biomass being lost from forest.

THE STUDY AREA

The southern part of Yobe state- Fika, Local Government Area lies on Latitudes 11°30'33"N & 12°00'00"N & Longitudes 10°50'10"E & 11°14'11"E. The study area falls within the Sudan Savannah vegetation zone, and is characterized by a hot and dry climate for most of the year (Hess, Stephens and Maryah, 1995). The west season falls between May and November. This is characterized by single maxima August. During this season, the moisture laden North East trade wind from the Atlantic Ocean blow over the area. Seventy percent of the total rainfall in the area happen to fall within four months of May to September. The area has average of 62 rainy days while average amount of rainy recorded in the area is 972 mm. the dry season which is the harmattan period is characterized by dry, dusty hazy Northern trade wind that blows over the area of savannah desert (Anderson, 2015). Temperature within the area varies with season. Although the temperature is relatively high almost all the year round, temperature of the area ranges from 27° c - 40° c. December and January is the coldest month with the average temperature of 34° (Anderson, 2014). The dry season starts from early November to late May and the hottest months are March, April and May with temperatures ranging between 39°C and 42°C. The Natural Vegetation of the area is Sudan savannah types which is characterized by thick vegetation around hill and mountain ranges. The vegetation has a wide variety of savannah trees species among which are, *Acacia Senegal, Acacia Albida, Acacia nilotica, Azadirachta indica, Adansonia digitata, Tamarindus indica, Balanites eagyptiaca, Combretum spp, Combretum mallei, Anogeissus leiocarpus, Piliostigma raticulata, Cacia siberania*. The area has a population of 129,855 Persons. The major ethnic groups in this local government include Bolewa, Ngamawa, Karai karai,Fulani and other settlers. The major occupations of these ethnic groups are mostly farming, cattle rearing and trading in food items (N.P.C, 2006).