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CHALLENGES OF DRY SEASON FARMING AND SUGARCANE PRODUCTION IN DOMA NASARAWA STATE.

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ABSTRACT

Sugarcane (Saccharum officinarum L.) is a genus of tall perennial grasses (familily poaceae, tribe Andropogoneae) and native to warm temperate to tropical regions of the old world. Sugarcane has stout, jointed and fibrous stalks that are rich in sugar and can measure more than 3 meters tall. It has a very high potential for biomass production and has other advantages such as being perennial adaptable to most types of soil, resistant to most diseases and a guard against soil erosion. It is traditionally cultivated and processed for sugar; however, it can be envisaged as a multipurpose crop with a potentially important role in integrated industries, biofuel production, and electricity. Sugarcane production is predominantly carried-out by indigenous farmers in Doma LGA, Nasarawa State. Despite the large harvest and practicing of dry season farming and sugarcane production, the challenges of dry season farming and sugarcane production became laudable in study area. The study examined the current challenges and constraints of dry season farming and sugarcane production in Doma Local Government Area of Nasarawa State. Data for this study were generated through questionnaire, in depth assessment/interviews, direct and personal observation. The data generated from the questionnaires were subjected to descriptive and inferential analysis using frequencies, percentages, univariate and bivariate analysis. The study revealed that majority (60%) of the farmers have wide knowledge on sugarcane cultivation and during dry season farming. Majority (40%) acknowledged sugarcane production have challenges which include biological and technological constraint. Lack of soil improvement conditions, markets, and transportation were the major problems encountered by the dry season farmers and sugarcane farmers. As they express their experience it showed that this challenges reduces in the area. The paper therefore recommends that government's intervention in providing funds to the farmers to boost their dry season farming and sugarcane production. The funds can be in the form of loans, grant and

subsidies. It also recommended that government, NGOs and the farmers to provide new farming technologies in the area tractors, Giant Pumping Machines Standard boreholes and fertilizers should be provided to farmers at subsidized rate.

Keywords: *Challenges, Dry Season Farming, Famers, Sugarcane Production*

INTRODUCTION

Dry season faming innovation evolved as the Tigris River cut down into the bedrock, and the water for irrigating adjacent field had to be lifted. They also noted that as the Euphrates River flood its course. This provided a good sit for the cultivation of wheat and barley which in turn led to civilization of the region. Majority of small holder famers in most developing countries depend on rain-fed agriculture and cannot obtain sufficient water resources to participate in large scale production in the dry season this has led to shortages of important Local corps high market prices and lack of technology to grow them when the conditions are not favorable. Sugarcane (saccharum officinarum L.) is a genus of tall perennial grasses (family poaceae, tribe Andropogoneae) and native to warm temperate to tropical regions of the old world. Sugarcane has stout, jointed and fibrous stalks that are rich in sugar and can measure more than 3 meters tall (Bigman, 2001). It has a very high potential for biomass production and has other advantages such as being perennial adaptable to most types of soil, resistant to most diseases and a guard against soil erosion (Tew, 1980). It is traditionally cultivated and processed for sugar; however, it can be envisaged as a multipurpose crop with a potentially important role in integrated industries, biofuel production, and electricity.

Sugarcane is grown in over 200 countries of the world and in 2008; an estimated 1,740 MT of sugarcane was produced worldwide (FARA, 2008). The top producers of sugarcane, in order of production, on a worldwide basis are Brazil, India, China, Thailand, Pakistan & Mexico. The estimates of sugarcane production for 2008 also indicate more than doubling of outputs to 1525 Million tons from some 21.9 million hectares harvested sugarcane. Sugarcane refers to any of six 37 species (depending on which taxonomic System is used) of tall perennial grasses of the genus saccharum (family poaceae, tribe Andropogoneae). Native to the warm temperate to tropical regions. All sugarcane species interbreed, and the major commercial cultivars are complex hybrids sugar which belongs to the grass

family (Poaceae), an economically important seed plant family that includes maize, wheat, rice and sorghum and many forage crops.

In 2010 FAO estimate it was cultivated on about 23.8 million hectares, in more than 90 countries with a worldwide harvest of 1.69 billion tones. But in Doma Local Government Areas, Sugarcane is the fifth largest production or cultivation in the areas source. The world demand for sugarcane is a tropical perennial grass that forms lateral shoots at the base to produce multiple stems, typically three to four meters high and about five centimeters in diameter. The stems grow in cane stalk, which when mature constitutes approximately 75 of the entire plant.

Production of sugar cane requires good soil fertility and Soil improvement (Suheang, 2005, Forum for Agricultural Research in Africa (FARA), 2008; Selhorst and Veen, 2008). In Nigeria, a range of crops have proven to be ideal for dry season farming; these include sugarcane, pepper, rice, tomato, cucumber, okra, spinach, watermelon and beans/cowpea. These crops, not only demonstrate resilience, but also enjoy sustained demand throughout the year, rendering them highly profitable choices for dry season farming by navigating dry season difficulties is a very simple and well understanding approach that all farmers should be aware of. (Waleed Adelunji, 2023).
Dry season farming in Nigeria is not without its share of challenges, but with the right strategies and approaches, farmers can successfully surmount these obstacles and maintain high productivity. Adequate water management stands as a cornerstone of success in dry season farming. Furthermore, the preparation of the soil is paramount.

In addition to these practices, a judicious approach to fertilization is essential. Soil fertility forms the bedrock of dry season farming success, and farmers must employ organic compost and select appropriate (NPC) fertilizers based on soil analysis to maximize crop growth, farmers should be vigilant, implementing early intervention measures to protect crops from common dry season threats. Dry season farming in Nigeria represents a promising avenue for farmers to elevate their livelihood and play a pivotal role in ensuring the country's food security. As the nation seeks out strategies for sustainable development, embracing dry season farming stands as a meaningful and progressive step forward.

Despite the laudable government policies and the increase in sugarcane harvested in Nigeria, the annual sugarcane production and yield in 2018

was 1.42 million tonnes at a decreasing rate of 1.42 percent from 1.49 million tonnes produced in 2017, meanwhile the annual production of sugarcane in 2012 was1.09 million tonnes which had an upsurge rate of 44.06 tonnes (Knoem Atlas, 2018). In the first seven months of the year 2017 Nigeria spent $227 million (N88.53billion) on sugar importation, this makes Nigeria largest importer of sugar in sub-Sahara Africa (Nairametrics, 2016).

There is a growing understanding that a lot of challenges cause harm than good in sugarcane or agricultural development in Nigeria (Ogah and Ari, 2012). Further to this, there are challenges of deforestation and land degradation. Garba, (2006), noted of that one of the major cause of poverty is destruction of natural resources, lading to environmental degradation, high temperature and consequently reduced productivity. In addition, lack of access to loan or savings is another challenges farmer are faced with in the study area. The result of a study conducted by Centre for Environmental Economics and Policy in Africa across African countries showed that lack of access to credit or saving is one of the major problems encountered by farmers is effects to soil| of soil and climate. According to Ikpe, Sawa, Idoma, Ejeh and Mashubi (2016), lack of money is a major constraint to challenges by farmers.

Inconsistent agricultural policies: Anselm and Taofeeg (2009) stated that weak infrastructure and inconsistency in government policies have always been major Snags in the development of agriculture in Nigeria. Lack of education information and training is frequently a key limiting effects/factors/problems to smallholder development. The report of IFAD (2010) confirmed that the poor state of the countries education has also had its tell on the poor people, majority of who are farmers in rural areas. In addition, they are raced with limited social services and infrastructure. FAO (2008) reported that about 90 percent of Nigeria's food is produced by small scale farmers who cultivate small plot of land and depend on rainfalls rather than irrigation systems as a result of their low knowledge base, access to facilities and poor financing.

Ikpe, et al. (2016), noted that farmers in Sokoto State are faced with the problem of lack of current knowledge on ways as a challenge to method of strategies; lack of access to water for irrigation; lack of improved came and seeds; inadequate information on weather incidence, lack of access to credit facilities, pest and disease problem, polluted water, pilfering, high

cost of hired labor, Transportation and Marketing problem, inadequate inputs, lack of access to irrigated land (water) and high cost of equipment and insufficient financing.

Dry season farming and sugarcane production is an annual crop that depends on rainfall and irrigation. According to Gawander (2007), the amount and duration of precipitation, humidity, moisture content, temperature and soil condition has great impact on sugarcane production. Dry season farming and sugarcane production is an important agricultural activity in Northern Nigeria. According to Nasarawa State Agricultural Development Project (2015), sugarcane is produced and sold in many local government areas (LGAs) of the states. This shown that many employment opportunities are available within the sugarcane industry.

Dry season farmers in Doma has numerous issues surrounding dry season farming which are, inadequate irrigable land and water, high cost of irrigated equipment's, inadequate credit facility, pest and disease problem, polluted water, inadequate inputs, transportation, pilfering, marketing problem and high cost of higher labour. To accelerate self-sufficiency in food production and the country's Gross Domestic Product rate of growth to above average (50%), it is essential that small scale irrigation potential should be harnessed in Doma. This will guarantee agricultural production both wet and dry seasons, and has the potential to catalyze socio-economic transformation of rural masses and alleviation of poverty.

II. STUDY AREA

Study Area (Doma Local Government) has a total land area of 5640km.The population census of 1971 gave its population of about 50,000 and a population of 138,991 (NPC, 2006). The Local Government Area is made up of three districts are Doma, Rukubi and Agbashi. Doma districts cover a land of about 1204 km^2, and has an estimated population of about 138,991 people 2006 census. Doma Local Government Area is situated between Latitude 8.24°N and 8°5¹N and Longitude 6°E and 6°30¹E. The Local Government shares boundaries with Lafia the State Capital in the West and Nasarawa Eggon Local Government in the West. The location of the study areas observed on the geological map of Nigeria; clearly show that, the entire Local Government is a zone of cretaceous sediments (sedimentary Basin) that had been deposited during marine transgression in about 130 million years ago. The commonest minerals found within the study area Galena. Limestone clay, chloride, Sepheterite

sodium and Barite. The relief of the area is generally characterized by low land area. The low land area is about 100 – 200 meters above the sea level, although exists a kind of spatial variation in the surface area. This kind relief form bears much greatly influence on the drainage pattern of the study areas. The study area is characterized by streams and rivers. This river and stream dried off their water during the dry season and while the wet season, the swell off their water or increase their volume of water content. This in turn have a negative impact of economic base of the people in a study area such as fishing and irrigation activities. The rest of the areas is marked by dense vegetable cover. The area has a mean annual rainfall of about 200mm to 300mm and higher temperature exceeding 70°c with relatively high humidity throughout the year justified that the area has in the southern Guinea savannah. Geology, the location of the study area observed on the geological map of Nigeria, clearly show that, the entire Local Government is a zone of cretaceous sediments (Sediment Basin) that had been deposited during the marine transgression in about 130 million years ago. The commonest minerals found within the study area Galena, Limestone Clay, Chloride, Sepheterite, Sodium and Barite. The soils of the study areas are basically tropical ferruginous soil that is slightly acidic reddish brown is Colour sand clay loam texture. Wikipedia (2024).

Doma Local Government Council.

Figure 1: Map of Nigeria Showing Nasarawa State

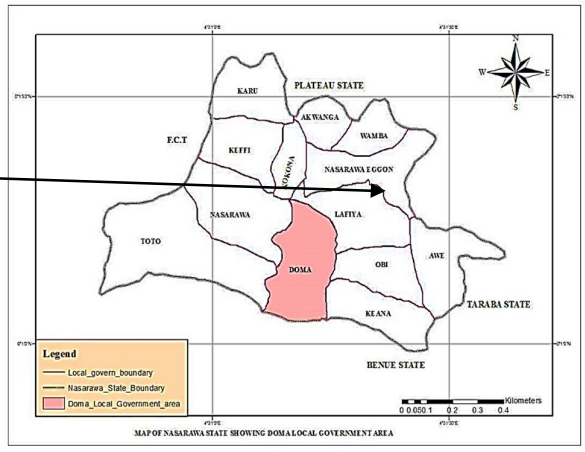

Figure 2: Nasarawa State Showing Doma Local Government Survey Department Area Source: Lands Doma L.G.A

OBJECTIVES OF STUDY

The general objective of this study is to identify the challenges and constraints of dry season farming and sugarcane production in Doma Local Government Area of Nasarawa State. The specific objectives of the study are to:

i. Describe the socio-economic characteristics of dry season farming and sugarcane production in the study area;
ii. To identify the challenges and constraints of dry season farming and sugarcane production.
iii. Examine the institutional support for sugarcane

LITERATURE REVIEW

The trend of industrial sugar consumption in 2018 shows that soft-drinks sub-sector is the leading consumer of industrial sugar in Nigeria using 344,417 metric tonnes which represent about 33% of total sugar consumption by industries. Food and Beverages sector followed with a consumption figure of 273,749 metric tonnes representing about 26% of total sugar consumed by industries (NSDC, 2018). As reported from the survey carried out by the National Sugar Development Council (NSDC) in 2018, bakery and Confectionery came third with a consumption figure of 202 million metric tonnes while Pharmaceutical sub-sectors accounted for 195,262 metric tonnes representing 19% and 18% of total industrial sugar consumption respectively. The least industrial consumer was the Dairy sub-sector which had a consumption figure of 41,890 metric tonnes representing just 4% of total industrial sugar consumption in 2018 (NSDC, 2018).

Nigeria imported over 750,000 thousand metric tonnes of raw sugar worth of ₦120 billion in 2018 (This Day, 2018) furthermore, the stated policy of the government is to move Nigeria quickly from dependence on import to at least 70% self-sufficiency in domestic sugar production (NSDC, 2018).
Sugarcane is production is predominantly carried-out by indigenous farmers in Doma LGA, Nasarawa State. Sugarcane is harvested by hand and mechanically. Hand harvesting the field is first set on fire. Harvesters then cut the cane just above ground level using cane knives or machetes. A skilled harvester can cut 500 kilograms (1,1001b) of sugarcane per hour.
Sugarcane served as food and in most countries including Nigeria and Doma particularly, sugarcane is cultivated, there are several foods and popular dishes derived directly from it, such as, raw sugarcane: Sugarcane

juice: a combination of fresh juice, extracted by hand or small mills, with a touch of lemon and ice to make a popular drink, known variously in Doma localities as usacharass, guarapa, guarab. Doma area is blessed with fertile and with number rivers which favor's crop farming including sugarcane. In Doma market day, many merchants of sugarcane do come and transport it to other parts of the country and even beyond the Nigerian boarders. Estimate land area cultivated for sugarcane production was about 3500 hectares yielding about 40-50 tie (bundles) (about 75000-100,000) of sugarcane per hectare (NASDA, 2016).

METHODOLOGY

A research design was employed to collect data from the study area. The data were of two categories; primary data from questionnaire administration and secondary data from already published works, this research work was conducted in Doma Local Government Area of Nasarawa State, Nigeria.

Sampling Procedure

Information were derived directly from field physical observation, use of questionnaire administration, oral/verbal. Purposeful sampling technique was used to determine the respondents for the study. Households heads above twenty years that were willing and concerned to make relevant contributions to the study regarding the challenges in the study are were purposively selected and one hundred and twenty (120) respondents were selected and administered questionnaire from (6) sugarcane farming villages in the study area Igbabo, Doma town, Dogon Kurmi, Idadu, Alagye and Ohina. Only villages that were easily accessible were randomly selected. The one hundred and twenty questionnaire were shared proportional to the population of each village but due to the non-availability of population figures for each village from the 2006 census results the questionnaire were distributed equally among the six (6) village. Twenty (20) questionnaire were administered in each of the sugarcane farming communities out of the 120 copies of the questionnaire administered in the field, copies were retrieved and analyzed. The data were analyzed and presented using tables, percentages and charts.

Sugarcane farmers in Doma Local Government Area of Nasarawa constitute the population of this study. For this study, multi-stage sampling technique was employed. In the first stage, Doma Town, Dogon Kurmi, Idadu, Alagye, and Ohina Villages were purposively selected due to their

prominence in dry season farming and sugarcane production in the Local Government Area (LBRDA, 2015).

Data Analysis

Descriptive statistics, which include percentage and frequency were used to analyze objectives i, iii and iv, while Net Farm Income (NFI) was also used to determine the objective ii.

The formula of NFI is expressed thus:

NFI = TR – TC ..... (1)

TR = GFI = TVP = TPP.Px .....(2)

TC = TVC + TFC .....(3)

GM = GFI – TVC ..... (4)

GFI = TVP = TPP.Px ..... (5)

Where:

NFI = Net Farm Income (₦) TR = Total Revenue (₦/ha)

GFI = Gross Farm Income (₦/ha)

TVP = Total Value of Production (₦/ha)

TPP = Total Physical Product (Kg/ha) and

Px = Unit market price of the product (₦/kg)

TC = Total Costs (₦)

TFC = Total Fixed Cost (₦)

TVC = Total Variable Cost (₦/ha)

GM = Gross Margin (₦/ha)

RESULTS AND DISCUSSIONS

Data collected from respondents and verbal interview information are presented in the following Tables.

Table 1: Personal Data of the Respondents.

Parameters	Options	No. of Respondents	Percentage (%)
Age (Years)	16-30	32	26.7
	31-45	68	56.6
	Above 45	20	16.7
		120	**100**
Gender	Male	96	76
	Female	24	24
		120	**100**
Level of	Non - Formal Education	48	40

Education	Primary Education	22	
18.4			
	Post Primary	18	15
	Post-Secondary	16	
13.3			
	Quran	7	
8.8			
	Others	9	
7.5			
		120	
100			
Farming 0-9	19	15.8	
Experience	10-19	30	25
	20-29	50	
41.7			
	30-31	13	
10.8			
	Above 40	8	
6.7			
		120	
100			
Farm Size	1-2	14	
11.6			
(Hectares)	2-3	22	
18.3			
	3-4	36	30
Above 4	48	40	
		120	
100			

Source: Field Work 2024

Table 1: showed that majority of the respondents (76%) falls between the age of (31) years and above, this is an indication that the respondents were quite qualified to give information about the changes that is occurring in their environment. 76% of the sampled farmers were males while 24% were females. The results also showed that majority of the respondents (40%) did not attend formal education; this is followed by those that obtained only SSCE Certificate or Grade II (18.4%) while (13.3%) of the respondents are first degree holder. The observation on household size, age and years of experience are similar though slightly varying to the finding of Kadin et al. (2014) study that reported a mean age of farmers.

Table 2: Method Used in Dry Season Farming and Sugarcane Production.

Method Used	Frequency	Percentages (%)
Dickel Operated	60	50
Pump Machine	-	-
Channel	20	16.7
Shadow	14	11.7
Bucket Watering	26	21.6
Sprinkler	-	-
	120	**100**

Source: Field Work 2024

The result of finding in Table 2 shows that basically sugarcane production in the study area is derived from human labour and subsistence in nature. Mechanization in production is practically absent, thus outputs are expected to be low compared to nations such as Thailand, China and other advanced countries that uses machines from cultivation to harvesting.
According to Iizumi and Ramankutty (2015) the agronomic technology available to farmers can influence how climate affects production such that for instance, direct seeding which is more time and labour saving planting methods than trans-planting can be used to compensate for climate related delayed planting.

Table 3: Sources of Water for Irrigation

Sources	No. of Respondent	Percentages (%)
Streams	72	60
Pound	48	40
Dam	-	-
	120	**100**

Sources: Field Work 2024

Table 3 shows that, 60% of the respondents' uses water from streams for Dry season farming and sugarcane production, 48% use pond since majority of the respondent use stream and 40% used for dry season farming and sugarcane production. It means that dam is not effective as such it needed government attention in order to make it effective for dry season farming though the construction of Dam give rise to some streams which are used for dry season farming in the area.

Table 4: Cultivation Commencement and Instruments used for dry season farming and sugarcane production.

Month	No. of Respondent	Percentages (%)
Oct/Nov	38	31.6
Nov/Dec	40	33.4
Dec/Jan	26	21.6
Jan/Feb	16	13.4
	120	**100**
Instrument	**No. of Respondent**	**Percentages (%)**
Hoe	84	73.4
Animal	-	-
Tractor	36	26.6
	120	**100**

Sources: Field Work 2024

The results in Table 4 showed that farmer's month of commencement of cultivation varies depending on the time harvest of previous year production. But in general, cultivation next year harvest mostly starts in early October and ends the next year in late February. Secondly, majority of the farmers (73.4%) uses local Hoes for cultivation and only a few privileged individual farmers employ tractors to cultivate their farmlands.

Table 5: Income level per Annum of dry season farming and sugarcane production farmers and Reasons for adapting dry season farming and Sugarcane production.

Income Level (%)	No. of Respondent	Percentages
0 - ₦200,000	14	11.67
₦200,000-₦ 400,000	20	16.67
₦ 400,000-₦ 600,000	22	18.33
₦ 600,000-₦ 800,000	28	23.33
₦ 800,000 and Above	46	38.33
	120	**100**

Source: Field Work 2024

Table 5: show income level of respondents, 11.6% have income below 200.000 per annum, 16.6% between ₦ 400,000 ₦ 550.000, 23.4% ₦ 550,000 and 30% are for those ₦ 650.000. This shows that most respondents earn income and the differences in the level of income is attributed to the bumper harvest most especially the vegetable crops in the study area.

Univariate Analysis of Variance Income from Sugarcane Sales

The result of analysis on variation in income distribution among respondents are presented in table 6.

Table 6: Univariate Analysis of Variance Income from Sugarcane Sales

Tests of Between-Subjects Effects

Dependent Variable: responses

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.000[a]	0	.	.	.
Intercept	1484.033	1	1484.033	717.983	.000
Error	245.967	119	2.067		
Total	1730.000	120			
Corrected Total	245.967	119			

a. R Squared = .000 (Adjusted R Squared = .000)

❖ **Challenges Faced By Dry Season Farmers And Sugarcane Producers**

Distribution of respondents according to challenges faced is presented table 6.

Table 7: Challenges faced by dry season farmers and sugarcane producers in the study area.

Credit Facility		
No. Access to Credit	32	13.3
Accessed Credit	88	86.7
Access to extension service		
Yes	52	35.6
No	68	64.6

Table 8: Respondents perception on Cost of Production

Cost of Production		
Moderate	28	18.9
High	55	50.0
Very High	32	31.1
Very Poor	15	4.3
Poor	20	21.3
Good	65	70.0
Very Good	15	4.3

Univariate Analysis of Variance

Tests of Between-Subjects Effects

Dependent Variable: response

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.000[a]	0	.	.	.
Intercept	967.740	1	967.740	623.511	.000
Error	231.260	149	1.552		
Total	1199.000	150			
Corrected Total	231.260	149			

a. R Squared = .000 (Adjusted R Squared = .000)

Other Challenges				
Pest and Diseases	32		24.4	
Flooding	34		37.8	
Lacks of funds		86		95.6
Inadequate farms Size		13		14.4

Source: Field Work 2024

The result presented in table 6 indicate that labour share of the farmers had access to credit facilities. This is contrary to the literature that dry season farmers and sugarcane producer in Nigeria often face limited access to credit facilities and which is partly responsible for their low productivity (Mgbenka & Mbain, 2016). As noted in Balana and Oyeyemi (2022), the

magnitude of the impact of credit on agricultural investment. As noted in Osabuoheen et al. (2018), technological advancement in the production and harvesting stages helps to promote commercialization and profitability of sugarcane production of sugarcane production. More so pest and Diseases, flooding, bad road network, lack of funds, and inadequate farm size were identified as challenges faced by dry season farmers and sugarcane producers in Doma LGA of Nasarawa State, Nigeria.

DISCUSSION OF FINDINGS.

The study has evaluated the dry Season Farmers and Sugarcane producers, and challenges in Doma L.G.A. The study has achieved to a large extent the objective of the study which is find out the level of knowledge acquired and the challenges the farmers faced in farming and cultivating sugarcane in the study area. The study revealed that 60% of the farmers have perceived or wide gained knowledge, positively on sugarcane growth and during dry season farming, although temperature increase has led to the prevalence of weeds, diseases, and insect pests of sugarcane; increase in rainfall amount in recent years has resulted to devastating floods which usually destroyed most of the sugarcane farms and sometimes washed away the entire farmlands along the flood plains; water stress is experienced during dry season.

CONCLUSION

From the study carried - out, the card and written interview conducted, some of the respondents indicate that problems facing the dry season farming and sugarcane production include biological and technological constraints. Lack of soil improvement conditions, markets, and transportation were the major problems encountered by the dry season farmers and sugarcane farmers in the study area.

RECOMMENDATIONS

Below are the recommendations made after findings that;

1. There is need for government's intervention in providing funds to the farmers to boost their dry season farming and sugarcane production. The funds can be in the form of loans, grants, subsidies.
2. There is need for government NGOs and the farmers to provide new farming technologies in the area. Tractors, Giant Pumping Machines Standardized boreholes and fertilizers should be provided to farmers at subsidized rate.

3. Government policies should therefore ensure that farmers have access to improved seed varieties chemical fertilizer, water for irritation and affordable credit as these increases the resilience of farmers to other dangers of factors.

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