

## **The Effect of Rainfall Variability in The Production of Rice and Guinea Corn Around Katcha in Niger State**

**Mohammed Ahmed Emigilati**  
**Department of Geography**  
**Federal University of Technology, Minna**

### **Abstract**

This research work attempts to verify the effects of rainfall variability on peasant farmers in production of rice and guinea corn, in Katcha and its environs. The results obtained showed that rainfall variability has no much influence on fluctuation of rice and guinea corn, but the attitude of farmers to other climatic factors, and agricultural inputs like soil type, seed variety, chemicals and meteorological and agriculture extension officers advice in farming operations. This was proved through series of tables based on above assertion that few of these farmers were exposed to agriculture education programmes. In turn causes down fall to quantity of rice and guinea corn production.

### **Introduction**

Deficiency in soil moisture is a feature of rainfall variability. Although according to (Prof. Adefolalu, 1986) and (Mohammed 2002) plants respond to moisture requirements and even drought situation has shown that sometimes, the amount of recorded rainfall is quiet irrelevant because years with perhaps normal or abnormal total annual rainfall, are characterised by delayed onset or premature cessation (O-C) or both (O C) of the raining season is sometimes worse for plants than the one with definite shortfall in total amount. The aim of this research work is to study fluctuation in the production of cereal crops like rice and guinea corn in Katcha and its environs.

The objective within this broad aim is to determine how rainfall variability influences rice and guinea corn production in the study area and offer suggestions for improvement.

### **The Study Area:**

The area of the research is a farming community in Niger State. The farmers of the area have been contributing immensely towards self-sufficiency in food production in Niger State and Nigeria at large. It is believed that the type of the investigation pursued in this study is a justification to highlight the degree of the contribution of these farmers as well as degree of problems in the study area particularly that associated to rainfall variability. This study is limited to the effects of rainfall variability on peasant farmers in Katcha and its environs.

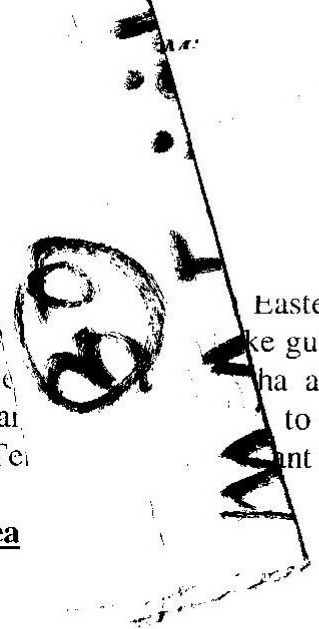
Its study is concerned with both fadama and upland cereal crops like guinea corn and rice. It covered the duration of ten years farming experience in the study area. Furthermore, because it is difficult to release data by government agencies, that is why we relied great deal on responses generated from my questionnaire rather than much depend on government agencies. But in case of climatic data, places like Airport Minna, Agricultural Development Project (ADP) Minna and National Cereal Research (NCR) Badeggi are used for collecting cereal crops and climatic data for reliability.

*Emigilati*

**Description of Study Area**

The area of study is located in the western part of these communities. This marshy area is used for agriculture and is navigable year round. The eastern part of these communities are mostly upland areas, used for growing guinea corn, millet and so on. It is a grassland area. These communities have two distinctive seasons, wet season starts in November to March and April. The temperature ranges from a minimum of 27°C to a maximum of 31°C.

**Fig.1 Location map of Study Area**



located between 5°E and 6°30'E. The area is mostly upland areas. This marshy area is used for agriculture and is navigable year round. The eastern part of these communities are mostly upland areas, used for growing guinea corn, millet and so on. It is a grassland area. These communities have two distinctive seasons, wet season starts in November to March and April. The temperature ranges from a minimum of 27°C to a maximum of 31°C.

**Description of Data Collection Method Used:**

This paper made use of data from library as secondary, other studies notes, field questionnaires and statistical analysis. Data on climate was derived from (1996 – 2005) records, NCI Badeggi, Airport Minna. In the area of data analysis, this research work made use of Simple mean and Percentages. Statistical analysis was employed with simple mean and percentage. Questionnaires were used for the collection of various respondents. The interviews were conducted with farmers and this included groundnuts and other farm products. This was based on simple random sampling techniques. Five towns to be used, Edotsu, Baro, Shabawoshi, Bakeko and Loguma in all Katcha local government area.

This researcher personally visited farmers and their farmland, estimated their farmland and record of production in both guinea corn and rice, and few other crops. The issue of using variability of rainfall for past ten years experience 1996 – 2005.

**Analysis and Discussion of Results:**

The statistical tables were to explain various information gathered and this includes, rainfall, fluctuation of guinea corn and rice, cessation, onset, planting period, period, migration, unemployment, marketing fluctuation, land degradation, total effects on farmers, socio-economic life. The following data analysis is based on the information extracted from the questions administered in five villages randomly selected. These five villages and towns are Edotsu, Bakeko, Baro, Shabawoshi and Loguma. The information received from individuals included occupation, period of planting rice and guinea corn, application of chemical, harvesting period, cessation, onset, period of first rain, types of crops grown, government inputs, cooperative works, land tenure system, migration level, emigration, drought, flood, extension works (e.g prices of food stuff like rice and guinea corn (1996 – 2005)), high yield years and low yield years.

**Discussion of Results**

Therefore, the tilling of land commences with first rain. As such any delay of first rain therefore affects the tilling and subsequent farming activities either in drought or not. The delay caused in planting is mostly critical, hence because in an abnormal distribution affects the yields and size of farm lands to be cultivated by individual farmers as it limits the length of farming period.

**Temporary rainfall variation in the study area.**

For example in the past (Jackson 1977) believes that any variations in rainfall for about 30% is still normal for the tropical wet and dry climate. The average duration of 6-month wet months at study area means that length between 5 and 7 months, wet period fairly for every plants. Any variation in the amount and duration of rainfall, according to Olafin (1981) results in three rainfall regions as follows:

- (1) The wet regime, when amount of rainfall is longer than normal, the duration is longer and the rainfall pattern is steady.
- (2) There is moderate regimes when the amount and duration of rainfall are approximately the same as the mean value and the rainfall pattern is fairly steady over the area.
- (3) When the dry regime accounted, is that either the amount and duration of rainfall is less than the mean value with erratic rainfall pattern or both the amount and period of rainfall are less than mean value.

However hundred questions was established to five villages within these local governments to give precisely information on rainfall variability effects on peasant farmers. The following are returned questionnaires as shown in tables 1 - 12. Tables justifying the discussion on Loguma, Bakeko, Edotsu, Baro and Shabawoshi.

**Table 1: Crops grown most in the study area.**

	BK	BR	SH	ED	LG	TOTAL	%
C/Corn	4	4	5	2	4	19	19
Rice	5	6	8	8	8	35	35
C/Nut	6	8	8	8	4	34	34
Supercane	3	3	3	3	9	21	21

Source: Field work 18/3/2006

Table 1 – explains the crops grown most in the study area is that about 10% grows guinea corn most among the crops, while about 35% grows rice yearly for both cash and food needs. About 34% grows groundnuts, and 21% concentrated on sugar cane. Owing to accession few concentration on rice and guinea, rather the other crops.

**Table 2: Ways to improve rice and guinea corn production**

	BK	BR	SH	ED	LG	TOTAL	%
Fertilizer	00	01	04	2	10	17	17
Seed variety	4	4	4	4	4	20	20
Chemical	2	1	1	1	1	6	6
Farm increase size	15	10	8	7	7	47	47

Source – Field work 2006.

Table 2- – reveals that way to improve rice and guinea corn, about only 27% were aware of use of fertilizer up to date. And 20% concentrated on seeds variety, while only 6% percent applied chemicals for insecticides and weeds control. And 47% percent yearly increases their farm land for the purposes of increase yields. This proved that they depend on farm sizes than intensive production.

**Table 3: Use of First Rainfall Planting Period of the Year**

	BK	BR	SH	ED	LG	TOTAL	%
April	4	0	3	3	0	10	10
May	4	0	3	4	13	24	24
June	3	12	3	0	21	38	38
Jan to Mar	1	3	3	1	-	9	9

Source – Field work.

Table 3 - reveals that only first rain for planting guinea corn/rice, on either April or May. While about 24% plant reasonable crops by May, for about 38% plant most of their crops by June, only 9% their community make use of any drop on January. Therefore January is regarded as free planting period. This is due to absence of irrigation system, only due to some occasions.

**Table 4: Crops Planting by onset Rain.**

	BK	BR	SH	ED	LG	TOTAL	%
G/Corn	8	4	4	4	3	23	23
Rice	4	8	3	3	9	27	27
G/Nut	4	0	0	0	0	0	0
Melon	4	8	8	4	13	11	48

Source – Field work.

Table 4 - reveals that only 25% concentration on guinea corn planting by onset rain. And 27% participated on rice cultivation by onset rain yearly. About 0% cultivated guinea corn while 48% declared interest on melon for the onset rain. In this regard melon is most offered interest during first rain. In return drop down the quantity of rice and guinea corn.

**Table 5: Years Rice and Guinea corn Failed Through Disaster and Drought & Flood.**

Year	BK	BR	SH	ED	LG	TOTAL	%
1996	4	4	4	4	4	20	20
1997	1	1	2	1	1	6	6
1998	4	3	4	2	4	15	15
1999	4	5	2	1	8	20	20
2000	2	4	2	4	5	17	17
2001	3	3	3	3	4	16	16
2002	2	3	1	2	3	11	11
2003	1	4	2	1	4	12	12
2004	2	4	2	3	4	15	15
2005	2	3	2	3	3	13	13

Source – Field work.

Table 5 - reveals that 1996 about 20% of community experienced disaster one way or other 1997 about 6% revealed, 1998 15%, 1999, 20% disaster through flood rain shortage to rice and guinea corn.

By the year 2000 in this communities about 17% were affected, while 16%, 2002 11% and 2003, 12% declared disaster group. 2004 and 2005 about 15% and 13% low yield as a result of disaster either in form of flood or fire from adjacent land. See the graph for level of disaster from (1996 – 2005) in the study area.

**Table 6: System of Farming.**

System	BK	BR	SH	ED	LG	TOTAL	%
Modern method	3	5	5	5	10	14	44
Traditional method	18	18	10	14	6	66	66

Source – Field work 2006.

Table 6 - System of farming in the communities (modern and traditional methods). It reveals that 44% of community depends on modern farming technique, use of tractors and chemical and application of fertilizers and crops rotations exercise.

About 66% of them depends on old system of farming, using local tools and organic manure. This in turn explains that low yield can also be attributed to attitude of these on farming activities, which is most rudimentary and local with weak means of cultivation.

**Table 7: Government inputs**

Govt. effort	BK	BR	SH	ED	LG	TOTAL	%
Extension officers	-	-	-	2	1	3	3
Capital	-	-	-	2	2	4	4
Chemical & Seed	2	1	1	2	1	7	7
Cooperative farming	1	1	1	-	1	4	4

Source – Field work.

Table 7: Government inputs - as on extension officer, fertilizers, chemicals, seeds and cooperative farming system this table 7 reveals that 3% of these communities use extension Agricultural Officer's advice in farming operations. About 4% enjoyed Agricultural Loan, while about 7% enjoyed application of chemicals such as weeds control, insecticide etc.

While 4% participated on cooperative farming to date. In this regards, low concentration of government inputs and an awareness on application of chemical in different form, low cooperative activities has great effect on production of guinea corn and rice, not only on rainfall variability as single form to check up.

**Table 8: Price Control on Cash & Food Crops.**

	BK	BR	SH	ED	LG	TOTAL	%
Rice	-	-	-	-	-	0	0
G/Corn	-	-	-	-	-	0	0
Cotton	1	2	1	2	1	7	7
G/Nut	2	1	2	3	2	10	10
Sugar cane	-	-	-	-	-	-	0

Source - Field work 2006

Table 8 - Price control on cash and food crops - it reveals that 0% agreed that no price control on local rice, guinea corn, while on about 7% said yes for cotton price control. And about 10% agreed that there is control price on guinea corn by middle in market days. And no price control on bottle of sugar cane in every market throughout the community.

**Table 9: Estimation of Migration and Emigrants 1996 - 2005 in these 5 villages.**

	BK	BR	SH	ED	LG	TOTAL	%
Migration	4	2	4	3	4	17	17
Emigrants	1	1	1	2	2	7	7
Land disputes	4	5	6	4	4	23	23

Source - Field work 2006.

Table 9 - reveals that as at 1996 - 2005, the total migration from their village to urban centers accounts for about 17%.

While about 7% inflow of people to these communities. And experienced land dispute for about 23% within 1996 - 2005. In response to above assertion, it is clear that that other attributes accounts for yearly rice and guinea corn fluctuation in these communities rather than rainfall variability.

**Table 10: Land Tenure System**

Land ownership system	BK	BR	SH	ED	LG	TOTAL	%
Hire	4	3	4	4	4	19	19
Purchase	-	-	-	-	-	0	0
Lease	3	4	3	2	3	15	15
None of the above	-	-	-	-	-	0	0

Source - Field work 2006.

Table 10 - Land system in these communities. Table 10 explains that hiring of land accounts for 19% while land purchase accounts for (0%) and lease accounts for about 15%. No attention for "none of above" recorded 0%.

Researcher made use of this returned results to declare low yield is not only applicable to rainfall variability but more of land tenure system.

**Table 11: Rainfall Dependents on Rice and Guinea corn Production or other means**

	BK	BR	SH	ED	LG	TOTAL	%
Irrigation	-	2	-	-	4	6	6
Rainfall	8	8	16	14	8	54	54
Through canal	8	8	8	9	7	40	40

Source - Field work 2006.

Table 11 - reveals that only about 6% farmer in these local governments made use of irrigation to produce rice and other crops. While about 54% depends on rainfall period for planting any type of crops, particularly rice and guinea corn. And about 40% depends on drawing water from stream and river to fadama rice farm during raining season. They depend on nearby flowing river to water rice farms. In respect of guinea corn depends on natural rain, in middle season planting.

**Table 12: Effects of Rainfall Variability on Quantity Production**

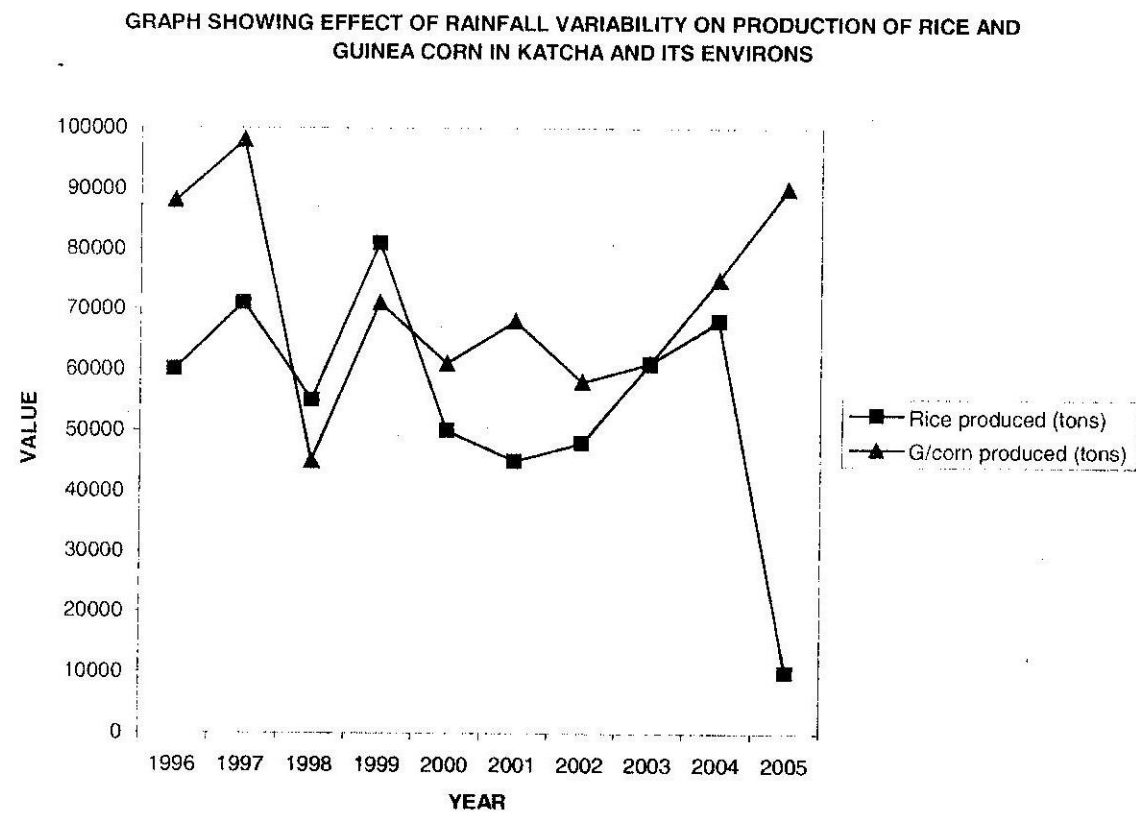
Govt. effort	BK	BR	SH	ED	LG	TOTAL	%
G/Corn	4	6	3	1	2	16	16
Rice	2	3	4	2	5	16	16
Farmer's interest	4	4	5	1	3	17	17
Political influence (politics)	16	16	14	4	1	39	51

Source - Field work 2006.

Table 12 reveals that about 17% percent always experience shortfall on guinea corn production, while about 16% declared short falls during interview through responses. And

17% deteriorated mind on rice/guinea corn production instead prefer other crops like sugar cane and g/nuts that demand short term moisture and not necessary water lodge.

In addition, about 51% were influenced by politicians and made this producers useless, in time of rice and g/corn farm activities. The researcher put his argument that politics and few reasons cause rural-urban migration.



GRAPH SHOWING EFFECT OF RAINFALL VARIABILITY AND DISASTER (FLOOD AND FIRE OUTBREAK) ON PRODUCTION OF RICE AND GUINEA CORN IN KATCHA AND ITS ENVIRONS

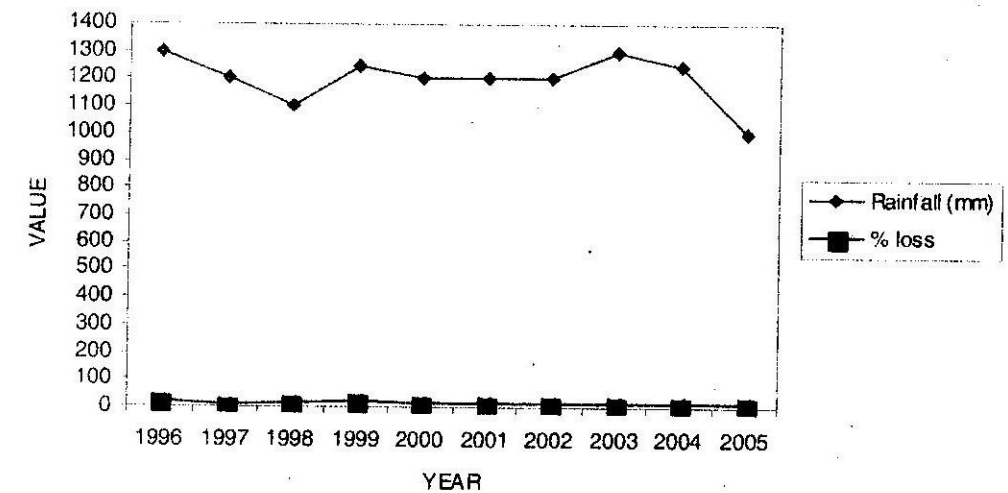


Fig. 1 The Graph showing disaster and value of rainfall characteristics.

This graph reveals that some years with high rainfall yielded little quantity of cereal crops, while years with low rainfall sometimes yielded high production. For example, 1997 with moderate rainfall variation, with almost highest rice production and fairly good result in guinea corn. In addition 1998 with over 1200mm of rainfall, yielded low production. In above assertion, production could not be determined by value of rainfall, rather other attributes influenced the production. In totality rainfall variation is not what determines fluctuation of guinea corn and rice, but many other factors influence.

Fig. 2 The graph showing effects of rainfall variability on production of rice and guinea corn in Katcha and its environs.

So also, disaster played high role in fluctuation of rice and guinea corn production. See Fig. 2 year 2000 and 2005. Therefore other attributes - disaster like flood, careless use of chemical, land dispute, seeds variety, crop market price and government inputs like capital and agricultural education programme are major factors that influenced fluctuation of these two cereal crops in the study area.

### Conclusion

In this large community like Katcha and its environs, that is widely settled in rural area, farming activities must be fully encouraged, because this place is a food basket for the nation.

Rainfall variability which people of the past took as major cause for deterioration of crop production, like guinea corn, rice is not much true from lesson learnt by this research.

Although there are some silent factors, like use of chemical, tractors, land use, and attitude of government specialists in Agriculture.

To some extent most of the farmers felt weak for production of guinea corn and rice. Because one way or other, politicians drew attention of able farmers to urban centers through 'money – bag' associations. In this respect, this area with soil fertility, human labour, and good climatic factors for agriculture must be encouraged through all possible means.

**Recommendations**

- The government should provide the farmers with tools, chemicals and seeds varieties.
- Extension officers for proper education on areas of getting moisture to farms such as irrigation, rather than depend on rainfall.
- Strictly to obey meteorological advices on climatic data.
- The government should provide incentives like capitals (loans to farmers) good storage facilities.
- There should be proper conservation of soil through erosion control approach by planting trees.

**References:**

Adefolalu D.O.(1990) precipitation effectiveness and predictability for sustainable.

Ayoade (1998) introduction of climatology for tropics John Wiley. New York pp 123-225.

Olofin E.A. (1984) climate constraints to water resources development in sedan sahalian one of Nigeria. Paper preserved at international seminar on the quality of the environments of Hausa land, Sokoto.