

Comparative Study of Economic Benefits of Rain-Fed and Dry Season Farming: Implications for Agricultural Extension in Benue State

Ivande, P.D., Obademi, A.O & Ugboji, A.U.
University of Agriculture, Makurdi
Benue State, Nigeria

Abstract

The study was a comparative study of economic benefits of rain-fed and dry season farming among rural households. Specifically it identified types of crops cultivated during rain-fed and dry seasons, assessed profit derived from the sale produce at each farming season and other preferred benefits; factors that militating against the practice of dry season farming and identified strategies for improved dry season farming. It was carried out in Makurdi Local Government Area of Benue State with a population of 3379 farm families. A random sample of 350 respondents was selected. Questionnaire was used for data collection. Data were analyzed using mean and standard deviation. Results show different crops cultivated during rain-fed season. Rice was rated as highest cultivated crop ($X=3.79$). Vegetables were mostly cultivated during dry season with pumpkin rated as the highest cultivated crop ($X=3.81$). Dry season farming was more profitable than rain-fed farming. Poor storage facilities was rated as major factor militating against dry season farming, ($X=3.5$). Provision of water pump generators was suggested by the respondents as the major strategy to improve the practice of dry season farming in the area. It was concluded that dry season farming has more economic benefits to the farmers than rain fed farming.

Keywords: Benefits, Rain-fed, Dry season, farming, Agriculture, Rural households

Introduction

Farming as a series of organized processes carried out by man on his natural environment, particularly affecting the soil and vegetation, for the purpose of systematically producing foodstuffs for sustenance and raw materials such as fibres. Rain-fed farming can be defined as cultivation of crops or farming in the period of the year during which rainfall distribution characteristics are suitable for

crop germination, establishment, and full development. It is farming in the period of the year categorized as the rainy or wet season, the length of which varies spatially or temporary, and with different types (Odekunle, 2004).

Farming involves to crop production during a dry season, utilizing the residual moisture in the soil from the rainy season, usually in a region that receives 20" or more of annual rainfall (Runsten, 2013).

Dry season farming does not yield maximally; rather it provides supplements of nature to dictate the true sustainability of agricultural production in the dry season. The seasonality results in food insecurity since food production becomes a challenge during the dry season. This is so due to the fact that farmers are apprehensive of the high risk involved in large scale crop production in the dry season, for reasons of lack of water to nourish the crops, tediousness of dry season farming operations, among others. Rather than venture into large scale crop production, farmers resort into growing crops of low significance as a way of avoiding risks. However, irrigated agriculture has been found to be an important contribution to the expansion of natural and world food supplies since 1960 and is expected not only to play a major role in feeding the growing world population. (Food and Agricultural Organisation FAO, 2010). It can now be used as an alternative to rain-fed agriculture during the dry season farming period (Ibekwe and Adosope 2010). Irrigation involves artificial supply and systematic dividing of water for agriculture and horticulture in order to obtain higher or qualitatively better production.

Federal Government of Nigeria (FGN) support better water management for dry season farming through irrigation. To this, FGN (2004) put in place plans to address climate change, a notable major constraint to increased agricultural production. It has been observed that recently persisted droughts, flooding, off-season rains and dry spells have disrupted crop growing seasons in many Nigerians agro-ecological zones, requiring the diversification of

income sources, other than rain fed-farming which results in low productivity, low income, perpetual poverty and malnutrition.

Apart from that, the need for all year round improved food production anywhere is inevitable (world bank 1996); and this cannot be left to be determined by rain-fed farming which is dictated by climatic conditions. Food and agricultural organization (FAO, 2000) identified Nigeria as having potential comparative advantage in the production of a variety of fresh and processed high valued crops during the rain-fed and dry season farming. It is in view of this that the comparative study of economic benefits of rain-feed and dry season farming is conceived. Both rain-fed and dry season agriculture provides economic benefits.

Economic benefits in the context of this study are benefits that can be quantified in terms of money generated, such as net income and revenues generated from the production of crops. It can be measured and used in farm business decisions and market analyses and consumption rate. The crops are also sold for production of other products useful to people of the state.

Despite the fact that rain-fed farming is known to be the traditional practice of Benue farmers, yet it has an inability to supply food all year round especially vegetables. Dry farming gives higher yield than rain-fed farming. This is because the farmer gives the crop what it requires; been it water, fertilizer and other necessary maintenance. Dry season farming that ensures high yield and can be supplemented with the dry season farming which has been neglected by so many farmers by farmers in Benue state.

Farmers only depend on rain-fed farming. It is against this background that the study intends to examine the economic benefits of rain-fed and dry season farming among Benue farmers.

Purpose of the Study

The general purpose of this study was to compare the economic benefits of rain-fed and dry season farming in Benue state-Nigeria. Specifically the study:

1. identified types of crops cultivated during the rain-fed and dry season
2. determined the profitability (expressed in Naira) of produce of rain-fed and dry season farming
3. determined other preferred benefits of rain fed and dry-season farming
4. identified factors that militate against the practice of dry-season farming
5. determined strategies to improve dry - season farming

Research Questions

The study sought answers to the following questions:

1. What are the types of crops cultivated during the rain-fed and dry-season farming?
2. What is the profitability (in Naira) of produce of rain-fed and dry season farming?
3. What are the economic benefits of rainfall and dry-season farming?
4. What are the factors that militate against the practice of dry-season farming?
5. What are the strategies that could be used to improve the rain-fed and dry-season farming?

Methodology

Research Design: This study is a survey design directed towards comparing the economic benefits of rain-fed and dry season farming in Makurdi Local Government Area of Benue State.

Area of Study: The research covered Makurdi Local Government Area of Benue State. The state was created in 1976. Makurdi is the capital of Benue State of Nigeria. The city is located in central Nigeria along the Benue River. It is bounded by Guma to the north, Gwer East to the East and Gwer West to West. Makurdi Local Government Area is located on the bank of river Benue and it is the head quarter of Benue State, it is acclaimed the nations "food basket" because of its rich and diverse agricultural produce which include yam, rice, beans, cassava, groundnut, soya beans etc. Animals reared include poultry, pigs and goats. The state also accounts for over 70 percent of Nigeria's soya bean production and it also boasts of one of the longest stretches of river systems in the country with great potential for a viable fishing industry, dry season farming through irrigation and for an inland water way (Fanan and Felix, 2014). There are various crops produced by farmers in Makurdi during rain-fed. This is to say farmers in Makurdi practice mostly the rain-fed farming. The practice of dry-season farming has been completely neglected by farmers.

Population of the Study: The population of this study comprises of all rain-fed and dry season farmers in Makurdi Local Government area of Benue state. These comprise of 3148 (rain fed) and 231 (dry season). The total targeted population of

the four council wards was 3379 farm families (Benue State Agriculture and Rural Development Agency (BNARDA), 2015)

Sample for the study: The study used a multistage sampling method to select sample size. The sample size of 350 respondents was determined using Yamane's formula. Comprising of 300 rain-fed farmers and 50 dry season farmers

Instrument for Data Collection: The instrument used was the researcher's designed questionnaires based on the stated objectives which consist of six sessions. First was the biography while the rest were based on the five objectives. Also Focus Group Discussion (FGD) guide was purposively held with dry season farmers to further apprehend much about dry season farming benefits

Data collection procedure: Necessary permission was taken from clan heads. Thereafter, 350 copies of questionnaire were distributed to the farmers along with written and verbal instruction and the numbers of copies retrieved.

Validation of Instrument: The instrument used was validated by the supervisor and a statistician and other experts in the department of Home Science and Management and Agricultural extension of University of Agriculture Makurdi.

Data Analysis techniques: Data were analyzed using means. The bench mark for the items was 2.50. Any item with a mean value of 2.50 and above was regarded as accepted while any item with the value of less than 2.50 was regarded as rejected.

Findings of the study

Table 1: Respondents Mean ratings on the type of crops cultivated during rain-fed farming

Crops	X ₁	X ₂	X ₃	SD ₁	SD ₂	SD ₃	Remarks
Pumpkin	3.79	3.81	3.8	0.45	0.47	0.46	Cultivated
Spinach	3.77	3.72	3.75	0.53	0.57	0.55	Cultivated
Pepper	3.74	3.51	3.63	0.44	0.54	0.49	Cultivated
Okra	3.65	3.43	3.54	0.62	0.63	0.63	Cultivated
Garden Egg	3.47	3.39	3.43	0.53	0.76	0.65	Cultivated
Sorrel plant	3.41	3.25	3.33	0.63	0.68	0.66	Cultivated
Tomatoes	3.25	2.96	3.11	0.55	0.68	0.62	Cultivated
Maize	3.06	2.52	2.79	0.63	0.80	0.72	Cultivated
Potatoes	2.71	1.93	2.32	0.87	0.65	0.76	Not cultivated
Ginger	2.71	1.87	2.29	0.91	0.77	0.84	Not cultivated
Onions	2.19	1.79	1.99	0.91	0.70	0.81	Not cultivated
Rice	2.11	1.51	1.81	0.92	0.77	0.85	Not cultivated
Grand Mean	3.12	2.81	2.98	0.67	0.67	0.67	

Source: Field Survey, 2019

Table 1 shows that, all the crops except cashew and orange with 2.11 and 2.19 mean respectively were accepted by the respondents as the type of crops cultivated

during rain-fed farming in Makurdi Local Government Area of Benue State with the highest mean of 3.79 from rice and least of 2.71 from soya beans and sweet potatoes. This implies that, rice is the highly cultivated crop in Makurdi local government area during rain-fed farming while soya beans and sweet potatoes are mostly cultivated on the small scale.

Result in Table 2 shows that all crops except rice, onions, ginger and potatoes

with 1.53, 1.79, 1.87 and 1.93 mean respectively were accepted by the respondent as type of crops cultivated during dry season in Makurdi Local Government Area with the highest mean of 3.81 from pumpkin and second highest from 3.72 from spinach. The finding of this result implies that, pumpkin, pepper, spinach, garden egg and okra are highly cultivated in Makurdi Local Government during dry season.

Table3: The profit realized from rain-fed and dry season farming

Rain-fed crops	N	Total cost of production	Total Return	Net Return	Dry Season crops	N	Total cost of production	Total Return	Net Return
		N	N				N	N	N
Spinach	31	273,000	500,000	227,000	Spinach	31	213,000	800,000	488,000
Yam	14	85,000	200,000	115,000	-----		-----	-----	-----
Maize	18	62,000	162,000	100,000	Maize	18	181,000	610,000	429,000
pumpkin	50	220,000	700,000	480,000	Pumpkin	50	230,000	940,000	710,000
Millet	17	75,000	152,000	77,000	-----		-----	-----	-----
Garden egg	22	202,000	570,000	368,000	Garden Egg	22	122,000	720,000	598,000
Rice	2	125,000	350,000	225,000	-----		-----	-----	-----
Pepper	29	99,000	310,000	211,000	Pepper	29	133,000	600,000	467,000
Beneseed	24	62,000	179,000	117,000	-----		-----	-----	-----
Okra	19	120,000	150,000	30,000	Okra	19	163,000	560,000	397,000
Tomatoes	21	50,000	610,000	110,000	Tomatoes	21	119,000	270,000	151,000
Total		1,273,000	3,433,000	2,160.00			1,260,000	4,500,000	3,240,000

Source: Field Survey, 2019

Table 3 indicates that rain-fed farmers used the cost of N1, 273,000 and have an average total returns of N31,433,000 giving a total net returns of 2,160,000 while dry season farmers used the cost of N1,260,000 and have an average total returns of 4,500,000 giving a total net returns of 3,240,000. The table also shows the farmers from rain-fed farming have the profit of 2,160,000 and farmers from dry season

farming have the profit of 3,240,000. More so, the gross margin difference of rain-fed and dry season farming is 1,080,000. This implies that dry season farming is more profitable than rain-fed farming due to scarcity of this produce during dry season which result in high demand thereby leading high price of produce in the market.

Table 4: Respondents Mean Rating on the Preferred Benefit derived from Rain-fed and Dry Season Farming

S/N	Benefits of rain-fed farming	X ₁	X ₂	X _s	SD ₁	SD ₂	SD _s	Remark
1	Abundance of food crops production	3.74	3.55	3.645	0.74	0.97	0.855	Accepted
2	Poverty reduction.	3.67	3.36	3.515	0.72	0.83	0.775	Accepted
3	All types of crops (i.e. both long and short maturing) can be cultivated	3.66	3.27	3.465	0.44	0.83	0.635	Accepted
4	It Improves standard of living	3.47	3.22	3.345	0.6	0.75	0.675	Accepted
5	Generation of high yield	3.25	1.98	2.615	0.55	0.76	0.655	Accepted
Grand Total		3.558	3.076	3.317	0.61	0.828	0.719	

Source: Field Survey, 2019

Table 4 shows the level at which respondents accepted the preferred benefits derived from rain-fed farming with the highest mean of 3.74 from abundance of food crops production and second highest mean of 3.67 from poverty reduction and the least mean of 3.25 from generation of high yield.

Also, all the benefits except increased the level technical efficiency of the farmer and increased asset base of the participant with 1.98 and 1.77 mean respectively were accepted by the respondents as preferred

benefits derived by the respondents as preferred benefits derived from dry season farming with the highest mean of 3.55 from increased income rates of the farmer and least mean of 3.22 from increased the training knowledge of the participants in irrigation farming. This implies that, despite other benefits derived from rain-fed and dry season farming in Makurdi local government area, there are other preferred benefits suggested by the farmers.

Table 5: Respondents Mean rating on the factors that militate against the practice of dry season farming

S/N	Factors	Mean	Std Dev	Remark
1	Poor storage facilities	3.51	.63	Accepted
2	Unavailability of pumping machines and cost of fuel for pumping water	3.21	.79	Accepted
3	Lack of knowledge in managing perishable produce (such as sorting, grading, and packing)	3.12	.78	Accepted
4	Lack of cooperation to fix common prices for produce	2.88	.95	Accepted
5	Poor transport system.	2.88	.90	Accepted
6	Lack of funds	2.77	.78	Accepted
7	Time consuming	2.66	.72	Accepted

Source: Field Survey, 2019

Table 5 revealed that all the factors were accepted by the respondents as factors that

militate against the practice of dry season farming, with the highest mean of 3.51

from poor storage facilities and the least mean of 2.88 from poor transport system and lack of cooperation to fix common prices from produce. This indicate that despite the challenges caused by other

factors, poor storage facilities was considered by the respondents as the factors highly militating against the practice of dry season farming.

Table 6: Respondents Mean rating on strategies to improve the practice of dry season farming

S/N	Strategies	Mean	Std. Dev.	Remark
1	Provision of water pump generators	3.67	0.55	Accepted
2	Provision of farm inputs	3.63	0.63	Accepted
3	Technology adoption by farmers	3.50	0.78	Accepted
4	Provision of capital	3.37	0.69	Accepted
5	Application of Agro-chemicals	3.21	0.79	Accepted
6	Construction of dam	3.13	0.97	Accepted
7	Provision of tractor	2.91	1.01	Accepted
8	Change on-farm management(decision about what crops to grow and how them)	2.88	0.90	Accepted

Source: Field Survey, 2019

Table 6 shows that all the strategies to improve the practice of dry season farming were accepted by the respondents with the highest mean of 3.67 from provision of water pump generators and the least mean of 2.88 from changes on farm management (decision about what crops to grow and how to grow them). This implies that, all the strategies to improve dry season farming are effective and highly applied by the farmers. However, provision of water pump generators is most considered among others.

Discussion of Findings

Research Question 1 seeks to identify the types of crops cultivated during rain-fed in Makurdi Local Government Area. Result in table 2 showed that the crops cultivated during rain-fed in Makurdi local government is very high. This in line

with (Ibekwe and Adesope, 2010) that rainy season is the normal cropping season for all crops.

Research question 2 was posed to identify the type of crops cultivated during dry season in Makurdi local government area. Results in table 3 shows that the type of crops cultivated during dry season in Makurdi local government area is very low and mostly vegetables. This is in agreement with (Ministry of Foreign Affairs, 2008) that dry season is associated with hammattan wind with low humidity and low night temperatures, making the area suitable for the growing of horticultural crops like garden eggs, okra and other leafy vegetables under irrigation.

Research question 3 assessed the profit derived from produce of rain-fed and dry season farming. The results in table 4 Shows that dry season farming is more profitable than rain-fed farming. The findings indicate that due to scarcity of

this produce during dry season results into high demand thereby leading into high price of price of produce in the market. This is in line with (Singh, 1999 and Food and Agriculture Organization 1996) which pointed out that in the South Western Nigeria, vegetables such as amaranthus species, pepper, tomatoes, and okra, are very popular and farmers involved in growing this to make some profit during the dry season.

Research question 4 sought to ascertain other preferred benefits of rain-fed and dry season farming in the area. The result obtained in table 5 shows that other preferred benefit of rain-fed and dry season farming include abundance of food crop production, poverty reduction, increased income rates of the farmer, increase the training knowledge of the participants in irrigation farming, ready market for the produce.

This is in line with (Blench and Ingawa, 2004 and National Fadama Development Project, 2003) which pointed out that, during the dry season when the river is flooded and it is observed that farmers are usually less busy on the farm during the dry season, therefore, irrigation farming serves as an alternative employment and additional source of income during the period.

Research question 5 identified factors militating against the practices of dry season farming in the study area. Results in table 6 indicate that, there are multiples factors militating against the practices of dry season farming.

This is in accordance to Eman and Gebremedhin (2007) and Bezabih and Hedera (2007) that the factors militating against the practice of dry season farming in the study area are; unavailability of

pumping machines and cost of fuel for pumping water, poor storage facilities, poor transport system.

Research question 6 sought to identify strategies to improve dry season farming in the study area. Results in table 7 indicate strategies to improve dry season farming. This is in line with Falcon (2004) and Oruonye, (2011) which pointed out some factors such as changes on farm management, which include decision about what crops to grow, when and how to grow them, application of agrochemicals, technology adoption by farmers, provision of capital, construction of dam, provision of water pump generators as strategies to improve the practices of dry season farming.

Conclusion

It was concluded that comparatively dry season farming has more economic benefits to the farmers than rain-fed farming. In view of this, it was recommended that farmers in the study area should venture more into dry season farming to ensure economic stability all year round.

Recommendations

- Farmers should be encouraged to practice dry-season farming to increase their income.
- Provision of water for dry season farming should be promoted in the area.

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