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Accessibility And Use Of Weather Forecast Information For Agronomic Practices Among Arable Crop Farmer In Ido Local Government, Nigeria

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Abstract: *This study examines the accessibility and use of weather forecast information for agronomic practices among arable crop farmers in Ido local government area of Oyo state. Random sampling was used to select 50 percent of registered crop farmers to give a total of 110 respondents in the study area. Data were obtained using structured questionnaire and described statistically with Chi Square and PPMC for the hypotheses. The study revealed that 63.6% had high access to sources of information on weather forecast, 55.4% of them derived high benefit from weather forecast information. Also, result showed that 57.3% had high level use of weather forecast while 53.6% of the respondents had severe constraint to the use of weather forecast information. Hypothesis of the study further revealed that there were significant relationship between socio-economic characteristics of the respondents and their use of weather forecast information in the area of education (x^2=29.726, p=0.0l3), secondary occupation (x^2=l8.123, p=0.006), age (x^2= -0.230, p=0.003) and income (x^2= -0.313, p=0:000). PPMC analysis showed significant relationship between respondents' benefits (r=0.397, p=0.000), accessibility (r=0.268, p=0.005) constraint (r=0.327, p=0.000) and use of weather forecast information. It is therefore recommended that both public and private organizations should provide effective weather forecast services to disseminate relevant and timely information on agronomic practices.*

Keywords: Weather, Hypothesis, Forecast, Questionnaire, Respondents

Introduction

Arable farming is a type of crop production that produces a wide range of annual crops. This means that the crop has its life cycle within a year. Such farm is located in area where the soil is rich or good for growing crops. Land that is not rich lacks suitability for cultivation for crop production. It has one or more limitations, for example: rocky and sandy land is considered non arable land, lack of sufficient fresh water for irrigation, adverse climatic conditions and excessive wetness with impracticality of drainage, excessive salts among others. Favorable weather is one of the major prerequisites for enhancing agricultural productivity in Africa and particularly in Nigeria. Inability to perfectly understand future weather conditions often exposes farmers to several production uncertainties which could necessitate adoption of some conservative approaches that sacrifice potential farm productivity through some risk minimization decisions.

There are so many problems challenging the production of arable crops in Nigeria. Some of the problems are lack of funds; ignorance, illiteracy, use of manual farm tools or methods, lack of good road; insufficient water and electricity surge, lack of food storage or processing facilities, lack of modem farm techniques, lack of scientific and technological know-how and bad leadership.

However, weather forecast can be of help because it has a profound influence on crop growth, development and yields, on the incidence of pests and diseases, on water needs and on fertilizer requirements and application. Climate change is the most severe problem that world is facing today, it has been suggested that it is a more serious threat than global terrorism [1]. Weather aberrations may cause physical damage to crops and soil. The quality of crop produce during movement from field to storage and transport to market depends on weather. Bad weather may affect the quality of produce during transport, and the viability and vigour of seeds and planting material during storage. Rainfall is by far the most important element of climate change in Nigeria and water resources potential in the country [2], which means that variability needs to be expressed in terms of the percentage probability of realizing a given amount of rain, or that the minimum assured rainfall amounts at a given level of probability need to be specified. The decision of what to produce and how to produce it is accordingly an important adaptation mechanism in the face of changing climate and other ecological and economic circumstances. This is of special importance to Nigeria and Africa at large, where the majority of poor small scale farmers practice mixed crop or livestock agriculture.

One of the major issues of concern in weather forecast dissemination to farmers, especially arable crop farmers is their inability to properly decode disseminated weather information for best farm decision making [3]. This has become very critical in Africa, where the majorities of the farmers are illiterate or possess inadequate formal education required for proper decision making as a result of complexity in climatic scenarios. Higher temperatures and declining rainfall patterns, as well as increasing frequency of extreme climate events (such as droughts and floods), are the expected future climate in the tropics [4]. These predicted changes in climate are expected to have differential impacts on agricultural productivity, food security and other sectors, across spatial and temporal scales. In the tropics and Africa in particular, changes in climate are expected to be detrimental to agricultural livelihood [5]. Therefore, this study seeks the accessibility and use of weather forecast for agronomic practices among arable crop farmers in Ido local government area of Oyo State. The objective of this study is to describe the socio-economic characteristics of the respondents, examine the extent of respondents' access to sources of information on weather forecast, ascertain benefits derived by respondents from the use of weather forecast information, determine the level of use of weather forecast information related to agronomic practices and examine the constraints faced by respondents in use of weather forecast in the study area.

METHODOLOGY:

The Ido Local Government Area (LGA) is one of the 33 local government area of Oyo state, Nigeria. Ido LGA is the largest Local Government in Ibadan land, Oyo state with Ten (10) wards Six hundred and one (601) villages. Its headquarters is in the town of Ido. It has an area of 986 km^2. On the account of extensive fertile soil, which is suitable for agriculture, the basic occupation of the people is farming. There are large hectares of grassland which are suitable for animal rearing, vast forest reserves and rivers. People in the area grow varieties of cash crops such as cocoa, kola nut, palm oil, timber and food crops such as maize and rice. The area is also suitable for a wide range of edible fruits. In fact, Ido Local Government can serve as the "food basket of the state" if well utilized. The area has also gained tremendously from industrialization process with the presence of industries such as Nigeria Wire and Cable Ltd, Nigeria Mining Corporation and the NNPC among others.

Population of the study comprises of arable crop farmers in Ido Local Government Area in Oyo State. Multi-stage random sampling technique was used. Firstly, purposive sampling was used to select 30% of the wards due to the predominance of arable crop farmers in the study area. Secondly, list of registered crop farmers was collected from Agricultural Department in Ido Local Government Area of Oyô State. Thirdly, 50% registered crop farmers were randomly selected from each ward to gives a total of one hundred and ten (110) respondents for the study.
Data for the study was collected from primary data with the use of well-structured questionnaires administered to the respondents. Information was collected based on the objectives of the study.
The statistical tools used for this research work were descriptive statistical tools, which include
Frequency table, simple percentile while the inferential statistical tool such as Chi-square and
Pearson Product Moment of Correlation (PPMC) were used for the hypotheses.

Results and Discussion

Table 1 discusses socio-economic characteristics of the respondents in the study. The result showed the distribution of this variable into five groups of age classes. Table 1 revealed that 9.1 percent of them fell in age range of 20 to 30 years, 18.2 percent fell between 31 and 40 years, 34.5 percent were in the range of 41 to 50 years, 22.7 percent fell between 51 and 60 years while 15.5 percent of the respondents were above 60 years. This showed that most of the respondents were 50 years and below. This implies that majority of them in crop farming were in their active age. Also, Table 1 revealed that most (53.6%) were male while 46.4 percent were female. This showed that male farmers were more into arable crop farming than their female counterpart.

Most (76.4%) of the respondents were married, 8.2 percent were single, 2.7 percent were divorced while 12.7 percent were widows. This showed that majority of the respondents were married. This implies that they are committed and have responsibilities to perform in their family members. The distribution of the level of education showed that 12.7 percent had no formal education, 17.3 percent attended adult education class, 1.8 percent had arable education, 13.6 percent had primary education, and 32.7 percent of them had secondary education while 21.8 percent had tertiary education. This showed that the highest or all the categories is primary education. Also, most (64.5%) of the respondent household size fell between 6 and 10 members, 27.3 percent were in the range of 1 to 5 while 8.2 percent of them were above 10 in their family. This showed that most of the respondents had fairly large household size which might be linked to fact that they serve as family labour. Majority (60.9%) of the respondents practiced Islamic religion, 29.1 percent of them were Christians while only 10.0 percent were traditional worshippers. Result further revealed that 45.5 percent of respondents identified trading as their secondary occupation, 30.0% were civil servant while 24.5 percent of them were artisan.

The distribution of the respondent based on their income showed that most (53.6%) of them earned less than N100,000 and N200,000, while 4.5 percent earned above N500,000. This revealed that majority of the respondents generated income of less than

N100,000 from their arable crop farming in the study area. Also, 46.4 percent of them had year of farming experience ranging from 6 to 10 years, 21.8 percent fell between 11 and 15 years, 3.6 percent fell between 16 and 20 years while 2.7 percent had above 20 years of farming experience. The result also showed that 46.4 percent of them cultivated between 2 and 5 acres of land, 34.5 percent cultivated less than 2 acres while 19.1 percent cultivated above 5 acres of land.

The result in Table 2 revealed the sources of information on weather forecast. It showed that 47.3 percent of the respondents' accessed information on weather forecast regularly through seminar attended, 50.0 percent accessed through organizations while 39.1 percent got information from extension workers. The table 4.2 further revealed that most of the respondents identified Radio (74.5%), internet (81.8%), farmers' meeting (55.5%), and Newspaper (60.9) as a regular sources of information on weather forecast. This showed that most of the farmers had regular sources of information related to weather condition. This agrees with the findings which stated that Radio is the cheapest and quickest means of passing information to farmers and effective medium of disseminating agriculture information in Nigeria [6].

Table 1: The Socio-economic characteristics of the respondents

Variables	Frequency	Percentage (%)
Age: 20-30 years	10	9.1
31-40 years	20	18.2
41-50 years	38	34.5
5 1-60 years	25	22.7
Above 60 Years	17	15.5
Sex		
Male	59	53.6
Female	51	46.4
Marital Status		
Single	9	8.2
Married	84	76.4
Divorced	3	2.7
Widow	14	12.7
Level of Education		
No Formal Education	14	12.7
Adult Education	19	17.3
Arabic Education	2	1.8
Primary Education	15	13.6
Secondary Education	36	32.7
Tertiary	24	21.8
Household Size		
1-5	30	27.3
6-10	71	64.5
Above 10	9	8.2
Religion		
Christianity	32	29.1
Islamic	67	60.9
Traditional	11	10.0
Secondary Occupation		
Trading	50	45.5
Civil Servant	33	30
Artisan	27	24.5

Table 1 Continued: The Socio-economic characteristics of the respondents

Variable	Frequency	Percentage (%)
Income		
Less N100,000	59	53.6
4100,000-44200,000	30	27.3
#200,001-44300,000	7	6.4
#300,001-4400,000	6	5.5
4400,001-4500,000	5	4.5
Above #500,000	3	4.5
Year of Experience		
1-5 years	28	25
6-10 years	51	46.4
11-15 years	24	21.8
16-20 years	4	3.6
Above 20 year	3	2.7
Area of Land		
Less than 2 Acres	38	34.5
2-5 Acres	51	46.4
Above 5 Acres	21	19.1

Sources: Field survey, 2021

Table 2.1 showed the categorization of respondents based on their access to sources of information. This revealed that most (63.6%) had high access to sources of information on weather forecast while 36.4% had low access. This implies that the more available sources of information the more they access weather forecast information. Table 3 revealed the benefits derived from weather forecast information. Most (80.9%) of the respondents derived benefits to larger extent in the aspect of improve crop yield, 68.2% identified prevention of farm hazard as benefits, 79.1% considered proper farm planning as benefits, 72.7% of them derived benefit to a larger extent in the area of enhanced good farm decision; 67.3% considered prevention of farm drudgery as high benefit while 73.6% derived benefit to a larger extent by preventing crop loss caused by unfavourable weather. This showed that most of the farmers derived benefit to larger extent from weather forecast information and it further implies that the more the farmers derived from weather forecast the more they use it for their agronomic practices. In summary, Table 3.1 revealed that 55.4% of the respondents derived high benefit while 34.6% derived low benefit. This showed that majority of them derived high benefit from weather forecast information. The distribution of the respondents by this variable showed the use of weather forecast information for agronomic practices.

Table 2: Access to Sources of Information on Weather Forecast Information

Sources Information	Regularly	Occasionally	Rarely	Not at All
Seminar	52 (47.3)	39 (35.5)	12 (10.9)	7 (6.4)
Organization	55 (50.0)	26(23.6)	25 (22.7)	4 (3.6)
Extension Worker	43(39.1)	33(30.0)	21(19.1)	13(11.8)
Radio	82 (74.5)	22 (20.0)	4 (3.6)	2 (1.8)
Television	91(82.7)	10(9.1)	7(6.4)	2(1.8)
Journals	54 (49.1)	41(37.3)	9(8.2)	6(5.5)
Film Show	44(40.0)	31(28.2)	35(22.7)	10(9.1)
Internet	90(81.8)	10(9.1)	6(5.5)	4(3.6)
Religious Meeting	22 (20.0)	40 (36.4)	39 (35.5)	9 (8.2)
Farmer's Meeting	61(55.5)	35 (31.8)	10(9.1)	4(3.6)
News Papers	67 (60.9)	23 (20.9)	14 (12.7)	6 (5.5)
Friends and families	34 (30.9)	40 (36.4)	28 (25.5)	8 (7.3)

Source: Field survey, 2021 ***percentage in parenthesis**

Table 2.1 Categorization of respondents based on access to sources of information

	Frequency	Percentage
Low	40	36.4
High	70	63.6
Total	110	100

Table 3: Benefit derived from use of weather forecast

Benefits	Larger Extent	Lesser Extent	Rarely	Not at All
Improve crop yield	89 (80.9)	16 (14.5)	4 (3.6)	1(0.9)
Prevention of farm hazard	75 (68.2)	31(28.2)	2(1.8)	2(1.8)
Proper farm planning	87 (79.1)	13 (11.8)	8 (7.3)	2(1.8)
Enhance good farm decision making process	80 (72.7)	21(19.1)	6 (5.5)	3 (2.7)
Enhance weed & pests management	74 (67.3)	29 (26.4)	7 (6.4)	-
Prevent farm drudgery	71(64,5)	20(18.2)	15 (13.6)	4(3.6)

Source: Field survey, 2021 ***Percentage in parenthesis**

Table 3.1 Categorization of respondents based on benefits derived

	Frequency	Percentage
Low	38	34.6
High	72	55.4
Total	110	100.0

Table 4 showed that most (70.9%) of the respondents used weather forecast information to know the right farming season, 65.5% used it for efficient use of fertilizer; 67.3% use it to monitor rain and drought while 69.1% claimed to use it for ascertain conducive weather to plant crops. The result further revealed that majority (70.0%) of the respondents used the weather information to know the right time to apply pesticides, 63.6% of them use it for pest and disease management, 62.7% use it for timely weeding, 70.0% use it for day to day decision and monitoring of farm weather (60.0%). Also, most (72.7%) of them used it to know right time to harvest, annual management decision (62.7%), farm land preparation (67.3%), soil water management (63.6%) and to know the right time for crop storage. This showed that most of the respondents in the study area had high level of use of weather forecast. This implies that farmers use weather forecast to enhance their farming operations. In summary, the result in table 4.1 showed that 57.3% had high level use of weather forecast while 42.7% had low use. This showed that majority of the respondents use weather forecast for their farming activities.

Table 5 showed the constraint to use of weather forecast information. Most (82.7%) of the respondents identify poor rural infrastructure as a major constraints, 60.9% considered their level of illiteracy, 70.9% linked their major constraint to inadequate technical knowledge while 58.2% identified poor communication channels as a major constraint. Table 5 further revealed that poor rural electrification (64.5%), lack of adequate precision on weather forecast (64.5%) and lack of adequate data on weather forecast (65.5%) as a major constraints associated with the use of weather forecast. This showed that most of the respondents in the study area faced severe constraints and this limited their level of use of weather forecast information. Table 5.1 revealed the categorization of the respondents based on the constraints associated with the use of weather forecast. This showed that most of the respondents had severe constraint to the use of weather forecast information in the study area.

The result in Table 6 showed that there were significant relationship between educational level (X^2 =29.726, p=0.0l3), secondary occupation (X^2 =18.123, p=0.006) of the respondents and their use of weather forecast information. This implies that the educational level of the respondents influence their access and use of information. Farmers with high level of education seek for more knowledge on how to improve on their current farming practices.

Table 4: Use of weather forecast information for agronomic practices

Variables	Larger Extent	Lesser Extent	Rarely	Not at All
Information on right farming season	78 (70.9)	19(17.3)	12(10.9)	1(0.9)
Weather information for efficient use of fertilizer	72(65.5)	23 (20.9)	12(10.9)	3 (2.7)
Information on monitoring of rain and Drought	74 (67.3)	18 (16.4)	15 (13.6)	3 (2.7)
Information on conducive weather to plant crops	76 (69.1)	22(20.0)	9(8.2)	3 (2.7)
Information on right time to apply pesticides	77(70.0)	19 (17.3)	10(9.1)	4 (3.6)
information on conducive weather for spraying herbicides	72(65.5)	23 (20.9)	11(10.0)	4 (3.6)
Information on pest and disease management	70(63.6)	26 (23.6)	11(10.0)	3 (2.7)
Weather information for timely weeding	69(62.7)	27 (24.5)	13 (11.8)	1(0.9)
Weather information on day to day management decision	77(70.0)	14 (12.7)	14 (12.7)	4(3.6)
Monitoring on farm weather	66 (60.0)	34 (30.9)	7 (6.4)	3 (2.7)
Information on crop harvesting	80 (72.7)	15 (13.6)	14 (12.7)	1(0.9)
Weather information on annual management decision	69 (62.7)	27 (24.5)	9(8.2)	5 (4.5)
Weather information for farm land preparation	74(67.3)	24(21.8)	10(9.1)	2(1.8)
Information on soil water management	70 (63.6)	26(23.6)	11(10.0)	3 (2.7)
Information on right time for crop storage	65 (59.1)	26 (23.6)	16 (14.5)	3 (2.7)

Source: Field survey, 2021 ***percentage in parenthesis**

Table 4.1 Categorization of respondents based on use of weather forecast

	Frequency	Percentage
Low	47	42.7
High	63	57.3
Total	110	100.0

Table 5: Constraints to use of weather forecast information

Variables	Major constraint	Minor constraint	Not a constraint
Poor rural infrastructure	91(82.7)	18 (16.4)	1(0.9)
Illiteracy condition	67 (60.9)	33 (30.0)	10(9.1)
Inadequate technical knowledge	78 (70.9)	27 (24.5)	5 (4.5)
Poor communication channels	64 (58.2)	36(32.7)	10 (9.1)
Traditional belief	46 (41.8)	17 (15.5)	47(42.7)
Poor rural electrification	71(64.5)	28(25.5)	11(10.0)
Lack of adequate precision on weather forecast	71(64.5)	27 (24.5)	12 (10.9)
Lack of adequate data on weather forecast	72(65.5)	32 (29.1)	6 (5.5)

Source: Field survey, 2021 *** Percentage in parenthesis**

Table 5.1 Categorization of respondents based on constraints faced by respondents

	Frequency	Percentage
Low	51	46.4
High	59	53.6

Total	**110**	**100.0**

This agrees with the findings of [7] who reported that education was the key to enhance productivity among farming households in the humid forest, dry savannah and moist savannah agro-ecological zones of Nigeria.

Table 6: Chi-square and PPMC analysis showing the relationship between the socio-economic characteristics and use of weather forecast information

Variables	Chi-square value	p-value	r-value	Decision
Sex	1.426	0.7		NS
Marital status	11.202	0.262		NS
Education	29.726	0.013		S
Household size	3.962	0.682		NS
Religion	6.973	0.323		NS
Secondary occupation	18.123	0.006		S
Age	-0.23		0.003	S
Income	-0.3 13		0	S
Year of experience	10.092		0.341	NS

Also, engaging in other income generating activities enhances their opportunity to access useful information such as weather risk management in order to improve on their practices. The result also showed that sex, marital status, household size, and religion were not significantly related to their use of weather forecast information.

This means that being male or female, married or not had no relationship with how they use weather forecast information. PPMC analysis also revealed that age and income were significant and inversely related to the use of weather forecast information. This implies that younger farmers have better access to information than older ones because they are more innovative and active and seek to know more. Also, farmers with higher income seek for better risk aversion strategies such as agricultural insurance scheme to manage risk associated with their livelihood activities which make them to use less information on weather forecast in the study area.

Table 7: PPMC analysis showing the relationship between benefits derived and use of weather forecast

Variables	r-values	p-value	Decision
Benefit derived and use of weather forecast	0.397	0	S

The result in table 7 showed that there was significant relationship between benefit derived and use of weather forecast information. This implies that the more farmers access and use information related to weather forecast, the more they derived benefits to improve their farming activities. Farmers consider the information relevant to their practices, hence they continue to use and access information on weather forecast.

Table 8: PPMC analysis showing the relationship between accessibility and use of weather forecast

Variables	r-values	p-value	Decision
Accessibility and use of weather forecast	0.268	0.005	S

Table 8 revealed that accessibility to weather forecast information was significantly related to the use of weather forecast information by farmers. This implies that high level of benefit derived from the use of weather forecast information influence respondents' access to information. Benefits related to farmers' activities encourage them to seek for more information pertaining to current practices. Table 9 showed that there was significant relationship between constraints to use of weather forecast and use of weather forecast information. This showed that farmers faced severe constraints in using weather forecast information. This means that accessing higher level of information on weather forecast goes along with severe constraints. This might be linked to

the fact that most of these information are presented to farmers in way that is too comprehensive for them to understand or they were faced with problems in accessing such information.

Table 9: PPMC analysis showing the relationship between constraints faced and use of weather forecast

Variables	r-values	p-value	Decision
Constraints faced and use of weather forecast	0.327	0.000	S

Conclusion

The study concludes that most of the arable crops farmers were married farmers in their active age and majority of them had educational level up to secondary school with fairly large household size. Most of the respondents were into trading, civil service and artisanship as their secondary occupation and generated annual income of less than one hundred thousand naira from their arable farming. Result on access to sources of information on weather forecast showed that most of the respondents had high access to sources of information through radio, television, internet and farmers' meeting. Respondents derived high benefits from using the weather forecast information and categorized constraints to use of weather forecast as high in severity. Hypotheses tested revealed that education, secondary occupation, age and income affect the use of weather forecast. Also, benefit derived, accessibility to sources of information and constraints to use of weather forecast affect the use of weather forecast. The following are recommended based on the finding in the study:

- Provision of effective weather forecast services to disseminate relevant and timely information.
- Adequate information on weather forecast should be made available to farmers during and after the planting season.
- Training support should be adequately given to farmers in order to improve their access to and use of weather forecast information.
- Both government and private organization should be actively involved in enlightenment programmes on usefulness of weather forecast information.
- Adequate precision on weather forecast information should be encouraged among various service providers of weather forecast. These will enhance production and productivity in the study area.
- Provision of basic amenities and necessary inputs that will make weather forecast easy to access should be provided for farmers in the study area.

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