NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 52 Number 1, April 2021 Pg. 83-88
Available online at: http://www.ajol.info/index.php/naj
https://www.naj.asn.org

PERCEIVED BENEFITS AND USE OF WEATHER FORECAST INFORMATION AMONG ARABLE CROP FARMERS IN IDO, OYO STATE NIGERIA

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Abstract
Agricultural production particularly arable crop farming is hinged on favourable weather condition which is often associated with inherent implication. This study therefore examined the perceived benefits and use of weather forecast information among arable crop farmers in Ido Local Government Area, Oyo State. Randomised sampling technique was used to select 50% of registered crop farmers to give a total of 110 respondents in the study area. Data were obtained using structured questionnaire and analyzed with Chi Square and Pearson Product Moment of Correlation (PPMC) for the hypotheses. The results of the finding revealed that majority of the respondents were married (76.4%) males (53.6%) above 50 years of age (38.2%). Also, most (91.8%) of the respondents household size were between 1 to 10 members. The result further revealed that 80.9% of the respondents earned annual income of less than N200,000 and cultivated less than one hectare of land each. Hypotheses 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 for education (χ^2 =29.726, p=0.013), age (χ^2 =-0.230, p=0.003) and income (χ^2 =-0.313, p=0.000). PPMC analysis showed significant relationship between respondents' benefits (r=0.397, p=0.000) and use of weather forecast information. In conclusion, it was revealed that education, age and income of the respondents influenced the use of weather forecast. Also, respondents derived enhanced benefits from weather information which influenced their extent of use of weather forecast. It is therefore recommended that both public and private organizations should provide effective weather forecast services to disseminate relevant and timely information useful for arable crop farming.

Keyword: Perceived benefit, weather forecast, information

Introduction

Sharing of information on weather and climate has witnessed tremendous improvement in the recent times. There has been an increase in volume of climate data available online thereby making the online portal data becoming a important medium of communication. Dissemination of climate information has improved in recent times. (Daron *et al*., 2015). Similarly, special agencies such as national meteorological and hydrological agencies have the mandate of generating and sharing of weather and climate information within African countries (Singh *et al*., 2016). Service providers on climate information in private organisations have gained popularity in forecasting in recent times. This may be attributed partly to their improved computational facilities and observational network and their flexibility which make them to overcome some constraints which affect government agencies (Parija and Mishra, 2015). Translation and modification of climate information into usable format has increased greatly, such as through agro-advisories for farmers (Dorward *et al*., 2015), and is also being disseminated through innovative communication channels for more widespread uptake. Ensuring the quality, consistency and appropriate interpretation of tailored information represents a continuing challenge for the climate community. Also, the extent to which the information on weather and climate are shared to local and regional decision-making remain unclear (Manjula and Rengalakshmi, 2015).

In recent times, there has been a move towards greater uptake of climate information on shorter time scales (Jones *et al*., 2015; Stone & Meinke, 2006) through, for example, setting up EWS, planning for resilience in agriculture, and managing water resources by integrating weather and climate information in planning decisions. Higher temperatures and declining rainfall patterns, and increasing frequency of extreme climate events (such as droughts and floods), are the expected future climate in the tropics (IPCC, 2007; Mitchell & Tanner, 2006; IPCC, 2001). In southern Africa, for example, rainfall patterns show a declining trend of summer rainfall (about 20%) from 1950-1999 and a high frequency of droughts, predicted to intensify in the 21st century (Mitchell and Tanner, 2006). Information on environmental condition particularly when they are related to weather / climate information are veritable tool to cope with rainfall variability (WMO, 2013). Availability of prediction of weather information on a coming 10-day period would be beneficial to farmers for farming operations such as sowing, weeding and harvesting and could be of major interest in areas with low adaptation capacity to seasonal forecasts (Roudier *et al*., 2014). The 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 (IPCC, 2007; IAC, 2004; Dixon *et al*., 2001; IPCC, 2001).

Weather predictions are often used for land clearing and land preparation. Similarly, most of farmers claim that their traditional method used for predicting the start of rain is correct for about a decade, but have not been used to predict dry spell that may probably commence after the rain has started. Also, weather forecast information access through scientific sources such as radio, television and extension agents are used by farmers to complement their indigenous forecasting methods. However, inaccuracies of some weather forecasts make farmers to take farm decision based on their own forecast (Sanni *et al,* 2012). It has been established that the use of weather forecast information has not been sufficiently studied, hence little is known. Several stakeholders have geared their efforts toward providing weather forecast services in order to guide against losses and reduced farm production associated with extreme weather conditions which are commendable when considering the access and use of weather forecast information. Hence, there is need to protect the farming activities from unfavourable weather variability through timely access to weather forecast information as adaptive strategy (Oyekale, 2015). It is against this background that this study focused on the objective which is to determine the perceived benefits and use of weather forecast information among arable crop farmers in Ido Local Government Area of Oyo State.

Methodology

Ido Local Government Area (LGA) is one of the 33 local government area of Oyo State, Nigeria, largest in Ibadan land, with Ten (10) wards and six hundred and one (601) villages. Its headquarters is in the town of Ido, with an area of 986km^2 and population of 103,261 (2006 census). It has 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. A multi-stage random sampling technique was used. First, random sampling was used to select 30% of the wards of arable crop farmers in the study area. The list of registered crop farmers was collected from Agricultural Department in Ido Local Government Area of Oyo State. Secondly, 50% of 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 were collected from primary sources with the use of a well structured questionnaire. Descriptive (such as frequency and percentages) and inferential (Chi-square and Pearson Product Moment of Correlation) statistics were used for analyses of data.

Model specification

$$X^2 = \Sigma\frac{(0-E1)}{E1} \text{ .... (1)}$$

Where;

X^2 = Chi square

∑= summation of values

E1= the expected value

0= the observed value

Pearson product moment correlation (PPMC) is also expressed thus;

$$r = \frac{\Sigma\,(x)(y)}{\Sigma\sqrt{x^2y^2}} \text{ ....(2)}$$

Where r = correlation coeeficient

∑ = summation of value

x= mean of independent variable

y= mean of dependent variable

Results and Discussion

Table 1 revealed that majority (53.6%) of the respondents were male, while 46.4% were female. This showed that male farmers dominate arable crop farming than their female counterparts. This is in line with the study of Ademola and Olujide (2014) who reported that most of the arable crop farmers were males with mean age of 55 years. Also, Ashagidigbi *et al*. (2019) reported crop farming operation was dominated by males. Majority (76.4%) of the respondents were married, 8.2% single, 2.7% divorced, and 12.7% widowed. This implies that they are committed and have responsibilities to perform family obligations. This finding is supported by the study of Nwaiwu (2015) who found that most of the crop farmers were married. The distribution of the level of education showed that 12.7% had no formal education, 17.3% attained adult level of education, 1.8% Arabic, 13.6% primary, 32.7% secondary, and 21.8% tertiary education. This showed that the highest of all the categories is primary education. Similar study of Ademola and Olujide (2014) reported that most of the arable crop farmers attained below secondary education. Most (91.8%) of the respondents had household size range of 1 - 10 members, while 8.2% had more than 10. This showed that most of the respondents had fairly large household sizes which might serve as family labour. Majority (60.9%) of the respondents practiced Islamic religion, 29.1% were Christians, while only 10.0% were traditional worshippers. The distribution of the respondents based on their income showed that most (80.9%) of them earned less than ₦200,000, while 19.1% earned above ₦200,000. This revealed that majority of the respondent's generated income of less ₦200,000 from their arable crop farming in the study area. Also, 71.4% had years of farming experience ranging from 1 to 10 years, while 28.6% had more than 10 years. The result also showed that majority (80.9%) of respondents cultivated less than one hectare of land, while 19.1% cultivated one hectare and above in the study area. Nwaiwu (2015) and Ashagidigbi *et al*. (2019) reported that most of the arable crop farmers cultivated less than one hectare. This might be due constraints in acquisition and allocation farm land to farmers.

Table 2 revealed the benefits derived from weather forecast information. Most of the respondent's derived benefits to larger extent in the area of improve crop yield (2.50). This ranked highest among the perceived benefits. Also, they considered proper farm planning (2.44) and prevention of farm hazard (2.39) as benefits which ranked 2^{nd} and 3^{rd} respectively. They also derived benefit to a larger extent in the area of enhanced good farm decision (2.38), enhancement of weed and pest management through timely weather forecast information (2.37) and prevention of farm drudgery (2.22) as which ranked 4^{th}, 5^{th} and 6^{th} respectively. This showed that majority of the farmers derived benefit to larger extent from weather forecast information. This implies that the more the farmers derived from weather forecast the more they use it for their farming operation. In summary, Table 3 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 results in Table 4 show distribution of respondents according to use of weather forecast information for agronomic practices. Results show that majority of the respondents used weather forecast information to elicit the following; know the right farming season (2.35), information on conducive weather to plant crops (2.32), weather information for farm land preparation (2.32) and information on right time to apply pesticides (2.31). These were ranked in order of extent of use as 1^{st}, 2^{nd} and 3^{rd} respectively. Also, majority also used weather information- for efficient use of fertilizer (2.26), timely weeding (2.26), monitoring of rain and drought (2.25), conducive weather for spraying herbicides (2.25), pest and disease management (2.25), day to day management decision (2.25) and soil and water management (2.25). The result in Table 4 further revealed that majority of the respondents used weather information- on annual management decision (2.23) and right time for crop storage (2.17). This therefore showed that most of the respondents in the study area had high level of use of weather forecast information. This implies that farmers use weather forecast information to enhance their farming operations. In summary, the result in Table 5 showed that 57.3% had high level use of weather forecast information, while 42.7% had low use. This showed that majority of the respondents use wither forecast for their farming activities. This finding deviated from the study of Oyekale (2015), who reported that little is known in aspect of utilization of weather forecasts information among farmers in Central Malawi.

The hypothesis testing showing the relationship between the socio-economic characteristics of the respondents and the use of weather forecast information is shown in Table 6. The result shows significant relationship between educational level (X^2 =29.726, p=0.013) 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. This follows the findings of Oyekale (2015) that access to formal education may significantly increase farmers' access to weather forecast information on pests/diseases activities. This also agrees with the findings of Adeoye *et al.* (2011) 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. The result also showed that sex, household size, and religion were not significantly related to their use of weather forecast information. PPMC analysis also revealed that age was significant and inversely related to the use of weather forecast information. This implies that younger farmers have better access to information than aged ones because they more innovative and active and seek to know more.

The result in Table 7 showed a 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.

Conclusion

The study showed that most arable crop farmers in the study area were married and in their active age. Majority of them had educational level up to secondary school with fairly large household size. Most of the respondents generated annual income of less than one hundred thousand from their arable farming. Respondents' derived high benefits from using the weather forecast information. Hypotheses tested revealed that education, age and income influence the use of weather forecast information. Also, perceived benefit derived from weather information affects respondents' extent of use of weather forecast.

There is need therefore for increased enlightenment programmes on importance 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 for arable crops in the study area.

Table 1 : The Socio-economic characteristics of the respondents

Variables	Frequency (n=110)	Percentage (%)
Age		
20-30 years	10	9.1
31-40 years	20	18.2
41-50 years	38	34.5
51-60 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 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 education	24	21.8
Level education		
Household size		
1-5	30	27.3
6-10	71	64.5
Above 10	9	8.2
Income per annum		
Less than ₦200,000	89	80.9
200,001-₦400,000	13	11.9
₦400,001-₦600,000	8	9.0
Years of experience		
1-10 years	79	71.4
11-20 years	28	25.
Above 20 years	3	2.7
Area of land	79	71.4
Less than one Hectare	89	80.9
One Hectare & above	21	19.1

Table 2: Perceived benefits derived from use of weather forecast

Benefits	Larger Extent	Lesser Extent	Rarely	Not at All	Mean	Rank
Improve crop yield	89 (80.9)	16 (14.5)	4 (3.6)	1 (0.9)	2.50	1st
Prevention of farm hazard	75 (68.2)	31 (28.2)	2 (1.8)	2 (1.8)	2.39	3rd
Proper farm planning	87 (79.1)	13 (11.8)	8 (7.3)	2 (1.8)	2.44	2nd
Enhance good farm decision making process	80 (72.7)	21 (19.1)	6 (5.5)	3 (2.7)	2.38	4th
Enhance weed & pests management	74 (67.3)	29 (26.4)	7 (6.4)	0(0.0)	2.37	5th
Prevent farm drudgery	71 (64.5)	20 (18.2)	15 (13.6)	4 (3.6)	2.22	6th

Percentage in parenthesis

Table 3: Categorization of respondents based on perceived benefits

	Frequency	Percentage
Low	38	34.6
High	72	65.4
Total	110	100.0

Table 4: Use of weather forecast information

	Larger Extent	Lesser Extent	Rarely	Not at All	Mean	Rank
Information on right farming season	78 (70.9)	19 (17.3)	12 (10.9)	1 (0.9)	2.35	1st
Weather information for efficient use of fertilizer	72 (65.5)	23 (20.9)	12 (10.9)	3 (2.7)	2.26	4th
Information on monitoring of rain and Drought	74 (67.3)	18 (16.4)	15 (13.6)	3 (2.7)	2.25	5th
Information on conducive weather to plant crops	76 (69.1)	22 (20.0)	9 (8.2)	3 (2.7)	2.32	2nd
Information on right time to apply pesticides	77 (70.0)	19 (17.3)	10 (9.1)	4 (3.6)	2.31	3rd
Information on conducive weather for spraying herbicides	72 (65.5)	23 (20.9)	11 (10.0)	4 (3.6)	2.25	5th
Information on pest and disease management	70 (63.6)	26 (23.6)	11 (10.0)	3 (2.7)	2.25	5th
Weather information for timely weeding	69 (62.7)	27 (24.5)	13 (11.8)	1 (0.9)	2.26	4th
weather information on day to day management decision	77 (70.0)	14 (12.7)	14 (12.7)	4 (3.6)	2.25	5th
Monitoring on farm weather	66 (60.0)	34 (30.9)	7 (6.4)	3 (2.7)	2.25	5th
Information on crop harvesting	80 (72.7)	15 (13.6)	14 (12.7)	1 (0.9)	2.35	1st
weather information on annual management decision	69 (62.7)	27 (24.5)	9 (8.2)	5 (4.5)	2.23	6th
Weather information for farm land preparation	74 (67.3)	24 (21.8)	10 (9.1)	2 (1.8)	2.32	2nd
Information on soil water management	70 (63.6)	26 (23.6)	11 (10.0)	3 (2.7)	2.25	5th
Information on right time for crop storage	65 (59.1)	26 (23.6)	16 (14.5)	3 (2.7)	2.17	7th

Percentage in parenthesis

Table 5: Categorization of respondents based on use of weather forecast information

	Frequency	Percentage
Low	47	42.7
High	63	57.3
Total	**110**	**100.0**

Table 6: Chi-square and PPMC analysis showing the relationships between some socio-economic characteristics and use of weather forecast information in the study area

Variables	Chi-square value	p-value	r-value	Decision
Sex	1.426	0.7		NS
Education	29.726	0.013		S
Household size	3.962	0.682		NS
Religion	6.973	0.323		NS
Age	-0.23		0.003	S
Year of experience	10.092		0.341	NS

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**	**0.000**	**S**

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