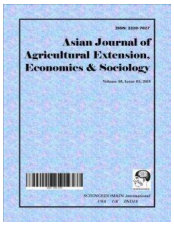

Asian Journal of Agricultural Extension, Economics & Sociology
6(1): 34-44, 2015; Article no.AJAEES.2015.060
ISSN: 2320-7027

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Sources of Risk and Management Strategies as Perceived by Monocrop and Intercrop Farmers in Kebbi State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AJJ designed the study, wrote the protocol and supervised the work. Authors AJJ and HJ carried out all performed the statistical analysis. Author BG managed the analyses of the study. Author AJJ wrote the first draft of the manuscript. Authors MFV and JNN managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2015/17308
Editor(s):
(1) Mohamed Hsssan M. Abdel Aaal, Faculty of Agriculture, Cairo University Egypt, Egypt.
Reviewers:
(1) Anonymous, Turkey.
(2) Milena Moteva, University of Architecture, Civil Engineering and Geodesy, Bulgaria.
(3) Anonymous, Pakistan.
Complete Peer review History: http://www.sciencedomain.org/review-history.php?iid=1057&id=25&aid=8722

Original Research Article

Received 7th March 2015
Accepted 28th March 2015
Published 9th April 2015

ABSTRACT

The study examined the sources of risk and management strategies of monocropping and intercopping systems in Kebbi State, Nigeria with the aim of identifying the most important sources of risk and coping strategies. The study is based on primary data gathered through a questionnaire survey of the sampled farmers in the study area. A multi-stage sampling technique was used to select 256 farmers comprising 98 monocrop farmers and 158 intercrop farmers. A Likert-type scale of 1 (not at all) to 5 (very important) was presented to the respondents in order to establish the important sources of risk and risk management strategies of the monocrop and intercrop farmers. The respondents were asked to score a list of 21 and 20 potential risk sources and risk management strategies respectively, according to their importance. The most important risk

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sources and management strategies were ranked based on the mean scores of the variables on the lists. The results from the study revealed that the most important sources of risk for both monocroppers and intercroppers are diseases, erratic rainfall, changes in government policy, changes in climatic conditions, price fluctuation (of inputs and outputs) and floods/storms. The most important risk management strategies for monocroppers are spraying for diseases and pests, spreading sales, borrowing (cash or grains) and fadama cultivation. The intercrop farmers perceived family members working off-farm, spreading sales, intercropping and borrowing (cash or grains) as the most important coping strategies. These factors should be considered when designing extension programmes and insurance schemes.

Keywords: Monocroppers; intercroppers; Likert scale; sources of risk and risk management strategies.

1. INTRODUCTION

Research on the sources of risk and management strategies in the Kebbi State of Nigeria is scanty. [1] have investigated the risk management strategies among onion farmers in Kebbi State. The researchers did not consider the factors that influence risk aversion, and besides this, there is little or no research that has investigated the relationships between the risk sources, risk management strategies, risk attitude and farmers' characteristics in the study area. There is a general belief that a positive relationship exists between risk perception and the farmers' use of risk management strategies, and that risk attitude is also an important driving force for the adoption of management strategies by farmers [2,3]. However, there is no real evidence to prove the expectations of the behaviour of farmers in the production environment. There is need to have a better understanding of the risk and the coping strategies of monocroppers and intercroppers in Kebbi State in order to ascertain the decision-making behaviours of the farmers, to develop appropriate risk-coping strategies for the farmers, and to add to the existing knowledge in the field of agricultural risk.

2. METHODOLOGY

2.1 Location and Population

The study was carried out in Kebbi State, located in the north-western part of Nigeria. Kebbi State is situated between latitudes 10º 8′ N – 13º15′ N, and longitudes 3º 30′ E–6º 02′ E. The State is bordered by Sokoto and Zamfara States to the east, Niger State to the south, Benin Republic to the west and the Niger Republic to the north. The population of the State was 3, 238, 628 in 2006 [4], and projected to be 3, 952, 766 in 2012 [5]. The State occupies an area of about 36 229 square kilometres. The major cities in the State include Birnin Kebbi (State capital), Argungu Yauri, Koko, Zuru, Jega.

2.2 Climate and vegetation

Kebbi State falls within the dry savannah agro-ecological zone of Nigeria [6]. The average annual rainfall is 1 020 mm [7]. Kebbi State experiences peak rainfall between July and August while harmattan (cold season) is usually from November to February and is characterised with strong winds. The mean annual temperature of about 27ºC is recorded in all locations, but temperature is generally high. However, during the harmattan season, the lowest temperature is 21ºC. Temperatures can go up to 40ºC during the months of April to June [8]. The average relative humidity during the wet season is 80%, but it is generally low (40%) for most of the year. The variation in relative humidity explains the hot, dry environment which is in sharp contrast to a hot, humid environment in the southern parts of Nigeria.

The climate favours both crop and livestock production. Agriculture is the major source of revenue and the backbone of the economy of the State. Over two-thirds of the population are engaged in agricultural production with about 80 – 90% of the population living in the rural areas [9]. The soils in the area range between sandy, loamy and clayey. The sandy soils are well drained and erodible. The clayey soils are common in the *fadama* areas. *Fadama* are flood plains and low-lying areas underlined by shallow aquifers and are found along Nigeria's river systems, which are used for small scale irrigation [10,11].

2.3 Ecological Problems

One of the major problems associated with the physical environment in the State is desertification. Desertification refers to a phenomenon of impoverishment of the terrestrial environment under the impact of unfavourable weather and human activities [12]. About 35 million people are located in the 11 States in northern Nigeria where desertification is evident and are facing threats of hunger and extreme weather conditions as a result of desert encroachment on arable lands [13]. The evidence of desertification is seen through the incidence of wind erosion, dune accumulation and exposure of lateritic ironstone on the landscape. The main causes of desertification are: too much demand for fuel wood, bush burning, unreliable rainfall patterns and grazing [13]. The establishment of shelter belts, woodlots, roadside plantations and forest reserves are some of the measures taken by the government to mitigate the menace. Other ecological problems affecting the State, *inter alia*, are flooding, pest infestation and erosion. Since 1988, flooding has become an annual event. The 2010 flood was devastating for the State, causing destruction of croplands and livestock within the flood plains, settlements bordering them and loss of lives [14]. The common pests in the study area are grasshoppers, caterpillars and quella birds.

2.4 Farming System

Intercropping is the predominant type of farming system, especially rain fed, with the use of traditional inefficient hand tools [15]. Monocropping is also practised by the farmers. Millet, sorghum, maize, rice, groundnuts and cowpeas are the dominant rain fed crops in the State. The typical crop mixtures include, sorghum / cowpeas, millet / sorghum, sorghum / groundnuts, millet / cowpeas, sorghum / cowpeas / rice [15]. The dominant *fadama* crops in the State, which include peppers, onions, ginger, tomatoes, lettuce, okra and sugarcane, are planted usually as sole crops. Tree crops, such as mango, guava, pawpaw and cashew, are cultivated by farmers in the State.

Animal husbandry is also practised by farmers in the State [9]. Livestock, such as cattle, sheep, goats and poultry (mostly local breeds), are raised on a small scale on free range systems. Complementary relationships exist with livestock fed on crop-residues, which contributes to draught power, manure, source of protein, income, savings and reserve against risk [16]. Livestock also provide different products and services to people, including socio-cultural roles [17].

2.5 Data Collection

The study is based on primary data gathered through a questionnaire survey of the sampled farmers in the study area. A formal survey was conducted using a structured questionnaire through personal interviews by the researcher and trained enumerators. The questionnaire was administered using a single visit approach.

2.6 Questionnaire Development

The questionnaire used for the study was developed by the researcher. Relevant literature [18,19,20,21,22,4,1,23,24] was consulted in order to identify the variables to include in the survey. Some of the questions asked in the questionnaire covered: personal characteristics of the respondents, the experimental gambling game, risk sources and management strategies. The questions were designed to answer the objectives of the study.

A pilot study was conducted to test the validity of the questionnaire. Ten farmers were randomly selected from each of the four agricultural zones in Kebbi and the questionnaire was administered to them. The responses from the respondents were checked to see if the replies were as required in the questions. The questions that seemed not to be clear to the farmers were reconstructed.

2.7 Sampling Technique

A multi-stage sampling technique was used to select 256 farmers comprising 98 monocrop farmers and 158 intercrop farmers. The reason for the sample size chosen is that there are more intercrop farmers than monocrop farmers in the State. In the first stage, the four agricultural zones were purposively selected in order to have a good representation of all the agro-ecological zones in the State. The second stage involved a random selection of two Local Government Areas (LGAs) from each of the four agricultural

zones. In the third stage, four villages were randomly selected from each of the two LGAs. The fourth stage involved the random selection of the 98 monocrop farmers and the 158 intercrop farmers. Since the population of the LGAs is not homogeneous, the number of farmers selected from each of the selected LGAs was calculated using the formula:

$$P = \frac{S}{N} \times n$$

Where P = Proportion, S = Desired sample size, N = Total population, n = Population of LGA in question.

2.8 The Survey and Data Collected

The survey was carried out in January to February, 2012 and data were collected on production practices for the 2011 cropping season. The household heads were interviewed by the researcher and the trained enumerators. Data were collected on farmers' sources of risk and risk management strategies.

3. RESULTS AND DISCUSSION

3.1 Sources of Risk and Risk Management Strategies as Perceived by the Survey Respondents

A Likert-type scale of 1 (not at all) to 5 (very important) was presented to the respondents in order to establish the important sources of risk and risk management strategies of the monocrop and intercrop farmers. The respondents were asked to score a list of 21 and 20 potential risk sources and risk management strategies respectively, according to their importance. The most important risk sources and management strategies were ranked based on the mean scores of the variables on the lists.

3.2 Average Scores and Ranking of the Sources of Risk as Perceived by the Respondents

Table 1 shows the average scores and ranking of the sources of risk of the monocroppers and intercroppers.

Monocrop farmers and intercrop farmers rated diseases, erratic rainfall and changes in government policy as the three most important sources of risk. These variables have a mean rating of 3.18, 3.02 and 2.79, respectively. Other risk sources perceived to be important to the monocroppers and intercroppers were changes in climatic conditions (2.72), price fluctuation, of input and output, (2.69), flood/storm (2.67), lack of work animals (2.58) and fertiliser unavailability (2.56). The monocrop farmers perceived erratic rainfall (3.28), diseases (3.26) and price fluctuation, of input and output (2.89) as the three most important sources of risk, while the intercroppers rated diseases (3.13), erratic rainfall (2.87) and changes in government and agricultural policy (2.82) as the three most important sources of risk. The results further reveal that there was a statistically significant difference at one per cent level ($P<0.01$) between the means of erratic rainfall for the monocrop and intercrop farmers. Also, the mean for price fluctuation was statistically significantly different at five per cent level ($P<0.05$) between the monocrop and intercrop farmers.

The monocroppers perceived changes in climatic conditions (2.83), changes in government and agricultural policy (2.76) and difficulty in finding labour (2.71) as other important sources of risk. There was a statistically significant difference at one per cent level ($P<0.01$) between the means for difficulty in finding labour for the monocroppers and intercroppers. Flood / storm (2.71), changes in climatic conditions (2.66), price fluctuation (of input and output) (2.56) and lack of work animals (2.55) were rated as other important sources of risk by the intercrop farmers. For monocroppers, excessive rainfall, insufficient rainfall, fire outbreak, theft and family relationships scored less than two, implying that most of the monocroppers did not perceive them as important. The result further shows that the mean for family relationships and theft were both statistically significantly different $P<0.01$ between the monocrop and intercrop farmers. The intercroppers perceived excessive rainfall, loss of land/ethnic clash and theft as relatively less important sources of risk. According to [25], farmers are faced with five major classes of risk, namely institutional, production, price, human/personal and financial risk. This study has revealed that most of the farmers in the study area are faced with production, institutional, human/personal and price risk.

Table 1. Average scores and ranking of important sources of risk by the monocrop and intercrop farmers, Kebbi State, January 2012

Sources of risk	Monocropper sn = 98		Intercropper sn = 157		Overall n = 255		Mean comparison t (assume ≠variances)
	Mean	Rank	Mean	Rank	Mean	Rank	
Diseases	3.26	2	3.13	1	3.18	1	0.985
Erratic rainfall	3.28	1	2.87	2	3.02	2	7.804***
Change in government and agricultural policy	2.76	5	2.82	3	2.79	3	-0.352
Changes in climatic conditions	2.83	4	2.66	5	2.72	4	1.2
Price fluctuation (of input and output)	2.89	3	2.56	6	2.69	5	2.426**
Flood/storm	2.6	10	2.71	4	2.67	6	-0.675
Pests	2.19	13	2.1	16	2.67	6	0.703
Lack of work animals	2.61	9	2.55	7	2.58	7	0.441
Fertiliser (unavailability)	2.67	8	2.48	10	2.56	8	1.396
Drought	2.5	11	2.53	8	2.52	9	-0.141
Difficulties of finding labour	2.71	6	2.37	11	2.5	10	2.655***
Insufficient work animals	2.47	12	2.49	9	2.49	11	-0.141
Market failure	2.69	7	2.32	12	2.47	12	86.118***
Illness of household member	2.13	15	2.31	13	2.24	13	-1.412
Insufficient family labour	2.18	14	2.19	15	2.19	14	-0.078
Family relationships	1.83	21	2.22	14	2.07	15	-2.800***
Insufficient rainfall	1.92	20	2.05	17	2	16	-1.222
Loss of land/ethnic clash	2.02	16	1.96	19	1.98	17	0.526
Fire outbreak	1.92	19	2	18	1.97	18	-0.664
Excessive rainfall	1.94	18	1.9	20	1.91	19	0.188
Theft	1.95	17	1.64	21	1.76	20	2.474***

*The asterisks (***and **) represents statistical significance at 1% and 5% probability levels, respectively*

Disease was rated as one of the most important risk source by both monocroppers and intercroppers: intercrop farmers rated disease as the most important source of risk, and the monocroppers rated disease as the second most important factor. Sorghum downy mildew, induced by *Peronosclerospora sorghi*, and *stem* borer limit sorghum and millet production in northern Nigeria [26,27]. Virus diseases constitute a serious threat that affects cowpea production in Nigeria and yields can as a result be reduced by 80-100 % [28]. Some of the common diseases that infest cowpea are: aphid-borne mosaic virus *potyvirus*, cowpea mild mottle virus *carlavirus*, cowpea mosaic virus *comovirus*, bacterial blight induced by *Xanthomonasax onopodis* pvvignicola, and cowpea leaf smut (Entyloma vignae), among others [29, 30]. Groundnut production is affected by *groundnut rosette* which is a virus disease common in northern Nigeria [31]. The use of agrochemicals has a positive, significant influence on crop yield [32]. Farmers rate diseases as an important source of risk owing to the fact that disease control through the use of agrochemicals increases the cost of crop production. Erratic rainfall is rated as an important source of risk by both the monocroppers and intercroppers. While monocroppers rated erratic rainfall as the most important factor, it was rated as the second most important source of risk by the intercroppers. In recent times, irregular rainfall has been experienced by farmers in Nigeria, especially in the northern parts of the country [33]. The consequent effect of erratic rainfall is delay in planting dates and death of plants when dry spells periods are prolonged.

On aggregate, changes in government and agricultural policy is scored as the third important source of risk for both monocrop and intercrop farmers. While monocroppers rated price fluctuation (of input and output) as the third important source of risk, the intercroppers scored changes in government and agricultural policy as the third important risk source. Intercroppers perceive uncertainty about changes in government and agricultural policy as a more important source of risk. Government policies on agriculture have been inconsistent and poorly implemented: these policies relate to fertiliser subsidy, agricultural pricing, pesticide regulation and crop insurance. The instability and poor implementation of government policies on agriculture are the major constraints to agricultural productivity in Nigeria [34,35], which pose a source of risk to the farmers. [35] reported that although the fertiliser subsidy has persisted in Nigeria, its execution is still unclear. Government policy on pesticide regulation is generally unsatisfactory [36]. Government policy on land reform was rated as the foremost important source of risk by large-scale sugarcane farmers in KwaZulu Natal [37].

Price fluctuation is an important source of risk to the farmers, which is more pronounced for monocrop farmers. This is so probably because they have only one type of crop to sell and if the price is low this affects the profit of the enterprise. This is unlike the case of intercroppers who have different crops to sell and if the price of one crop is low, profit can be gained from the high price obtained from the sale of the other crop. Low prices are unfavourable to farmers because they have a negative effect on their profit. The price support policy does not seem to be stable, thus farmers rated price fluctuation as an important source of risk. Output and input prices have been ranked the highest source of risk by onion farmers in Kebbi State, Nigeria [1]. Crop price and changes in input costs have been rated high as sources of risk, as noted by [37].

Other important sources of risk perceived by the farmers are, market failure, flood/storm, fertiliser unavailability, changes in climatic conditions and difficulties in finding labour. Market failure is perceived as a more important source of risk by the monocrop farmers. There is a statistically significant difference at one per cent level ($P<0.01$) between the means of market failure for the monocrop and intercrop farmers. This is not surprising because monocroppers produce only one type of crop and in the event of market failure, they will make little or no profits. Uncertainty about flood/storm was rated as an important source of risk by the farmers, and this is probably because of the flood incidence experienced by farmers in the State in the 2010 cropping season which devastated many farms, lives and properties. The effect of floods on crop production is poor harvests, or in severe cases total loss of crops, with a resultant effect of increased food crop prices in the affected areas, as has been experienced in Kebbi State and other northern states of Nigeria [33]. The absence of capital for private-sector participation in the supply and distribution of fertiliser in Nigeria poses a serious challenge to the use of fertiliser by the small-scale farmers [35]. The

federal government and the various state governments have subsidised fertiliser for farmers, which is distributed to farmers through the Agricultural Development Projects (ADPs), although the supply of fertiliser by the government is inadequate and untimely [33] Farmers purchase fertiliser in the market at high prices and that is why they rated fertiliser unavailability as a source of risk to farming. [38] reported that, among other factors, the price of fertiliser is an important factor that influences farmers' use of fertiliser in arable crop production in Imo State Nigeria.

Changes in climatic conditions were perceived as another important source of risk by the farmers. According to [33], rural farmers are experiencing the effects of climate change which is manifested in the form of delayed rainfall, floods and disease outbreaks. The consequent effect of climate change is hunger among the rural dwellers who depend solely on agriculture as a source of livelihood. Farmers also perceived difficulties in finding labour as another important source of risk. Farmers in the study area face labour constraints, especially during peak labour demand periods, because some youths migrate from the State to the southern part of the country in search of employment.

3.3 Average and Ranking of Risk Management Strategies by the Monocrop and Intercrop Farmers

Risk sources have adverse effects on farm productivity and this reduces farm income. Farmers have over the years, however, devised different risk management strategies to combat the risk sources. Table 2 shows the average and ranking of risk management strategies by the monocrop and intercrop farmers in the study area.

Overall, monocroppers and intercroppers scored spreading sales (3.20), family members working off-farm (3.15) and borrowing (cash or grains) (2.96) as the three most important risk management strategies. Other management strategies perceived to be important by both monocroppers and intercroppers were spraying for diseases and pests (2.94), intercropping (2.90) and storage programmes (2.73).

Monocrop farmers rated spraying for diseases and pests (3.23), spreading sales (3.06) and borrowing (cash or grain) (2.96) as the three most important risk management strategies. Intercroppers scored family members working off-farm (3.36), spreading sales (3.29) and intercropping (3.23) as the three most important management strategies.

The mean for family members working off-farm for the two groups of farmers were statistically significantly different at one per cent level ($P<0.01$). Monocroppers and intercroppers rated spreading sales as the second most important management strategy. Other management strategies perceived by the monocroppers were *fadama* cultivation (2.92), selling of assets (2.83), family members working off-farm (2.83), and membership of cooperative societies (2.62). Intercroppers perceived borrowing (cash or grains) (2.95), selling of assets (2.85), storage programmes (2.84) and spraying for diseases and pests (2.75) as other important risk management strategies. Both monocrop and intercrop farmers rated household head working off-farm, *adashe* (rotation contribution) and reduced consumption as relatively the least important management strategies. Reduced consumption was seen as relatively the least important management strategy, probably because farmers can borrow grains or cash from their relatives, which is evident from the high rating of borrowing.

From the scores obtained for the management strategies, it can be deduced that farmers in the study are combating price, financial and production risk. As mentioned above, spreading sales is the second most important strategy noted by the monocrop and intercrop farmers. Farmers in the study area did not sell all the farm produce at the same time because farm produce is associated with seasonal price variation. Farmers try to take advantage of periods when supply is low and the demand is high so as to get good prices, thereby maximizing profit. [1] found that 4% of the onion farmers in Kebbi State carried out sequential marketing, although the percentage is low, probably because onions are a perishable commodity.

Table 2. Average score and ranking of important risk management strategies by monocrop and intercrop farmers, Kebbi State, January 2012

	Monocroppers n = 98		Intercroppers n = 151		Overall n = 249		Mean comparison t (assume ≠variances)
Risk management strategies	**Mean**	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**	
Spreading sales	3.06	2	3.29	2	3.20	1	-1.53
Family members working off-farm	2.83	6	3.36	1	3.15	2	-3.533***
Borrowing (cash or grains)	2.96	3	2.95	4	2.96	3	0.00
Spraying for diseases and pests	3.23	1	2.75	7	2.94	4	3.447***
Intercropping	2.41	12	3.23	3	2.90	5	-6.095***
Selling of assets	2.84	5	2.85	5	2.84	6	-0.07
Fadama cultivation	2.92	4	2.68	8	2.77	7	1.885*
Storage programme	2.57	8	2.83	6	2.73	8	-1.899*
Cooperative societies	2.61	7	2.62	9	2.62	9	-0.07
Fertiliser provision by government/self	2.50	9	2.39	11	2.44	10	0.86
Planning expenditure	2.50	9	2.28	13	2.37	11	1.54
Having crop insurance	2.31	15	2.40	10	2.37	12	-0.70
Gathering market information	2.46	11	2.27	14	2.35	13	1.46
Price support	2.32	14	2.34	12	2.33	14	-0.16
Training and education	2.49	10	2.17	15	2.29	15	2.806***
Investing off-farm	2.33	13	2.14	16	2.21	16	1.66
Household head working off-farm	2.18	17	2.13	17	2.15	17	0.44
Faith in God	2.23	16	2.05	20	2.12	18	1.48
Adashe(Rotation contribution)	2.15	18	2.08	18	2.11	19	0.75
Reduced consumption	2.12	19	2.07	19	2.09	20	0.38

*The asterisks (*** and *) represents statistical significance at 1% and 10% probability levels, respectively*

Family members working off-farm is seen as an important management strategy by the farmers because working off-farm boosts household income. This result is consistent with the findings of [39] for Ethiopian farmers, and of [40,24] for Nigerian farmers. Borrowing (cash or grains) was perceived as an important risk management strategy by the farmers, though it was ranked higher by the monocroppers. Borrowing has a cushion effect on farmers' finances during periods of scarcity and borrowing of grains helps to reduce hunger, especially towards the period of harvest. Intercropping was the third most important management strategy for the intercrop farmers. This is not surprising because intercropping is practised in order to guard against the risk of crop failure and so intercropping is a form of diversification. Selling of assets was seen as another important management strategy by monocrop and intercrop farmers. Most farmers in the study area have livestock enterprises which serve as liquid assets: livestock and livestock products are sold when there is food shortage or when there are other needs to be met by the household. The result is comparable with those of [24,40] who reported that farmers sell liquid assets as a means of managing risk.

Fadama cultivation is more pronounced as an important management strategy by the monocroppers probably because monocroppers are more at risk in the event of any uncertainty occurrence. *Fadama* cultivation involves the cultivation of vegetable crops (such as onions, cabbages, tomatoes, peppers (hot and mild), ginger, cucumbers, Irish and sweet potatoes), maize and wheat. *Fadama* cultivation is carried out to safeguard against crop failure, thereby reducing risk and it is also seen as an important enterprise diversification by the farmers. *Fadama* cultivation serves as a means of getting some income for the farmers. [41] reported that farmers in Kenya see enterprise diversification as an important risk management strategy that reduces risk to the farmers. The use of storage programmes is perceived as an important risk management strategy by the farmers, especially the intercroppers. Farmers store their farm produce until the prices are high so as to get higher prices, thus more farm income. The means for training and education for the two groups of farmers were statistically significantly different at one per cent level ($P<0.01$). Training and education helps farmers to know the best management practices to adopt in order to enhance productivity.

4. CONCLUSION

The results of the determination of the sources of risk for both monocroppers and intercroppers reveal that diseases, erratic rainfall, changes in government and agricultural policy, and price fluctuations are the 5 most important sources of risk. The variables rainfall, difficulties in finding labour, theft, market failure, price fluctuation and family relationships were statistically significantly different between monocrop and intercrop farmers. The 5 most important risk management strategies for both monocroppers and intercroppers were, spreading sales, family members working off-farm, borrowing (cash or grains), spraying for diseases and pests, and intercropping. The variables family members working off-farm, spraying for diseases and pests, intercropping, *fadama* cultivation, storage programme and training and education were statistically significantly different between monocroppers and intercroppers. Monocroppers and intercroppers rated spreading sales as the second most important management strategy. The prominent sources of risk (such as diseases, erratic rainfall, changes in government and agricultural policy, price fluctuations), and management strategies (spreading sales, family members working off-farm, borrowing (cash or grains), spraying for diseases and pests) for both moncrop and intercroppers should be considered when formulating agricultural policies on insurance and agricultural development.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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