ASSESSMENT OF RISK ATTITUDES AMONG SMALLHOLDER ARABLE CROP FARMERS IN KOGI STATE, NIGERIA

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Abstract
Arable crop farmers in Nigeria face considerable production uncertainties that influence their decisions regarding technology adoption, input use and farm investments, yet limited empirical evidence exists on their behavioural responses to risk. This study examined the risk attitudes of smallholder arable crop farmers engaged in yam, cassava and potato production in Kogi State, Nigeria. Specifically, the study determined the socio-economic characteristics of arable crop farmers, assessed their risk attitudes, and identified the constraints faced by farmers based on their risk attitudes. A multi-stage sampling technique was employed to select 240 arable crop farmers from major farming communities in Kogi State. Primary data were collected using a structured questionnaire and analysed using descriptive statistics, including frequencies, percentages, means, and Likert scale analysis. The findings revealed that the average age of the farmers was 48 years, majority(75.42%) were male, married (82.92%), and having at least secondary education (64.20%). The mean farming experience and farm size were 16.83 years and 3.06 hectares, respectively. Access to extension services, credit facilities, and cooperative societies was generally low. The results further showed that 81.67% of the farmers were risk averse, while 8.33% were risk neutral and 10.00% were risk seekers. The major constraints associated with farmers' risk attitudes were inadequate access to credit (mean = 2.92), lack of awareness (mean = 2.57), inadequate extension services (mean = 2.54), post-harvest losses (mean = 2.52), and high input costs (mean = 2.40). The study concluded that most smallholder arable crop farmers in Kogi State exhibit risk-averse behaviour under conditions of limited institutional support. It recommends improved access to credit, strengthened extension services, and increased farmer education to enhance farmers' capacity to cope with production risks.

Keywords*: Assessment, Risk, attitudes, smallholder, arable crop farmers.*

Introduction

Agriculture remains one of the most important sectors of the Nigerian economy, providing employment, income and food for a large proportion of the population (FAO, 2021; National Bureau of Statistics, 2023). The sector contributes significantly to national food security and serves as the primary source of livelihood for most rural households. In Kogi State, smallholder arable crop farmers are actively engaged in the production of crops such as yam, cassava and potato, which are important for household consumption, income generation and industrial use. Despite the importance of these crops, agricultural production is continually constrained by numerous production, financial and institutional challenges that expose farmers to varying levels of risk (Aminu et al., 2020; Alehile et al., 2022).

Agricultural production is inherently risky because it depends largely on factors beyond the control of farmers. Fluctuations in weather conditions, pest and disease outbreaks, high input costs, inadequate access to credit, unstable market prices, poor extension services and weak rural infrastructure all influence farmers' production decisions and farm income (Duong et al., 2019; Ojo et al., 2022; Agbola et al., 2023). These uncertainties often affect farmers' willingness to invest in improved technologies and may influence their attitude towards agricultural risk.

Risk attitude describes the behavioural disposition of farmers when making decisions under conditions of uncertainty (Hardaker et al., 2015). Depending on their perception of possible gains

and losses, farmers may be risk averse, risk neutral or risk seeking. These attitudes influence decisions relating to the adoption of improved technologies, farm investment, access to credit and other production practices (Oparinde et al., 2018; Akanbi et al., 2022). Understanding farmers' risk attitudes is therefore essential for designing agricultural policies and interventions that enhance productivity, strengthen resilience and improve rural livelihoods (Ibitoye & Saliu, 2019; Adisa et al., 2024).

Socio-economic characteristics such as age, educational level, farming experience, farm size, household size, access to extension services, cooperative membership and access to credit have been shown to influence farmers' decision-making under risky production environments (Ahaneku et al., 2019; Ibeagwa et al., 2019; Sheu-Usman et al., 2022). These characteristics determine farmers' capacity to obtain information, mobilise production resources and respond to agricultural uncertainties. Similarly, the constraints confronting farmers may further shape their ability to cope with production risks and influence their risk attitudes.

Although several studies have examined agricultural risks and farmers' coping mechanisms in Nigeria, limited attention has been given to the risk attitudes of smallholder arable crop farmers in Kogi State and the constraints associated with those attitudes (Oparinde et al., 2018; Akanbi et al., 2022; Adejo et al., 2025). Addressing this gap is important because understanding farmers' behavioural responses to risk provides valuable information for policy formulation, extension service delivery and institutional support programmes aimed at improving agricultural productivity and livelihoods. This study therefore examined the risk attitudes of smallholder arable crop farmers in Kogi State, Nigeria. Specifically, the study sought to:

i. determine the socio-economic characteristics of arable crop farmers in Kogi State;
ii. determine the risk attitudes of arable crop farmers in Kogi State; and
iii. identify the constraints faced by arable crop farmers in Kogi State on the basis of risk attitudes.

Methodology

Study Area

The study was conducted in Kogi State, Nigeria, located in the North-Central geopolitical zone of the country. The State lies between latitudes 6°30′N and 8°50′N and longitudes 5°51′E and 8°00′E, covering approximately 29,833 km². Agriculture is the dominant occupation in the state, with over 70% of the population depending on farming for their livelihood. The major arable crops cultivated include yam, cassava, potato, maize, rice and groundnut. The favourable climate and fertile soils make the state suitable for the production of a wide range of food crops.

Sampling Procedure and Sample Size

A multi-stage sampling technique was employed for the study. In the first stage, two agricultural zones (Ayetoro Gbede and Anyigba) were purposively selected because of their high concentration of arable crop farmers. In the second stage, two agricultural blocks were randomly selected from each zone, giving four blocks. Thereafter, two cells were randomly selected from each block to obtain eight cells.

Finally, thirty (30) arable crop farmers were randomly selected from each cell, resulting in a total sample size of 240 respondents.

Method of Data Collection

Primary data were collected using a structured questionnaire administered to the selected respondents.

The questionnaire elicited information on the socio-economic characteristics of the farmers, their risk attitudes and the constraints encountered in agricultural production.

Measurement of Variables

Risk attitude was measured using a five-point Likert scale. Farmers with mean scores below the decision mean were classified as risk averse, those with scores equal to the decision mean were classified as risk neutral, while respondents with mean scores above the decision mean were classified as risk seekers. Constraints faced by arable crop farmers were assessed using a three-point Likert scale of Serious Constraint (3), Moderate Constraint (2), and Not a Constraint (1). A mean score of 2.00 and above was
regarded as a serious constraint.

Method of Data Analysis

Data collected for the study were analysed using descriptive statistics, including frequencies, percentages, means and standard deviations.

The analytical techniques used to achieve the study objectives were as follows:
Objective i: Frequencies, percentages and means were used to analyse the socio-economic characteristics of arable crop farmers.
Objective ii: Frequencies, percentages and mean scores were used to determine the risk attitudes of arable crop farmers.
Objective iii: Mean scores and standard deviations were used to identify the constraints faced by arable crop farmers based on their risk attitudes.

Results and discussion

Table 1: Socio-economic Characteristics of Arable Crop Farmers in Kogi State (n=240)

Variables		Frequency	Percentage (%)	Mean/Mode
Age Category (Years)	23-30	19	7.92	
	31-40	51	21.25	
	41-50	68	28.33	48 years
	51-60	67	27.92	
	61-70	35	14.58	
Sex	Male	181	75.42	
	Female	59	24.58	
Marital Status	Single	18	7.50	
	Married	199	82.92	
	Widowed	17	7.08	
	Divorced	6	2.50	
Household Size Category	Small (1-4 persons)	118	49.17	
	Medium (5-8 persons)	104	43.33	5.00 persons
	Large (9-12 persons)	18	7.50	
Educational Level	Non formal education	43	17.9	
	Primary	19	7.90	
	Secondary	77	32.10	
	Tertiary	77	32.10	
	Others	24	10.00	
Farming Experience Category	Low (1-15 years)	133	55.42	
	Medium (16-30 years)	76	31.67	16.83 years
	High (above 30 years)	31	12.91	

Farm Size Category	Small farms (0.3 - 2.0 ha)	65	27.08	
	Medium farms (2.1 - 5.0 ha)	134	55.83	3.06 ha
	Large farms (above 5.0 ha)	41	17.08	
Extension Contact	Had Extension Contact	82	34.17	
	Had No Contact	158	65.83	
Cooperative Membership	Member of Cooperative	95	39.58	
	Not a Member of Cooperative	145	60.42	
Credit Access	Had Credit Access	46	19.17	
	Had No Credit Access	194	80.83	
Source of Farmland	Inherited	86	35.8	
	Purchased	76	31.70	
	Communal Land	23	9.60	
	Rented	22	9.20	
	Lease	19	7.90	
	Gift	11	4.60	
	Others	3	1.30	
Arable Crops Cultivated	Yam and Cassava	92	38.30	
	All (Yam, Cassava, Potato)	79	32.90	
	Yam only	28	11.70	
	Cassava only	17	7.10	
	Potato only	12	5.00	
	Yam and Potato	9	3.80	
	Cassava and Potato	3	1.30	
Total		**240**	**100.00**	

Source: Field Survey (2025)

The socio-economic characteristics of the respondents are presented in Table 1. The findings revealed that the mean age of the farmers was 48 years, indicating that arable crop production in Kogi State is dominated by economically active individuals who are still within their productive years. Farmers within this age bracket are more likely to possess the physical strength and farming experience required for the labour-intensive nature of arable crop production. This finding agrees with previous studies that reported the active involvement of middle-aged farmers in agricultural production.

The study further revealed that male farmers (75.42%) dominated arable crop production. This may be attributed to the physically demanding operations involved in land preparation, planting, weeding and harvesting, which are traditionally undertaken by men in many rural communities. Most respondents (82.92%) were married, suggesting the availability of family labour and greater household responsibility, both of which may influence farm decision-making and attitudes toward production risks. The educational profile showed that over sixty percent of the respondents had at least secondary education. This level of education is expected to improve farmers&; ability to access agricultural information, understand extension messages and make

informed production decisions under uncertain conditions.

The average farming experience of 16.83 years indicates that the respondents possessed considerable practical knowledge of arable crop production. Similarly, the mean farm size of 3.06 hectares confirms that the respondents were predominantly smallholder farmers.

Despite these favourable characteristics, access to institutional support remained poor. Only 34.17% of the respondents had access to extension services, 39.58% belonged to cooperative societies, while only 19.17% had access to formal credit facilities. Limited institutional support may reduce farmers; capacity to cope effectively with production uncertainties and influence their attitude toward agricultural risk.

Table 2: Distribution of Respondents by Risk Attitude Category (n=240)

Risk Attitude Category	Frequency	Percentage	Cumulative (%)
Risk Averse	196	81.67	81.67
Risk Neutral	20	8.33	90.00
Risk Takers	24	10.00	100.00
Total	240	100.00	

Source: Field Survey (2025)

The distribution of respondents according to their risk attitudes is presented in Table 2. The results showed that 81.67% of the respondents were risk averse, while 8.33% were risk neutral and only 10.00% were risk seekers. The predominance of risk-averse farmers suggests that most respondents preferred production decisions that minimise uncertainty rather than strategies with potentially higher returns but greater risks. This behaviour is expected among smallholder farmers whose livelihoods depend largely on agricultural production and who have limited access to financial resources, extension services and agricultural insurance.

Risk-averse behaviour may also explain the relatively slow adoption of innovative technologies among smallholder farmers. Farmers who are highly risk averse are generally reluctant to invest in unfamiliar production practices unless there is adequate assurance of positive returns. The finding further implies that strengthening institutional support through improved extension services, access to affordable credit and farmer education could reduce production uncertainties and encourage more informed decision-making among arable crop farmers in Kogi State.

Table 3. Distribution of Respondents by Constraints Faced by Arable Crop Farmers Based on Risk Attitudes (n=240)

S/N	Variables	Mean ($\bar{x}$)	Std.D
1	Inadequate access to credit or loans	2.92	0.31
2	High cost of inputs	2.40	0.58
3	Lack of awareness of risk strategies	2.57	0.66
4	Inadequate extension services or workshop	2.54	0.58
5	Poor access to irrigation	2.34	0.72
6	Market price fluctuations	2.39	0.72
7	Uncertainty in government policies	1.55	0.75
8	High transportation cost	1.92	0.75
9	Poor road networks	1.90	0.78
10	Low profit margins	2.34	0.80
11	Land tenure issues	1.69	0.85
12	Post-harvest losses due to storage issues	2.52	0.66
13	Insufficient capital	2.32	0.59
14	Lack of knowledge of risk management strategies	2.38	0.77

15	Unwillingness to practise risk management strategies	2.06	0.80
16	Insufficient labour	2.18	0.59
17	Lack of sufficient planting material	2.30	0.62

Source: Field Survey (2025) Mean score based on 3-point scale 1 = Not a Constraint, 2 = Moderate Constraint, 3 = Serious Constraint

Table 3 presents the mean scores of constraints. Fifteen out of seventeen constraints recorded mean scores above 2.0, indicating they were perceived as moderate to serious. The most serious constraint was inadequate access to credit or loans (mean = 2.92), followed by lack of awareness of risk strategies (mean = 2.57), inadequate extension services (mean = 2.54), post-harvest losses due to storage issues (mean = 2.52), high cost of inputs (mean = 2.40), and market price fluctuations (mean = 2.39). Uncertainty in government policies (mean = 1.55) and land tenure issues (mean = 1.69) were perceived as less critical.

Discussion

Arable crop farming in Kogi State is predominantly carried out by economically active middle-aged farmers with a mean age of 48 years, suggesting that farming remains an occupation of individuals within their productive years who possess the physical capacity for labour-intensive operations. This finding aligns with Adole et al. (2024) and Akanbi et al. (2022), who reported similar age structures among crop farmers in Kogi and Oyo States. The high proportion of male farmers (75.42%) reflects the labour-intensive and culturally male-dominated nature of arable crop production, corroborating the findings of Ufondu et al. (2021) and Akinola and Ojo (2019).

Educational attainment was relatively high, with 64.20% of farmers having at least secondary education. This suggests a strong potential for the adoption of improved risk management strategies, as education enhances farmers' capacity to evaluate risk-return trade-offs, access agricultural information, and utilise extension services (Oparinde et al., 2018; Alabi et al., 2023). The mean farming experience of 16.83 years and mean farm size of 3.06 hectares confirm that respondents are predominantly smallholder farmers with considerable practical knowledge of arable crop production. However, access to institutional support services was severely limited. Only 34.17% had contact with extension agents, 39.58% belonged to cooperative societies, and a mere 19.17% had access to credit facilities. This pattern of weak institutional support is consistent with Adejo et al. (2025) and Sheu-Usman et al. (2022), who reported similar constraints among farmers in Nigeria. The most common crop combination was yam and cassava (38.30%), followed by cultivation of all three crops (32.90%), reflecting farmers' risk diversification strategies through mixed cropping (Echebiri & Onu, 2019).

The results revealed that the overwhelming majority of farmers (81.67%) were risk averse, while 8.33% were risk neutral and only 10.00% were risk seekers. This predominance of risk aversion suggests that most farmers prefer production decisions that minimise uncertainty rather than strategies that carry higher potential returns but also higher risks. This finding is consistent with Oparinde et al. (2018), who found that a substantial proportion of cassava and maize farmers in Southwest Nigeria were risk averse. Similarly, Akanbi et al. (2022) reported that most crop farmers in Oyo State exhibited risk averse attitudes, which influenced their production and investment decisions.

Risk-averse behaviour among smallholder farmers may be attributed to several factors, including limited access to credit, inadequate agricultural insurance, lack of information about modern farming practices, and the vulnerability of farming households to production shocks (Ogundari & Ojo, 2022). Farmers who are highly risk averse are generally reluctant to invest in unfamiliar production practices unless there is adequate assurance of positive returns. This behavioural pattern can slow the diffusion of improved agricultural technologies and limit productivity growth among smallholder farmers. The implication is that interventions addressing

perceived risks, such as demonstration plots and participatory technology trials, could encourage uptake of improved practices among risk averse farmers.

The small proportion of risk neutral (8.33%) and risk taking (10.00%) farmers suggests that only a minority are willing to experiment with new technologies and practices. These farmers may serve as early adopters and can act as models for their more risk averse neighbours.

The constraint analysis revealed that fifteen out of seventeen constraints recorded mean scores above 2.0, indicating that farmers perceived most constraints as moderate to serious. The most severe constraint was inadequate access to credit or loans (mean = 2.92), followed by lack of awareness of risk strategies (mean = 2.57), inadequate extension services (mean = 2.54), post-harvest losses due to storage issues (mean = 2.52), and high cost of inputs (mean = 2.40). Market price fluctuations (mean = 2.39) and lack of knowledge of risk management strategies (mean = 2.38) were also perceived as significant constraints.

The dominance of financial constraints aligns with Adejo et al. (2025), who identified credit access as a major constraint among farmers in Kogi State. Alabi et al. (2023) similarly reported that lack of credit is one of the most important constraints affecting farmers' ability to manage risks. The high ranking of extension-related constraints (lack of awareness and inadequate extension services) reflects the weak institutional support documented in the socio-economic characteristics. This finding corroborates Sheu-Usman et al. (2022), who noted that inadequate extension services hinder technology adoption among Nigerian farmers.

Post-harvest losses due to storage issues (mean = 2.52) and high input costs (mean = 2.40) further compound farmers' vulnerability to production risks. These findings are consistent with Ufondu et al. (2021), who identified post-harvest losses as a major challenge for yam farmers in North Central Nigeria, and Ojo et al. (2022), who reported that high input costs constrain adoption of improved technologies.

In contrast, uncertainty in government policies (mean = 1.55) and land tenure issues (mean = 1.69) were perceived as less critical, suggesting that farmers are more immediately concerned with operational and financial constraints than with policy-level factors. Similar observations were reported by Amusat et al. (2023), who noted that land tenure constraints vary across locations depending on local land ownership arrangements.

Conclusion

This study assessed risk attitudes of smallholder arable crop farmers in Kogi State, Nigeria. The findings revealed that arable crop production in the study area is dominated by economically active and experienced farmers operating on relatively small farm holdings. Although a reasonable proportion of the farmers had formal education, access to institutional support services such as agricultural extension, credit facilities and cooperative societies remained inadequate.

The study further established that the majority of the respondents were risk averse, indicating a preference for production decisions that minimise uncertainty rather than high-risk investments. This behaviour is largely influenced by limited access to production resources and institutional support. The study also identified inadequate access to credit, lack of awareness, poor extension services, post-harvest losses and high input costs as the major constraints influencing farmers' risk attitudes. These constraints reduce farmers' capacity to adopt improved technologies and limit their ability to respond effectively to production risks.

It is therefore concluded that strengthening institutional support systems is essential for improving farmers' ability to manage production risks and enhancing the productivity and sustainability of smallholder arable crop farming in Kogi State.

Recommendations

Based on the findings of this study, the following recommendations were:

1. Government and agricultural development agencies should improve farmers' access to affordable credit through farmer-friendly credit schemes to reduce financial constraints and

encourage productive investments.

2. Agricultural extension services should be strengthened through regular farm visits, farmer training programmes and demonstrations to improve farmers' knowledge of risk management and modern production practices.
3. Farmers should be encouraged to form and actively participate in cooperative societies to improve access to credit, agricultural inputs, market information and extension services.
4. Investment in rural infrastructure, particularly storage facilities and feeder roads, should be prioritise to minimise post-harvest losses and improve market access for arable crop farmers.
5. Policies aimed at reducing the cost of improved farm inputs should be strengthened to enhance farmers' productivity and reduce their exposure to production risks.

References

Adejo, P., Shaibu, D., & Shaibu, U. (2025). Understanding the nexus of extension teaching methods and adoption of improved agricultural production technologies: Empirical evidence from cowpea farmers in Kogi State, Nigeria. *Tekirdağ Ziraat Fakültesi Dergisi*, 12(1), 122–133.

Adisa, R. S., Abuo, T. N., Ifabiyi, J. O., Abdulrahman, O. L., & Abdrashid, M. O. (2024). Climate variability adaptation strategies among rice farmers in Niger State, Nigeria. *Journal of Agriculture, Food, Environment and Animal Sciences*, 5(1), 13–21.

Adole, P. O., Peter, I. N., & Naswem, A. A. (2024). Impact of socio-economic characteristics on post-harvest management technologies of selected horticultural crops among farmers in Kogi State, Nigeria. *ADAN Journal of Agriculture*, 5(1), 1–12.

Agbola, T. O., Kehinde, A. D., & Akintunde, O. K. (2023). Risk management strategies among smallholder rice farmers in Ofu Local Government Area, Kogi State, Nigeria. *Scientific African*, 19, e01535.

Ahaneku, C. E., Onyeagocha, S., Eze, E. C., & Chidiebere-Mark, N. (2019). Risks and determinants of risk management strategies among rural cassava-based farmers in Imo State. *Journal of Agriculture and Food Sciences*, 17(2), 9–18.

Akanbi, S-U. O., Adekunle, A. O., Mukaila, R., & Isola, A. J. (2022). Assessment of crop farmers' attitude to risk and management methods in Oyo State, Nigeria. *Western Balkan Journal of Agricultural Economics and Rural Development*, 4(1), 37–48.

Akinola, A. A., & Ojo, O. E. (2019). Nutritional and economic roles of root and legume crops in Nigeria. *Journal of Agricultural Extension and Rural Development*, 11(3), 120-130.

Alabi, O. O., Makarau, S. B., Aluwong, J., Bayei, J., Lyocks, J. S., Man, A., Anekwe, C. O., Safugha, G. F., Alabuja, F., & Obinna-Nwandikom, C. O. (2023). Evaluation of maize farmers' attitude towards risk management and preference for crop insurance in Nigeria. *International Journal of Agriculture, Environment and Food Sciences*, 7(1), 62–69.

Alehile, K. S., Njiforti, P. P., Duru, M. C., & Jibril, M. S. (2022). Impact of climate change on Nigerian agricultural sector crop production. *Journal of Economics and Allied Research*, 7(1), 105–115.

Aminu, F. O., Balogun, E. O. S., & Oke, O. B. (2020). Farm risks and management strategies among arable crop farmers in Odogbolu Local Government Area of Ogun State, Nigeria. *Agrosearch*, 19(2), 41–53.

Chiaka, J.C., Zhen, L., Yunfeng, H., Xiao, Y., Muhirwa, F. & Lang, T. (2022). Smallholder farmers' contribution to food production in Nigeria. *Frontiers in Nutrition*, 9, 916678.

Duong, T. T., Brewer, T., Luck, J., & Zander, K. (2019). A global review of farmers' perceptions of agricultural risks and risk management strategies. *Agriculture*, 9(1), 10.

FAO. (2021). *The State of Food and Agriculture 2021: Making agrifood systems more resilient to*

shocks and stresses. Food and Agriculture Organization of the United Nations.

Hardaker, J.B., Lien, G., Anderson, J.R. & Huirne, R.B.M. (2015). *Coping with risk in agriculture: Applied decision analysis* (3rd ed.). CABI Publishing.

Ibeagwa, O. B., Ehirim, N. C., Ben-Chendo, G. N., Ukoha, I. I., Osuji, E. C., Maduike, I. A., Okwara, M. O., & Martins, S. E. (2019). Assessment of the risk management strategies among arable crop farmers in Owerri West Local Government Area of Imo State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*, 33(3), 1–10.

Ibitoye, S.J. & Saliu, O.J. (2019). An evaluation of the performance of Nigeria Agricultural Insurance Scheme in Kogi State. *Economics & Sociology*, 33(2), 1-9.

National Bureau of Statistics (NBS). (2023). *Demographic statistics bulletin 2023*. National Bureau of Statistics.

Ojo, T. O., Ogundeji, A. A., & Emenike, C. U. (2022). Does adoption of climate change adaptation strategy improve food security? A case of rice farmers in Ogun State, Nigeria. *Land*, 11(11), 1875.

Oparinde, L. O., Amos, T. T., Aturamu, O. A., & Daramola, A. G. (2018). Attitudes towards risk and risk combating strategies among maize and cassava farmers in Southwest, Nigeria. *Journal of Economics, Management and Trade*, 21(7), 1–12.

Sheu-Usman, T.Y., Fadahun, N.B., & Bolaji, M. (2022). Effectiveness of agriculture risk management strategies for resilience to climate shocks in Nigeria. *Scandinavian Journal of Agronomy*, 11(3), 120–129.

Ufondu, C.U., Ali, A.T., Salimonu, K. K., & Falusi, A. O. (2021). Yam production in some South East and North Central Zones of Nigeria beyond COVID-19 for acceleration towards inclusive sustainable development. *African Journal of Food, Agriculture, Nutrition and Development*, 19(7), 1–16.

Zhang, Y., Tan, Y., Qian, L., Sarkar, A., Nurgazina, Z., & Ali, U. (2020). Natural disaster shock, risk aversion and corn farmers' adoption of degradable mulch film: evidence from Zhangye, China. *International Journal of Climate Change Strategies and Management*, 12(4), 431–448.