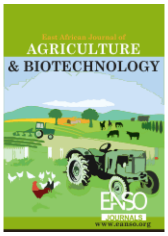

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Original Article

Profitability of Using Aflatoxin Smart Technologies amongst Smallholder Maize Farmers in Kongwa and Namtumbo Districts

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Aflatoxins, Aflatoxin Smart Technologies, Profitability, Adoption Incentives, Maize.

ABSTRACT

Aflatoxins are among the dangerous food scares on staple crops affecting food and nutritional safety. However, the use of good agronomic practices and aflatoxin-reducing products lessens aflatoxin infestations on farm produce. However, there is information dearth on the profitability of using aflatoxin smart technologies amongst farmers. Therefore, this study was designed to determine the profitability of using aflatoxin smart technologies amongst small-holder maize farmers in Kongwa and Namtumbo Districts. Regarding methodology, the study used a cross-sectional research design entailing 344 respondents (300 maize farmers and other 44 key informants). Whereby, simple random selection procedures were used to determine maize farmers, and purposively sampling procedures were used to determine key informants. Collected data was analyzed by Statistical Package for Social Sciences (SPSS) with the aid of both descriptive and inferential statistics. The study's findings showed that there were no easy ways used by farmers and traders to differentiate contaminated maize from non-contaminated maize which leads to an inability to pay more price for aflatoxin-free maize. In both districts, there were slightly small differences in the price of maize for farmers who adopted aflatoxin smart technologies and those who didn't use these technologies. However, despite the prices of maize being almost the same for adopters and non-adopters and the increase in production costs for farmers who adopted aflatoxin smart technologies, data showed it was profitable to use these technologies. Whereby findings showed that the profit margin for adopters was TZS 207,645.3 and TZS 171,176.2 for non-adopters in Kongwa District while the profit margin of TZS 763,788.1 for adopters and TZS 466,142.9 non-adopters in Namtumbo District. Then, the study concluded that there is a need to promote the use of aflatoxin smart technologies since the additional costs of using these technologies are well compensated with a profit margin as well as increased maize quality and quantity (yield).

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INTRODUCTION

Aflatoxins are among the dangerous food scares on staple crops affecting food and nutritional safety (Ortega-beltran & Bandyopadhyay, 2020). These carcinogenic mycotoxins result from moulds belonging to *Aspergillus flavus* (Kerry *et al.*, 2023; Wu, 2015). The problem seems to be high in less developed countries which depend much on agriculture. Whereby poor agronomic practices and the inability to control climatic factors seem to be the major factors accelerating the problem (Nyangi *et al.*, 2016; Stepman, 2018). While improvements in farm practices and the use of various readymade aflatoxin smart technologies have shown a significant impact in reductions of aflatoxin contaminations, yet, empirical shows there is a low adoption rate of the prominent technologies (Bandyopadhyay *et al*., 2019). Low adoption rates are highly associated with the type of farming systems; whereby most rural farmers produce food for subsistence featured by; small cultivated land sizes, low fertilizer use, the use of local seed varieties, low use of insecticides and pesticides, poor farm management and postharvest crop handling (Okori et al., 2022). This leads to low yield per area which further gets reduced due to aflatoxin's damages and ultimately affects the commercialization process of farming systems (Senghor *et al*., 2021). Moreover, the dependence on consumption of unprocessed food in rural areas exposes them to the risks of the impacts of aflatoxins on their health (Parimi *et al*., 2018).

On the other hand, Low awareness levels and high costs associated with good agronomic practices/ products have been among the factors affecting adoption rates of these practices and technologies (Ayedun *et a*l., 2017). Whereby farmers in rural areas are unable to access various products which have been proven to reduce the metabolism of mould fungus (Negash, 2018). This is caused by the remoteness of these areas, high transport costs, existence of local shops featuring low investment capital (Okori *et al*., 2022). Also, the high price of aflatoxin smart technologies has been a significant factor in the low adoption rates of these products (Jolly et al., 2009). Nonetheless, access to extension services has been an important factor in the awareness creation and promotion of the adoption of various technologies and practices (Migwi *et al*., 2020). But, in most less developed nations, most rural farmers have limited access to this important service (Okori et al., 2022). In addition, the inability of buyers to express more incentives on aflatoxin-free agricultural commodities provides no adoption

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incentives amongst farmers to use aflatoxin smart technologies (Anitha et al., 2019).

Difficulties in observing the contamination have failed to establish market-based incentives in terms of prices and quality stipulations which in turn gives no motive to farmers to take into account the issues on aflatoxins (Narayan & Geyer, 2022). A survey conducted by Ortega-beltran & Bandyopadhyay, (2020) and Rwebangira et al., (2022) showed that the low adoption rate of aflatoxin smart technologies is associated with increased production costs which has been reflected in the market price of agricultural commodities. However, in most markets, most commodities are charged the same prices. While a study by *Xu et al*., (2022) reported a significant increase in maize yield due to the use of various aflatoxin technologies but in the markets the products were sold at the same prices since there are no mechanical easy ways of differentiating aflatoxin-contaminated from non-contaminate agro –products. This is somehow a disappointment to farmers since the use of aflatoxin smart technologies increases costs which affects farmers’ profitability. Therefore, this study was designed to determine the profitability of using aflatoxin smart technologies amongst smallholder maize farmers.

MATERIALS AND METHODS

Study Area and Design

The study was conducted in two districts which are located in two regions with two different agro-ecological zones. Kongwa district is one of the districts of Dodoma region which is located in Central Tanzania with a Semiarid agro-ecological zone while Namtumbo District is located in Ruvuma Region which is found in the Southern Highlands of Tanzania and has a Tropical agro-ecological zone (Figure 1). The study selected these two districts since are major in maize production with regards to their zones, therefore the study aimed to compare differences in farmers' practices on maize cultivations and measures taken to reduce aflatoxin contaminations on maize and profitability on using aflatoxin smart technologies. The study used a cross-sectional research design entailing 300 maize farmers and other 44 key informants from four villages which were Banyibanyi and Mkoka villages in Kongwa District - Dodoma Region as well as Limamu and Mwangaza villages in Namtumbo District – Ruvuma Region. Simple random selection procedures were used to select maize farmers while purposively selection procedures were used to select the study’s key informants (maize traders, agro-input dealers and agricultural officers). Additionally, survey questionnaires were used to collect data from maize farmers while structured interviews were used to collect data from identified study’s key informants. Collected data were cleaned, coded and analyzed through Statistical Package for Social Sciences (SPSS) Version 25 with the aid of analytical models.

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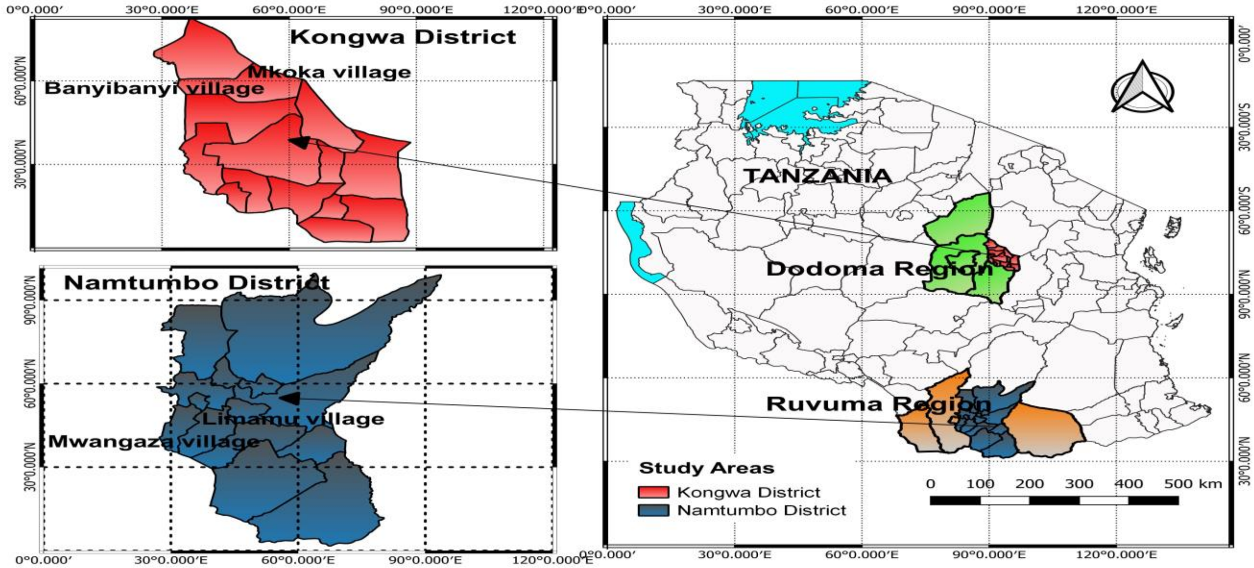
Figure 1: Study Areas



Analytical Framework

Profitability on Using Aflatoxin Smart Technologies

To estimate the profitability of using aflatoxin smart technologies the study used gross margin (GM) which is an excess after deducting variable costs (VC) from generated revenues (TR) as shown in equation (i).

$$Gross\ margin\ (GM) = Total\ Revenue\ (TR) - Total\ Variable\ Costs\ (TC) \dots\dots\dots (i)$$

$$GM = P_y Y - P_x X$$

Where:

GM Gross Margin

TR Total revenue

TVC Total Variable Costs

P_y Age, farm size and farmer's experience in years

Y Quantity of Maize yield

P_x Price of variable inputs

X Quantity of variable inputs

RESULTS AND DISCUSSIONS

Demographic Characteristics of Maize Farmers

The study's results (Table 1) showed there was a statistically significant difference in the education of maize farmers who adopted aflatoxin smart technologies and non-adopters at $P<0.01$ (X^2 = 10.759). The majority of maize farmers had a primary education level accounted about 77.3% with 56.3% adopters and 21% non-adopters, followed by 13.4% with secondary education level accounting for 11.4% adopters and 2% non-adopters, 5.7% with no formal education entailed 3.7 adopters and 2.0% non-adopters, 2.0% with bachelor degree involved 1.7% adopters and 0.3 non-adopter and 1.7% with college-level pertained all adopters. Results showed that the gender of maize farmers was not statistically different at $P<0.05$ but the study entailed 75% males within which 54.7% adopted aflatoxin smart technologies while 20.3% were non-adopters. On the other hand, 25% of maize farmers were female with 20% adopters and 5% non-adopters. Also, the marital status of the maize farmers was not a statistical difference between adopter and non-adopters at $P<0.05$ but generally, 79.0% of maize farmers were married within which 57.7% adopted aflatoxin

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smart technologies and 21.3% didn't adopt these technologies.

The study involved maize farmers who were single accounting for 11.3 with 9.0% adopters and 2.3% non-adopters, followed by 5.7% separated entailed 4.7% adopters and 1.0% non-adopters, as well as 4.0 widowed with 3.3 adopters and 0.7% non-adopters. Additionally, the age of maize farmers was not statistically different between adopters and non-adopters but the study entailed 39.7% maize farmers with age between 36 – 54 years (29.3% adopters and 10.3% non-adopters), 38.7% of maize farmers with age between 18 – 35 years (29.3% adopters and 9.3% non-adopters) and 21.7% of maize farmers with 55 years and above (16.0% adopters and 5.7% non-adopters). Moreover, the household size of maize farmers was not statistically different between adopters and non-adopters of aflatoxin smart technologies however, most of the households had a number of people below 5 accounted for 67% of maize farmers and entailed 50.3% adopters and 16.7 non-adopters. On the other hand, 32.7% of maize farmers' households had 5 -10 people within which 24.0% were adopters and 8.7% were non-adopters. 0.3% of households had more than 10 people and all were adopters of aflatoxin smart technologies.

Table 1: Demographic Characteristics of Maize Farmers in the Study Area

Variable (n = 300)		Non-adopters	Adopters	Total	Pearson Value	
					Chi-Square	Sig.
Gender	Female	15 (5.0)	60 (20.0)	75 (25.0)	1.504	0.220
	Male	61 (20.3)	164 (54.7)	225 (75.0)		
	Total	**76 (25.3)**	**224 (74.7)**	**300 (100)**		
Marital status	Single	7 (2.3)	27 (9.0)	34 (11.3)	3.633	0.458
	Married	64 (21.3)	173 (57.7)	237 (79.0)		
	Separated	3 (1.0)	14 (4.7)	17 (5.7)		
	Widowed	2 (0.7)	10 (3.3)	12 (4.0)		
	Total	**76 (25.3)**	**224 (74.7)**	**300(100)**		
Education level	No formal	6 (2.0)	11 (3.7)	17 (5.7)	10.759***	0.001
	Primary	63 (21.0)	169 (56.3)	232 (77.3)		
	Secondary	6 (2.0)	34 (11.4)	40 (13.4)		
	College level	0 (0.0)	5 (1.7)	5 (1.7)		
	Bachelor degree	1 (0.3)	5 (1.7)	6 (2.0)		
	Total	**76 (25.3)**	**224 (74.7)**	**300 (100)**		
Age	18 - 35	28 (9.3)	88 (29.3)	116 (38.7)	0.143	0.931
	36 - 54	31 (10.3)	88 (29.3)	119 (39.7)		
	55 and Above	17 (5.7)	48 (16.0)	65 (21.7)		
	Total	**76 (25.3)**	**224 (74.7)**	**300 (100)**		
Household Size	Below 5	50 (16.7)	151 (50.3)	201 (67)	0.436	0.804
	5 – 10	26 (8.7)	72 (24.0)	98 (32.7)		
	Above 10	0 (0.0)	1 (0.3)	1 (0.3)		
	Total	**76 (25.3)**	**224 (74.7)**	**300 (100)**		

Numbers parenthesis are percentages (%) *** $P<0.01$, ** $P<0.05$, ** $P<0.1$

Types of Land-Cultivated Maize in Relation to Adoptions of Aflatoxins Smart Technologies

The type of land ownership has been an important factor influencing the adoption of farming technologies (Stepman, 2018b). The same thing has been reported and land ownership plays an important role in the adoption of aflatoxin smart technologies. Findings showed that there was a statistical difference in adoptions of AST with owned farms at $P<0.01$ and ($X^2 = 35.808$) such that out of 300 maize farmers, 20.0% adopted AST in

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Kongwa and 18.6% adopted AST in Namtumbo district. Also, findings showed that there was a statistical difference between the district, leased land ownership and adoption status of AST at $P<0.01$ and (X^2 = 13.081) such that 1.0% of maize farmers adopted AST in Kongwa had leased farms while 2.3% adopted AST in Namtumbo district had leased farm. Additionally, findings showed there was a statistical difference in family-owned land across districts and adoptions of AST at $P<0.01$ and (X^2 = 18.316) in a way that 3.3% adopted AST in Kongwa while 27.0% adopted AST in Namtumbo District. Furthermore, findings showed that there was a statistically insignificant difference between community land, owned land, leased land and family land at $P<0.05$, 3.6% of maize farmers used owned and leased land, 0.7% had community land and 0.3% had owned, leased and owned land (Table 2).

Table 2: Types of Land Ownerships in Relation to Adoptions of Aflatoxin Smart Technologies

Land ownership status	Adoption	District: Kongwa	District: Namtumbo	Total	Chi-square test: Pearson Value	Chi-square test: Sig.
Owned	Non-adopter	49 (16.3)	0 (0.0)	49 (16.3)	35.808***	0.000
	Adopter	60 (20.0)	56 (18.7)	116 (38.7)		
	Total	**109 (36.3)**	**56 (18.7)**	**165 (55.0)**		
Leased	Non-adopter	13 (4.3)	0 (0.0)	13 (4.3)	13.081***	0.000
	Adopter	3 (1.0)	7 (2.3)	10 (3.3)		
	Total	**16 (5.3)**	**7 (2.3)**	**23 (7.6)**		
Family owned	Non-adopter	5 (1.7)	2 (0.7)	7 (2.3)	18.316***	0.000
	Adopter	10 (3.3)	81 (27.0)	91 (30.3)		
	Total	**15 (5.0)**	**83 (27.7)**	**98 (32.7)**		
Community-owned	Adopter	-	2 (0.7)	2 (0.7)		
	Total	-	**2 (0.7)**	**2 (0.7)**		
Owned and Leased	Non-adopter	7 (2.3)	0 (0.0)	7 (2.3)	1.925	0.165
	Adopter	3 (1.0)	1 (0.3)	4 (1.3)		
	Total	**10 (3.3)**	**1 (0.3)**	**11 (3.6)**		
Owned, leased and family owned	Adopter	-	1 (0.3)	1 (0.3)		
	Total	-	**1 (0.3)**	**1 (0.3)**		

Duration in Which Maize Farmers Sell their Harvests

Immediate After Harvest

The chi-square test (X^2 = 1.236) indicated that the sale of maize immediately after harvest wasn't statistically different between the two regions. Implying that in both regions, the behaviours of maize farmers in selling maize immediately after harvest were not statistically significantly different. Moreover, this indicates that in both regions some farmers do not store their harvested maize. Interestingly, during the survey, some farmers revealed that they prefer selling their maize directly after harvests to avoid storage costs, the influence of ongoing prices and the need for money. Moreover, it was found that some farmers sell their maize directly due to the fact that harvested maize contains high moisture contents which fetch high selling weight resulting in more money. However, this triggers higher chances for aflatoxin contaminations in case a buyer doesn't properly dry the bought maize (Table 3).

After Three (3) Months

The chi-square test (X^2 = 8.546) showed there was a statistical difference between farmers' sales of maize for the duration of three months at $P < 0.01$.

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Compared to the Dodoma region, there was a slightly larger number of farmers in the Ruvuma region who sold their maize after three months. However, it was reported that there was a significant difference between prices when farmers sell maize immediately after harvests and when sell maize after three months. Moreover, the market price was reported to be a major influence in storing maize and selling it after some while (Table 3).

After Six (6) Months

It was also found that sales of maize after at least six (6) months were statistically different between farmers in the two regions (X^2 = 34.682) at P < 0.001 (Table 3). Whereby it was found that most of farmers in Dodoma sold their maize after six months than farmers in the Ruvuma region. This means that when a farmer stores their harvest for a longer period increases the chance to fetch high selling prices but in turn increases higher chances for infestations if maize is not well stored which further increases the chance for aflatoxin contaminations.

After Nine (9) Months

Also, the study's findings showed that there was a statistically significant difference between farmers in selling maize after nine (9) months between the two regions (X^2 = 5.684) at P < 0.05 (Table 3). Whereby out of 5% of farmers; 4% were from Ruvuma while 1 % were from Dodoma region. However, only a few farmers reported selling their maize after nine months in both regions and most of these farmers are the ones who sell to meet farming costs.

Table 3: Duration in Which Maize Farmers Sell Their Harvests

When a farmer sells maize (n = 300)	**Response**	**District**		**Total**	**Chi-Square test**	**Sig.**
		Kongwa	**Namtumbo**			
Immediate after harvests	No	130 (43.3)	123 (41.0)	253 (84.3)	1.236	.266
	Yes	20 (6.7)	27 (9.0)	47 (15.7)		
Total		**150 (50)**	**150 (50)**	**300 (100)**		
After three (3) months	No	131 (43.7)	111 (37.0)	242 (80.7)	8.546**	.003
	Yes	19 (6.3)	39 (13.0)	58 (19.3)		
Total		**150 (50)**	**150 (50)**	**300 (100)**		
After six (6) months	No	50 (16.7)	101 (33.6)	151 (50.3)	34.682***	.000
	Yes	100 (33.4)	49 (16.3)	149 (49.7)		
Total		**150 (50)**	**150 (50)**	**300 (100)**		
After nine (9) months	No	147 (49.0)	138 (46)	285 (95.0)	5.684***	.017
	Yes	3 (1.0)	12 (4.0)	15 (5.0)		
Total		**150 (50)**	**150 (50)**	**300 (100)**		

Numbers parenthesis are percentages (%) **** P<0.01, ** P<0.05, ** P<0.1*

> *"The prices of maize vary with duration when maize is sold, but during harvest, the prices are very low, at least after sometimes the prices go up, but there are no price differences for users and non-users of aflatoxin smart technologies".*

Profitability of Using Aflatoxin Smart Technologies among Maize Farmers

Table 4 shows the profitability analysis of using aflatoxin smart technologies amongst maize farmers in the two districts. Results show there are statistical differences in costs and returns among the adopters and non-adopters as well as across the districts. It was found that the use of aflatoxin smart technologies in both Kongwa and Namtumbo

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Districts significantly added average variable costs of TZS 266,696.76 and TZS 438,446.38 respectively. Moreover, it was found that variable costs differed among non-adopters in the two Districts such that TZS 106,172.38 and TZS 198,857.14 in Kongwa and Namtumbo Districts respectively. Furthermore, the yield seemed to differ among adopters and non-adopters; whereby in the Kongwa district, the mean yield amongst adopters was 5 bags per acre while non-adopters' mean yield was 3.05 bags per acre. In Namtumbo districts, the mean yield per acre for adopters was 12.41 bags per acre and for non-adopters was 7 bags per acre. Nonetheless, the study found that there were slightly small differences in mean selling prices between adopters and non-adopters in both regions. This is attributed lack of market incentives for aflatoxin-free products like maize. The low market incentives on aflatoxin-free maize and its products affect the ability of farmers to adopt various technologies that reduce aflatoxin contaminations. Moreover, the average income per acre for adopters in the Kongwa district was TZS 474,342.1 and TZS 277,348.6 for non-adopters while in the Namtumbo district average income per acre for adopters of AST was TZS 1,202,234.5 and TZS 665,000.0 for non-adopters. Furthermore, findings showed that the profit margin for maize farmers in Kongwa District was TZS 207,645.3 for adopters and TZS 171,176.2 for non-adopters while in Namtumbo District the profit margin for adopters was TZS 763,788.1 and TZS 466,142.9 for non-adopters.

Table 4: Profitability Analysis of Using Aflatoxin Smart Technologies in Kongwa and Namtumbo Districts.

	Kongwa District		Namtumbo District	
Variable costs per Acre (TZS)	**Adopters (n = 76)**	**Non-Adopters (n = 74)**	**Adopters (n = 148)**	**Non-Adopters (n = 2)**
Leasing	23,214.3	23,183.3	59,444.4	-
Seed Costs	14,997.4	9,335.1	30,641.9	7,500.0
Labor costs	65,855.3	61,547.3	98,300.7	127,500.0
Fertilizer	130,000.0	-	165,281.5	44,000.0
Insects	-	-	11,882.4	-
Herbicides	14,000.0	-	16,052.6	-
Fungicides	-	-	14,777.8	-
Transport	14,036.0	9,099.3	29,865.7	8,857.1
Parking material	4,593.9	3,007.3	12,199.4	11,000.0
Total Variable Costs	**266,696.8**	**106,172.4**	**438,446.4**	**198,857.1**
Returns (Bag of 100kgs)				
Average yield per acre	5.0	3.1	12.4	7.0
Average price per bag	94,868.4	91,013.5	96,885.1	95,000.0
Average income per acre	**474,342.1**	**277,348.6**	**1,202,234.5**	**665,000.0**
Gross margin	**207,645.3**	**171,176.2**	**763,788.1**	**466,142.9**

DISCUSSIONS

The study was designed to determine the profitability of using aflatoxin smart technologies with the aim of adding tireless efforts to reducing the impact of aflatoxin contaminations. The study found that most adopters of aflatoxin smart technologies were male, which was triggered by differences in financial strength between males and females. Most households in the study areas were dominated by males who were considered the breadwinners and owners of the household's resources. The study's findings align with a study by Rwebangira *et al.*, (2022) on factors that influence smallholder farmers ' decisions to employ hermetic bag technology for maize grain storage in

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Kilosa District, Tanzania. However, male dominance over resources over females and differences in the adoption of aflatoxin smart technologies is not only reported in Tanzania but it's also in many countries as was reported in a study which was conducted in Kenya by Migwi *et a*l., (2020) on a study food additives & contaminants: part A assessment of willingness-to-pay for aflasafe Ke01, a native biological control product for aflatoxin management in Kenya. Additionally, findings showed that most adopters of aflatoxin smart technologies were married as reported by Rwebangira et al., (2022).

Also, findings showed that most of the adopters of AST had a primary education level due to the high number of people with primary education level who engages in agricultural activities after failure to proceed with other levels of education which differs from a study by Shiferaw et al., (2020) on study named Crops that feed the world 6. Past successes and future challenges to the role played by maize in global food security, who showed that majority of maize farmers had primary education level which affected the adoptions of technologies that reduces aflatoxins. Additionally, results showed that most adopters of aflatoxin smart technologies had age-falling in a working group as also reported by (Ortega-beltran & Bandyopadhyay, 2020). Furthermore, data showed most of the households that adopted aflatoxin smart technologies had a number below 5 members since most of these households had well economic status due to few people with low diversification of household resources as also reported by (Anitha et al., 2019).

Also, findings showed that the majority of maize farmers who adopted aflatoxin smart technologies had their own land. This is due to the fact that when farmers own lands, reduces variable costs such as leasing costs which paves more abilities of farmers to meet costs for aflatoxin smart technologies. The same findings were reported by a study of Stepman (2018), a study titled Scaling Up the Impact of Aflatoxin Research in Africa, the Role of Social Sciences. Moreover, the study found variations in the prices of maize between adopters and non-adopters in both districts. In some cases, the study found that farmers who used aflatoxin smart technologies sold their maize at lower prices compared to those who didn't use these technologies. Price variations between adopters and non-adopters demoralize farmers' initiatives to use aflatoxin smart technologies to reduce contaminations in maize. This aligns with the findings of a study by Bandyopadhyay et al., (2019) on "ground-truthing" efficacy of biological control for aflatoxin mitigation in farmers' fields in Nigeria: from field trials to commercial usage. It also aligns with the findings of a study by Stepman, (2018). Furthermore, the duration in which maize is sold was the only factor which determined price variations in both districts and a majority of maize farmers sold their maize after six (6) months which fetched relatively high prices, which is in line with *Rwebangira et al.,* (2022).

Also, the study's results on gross margin analysis the study found that despite low selling prices among adopters and non-adopters in both districts yet, there is a high profit margin on using aflatoxin smart technologies which is highly reflected in increased maize yields. This means that despite increased costs of production by buying aflatoxin smart technologies, the study found that these costs are covered with increased yield as well as there was incremental revenues after sales of increased yields. These findings conquers with a study which was conducted by Ortega-beltran & Bandyopadhyay, (2020).

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The study's results have provided evidence that despite the increase in variable costs of using aflatoxin smart technologies amongst smallholder maize farmers, these additional costs are covered by income generated from sales of maize. This shows that the use of aflatoxin smart technology is

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profitable and can be viewed from two perspectives; firstly; it is a strategy of reducing aflatoxin contaminations but also a strategy of increasing farmers' income. The findings of the study show the need to promote the adoption of these technologies so as to expose farmers to strategies for reducing aflatoxin contaminations in maize and promoting farmers' income through increased maize quality and yield. Also, findings showed that the actors of the maize value chain provide no incentives through additional prices for aflatoxin-free maize, rather buyers pay the same price for all types of maize in the markets without appraising the efforts taken by farmers in reducing contaminations on maize. Also, selling maize after at least six months seemed to fetch high prices but subject maize to higher risks of aflatoxin contaminations if maize is not stored.

Recommendations

With regard to the results found, the study would like to recommend that;

- There is a need to standardize maize prices for aflatoxin-free maize so as to attract more farmers to use various technologies that reduce aflatoxin infestations on maize and other agricultural products.
- There is a need for more promotions on the use of aflatoxin smart technologies amongst maize farmers by reducing selling prices.
- There is a need for foreign and domestic investors to invest in the construction of modern storage facilities that will be helpful to maize farmers in storing maize in safe ways.

Conflict of Interest

The study declares no conflicts of interest.

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