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ADOPTION OF SOYA BEAN AS AN ADAPTATION APPROACH TO CLIMATE CHANGE, A CASE OF INGQUZA HILL, EASTERN CAPE.

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Introduction

- Climate change poses a significant threat to agricultural productivity, particularly in vulnerable regions such as Ingquza Hill in the Eastern Cape of South Africa. Smallholder farmers, who rely heavily on traditional crops, face increasing risks due to changing weather patterns, which leads to reduced yields and food insecurity (Mastrorillo *et al.*, 2016).
- The literature on climate change adaptation in agriculture emphasizes the need for effective strategies that can enhance resilience among smallholder farmers. Several studies highlight the importance of crop diversification as a means to adapt to the impacts of climate variability (Nhemachena & Hassan, 2007; Bryan et al., 2013).
 - The adoption of climate-resilient crops, such as soybeans, presents an opportunity for these farmers to adapt to changing environmental conditions.



Introduction

- Soybeans, a leguminous crop that is recognized for its adaptability to diverse environmental conditions and its nutritional benefits, could serve as a viable alternative for smallholders seeking to enhance their resilience against climate change (Hoffman et al., 2019).
- Despite the potential benefits of adopting soybeans as an adaptation strategy to climate change, smallholder farmers in the Eastern Cape face several barriers to adoption.
- This study provides an insights into the viability of soybean production as a sustainable agricultural practice in the context of climate change adaptation in Ingquza Hill for improved yields and food security.
 - This research study also contributes to understanding how local farmers can better cope with the challenges posed by a changing climate, ultimately fostering sustainable agricultural development in the region.



Methodology





Methodology

The general Binary Logistic Regression Model is expressed as follows:

The operational model:

[[SBPI]]_i=β0 + β1 AGE+ β2 MarS+ β3 GND+ β4 AgriExp+ β5 MkA+ β6 EduLev+ β7 Hlnc+ β8 HSz+β9 SBTrain + β10 FarmInc +… Ui......(2)

The model assumes that Yi is linearly related to the predictors.

Where:

- Log [(Pi / (1 Pi)] = Decision to Adopt Soya Bean Production Initiatives
- Pi = Predicted probability that Y equals to one (1) (Adopters of soya bean production initiatives)
- 1 Pi = Predicted probability that Y equals to zero (0) (Non-adopters of soya bean production initiatives).
- In = the natural logarithm
- B0 = the regression constant (intercept)
- Ui = the error term
- B1, to $\beta 10$ = the regression coefficients for the independent variables





Study area

- The study was conducted in the Ingquza Hill local municipality in the Eastern Cape.
- Ingquza Hill Local Municipality is one of the five local municipalities within the jurisdiction of O.R. Tambo District Municipality. It consists of the magisterial areas of Lusikisiki and Flagstaff. The area is predominantly rural, with a surface area of 2477 km.
- The primary sector consists of two broad economic sectors, namely the mining and agricultural sectors.
- Agricultural activities in the area are largely subsistence farming, particularly livestock, although the Magwa Tea Plantation provides limited commercial productivity as well as job opportunities.



Results: Socioeconomic characteristics

Variable	Adopter %	Non-adopters %	Overall	
Age				
20 - 34 years	16,4	22,7	19,55	
35 – 44 years	22,9	28,5	25,7	
45 – 54 years	26,7	24,9	25,8	
55 – 65 years	25,6	12,2	18,9	
66 + years	6,7	13,4	10,05	
Total	100	100	100	
Gender				
Male	38,2	57,8	48	
Female	61,8	42,2	52	
Total	100	100	100	
Educational status				
Never went to school	15,6	7,8	11,7	
Primary	45,6	61,1	53,35	
Secondary	25,6	24,4	25	
Tertiary	13,3	6,7	10	
Total	100	100	100	
Formal employment status				
Yes	24,4	20,0	22,2	
Νο	75,6	80,0	77,8	
Total	100	100	100	
Agricultural Experience				
0 to 5 years	13,1	18,3	68,9	
6 to 10 years	19,7	25,1		
10 + years	67,2	56,6	68,9	
Total	100	100	100	

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Results: Agroclimatic conditions

Climatic conditions experienced by smallholder farmers



■ Yes (%) ■ No(%)

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Results: adoption of soya bean production

Adoption of soya bean production

Adopters
Non adopter



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Results: Regression analysis

INEPENDANT VARIABLES	В	S.E.	df	Sig.	Exp(B)
AGE	.637	.333	1	.056*	1.891
GENDER	.586	.307	1	.056*	1.796
HOUSEHOLD SIZE	.067	.222	1	.763	1.069
ARABLE LAND SIZE	.321	1.180	1	.786	1.378
EMPLOYMENT STATUS	.192	.558	1	.730	1.212
FARM INCOME	2.221	.586	1	.000***	.109
EDUCATIONAL LEVEL	1.309	.577	1	.023**	.270
SOYA BEAN TRAINING	.409	.261	1	.004***	.664
AGRICULTURAL EXPERIENCE ACCESS TO EXTENSION SERVICES	425 .102	.457 .491	1 1	.352 .835	.654 1.108
AVAILABILITY OF FUNDING	.047	.161	1	.769	1.049
CHANGE IN RAINFALL PATTERNS	2.000	.627	1	.041**	.135
HEAT STRESS SOIL EROSION	379 1.458	.191 .430	1 1	.015** .052**	.684 4.296
WATER SCARCITY	047	.129	1	.716	.954
UNCONTROLLABLE PESTS AND WEEDS	1.289	.434	1	.002***	.276
MODEL SUMMARY					
-2 LOG LIKELIHOOD	145.816ª				
COX & SNELL R SQUARE	0.438				
NAGELKERKE R SQUARE	0.582				

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DISCUSSION

- Previous studies have consistently shown that soybean is a resilient crop that can adapt well to changing climate conditions and has a high tolerance to drought and can improve soil fertility through nitrogen fixation with numerous economic benefits (Lema *et al.* (2019) and Manda et al. (2020)
- In the context of Ingquza Hill, the findings identified economic and environmental benefits are drivers of the adoption of soya bean production, highlighting factors such as such as gender, age, educational level, heat stress, and change in rainfall patterns.
- These findings align with the work of Osei et al. (2021), who noted that the successful adoption of climate-resilient crops often depends on the availability of resources and support systems. The study in Ingquza Hill underscores the need for targeted interventions to address these challenges, such as providing training and facilitating the adoption of soya bean as an effective adaptation strategy to climate change in the region.
- Overall, the study underscores the importance of promoting soya bean as a viable adaptation strategy to climate change in the region, while also highlighting the need for targeted support such as training and youth and women-specific programmes.



CONCLUSION AND RECOMMENDATIONS

- The study concludes that the adoption of soya bean production as an adaptation approach to climate change in Ingquza Hill, Eastern Cape, presents significant opportunities for enhancing agricultural resilience and improving food security.
- Soybean cultivation has the potential to provide farmers with a viable crop that is more tolerant to changing climate conditions, thereby ensuring stable yields and income.

The study could contribute to a more sustainable agricultural framework that addresses climate change challenges. This study therefore recommends that :

- Local agricultural extension services should be strengthened to provide farmers with the necessary training and resources for successful soya bean cultivation.
- Policies should be developed to support the transition to soybean farming, including financial incentives, access to quality seeds, and market development.
- Collaborative efforts among government, NGOs, and research institutions are essential to facilitate knowledge sharing and promote sustainable practices.
- Engaging local communities not limited to youth and women in the decision-making process to enhance the effectiveness of the initiatives and ensure that they align to the specific needs of farmers in the region.





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Thank you Kea Leboha

"The Journey ahead is still long, let treat our planet as a patient."



