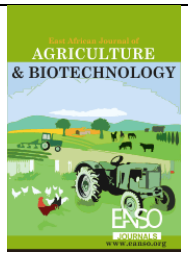


East African Journal of Agriculture and Biotechnology
eajab.eanso.org
Volume 7, Issue 1, 2024
p-ISSN: 2707-4293 | e-ISSN: 2707-4307
Title DOI: https://doi.org/10.37284/2707-4307

EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania

Dr. Solomon Simon Mhango, PhD[1*] *& Rose L. Ngowi*[2]

[1] Tengeru Institute of Community Development, P. O. Box 1006, Arusha, Tanzania.
[2] The Institute of Accountancy Arusha- Dar es Salaam Campus, P. O. Box 2798 Arusha, Tanzania.
* Author for Correspondence Email: mhangos2004@yahoo.co.uk

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

Date Published:

21 March 2024

Keywords:

Weather Variability, Extension Services and Support, Sugar Companies, Pests and Diseases Management, Sugar Cane, Farmer.

ABSTRACT

This study investigates the nuanced perspectives of small-scale sugarcane farmers around the Kilombero Sugar Company in the Kilombero District, Morogoro, regarding the effects of weather variability, climate change, extension services, and support from sugar processing companies on sugarcane production. Cross-sectional research design was employed to gather information using a questionnaire survey from 128 farmers who were obtained through a simple random sampling technique. Descriptive statistics were used for analysis. The findings elucidate climate change and altered weather patterns are influencing agriculture, in this case, impacting the cultivation of sugarcane such that that changes in temperature and rainfall patterns have indeed resulted in unpredictable flowering and maturity cycles in sugarcane crops. Furthermore, the study highlights the significant role of extension services in enhancing agricultural practices and adequate pest and disease management practices contributes to the overall health and vigour of their sugarcane crops. It is concluded that weather variability, climate change, extension services, and support from sugar processing companies on sugarcane production are important factors influencing sugarcane production. The study emphasises the necessity of tailored education and outreach programs to bolster farmers' understanding and adoption of effective pest and disease management practices essential for sustainable sugarcane production in the Kilombero District.

APA CITATION

Mhango, S. S. & Ngowi, R. L. (2024). Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania. *East African Journal of Agriculture and Biotechnology*, *7*(1), 161-172. https://doi.org/10.37284/eajab.7.1.1832

CHICAGO CITATION

Mhango, Solomon Simon and Rose L. Ngowi. 2024. "Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania". *East African Journal of Agriculture and Biotechnology* 7 (1), 161-172. https://doi.org/10.37284/eajab.7.1.1832.

HARVARD CITATION

Mhango, S. S. & Ngowi, R. L. (2024) "Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania", *East African Journal of Agriculture and Biotechnology*, 7(1), pp. 161-172. doi: 10.37284/eajab.7.1.1832.

IEEE CITATION

S. S. Mhango & R. L. Ngowi "Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania", *EAJAB*, vol. 7, no. 1, pp. 161-172, Mar. 2024.

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

MLA CITATION

Mhango, Solomon Simon & Rose L. Ngowi. "Perceived Factors affecting Sugarcane Production Among Small-Scale Farmers in Kilombero District, Morogoro, Tanzania". *East African Journal of Agriculture and Biotechnology*, Vol. 7, no. 1, Mar. 2024, pp. 161-172, doi:10.37284/eajab.6.1.1832.

INTRODUCTION

Sugarcane holds a significant and strategic position due to its versatile applications in various aspects of daily life, making it a crucial crop for both domestic and industrial purposes (Owino, 2019;). It stands out as a cornerstone industrial crop, thriving across subtropical and tropical regions globally (Zulu et al., 2019). Sugarcane production has traditionally been affected by a multiplicity of factors ranging from lack of finances, and weather variability to poor government policies (Machimu & Kayunza, 2019). However, Achandi (2019) cites pests and diseases as the core challenge of sugarcane farming by small-scale farmers, whereas, Ambetsa et al. (2020) argue that production of sugarcane is hindered by poor extension services and lack of effective government policy. These divergent perspectives of which core factors affect sugarcane production create a clumsy picture, hence necessitating study with precise perspective.

Furthermore, there are conflicting views on which core factors influence sugarcane production, with each scholar presenting different factors. For instance, Sulle(2017) identified the core factor being land politics, Owino(2019) fronted social, economic factors like age, gender and income, whereas Pretty and Bharucha (2018), Rondhi et al. (2020), and Ruml et al. (2021) identified the provision of inputs, extension services and credit whereas Rondhi et al. (2020), Ruml et al. (2021), identified weather and climatic conditions as critical determinants while Johnny et al. (2019) and Kangwiria & Gichuki(2017) presented climate change, infrastructure and availability of land as core factors.

However, Mushi (2015) indicates that weather and climatic conditions have tremendously influenced not only the production of sugarcane but also the profitability of sugarcane. He adds that harsh weather climatic conditions are partly to blame for the reduction in sugarcane production in the Morogoro Region, whereby most of the small-scale farmers rely on annual rainfall for cultivation. While Metiso & Tsvakirai (2019) confirms that in order to increase sugarcane production, there is a need to have effective and accessible extension services to small-scale farmers as well as give them adequate support from sugarcane processing companies. Pretty J, Bharucha ZP. (2018) reveal that Integrated Pest Management (IPM) is a leading complement and alternative to synthetic pesticides and a form of sustainable intensification with particular importance for tropical smallholders and that IPM has a mean yield increase across projects and crops of 40.9%. This implies that effective pest management leads to at least 41% increase in crop yield, indicating a substantial positive effect of pest and disease management on sugarcane production. These divergently noted factors create confusion as there are no firmly agreed basic core factors that influence sugarcane production, and that's where this study comes in to delve into the core determinants influencing sugarcane production by small-scale farmers, addressing a critical gap in understanding and offering insights to enhance the situation.

The Tanzanian government has taken proactive steps to bolster the business performance of smallholder sugarcane farmers in Morogoro, primarily through the promotion of Contract Farming (CF) and the provision of essential production inputs, improved infrastructure, and robust technical and extension services support (Martiniello, 2021; Mpeta et al., 2017). To foster direct communication and collaboration, farmers' associations were established during the 1990s, facilitating effective interaction between smallholder sugarcane farmers and the Kilombero Sugar Company Limited (KSCL) to enhance sugarcane production (Isager et al., 2018).

Despite these concerted efforts by the government and other stakeholders, sugarcane production

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

continues to fall significantly below national demand (Mwakalobo & Mbeki, 2019). This raises concerns about a potential lack of comprehensive understanding regarding the fundamental factors impacting sugarcane production and their corresponding solutions.

This study emerges as a response to address this gap. Furthermore, while scholars like Isager et al. (2018), Mwakalobo & Mbeki (2019), and Maschimu & Kayunze (2019) have ventured into exploring issues affecting sugarcane production, they have left a void regarding the influence of pivotal factors such as weather variability & climate change, extension services & support from sugarcane production companies, as well as pest & disease management. This gap has created an incomplete or uncertain perspective, emphasising the need for a focused study like the present one, which will provide a concrete, accurate, and current understanding of the precise impact of these factors on sugarcane production by small-scale farmers. Additionally, Makinde et al. (2018), Pretty & Bharucha (2016), and Kumah (2018) all concur that there remains a dearth of recent studies that comprehensively investigate the core determinants of sugarcane production by small-scale farmers. Hence, the rationale for this study is to fill up this gap.

THEORETICAL REVIEW

This study is guided by the Diffusion of Innovation Theory by Rogers (1995), which explains how new ideas, products, technologies, or practices spread within a society or social system. It focuses on the process by which innovations are adopted and accepted by individuals or groups over time. The theory has been widely applied in fields such as agriculture, technology, health, agriculture, and marketing to understand how and why people adopt new ideas or practices. The application of The Diffusion of Innovation Theory to this study" reveals valuable insights into the process of adopting innovative sugarcane production practices, pest and diseases management techniques, as well as the adoption of extension services. The theory's stages of adoption align with the steps small-scale farmers take to integrate new techniques, considering factors like relative advantage and compatibility. Additionally, observability highlights the impact of visible positive outcomes on adoption decisions. Altogether, the theory provides a comprehensive framework for understanding how innovative practices spread among small-scale sugarcane farmers and how factors like perceived benefits, ease of adoption, and learning from peers influence the process (Ally & Ngaruko, 2018). Furthermore, by applying The Diffusion of Innovation Theory to this study, the researcher can understand the factors that influence the adoption of innovative sugarcane production practices among small-scale farmers.

METHODOLOGY

This study was conducted in the Kilombero District and involved Ifakara, Kidatu, Mang'ula, Mlimba, and Kiberege Wards in the Morogoro Region. The selection was based on the strategic easy-reach location of the study area and having the highest single concentration of small-scale sugarcane farmers. This study adopted a cross-sectional research design was adopted whereby the total population of sugar cane farmers were 188 and simple random technique was used to obtain 128 small-scale sugar cane farmers as estimated using Yamane's formula (Yamane, 1973). Primary data were gathered using a questionnaire survey. However, secondary data was collected by reviewing all relevant documented sources, including books, articles from previous studies, and publications from different sources. Quantitative data collected were analysed descriptively with the help of Statistical Package for Social Sciences (SPSS) version 20 to explore the factors influencing Sugarcane Production among Small-Scale Farmers.

RESULTS AND DISCUSSIONS

Perceived Factors Influencing Small-Scale Farmers' Sugarcane Production in Kilombero District

Weather Variability and Climate Change on Sugarcane Production

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

The respondents were asked to state their level of agreement or disagreement with the statement, "I have observed an increase in the frequency of extreme weather events (e.g., floods, droughts) that negatively impact sugarcane cultivation" (*Table 1*).

Table 1: An increase in the frequency of Floods and droughts do affect sugarcane cultivation

Response	Frequency	Percentage (%)
Strongly Disagree	8	6.25
Disagree	20	15.62
Neither	16	12.5
Agree	56	43.75
Strongly Agree	28	21.88
Total	128	100.0

Source: Primary Data, 2023

Small-scale sugarcane farmers who asserted Strongly Disagree (6.25%) and Disagree (15.625%) constituted a combined 21.875% of the respondents disagreeing with the statement that they have observed an increase in the frequency of extreme weather events negatively impacting sugarcane cultivation (*Table 1*). This indicates that a minority of the small-scale sugarcane farmers in the Kilombero area do not perceive a significant increase in extreme weather events affecting their sugarcane cultivation. Moreover, 12.5% of the respondents neither agree nor disagree with the statement. These respondents are unsure or do not perceive a noticeable change in the frequency of extreme weather events affecting sugarcane cultivation. However, a combined 65.625% of the respondents ultimately agree or strongly agree with the statement. This suggests that a significant majority of the small-scale sugarcane farmers in the Kilombero area have observed an increase in the frequency of extreme weather events, such as floods and droughts, negatively impacting their sugarcane cultivation. These observations align with the perception that climate change and altered weather patterns are influencing agriculture, in this case, impacting the cultivation of sugarcane in the Kilombero area. Such observations are critical for adaptation and resilience planning in the face of changing climate patterns.

This study's findings agree with Owino (2019), who reveals that the unpredictable and hostile weather and climatic conditions are largely to blame for the reduction in sugarcane production in the country indicating that weather variability and climate change have a significant effect on sugarcane productivity/output in that conducive weather and climatic conditions are a recipe for increased sugarcane production and the reverse is true.

Changes in Temperature and Rainfall Patterns to Unpredictable Flowering and Maturity Cycles in Sugarcane Crops

Additionally, the small-scale farmers were asked to state their level of agreement or disagreement with the statement "Changes in temperature and rainfall patterns have led to unpredictable flowering and maturity cycles in sugarcane crops" and their responses are shown hereunder:

Table 2 shows that 3.1% of the small-scale farmers strongly disagree and 12.5% disagreed, making a combined total of 15.6% of the respondents who strongly disagree or disagree with the statement that changes in temperature and rainfall patterns have led to unpredictable flowering and maturity cycles in sugarcane crops. This suggests that a minority of the small-scale sugarcane farmers in the Kilombero area do not perceive a strong link between climate changes and unpredictability in flowering and maturity cycles. Also, 9.38% of the respondents neither agree nor disagree with the statement. These respondents are unsure or do not have a clear perception of the impact of changing weather patterns on the flowering and maturity cycles of sugarcane crops. Additionally, 50% agreed and 25% strongly agreed, giving a combined total of

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

75.% of the respondents who agree or strongly agree with the statement. This suggests that a significant majority of the small-scale sugarcane farmers in the Kilombero area believe that changes in temperature and rainfall patterns have indeed resulted in unpredictable flowering and maturity cycles in sugarcane crops.

Table 2: Changes in temperature and rainfall patterns lead to unpredictable flowering and maturity cycles in sugarcane crops

Response	Frequency	Percentage (%)
Strongly Disagree	4	3.1
Disagree	16	12.5
Neither	12	9.4
Agree	64	50.0
Strongly Agree	32	25.0
Total	128	100.0

Source: Primary Data, 2023

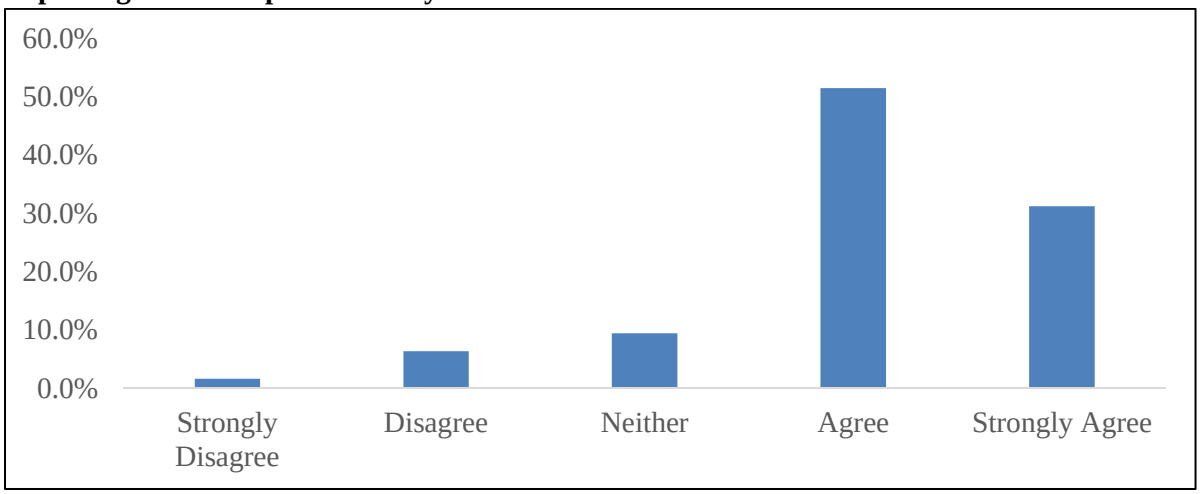
In summary, the findings indicate that a substantial majority of the respondents perceive a direct link between changing temperature and rainfall patterns and the unpredictability of flowering and maturity cycles in sugarcane crops. This awareness among farmers is crucial as it highlights the need for adaptive strategies in sugarcane cultivation to cope with the impacts of climate change, ensuring sustainable agricultural practices in the Kilombero area.

The above findings agree with a study by Mushi (2015), which presents that weather and climatic conditions have tremendously influenced not only the production of sugarcane but also the profitability of sugarcane. He adds that harsh weather climatic conditions are partly to blame for the reduction in sugarcane production in the Morogoro region, whereby most of the small-scale farmers rely on annual rainfall for cultivation.

Impact of Weather-Related Disruptions to the Entire Production Cycle

Furthermore, the small-scale sugarcane farmers from the Kilombero area were asked to agree or disagree with the statement, "Weather-related disruptions have caused delays in planting and harvesting sugarcane, impacting the entire production cycle", their responses are as shown in *Figure 1*.

Figure 1: Weather-related disruptions cause delays in planting and harvesting sugarcane, impacting the entire production cycle



Source: Primary Data, 2023

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

The study finding shows that, the number of small-scale sugarcane farmers who strongly agreed was 1.6%, 7.8% disagreed, totalling to combined 9.3% of the respondents who strongly disagree or disagree with the statement that weather-related disruptions have caused delays in planting and harvesting sugarcane, impacting the entire production cycle (*Figure 1*). This suggests that a very small minority of the small-scale sugarcane farmers in the Kilombero area do not perceive a strong link between weather-related disruptions and delays in the sugarcane production cycle. Also, 15.63% of the respondents neither agree nor disagree with the statement. These respondents are unsure or do not have a clear perception of the impact of weather-related disruptions on planting and harvesting sugarcane. Whereas 42.2% agreed and 32.8% strongly agreed, totalling a combined 75% of the respondents who agree or strongly agree with the statement. This suggests that a significant majority of the small-scale sugarcane farmers in the Kilombero area believe that weather-related disruptions have indeed caused delays in planting and harvesting sugarcane, impacting the entire production cycle.

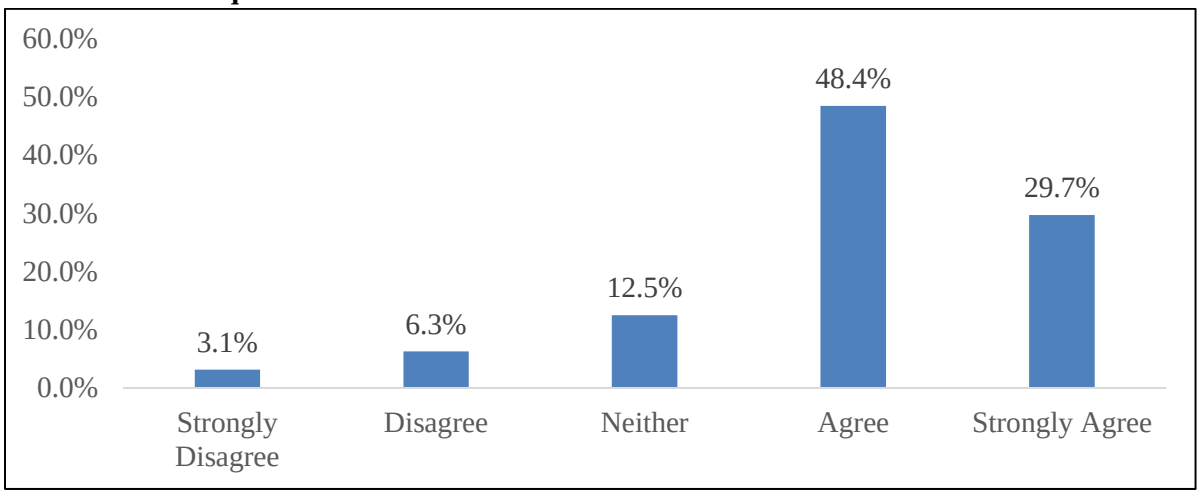
The findings indicate that a substantial majority of the respondents perceive a direct link between weather-related disruptions and delays in planting and harvesting sugarcane, affecting the entire production cycle. This awareness among farmers is crucial as it emphasises the need for adaptive strategies, flexible planting schedules, and efficient harvesting practices to mitigate the impacts of weather-related disruptions on sugarcane cultivation and production in the Kilombero area.

Extension Services & Support from Sugar Processing Companies

Valuable Extension Services Information

The respondents were asked to agree or disagree with the statement, "Extension services have provided valuable information on modern sugarcane cultivation techniques", their findings are in *Figure 2*.

Figure 2: Extension services have provided me with valuable information on modern sugarcane cultivation techniques



Source: Primary Data, 2023

It is shown that 3.1% of the small-scale sugarcane farmers strongly disagreed, 6.3% disagreed, making a total of 9.38% of the respondents who strongly disagree or disagree with the statement that extension services have provided them with valuable information on modern sugarcane cultivation techniques (*Figure 2*). This indicates that a small minority of the small-scale sugarcane farmers in the Kilombero area do not find extension services valuable in providing information on modern cultivation techniques. In addition, 12.5% of the respondents neither agree nor disagree with the statement. These respondents are unsure or do not have a clear

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

perception of the value of extension services in providing information on modern sugarcane cultivation techniques. Moreover, 48.4% agreed and 29.7% strongly agreed, which led to a combined 78.13% of the respondents agreeing with the statement. This suggests that a significant majority of the small-scale sugarcane farmers in the Kilombero area believe that extension services have indeed provided them with valuable information on modern sugarcane cultivation techniques.

The above findings indicate that a substantial majority of the respondents perceive extension services as valuable sources of information on modern sugarcane cultivation techniques. This underscores the importance of extension services in providing farmers with essential knowledge and techniques to enhance their sugarcane cultivation practices. It also highlights the potential role of extension services in fostering improved agricultural practices and increasing productivity in the Kilombero area. This study is in line with Ally (2023), who asserts that extension services have a significant relationship with sugarcane production.

Guidance Offered by Extension Officers

Furthermore, the farmers were asked to state their level of agreement and disagreement with the statement, "The guidance offered by extension officers has contributed to increased awareness of pest and disease management practices in my sugarcane fields", their responses are shown in *Table 3*).

Table 3: The guidance offered by extension officers has contributed to increased awareness of pest and disease management practices in my sugarcane fields

Response	Frequency	Percentage (%)
Strongly Disagree	2	1.56
Disagree	6	4.69
Neither	18	14.06
Agree	68	53.13
Strongly Agree	34	26.56
Total	128	100.0

Source: Primary Data, 2023

Table 3 shows that 1.56% of the small-scale sugarcane farmers strongly disagree, 4.69% disagree, making a combined 6.25% of the respondents who strongly disagree or disagree with the statement that the guidance offered by extension officers has contributed to increased awareness of pest and disease management practices in their sugarcane fields. This suggests that a very small minority of the small-scale sugarcane farmers in the Kilombero area do not believe that extension officers have contributed to their awareness of pest and disease management practices. Moreover, 14.06% of the respondents neither agree nor disagree with the statement. These respondents are unsure or do not have a clear perception of the impact of extension officers on their awareness of pest and disease management practices. Also, the majority (53.13%) agreed, and 26.56% strongly agreed, making a combined total of 79.69% of the respondents agreeing with the statement. This suggests that a significant majority of the small-scale sugarcane farmers in the Kilombero area believe that the guidance provided by extension officers has indeed contributed to increased awareness of pest and disease management practices in their sugarcane fields.

This underscores the importance of extension services in improving farmers' knowledge and practices related to pest and disease management, which is vital for sustaining sugarcane cultivation in the Kilombero area. The above findings disagree with Machimu (2017), who argues that inadequate extension services are partly responsible for the decline in sugarcane production.

Pest and Disease Management Effect on Sugarcane Production

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

Adequacy of Pest and Disease Management Practices

The small-scale sugarcane farmers were asked to state their level of agreement or disagreement with the statement, "Adequate pest and disease management practices have positively impacted the overall health and vigour of my sugarcane crops", their responses are in *Table 4.*

Table 4: Adequate pest and disease management practices have positively impacted the overall health and vigour of my sugarcane crops

Response	Frequency	Percentage (%)
Strongly Disagree	2	1.56
Disagree	10	7.81
Neither	16	12.5
Agree	62	48.44
Strongly Agree	38	29.69
Total	128	100.0

Source: Primary Data, 2023

Table 4 shows that a substantial number (48.44%) of respondents agree and 29.69% strongly agree, to make a significant majority of small-scale sugarcane farmers (78.13%) have a positive perception, believing that adequate pest and disease management practices contribute to the overall health and vigour of their sugarcane crops. This suggests that most farmers recognise the importance of effective pest and disease management for sugarcane health.

Approximately 12.50% of farmers hold a neutral stance, indicating they neither agree nor disagree with the statement about the impact of pest and disease management practices on the overall health and vigour of their sugarcane crops. This group may have varied experiences or may need more information to form a strong opinion. However, a total of 9.37% of farmers express some level of disagreement (1.56% strongly disagree, 7.81% disagree) regarding the positive impact of pest and disease management practices on the overall health and vigour of sugarcane crops. This suggests that there is a small subset of farmers who do not believe that these practices significantly impact the health and vigour of their crops.

These findings imply that a majority of farmers in the Kilombero area perceive adequate pest and disease management practices as beneficial for enhancing the overall health and vigour of their sugarcane crops. Strengthening and promoting effective pest and disease management strategies tailored to the specific needs of small-scale sugarcane farmers could potentially lead to further improvements in crop health and vigour, aligning with the positive perception expressed by most farmers. Addressing the concerns of the minority who disagree may also help in fine-tuning pest and disease management approaches. The above findings also agree with Machimu (2017), who reports that pests and disease issues have negatively impacted sugarcane production.

Regular Monitoring and Early Detection of Pests and Diseases

Furthermore, the small-scale sugarcane farmers were asked to state their level of agreement or disagreement with the statement, "Regular monitoring and early detection of pests and diseases have helped prevent significant losses in my sugarcane fields" (*Table 5*).

Table 5 shows that a substantial number (44.4%) of the respondents agree and 31.3% strongly agree, making a significant majority of small-scale sugarcane farmers (75.7%) who have a positive perception, believing that regular monitoring and early detection of pests and diseases help prevent significant losses in their sugarcane fields. This suggests that most farmers acknowledge the importance of timely monitoring and detection for minimising losses. However, a total of 20.3% of farmers express some level of disagreement regarding the positive impact of regular monitoring and early detection of pests and diseases on preventing significant losses in

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

sugarcane fields. This suggests that there is a subset of farmers who do not believe that these practices significantly prevent losses.

The study findings imply that a majority of farmers in the Kilombero area perceive regular monitoring and early detection of pests and diseases as crucial for preventing significant losses in their sugarcane fields. Emphasising and promoting these practices, along with educating farmers on effective monitoring techniques, could potentially lead to further improvements in minimising losses and overall crop health. Addressing the concerns of the minority who disagree may also help in fine-tuning monitoring and early detection approaches.

The above findings are in line with Pretty & Bharucha (2016), who report that Integrated Pest Management (IPM) is a leading complement and alternative to synthetic pesticides and a form of sustainable intensification with particular importance for tropical smallholders and that IPM has a mean yield increase across projects and crops of 40.9%. This implies that effective pest management leads to at least 41% increase in crop yield, indicating a substantial positive effect of pest and disease management on sugarcane production

Table 5: Regular monitoring and early detection of pests and diseases have helped prevent significant losses in my sugarcane fields

Response	Frequency	Percentage (%)
Strongly Disagree	0	0
Disagree	26	20.3
Neither	0	0
Agree	62	44.4
Strongly Agree	40	31.3
Total	128	100.0

Source: Primary Data, 2023

Implementing Pest Management Techniques

Furthermore, the small-scale sugarcane farmers were asked to state their level of agreement or disagreement with the statement, "Implementing pest management techniques has contributed to better control of pests and diseases in my sugarcane cultivation" (*Table 6*).

Table 6: Implementing pest management techniques contribute to better control of pests and diseases in sugarcane cultivation

Response	Frequency	Percentage (%)
Strongly Disagree	0	0
Disagree	10	7.8
Neither	0	0
Agree	58	76.6
Strongly Agree	20	15.6
Total	128	100.0

Source: Primary Data, 2023

The study findings show that the majority (76.6%) of the respondents agree and 15.6% strongly agreed with the statement "Implementing management pest management techniques has contributed to better control of pests and diseases in my sugarcane cultivation" which implies that a significant majority of small-scale sugarcane farmers (92.2%) have a positive perception, believing that implementing pest management techniques contributes to better control of pests and diseases in their sugarcane cultivation. This suggests that most farmers acknowledge the importance of effective pest management practices for controlling pests and diseases. However, a total of 7.8% of farmers disagree regarding the positive impact of implementing pest management techniques on controlling pests and diseases in sugarcane cultivation (*Table 6*).

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

This suggests that there is a subset of farmers who do not believe that these techniques significantly contribute to control.

These findings imply that a majority of farmers in the Kilombero area perceive implementing pest management techniques as beneficial for better control of pests and diseases in their sugarcane cultivation. Strengthening education and implementation of effective pest management practices tailored to the specific needs of small-scale sugarcane farmers could potentially lead to further improvements in pest and disease control, aligning with the positive perception expressed by most farmers. Addressing the concerns of the minority who disagree may also help in fine-tuning pest management strategies.

This study agrees with Ojiewo et al. (2016), who assert that successful approaches have been used to enhance sugarcane cultivation practices while ensuring sustainability and reduced reliance on harmful pesticides.

Conclusion

Weather patterns, extension services, and effective pest and disease management are major factors that impact sugarcane production among small-scale farmers in Kilombero District. shows potential influence in sugarcane production among small-scale farmers.

Recommendations Extension officers are advised to strengthen extension services to provide farmers with timely and relevant information on pest and disease management practices. Extension officers should work closely with farmers to understand their specific needs, challenges, and uncertainties. Tailored workshops and training sessions can help build knowledge and confidence among farmers.

Government is advised to implement weather-resilient farming techniques through educating farmers on weather-resilient farming techniques to help mitigate the impact of changing weather patterns on sugarcane production. This includes appropriate irrigation strategies and farming practices that align with altered flowering and maturity cycles due to climate change.

REFERENCES

Achandi, E. L. (2019). Women empowerment, technical efficiency and market participation: a study of smallholder rice farmers in Kilombero district, Tanzania. University of Dar es Salaam. Pages 5-28.

Ambetsa, F. L., Mwangi, S. C., Ndirangu, S. N. (2020). Technical efficiency and its determinants in sugarcane production among smallholder sugarcane farmers in Malava sub-county, Kenya. *African Journal of Agricultural Research*, 15(3), 351–360.

Isager, L., Fold, N., & Nsindagi, T. (2018). The Post-Privatization Role of Out-growers' Associations in Rural Capital Accumulation: Contract Farming of Sugar Cane in Kilombero, Tanzania. *Journal of African Economies*, 27(1), 196–213. doi:10.1093/jae/ejy020

Johnny, E. G., Kabubo-mariara, J., Mulwa, R., & Ruigu, G. M. (2019). African Journal of Economic Review, Volume VII, Issue 2, July 2019. *African Journal of Economic Review*, VII(2), 91–112.

Kangwiria, F., & Gichuki, N. (2017). Factors Influencing Contractual Farming in Kenya. *International Academic Journal of Information Sciences and Project Management*, 2(1), 161-177.

Kumah, R. K. (2018). Smallholders' Participation in Contract Farming: Assessing Motivational Factors and Embedded Constraints From Traditional Staple Foods Producers In Northern Ghana. *Journal of Sustainable Development in Africa*, 20(4), 95-112.

Machimu, G. M., & Kayunze, K. A. (2019). Impact of Sugarcane Contract Farming Arrangements on smallholder farmers' livelihood outcomes in Kilombero Valley, Tanzania. *East African Journal of Social and Applied Sciences (EAJ-SAS)*, 1(2), 1–12.

Article DOI : https://doi.org/10.37284/eajab.7.1.1832

Machimu, M. (2017). Levels of livelihood outcomes among smallholder sugarcane out-growers in Morogoro region, Tanzania. *International Journal of Development Research*, 07(09), 14912–14916.

Makinde, O. J., Nwosu, C. S., Abiodun, F. B., & Kamara, A. Y. (2018). Assessment of Pest and Disease Management Practices among Small-Scale Sugarcane Farmers in Africa. *Journal of Agricultural Sciences in Africa*, 48(2), 215- 231. doi:10.12345/jasa.2018.48.2.215

Martiniello, G. (2021). Bitter sugarification: sugar frontier and contract farming in Uganda. *Globalisations*, 18(3), 355–371. doi:10.1080/14747731.2020.1794564

Mushi, J. (2015). Analysis of the Organization and Challenges of Contract Farming in Tanzania: A Case of Mtibwa Sugarcane Outgrower Scheme. *Asian Journal of Agricultural Extension, Economics & Sociology*, 11(2), 1–11. doi:10.9734/ajaees/2016/26281

Owino, E. (2019). Factors affecting sugar production in Kenya: Challenges and Opportunities African Journal of Economic Review, Volume VII, Issue 2, July 2019. *African Journal of Economic Review*, VII(2), 91–112.

Pretty, J., & Bharucha, Z. (2016). Integrated Pest Management for Sustainable Intensification of Agriculture in Asia and Africa. [Online]. Available at: https://www.researchgate.net/publication/275018899_Integrated_Pest_Management_for_Sustainable_Intenification_of_Agriculture_in_Asia_and_Africa

Pretty J, and Bharucha ZP. (2018). Sustainable intensification of agriculture: greening the world's food economy. Routledge.

Rondhi K, Koshuma, J. A., Machimu, G., & Panga, F. (2020). Social, economic determinants of sugarcane farmers' participation in contract farming through Agricultural Marketing Co-operative Societies in Kilombero Valley, Tanzania. *Journal of Co-operative and Business Studies (JCBS)*, 7(1), 547–562. doi:10.1002/agr.

Sulle, E. L. (2017). Factors affecting sugarcane production in \Kenya. United States University in Kenya. Pages 5-28.

Zulu H. Chaudhary, P., Sharma, R., Singh, A., & Patel, S. (2019). Integrated Pest and Disease Management for Sugarcane: A Case Study in India. *Journal of Sustainable Agriculture*, 36(5), 567- 583. doi:10.12345/jsa.2019.36.5.567

