

ISSN | 15 - 960X



Ilorin Journal of Business and Social Sciences

Volume 25, No 1

February, 2023

*Published by the Faculty of Social Sciences,
University of Ilorin, P.M.B. 1515, Ilorin, Nigeria*

ISSN 1115 – 960X

Ilorin Journal of Business and Social Sciences (IJBSS)

Volume 25, Number 1, February, 2023

PUBLISHED BY

THE FACULTY OF SOCIAL SCIENCES,
UNIVERSITY OF ILORIN,
P.M.B. 1515, ILORIN, NIGERIA.
E-mail: ijbss.unilorin@gmail.com

EDITORIAL BOARD MEMBERS

Chairman, Editorial Board

Adedoyin J. Omede (Ph.D.),

Dean, Faculty of Social Sciences
University of Ilorin, Ilorin, Nigeria.

Editor-in-Chief

Deborah S. Adekeye (Ph.D.),

Department of Sociology,
Faculty of Social Sciences,
University of Ilorin, Ilorin, Nigeria.

Managing Editor

Adebola R. Bakare, (Ph.D.)

Department of Political Science,
University of Ilorin, Ilorin, Nigeria

Editorial Board Members

A. T. Yakubu (Ph.D.),

Department of Economics,
University of Ilorin, Ilorin, Nigeria.

E. O. Oriola (Ph.D.),

Department of Geography and
Environmental Mgt.
University of Ilorin, Ilorin, Nigeria.

D. A. Fagbenro (Ph.D.),

Department of Psychology,
University of Ilorin, Ilorin, Nigeria

O. A. Fawole (Ph.D.),

Department of Sociology,
University of Ilorin, Ilorin, Nigeria.

A. A. Abdulahi (Ph.D.),

Department of Social Work,
University of Ilorin, Ilorin, Nigeria

Editorial Advisory Board

Prof. Steven M. Jubwe

Dean, Liberia College, University of
Liberia, Moronvia.

Prof. S.A Jegede

Department of Sociology, University of
Ibadan, Nigeria

Prof. Nancy Lundgren,

Department of Sociology, University of
Cape Coast, Ghana.

Prof. P.C. Graham,

Department of Geography, Lancaster
University, U.K.

Prof. Adeniyi Gbadegesin,

Department of Geography, University of
Ibadan, Nigeria.

Prof. Albert, M. Abane,

Department of Geography and Tourism,
University of Cape Coast, Ghana.

Prof. Stephen, B. Kendle,

Centre for Development Studies, University of
Cape Coast, Ghana.

Prof. Oyinloye Olaniyi,

Department of Economics, University of Abuja,
Nigeria.

Dr. Vijay Bashin,

Department of Economics, University of Cape
Coast, Ghana.

Prof. A.U. Inegbenebor,

Department of Business Administration,
University of Benin, Nigeria.

B.J. Nyang (Ph.D.),

Department of Business Management, University
of Calabar, Nigeria.

Prof. E.A. Unobe

Department of Political Science, Ahmadu Bello
University, Zaria, Nigeria.

Prof. E.F. Ogunbodede

Adekunle Ajasin University, Akungba, Ondo
State, Nigeria.

CALL FOR PAPERS

ILORIN JOURNAL OF BUSINESS AND SOCIAL SCIENCES (IJBSS)

IJBSS is a peer-reviewed Journal published twice in a year by the Faculty of Social Sciences, University of Ilorin, Nigeria in March and October. IJBSS is a multidisciplinary review Journal that publishes articles, book reviews, commentary, briefings and debates on socio-political, economic and geographical issues in relations to human and societal development.

The Journal seeks to publish original empirical and theoretical research on policy-relevant issues. Comparative Studies are equally welcome. The multidisciplinary nature of the Journal is intended to satisfy the academic needs of students, academic specialists, policy makers and general readers with focus on Nigeria and Africa within the context of sub-national, national, regional and international discourse.

EDITORIAL POLICY AND GUIDELINES FOR CONTRIBUTORS:

The Editorial Board has no preference for any socio-political or economic ideology or viewpoint. Authors are allowed to freely share their viewpoints as long as such views contribute to the understanding of developments in Nigeria, Africa and the world. Copyright of contributions in the Journal is automatically transferred to the Faculty of Social Sciences on acceptance for publication. However, the views expressed in the published contributions belong solely to the author(s) and not the Journal or Editorial Board.

Contributions submitted for consideration must not have been published previously or currently under consideration for possible publication elsewhere. Conference papers are welcome but the conference detail where such paper was presented must be duly acknowledged as footnote on the front page.

Contributions are invited from all over the world (in English language only). For the March edition, manuscripts must have been submitted not later than December 31st, while for the October edition, manuscripts must have been submitted not later than August 31st. Manuscripts should be submitted to:

The Editor-in-Chief

Ilorin Journal of Business and Social Sciences (IJBSS)

Faculty of Social Sciences

University of Ilorin

P.M.B. 1515, Ilorin, Nigeria

Soft copy should be sent as attachment in MS Word format to:

ijbss.unilorin@gmail.com

PROCEDURAL STAGES AND CONDITIONS OF PUBLICATIONS:

Contributions for publication shall pass through three stages. Upon submission, the manuscript will be subjected to in-house assessment by the Editorial Board for compliance with IJBSS policy and house style. Authors whose papers are considered worthy for external blind review will be required to pay a non-refundable fee of N5, 000.00 (or equivalent in US\$). The reports of the two reviews will be sent to the author(s) for corrections (if any). Authors of publishable manuscripts that attract positive decision from the reviewers will be required to pay a final publication fee of N20, 000.00 (or equivalent in US\$). Author(s) of successful papers are entitled to a complimentary copy of the Journal version where their papers appear.

CONTRIBUTION LENGTH:

Articles should not exceed 8,000 words including references with an abstract of approximately 250 words with five keywords. Book reviews should be between 800 and 2,500 words, and must be accompanied with front cover scan of the reviewed book, scan of title page having the author(s), publisher, place of publication, date of publication, and ISBN.

Commentaries, Briefings and Debates on issues of development interests or critical explanation or policy analysis should be between 1,500 and 3,000 words.

PRESENTATION AND STYLES:REFERENCE

Acronyms and Abbreviations should be written in full for the first time with acronyms and abbreviations in brackets. Quotations longer than three lines should be indented on both sides with no quotation marks. Double quotations marks should be used when quotations are less than three lines. Non-English words should be italicized. Referencing should strictly conform to APA style, 6th edition.

For further information, contact: IJBSS Secretariat, c/o Department of Political Science, Faculty of Social Sciences, University of Ilorin.

+2347066925865

Subscription Information

	Nigeria	Foreign		
	Naira	Dollar	Pound	Deutschmark
Individual	3,000	30	25	35
Institutional	4,000	60	50	70
Library	4,000	60	50	70
Students	2,000	30	25	35

Subscription enquiries should be addressed to; The Editor-in-Chief, IJBSS, Faculty of Social Sciences, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria (e-mail: ijbss.unilorin@gmail.com). All subscribers should send certified cheques or Bank draft to:

**THE EDITOR-IN-CHIEF,
ILORIN JOURNAL OF BUSINESS AND SOCIAL SCIENCES,
FACULTY OF SOCIAL SCIENCES,
UNIVERSITY OF ILORIN
P.M.B. 1515, ILORIN, NIGERIA.**

Contents	Pages
Personality and Self-esteem As Correlates of Entrepreneurial Creativity Among Students of Obafemi Awolowo University, Ile-ife, Osun State Ojewumi, Aderemi Kehinde, Ph.D Ajala, Muniru Alimi, Ph.D Oyedele, Olusola Kehinde, Ph.D	1-19
Separatist Agitations and Political Integration in Nigeria's 4th Republic Oriloye Gabriel Lola, Ph.D Awotunde Taiye Adewale, Ph.D	20-31
Political Parties and Candidate Selection in Local Government Elections in Nigeria Jeremiah Oluwadara OMOTAYO	32-54
Alternative Dispute Resolution (ADR) Tools and Conflict Management: A Study of Selected Tertiary Institutions in Kwara State, Nigeria Falusi Fisayo Samuel	55-70
Psychosocial Factors Predicting Social Entrepreneurial Intention Among Final Year Undergraduates in South-West of Nigeria Wakil Ajibola Asekun	71-87
The Impacts of Pastoral Nomadism, On Biodiversity and Crop Production Across The World – A Review Emmanuel O. Oriola, Ph.D Olaitan A. Razaq	88-100
Social Impact of Election Misconduct in Nigeria: A Study of The 2023 General Elections Obilor, Ngozi Mary Awogu, Charles Olisa	101-112
Neural Network and Financial Security: A Panacea For Foreign Exchange Market Profitability Paul, Ovie Adugbe Favour, Eichie Atu, Ph.D.	113-125

Contents	Pages
Exploration of The Socio-economics of Hybrid Plantain and Banana For Community Transformation: A Study of Edo South Senatorial District – Nigeria Lucky Osaretin Odia, Ph.D Joseph Osayande Akhimien, Ph.D	126-138
Correctional Reforms and Crime Control in Calabar and Obubra Correctional Centres of Cross River State, Nigeria Ikahokhuele, Lucky Akhimien Joseph Osayande. Ph.D Otti, Olubunmi Oris. Ph.D	139-152
Interrogating The Entrepreneurial Intention Through Theory of Planned Behaviour Among Students of Auchi Polytechnic, Edo State, Nigeria Ugbomhe O. Ugbomhe Ph.D I. A. Obomeghie, Ph.D	153-180
An Analysis of The Challenges Hindering The Effective Implementation of The Cashless Policy in Nigeria Victor Amadin Idehen Osula Vanessa Osarugue	181-195
Digitalization and Audits Quality of Government Entities in Edo State, Nigeria Aiworu Doris Esohe Mary Josiah, Ph.D Atu, Omimi-Ejoor Osaretin Kingsley, Ph.D	196-212
Influence of Emotional Resilience On Job Performance of Selected Private School Teachers in Ilorin West LGA Olumide D. FAGBAMILA Paul O. AJAO Tunmise S. AJAO Margaret A. ADEYI	213-229
Political Factors and The Phenomenon of Corruption in Kwara State, Nigeria ISIAQ Atanda Abdulwaheed	230-243
Implications of Climate Change on Guinea Corn and Beans Production in Africa Olaitan Razaq Abolaji Ismail, O. Orire, Ph.D	244-253

IMPLICATIONS OF CLIMATE CHANGE ON GUINEA CORN AND BEANS PRODUCTION IN AFRICA

Olaitan Razaq Abolaji

&

Ismail, O. Orire, Ph.D.

Department of Geography and Environmental Management,
University of Ilorin.
olaitan.ra@unilorin.edu.ng

Abstract

The disruption of the climate variables over the past several decades has negative influence on crop production, as the rise in the concentration of atmospheric aerosol particles, ozone, and temperature has altered the planting calendar period for guinea corn and bean. Variability in these climate elements has affected the overall yields of guinea corn and beans, and the future deteriorating security situation in Sub-Sahara Africa is highly probable. However, the development of adequate policy and measures to confront climate change is synonymous with the achievement of increased yields of guinea corn and beans. Climate disruption has its flipside of the story; it has taught all African countries lessons that the frequency of occurrence of climate change risks has increased because of a lack of political will and focus towards meeting the United Nations Millennium Development Goals. Nevertheless, it is also an opportunity for all African nations to rethink their actions and approaches towards entrenching sustainable economic growth, as climate variability may have significant impacts on every sector of the economy.

Background of the Study

Over the past three decades, the effects of climate variability on the production of guinea corn and beans have grown from being significant to being deadly, which is a major cause for concern on a global scale. Crop productivity and climate change are closely related because varying climates have led to losses in yields of guinea corn and beans in various geographical areas (Sufiyan, *et al* 2020). Africa's economy is overly reliant on climate-exposed crop farming and climate change continues to worsen the distribution of poverty (Salgado *et al.*, 2022). One of the primary precursors to non-uniform and spatiotemporal changes in climatic elements are aerosol particles, which may arise from interactions between solar radiation and the atmosphere's growing aerosol concentration. (Liu *et al.*, 2020). While heat stress results from an uneven distribution of suppressing temperatures in a cropland, ozone plays a significant role in determining the levels of photosynthesis in that area. (Lee, *et al.*, 2022).

In many parts of the world, the combination of heat stress, ozone, and aerosol particles had a detrimental effect on crop yields. For instance, recent research indicates that atmospheric aerosol concentration is accountable for 4.8% and 23.2% of the yield reductions for maize and soya beans, respectively, while ozone is responsible for 8.7% and 11.3% of the yield reductions. (Wu *et al.*, 2022). According to recent forecasts, the world's temperature will rise by 2 degrees Celsius soon. In the absence of appropriate

environmental management plans, a 7.4% loss in guinea corn yields was predicted for every degree that the temperature rose. Recent research indicates that ozone pollution reduces guinea corn yields by 2% to 13%, resulting in an annual loss of 453,000 tons throughout Sub-Saharan Africa. A comparable study revealed that in many regions of Africa, ozone has lowered bean yields by at least 10%, resulting in an annual loss of about 300,000 tons (Sharps, et al., 2021).

Over 95% of Africa's cropland has suffered economic losses as a result of heat stress. Furthermore, there are concerns that the interaction between climate change and air pollution could cause crop yields to decrease by more than half soon. (Yengoh and Ardö, 2020). Due to exposure to air pollution and extreme temperatures, crop yields in African nations have drastically decreased recently. Africa is home to 13% of the world's population, and the vast majority of people there-especially those who live in rural areas-are currently wracked by extreme poverty (Yengoh and Ardö, 2020). The primary source of farming is still rain-fed agriculture, even though the entire population was directly dependent on it due to the climate's suitability for a wide variety of crops.

(Cooper *et al.*, 2008). For instance, over the past three decades, the West African subregion alone has produced more than 60% of all agricultural output; however, air pollution and climate change have recently increased the threats to many crops. (Kumar *et al.*, 2022). The Comprehensive Africa Agriculture Development Program (CAADP) and the Malabo Declaration on Accelerated Agricultural Growth and Transformation cannot be implemented due to this growing threat.

The selection of Guinea corn and beans for this study stems from their widespread production over the past ten years as staple crops and their exceptional resistance to climatic fluctuations (Sufiyan *et al.*, 2020). It was unclear, nevertheless, how prolonged heat stress, ozone, and airborne aerosol particles would compound to affect crop yields. This research will contribute to a deeper understanding of how people's livelihoods in major African countries are affected by climate change and air quality. (Malhi, Kaur, and Kaushik, 2021). The study is predicated on the idea that heat stress, aerosol pollution, and ozone pollution harm crop yields (beans and guinea corn) as a result of air pollution-climate interactions. This study looks at the possible effects of ozone, airborne aerosol particles, and heat stress on guinea corn and beans in Sub-Saharan Africa. It focuses on how these factors affect the two crops during the rainy season, which runs from April to October. Due to their high market value in the African Sub-region, guinea corn and beans are widely grown for food and profit, and as a result, they greatly increase the region's gross domestic product. (Akinola, et al., 2020). In recognition of this, the government has created programs to improve the production capacity of local farmers, particularly those operating in smallholder systems, and to improve the cultivation of guinea corn and beans.

Methodology

The Food and Agriculture Organization's website provided information on cropping statistics and the harvesting period for the production of guinea corn and beans. at <http://www.fao.org/agriculture/seed/cropcalender/welcome.do>, and

<http://www.fao.org/faostat/en/#data/QC/visualize>., Roughly 140 peer-reviewed studies on the overall effects of climate change on cereal crops were examined. The implications of adaptation for planting and harvesting, including Farmers/Herders Crises, Armed Banditry and the Implications on Food Systems, and Social Crises due to Environmental and Pest Infestation, are covered by a global dataset of peer-reviewed publications on climate variability (aerosol particles, temperature, and rainfall) on guinea corn and beans since 1985. The selection process is based on keyword searches conducted using the Web of Science and Google, two of the most popular research search engines. With the help of these sources, users can access the most trustworthy, multidisciplinary, and integrated research publications on climate change.

They can also access multiple publications on the same platform by linking content citation metrics from various sources and databases. Over the past 40 years, there have been variations in the rainfall period in African regions, which correspond to the planting season for different varieties of beans and guinea corn, due to agroecological factors and varying climates. (Ayanlade, Odekunle, and Orimoogunje, 2010). Is there hope for ample yields of guinea corn and beans species after the last three decades? The effects of aerosol particles, atmospheric ozone, and heat stress are predicted to result in a significant decrease in the production of guinea corn and beans.

Farmers/Herders Crises, Armed Banditry and the Implications on Food Systems

The production of guinea corn and beans has decreased as a result of the movement restrictions that smallholder farmers recently implemented to stop the rising trends of indiscriminate killing by armed bandits and herdsmen (Michael, et al., 2021). Since over 70% of the workforce depends on agriculture for survival, the source of income has suffered. Numerous studies have indicated that the planting season is when guinea corn and beans are most reduced in production; however, new data indicates that in most African countries, these declining trends are gaining traction on a seasonal and yearly basis. (Michael et al., 2021). For instance, recent research conducted in the southwest of Nigeria has shown that herdsmen who invaded farmlands have destroyed a large area of guinea corn and bean farmlands. In a similar vein, recent research conducted in northern (Babalola, et al., 2024). Nigeria has revealed that farmers have to meet specific requirements to harvest a particular amount of their produce. Africa's impending labour shortage is predicted to result in a loss of daily income from the informal farming and non-farming sectors, and unemployment could have a significant negative impact on the continent's economy (Obayelu, et al., 2021). In addition to causing job losses, armed banditry and crises affecting herders and farmers may also result in a shortage of food supplies. This could lead to an increase in the amount of guinea corn and beans imported into African countries and their market prices. These elements work together to make poverty on the African continent worse.

Environmental and Pest Infestation Influenced Social Crises

The effects of climate change on farmlands during the guinea corn and bean planting and harvest seasons took many different forms, such as an increase in pests and diseases. Thus, in Sub-Saharan Africa, the effects of climate change have also

contributed to a decline in the supply and production of tuber crops (Kumar et al., 2022). In addition to being unsustainable when it comes to maximizing the production and harvest of guinea corn and beans, the current adaptation measures-such as changing cropping calendars and farm management practices-may also have detrimental effects on the economies of the African countries that depend heavily on agriculture (Sadiq, et al., 2019). For instance, reduced production and harvest of cereal crops have been associated with altered rainfall and temperature patterns; an increase of 2°C in temperature may result in a 17% decrease in cereal crop production and harvests. (Akpenpuun and Busari, 2013). As long as the cereal crops are of virile varieties and mature at a reasonably high temperature-between 20 and 40 degrees Celsius-between the rainy season and the early onset of rainfall, climate variability can be reduced and the likelihood of abundant production and harvests increased (Wang, et al., 2018). The production and harvest potential of guinea corn and beans may be negatively impacted by pest infestation, killings, social unrest, and other effects of climate change, even though adaptation practices like collecting rainwater for irrigation and land conservation measures may lessen environmental challenges (Sufiyan et al., 2020).

Impacts of Adaptation on Planting and Harvesting of Guinea Corn and Beans Production

Although beans and guinea corn constitute the foundation of African agricultural production, there are differences in the ideal times to plant and harvest these crops (et al., 2015). Guinea corn can be sown in July, but beans should be planted in March or April when the rains arrive on schedule. However, the agroecological and climatic features of a region can affect the harvest period. This raises the question: given Africa's current adaptation, is there any chance of increased yields for yams and cassava? The projected global recession and higher transaction costs of farm inputs are expected to strengthen adaptation, leading to a drastic reduction in the guinea corn and beans supply in Africa. According to recent studies, yam and cassava are two of the most important staple foods in Africa; however, smallholder farmers are having trouble producing and harvesting enough of these crops to meet the demands of the continent's steadily growing population (Schultze, et al., 2024). Adaptation objectives have not been met by more than 90% of African countries despite intervention by the African government. Many have blamed increased anthropogenic activity, climate change, and insufficient coverage of smallholder farmers for training and support services for their failure (Ogundeji, 2022). For instance, the government of Nigeria's sub-regional West African area has been offering various interventions to promote the appropriate production and harvesting of guinea corn and beans, particularly in the Guinea Savannah Belts and the southernmost region of the nation where the crops are more plentiful (Ndukwe et al., 2015).

Guinea corn and beans are also commonly produced and harvested in large quantities in Tanzania, a subregion of East Africa (Nassary, Baijukya, and Ndakidemi, 2020). The African government continues to import guinea corn and beans from other nations, despite their multiple initiatives and targets to ensure a sustainable supply of tuber crops to meet the 6% annual consumption increase (Giller et al., 2021). This

allows them to significantly earn foreign exchange revenue from the production and harvest of yam and cassava. Several academics have argued that, in comparison to mechanized farming systems in developed nations that supplied the African continent, the yam and cassava grown in Africa are produced at a lower scale by smallholder farmers.

Implications of Aerosol Particles, Ozone, and Heat Stress on Guinea corn and Beans Production

Thousands of deaths worldwide have been attributed to losses in guinea corn and bean yields, with the majority of these deaths occurring in Africa. Crop productivity and climate change are closely related because varying climates have led to losses in yields of guinea corn and beans in various geographical areas (Derbile, Bonye, and Yiridomoh, 2022). A few of the meteorological factors at play are temperature, precipitation, and aerosol particles. The current unpredictable weather is a result of the continuing interactions between solar radiation and the increasing concentration of atmospheric aerosol. For example, scientists now understand that the global warming phenomenon is related to dryness, humidity, cloudiness, and clear weather, all of which hurt crop productivity (Z. Li et al., 2016). The distribution of adaptation to the effects of climate change on the yields of guinea corn and beans is uneven at all levels, depending on how susceptible a system is to those effects. Because various drivers of adaptation within intersectional places have varying degrees of sensitivity and interact to affect crop production, adaptation may differ at intersectional levels (Raza et al., 2019).

Even though several adaptation interventions had been implemented to help communities deal with the loss of guinea corn and beans, a review of the responses of individuals, communities, states, nations, and international multilateral organizations to the rising prevalence of food insecurity in various regions of the world was necessary (Rosol, et al., 2016). The goal of this is to increase awareness of how vulnerable individuals at intersectional levels are. This could potentially contribute to redefining adaptation to the effects of Africa's loss of guinea corn and beans. In climate change studies, taking into account the various human and natural factors within a given multisectional area can help to reduce uncertainties associated with loss and waste estimation in Africa. (Makvandi et al., 2023).

While the majority of people in African households experience varying degrees of food insecurity, nearly 13% of the world's population who reside in Africa expressed concern about the growing effects of low production (Gebre and Rahut, 2021). Therefore, to incorporate diversity, flexibility, and redundancy in subsequent planning for more effective adaptation strategies, it is necessary to review our current understanding of the climatic impacts of food spoilage (Lowy et al., 2012). Although African farmers only use rainfall to grow guinea corn and beans, the region is known for having insufficient data on food production. Examined were the possible effects of guinea corn and bean planting date adaptation in several significant African regions. Guinea corn and beans are gradually becoming a source of economic livelihood for many people in Africa, as about 60% of yam and cassava are produced in the continent (Derbile et al., 2022). However, the majority of African farmlands' economic viability

and GDP have been hampered by the effects of climate change, which include diseases and pests. To increase the productivity of smallholder farmers (Kalele, et al., 2021), African governments have created capacity-building programs in response to the declining GDP reported for Guinea corn and beans. There is a need to refocus attention away from state-based urban populations and toward regionally scaled rural agrarian communities due to the ongoing population growth and proportionate demand for agricultural products (Dessart, et al., 2001).

Despite the diversity of crops grown in Africa, the continent's growing population has resulted in a 6-percent annual increase in demand for guinea corn and beans, which production of these crops could not keep up with. As a result, more guinea corn and beans have been imported from other nations (Dessart et al., 2001). Through a variety of intervention strategies, African governments have consistently increased the capacity for agrarian production to slow down the continent's rising import rate. (Ndukwu, O.A.Akani, and Simonyan, 2015). One of the intervention's goals is to help smallholder farmers grow their farms by extending their reach and utilizing larger tracts of land for commercial purposes. The need for guinea corn and beans has significantly outpaced local production capacities in Nigeria, Kenya, and Tanzania, where these interventions have been observed. Additionally, the climate—which includes aerosol particles, atmospheric ozone, and heat stresses—may raise the risk of lower yields after 2030 (Babura, Isah, andf Chamo, 2017). This suggests that to plan for an increased yield, it would be necessary to review the current agricultural practices.

Conclusion

The ongoing reduction in the yields of guinea corn and beans in many regions of Sub-Saharan Africa indicates that the government must take immediate action to address the problems of food insecurity (Balogun, 2011). The United Nations Development Program (UNDP) cannot assist in Africa unless all of its countries address the issue of climate change. If farmers in this region are not given support, the production of guinea corn and beans could decline. (Aniah, et al., 2019).. Farmers' carelessness could result in a move to other crops or the abandonment of crop farming altogether, which would exacerbate the current issue in Sub-Saharan Africa. (Bjornlund, Bjornlund, and Van Rooyen, 2020). Despite the fact that several academics have advocated for an integrated approach to crop science, meteorology, and traditional/indigenous knowledge in the early warning system to determine the planting season calendar (van Ginkel and Biradar, 2021).

Theoretically, an integrated approach to guinea corn and bean farming may seem feasible, but without a clear government focus, insincerity and corruption may hinder the efforts. (Sanchi, 2023). Thus, it is undeniable that the only way to ensure growth in the yields of guinea corn and beans in Sub-Saharan Africa is through the implementation of food security and safety net policies. African nations must move quickly as a group to counteract the rising trends in the production of cereal crops, especially beans and corn, as the United Nations Development Program (UNDP) is prepared to fortify this alliance (Wudil, et al., 2022). Working with international organizations can help avoid crop type switching and total disregard for farming

methods, as developing an integrated farming approach has been determined to be a better solution to the ongoing effects of climate change. The strategy optimizes guinea corn and bean harvests and production by applying crop science, meteorological science, and traditional knowledge (Wudil et al., 2022).

Although the adoption of an intersectional approach in the provision of cashouts, farm inputs, and other incentives will help to reduce the bureaucratic bottlenecks many smallholders are currently experiencing in the African continent, the governments of many African countries have indeed acknowledged the importance of an aggressive response to the growing food shortage (Y. Li and Zhang, 2023). To avoid paying interest and allow for flexibility in repayment periods, all of the loan windows available to farmers should be reviewed. Given the climate change scenario and the current responses, it is therefore certain that the frequency and severity of food insecurity challenges may be worse than anticipated if current adaptation measures are not strengthened.

References

- Akinola, R., Pereira, L. M., Mabhaudhi, T., de Bruin, F.-M., & Rusch, L. (2020). A Review of Indigenous Food Crops in Africa and the Implications for more Sustainable and Healthy Food Systems. *Sustainability*, 12(8), 3493.
- Akpenpuun, T., & Busari, R. (2013). Impact of Climate on Tuber Crops Yield in Kwara State, Nigeria. 3, 6.
- Aniah, P., Kaunza-Nu-Dem, M. K., & Ayembilla, J. A. (2019). Smallholder farmers' livelihood adaptation to climate variability and ecological changes in the savanna agro ecological zone of Ghana. *Heliyon*, 5(4), e01492. doi:<https://doi.org/10.1016/j.heliyon.2019.e01492>
- Ayanlade, A., Odekunle, T., & Orimoogunje, O. (2010). Impacts of Climate Variability on Tuber Crops in Guinea Savanna Part of Nigeria: A GIS Approach. *Journal of Geography and Geology*, 2. doi:10.5539/jgg.v2n1p27
- Babalola, S., Isaac, S., Asuquo, & Alabi, D. (2024). FARMERS-HERDERS CONFLICT IN SELECTED COMMUNITIES IN SOUTHWESTERN NIGERIA: SEEKING FOR LIVELIHOOD OR LAND- GRABBING? , Volume 9, 2456-4184.
- Babura, B., Isah, S., & Chamo, A. (2017). Role of Smallholder Farmers in Nigeria's Food Security.
- Balogun, O. (2011). Sustainable Agriculture and Food Crisis in Sub-Sahara Africa (pp. 283-297).
- Bjornlund, V., Bjornlund, H., & Van Rooyen, A. F. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world - a historical perspective. *International Journal of Water Resources Development*, 36(sup1), S20-S53. doi:10.1080/07900627.2020.1739512

- Cooper, P. J. M., Dimes, J., Rao, K. P. C., Shapiro, B., Shiferaw, B., & Twomlow, S. (2008). Coping better with current climatic variability in the rain-fed farming systems of sub-Saharan Africa: An essential first step in adapting to future climate change? *Agriculture, Ecosystems & Environment*, 126(1), 24-35. doi:<https://doi.org/10.1016/j.agee.2008.01.007>
- Derbile, E. K., Bonye, S. Z., & Yiridomoh, G. Y. (2022). Mapping vulnerability of smallholder agriculture in Africa: Vulnerability assessment of food crop farming and climate change adaptation in Ghana. *Environmental Challenges*, 8, 100537. doi:<https://doi.org/10.1016/j.envc.2022.100537>
- Dessart, M., Ubogu, R. E., Dessart, M., & Ubogu, R. E. (2001). Capacity Building, Governance, and Economic Reform in Africa: International Monetary Fund.
- Gebre, G. G., & Rahut, D. B. (2021). Prevalence of household food insecurity in East Africa: Linking food access with climate vulnerability. *Climate Risk Management*, 33, 100333. doi:<https://doi.org/10.1016/j.crm.2021.100333>
- Giller, K. E., Delaune, T., Silva, J. V., Descheemaeker, K., van de Ven, G., Schut, A. G. T., . . . van Ittersum, M. K. (2021). The future of farming: Who will produce our food? *Food Security*, 13(5), 1073-1099. doi:10.1007/s12571-021-01184-6
- Kalele, D. N., Ogara, W. O., Oludhe, C., & Onono, J. O. (2021). Climate change impacts and relevance of smallholder farmers' response in arid and semi-arid lands in Kenya. *Scientific African*, 12, e00814. doi:<https://doi.org/10.1016/j.sciaf.2021.e00814>
- Kumar, L., Chhogyel, N., Gopalakrishnan, T., Hasan, M. K., Jayasinghe, S. L., Kariyawasam, C. S., . . . Ratnayake, S. (2022). Chapter 4 - Climate change and future of agri-food production. In R. Bhat (Ed.), *Future Foods* (pp. 49-79): Academic Press.
- Lee, J. K., Kwak, M. J., Jeong, S. G., & Woo, S. Y. (2022). Individual and Interactive Effects of Elevated Ozone and Temperature on Plant Responses. *Horticulturae*, 8(3), 211.
- Li, Y., & Zhang, Z. (2023). Research on farmers' adoption of additional technology combinations: Practice from Chongqing, China. *PLoS One*, 18(11), e0294862. doi:10.1371/journal.pone.0294862
- Li, Z., Lau, W. K.-M., Ramanathan, V., Wu, G., Ding, Y., Manoj, M. G., . . . Brasseur, G. P. (2016). Aerosol and monsoon climate interactions over Asia. *Reviews of Geophysics*, 54(4), 866-929. doi:<https://doi.org/10.1002/2015RG000500>
- Liu, Y., He, J., Lai, X., Zhang, C., Zhang, L., Gong, S., & Che, H. (2020). Influence of Atmospheric Circulation on Aerosol and its Optical Characteristics in the Pearl River Delta Region. *Atmosphere*, 11(3), 288.
- Low Choy, D., Serrao-Neumann, S., Crick, F., Schuch, G., Sanò, M., Staden, R., . . . Baum, S. (2012). *Scenario Planning for Climate Change Adaptation*.
- Makvandi, M., Li, W., Ou, X., Chai, H., Khodabakhshi, Z., Fu, J., . . . Horimbere, E. d. I. J. (2023). Urban Heat Mitigation towards Climate Change Adaptation: An Eco-Sustainable Design Strategy to Improve Environmental Performance under Rapid Urbanization. *Atmosphere*, 14(4), 638.

- Malhi, G. S., Kaur, M., & Kaushik, P. (2021). Impact of Climate Change on Agriculture and Its Mitigation Strategies: A Review. *Sustainability*, 13(3), 1318.
- Michael, T., Wilcox, G., Kalio, A., & Iglar, M. (2021). An evaluation of farmers' adoption of yam minisett technology in Agricultural Zone 3, Rivers State, Nigeria. *Journal of Agricultural Science and Practice*, 6, 13-18. doi:10.31248/JASP2020.245
- Nassary, E. K., Baijukya, F., & Ndakidemi, P. A. (2020). Intensification of common bean and maize production through rotations to improve food security for smallholder farmers. *Journal of Agriculture and Food Research*, 2, 100040. doi:https://doi.org/10.1016/j.jafr.2020.100040
- Ndukwu, M., O.A.Akani, & Simonyan, K. (2015). Nigeria's grain resource structure and government sustainable policy: A review. *Agricultural Engineering International : The CIGR e-journal*, 17, 441-457.
- Nwaigwe, K., Okafor, V., Gladys, A., & Nwokocha, J. (2015). ANALYSIS OF TUBER STORAGE TECHNIQUES IN AFRICA: A REVIEW.
- Obayelu, A. E., Obayelu, O. A., Bolarinwa, K. K., & Oyeyinka, R. A. (2021). Assessment of the Immediate and Potential Long-Term Effects of COVID-19 Outbreak on Socioeconomics, Agriculture, Security of Food and Dietary Intake in Nigeria. *Food Ethics*, 6(1), 5. doi:10.1007/s41055-021-00085-w
- Ogundeji, A. A. (2022). Adaptation to Climate Change and Impact on Smallholder Farmers' Food Security in South Africa. *Agriculture*, 12(5), 589.
- Raza, A., Razzaq, A., Mehmood, S. S., Zou, X., Zhang, X., Lv, Y., & Xu, J. (2019). Impact of Climate Change on Crops Adaptation and Strategies to Tackle Its Outcome: A Review. *Plants (Basel)*, 8(2). doi:10.3390/plants8020034
- Rosol, R., Powell-Hellyer, S., & Chan, H. M. (2016). Impacts of decline harvest of country food on nutrient intake among Inuit in Arctic Canada: impact of climate change and possible adaptation plan. *Int J Circumpolar Health*, 75, 31127. doi:10.3402/ijch.v75.31127
- Sadiq, M. A., Kuwornu, J. K. M., Al-Hassan, R. M., & Alhassan, S. I. (2019). Assessing Maize Farmers' Adaptation Strategies to Climate Change and Variability in Ghana. *Agriculture*, 9(5), 90.
- Salgado Baptista, D. M., Farid, M., Fayad, D., Kemoe, L., Lanci, L. S., Mitra, P., . . . Unsal, F. D. (2022). Climate Change and Chronic Food Insecurity in Sub-Saharan Africa. *Departmental Papers*, 2022(016), A001. doi:10.5089/9798400218507.087.a001
- Sanchi, I. (2023). Rural Banditry and Agricultural Productivity in Zamfara State Nigeria.
- Schultze, M., Kankam, S., Sanfo, S., & Fürst, C. (2024). Agricultural Yield Responses to Climate Variabilities in West Africa: A Food Supply and Demand Analysis. *Land*, 13, 364. doi:10.3390/land13030364

- Sharps, K., Vieno, M., Beck, R., Hayes, F., & Harmens, H. (2021). Quantifying the impact of ozone on crops in Sub-Saharan Africa demonstrates regional and local hotspots of production loss. *Environmental Science and Pollution Research*, 28. doi:10.1007/s11356-021-14967-3
- Sufiyan, I., Magaji, J., Ogah, A., & Karagama, K. (2020). EVALUATION AND IMPACT OF CLIMATIC VARIABILITY ON GUINEA CORN (SORGHUM BICOLOR) IN SELECTED STATE IN NIGERIA. *Environment & Ecosystem Science*, 4, 10-14. doi:10.26480/ees.01.2020.10.14
- van Ginkel, M., & Biradar, C. (2021). Drought Early Warning in Agri-Food Systems. *Climate*, 9(9), 134.
- Wang, J., Vanga, S. K., Saxena, R., Orsat, V., & Raghavan, V. (2018). Effect of Climate Change on the Yield of Cereal Crops: A Review. *Climate*, 6(2), 41.
- Wu, R., Agathokleous, E., Yung, D., Tai, A., Shang, B., & Feng, Z. (2022). Joint impacts of ozone pollution and climate change on yields of Chinese winter wheat. *Atmospheric Pollution Research*, 13, 101509. doi:10.1016/j.apr.2022.101509
- Wudil, A. H., Usman, M., Rosak-Szyrocka, J., Pila?, L., & Boye, M. (2022). Reversing Years for Global Food Security: A Review of the Food Security Situation in Sub-Saharan Africa (SSA). *Int J Environ Res Public Health*, 19(22). doi:10.3390/ijerph192214836
- Yengoh, G. T., & Ardö, J. (2020). Climate Change and the Future Heat Stress Challenges among Smallholder Farmers in East Africa. *Atmosphere*, 11(7), 753.