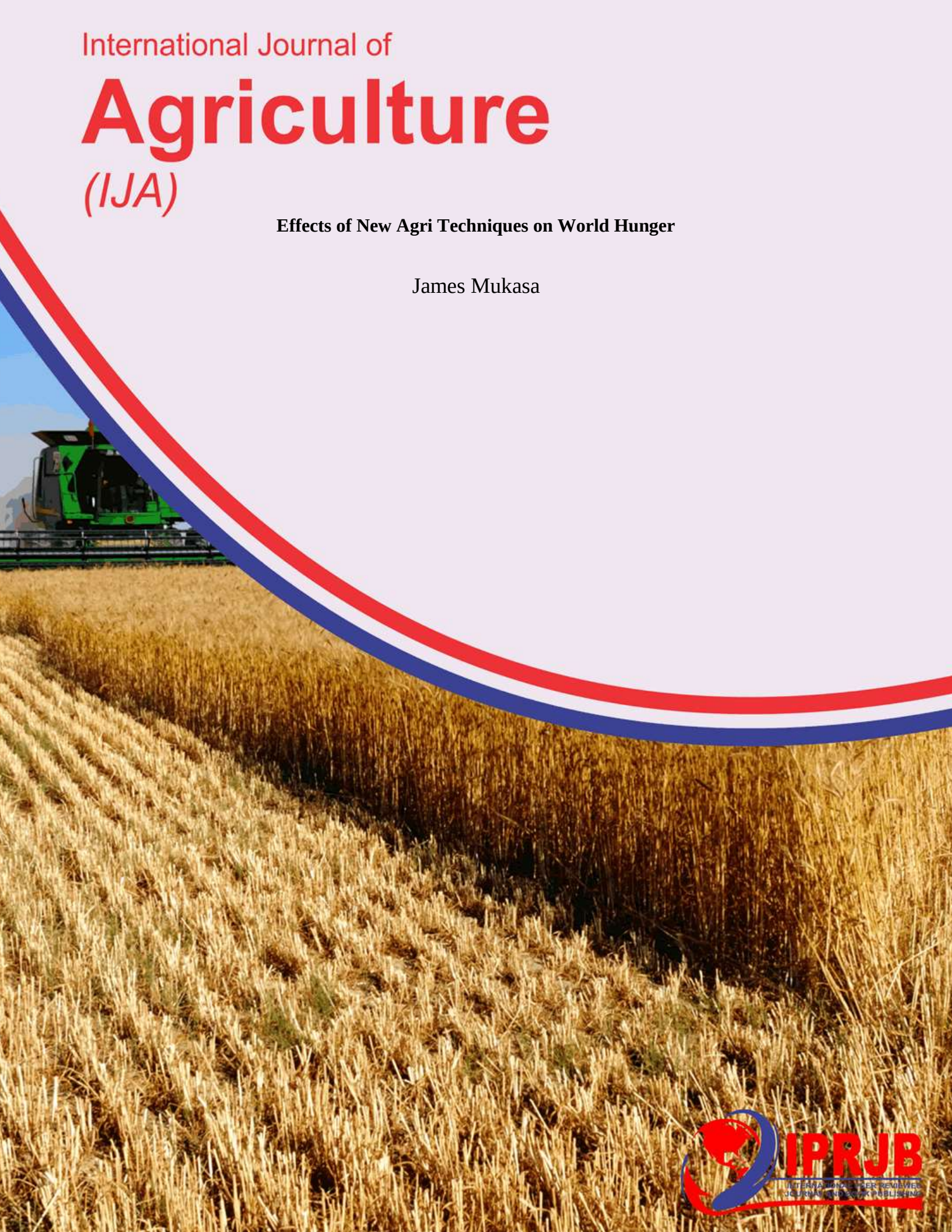
International Journal of
Agriculture
(IJA)

Effects of New Agri Techniques on World Hunger

James Mukasa



International Journal of Agriculture
ISSN 2520-4629X (Online)
Vol.8, Issue 1, No. 4. PP. 31 - 40, 2023

www.iprjb.org

Effects of New Agri Techniques on World Hunger

James Mukasa
Busoga University

Article History

Received 15th April 2023

Received in Revised Form 28thApril 2023

Accepted 12th May 2023

Abstract

Purpose: The aim of the study was to examine the effect of new agriculture techniques on world hunger.

Methodology: This study adopted a desktop methodology. This study used secondary data from which include review of existing literature from already published studies and reports that was easily accessed through online journals and libraries.

Findings: The study revealed that new agri techniques has increased yield of crops. With advanced technology and modern crop varieties, farmers can produce more food with less land, water, and other resources. This can help to meet the growing demand for food as the global population continues to increase. Some of the new agri technique include adoption of GMOs, precision irrigation, precision agriculture and vertical farming.

Unique Contribution to Theory, Practice and Policy: The study was anchored theory of sustainable agriculture and theory of agricultural innovation systems (AIS). The study recommended that policies and institutional frameworks should be developed to support the adoption of modern technologies in agriculture including the provision of technical assistance, access to credit and market support. The study recommended there is need for financial incentives to encourage farmers to adopt new agricultural techniques.

Keywords: *New Agri Techniques, Sustainable Agriculture, World Hunger*

International Journal of Agriculture
ISSN 2520-4629X (Online)
Vol.8, Issue 1, No. 4. PP. 31 - 40, 2023

INTRODUCTION

Over the past few decades, new agricultural techniques have emerged and evolved to help farmers improve crop yields and grow crops more efficiently. These techniques include the use of genetically modified seeds, precision agriculture, and the adoption of modern technologies like drones, sensors and big data. The effects of these techniques on world hunger have been significant, as they have enabled farmers to grow more food on less land, using fewer resources, and with less environmental impact.

Poor people typically spend up a big percent of their disposable income on food. Food riots in countries as far-flung as Haiti, the Philippines, Indonesia, Ethiopia, Burkina Faso, Egypt, and Cameroon suggest troubling times ahead as fears of hunger take root. The international community must take measures to provide food and cash assistance to meet immediate needs and to improve agricultural policies (Hawkes, 2020). Increasing demand for staples has not been matched by investments in agricultural productivity, especially in developing countries where rising food prices are felt most acutely. The longer-term impact of this global hunger crisis could stall or reverse decades of progress against hunger and extreme poverty and prevent the world from reaching the Millennium Development Goals (MDGs) by 2015.

Achieving food security needs policy and investment reforms on multiple fronts including human resources, agricultural research, rural infrastructure, water resources, and farm- and community-based agricultural and natural resources management (Plotnikov, 2021). Progressive policy action must not only increase agricultural production, but also boost incomes and reduce poverty in rural areas where most of the poor live.

Increased investment in people is essential to accelerate food security improvements. In agricultural areas, education works directly to enhance the ability of farmers to adopt more advanced technologies and crop-management techniques and to achieve higher rates of return on land (Shah, 2019). Moreover, education encourages movement into more remunerative nonfarm work, thus increasing household income. Women's education affects nearly every dimension of development, from lowering fertility rates to raising productivity and improving environmental management.

IPGRI has set the strategic goal of deploying agricultural biodiversity to improve nutrition and livelihoods in rural and poor communities in developing countries. Its nascent program on dietary diversification focuses on revitalizing indigenous food systems and promoting the increased utilization of biodiversity for improved nutrition (Harmayani, 2017). IPGRI is well aware of the limited evidence base linking biodiversity, nutrition, and health in several developing countries. Starting with sub-Saharan Africa, it has therefore embarked on the development of research partnerships for the analysis of the nutrient and non-nutrient properties of indigenous and traditional foods and the compilation of an easily accessible database on the diversity of nutrients and bioactive compounds in traditional foods within and between food crop species, while at the same time continuing the dialogue with policy makers in the agriculture, health and rural development sectors on the benefits of using agricultural biodiversity.

IPGRI is involved in two major projects to promote dietary diversity within traditional food systems. The ongoing International Development Research Centre (IDRC)-supported project aims

to advance dietary diversification in Kenya, Senegal, Uganda, and Tanzania as a long-term sustainable strategy to address nutritional deficiencies and health problems associated with the emergence of simplified diets (Adenle, 2017). Within these country projects, IPGRI has forged partnerships with international agricultural research centers, national agricultural research systems, universities, national and local government agencies, and community-based organizations in an effort to build and maintain the momentum and capacity to stem and reverse the erosion of agricultural and dietary diversity.

One of the key benefits of new agricultural techniques is that they allow farmers to produce more food on the same amount of land. This is especially important in regions where land is scarce or where population growth has outpaced the availability of arable land. By using techniques like precision agriculture and genetically modified crops, farmers can grow crops that are more resistant to pests and diseases, use less water and fertilizer, and produce higher yields per acre (Dawson, 2011). Another important effect of new agricultural techniques on world hunger is that they can help reduce food waste. By using modern technologies like sensors and big data, farmers can monitor their crops more closely and identify potential problems before they become serious. This can help prevent crop losses due to pests, disease, or weather events, which in turn can help reduce food waste and ensure that more food is available to feed people (Janssen, 2019).

Finally, new agricultural techniques can also help improve food security by making food more affordable and accessible to people in need. By increasing crop yields and reducing food waste, these techniques can help stabilize food prices and ensure that there is enough food to go around. This can be especially important in regions where food insecurity is a major problem, as it can help prevent food riots, malnutrition, and other serious health problems. Overall, the effects of new agricultural techniques on world hunger have been largely positive, as they have helped farmers produce more food on less land, reduce food waste, and improve food security (Dawe, 2018). However, these techniques are not without their challenges, and they must be implemented carefully and responsibly to ensure that they do not have unintended consequences for the environment or for human health.

Agriculture has been a crucial factor in the development of human civilization, providing the necessary food and resources to sustain life. However, the world is still struggling to eradicate hunger, with many people suffering from chronic malnutrition. To address this issue, new agricultural techniques have been developed and implemented around the world. New agri techniques involve the use of advanced technology, improved farming practices, and modern crop varieties to increase crop productivity and yield. These techniques have the potential to significantly increase food production, reduce waste, and improve the quality and nutritional value of crops (Lee, 2020).

With advanced technology and modern crop varieties, farmers can produce more food with less land, water, and other resources. This can help to meet the growing demand for food as the global population continues to increase. Additionally, new agri techniques can improve the quality and nutritional value of crops. For example, genetically modified crops can be designed to resist pests and diseases, reducing the need for pesticides and herbicides. This not only reduces the environmental impact of farming but also increases the availability of healthy and nutritious crops (Kastner, 2012). Furthermore, new agri techniques can help to reduce waste in the food supply

chain. This can be achieved through better storage and transportation methods, as well as improved harvesting techniques that reduce damage to crops. This can ensure that more food reaches the people who need it, reducing food insecurity and hunger.

In the United States, new agri techniques such as precision farming, biotechnology, and the use of high-yielding crop varieties have been implemented. These techniques have led to an increase in crop yield and quality, particularly in the production of corn and soybeans (Fuglie, 2018). Additionally, the US government has implemented policies to promote sustainable agriculture and reduce food waste, such as the Farm to School program, which aims to connect schools with local farmers to provide fresh, healthy food to students.

In China, new agri techniques such as improved seed varieties, precision farming, and the use of biotechnology have been implemented. These techniques have led to an increase in crop yield and quality. The Chinese government has also implemented policies to promote sustainable agriculture and reduce food waste (Fan, 2015). These policies have helped to increase crop yields and improve food security in the country.

In Brazil, new agri techniques such as conservation agriculture, crop rotation, and the use of high-yielding crop varieties have been introduced. These techniques have led to an increase in crop yield and quality, particularly in the production of soybeans, corn, and cotton. Additionally, the Brazilian government has implemented social programs such as Bolsa Familia, which provides financial assistance to low-income families and has helped to reduce food insecurity (Machado, 2018). The Cerrado Agricultural Development Program was implemented in the 1970s to expand agriculture in the country's Cerrado region. The program utilized new agri techniques such as improved soil management, irrigation systems, and the use of high-yield crops. This helped to increase food production and improve food security in the region.

In India, new agri techniques such as precision farming, drip irrigation, and the use of high-yielding crop varieties have been introduced. These techniques have led to a significant increase in crop yield and quality (Singh, 2017). Additionally, initiatives such as the National Food Security Act aim to provide subsidized food grains to the poorest sections of society. In India, the Green Revolution of the 1960s introduced new agri techniques such as high-yield varieties of crops, modern irrigation systems, and the use of fertilizers and pesticides. This helped to increase food production and reduce hunger in the country.

In Mexico, The MasAgro program was introduced in 2009 to promote sustainable agriculture and increase food production. The program utilized new agri techniques such as precision agriculture, improved soil management, and the use of high-yield crops (Valbuena, 2012). This has helped to reduce hunger and improve food security in the country.

In Ethiopia, new agri techniques such as the use of improved seed varieties, crop diversification, and soil conservation have been introduced. These techniques have led to an increase in crop yield and quality, particularly in the production of wheat and maize. Additionally, the Ethiopian government has implemented policies to promote sustainable agriculture and improve access to food for the most vulnerable sections of society (Alemu, 2018). In Kenya, the government has introduced new agri techniques such as conservation agriculture, which involves minimal soil

disturbance and the use of cover crops to improve soil fertility. This has helped to increase crop yields and improve food security in the country.

The development of new agri techniques has played a critical role in addressing world hunger in different nation states around the world. These techniques have helped to increase crop productivity, improve the quality and nutritional value of crops, and reduce food waste, contributing to a more sustainable and equitable food system.

Theoretical Framework

Theory of Sustainable Agriculture

Sustainable agriculture is a farming practice that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. It seeks to balance economic, social and environmental goals to create a system that is efficient, resilient, and adaptable.

Sustainability theory came up in 1972 developed by Meadows and others in a team of 17 researchers when the report, "Limits to Growth" came into the public attention (Ageyman, 2005). The theory of sustainability clearly defines an economy and society that is lasting and exists on a global scale. The theory attempts to prioritise and integrate the social responses that are within environmental and cultural perspectives to resolve prevailing challenges (Ekardt, 2009). Through an economic model, the theory brings to focus the sustaining of natural and financial capital in order to enhance human dignity. Generally, sustainability is ability of an entity to be maintained with time and achieve the set out goals and objectives. For a project to be termed sustainable, it is not supposed to exhaust the resources that it depends on for sustenance or the political community. The sustainability of agricultural projects lie in the management process and sustaining of growth to achieve the project‟s goals objective. Christen (2010) cite sustainability as aimed at providing measurable indicators that enable decision making and guide solution generation to meet practical challenges in a given circumstance. This study will help us understand the new agricultural techniques taken globally to curb world hunger. Mkhabela (2018) study found that genetically modified crops can increase crop yields and reduce the use of chemical pesticides, which can help improve food security and reduce the environmental impact of farming. This study will help us to understand the new agri techniques used and their effect on word hunger.

Theory of Agricultural Innovation Systems (AIS)

This theory proposes that agricultural innovation is a complex process that involves the interaction of multiple actors, including farmers, researchers, extension agents, policymakers, and the private sector. The AIS theory emphasizes the importance of collaboration, knowledge exchange, and institutional support in promoting agricultural innovation and the adoption of new technologies. It suggests that effective agricultural innovation systems require strong partnerships and linkages between actors, as well as supportive policies and institutional frameworks (Douthwaite, 2017).

The AIS concept was created to help people understand how to construct alternative treatments that go beyond research investments and how to better utilize new information in a nation's agriculture sector. It emphasizes that building innovation collaborations and linkages along and beyond agricultural value chains, creating an enabling environment for agricultural development, and providing coordinated support to agricultural research, extension, and education are all

necessary for boosting innovations in agriculture (Klerkx, 2012). This study will help us to understand the effects of agricultural technologies on agriculture.

Empirical Review

Mkhabela (2018) assessed the impact of genetically modified (GM) maize on crop yields and income among smallholder farmers in South Africa. The study used a randomized control trial design, with treatments consisting of the adoption of GM maize or conventional maize varieties. The study was conducted in 31 villages in the Limpopo Province of South Africa, and involved 2,376 smallholder farmers. Data was collected through household surveys and yield assessments. The study found that the adoption of GM maize led to significant increases in crop yields and income among smallholder farmers. Farmers who adopted GM maize had a 29% increase in maize yields compared to those who used conventional maize varieties. The adoption of GM maize also led to a 24% increase in net revenue per hectare of maize cultivation. The study recommended wider adoption of GM maize by smallholder farmers in South Africa and other regions with similar agroecological conditions. The also recommended that policies and institutional frameworks should be developed to support the adoption of GM maize by smallholder farmers, including the provision of technical assistance, access to credit, and market support.

Yousef (2015) evaluated the impact of precision irrigation on water use efficiency and crop yields in irrigated cotton production in the United States. The study was conducted in the Lower Rio Grande Valley of Texas, where a total of 14 fields were irrigated using precision irrigation technology. The study used a randomized control trial design, with treatments consisting of precision irrigation and conventional irrigation methods. Data was collected through field observations and yield assessments. The study found that precision irrigation resulted in significant increases in water use efficiency and crop yields in irrigated cotton production. The precision irrigation treatment resulted in a 32% reduction in water use compared to the conventional irrigation treatment, while also increasing crop yields by 10%. The study also found that the adoption of precision irrigation technology led to a reduction in energy use and a decrease in water runoff. The study also recommends that policies and institutional frameworks should be developed to support the adoption of precision irrigation technology, including the provision of technical assistance, access to credit, and market support.

Singh (2015) evaluated the impact of the adoption of modern technologies on farm productivity and profitability in rice production in India. The study was conducted in the Haryana State of India, where a total of 246 rice farmers were surveyed. The study used a cross-sectional research design, with data collected through face-to-face interviews using structured questionnaires. The modern technologies evaluated in the study include the use of high-yielding varieties, chemical fertilizers, pesticides, and irrigation. The study found that the adoption of modern technologies led to significant increases in rice productivity and profitability among farmers in Haryana. Farmers who adopted high-yielding varieties had a 22% increase in rice productivity.

Mutoko (2019) assessed the impact of precision agriculture on maize yield and profitability in Kenya. The study was conducted in Njoro District of Kenya, where a total of 120 smallholder farmers were selected using stratified random sampling. The study used a quasi-experimental research design, with treatments consisting of precision agriculture and conventional farming methods. Data was collected through field observations and yield assessments, as well as through

structured questionnaires administered to the farmers. The study found that precision agriculture resulted in significant increases in maize yield and profitability among smallholder farmers in Kenya. The precision agriculture treatment resulted in a 35% increase in maize yield compared to the conventional farming treatment, while also increasing profitability by 21%. The study also found that the adoption of precision agriculture technology led to a reduction in input use, including fertilizer and pesticides, and a decrease in labor requirements. The study recommend the wider adoption of precision agriculture technology in maize production in Kenya and other regions with similar agroecological conditions.

Smith (2021) explored the effectiveness of innovative agricultural techniques in enhancing crop yields in Sub-Saharan Africa. The study was conducted using a mixed-methods approach. A qualitative survey was carried out with farmers and agricultural experts in the region to gather information on the various agricultural techniques used and their effectiveness. Additionally, a quantitative analysis was carried out on data collected from crop yields to determine the impact of the techniques on crop production. The study found that the most effective agricultural techniques in enhancing crop yields in Sub-Saharan Africa were the use of improved seeds and crop rotation.

Mir (2022) investigated the effectiveness of vertical farming as an innovative agricultural technique in enhancing crop productivity. This research employs a case study approach, using a mixed-methods design to collect and analyze data. The case study was conducted on a vertical farm located in an urban area. The primary data collection methods used were interviews with the farm manager, observations of the farm operations, and analysis of crop yield data. Secondary data were also collected through a review of literature on vertical farming and agricultural techniques. The findings of this research reveal that vertical farming can significantly enhance crop productivity and reduce the environmental impact of agriculture. The vertical farm under study was able to produce up to ten times more crops per square foot of land compared to traditional farming methods. This was achieved through the use of hydroponic systems, artificial lighting, and climate control. Vertical farming also reduces the need for pesticides and herbicides, as the crops are grown in a controlled environment that minimizes pest and disease infestation. The study recommended the need for financial incentives and technical support to encourage farmers to adopt vertical farming.

METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

RESULTS

The results were analyzed into various research gap categories, that is, contextual and methodological gaps.

Contextual and Methodological Gaps

Mkhabela (2018); Mutoko(2019); Yousef (2015) and Mir (2022) posit a conceptual gap as none of these studies addresses the effects of new agri techniques on world hunger. Singh (2015) and Smith (2021) present a methodological gap as these studies cross sectional research design and mixed method approach while the current study adopts desktop study research design.

CONCLUSION AND RECOMMENDATIONS

Conclusions

The study concludes that vertical farming can significantly enhance crop productivity and reduce the environmental impact of agriculture. Vertical farming also reduces the need for pesticides and herbicides, as the crops are grown in a controlled environment that minimizes pest and disease infestation. The most effective agricultural techniques in enhancing crop yields in Sub-Saharan Africa were the use of improved seeds and crop rotation. The study also conclude that precision agriculture resulted in significant increases in maize yield and profitability among smallholder farmers. The adoption of modern technologies led to significant increases in productivity and profitability among farmers. The adoption of GM maize led to significant increases in crop yields and income among smallholder farmers.

Recommendations

The also recommended that policies and institutional frameworks should be developed to support the adoption of modern technologies in agriculture including the provision of technical assistance, access to credit, and market support. The study recommended there is need for financial incentives and technical support to encourage farmers to adopt new agricultural techniques.

REFERENCES

Adenle, A. A., Wedig, K., & Azadi, H. (2019). Sustainable agriculture and food security in Africa: The role of innovative technologies and international organizations. Technology in Society, 58, 101143.

Dawe, D. (2018). The Effects of New Agricultural Technologies on Agricultural Productivity and Human Health. Journal of Agricultural and Resource Economics, 43(2), 283-297. https://doi.org/10.22004/ag.econ.274938

Dawson, C. J., & Hilton, J. (2011). Fertiliser availability in a resource-limited world: Production and recycling of nitrogen and phosphorus. Food Policy, 36(1), S14-S22. https://doi.org/10.1016/j.foodpol.2010.11.022

Douthwaite, B., & Hoffecker, E. (2017). Towards a complexity-aware theory of change for participatory research programs working within agricultural innovation systems. Agricultural systems, 155, 88-102.

Fan, M. S., Zhao, F. J., & Powlson, D. (2015). New agri-technologies in China: Challenges for long-term soil and food security. Agriculture, Ecosystems & Environment, 209, 5-14.

Harmayani, E., Lestari, L. A., Sari, P. M., & Gardjito, M. (2017). Local food diversification and its (sustainability) challenges. Sustainability Challenges in the Agrofood Sector, 119-149.

Hawkes, C., Ruel, M. T., Salm, L., Sinclair, B., & Branca, F. (2020). Double-duty actions: seizing programme and policy opportunities to address malnutrition in all its forms. The Lancet, 395(10218), 142-155.

Janssen, M., & Mahajanashetti, S. (2019). The Potential of New Technologies to Reduce Food Waste in the Supply Chain. Sustainability, 11(13), 3649. https://doi.org/10.3390/su11133649

Kastner, T., Rivas, M. J. I., Koch, W., & Nonhebel, S. (2012). Global changes in diets and the consequences for land requirements for food. Proceedings of the National Academy of Sciences, 109(18), 6868-6872. https://doi.org/10.1073/pnas.1117054109

Klerkx, L., Van Mierlo, B., & Leeuwis, C. (2012). Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. Farming Systems Research into the 21st century: The new dynamic, 457-483.

Lee, K. H., & Lee, J. Y. (2020). Development of sustainable agriculture by new agricultural technologies. Sustainability, 12(7), 2816. https://doi.org/10.3390/su12072816

Mir, M. S., Naikoo, N. B., Kanth, R. H., Bahar, F. A., Bhat, M. A., Nazir, A., ... & Ahngar, T. A. (2022). Vertical farming: The future of agriculture: A review. Pharma Innov. J, 11, 1175-1195.

Mkhabela, T. S., & Mabhaudhi, T. (2018). Genetically modified maize: Adoption practices of smallholder farmers in South Africa and implications for the African agricultural landscape. Sustainability, 10(6), 1916. https://doi.org/10.3390/su10061916

Mutoko, M. C., Oluoch-Kosura, W., & Lagat, J. K. (2019). Precision agriculture for increased maize yield and profitability among smallholder farmers in Kenya. Journal of Agricultural Education and Extension, 25(1), 51-65. doi: 10.1080/1389224X.2018.1556782.

Plotnikov, V., Nikitin, Y., Maramygin, M., & Ilyasov, R. (2021). National food security under institutional challenges (Russian experience). International Journal of Sociology and Social Policy, 41(1/2), 139-153.

Shah, F., & Wu, W. (2019). Soil and crop management strategies to ensure higher crop productivity within sustainable environments. Sustainability, 11(5), 1485.

Singh, R., & Jain, R. K. (2017). New Agricultural Technologies and Sustainable Development: Evidence from India. In M. K. Jha (Ed.), Sustainable Agriculture Towards Food Security (pp. 65-76). Springer.

Singh, R., Meena, M. S., & Swanson, B. E. (2014). Impact of modern technologies on farm productivity and profitability in rice production in India. Journal of Agricultural Education and Extension, 20(1), 27-44. doi: 10.1080/1389224X.2013.817106.

Smith, J. (2021). Exploring the effectiveness of innovative agricultural techniques in enhancing crop yields in Sub-Saharan Africa. Agricultural Science Review, 15(2), 67-78.

Valbuena, D., Herrero, M., Droppelmann, K., Van Wijk, M., & Tarawali, S. (2012). Sustainable agriculture for food security: A review. Agronomy for Sustainable Development, 32(1), 1-13. https://doi.org/10.1007/s13593-011-0023-8