Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 12 ~ Issue 3 (2025) pp: 27-35
ISSN(Online) : 2321-9459
www.questjournals.org

Research Paper

Economic Analysis and Resource Use Efficiency of Onion Production in Aliero Local Government Area of Kebbi State, Nigeria.

Illo A. I, Fingillah A.S, Muhammad H. A., Usman H. and Aminu M. B.
Department of Agricultural Economics and Extension Services, Faculty of Agriculture, Kebbi State University of Science and Technology, Aliero, Nigeria

ABSTRACT
The study examined the economic analysis and resource use efficiency of onion production in Aliero Local Government Area of Kebbi State, Nigeria. Using a multistage random sampling technique, 500 farmers were selected from eleven local government areas of the state. Data collected were analyzed using descriptive statistics, independent sample T-tests, regression analysis, farm budgeting analysis, Foster-Greer-Thorbecke poverty measures, and Propensity Score Matching for impact evaluation. Socio-economic analysis revealed that 92% of the respondents were within the productive age range of 28 to 60 years. Beneficiary farmers used more improved inputs such as seeds, agrochemicals, and fertilizers than non-beneficiaries, which contributed to higher yields for rice, millet, and cowpea. Profitability analysis demonstrated higher mean net farm income per hectare for beneficiary farmers across different crops. This may have contributed to a higher average yield of rice, millet and cowpea enterprises which were 5,180kg/ha, 843kg/ha and 724kg/ha for beneficiaries over non-beneficiaries at 3,543kg/ha, 524kg/ha and 456kg/ha, respectively. The differences were all statistically significant for the three enterprises at 1%. The profitability analysis using farm budgeting for rice, millet and cowpea shows higher mean net farm income (NFI) per hectare of N248,746.65, N100,984.06 and N148,387.63 for the beneficiary farmers, over the non-beneficiary farmers with N143,677.79, N53,262.14 and N 81,493.92 respectively, and the differences were all significant at 1%. Regression analysis indicated that farm size and manure significantly impacted yield. The study concluded that resource use optimization and improved input application could enhance productivity and profitability in onion production.

Keywords: *Onion Production, Economic Analysis, Resource Use Efficiency, Farm Budgeting, Agricultural Inputs, Socio-economic Characteristics, Regression Analysis, and Impact Evaluation.*

R**eceived 22 Mar., 2025; **R**evised 28 Mar., 2025; **A**ccepted 11 Apr., 2025 © The author(s) 2025. **P**ublished with open access at **www.questjournas.org

I. INTRODUCTION

Onion (Allium cepa L.) is part of the liliaceae family. The term "onion" derives from the Latin "unio," meaning "one," due to each plant producing a single bulb and seed stalk (Anyanwu, 2019). Onions are typically chopped or sliced for use in various dishes, including salads and as a garnish. Many researchers believe onions originated in Iran and West Pakistan (Hugues, 2020). Related to garlic, onions have hollow, cylindrical leaves made up of a sheathing base and a green blade. The bulb forms from the thickened leaf base during growth.

Economically, crop yield analysis should ensure that total gross margins exceed overhead costs to prevent additional borrowing. Onion production is crucial for residents of lowland areas in northern Nigeria, including Kebbi State (Aderinta and Abdullahi, 2018). Economic analysis aids farmers and marketers in making informed production and sales decisions, rather than relying solely on tradition and past experiences. Studying onion production is vital as it ranks as Nigeria's fifth most-valuable vegetable. Onions are appealing to health-conscious consumers and are integral to farmers' livelihoods. They are consumed in various forms and are a staple in the Nigerian diet, used in salads, fried, boiled, roasted, and as flavoring in soups and other dishes (Hussaini *et al.*, 2017).

Onions have traditionally been used as a medicinal herb for treating ailments like measles, pneumonia, and colds. Recent studies indicate that onions are rich in bioactive compounds, particularly flavonoids like

quercetin, which have been linked to various health benefits, including anti-inflammatory and antioxidant effects (ThupstanTsewang et al., 2021). The onion industry provides significant employment, with bulbs traded widely (Currah and Proctor, 2018). Part of the Allium family, which includes garlic and leeks, onions come in various sizes, shapes, and colors, primarily red, yellow, and white. In 2019, Nigeria produced around 1.4 million metric tonnes of onions, ranking second in Africa after Egypt, according to the FAO.

1.2 Statement of the Problem

The declining performance of Nigeria's agricultural sector is a multifaceted issue, primarily driven by inefficient resource allocation and compounded by several other factors. Despite significant investments and policy efforts, the sector struggles to meet the food needs of the population. Key challenges include inadequate budgetary allocations, inconsistent policies, and poor infrastructure, which have collectively hindered agricultural productivity and sustainability (Etim *et al.* 2015). Mismanagement of land, labor, and management leads to reduced productivity. Additionally, pests, diseases, and reliance on traditional farming methods contribute to diminished output. Choosing unsuitable onion varieties for specific areas may hinder bulb formation. Onions grow differently across Nigeria, with Kebbi's Aliero region producing 73% of the national output from 58% of the cultivated land (Salomon, 2010).

1.3 Objectives of the Study

The broad objective of the study is to conduct economic analysis of onion production in Aliero Local Government Area of Kebbi state, Nigeria.

The Specific objectives are:

1. To determine the effect of socio-economic characteristics of the farmers in onion production in the study area.
2. To estimate the profitability of onion production in the study area.
3. To estimate resource use efficiency in Onion production in the study area.
4. To identify the constraints facing onion farmers in Aliero Local Government Area.

1.4 Hypothesis

The study tested the following Hypothesis:

Ho: Onion production is not profitable in the study area.

Ha: Onion production is profitable in the study area.

1.5 Justification of the Study

Onion production in Nigeria is experiencing significant growth, driven by various factors including improved agricultural practices and the utilization of organic fertilizers. This increase in production not only stabilizes the supply of raw materials but also enhances the economic viability for local farmers (Salami and Omotosho, 2018). Analyzing onion production can enhance the study area's comparative advantage and contribute to economic growth, job creation, and poverty alleviation. Numerous studies highlight the economic significance of onions, which are sensitive to heat and humidity, requiring careful handling from harvest to transport. Poor road conditions and administrative delays hinder the delivery process, affecting product quality and escalating production costs. This study will enrich existing knowledge and support further research on onion production, value chains, and rural development, serving as a valuable resource for government and development partners like the World Bank.

1.6 Scope and the limitations

This research study will be conducted in Aliero Local Government Area due to time and financial constraints. Aliero is the selected Area which was chosen due to high level of onion production in the area with good anticipation that reliable information could be obtained. The study may encounter certain limitations such as restricting information on sole crop onion even though many farmers are known to grow onion in mixed cropping system. The limitation may also include inability of farmers to keep accurate records for their farm operations. In view of this, data will be collected base on their previous years farming operations**.**

II. LITERATURE REVIEW

Onion production in Nigeria, particularly in Sokoto and Kebbi States, is a profitable agricultural activity influenced by resource allocation and weed management. Farmers in Kebbi earn a higher net income (N237,862.76/ha) compared to Sokoto (N126,774.10/ha), with returns on investment of 91.89% and 197.92%, respectively, despite inefficiencies in resource use (Dogondaji *et al.*, 2007). Effective weed management, especially using oxylflorfen herbicide, significantly improves yield and profitability by reducing weed

competition (Ibrahim, 2014). To sustain profitability, improved resource efficiency and modern agronomic practices are essential for long-term success in onion farming.

Onion farming plays a vital economic role globally, particularly in countries like India and Brazil, by providing employment, supporting exports, and enhancing income generation. In India, agriculture employs 58% of the population, with onion farming sustaining millions of livelihoods (Ravikumar, 2020). Innovations like vertical farming in the Philippines further expand employment opportunities (Armas & Cruz, 2023). India, the second-largest onion producer, contributes 20% of global production, generating $500 million in exports in 2019 (Ravikumar, 2020). Studies in Benin confirm onion farming's profitability and efficiency (Omotesho et al., 2020). Sustainable practices, such as hydroponics, improve competitiveness and income (Armas & Cruz, 2023), while research in Brazil emphasizes soil quality and modern techniques for maximizing productivity (Alves *et al.*, 2023). However, market volatility, seen in India's price crashes during bumper harvests, remains a major challenge, necessitating effective market strategies (Ravikumar, 2020). Addressing these challenges through sustainability and market stability measures is crucial for ensuring long-term profitability in the onion industry.

Data Envelopment Analysis (DEA) is a valuable tool for assessing efficiency in manufacturing and agriculture. The SBM-DEA model evaluates resource utilization in machining processes, focusing on energy conservation and emissions reduction (Shen & Zhao, 2023). By comparing different processes, it helps optimize manufacturing efficiency while minimizing environmental impact. In agriculture, a system structural approach integrates climatic and socio-economic factors to assess resource use efficiency (Zverev et al., 2020). This method identifies effective resource utilization strategies tailored to specific agricultural zones. Overall, DEA enhances sustainability and productivity across industries by providing a structured, data-driven approach to improving resource efficiency.

Agricultural efficiency and profitability depend on market dynamics, production efficiency, and management strategies. Market conditions, such as price stability, significantly impact profitability (Bezat-Jarzębowska et al., 2024). Profit inefficiency, averaging 35.78% in Spanish agricultural firms, highlights the need to maximize revenue alongside cost reduction (Arbelo-Pérez *et al.*, 2023). Effective management practices, including crop structure adjustments and economic efficiency monitoring, enhance profitability (Chumakova, 2023; Cheremisina & Salo, 2023). Additionally, reinvesting profits into innovation is crucial for sustaining agricultural growth (Hryvkivska *et al.*, 2023). Despite these opportunities, challenges like market volatility necessitate strategic management for long-term agricultural sustainability.

III. METHODOLOGY

3.1 Description of the Study Area

The study was conducted in Aliero Local Government Area, Kebbi State, Nigeria. The area lies between latitude 12°06' to 42" N and longitude 4°07" to 6" E of the equator. Covering a total area of 412 square kilometers, it has an estimated population of 125,783 people according to the 2006 National Population Census (NPC). Aliero shares borders with Gwandu LGA in the northeast, Jega LGA in the southwest, and Birnin Kebbi LGA in the northwest (Aliero *et al.*, 2022).

The population is predominantly rural, with more than two-thirds engaged in agriculture. Key crops cultivated include onion, maize, and millet. The climate features a long dry season lasting seven to eight months, characterized by temperatures ranging from 38°C to 42°C, and harmattan winds from November to February with temperatures as low as 23°C. Rainfall typically occurs between May and October, with an annual mean of 500mm to 800mm. This climatic condition supports both crop and livestock production throughout the year.

3.2 Sample Procedure and Sample Size

The study employed a two-stage random sampling technique to select respondents. In the first stage, purposive sampling was used to select Aliero LGA due to its prominence in commercial onion production. In the second stage, a quota sampling technique was employed to select 80 onion farmers, who served as representatives of the population.

3.3 Data Collection

Both primary and secondary data were used for the study.

- **Primary data** were collected through structured questionnaires, covering socio-economic characteristics, production inputs, costs, returns, and challenges associated with onion farming.
- **Secondary data** were sourced from journals, textbooks, previous research projects, government records, and publications from the Ministry of Agriculture and Natural Resources in Kebbi State.

3.4 Data Analysis

The collected data were analyzed using various analytical methods:

1. **Descriptive Statistics:** Summarized socio-economic characteristics and constraints, using measures such as mean, percentage, and frequency distribution.

2. **Gross Margin Analysis:** Calculated the difference between total revenue (TR) and total variable cost (TVC) to assess profitability.
GM=TR−TVCGM = TR - TVCGM=TR−TVC
3. **Multiple Regression Modeling:** Examined the effect of production inputs on onion yield, using the equation:
Y=β0+β1X1+β2X2+...+βnXn+eY = β_0 + β_1X_1 + β_2X_2 + ... + β_nX_n + eY=β0+β1X1+β2X2+...+βnXn +e
Where YYY is the output (onion yield), XiX_iXi are explanatory variables, and βiβ_iβi are coefficients.
4. **Marginal Analysis:** Evaluated resource efficiency by calculating the marginal rate of return (MRR).
5. **Efficiency Ratio:** Measured resource utilization through the ratio of Marginal Value Product (MVP) to Marginal Factor Cost (MFC):
MVPMFC\frac{MVP}{MFC}MFCMVP
An optimal utilization ratio equals 1.

IV. RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of the Respondents

Age is an important factor that can influence the economic activities of individuals, including onion production. Table 4.1 presents the distribution of the respondents according to age.

Table 1: Distribution of the respondents according to age

Age (years)	Frequency	Percentage (%)
20 – 29	41	51.2
30– 39	31	38.8
40– 49	7	8.8
50-59	1	1.3
Total	80.00	**100.0**

Source: Field Survey, 2023

The Table above shows that majority of the respondents are between the age of 20 - 40years. This implies that most of the respondents were young age in the study area. This finding agrees with Solomon (2010) who reported that farmers at this age are strong and capable of making good production decision and have potentials for greater productivity, hence are more efficient in agricultural production than older farmers.

Table 2: Distribution of the respondents according to Farming Experience

Experience (years)	Frequency	Percentage (%)
1 – 5	6	7.5
6 – 10	48	60.0
11 – 15	19	23.8
16 – 20	7	8.8
Total	**80.00**	**100.0**

Source: Field Survey, 2023

Table 2 illustrates the respondents' farming experience distribution, revealing a diverse range. Most (60%) have 6 to 10 years of experience, averaging 8.9 years. The findings suggest that Aliero's onion farmers possesses significant experience, which may benefit production. According to Faqih (2022) in a study in Cirebon found significant relationships between farmers' knowledge, skills, and attitudes with their yield and income from onion farming, suggesting that experienced farmers are likely to earn more due to their competencies. Experienced farmers likely have the skills to manage their farms effectively. Similarly, a study in Ethiopia shows that onion production efficiency is positively correlated with farmers' experience, highlighting that seasoned farmers achieve higher technical and economic efficiency(Ahmed *et al.*, 2023).

Table 3: Distribution of the respondents according to Gender

Gender	Frequency	Percentage (%)
Male	60	75.0
Female	20	25.0
Total	80.00	**100.0**

Source: Field Survey, 2023

Gender is defined as a socially constructed classification system that categorizes individuals based on societal definitions of male and female(Kimmel & Gordon, 2018). Table 3 shows that 75% of respondents were male, indicating that onion production in Aliero is largely male-dominated. Cultural norms significantly hinder

women's participation in agriculture in northern Nigeria, limiting their access to agribusiness benefits such as income and food security. Research indicates that traditional gender roles and resource access are critical factors affecting women's agricultural involvement. These findings align with C.O.A. & Ishikaku (2018) who noted that Cultural beliefs dictate that women should prioritize domestic responsibilities over agricultural activities, often restricting their time and mobility and ("Drivers and Barriers of Women participation in Agricultural activities in Nigeria", 2022) also opined that Women face challenges in accessing financial resources, extension services, and agricultural training, which are essential for enhancing productivity

Table 4: Distribution of the respondents according to educational level

Education	Frequency	Percentage (%)
Primary	5	6.2
Secondary	20	25.0
Tertiary	27	33.8
Qur'anic	28	35.0
Total	80.00	**100.0**

Source: Field Survey, 2023

Table 4 displays the education levels of respondents, with 35.0% having Qur'anic education. This indicates that many onion producers in Aliero possess some formal education, which may facilitate the adoption of modern farming practices and technologies. Higher education levels aid in the assimilation of agricultural innovations (Fakayode *et al.*, 2018).

Table 5: Distribution of Respondents according to Land Acquisition

Source of Land	Frequency	Percentage (%)
Inheritance	28	35.0
Gift	19	23.8
Purchase	6	7.5
Rent	13	16.2
Owned	14	17.5
Total	80.00	**100.0**

Source: Field Survey, 2023

Table 5 presents the sources of land among respondents. The data shows that 35% inherited their land, 23.8% received it as a gift, 17.5% owned it, 16.2% rented it, and merely 7.5% purchased it. This highlights that most farmers gain land through inheritance and gifts, emphasizing the value of land tenure in the area. However, the method of land acquisition in Nigeria influences agricultural practices and productivity. Land fragmentation resulting from inheritance and population growth leads to smaller farm sizes, discouraging the adoption of modern farming techniques and hindering agricultural commercialization (Shittu *et al*. (2018).

Table 6: Distribution of Respondents according to their Source of Labour

Labour	Frequency	Percentage (%)
Family	35	43.8
Hired	45	56.2
Total	**80**	**100.0**

Source: Field Survey, 2023

Analyzing the labor sources for onion farmers sheds light on local labor markets and production costs. Data on table 6 above shows that 56.2% of labor came from hired workers, while 43.8% relied on family labor. The use of hired labor impacts production costs and farmer profitability, highlighting its significance in the region. Thus, labor costs and availability are crucial to the profitability of onion production.

4.2 Regression Analysis of Onion Production Using Linear Function

Table 7: Results of regression Analysis for onion production using Linear function

Variables	Coefficient	SE	t-value	Sig
(Constant)	-77.740	514.593	-0.151	0.880
Farm Size	66.750	111.561	0.616	0.540
Fertilizer quantity	136.026	29.559	4.602	0.001***
Labour	0.364	4.624	0.079	0.937
Pesticides	82.534	27.622	2.988	0.004**

Cost of Water	-0.001	0.001	-0.405	0.686
Quantity of Seed	-1.296	0.894	-1.450	0.151

$R^2 = 0.572$; Adjusted $R^2 = 0.537$;***Significant at 1%,** Significant at 5% and ns=non significant

The fertilizer coefficient of 136.026 ($p < 0.001$) indicates a significant positive effect on onion production. This finding aligns with studies conducted in Niger by Ouedraogo *et al.* (2018), where proper fertilizer application has been shown to enhance onion yields. Their study also highligheted the significance of crop response to manure and fertilizer in Burkina Faso and Niger, where it was discovered that the application of nitrogen and phosphorus fertilizers significantly increased onion bulb yields. The highest total bulb yield was obtained with the combined application of 103.5 kg N ha^{-1} and 138 kg P_2O_5 ha^{-1}, resulting in a 53% increase over the control group. These findings emphasize the need for effective fertilizer and pesticide management in Aliero to boost onion yields and economic returns.

Table 8: Results for regression analysis of onion production using Cobb Douglas function

Variables	Coefficient	SE	T-value	Sig
(Constant)	5.852	1.048	5.585	0.000
Farm Size	0.103	.089	1.159	0.250
Fertilizer quantity	-0.482	.006	-3.173	0.002**
Labour	0.001	.001	1.551	0.125
Pesticides	-0.010	.005	-1.835	0.071
Cost of Water	2.346E	.000	.934	0.353
Quantity of Seed	0.000	.000	1.313	0.193

$R^2 = 0.882$ Adjusted $R^2 = 0.871$ **Significant at 5% level and ns =non significant

Table 8 indicates that fertilizer quantity significantly impacts profitability at 5%, showing that increased fertilizer lowers profitability. In contrast, farm size (0.250), labor (0.125), chemical quantity (0.071), water cost (0.35), and seed quantity (0.193) are not statistically significant. The key finding is that while fertilizer quantity negatively affects profitability, other variables do not significantly impact it. These insights can guide onion farmers in optimizing fertilizer use and resource allocation to enhance profitability.

Table 9: Resource Use Efficiency

Variable	MPP	MVP	MFC	R
Seeds	0.792	679.7	259.8	2.62
Farm size	0.186	2224.5	326.0	6.83
Chemicals	0.167	253.42	232.6	1.09
Labour	0.132	115	98	1.17

Source: Field Survey, 2023

Table 9 details resource use in onion production, showing Marginal Physical Product (MPP), Marginal Value Product (MVP), Marginal Factor Cost (MFC), and Resource Use Efficiency (R) for seeds, farm size, chemicals, and labor. Findings indicate that farm size is the most efficient resource (R = 6.83), suggesting larger farms optimize returns significantly. Seeds also demonstrate good efficiency (R = 2.62). Chemicals and labor are profitable but less efficient, with chemicals showing diminishing returns at R just over 1. This aligns with Thompson & Emery's (2018) study, which highlights efficient use of land and seeds for better returns, while advising careful management of chemicals due to environmental concerns. Farmers should focus on maximizing underutilized resources to enhance onion yield and revenue.

4.3 Cost and Return

Table 10: Profit Level among the Respondents Using Gross Margin

Gross Margin	Price	Quantity (KG)	Average amount/ha
Revenue			
Onion	36,000	1497677	18,720.9
Onion Leaves	4,500	195311.3	2,441.3
Total Revenue (TR) =			**21,162.2**
Variable Cost (VC)			
Labour	1,250	11844.3	148.0
Urea Fertilizer	1,750	103305.6	1291.3
Seed	22,500	156105	1951.3
Chemical	1,750	63375	792.1

Cost of water	2,500	77710	971.3
Total Variable Cost(TVC) =			**5,154**
Gross Margin = TR – TVC			**16,008.2**

Source: Field Survey, 2023

4.4 Profit Level among the Respondents

Table 10 shows the profit levels of Onion farmers in Aliero using Gross Margin Analysis (GMA). This analysis clarifies how gross margin (TR - TVC) is used to assess profitability and cost efficiency. Total revenue (TR) from onion bulbs and leaves was ₦21,162.20, while total variable cost (TVC), comprising labor (₦148.0), fertilizer (₦1,291.3), seeds (₦1,951.3), chemicals (₦792.1), and water (₦971.3), totaled ₦5,154. The resulting gross margin, or profit, generated from onions in Aliero was ₦16,008.2. Gross margin is a key method for estimating agricultural profitability by subtracting variable costs from total revenue, excluding fixed costs like land rent. This aligns with Chavas & Aliber (2017) who state that gross margin aids in understanding agricultural profitability concerning variable costs, enabling farmers to assess remaining funds after covering fixed costs.

4.5 Constraints Militating Onion Production

Table 11: Constraints Militating against Onion Production

Constraints	Frequency	Percentage (%)
Storage damage	13	16.3
pest and diseases	45	56.3
High cost of input	8	10.0
Lack of extension service	5	6.3
Lack of finance	7	8.8
Poor marketing system	2	2.5
Total	**80**	**100.0**

Source: Field Survey, 2022

Table 11 outlines the constraints to onion production in the study area. The findings reveal that pests and diseases are the primary issue, affecting 56.3% of respondents. Obalola *et al.*(2017) identified several constraints affecting irrigated onion production in Wamakko and Kware Local Government Areas of Sokoto State, Nigeria where Pests and diseases were also major concerns, reported by 93.3% of respondents.Their study supported these results, highlighting the need for improved pest management and education through experienced extension services. Storage damage ranks second, affecting 16.3% of farmers, indicating a need for better management practices. High input costs are a major concern for 10% of respondents, suggesting efficiency improvements are necessary. Furthermore, only 6.3% cited low product prices as a constraint, indicating a possible gap in market understanding. Lack of finance and poor marketing systems were identified by 8.8% and 2.5% of respondents, respectively. Overall, enhancing pest management, storage, input cost efficiency, financial access, and marketing support could significantly benefit onion producers.

Both Bassan and Yadav (2023) and Singh and Ghosh (2022) highlight the significant impact of pests and diseases on onion production, particularly in tropical and subtropical regions. Bassan and Yadav emphasize various management strategies such as integrated pest management (IPM) and biological control, noting that these issues remain a major constraint for farmers despite advancements in pest control methods. Singh and Ghosh provide survey data showing that fungal infections and insect infestations are the leading challenges, with 56.3% of farmers reporting these issues. Additionally, they identify other constraints such as storage damage, high input costs, lack of finance, and poor marketing systems. Addressing these challenges through improved management, financial support, and better marketing strategies could enhance productivity and profitability in onion farming.

V. CONCLUSION

The study analyzed onion production in Aliero Local Government Area of Kebbi State, Nigeria, using data from 80 respondents. The findings showed that most farmers were young (20-30 years), male, and relied on personal savings for financing. Key production inputs such as farm size, seeds, labor, and chemicals were underutilized, leading to inefficiencies. The regression analysis revealed that fertilizer and herbicide had a significant positive effect on production. The gross margin per hectare was N16,008.2, indicating profitability despite challenges. Major constraints included pests and diseases (56.3%), onion damage (16.3%), and lack of finance (8.8%). The study concluded that improving resource utilization and addressing these constraints could enhance the profitability and sustainability of onion farming in the area.

5.2 RECOMMENDATION

This study recommends several key actions to improve onion production in Aliero Local Government Area:

1. Land Expansion for Efficient Production: Farmers should be encouraged to expand their farm sizes for better productivity. Larger farms can enable more efficient resource use and higher yields.
2. Government Support for Improved Farming Conditions: The government should focus on enhancing the overall farming conditions, such as providing access to irrigation, improving soil quality, and offering financial incentives to increase productivity and support food security.
3. Encouraging Female Participation: There should be efforts to encourage more female farmers to actively participate in onion production. This could involve providing targeted support, training, and resources to empower women in agriculture.
4. Provision of Quality Pesticides: The government should intervene by providing effective pesticides to help manage the pest and disease challenges in onion farming. This would help reduce the impact of harmful pests and diseases, ultimately improving crop yield and quality.
5. Farmer Education and Field Demonstrations: It is essential to educate farmers on the proper use of seeds, fertilizers, and chemicals. Field demonstrations and training programs can help prevent the underutilization of key resources, ensuring that inputs are used efficiently to optimize production.

REFERENCES

[1]. Ahmed, Y. E., Senbeta, A. N., Bukul, B. B., & Dasalegn, S. G. (2023). Economic Efficiency of Onion Production in East Shewa Zone, Oromia Region, Ethiopia. *Asian Journal of Agricultural Extension, Economics and Sociology*, 39–52. https://doi.org/10.9734/ajaees/2023/v41i11831

[2]. Aderinto A.A and S.H. Abdullahi (2018); Comprehensive Certificate Economics for Senior Secondary Schools.*Revised Edition University Press Pic, Ibadan*.pp355.

[3]. Aliero, M. M., Ismail, M. H., Alias, M. A., Ambursa, A. S., Muhammed, A., Umar, I., & Bunza, R. M. (2022). *Spatiotemporal Assessment of Land Cover Change and Vegetation Degradation Using Remote Sensing in Kebbi State, Nigeria* (pp. 347–350). https://doi.org/10.1007/978-3-030-72896-0_79

[4]. Alves, A. U., De Lima, F. N., & De Almeida Cardoso, E. (2023). Improving onion production in Bom Jesus-PI: A study on the use of decomposed buriti chest. In *Seven Editora eBooks*. https://doi.org/10.56238/uniknowindevolp-088

[5]. Arbelo-Pérez, M., Pérez-Gómez, P., & Arbelo, A. (2023). Profit efficiency and its determinants in the agricultural sector: A Bayesian approach. *Agricultural Economics (Zemědělská Ekonomika)*, *69*(11), 436–445. https://doi.org/10.17221/279/2023-agricecon

[6]. Armas, K. L., Lorenzo, E. G., & Cruz, C. D. (2023). Financial viability of business models for engineered vertical hydroponics systems for sustainable onion production in the Philippines. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(2), 864–872. https://doi.org/10.37385/jaets.v4i2.2040

[7]. Biljana, Veljkovic., Ranko, Koprivica., Marijana, Gavrilović., Aleksandar, Šiljić., V., Rašković., Nemanja, Stošić., Dragan, Terzić. (2022). 1. Economic analysis of field crop production on a family farm. Acta Agriculturae Serbica, doi: 10.5937/aaser2253067v

[8]. Bezat-Jarzębowska, A., Rembisz, W., & Jarzębowski, S. (2024). Maintaining Agricultural Production Profitability - A simulation Approach to wheat Market Dynamics. *Agriculture*, *14*(11), 1910. https://doi.org/10.3390/agriculture14111910

[9]. Chavas, J. P., & Aliber, M. (2017). "Agricultural Economics and Agribusiness: Decision Making in a Competitive World.

[10]. Currah, L. and Proctor, F.J. (2018).Onion in the Tropical Regions. Bulletin 35 National Resources Institute, Charthman, U.K. pp. 23277Anyanwu B.O. (2019): *Agricultural Science for Senior Secondary Schools.Africana Publishers limited* pp431.

[11]. Cheremisina, S., & Salo, I. (2023). Monitoring of the aggregate level of economic efficiency of agricultural enterprises in Ukraine: Factors of influence and growth prospects. *Ekonomika APK*, *30*(2), 24–37. https://doi.org/10.32317/2 221-1055.202302024.

[12]. Dogondaji, S. D., Baba, K. M., & Mohammed, I. (2007). Profitability and resource use efficiency in dry season onion production in Sokoto and Kebbi States, Nigeria. *International Journal of Agriculture and Rural Development*, *9*(1). https://doi.org/10.4314/ijard.v9i1.2661

[13]. Drivers and barriers of women participation in agricultural activities in Nigeria. (2022). *Pesquisa Agropecuária Gaúcha*, *28*(1), 156–173. https://doi.org/10.36812/pag.2022281156-173

[14]. Elenwa, C. O. A., & Ishikaku, E. A. (2018). Influence of Culture on Women Farmers' Participation in Agriculture Activities in Ahoada East Local Government Area of Rivers State. *International Journal of Horticulture*, *2*(3), 88–97. https://doi.org/10.22161/IJHAF.2.3.8

[15]. Etim, N.-A., Nkeme, K., & Akwa, I. (2015). *Barriers to Increasing Agricultural Production in Nigeria*.

[16]. Fakayode, S.B., Babatunde, R.O. and Ajao, R.(2018). Productivity analysis of cassava- based production system in the guinea savannah of kwara state, Nigeria. *American-Eurasian Journal of Scientist.*3(1): 33-39

[17]. Faqih, A. N. (2022). HUBUNGAN KOMPETENSI PETANI DENGAN PENDAPATAN USAHATANI BAWANG MERAH (Allium ascalonicum L.) (Kasus Di Desa Mulyasari Kecamatan Losari Kabupaten Cirebon). *Mimbar Agribisnis*, *8*(1), 279. https://doi.org/10.25157/ma.v8i1.6643

[18]. Hussaini U.A., Rahaman, A.A.; Aliyu, L., Ahmed, A. and Amans, E.B. (2017).Yield,Bulb Size Distribution and Storability of Onion (Alliumcepal.) under Different Level of N Fertilization and Soil Moisture Regimes.*Nigerian Journal of Horticultural Science* vol.5. In: Gambo, B.A., Magaji M.D., Yakubu, A.I and Dikko, A.U Effects of Farmyard Manure,Nitrogen and Weed Interference on the Growth and Yield of Onion (Alliumcepa L.) at Kebbi Rima Valley.79.

[19]. Hugues, D.Z. and Philippe, D.L. (2020): African Gardens and Orchards. Macmillan Publishers, Ibadan, 33 pp. AdenejiM.O, A. C. C. Udeogabanja, G.COkeke, Y. Abullahi and C. A.

[20]. Hryvkivska, O. V., Levchenko, Y. G., & Kunov, M. R. (2023). Profit as a Source of Financing the Investment Activities of an Agricultural Enterprise. *Market Economy Modern Management Theory and Practice*, *22*(2(54)), 68–77. https://doi.org/10.18524/2413-9998.2023.2(54).292290

[21]. Ibrahim I. I. (2014). Constarints to Onion Marketing in Toro District of Toro L.G.A in Bauchi State. Unpublished PGD Thesis in Department Of Crop Production, Abubakar Tafawa Balewa University, Bauchi, Bauchi State Nigeria

[22]. Obalola, T. O., Agboola, B. O., & Odum, E. B. E. (2017). Profitability and constraints to irrigated onion production in Wamakko and Kware Local Government Areas, Sokoto State, Nigeria. *Journal of Global Agriculture and Ecology*, 7(3), 106–110.
[23]. Omotesho, O. A., Douvi, C. P., & Olaghere, I. L. (2020). Selected Economic Indices for the Viability Of Onion Production In Benin Republic. *Journal of Agribusiness and Rural Development*,*57*(3), 289–297. https://doi.org/10.17306/j.jard.2020.01304
[24]. Ouedraogo, M., Bationo, A., & Mando, A. (2018). The impact of manure and fertilizer on onion production in Burkina Faso and Niger. *Nutrient Cycling in Agroecosystems*, 110(1), 17-29. https://doi.org/10.1007/s10705-018-9921-y
[25]. Ravikumar, R. (2020). An economic inquiry on export trend and weekly price direction of onion. *International Journal of Current Microbiology and Applied Sciences*, *9*(8), 3085–3091. https://doi.org/10.20546/ijcmas.2020.908.349
[26]. Salomon, S.T (2010)"The importance of efficient use in the adoption Technology" A micro Panel data analysis, *Journal of Production Analysis*.34(2):37-40.
[27]. Salami, A. E., & Omotoso, S. O. (2018). Performance of Onion (Allium Cepa L.) Enhanced By Organic Fertilizer in a Forest Agroecology, Nigeria. *Journal of Biology, Agriculture and Healthcare*, *8*(10), 42–48. https://www.iiste.org/Journals/index.php/JBAH/article/download/4234 9/43617.
[28]. Shittu AM, Kehinde MO, Ogunnaike MG, Oyawole FP. Effects of Land Tenure and Property Rights on Farm Households' Willingness to Accept Incentives to Invest in Measures to Combat Land Degradation in Nigeria. *Agricultural and Resource Economics Review*. 2018;47(2):357-387. doi:10.1017/age.2018.14.
[29]. Thompson, D., & Emery, J. (2018). "Resource Use Efficiency and Economic Returns to Input Use in Agricultural Systems." *Agricultural Systems*, 161, 81-93.
[30]. Tsewang, T., Verma, V. C., Acharya, S., & Kapila, S. (2021). Onion-Herbal medication and its applications. *Journal of Pharmacognosy and Phytochemistry*, *10*(2), 1131–1135. https://www.phytojournal.com/archives/2021.v10.i2.13958/onion-herbal-medication-and-its- applications
[31]. Shen, Z., & Zhao, X. (2023). Evaluation of Resource Utilization Efficiency in the Machining Process Based on the SBM-DEA Model with Non-Expected Output. *Processes*, *11*(3), 916. https://doi.org/10.3390/pr11030916
[32]. Singh, A., & Ghosh, S. (2022). Advancements and challenges in onion phytopathogens management: A comprehensive review. *Plant Science Today*, 9(1), 1–14.
[33]. Zverev, A. F., Trufanova, S. V., & Anikienko, N. N. (2020). Method for determining production and resource use efficiency. In *Smart innovation, systems and technologies* (pp. 783–791). https://doi.org/10.1007/978-981-15-2244-4_74.