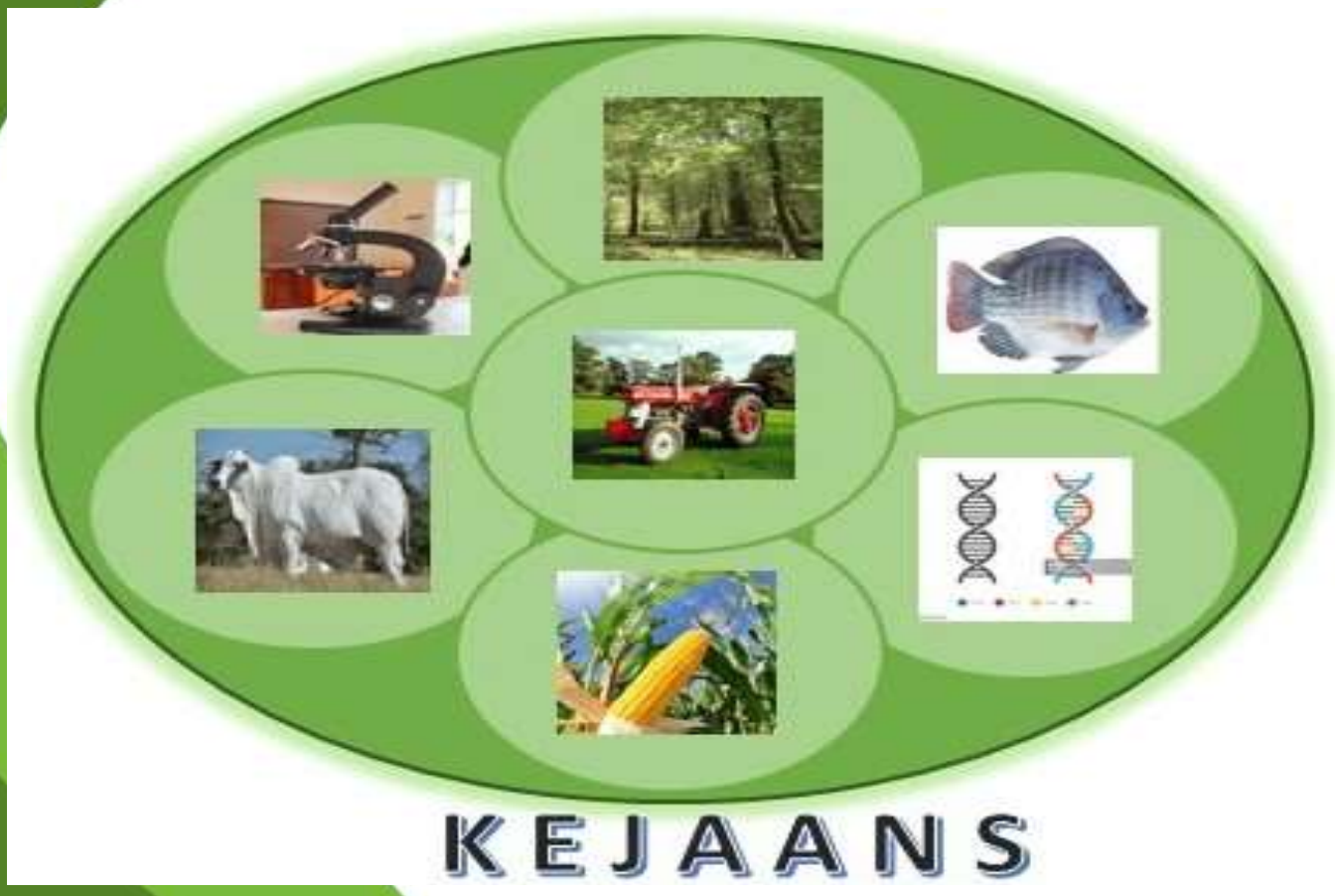
(KEJAANS)

KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES

January, 2025 Vol. 1, issue 1



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ISSN: 1595-5776

KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES (KEJAANS)

JANUARY, 2025: Volume 1, Issue 1

OFFICIAL JOURNAL OF THE

FACULTY OF AGRICULTURE

KEBBI STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, ALIERO

ISSN: 1595-5776

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This official scientific publication of the Faculty of Agriculture, Abdullahi Fodiyo University of Science and Technology Aliero, is a non-profit, open access, double-blind peer-reviewed Journal publishing four issues (January, April, July and October) per annum. The Journal is a platform open to collaborations with researchers, authors, institutions, research agencies and private companies related to Agriculture. The Mission of the Journal is to disseminate scientific knowledge through the publication of original research articles, research notes, book reviews, letters to the editor and reviews of Literature, representing a contribution to scientific and technological knowledge in respective areas covered by the Journal. The Kebbi Journal of Agriculture and Natural Sciences seeks to validate and disseminate new knowledge, making it public in order to strengthen the human capacity, constitute a link in the scientific community to the society and encouraging the expansion of University and academic researches.

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The Kebbi Journal of Agriculture and Natural Sciences has the sole aim of providing an intellectual platform and ideas for scholars, by promoting interdisciplinary studies related to agriculture and natural science through publishing the latest scientific research findings that are of direct policy implications and beneficial to the research community. Consequently, the journal covers all aspects of Crop Science, Animal Science, Agricultural Economics, Agricultural Extension and Rural Development, Food Science, Fisheries and Aquaculture, Biotechnology, Soil Science and Agricultural Engineering, Forestry and Environment, Wildlife, Agricultural Education, Agro-allied Industries as well as all Natural Science researches related to Agriculture.

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Title page

The first page of the manuscript should contain the title of the article, which should be concise and explicit, typed with upper-case, bold, 14 font size, TNR and not more than 21 words. The surname and forenames (in full) of authors, affiliation of each author should be provided. Phone number and email address of the corresponding author (identified by an asterisk) should be provided. Superscripts should be used to relate authors to their affiliations.

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A conscience introduction of the background to the subject is required and should include a brief statement of the problem, significance and purpose of the research and relationship to earlier works with well acknowledged references.

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This section must be presented with adequate clarity and provide sufficient details to permit the repetition of the experimental work. The techniques and the methodologies adopted should be supported with standard references. Subheadings under this section should be in lower case except the first letter.

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Results should be presented concisely. Only in exceptional cases will it be permissible to present the same set of results in both Table and figure. In discussion, point out the significance of the results and place the results in the context of other work and theoretical background. Results and Discussion part could be written separately if author so wish.

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DeVries, J. and Toenniessen, G. (2001). *Securing the Han/est Biotechnology, Breeding and Seed Systems for African Crops*. The Cromwell Press, Trowbridge, Wiltshire, UK. 208pp.

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Avoid the use of figures /numbers at the beginning of a sentence. Write out one through nine unless a measurement, a designator, or a range (e.g five seeds, 8cm, 3yr, 5-11 flowers)

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KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES (KEJAANS)
JANUARY, 2025: Volume 1, Issue 1:158-162
p-ISSN: 1595-5776

EFFECT OF ORGANIC AND INORGANIC SOURCES OF NUTRITION ON GROWTH AND YIELD OF PEARL MILLET (*PENNISETUM GLAUCUM* L.) IN ALIERO KEBBI STATE

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ABSTRACT

The study was conducted at Teaching and Research Farm of Kebbi State University of Science and Technology, Aliero during 2024 raining season to determine the effect of organic and inorganic fertilizers on growth and yield of pearl millet (Pennisetum glaucum L.). Treatments consisted of six different sources of organic and inorganic fertilizers combinations which comprises ***1)*** *Poultry manure at rate 2.0 t/ha, + 50% RDN,* ***2)*** *Poultry manure at rate 1.5 t/ha, + 75% RDN,* ***3)*** *Cowdung 2.5 t/ha + 50% RDN,* ***4)*** *Cowdung 2.0 t/ha + 75% RDN,* ***5)*** *NPK (80:40:40 Kg/ha) and* ***6)*** *Control. The experiment was laid out in Randomize Complete Block Design (RCBD) with three replications. The results showed that application of NPK (80:40:40 Kg/ha) recorded higher mean values for plant height, number of leaves, leaf length and width than all the fertilizer combinations and the control. Yield components such as panicle weight, seed weight and grain yield were also higher in plots that received NPK (80:40:40 Kg/ha) than the rest of the fertlizer treatments and control. In conclusion application of NPK (80:40:40 Kg/ha) gave the best crop performance and grain yield.*

Keywords: Millet, Nutrition, Growth, Yield, Manure

Introduction

Pearl millet (*Pennisetum glaucum* L.*)* is small-grained, annual, warm-weather cereal belonging to the grass family called Poaceae. It is highly tolerant to drought and other extreme weather conditions and have a similar nutrient content to other major cereals (Fahad 2017). It is an important staple crop in Nigeria, particularly in the arid and semi-arid regions. The crop is well-adapted to arid and semi-arid regions with high temperatures and low rainfall. Pearl millet can adapt to various soil types but performs best in well-drained, moderately fertile soils. The ideal soil type for pearl millet cultivation is sandy loam to clay loam, which ensures good aeration, water-holding capacity, and proper drainage. These characteristics promote better root development, nutrient uptake, and overall crop growth (Yadav *et al*., 2019). According to the Food and Agriculture Organization of the United Nations (FAO, 2022) global production

of millet was 30.9 million tonnes. India is the top millet producer worldwide, with 11.8 million tonnes grown annually. Some 38% of the world total and nearly triple its nearest rival. Eight of the remaining nine nations in the top 10 producers are in Africa, ranging from Niger (at 3.7 million tonnes) to Chad (0.7 million tonnes); the sole exception is China, number three in global production, at 2.7 million tonnes. In Nigeria, it is primarily grown in the Sahel and Sudan savannah zones, which cover about 70% of the country's land area (Okoruwa *et al.,* 2021). Pearl millet is primarily consumed as a staple food in the form of porridge, flatbreads, and various traditional dishes. In many producing countries, pearl millet consumption is highest in rural areas and among lower-income households (Rao *et al.*, 2021). The crop is also used as animal feed and for brewing alcoholic beverages in some regions. Inorganic fertilizers have been widely used to increase crop yields, but their use has raised concerns about environmental sustainability and soil health (Singh *et al.,* 2021). The yield of pearl millet in Nigeria is generally low, which poses a significant challenge to food security and economic development. One of the major factors contributing to low pearl millet yield in Nigeria is poor soil fertility. The use of inorganic fertilizers to amend soil fertility is limited by their high cost, while the availability and quality of organic fertilizers are also a concern. In addition, excessive use of inorganic fertilizers can lead to environmental pollution and soil degradation (Ali *et al.*, 2021). The research aimed to investigate more affordable alternatives to alluvate poor soil fertilty, such as combination of organic and inorganic fertilizers, and to develop integrated nutrient management practices that combine the use of organic and inorganic fertilizers.

Material and Methods

Experimental site

Field experiment was conducted at the teaching and research farm of Kebbi State University of Science and Technology Aliero during 2024 rainy season.

Treatments and Experimental Design

Treatments consisted of six different sources of organic and inorganic fertilizers combinations which comprises:

1). Poultry manure at rate 2.0 t/ha, + 50% RDN,
2). Poultry manure at rate 1.5 t/ha, + 75% RDN,
3). Cowdung 2.5 t/ha + 50% RDN,
4). Cowdung 2.0 t/ha + 75% RDN,
5). NPK (80:40:40 Kg/ha) and
6). Control.

The experiment was laid out in Randomize Complete Block Design (RCBD) with three replications.

Agronomic practices

The land was plowing (20-25 cm), followed by harrowing and leveling, to create a well-tilth, uniform seedbed. Remove weeds and crop residues from the previous season to minimize competition for nutrients, water, and sunlight. Planting was done using hand hoeing and dibbling method. The planting depth will be 1.5 cm to avoid late emergence of seed. Fertiller was applied on treatment basis, weeds were controlled manually by hoe at 3 and 6 WAS. Harvesting was done manually when the grains are formed, matured and the panicle is firm and stiff.

Data Collection

Data was collected on the following growth and yield parameters

Plant height (cm):

Plant height was measured from the base of each plant to the tip of the highest growing point from randomly selected five plants using a graduated meter rule and the values were

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JANUARY, 2025: Volume 1, Issue 1:158-162
p-ISSN: 1595-5776

recorded at harvest. The average height was recorded for each plot.

Number of leaves:
This was done by counting the total number of fully expanded leaves on the randomly selected plants for each plot at 10 WAS and the average was recorded.
corded.

Panicle weight (g):
The five randomly selected panicles from each net plot were weighed using a mettler Toledo SB 16001 weighing balance and the average recorded.

1000-grain weight (g):
A randomly selected 1000-dried grains were collected per panicle from each net plot and weighed using a mettler Toledo SB 16001 weighing balance and the average recorded

Grain yield (t ha^{-1}):
The harvested panicles from each net plot were threshed, cleaned and the grains will be weighed using a mettler Toledo SB 16001 weighing balance and thereafter expressed in kilogram per hectare.

Data Analysis
Data collected was subjected to analysis of variance (ANOVA) using SAS software package version 2003. The treatment means to be significant were separated using Least Significant Difference at 5% level of significance (LSD).

Results and Discussion
Plant height and Number of leaves
Effect of organic and inorganic fertilizers on height and number of leaves of millet was significant at 10 WAS, where plots treated with NPK fertilizer produced the tallest millet plants with highest number of leaves, and the shortest millet plants with least number of leaves were from plots with no fertilizer inputs (Table 1). The possible reason for having the tallest plants in NPK applied plots could be attributed to the faster release of essential nutrients by the inorganic fertilizer. This increases the formation of chlorophyll which in turn results in higher photosynthetic activity, vigorous growth, and taller plants. This result concurs the findings of Mahadi *et al.* (2013) Rani *et al.* (2020), Maiya (2024) and Louhar *et al.* (2020) who reported a significantly increase in plant height of maize in NPK treated plots compared to other fertilizer treatments.

Table 1: Shows the effect of organic and inorganic fertilizers on plant height and number of leaves of Millet during 2024 wet season at Aliero

	10 WAS	
Treatment	**Plant height (cm)**	**Number of leaves**
Cowdung at 1.5 t/ha + 75% RDN	98.24^{d}	7.00^{d}
Cowdung at 2.0 t/ha + 50% RDN	115.10^{c}	7.00^{d}
Poultry dropping at 1.5 t/ha + 75% RDN	126.67^{b}	8.00^{c}
Poultry dropping at 2.0 t/ha + 50% RDN	135.50^{b}	10.00^{b}
NPK (80:40:40)	148.50^{a}	12.00^{a}
Control	63.09^{e}	4.00^{e}
LSD (0.05)	**10.19**	**0.887**

Means followed by the same letter(s) within a column in each treatment group are not significantly different at 5% probability level using LSD, WAS= week after sowing, RDN= recommended dose of nitrogen, t/ha= tons per hectare, g=gram

Panicle weight, 1000 seed weight and grain yield

Influence of organic and inorganic fertilizer treatments on panicle weight and 1000 seed weight were significant, where plots treated with NPK fertilizer was statistically similar to plots that received 2.0 t ha^{-1} of poultry manure + 50 % RDN but differed significantly with all other fertilizer combinations, and plots that left unfertilized recorded the least. On grain yield plots treated with NPK fertilizer recorded the highest grain yield followed by plots that received poultry manure + RDN and cowdung + RDN. And the control had the least grain yield. This finding is in accordance with that of Mahadi (2013) who reported higher seed weight and grain yield with NPK fertilizer compared to plots not treated with fertilizers. This significant in grain yield difference can be attributed to the faster release of nutrients for plants use from the inorganic NPK fertilizer which gave higher grain yield of millet. This finding is in line with that of Mahadi *et al.* (2013), Enujeke (2013), Senthilkumar and Gokul (2021), Xing *et al.* (2023), and triveni *et al.* (2020) who reported that higher maize grain yield was obtained from plants that received NPK fertilizer over the other plants due to its faster release of nutrient for the plant used.

Table 2: Shows the effect of organic and inorganic fertilizers on panicle weight, seed weight and grain yield of Millet during 2024 wet season at Aliero

Treatment	**Panicle weight (g)**	**1000seed weight (g)**	**Grain yield (t/ha)**
Cowdung at 1.5 t/ha + 75% RDN	24.68^{b}	8.67^{c}	1.24^{e}
Cowdung at 2.0 t/ha + 50% RDN	26.67^{b}	9.33^{c}	1.58^{d}
Poultry dropping at 1.5 t/ha + 75% RDN	28.00^{b}	11.20^{b}	1.89^{c}
Poultry dropping at 2.0 t/ha + 50% RDN	32.22^{a}	12.95^{a}	2.35^{b}
NPK (80:40:40)	36.67^{a}	14.20^{a}	2.54^{a}
Control	11.05^{c}	5.58^{d}	0.34^{f}
LSD	**4.080**	**1.190**	**0.186**

Means followed by the same letter(s) within a column in each treatment group are not significantly different at 5% probability level using LSD, WAS= week after sowing; RDN= recommended dose of nitrogen, t/ha= tons per hectare, g=gram

Conclusion

This experiment concluded that field application of NPK (80:40:40) gave the best result than the rest of the nutritional sources combination on growth yield and yield attributes of pearl millet

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