(KEJAANS)

KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES

January, 2025 Vol. 1, issue 1

CONTACT:
The Editor,
Kebbi Journal of Agriculture and Natural Sciences,
Faculty of Agriculture,
Kebbi State University of Science and Technology Aliero,
PMB 1144, Birnin kebbi, Nigeria.
Email: kejaanseditor@ksusta.edu.ng, kejaans.foa@gmail.com.
Phone: +234 8039370546

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

About the Journal

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.

Scope of Kebbi Journal of Agriculture and Natural Sciences (KEJAANS)

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.

INSTRUCTIONS FOR AUTHORS

Submission of Manuscript

Submission of manuscript to JAANS shall be on an online platform. Papers could also be submitted as e-mail attachment to the Editor-in-Chief using the kejaanseditor@ksusta.edu.ng or kejaans.foa@gmail.com. The paper should be submitted as a single file in Microsoft Word Format (no other formats will be accepted) and the file shall not be more than 5 Megabytes so that it can be e-mailed to reviewers. The first author, month and year of submission shall be the file name (e.g Ibrahim *et al.* Aug 2010 doc). Once the Editorial Board receives the submission, acknowledgement shall be sent to the corresponding author. If acknowledgement of submission is not received within a week, the author shall remind the Editor-in-Chief through the official email.

Preparation of Manuscript

General presentation: The manuscript should be presented clearly and concisely in English Language. Manuscripts must be prepared (preferably with MS word package) using l2-point New Times Roman (TNR) font, double line-spaced on A4 size paper (210 — 297mm) with at least 3cm margins on all sides. All typing should be justified. Pages including figures and Tables, should be numbered consecutively in the bottom middle with the title page as page l. Manuscript should contain the following sections (except for review and commentary articles): **Title page; Abstract; Introduction; Materials and Methods; Results, Discussion (Results and Discussion could be combined); Conclusion and References**.

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.

Abstract

The next page should contain abstract in English. Abstract should not be more than 250 words and should provide sufficient information to give the reader a full understanding of the content of the article. Paragraphs, footnotes, references and undefined abbreviations should be avoided.

Keywords

Up to five keywords in normal fonts, separated by semi-column, should be provided to assist the reader and facilitate information retrieval.

Body of Text

The title of the article should be typed in upper-case letters and bold. All other headings should be typed in upper-case letters and bolded while sub-headings should be in lower-case and bolded. The main headings should not be indented. The SI unit system must be used. Standard abbreviations may be used without definition, and specialized abbreviations should be used only after they are defined when they first appear. Use capital 'T' for Table and 'F' for figure. Mathematical formulae should be carefully typed with symbols, correct alignment and must be adequately spaced. Statistical evaluation of results should be described briefly and if necessary, supported by references.

Introduction

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.

Materials and Methods

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.

Results and Discussion

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.

References

Only published articles (Journals and Proceedings) or Books may be cited. In addition, articles with evidence of Journal acceptance are considered as "in press" and are also citable. The reference list should be arranged alphabetically. Authors should be referred to in text by name and year (Harvard system). Examples:

For Journals, list as:

Jega, I.S. and Kwaifa, M..N. (2017). Statistics of Cassava Yield Trials with the Additive Main Effects and Multiplicative Interaction (AMMI) model. *African Journal of Root and Tuber Crops*, 3 (1), 46-50.

Within the text, references should be given as: Meaza *et al*. (2007), or similar results have been obtained (Meaza *et al*., 2007).

For proceedings, list as:

Aina, O.O., Dixon, A.G.O.and Akinrinde, E.A. (2021). Influence of shoot and root characteristics of cassava genotypes on yields in Nigeria. *African Crop Science Conference Proceedings, Vol. 5*. pp. 1119-1125.

For Books, list as:

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.

For electronic resource materials (online publications) list as:

Zachary, G.P. *Africa plays the rice card*. Foreign Policy. May/June 2008 (web-exclusive story).http://WWW.foreignpolicycom/stogg/cms. php? story id = 4306. Accessed 26 August 2008.

Tables and Figures

Tables and Figures should be labelled serially using Arabic numerals (e.g Table 1, Table 2, etc; Figure 1, Figure 2, etc.)

Abbreviations

Avoid the use of abbreviations at the beginning of the title, heading or sentence. The following abbreviations with numerals can be used without spelling out at first use. H, min, s, yr, mo, mm, kg, g, DNA, RNA, cpDNA, dNTP.

Numbers

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)

Ethical matters

The author using experimental animals must seek permission and include a statement that the investigation was approved by the Ethics Clearance Committee of the researchers' institution.

Copyright

Submission of a copyright to **KEJAANS** implies that the study presented has not been published before or under consideration for publication elsewhere. Once an article has been accepted for publication, author concedes the copyright to **KEJAANS**. However, authors are responsible for the content that appeared in their manuscripts.

Plagiarism Check on Submitted Papers

Since academic Journals must strictly audit the quality of the papers, prevent plagiarism, fraud and other phenomena, ensure that the papers are scientific, original and standardized; cultivate the author's research integrity and consciousness in the process, create a healthy and fair academic environment. It is advisable that each author first conduct a plagiarism check on their paper before submission. Every submitted paper undergoes a plagiarism check by the editors. The editors of **KEJAANS** shall liaise with the Academic Librarians of the organization/institution to do this. Any paper that is more than 20% (or less as determined by the editors) in its plagiarism check shall be sent back to the author for reworking and resubmission.

Blind Peer-review of Submitted Papers

Submitted papers that passed a plagiarism check by **KEJAANS** shall be sent to at least two reviewers that are expert in the field, after every piece of information that can reveal the identity or the affiliation of authors has been concealed for fair, blind peer review. The reviewers shall give a comprehensive report of their review. The editors shall design a Form to be completed by the reviewers after the review. The reports and completed forms shall guide the editors in their further decisions on the reviewed article. The reviewers shall recommend the paper for publication or otherwise.

Publication of Papers

This shall be done after the acceptance of articles for publication in line with the next publication time of the Journal. Prior to publication, a galley proof copy shall be sent to the corresponding author who shall immediately effect correction (if any), and return to the editors. The number of articles to be published in a given issue of the Journal shall be at least 15. It is not compulsory for **KEJAANS** to produce an issue of the Journal if there are no accepted articles ready for publication at a given time of publication.

KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES (KEJAANS)
JANUARY, 2025: Volume 1, Issue 1:169-173
p-ISSN: 1595-5776

GROWTH AND YIELD OF MILLET (*Pennisetum americanum*) AS INFLUENCED BY NPK FERTILIZER RATES IN SUDAN SAVANNA OF KEBBI STATE

*Aliyu, A. K., A. Muhammad, M. S. Na-Allah and M. Akibu

Department of Crop Science, Kebbi State University of Science and Technology, Aliero, Nigeria.

Corresponding author: kaliyuaishat@gmail.com 08030433290

ABSTRACT

A field experiment was carried out during the 2020/2021 rainy season at Teaching and Research farm of Kebbi State University of Science and Technology Aliero, to study the effect of NPK fertilizer rates on the agronomic performance of millet. The treatments consisted of six (6) NPK rates: T1 (0 kg ha^{-1}), T2 (25 kg ha^{-1}), T3 (50 kg ha^{-1}), T4 (75 kg ha^{-1}), T5 (100 kg ha^{-1}), and T6 (125 kg ha^{-1}) laid out in a Randomized Complete Block Design (RCBD) with three (3) replications. The result showed that the NPK rate of 125 kg ha^{-1}produced the highest mean values for plant Height, leaf length and leaf width. The highest leaf number was recorded in plot treated with 25 kg ha^{-1} NPK rates. The longest and heaviest panicles were recorded in 75 kg ha^{-1} NPK rates; while the heaviest grains (1000-grain weight) and total yield per hectare were obtained 100 kg ha^{-1} rate. Based on the result obtained from this resaerch it can be concluded that application of 100 kg ha^{-1} NPK rate adopted for millet production in the study area.

Keywords: NPK, Millet, rate, savanna,

Introduction

Millet (*Pennisetum americanum* L.) is an important cereal that makes up about two-third of the total cereal production in Africa and it is regarded as one of the world's four most essential cereal crops (maize, rice, sorghum and millet). Its ability to withstand stress and thrive in hot regions have made it quite popular in hot regions and especially across many African countries which account for about 55 percent of the global total pearl millet production and also take up 59% of the global total area under pearl millet cultivation (Mukhtar, 2018). In Sub-Sahara Africa, Nigeria is among the major pearl millet producing countries with an average annual production of 4.8 million tons (Galadima *et al*., 2019). Pearl millet is ranked third after maize and sorghum, among the cereal food crops produced in Nigeria. According to Galadima *et al.*, (2019), research and development interventions which result to availability of improved millet varieties to farmers might likely boost production, leading to increase income, ensure food security and welfare of the farmers. Based on this, the millet production improvement program in Nigeria is concerned with a higher yield for human food. According to (Mukhtar, 2018) Sudan savanna of Nigeria provides ideal agro-ecological condition for the production of millet. For this reason, it is predominantly produced and consumed within the region, making it a staple for over 40% of the populace.

Improved Pearl millet as the subject of this research is that type of variety, which has a higher yielding ability that matured earlier (60 to 70 days as against 70 to 100 days for local

traditional varieties). They are resistant to striga, drought, pest and diseases. They respond optimally to fertilizer and other management practices. More significantly the grain size is larger while the panicle is more compact (Galadima *et al.*, 2019). Poor soil fertility and erratic rains are the most important constraints to crop production in arid and semi-arid regions. Soil fertility management particularly managing nutrients like nitrogen (N) and Phosphorus (P) plays a major role in increasing production and productivity of pearl millet (Bhuva and Detroja, 2018). Nitrogen is an essential nutrient and key limiting factor in crop production of different agro ecosystems. It is considered as one of the most important plant nutrients for growth and development of crop plant (Berg, 2011).

Millet is one of the most important cereal crops widely cultivated in Northern parts of Nigeria. It is an early maturing (80 -100 days) crop that is more adapted to drier conditions and low soil fertility than sorghum. It is planted by farmers with the first rains. The grains are usually consumed as *tuwo*, *fura* or *koko* in the North and in many other ways depending on the local dietary habits of the people. The crop is also used for livestock feed as well as for brewing local drinks (Burkutu) and recently in modern brewing industries (National Agricultural Extension and Research Liaison Service, 1999).

Millet is grown mostly on marginal and sub marginal lands, which are poor in organic matter, low in available nitrogen and phosphorus. Poor soil fertility and erratic rains are the most important constraints to crop production in arid and semi-arid region. Studies conducted around Sudan savanna regions revealed that higher millet yields were achieved consequent to mineral fertilizer application apparently in the short run, but in the long run however, their continues use tends to alter the physicochemical properties of the soil resulting in progressive decline in soil fertility (Rayar,2000). The aim of this research was carried out to determine the response of millet to rates of NPK mineral fertilizer.

Materials and methods

Field experiment was conducted at the Teaching and Research Farm of Kebbi State University of Science and Technology Aliero located in University Orchard (Lat.12.29) ;(Long.4.4671) during 2020/2021 rainy season. The soil of the experimental field was sandy loam. Treatments consist of six (6) rates of NPK (20:10:10) fertilizer; 0kg ha-1, 25kg ha^{-1}, 50 kg ha^{-1}, 75kg ha^{-1},100 kg ha^{-1}, and 125kg ha^{-1}which was laid out in Randomize Complete Block Design (RCBD) which was replicated 3 times. Sowing was done using 75 x 75 cm with each net plot made into 6 ridges. Data were collected on: Plant height (cm), Number of leaves, Leaf length (cm), Leaf width (cm), Panicle length (cm), Panicle weight (g), 1000-grain weight (g), Grain yield (t ha^{-1}). Data collected were subjected to analysis of variance as described by Gomez and Gomez (1984). The treatment means were separated using least significant difference ($LSD_{0.05}$) at 5% level of significance.

Results and discussion

Plant height of millet as influenced by NPK rate is not significantly different ($p<0.05$) (Table 1) The treatment applied with T6-125kg/ha (238.92) produce the highest plant height , then T5- (233.42), T4- (233.25) and T3- (134.25) followed by T2- (136.58), T3- (134.25). The treatment with no fertilizer application recorded the lowest plant height T1- (80.33). Leaves Number of millet is known to be not significant. Leaf length of millet as influence by NPK rates which are not significantly different ($p<0.05$). T6- (50.83), T4- (49.58), T5- (48.33), T3- (32.75), and T2- (31.42), are not significant. T1- (23.00) which contain 0kg fertilizer has the shortest leaf

length. T6- (3.93) produces wide leaf width than others.

Table 1: Plant height, leaf number leaf length and leaf width of Sosat millet as influenced by NPK (20:10:10) Rates in Aliero during 2021 rainy season

NPK (20:10:10) Rates (kgha^{-1})	**Plant height (cm)**	**Leaf number**	**Leaf length (cm)**	**Leaf width (cm)**
0	80.33c	6.50	23.00c	1.15d
25	136.58b	8.67	31.42b	1.29d
50	134.25b	7.17	32.75b	2.25c
75	233.25a	7.67	49.58a	2.98b
100	233.42a	6.00	48.33a	3.92a
125	238.92a	7.17	50.83a	3.93a
LSD $_{0.05}$	**13.947**	**1.677**	**2.907**	**0.385**

Means followed by the same letter (s) in a treatment group are not significantly different at 5% level of significance using LSD.

The treatment that provide higher Panicle length of millet is T4- (27.26) and are not significantly different.T-3, T-4, T-5, and T-6 shows no significant difference ($p<0.05$) to NPK rates. 1000-grain weight was significantly influenced by sources of fertilizer. The least 1000 -grain weight was recorded in the 0kg/ha T-1 which has (3.11g). According to the data presented in the table 2, T-5 which has (100kg/ha) produced highest yield (2273).

Table 2: Panicle length, panicle weight, 1000 grain weight and grain yield of sosat millet as influenced by NPK (20:10:10) rates in Aliero during 2021 rainy season

NPK (20:10:10) Rates (kg ha^{-1})	**Panicle length (cm)**	**Panicle weight (g)**	**1000 grain weight (g)**	**Grain yield (kg ha^{-1})**
0	25.16	82.03^{c}	3.11^{c}	835^{c}
25	25.45	93.67^{c}	3.12^{c}	1051^{b}
50	21.67	118.65^{b}	4.67^{b}	1072^{b}
75	27.26	233.31^{a}	4.66^{b}	2263^{a}
100	24.30	222.84^{a}	5.23^{a}	2273^{a}
125	24.12	223.72^{a}	5.12^{a}	2108^{a}
LSD 0.05	6.412	119.671	0.234	25.212

Means followed by the same letter(s) in a treatment group are not significantly different at 5% level of significance using LSD.

Conclusion and Recommendation

The trial was conducted during the rainy season of 2020/ 2021 at the Kebbi State University orchard Aliero (Lat. 12.29) ;(Long. 4.4671) located in the Sudan savanna agro-ecological zone of Nigeria. The experiment is carried out to determine the effectiveness of NPK rates on the performance of millet (*pennisetum americanum).* The experiment consists of six treatments which are the NPK rates (0kg, 25kg, 50kg, 75kg, 100kg, and 125kg) ha-1 laid out in a Randomized Complete Block Design (RCBD) with three replications. A total land area of 42.5M made into 16 plots of 4.5m each was used. The result shows that highest plant Height, leaf length and leaf width was producing by 125 kg/ha of NPK rate and 25kg/ha for leaf number. 75kg/ha produce highest panicle length, panicle weight. 100kg/ha produce high number of 1000-grain weight Weighed and Grain yield too. According to the data presented in the table 2, T-5 which has (100kg/ha) produced highest yield (2273) recommending that 75kg/ha should be used by farmers as a result of economic purpose for optimum yield production and that of T4 (75kg\ha) (2263) and T6 (125kg\ha) (21108). However, this research is here by

References

A.K' (2015). Climate Resilient Crop Varieties for Sustainable Food Production under Aberrant Weather Conditions. Central Research Institute for Dry land Agriculture (ICAR), Hyderabad. P47.

Azare, IM; (2014): Farmers' Perception and Response to Climate Change in Katagum Local Government Area of Bauchi State. MSc. Unpublished Thesis. Pp. 1 -85.

Bagamba, F; Bashaasha, B; Claessens1L; Antle, J; (2012): *Assessing Climate Change Impacts and Adaptation Strategies for Smallholder Agricultural Systems in Uganda. African Crop Science Journal, Vol. 20, Issue Supplement s2, pp. 303 – 316.*

Bonsall, Will. 2011. "Small-scale production of unconventional small grains." Presented at Northern Grain Growers Winter Conference. March 9. Burlington, VT.

Craufurd, P.Q. and F. R. Bidinger. 1988. *Effective of the duration of the vegetative phase on crop growth, development and yield in two contrasting pearl millet hybrids.* ICRISAT, Patancheru, p.o. Andhra Pradesh, 502 324, India. 110P: 71-79.

Jama B.A, Mafongoya P.L, (1999). Strategies for soil fertility recapitalization in Africa: Experiences from Western Kenya and Eastern Zambia. In: FAO proceedings on soil fertility initiative in sub-Saharan Africa

Logsdon, Gene. 2009. Small-scale grain raising. White River Junction, VT: Chelsea Green Publishing.Oelke, E.A., E.S. Oplinger, D.H. Putnam, B.R. Durgan, J.D.Doll, D.J. Undersander.

"Millets." Alternative FieldCrops Manual. Retrieved March 4, 2011. (http://www.hort.pursue.edu/newcrop/afcm/millet.html).

Maheswari, M; Sarkar, B; Vanaja, M; Srinivasa Rao, M; Srinivasa Rao, C.h; Venkateswarlu, B; Sikka.Natalia, T; (2011). *Climate Change Current Issues. Kiel Institute forthe World Economy Hindenburgufer 66 24105 Kiel, Deutschland. Pp 1-29*

.Mahalakshmi, V., F.R. Bidinger and G.D.P Rao. 1988. *Timing and intensity of water deficient during flowering and grain filling in pearl millet*. Agronomy Journal 80:130-135.

Mahalakshmi, V. and F.R. Bidinger. 1985. *Water stress and time of floral initiation in pearl millet.* Journal of

Agricultural Sciences, Cambridge, 105:437-445.

Olk D.C, Cassman KG (1993). Reduction of potassium fixation by organic matter in vermiculitic soils. In: Mulongoy K, Merckx R (eds.). *Soil Organic Matter Dynamics and Sustainability of Tropical Agriculture.* A Wiley-Sayce Co-publication, IITA/K.U. Leuven. pp. 307-315.

Oelke, E.A., E.S. Oplinger, D.H. Putnam, B.R. Durgan, J.D.Doll, D.J. Undersander. "Millets." Alternative FieldCrops Manual. Retrieved March 4, 2011. (http://www.hort.purdue.edu/newcrop/afcm/millet.html)Board on Science and Technology for Interval Development. 1996. Lost Crops of Southern Africa: Grains, vol. 1. Washington, D.C.: National Academy Press.

Ong, C.K. 1983a. Response to temperature in a stand of pearl millet (Pennisetium typhoides S&H): I. Vegetative development. J. Experimental Botany 34(140):322-336.

Ong, C.K. 1983b. Response to temperature in a stand of pearl millet (Pennisetium typhoides S&H): II. Reproductive development. J. Experimental Botany 34(140):337-348.

Ong, C.K. 1983b. Response to temperature in a stand of pearl millet (Pennisetium typhoides S&H): 4. Extension of individual leaves. J. Experimental Botany 34(149): 1731-1739.

Rego TS, Seeling B, Nageswara RV, PardhasaradIndia. In: Adv-Gyamfi JJ (ed.). Food security in nutrient-stressed environments: Exploiting plants ,genetic capabilities. Kluwer Academic Publishers, The Netherlands. pp. 301-311

Soman, P., T.J. Stomph, F.R. Bidinger and L.K. Fussell. 1987. *Improvement In stand establishment in pearl millet.* In Food Grain production in semi-arid Africa, pp 159-170. Eds J.M. Menyonga, J.M. Bezuneh and A. Ypodeowei. OAU/STRC-SAFRAD, Burkina Faso.