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School of Agriculture and Agricultural Technology, Federal University of Technology, Niger State, Minna, Nigeria

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**PROCEEDINGS**

*of the*

**3rd International Conference**

*of*

**School of Agriculture and Agricultural Technology**

**(SAAT)**

*Held at*

Caverton Hall

Federal University of Technology

Minna

ICAAT 2024

*1st –4th December 2024*

School of Agriculture and Agricultural Technology Federal University of Technology

P. M. B. 65, Minna, Nigeria Email: [icaat2024@gmail.com](mailto:icaat2024@gmail.com)

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Prof. J. H. Tsado

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#### HISTORICAL BACKGROUND OF SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY

The School of Agriculture and Agricultural Technology (SAAT) was established in January 1986 with two Departments (Animal Production and Crop Production) With subsequent development, six more departments (i) Soil Science and Land Management (ii) Water Resources, Aquaculture and Fisheries Technology (iii) Agricultural Economics and Farm Management (iv) Agricultural Extension and Rural Development (v) Food Science and Technology, and (vi) Horticulture were created. The Department of Fisheries Technology started in 1987 as a Unit in the Department of Animal Production which transformed to the Department of Animal Production and Fisheries Technology in 1989 and was split into Department of Animal Production and Department of Fisheries Technology in 1991. The Department was repackaged and renamed Department of Water Resources, Aquaculture and Fisheries Technology in 2006.

A new Unit, Agricultural Economics and Extension Technology was created during the 1997/1998 session under the Department of Crop Production. In 2002, the Unit was separated from the mother Department and upgraded to a full-fledged Department which in turn gave birth to Department of Agricultural Economics and Farm Management and Department of Agricultural Extension and Rural Development in 2017. In 1997, the proposed Department of Food Science and Nutrition took off as a Unit in the Department of Animal Production and became a full-fledged Department of Food Science and Technology in 2013. Similarly, the Horticulture Unit in the Department of Crop Production became a separate Department of Horticulture in 2020. In 2019, the Vice-Chancellor approved an interim Centre for Shea Research and Development. Prof. K.M. Baba was appointed as pioneer Centre Coordinator while a Technical Committee which serves as a Board for the Centre was also constituted, with Prof.

M.A.T. Suleiman as Chairman, to provide policy and strategy direction for the Centre.

The student intake into the school at inception in 1986 was two (one student each for Department of Animal Production and Department of Crop Production), and both graduated in 1989. Since then, the school has witnessed tremendous progress in terms of staff recruitment and development, infrastructural development and student enrolment. In the current 2019/2020 session, academic staff strength is 115 and student population stands at 2,895 for undergraduates and 314 for postgraduate students, totaling 3,209 students.

Dr. Z. Stecki was the first Coordinator for the school (January 1986 to September 1988). Dr.

E.A. Salako took over as School Coordinator from October 1988 to 1990 and served later as Acting Dean. When he became the only Professor in the School, he was made the substantive Dean. After his tenure, the school reverted to the position of Acting Deanship since no Professor was on ground then. The Acting Deans were Dr. J.A. Oladiran (1995-1998) and Dr. S.L. Lamai (1998-2001). By September 2001, with more Professors on ground, the Board of School of Agriculture and Agricultural Technology, in accordance with the University regulations, elected Prof. O.O.A. Fasanya as the Dean of the School for a two-year term. Since then, the Deanship position in the school has been filled by election. Prof. E.A. Salako took over from Prof. O.O. A. Fasanya in 2003 and Prof. S.L. Lamai took over from Prof. E.A. Salako in 2005. In January

2008, following the appointment of Prof. S.L. Lamai as the Dean of Postgraduate School, Prof.

K.M. Baba assumed Deanship of the School. In February 2012, Prof. M.G.M. Kolo succeeded Prof. K.M. Baba who had completed his second two-year term. Professor M.G.M. Kolo was re- elected for another two years from February 2014 but while in his second term, he was appointed Dean of Postgraduate School. In April 2015, Prof. R.J. Kolo was elected as the new Dean of the School and re-elected for second term. Prof. A.J. Odofin assumed the Deanship of the School in



April 2019 and served for only one term of two years. Prof. Job Nmadu took over from Prof. A.J. Odofin as the Dean of School of Agriculture and Agricultural Technology on 9th April, 2021 to April 8th 2023. Prof. Jacob H Tsado is the current Dean of School of Agricultural Technology who assumed duty on 9th April 2023 to date.

Under the leadership of Prof. Faruc Kuta as the Vice Chancellor, the School has witnessed tremendous growth which has resulted in the creation of new departments (Department of Forestry and Wildlife Conservation, and Human Nutrition and Dietetics), also a new programme has been proposed to NUC (Seed Science and Technology) which is awaiting approval.

**PROGRAMME OF EVENTS**

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| **DAY ONE** | **Sunday, 1st December, 2024** |
| 4.00 pm | Arrival of Participants and Settling in |
| **DAY TWO** | **Monday, 2nd December, 2024** |
|  | **Opening Ceremony (Moderator)** |
| 8.00 – 9.40 a.m. | Registration of Participants |
| 9.45 – 10.00 a.m. | Arrival of Dignitaries and Participants |
| 10.00 a.m. | University Anthem  National Anthem |
| 10.10 – 10.15 a.m. | Opening Prayer |
| 10.15 – 10.25 a.m. | Welcome Address by the Vice-Chancellor, Federal University Technology, Minna |
| 10.25 – 10.45 a.m. | Address by the Dean School of Agriculture and Agricultural Technology |
| 10.45 – 11.15 a.m. | **Keynote Address One by:**  Prof. (Mrs.) Mona Zayed  Director of Microbial Inoculants Center, Faculty of Agriculture Ain Shams University, Cairo, Egypt |
| 11.15 – 11.25 a.m. | Goodwill Messages |
| 11.25 – 12.05 a.m. | **Keynote Address Two by:**  Alh. Musa Salihu Bawa Bosso, Niger State Commissioner for Agriculture. Niger State Ministry of Agriculture, Minna |
| 12.05 – 12.35 p.m. | **Keynote Address Three by:**  Dr. Sanusi Muhammad  Director, Department of Artificial Intelligence and Robotics, National Space Research and Development Agency (NASRDA), Abuja, Nigeria |
| 12.35 – 12.45 p.m. | Group Photograph |
| 12.45 – 2.00 p.m. | Lunch Break and Registration |
| 2.00 – 4.30 p.m. | Scientific Session 1 Venue: Rooms 1. 2 & 3 PG Classes, SAAT Phase 2 |
| **DAY THREE** | **Tuesday, 3rd December, 2024** |
| 10.00 – 12 noon | Scientific Session 2 Venue: Rooms 1. 2 & 3 PG Classes, SAAT Phase 2 |
| 12.00 noon | Excursion/ Departure |

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| 1 and 2 | Animal Production, Food Science and Technology, Nutrition and Dietetics, and Water Resources, Aquaculture and Fishery  Technology | Room 2 PG  Class, SAAT  Phase 2 | Prof. A. A. Malik | Dr. S. James |
| 1 and 2 | Crop Production, Horticulture, Seed Science and Technology, Soil Science and Land Management, Forestry and Wildlife Technology, and Environmental Management | Room 3 PG  Class, SAAT  Phase 2 | Prof. P. A. Tsado | Dr. (Mrs.) A.  Y. Mamudu |

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**WELCOME ADDRESS BY THE DEAN, SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY, MINNA**

**ON THE OCCASION OF THE OPENING CEREMONY OF THE**

**3RD INTERNATIONAL CONFERENCE OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY (ICAAT) HELD ON**

**DECEMBER 1ST - 4TH, 2024**

**AT THE CAVERTON LECTURE THEATRE AT 10.00AM PROMPT**

Good morning, distinguished Vice Chancellor, members of the university management team, Deans, Professors, HODs, esteemed keynote and plenary speakers, honoured invited guests, colleagues, scholars, students, and friends.

It is a great privilege and a profound honour to stand before you today as we gather for the opening ceremony of the 3rd International Conference of the School of Agriculture and Agricultural Technology, here at the Federal University of Technology, Minna. I warmly welcome each of you and extend my sincere appreciation for making the time to join us in this significant discourse. Your presence here is a testament to your dedication to the advancement of agricultural research and development for a better and more food-secure world.

The theme for this year’s conference, "Integrated Approaches to Achieving Food Security through Artificial Intelligence and Effective Policy Implementation," underscores the urgency and complexity of our collective mission. As we confront mounting challenges, including food scarcity, climate change, and evolving agricultural demands, we must embrace innovative solutions to ensure the availability, accessibility, and sustainability of food for every member of our global community.

Artificial intelligence has emerged as a transformative tool, offering unprecedented opportunities for precision agriculture, predictive analysis, resource optimization, and data-driven decision- making. However, technological innovation is only one piece of the puzzle. Effective policy implementation—grounded in collaboration, inclusivity, and the practical realities of our farmers and stakeholders—will serve as the necessary enabler for meaningful change. It is this dynamic intersection of innovation and governance that we seek to explore and strengthen over the course of this conference.

I am deeply encouraged by the wealth of knowledge and expertise represented here today. Our esteemed keynote and plenary speakers will provide valuable insights that challenge conventional thinking and illuminate new pathways for progress. The diverse range of research presentations, discussions, and networking opportunities will undoubtedly inspire fresh perspectives and collaborative ventures.

I would like to express my heartfelt thanks to our Vice Chancellor, whose unwavering support and leadership continue to propel the Federal University of Technology, Minna, to the forefront of academic excellence. To the university management, the Niger State Government, our

sponsors, and all those who have contributed to the organization of this conference, your dedication and hard work are the backbone of this success.

As we embark on this important journey together, I encourage every participant to engage openly, exchange ideas, and form connections that extend beyond these sessions. Our shared commitment to food security demands innovation, resilience, and collective action, and I am confident that the deliberations here will leave a lasting impact.

Thank you, and I wish you all a highly successful, enriching, and productive conference.

**Professor Jacob Haruna Tsado,**

**Dean, School of Agriculture and Agricultural Technology December 2, 2024**

#### EFFECT OF POULTRY MANURE SOURCES AND LEVELS ON YIELD OF COWPEA IN MINNA

Saidu, Zaharadeen Bala, Uzoma, Anthony Ozoemenam, Eze, Peter Chukwu, and Abubakar, Hauwa Bosso

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#### A BST R AC T

A field experiment was carried out at the Federal University of Technology, Minna, in the cropping season of 2024 to determine the effect of poultry manure sources and levels on the yield of cowpea. The study was a 2 x 5 x 4 factorial experiment. The experiment was arranged in a Randomized Complete Block Design (RCBD). The treatments consisted of two sources of poultry manure (Deep Liter and Battery Cage Poultry systems) at 0, 5, 10, 15, and 20 t/ha replicated four times. The treatments were applied 2 weeks before planting to ensure proper breakdown of the organic material. The gross plot size was 4m x 4m (16 m2) each, while the net plot size was 45m x 22m (990 m2). Seeds (SAMPEA 20T, Early Maturing and Semi Erect) were planted at the rate of 3 seeds/hill and a spacing of 75cm between the rows and 25cm within the rows and later thinned to 1 plant/stand at 2 weeks after planting (WAP). All plots received a basal dose of N and P at an approved rate of 10kg N/ha and 30kg P/ha. The same quantity of inorganic fertilizer was applied per plot irrespective of the different levels of treatment. Pods were harvested at 12 WAP and sundried. The pods were threshed to separate the grains from the haulm. Data obtained were subjected to Analysis of Variance at a 5% level of probability using Statistix 8.0 statistical software. Duncan multiple range test (DMRT) was used to separate significant differences between means. Results showed that the poultry manure sources did not significantly affect the yield of cowpea. The poultry manure level did not significantly affect the yield parameters. However, the best improvement in yield parameters was observed when 0 t/ha poultry manure was applied regardless of sources. It is therefore recommended that growing SAMPEA 20T with poultry manure should not be encouraged. If, however, there is a need to use poultry manure, the battery cage source should be recommended.

**Keywords:** Cowpea, Poultry Manure, Deep Litter, Battery Cage.

#### INTRODUCTION

Cowpea (*Vigna unguiculata*), one of the important legume crops grown globally, plays a vital role in the livelihood of millions of smaller holder farmers who depend on it as a source of economic livelihood and nutritional well-being (Bolarinwa*et al.,* 2021). Cowpea is mainly grown for food, fodder, vegetables, green manure, and cover crops. Cowpea is vegetables (leaves and fresh pods) or grain. In sub-Saharan Africa (SSA), West Africa is regarded as the major cowpea- producing region with 80% of the total regional production reported for Nigeria and Niger at first and second positions respectively for 14 years in a row (Huynh *et al.,*2016). Cowpea is rich in protein and carbohydrate content with high nutritive value and palatability (Ddungu *et al.,* 2015). Despite the importance of cowpeas, their productivity in Nigeria is very low, at less than 600

kg/ha compared with a potential grain yield of over 2000 kg/ha (Boukar *et al.,*2018). This is due to the use of unimproved varieties and poor soil fertility due to land degradation as a result of erosion, desertification, tillage, and unsustainable agricultural practices. Apart from cowpea’s nutritional component, the crop has high rates of symbiotic nitrogen fixation and improves soil fertility which can be achieved by litter accumulations that impact organic matter positively. However, the quantity of organic matter accumulated under any cropping system may not be stable over time and may need external applications in the form of animal manures. Studies of Kannan *et al.,* (2005), have shown that poultry manure may be a preferable source of animal manure used in crop production.

Poultry Manure has been used since the earliest civilization for improving soil properties, it is primarily composed of Nitrogen (N), Phosphorus (P), and Potassium (K); it also contains calcium, magnesium, sulphur, and some micronutrients (Kannan *et al.,*2005), which are critical for crop growth and soil fertility. The application of poultry manure has been shown to increase the organic matter content of the soil, which in turn improves its structure, water-holding capacity, cation exchange capacity (CEC), and soil microbial properties (Ayoola & Adeniyan, 2006). The application of poultry manure introduces a substantial amount of organic matter into the soil, which serves as a substrate for microbial activity. This can lead to an increase in microbial biomass, diversity, and activity, all of which are beneficial for soil health and plant growth (Adesodun & Mbagwu, 2008). The objective of the study was to determine the effect of poultry manure sources and levels on the yield of cowpea.

#### MATERIALS AND METHODS

##### Description of Study Site

The study was conducted at Federal University of Technology, Minna, Niger State. The experimental site is located beside the University Works Department on latitude 9°31'6"N to 9°31'50"N and Longitudes 6°26'26"E to 6°27'6"E. Minna has a sub-humid climatic condition. The annual rainfall is 1284mm, while the mean temperature is 32 oC, the dry season lasts for five (5) months from November to March, while the rainy season extends between April and October. The soils of Minna developed from basement complex rocks ranging from shallow to very deep soils overlying deeply weathered gneisses and magnetite with some underlain by iron pans to varying depths. The soils are mostly sandy in texture. Minna is located in the Southern Guinea savanna zone characterized by vast grassland with few scattered trees and shrubs. Crops are mostly grown under rain-fed conditions. The crops include maize, rice, cowpea, soybean, and groundnut. Crops grown under irrigation during the dry season include rice, maize, and vegetables.

##### Treatments and Experimental Design

The study was a 2 x 5 x 4 factorial experiment. The treatments consisted of two sources of poultry manure (Deep Liter and Battery Cage Poultry systems) at 0, 5, 10, 15, and 20 t/ha replicated four times. The treatments were applied 2 weeks before planting to ensure proper breakdown of the organic material. The experiment was arranged in a Randomized Complete Block Design (RCBD)

**REP 1**

|  |  |  |
| --- | --- | --- |
| **DL0** |  | **BC0** |

|  |  |  |
| --- | --- | --- |
| **BC5** |  | **BC20** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | |  | **BC10** |  | **DL15** |  |  |  |  |  | **BC15** |  | **DL10** |  | **DL20** |  | **DL5** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DL20** |  | **BC0** |  | **BC15** |  | **BC20** |  | **DL15** |  | **BC5** |  | **DL0** |  | **DL10** |  | **BC10** |  | **DL5** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DL20** |  | **BC0** |  | **BC20** |  | **DL10** |  | **BC10** |  | **BC5** |  | **DL5** |  | **BC15** |  | **DL15** |  | **DL0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **BC0** |  | **BC5** |  | **DL15** |  | **DL10** |  | **BC15** |  | **DL0** |  | **DL5** |  | **BC10** |  | **DL20** |  | **BC20** |

**REP 2**



**REP 3**

**REP 4**

*DL: Deep Litter, BC: Battery Cage, 5,10,15,20: Poultry manure application rates (t/ha)*

##### Figure 1: Plot Layout Agronomic Practices

The field was cleared and ploughed using a tractor. The plots were leveled manually using a hoe. The gross plot size was 4m x 4m (16 m2) each, while the net plot size was 45m x 22m (990 m2). Seeds (SAMPEA 20T, Early Maturing and Semi Erect) were planted at the rate of 3 seeds/hill and a spacing of 75cm between the rows and 25cm within the rows at a depth of 5cm according to (Dugje *et al.,*2009). The plants were thinned to 1 plant/stand at 2 weeks after planting (WAP). All plots received a basal dose of N and P at an approved rate of 10kg N/ha and 30kg P/ha. The nutrient was sourced from NPK 20:10:10 and SSP. 0.00072kg (0.72grams) of NPK20:10:10 fertilizer was applied per plant stand i.e 0.07kg (70grams) per plot at planting and 0.00182kg (1.82grams) of SSP was applied per plant stand i.e. 0.175kg (175 grams) per plot by band placement method. The same quantity of inorganic fertilizer was applied per plot irrespective of the different levels of treatment. Weeding was done manually first at 2 WAP, and secondly at 5 WAP to ensure a clean field. Insect pest was controlled using insecticide 5 weeks after planting when flower bud initiation had started. This was to control thrips and early attack of *Maruca* pod borer and ensure good flowering. Pods were harvested at 12 WAP and sundried. The pods were threshed to separate the grains from the haulm.

##### Measurement of Crop Yield Parameters

Pod weight was determined by weighing the pods from each plot and expressing the weight in Kg/ha. Grain yield was determined by weighing the grains from each plot and expressing the weight in Kg/ha. Haulm weight was determined by weighing the haulm from each plot and expressing the weight in Kg/ha.

##### Statistical Analysis of Data

The data were subjected to Analysis of Variance at a 5% level of probability using Statistix 8.0 (Statistix, 2010) statistical software. Duncan multiple range test (DMRT) was used to separate the means.

#### RESULTS

Organic sources did not significantly(p>0.05) affect pod weight (Table 1). Plants that received poultry manure from battery cages produced heavier pod weights (1187.49 Kg/ha) compared to those fertilized with poultry manure from a deep litter system (1056.25 Kg/ha). The increase as a result of manure from the battery cage system was 12.5%. Haulm weight (Kg/ha) was not significantly(p>0.05) affected by organic sources (Table 1). Similarly, plants fertilized with battery cage manure produced a heavier haulm weight of 446.88 Kg/ha compared to the haulm weight of 410.94 Kg/ha obtained by deep litter manure. The increase in haulm weight as a result of battery cage manure was 8.52%. Grain yield (kg/ha) was not significantly (p>0.05) affected by organic sources (Table 1). Cowpea plants supplied with battery cage manure produced a heavier grain yield of 743.75 Kg/ha compared to a grain yield of 651.56 Kg/ha produced by deep litter manure. The increase in grain yield due to battery cage manure was 14.1%. Regardless of sources, all yield parameters were highest when 0 t/ha of poultry manure was added (Table 1). The addition of poultry manure beyond 0 t/ha only depressed yield parameters with the highest depression obtained at 10 t/ha across all yield parameters observed.

##### Table 1: Main Effect of Poultry Manure Sources and Levels on Yield of Cowpea

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment | Pod Weight (Kg/ha) | Haulm Weight (Kg/ha) | Grain Yield (Kg/ha) |
| Sources (S) |  |  |  |
| Deep Litter | 1056.25 | 410.94 | 651.56 |
| Battery Cage | 1187.49 | 446.88 | 743.75 |
| Significance | NS | NS | NS |
| Levels (t/ha) (L) |  |  |  |
| 0 | 1332.03 | 457.03 | 859.38 |
| 5 | 1105.47 | 425.78 | 679.69 |
| 10 | 996.06 | 375.00 | 621.09 |
| 15 | 1097.65 | 453.13 | 636.72 |
| 20 | 1078.13 | 433.59 | 691.41 |
| Significance | NS | NS | NS |
| S\*L | NS | NS | NS |

**NS = Not Significant DISCUSSION**

As a result of the battery cage system, yield and yield characteristics were improved compared to the deep litter system. This is because of the absence of litter material in the manure obtained from the battery cage system unlike that of the deep litter system with saw dust fortification. This is consistent with the report of Johnson & Clark, (2021), who maintained that the yield of crops fertilized with deep litter system manure was lower than that of battery cage system manure. The deep litter system manure used in the experiment was fortified with sawdust which ordinarily

should have a C: N ratio of 400:1 (Söderström & Jones, 2019). This implies that Nitrogen immobilization will increase under deep litter manure of saw dust origin compared to battery cage manure. At the level of manure application, 0 t/ha averagely produced the best yield characteristics observed. This implies that the inherent fertility status of the soil was probably sufficient for yield increase such that a further improvement by application of manure was altering the physiology of the plant by increasing source/sink competition in favor of vegetative growth and at the expense of grain and pod growth (Zhang & Wang, 2020).

#### CONCLUSION

The poultry manure sources did not significantly affect the yield of cowpea. Similarly, the poultry manure level did not significantly affect the yield parameters. However, the best improvement in yield parameters was observed when 0 t/ha poultry manure was applied regardless of sources.

#### RECOMMENDATIONS

It is therefore recommended that growing SAMPEA 20T with poultry manure should not be encouraged. If, however, there is a need to use poultry manure, the battery cage source is recommended.

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