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# EFFICIENCY OF DIFFERENT FERTILIZER ON PERFORMANCE AND UPTAKE FOR CUCUMBER PRODUCTION (*Cucumis sativus L.*) IN OGBOMOSO, OYO STATE

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## ABSTRACT

A field experiment was conducted on the Teaching and Research Farm at Ladoke Akintola University of Technology Ogbomoso, Oyo State, Nigeria. The study investigated the impact of various fertilizer types and cucumber varieties on growth, yield, and nutrient uptake in cucumber production in Ogbomoso, Oyo State. The experimental design was a Randomized Complete Block Design (RCBD) with five fertilizer treatments (poultry manure, urea, Mack Pure organic, NPK, and control) and three cucumber varieties (Cucumber marketer, Seminis, and Amarisa super F1). Results showed that poultry manure and urea significantly ($P < 0.05$) enhanced growth and yield parameters, with poultry manure increasing leaf count and vine number, while urea improved fruit production and nutrient uptake, especially for nitrogen and phosphorus. The "Cucumber marketer" (V1) variety demonstrated the highest growth performance and nutrient uptake. Although fertilizer and variety independently influenced yield, their interaction was limited in enhancing fruit production. The study suggests that farmers seeking higher cucumber yields and sustainable soil nutrients should consider using poultry manure and urea, combined with high-performing varieties like "Cucumber marketer."

**Keywords:** Cucumber, Nutritional value, Fertilizers, Nutrient uptake, Weeks after planting (WAP)

## INTRODUCTION

Cucumber (*Cucumis sativus L.*) is a high-value horticultural crop grown worldwide for its nutritional, culinary, and economic importance. Cucumber is a versatile vegetable with a wide range of uses in different areas such as culinary, medicinal, and cosmetic (Sabir *et al*., 2019). Its crisp, refreshing taste makes it a popular choice in salads, sandwiches, and as a garnish for drinks. However, cucumbers are more than just a tasty addition to your meals. They are also a good source of vitamins and minerals, making them a healthy snack option. Cucumbers contain vitamin C, vitamin K, potassium, and magnesium, among other nutrients (Higdon and Frei, 2019). Aside from being consumed as food, cucumbers have various other uses. They are a common ingredient in skincare and beauty products, thanks to their high water content and cooling properties. Cucumber slices can be placed on the eyes to reduce puffiness, and cucumber extract is a popular ingredient in moisturizers and facial masks (Khan *et al*., 2021). Cucumbers also have a long history of use in traditional medicine. They are believed to have diuretic properties, meaning they can help to flush excess fluids from the body. Cucumber juice is a common remedy for urinary tract infections and other conditions that cause inflammation in the body (Al-Asmari *et al*., 2022). In addition, cucumbers are a valuable ingredient in the production of pickles, a popular food item worldwide. Pickling cucumbers involves soaking them in a vinegar solution, which gives them a tangy, sour flavor. Pickled cucumbers can be eaten as a snack or used as a condiment to add flavor to sandwiches, burgers, and other dishes (U.S. Department of Agriculture, 2022).

Optimizing cucumber production, especially in regions with variable soil fertility, depends significantly on efficient nutrient management strategies (Abiodun and Ali, 2021). Fertilizers play a central role in this optimization process, as they provide essential nutrients that influence plant growth, yield, and nutrient uptake efficiency (Ibrahim *et al*., 2023). However, the choice and efficiency of different fertilizer types—organic, inorganic, and integrated approaches—can vary considerably in their impact on cucumber performance, depending on environmental and soil factors (Bello *et al*., 2022).

Organic fertilizers, often derived from plant and animal residues, have been shown to enhance so il health by improving its physical, chemical, and biological properties (Oluwaseun and Olufemi, 2020, Owoade *et al.,* 2017, Owoade and Abolarin 2020). These fertilizers release nutrients more slowly compared to inorganic fertilizers, which can improve nutrient retention

and minimize leaching losses. In contrast, inorganic fertilizers, typically composed of concentrated nutrient compounds, are known for their rapid nutrient availability and higher immediate impact on plant growth (Olujide and Oyedepo, 2021, Owoade and Abolarin 2020). Integrated fertilizer management combines organic and inorganic fertilizers to maximize nutrient availability while promoting soil health, a balance that has shown promising results for yield and sustainability in cucumber production (Yakubu *et al*., 2023).

Understanding the efficiency of these fertilizer types is essential for designing optimal fertilization programs that enhance cucumber yield while ensuring environmental sustainability. This study, therefore, investigates the effects of different fertilizer types on cucumber growth performance and nutrient uptake. By identifying the most effective fertilizer practices, this research aims to provide recommendations that can help farmers maximize cucumber productivity while promoting sustainable agriculture practices. The objective of this study was to determined the efficiency of different fertilizer on performance and uptake for cucumber production (*Cucumis sativus L*.) in Ogbomoso, Oyo state.

## MATERIALS AND METHODS

*Experimental Site*

The field experiment was carried out in Teaching and Research Farm, Ladoke Akintola University of Technology (LAUTECH), Ogbomoso, (Latitude 8° 10'N and Longitude 4° 25'E) in the Derived savannah agro-ecological zone of Southwestern Nigeria. It has a bimodal pattern of rainfall distribution which is characterized by peaks around July and September. The day temperature ranges between 25.8°C in August and 30.50 °C in March, with mean annual temperature of 27°C (Ewetola *et al.,* 2020). The experimental site was manually cleared; tilled and flat beds measuring 3 m x 3 m were constructed.

**Experimental design**

The experimental design was Randomized Complete Block Design (RCBD). There were 15 treatments and each treatment was replicated three times to give a total of 45 experimental units for the varieties of Cucumber planted. Five fertilizer treatments were used. Fertilizer treatment used are as follows: T1 (poultry manure), T2; (urea), T3; (Mack pure organic), T4 (NPK), and T5 (Control). Three varieties of cucumber used are: V1 (Cucumber marketer), V2 (Seminis), and V3 (Amarisa super F1) which was planted on bed and watered regularly.

**Data collection and analysis**

Data collection commenced five weeks after planting (5WAP). The growth parameters observed were number of leaves and vine number. Yield parameters were number of flower per plant, and number of fruits per plant. Nutrient uptake was calculated as Nutrient concentration in plant tissue multiply by Plant dry weight divided by one hundred. Each parameter measured was subjected to (ANOVA) Analysis of variance and means were separated using Least Significance Difference (LSD) at 5% probability level.

## RESULTS AND DISCUSSION

*Growth parameters*

**Number of Leaves**

Table 1 shows the effects of different fertilizer types and cucumber varieties on the number of leaves per plant at various weeks after planting (WAP). At 5 WAP, Variety V1 had the highest leaf count with poultry manure, while the control treatment showed the lowest leaf count. At 6 WAP, leaf numbers increased across treatments, with V1 under urea showing the highest count. Poultry manure and urea continued to be effective, with significant differences observed among varieties and fertilizers. At 7 WAP, leaf numbers further increased, with V1 treated with poultry manure having the highest count. Poultry manure and urea maintained their effectiveness, with both variety and fertilizer showing significant effects.

**Vine number**

Table 2 displays the effects of different fertilizer types and cucumber varieties on the vine number of cucumber plants at 5, 6, and 7 weeks after planting (WAP). At 5 WAP, V1 had the highest vine count with NPK, while the control treatment yielded the lowest counts. NPK was the most effective fertilizer overall. At 6 WAP, vine numbers increased, with V1 responding best to poultry manure. Poultry manure led to

the highest average vine number, while the control remained lowest. At 7 WAP, vine numbers continued to rise, with V1 under poultry manure showing the highest count. Poultry manure remained the most effective fertilizer overall. At 5, 6, and 7 weeks after planting (WAP), different fertilizers significantly influenced cucumber vine numbers across varieties (V1, V2, V3).

*Yield parameters*

**Number of flowers**

Table 3 shows the effects of different cucumber varieties and fertilizer types on the number of flowers produced at 5, 6, and 7 weeks after planting (WAP). At 5 WAP, Variety 1 (V1) had the highest average number of flowers across all fertilizer treatments, with 13.0 flowers on average, while Variety 3 (V3) had the lowest count (5.4). V1 also responded well to Mack Pure fertilizer, producing 21.0 flowers, the highest among all treatments. Among fertilizer types, Mack Pure led to the highest flower count (13.7 on average), while the control treatment (no fertilizer) resulted in the lowest (6.7). At 6 WAP, V1 continued to produce the highest number of flowers across treatments, particularly with Mack Pure (146.0 flowers). V2 and V3 showed much lower flower counts across all fertilizers, with V3 having the lowest count overall. Mack Pure again led to the highest average number of flowers (54.4), followed by Urea. The control yielded the fewest flowers (28.6). At 7 WAP, V1 consistently produced the most flowers, particularly under Mack Pure and NPK treatments. V3 remained the lowest in flower production. The general trend continued with Mack Pure and NPK fertilizers supporting the highest flower counts, while the control had the least effect.

**Number of fruits**

Table 4 presents the effects of different fertilizer types and cucumber varieties on the number of fruits produced at different weeks after planting (WAP). At 5 WAP, Variety 2 (V2) consistently produced more fruits across all fertilizer treatments, with the highest count of 45 fruits under Urea treatment. Variety 3 (V3) followed closely, while Variety 1 (V1) produced the least number of fruits. The average effect of fertilizers on fruit number indicates that Urea generally promoted higher fruit production (24 fruits), while the control (no fertilizer) resulted in the lowest fruit count (6.7 fruits). Similar trends continue at 6 WAP, with V2 yielding the highest number of fruits across all fertilizer treatments, particularly under Urea and Poultry Manure. Variety 1 remained the lowest in fruit production. The mean fruit count shows that Urea still leads to the highest fruit yield (7.0), followed by Poultry Manure. Control yielded the lowest number of fruits again. By 7 WAP, V2 continued to outperform the other varieties, especially under Urea and Poultry Manure treatments. V1 remained the lowest producer. The general trend shows Urea and Poultry Manure as the most effective fertilizers for fruit production at this stage, with average fruit counts of 12.0 and 11.0, respectively. Control still yielded the fewest fruits (5.0). Significant differences in fruit production were found due to variety and fertilizer type, though the interaction between them was only significant at 6 WAP. This suggests that both variety and fertilizer type independently contribute to fruit yield, with limited synergistic effects.

**Nutrient uptake**

Table 5 displays the effects of different fertilizer types and cucumber plant varieties on the nutrient uptake (Nitrogen, Phosphorus, and Potassium) of cucumber plants. V1 (Cucumber marketer) had the highest mean nitrogen uptake across all fertilizer types (0.87), while V3 (Amarisa super F1) had the lowest (0.54). Among the fertilizers, urea consistently led to the highest nitrogen uptake across all varieties, with an overall mean of 0.90, while control treatments resulted in the lowest nitrogen uptake. The least significant difference (LSD) results suggest that differences in nitrogen uptake are not statistically significant among varieties, fertilizers, or their interaction. Phosphorus uptake was highest in variety V1 with a mean of 9.13, followed by V2 (Seminis) (7.05) and V3 (5.04). Among the fertilizer treatments, urea led to the highest phosphorus uptake with a mean of 12.06, while control treatments again resulted in the lowest uptake values. LSD results show a significant difference in phosphorus uptake among varieties and fertilizers, but not for their interaction, indicating that both variety and

fertilizer type independently influence phosphorus uptake. Variety V1 recorded the highest mean potassium uptake (2.02), while V3 had the lowest (0.94). Urea and NPK 15:15:15 led to higher potassium uptake across varieties, while control treatments resulted in the lowest uptake values. Similar to nitrogen, the LSD test shows no significant differences for potassium uptake among varieties, fertilizers, or their interaction.

## CONCLUSION

This study highlights the significant effects of fertilizer type and cucumber variety on growth, yield, and nutrient uptake in cucumber production. Poultry manure and urea were especially effective, with poultry manure enhancing leaf count and vine number, and urea promoting higher fruit yield and nutrient uptake. The "Cucumber marketer" (V1) variety showed the best performance overall. Both fertilizer and variety independently influenced growth and yield; however their interaction had a limited effect on fruit production.

## RECOMMENDATIONS

Based on the findings made during the course of this research work, the following recommendations were made:

1. Use of Urea and Poultry Manure for improved yield and nutrient uptake.
2. Adopting Integrated Fertilizer Management to balance short- and long-term nutrient availability.
3. Promoting Sustainable Nutrient Management Practices to support productivity and environmental sustainability.

## REFERENCES

Abiodun, M., and Ali, M. (2021). Optimizing cucumber production through nutrient management strategies in variable soil conditions. *Journal of Agricultural Sciences*, 12(3), 123–132.

Al-Asmari, A., Khan, M., and Ansari, A. (2022). Traditional uses and pharmacological potential of cucumber: A review. *Journal of Ethnopharmacology*, 282, 114598. https://doi.org/10.1016/j.jep.2022.114598

Bello, S. A., Yusuf, A., and Usman, T. (2022). Comparative efficiency of organic and inorganic fertilizers on cucumber (Cucumis sativus) yield and quality. *African Journal of Horticultural Science*, 17, 89–102.

Ewetola E. A., Onofua O. E., Ola O. D. and Akande A. O. (2020). Influence of saw dust and plastic mulch on soil physical properties, growth and yield of Okra (*Abelmoschus Esculentus* (L.) Moench. *Nigerian Journal of Horticultural Science*. Vol. 25 (2)1118-2733.

Higdon, J., and Frei, B. (2019). *Vitamin and Mineral Basics*. Linus Pauling Institute, Oregon State University. Available at: https://lpi.oregonstate.edu

Ibrahim, A. O., Abdulkadir, M., and Aliyu, I. M. (2023). Impact of fertilizer type on nutrient uptake and yield of cucumbers in arid soils. *International Journal of Horticulture Science and Technology*, 18(4), 203–212.

Khan, M., Rehman, A., and Alam, N. (2021). Uses of cucumber in skincare: An overview of its potential applications. *Cosmetic Science Journal*, 5(2), 33–42.

Olujide, A. O., and Oyedepo, T. O. (2021). Inorganic fertilizers and their immediate effects on cucumber yield. *Agricultural Chemistry Review*, 8(2), 101–109.

Oluwaseun, O. R., and Olufemi, A. K. (2020). Benefits of organic fertilizers in improving soil properties and crop production. *Soil and Environmental Science Journal*, 15(1), 29–39.

Owoade, F. M., Abolarin, A. O. and Ewetola, E. A. (2017). Effects of organic and inorganic nutrients sources on performance of *Aloe vera* and soil chemical properties. *Canadian Journal of Pure and Applied Sciences*, 11(3):4305-4311. https://www.cjpas.net.

Owoade, F. M. and Abolarin A. O. (2020). Efficacy of Sunshine and neem-based organic fertilizer on performance and chemical constituents of *Aloe vera* in the Southern Guinea Savanna Ecology of Nigeria. *LAUTECH Crop and Environmental Reviews* 1(2): 112-121. https://laucers.com

Sabir, S., Qureshi, R., and Rehman, M. (2019). Culinary, medicinal, and cosmetic importance of cucumber (Cucumis sativus L.): A review. *Journal of Medicinal Plants Studies*, 7(4), 62–67.

U.S. Department of Agriculture. (2022). *Cucumbers: Nutritional Profile and Pickling Process*. Available at: https://www.usda.gov

Yakubu, Y., Okeke, E., and Alhassan, M. (2023). Integrated fertilizer management for sustainable cucumber production: A field-based assessment. *Sustainable Agriculture Research*, 32(2), 143–152.

**Table 1: Effects of varieties and fertilizers types on number of leaves of cucumber plants**

| | Fertilizer types | | | | | |
|---|---|---|---|---|---|---|
| **Variety** | **Poultry Manure** | **Urea** | **Mack pure** | **NPK 15:15:15** | **Control** | **Variety mean** |
| | | | **5 WAP** | | | |
| V1 | 9.0 | 8.0 | 7.0 | 5.0 | 5.0 | 7.0 |
| V2 | 5.0 | 6.0 | 7.0 | 5.0 | 6.0 | 6.0 |
| V3 | 7.0 | 4.0 | 4.0 | 5.0 | 5.0 | 5.0 |
| FER TY Mean | 7.0 | 6.0 | 6.0 | 5.0 | 6.0 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | 1.2 | | | | | |
| LSD V*F | ns | | | | | |
| | | | **6 WAP** | | | |
| V1 | 16.0 | 14.0 | 13.0 | 10.0 | 9.0 | 12.0 |
| V2 | 11.0 | 9.0 | 11.0 | 8.0 | 9.0 | 10.0 |
| V3 | 9.0 | 6.0 | 7.0 | 6.0 | 7.0 | 7.0 |
| FER TY Mean | 12.0 | 10.0 | 10.0 | 8.0 | 8.0s | |
| LSD Variety | 2.2 | | | | | |
| LSD Fertilizer | 1.8 | | | | | |
| LSD V*F | ns | | | | | |
| | | | **7 WAP** | | | |
| V1 | 20.0 | 21.0 | 20.0 | 13.0 | 12.0 | 17.0 |
| V2 | 17.0 | 13.0 | 14.0 | 10.0 | 11.0 | 13.0 |
| V3 | 15.0 | 11.0 | 10.0 | 9.0 | 10.0 | 11.0 |
| FER TY Mean | 17.0 | 15.0 | 15.0 | 10.0 | 11.0s | |
| LSD Variety | 2.8 | | | | | |
| LSD Fertilizer | 3.6 | | | | | |
| LSD V*F | ns | | | | | |

Least Significant Difference at 5% level of probability, FER TY- Fertilizer types, WAS- Week after planting (Field survey, 2023)

**Table 2: Effects of varieties and fertilizers types on vine number of cucumber plants**

| | Fertilizer types | | | | | |
|---|---|---|---|---|---|---|
| **Variety** | **Poultry Manure** | **Urea** | **Mack pure** | **NPK 15:15:15** | **Control** | **Variety mean** |
| | | | **5 WAP** | | | |
| V1 | 18.0 | 10.0 | 20.0 | 16.0 | 12.0 | 15.0 |
| V2 | 17.0 | 17.0 | 13.0 | 18.0 | 13.0 | 15.0 |
| V3 | 18.0 | 11.0 | 20.0 | 14.0 | 10.1 | 15.0 |
| FER TY Mean | 17.0 | 12.0 | 18.0 | 16.0 | 12.0 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | 3.5 | | | | | |
| LSD V*F | 6.1 | | | | | |
| | | | **6 WAP** | | | |
| V1 | 38.0 | 29.0 | 33.0 | 36.0 | 38.0 | 35.0 |
| V2 | 28.0 | 35.0 | 29.0 | 29.0 | 27.0 | 30.0 |
| V3 | 34.0 | 33.0 | 38.0 | 28.0 | 33.0 | 33.5 |
| FER TY Mean | 33.0 | 32.0 | 33.0 | 31.0 | 33.0 | |
| LSD Variety | 4.5 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |
| | | | **7 WAP** | | | |
| V1 | 62.1 | 48.0 | 49.0 | 62.0 | 54.0 | 55.0 |
| V2 | 51.0 | 61.0 | 52.0 | 54.0 | 55.0 | 55.0 |
| V3 | 49.0 | 63.0 | 59.0 | 58.0 | 58.0 | 57.0 |
| FER TY Mean | 54.0 | 57.0 | 53.0 | 58.0 | 55.0 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | 12.5 | | | | | |

Least Significant Difference at 5% level of probability, FER TY- Fertilizer types, WAS- Week after planting (Field survey, 2023)

**Table 3: Effects of varieties and fertilizers types on number of flowers of cucumber plants**

| | Fertilizer types | | | | | |
|---|---|---|---|---|---|---|
| **Variety** | Poultry Manure | Urea | Mack pure | NPK 15:15:15 | Control | Variety mean |
| | | | **5 WAP** | | | |
| V1 | 20.3 | 5.3 | 21.0 | 9.0 | 9.3 | 13.0 |
| V2 | 18.0 | 9.3 | 10.0 | 10.7 | 7.7 | 11.1 |
| V3 | 6.0 | 4.0 | 10.0 | 4.0 | 3.0 | 5.4 |
| FER TY Mean | 14.8 | 6.2 | 13.7 | 7.9 | 6.7 | |
| **LSD Variety** | 5.7 | | | | | |
| **LSD Fertilizer** | 7.4 | | | | | |
| **LSD V*F** | ns | | | | | |
| | | | **6 WAP** | | | |
| V1 | 118.3 | 78.7 | 146.0 | 111.3 | 67.0 | 104.3 |
| V2 | 10.7 | 11.0 | 7.0 | 6.0 | 7.0 | 8.3 |
| V3 | 11.7 | 6.7 | 10.3 | 8.0 | 11.7 | 9.7 |
| FER TY Mean | 46.9 | 32.1 | 54.4 | 41.8 | 28.6 | |
| LSD Variety | 26.3 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |
| | | | **7 WAP** | | | |
| V1 | 33.7 | 60.7 | 62.3 | 58.3 | 37.3 | 50.5 |
| V2 | 12.3 | 11.0 | 7.0 | 6.0 | 4.3 | 8.1 |
| V3 | 5.0 | 4.3 | 1.7 | 5.3 | 2.0 | 3.7 |
| FER TY Mean | 17.0 | 25.3 | 23.7 | 23.2 | 14.6 | |
| LSD Variety | 13.7 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |

Least Significant Difference at 5% level of probability, FER TY- Fertilizer types, WAS- Week after planting (Field survey, 2023)

**Table 4: Effects of varieties and fertilizers types on number of fruit of cucumber plants**

| | Fertilizer types | | | | | |
|---|---|---|---|---|---|---|
| **Variety** | **Poultry Manure** | **Urea** | **Mack pure** | **NPK 15:15:15** | **Control** | **Variety mean** |
| | | | **5 WAP** | | | |
| V1 | 13.0 | 2.0 | 7.0 | 3.0 | 2.0 | 6.0 |
| V2 | 37.0 | 45.0 | 43.0 | 27.0 | 31.0 | 37.0 |
| V3 | 31.0 | 26.0 | 21.0 | 20.0 | 18.0 | 23.0 |
| FER TY Mean | 27.0 | 24.0 | 24.0 | 17.0 | 17.0 | |
| LSD Variety | 8.0 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |
| | | | **6 WAP** | | | |
| V1 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 |
| V2 | 4.0 | 14.0 | 13.0 | 9.0 | 11.0 | 10.0 |
| V3 | 6.0 | 3.0 | 6.0 | 7.0 | 3.0 | 5.0 |
| FER TY Mean | 5.0 | 7.0 | 8.0 | 6.0 | 6.0 | |
| LSD Variety | 0.9 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | 2.0 | | | | | |
| | | | **7 WAP** | | | |
| V1 | 8.0 | 7.0 | 4.0 | 3.0 | 4.0 | 5.0 |
| V2 | 14.0 | 19.0 | 17.0 | 12.0 | 11.7 | 15.0 |
| V3 | 12.0 | 11.0 | 9.0 | 8.0 | 7.0 | 9.0 |
| FER TY Mean | 12.0 | 12.0 | 10.0 | 8.0 | 7.0 | |
| LSD Variety | 3.6 | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |

Least Significant Difference at 5% level of probability, FER TY- Fertilizer types, WAS- Week after planting (Field survey, 2023)

**Table 5: Effects of varieties and fertilizers types on nutrient uptake of cucumber plants**

| | Fertilizer types | | | | | |
|---|---|---|---|---|---|---|
| **Variety** | **Poultry Manure** | **Urea** | **Mack pure** | **NPK 15:15:15** | **Control** | **Variety mean** |
| | | **Nitrogen** | | | | |
| V1 | 0.98 | 1.36 | 1.09 | 0.40 | 0.57 | 0.88 |
| V2 | 0.68 | 0.82 | 0.53 | 0.58 | 0.63 | 0.65 |
| V3 | 0.94 | 0.52 | 0.54 | 0.41 | 0.32 | 0.54 |
| FER TY Mean | 0.86 | 0.90 | 0.73 | 0.47 | 0.51 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | 1.09 | | | | | |
| | | **Phosphorus** | | | | |
| V1 | 8.10 | 12.51 | 13.46 | 4.83 | 6.97 | 9.13 |
| V2 | 6.27 | 7.65 | 12.31 | 10.78 | 7.16 | 8.84 |
| V3 | 11.92 | 6.77 | 6.97 | 4.57 | 5.03 | 7.05 |
| FER TY Mean | 8.76 | 8.98 | 10.91 | 6.73 | 6.32 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |
| | | **Potassium** | | | | |
| V1 | 2.69 | 3.12 | 2.69 | 0.67 | 0.95 | 2.02 |
| V2 | 0.95 | 1.39 | 0.92 | 1.02 | 0.93 | 1.04 |
| V3 | 1.47 | 0.81 | 0.91 | 0.69 | 0.84 | 0.94 |
| FER TY Mean | 1.70 | 1.77 | 1.50 | 0.79 | 0.91 | |
| LSD Variety | ns | | | | | |
| LSD Fertilizer | ns | | | | | |
| LSD V*F | ns | | | | | |

Least Significant Difference at 5% level of probability, FER TY- Fertilizer types, WAS- Week after planting (Field survey, 2023)