**EFFICACY OF COMPOST, NPK AND ORGANOMINERAL FERTILIZERS ON GROWTH AND YIELD OF Celosia argentea L.**

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 **Abstract**

A pot trial was conducted in the screen-house of Kwara State University, Malete, Nigeria during 2014 planting season to examine the efficacy of compost, NPK and organomineral fertilizers on growth and yield of *Celosia argentea* as well as residual effects. The treatments comprised of Aleshinloye Grade A (Organomineral fertilizer), Aleshinloye Grade B (Un-amended compost), Sunshine Grade A (Organomineral fertilizer), Sunshine Grade B (Un-amended compost), NPK and control. The experiment was laid out in a completely randomized design (CRD) with three replicates. All the treatments (except the control of no soil additive) were applied at the rate of 45 kg N ha-1. Measurements of agronomic parameters were taken and data collected were subjected to analysis of variance (ANOVA) using the statistical analysis system (SAS). The parameters assessed were significantly influenced (*p<*0.05) by the applied fertilizer types. The results show that dry shoot yield values of *celosia argentea* were 2.5 and 2.4 g respectively with Sunshine Grade A and Aleshinloye Grade A. Residual effect of Amaranth fresh shoot yield values obtained from Sunshine Grade A (5.3 g) and Aleshinloye Grade A (5.6g) were significantly (*p<* 0.05) higher than that of the NPK treatment (3.6 g).

In summary, the yield of celosia in Guinea Savanna zone of Nigeria can be significantly improved with application of organic fertilizers fortified with mineral fertilizer at 45 kg N ha

**Keywords:** *celosia argentea*, NPK, organic fertilizer, organomineral fertilizer, shoot yield.

**INTRODUCTION**

*Celosia argentea* an edible species of the genus *Celosia* of the Amaranthaceae family is widely grown in gardens and other parts of West Africa. This leafy vegetable is an essential component of people’s diet in Nigeria and other parts of West Africa. The leaves and young shoots are used in soups and stews. The leaves contain high levels of calcium, phosphorus and iron. This plant is an important source of proteins, calories, vitamins and minerals (Sanni *et al*, 2014). The vegetable is predominantly produced in Nigeria by resource-poor farmers and compound gardens where it is intercropped with arable starchy staples to produce enough food to satisfy their dietary and cash requirements and to minimize the risk of crop failure. (Akinyemi and Tijani-Eniola, 1997). Continuous cropping of soils with leafy vegetables is usually associated with loss of organic matter, since almost all parts of the crop are harvested and crop residues are removed from the field or burned. The practical way to improve the quality of soils with low organic matter is through addition of organic materials to the soil either fresh, composted or farm yard manures. Organic matter possesses many desirable properties such as high water holding capabilities, cation exchange capacity, sequester contaminants (both organic and inorganic), enhanced nutrient uptake, and beneficial effects on the physical, chemical and biological characteristics of soil (Oroka, 2012 and Asgharipour, 2012).

Organic fertilizers are a low input and environment friendly technology of improving nutrient status of tropical soils for sustainable crop production. Therefore, it is important to investigate the use of locally sourced organic materials which are cheap, environment friendly and probably an effective way of improving and sustaining the productivity of soils and arable crops such as *C. argentea.* Some attempts have been made to investigate the effect of cow dung, poultry manure, mineral fertilizer and organo mineral fertilizer on *celosia* (Akinyele, *et al*., 2012,) and *Amarantus cruentus* (Makinde et al., 2010 and Olowoake, 2014), but the effect of these fertilizers on the growth and yield of *C. argentea* has not been widely investigated in Ilorin, Southern Guinea Savanna of Nigeria. Therefore, the objective of this study is to investigate efficacy of compost, NPK and organomineral fertilizers on growth and yield of celosia argentea

**MATERIALS AND METHODS**

The potted experiment was set up in a screen-house at Kwara State University (Latitude 80 71’N and Longitude 40 44’E), Malete. The experiment was carried out to study the efficacy of compost, NPK and organomineral fertilizers on the growth and yield of *celosia argentea.* Eighteen pots were filled with 5.5kg of soil. The treatments used were: Aleshinloye Grade A (compost amended with mineral fertilizer); Aleshinloye Grade B (un-amended compost); Sunshine Grade A (compost amended with mineral fertilizer); Sunshine Grade B (un-amended compost); mineral fertilizer (NPK 15-15-15); and control. The treatments were arranged in a completely randomized design (CRD) with three replicates. The soils and compost were left to mineralize for two weeks before planting while the mineral fertilizer was applied two weeks after planting. The pots were perforated at the bottom to allow for easy drainage and facilitate aeration. Celosia seeds were broadcasted and thinned to two (2) seedlings. Sunshine Grade A, Sunshine Grade B, Aleshinloye Grade A and Aleshinloye Grade B is a composted commercial organic fertilizer manufactured by Ondo State Government and Aleshinloye fertilizer plant in Ibadan, Nigeria, respectively. All the treatments except the control were applied at the rate of 45 kg N ha-1 as recommended by Olaniyi and Ojetayo (2012) for the optimum growth of *Celosia*. The experiment was repeated without any fertilizer application at the second planting. Collection of data commenced from 3weeks after planting and was done weekly till the sixth weeks. Growth and yield parameters data collected were as follows: plant height, stem girth, number of leaves and yield components such as fresh and dry shoot weight.

RESULTS AND DISCUSSION

The effects of fertilizer treatments on growth parameters at first and second planting are shown on Table 1. Un-ammended compost, organomineral and NPK fertilizers had significant effect on *Celosia.* At 6 Weeks after Planting (6 WAP) Sunshine Grade A, Aleshinloye Grade A and NPK were significantly (p< 0.05) better than Sunshine Grade B, Aleshinloye Grade B and control. The highest plant height of 44.7 cm was obtained from plant fertilized with Sunshine Grade A. Also, the residual effect of fertilizer treatments at 6 WAP shows that un-ammended compost and organomineral fertilizers were significantly (p< 0.05) better than control and NPK. The highest plant height of 17.4 cm was obtained from *Celosia* plant fertilized with Aleshinloye Grade A.

**Table 1. Effects of un-ammended compost, organomineral and inorganic fertilizer on the growth of *Celosia argentea*****at first and second cropping**

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment |  Plant Height (cm) | No of leaves | Stem girth (mm) |
| First Cropping |
| Control | 20.0c | 9.0d | 2.0c |
| Sunshine Grade A | 44.7a | 17.2a | 4.4a |
| Sunshine Grade B | 33.0b | 13.3c | 3.3b |
| Aleshinloye Grade A | 42.0a | 16.3ab | 4.6a |
| Aleshinloye Grade B | 35.0b | 13.0c | 3.2b |
| NPK 15-15-15 | 44.3a | 15.0b | 4.5a |
| Residual effect |
| Control | 7.5c | 7.6c | 1.2c |
| Sunshine Grade A | 14.7ab | 12.5a | 2.7a |
| Sunshine Grade B | 14.7ab | 11.3a | 2.1b |
| Aleshinloye Grade A | 17.4a | 12.8a | 2.8a |
| Aleshinloye Grade B | 13.2ab | 10.5ab | 2.0b |
| NPK 15-15-15 | 10.4b | 9.0b | 2.1b |

Means having the same letter along the columns indicate no significant difference using Duncan’s Multiple Range Test at 5% probability level.

At 6 weeks after planting (6 WAP), *Celosia* number of leaves in Sunshine Grade A and Aleshinloye Grade A were significantly (p< 0.05) higher than number of leaves from Sunshine Grade B, Aleshinloye Grade B, NPK and control. During second planting at 6 Weeks After Planting, *Celosia* number of leaves in un-ammended compost and organomineral fertilizers were significantly (p< 0.05) higher than number of leaves from NPK and control. The response of stem girth of *Celosia* to application of different types fertilizers during the first and second planting were shown in Table 1. At 6 WAP stem girth of *Celosia* with Sunshine Grade A, Aleshinloye Grade A and NPK were significantly (p< 0.05) higher than stem girth of Sunshine Grade B, Aleshinloye Grade B and control. However, Aleshinloye Grade A produced the highest stem girth of 4.60 mm. The result of residual effect on *Celosia* stem girth at 6 WAP shows that Aleshinloye Grade A and Sunshine Grade A were significantly (p< 0.05) different from all other treatment including the control. Figure 1 shows that Aleshinloye Grade A, Sunshine Grade A and NPK has the highest fresh shoot yield and it is significantly (p< 0.05) higher than others. However, Sunshine Grade B and Aleshinloye Grade B came second and significantly better than control. The trend is the same for the dry shoot yield.

Figure 2 shows that Aleshinloye Grade A and Sunshine Grade A has the highest fresh shoot yield for the residual planting and it is significantly (p< 0.05) better than others. However, Sunshine Grade B, Aleshinloye Grade B and NPK came second and significantly different from control. The dry shoot yield shows that there was no significant difference between Aleshinloye Grade A and Sunshine Grade A.

Application of Aleshinloye Grade A and Sunshine Grade A proved most effective in ensuring good performance in terms of growth, fresh shoot and dry shoot yield of *Celosia argentea* at first and second cropping. In agreement with these results, Akinyele *et al*., (2012) reported that organomineral fertilizer significantly improved growth and yield of *Celosia* compared to NPK. Similarly, Olowoake, (2014) reported that growth and shoot weight of *Amaranthus cruentus* at first and second cropping was markedly influenced by the application of organomineral, Aleshinloye Grade A and Sunshine Grade A. This might be as a result of higher N, P, and K present in organomineral fertilizer than un-amended compost (Akinyele *et al*., 2012). The low residual effect of *Celosia* to NPK fertilizer as compared to Organomineral fertilizers corroborates the response patterns reported by Ogunlade *et al.,* (2011) on *Solanum macrocarpon* and Olowoake and Ojo (2014) on *Amaranthus caudatus*

**CONCLUSION**

Generally, from the study there was an increase in the performance of *celosia* on the parameters measured. This implies that *celosia* responds well to organomineral and un-ammended compost and NPK fertilizers. However, the application of Aleshinloye Grade A and Sunshine Grade A influences its growth than NPK fertilizer. This indicated that organomineral fertilizer is good for the farmers to use as soil amendments for production of *Celosia argentea*.

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