



THE EFFECT OF NPK FERTILIZER ON THE GROWTH AND YIELD OF AMARANTHUS.

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Abstract

Amaranth (Amaranthus spp.) is one of the most important underutilized crops inherent to Central and South America. In Africa, old-fashioned leafy vegetables are used as a source of nutrients and vitamins for both urban and rural populace. It is extensively cultivated in different regions of the world as well as in Nigeria as food and leafy vegetable NPK fertilizers are as supplement to natural crop nutrients supplied by the soil especially when the soil fertility decreases. Nitrogen fertilizer affect respond of amaranth cultivars in relation to growth and yield. Four experiments were conducted on the Research Farm of the Department of Agricultural Technology, Federal Polytechnic. The first experiment was to see the effect of nitrogen fertilizer on the growth of Amaranthus. The second was on the effect of nitrogen fertilizer on the yield of Amaranthus. The third was to compare the effect of different concentration of nitrogen fertilizer on the growth of Amaranthus. The fourth was compare the effect of different concentration of nitrogen fertilizer on the yield of Amaranthus. The results show that nitrogen fertilizer had statistical significant effect on the growth of Amaranthus ($p < 0.01$). Nitrogen fertilizer had statistical significant effect on the growth of Amaranthus ($p < 0.01$). Different concentration of nitrogen fertilizer had a statistical significant different effect on the growth of Amaranthus ($p < 0.01$). Different concentration of nitrogen fertilizer had a statistical significant different effect on the yield of Amaranthus ($p < 0.05$).

Keywords: NPK, Growth, Yield and Amaranthus

Introduction

Amaranthus collectively known as Amaranth is a multiethnic genus of herbs. More than 50 species are recognized with inflorescence and foliage ranging from purple and red to gold. Amaranth (Amaranthus spp.) is one of the most important underutilized crops inherent to Central and South America. In Africa, old-fashioned leafy vegetables are used as a source of nutrients and vitamins for both urban and rural populaces. It is extensively cultivated in different regions of the world as well as in Nigeria as food and leafy vegetable (Steiner K. G. 2017).

The vegetable belongs to the family Amaranthaceae and genus Amaranthus as various nutritional studies have indicated. (Siemonsma, J.S. 2015). Amaranth is a rich foundation of calcium, iron, and vitamins A and C which are essential to provide nutritional constituent for people which help to decrease malnutrition cases (Singh 2014). The vegetable when eaten on daily basis reduces trouble of constipation, (Segura 2012). The native vegetables like Amaranthus cruentus have been recognized to be good for feeding in most rural societies in Africa, (Schippers, R.R. 2019).. Based on the nutritive significance of amaranth, the vegetable has the prospective benefits of feeding programs, as well as their preferment as part of a complex diet for the weak groups (Adekiya 2009).

NPK fertilizers are as supplement to natural crop nutrients supplied by the soil especially when the soil fertility decreases Akigbo (2010). Nitrogen fertilizer affect respond of amaranth cultivars in relation to growth and yield in a field experiment carried out in 2003 and 2004 cropping season to find out the respond of amaranth cultivar to nitrogen fertilizer. The result showed that fertilizer rate and spacing had a statistically significant effect on the growth and yield of amaranth and closer spacing of 25 x 25cm within and between the rows respectively Lawrence F. (2004) . Fertilizer is used to increase crop production and maintain the soil fertility. It means that fertilizer has a dual purpose for feeding crops and increasing soil fertility (Neihikhere, 19890).

Aims and Objectives of the Study

The aim of this research work is to investigate the effects of different Nitrogen levels on growth and yield potential of A. cruentus.

Objectives of the study

- I. To find out the effect of NPK fertilizer on the growth of Amaranthus
- II. To investigate the effect of NPK fertilizer on the yield of Amaranthus.
- III. T determine the effect of different concentration of NPK fertilizer on the growth of Amaranthus
- IV. To Show the effect of different concentration of NPK fertilizer on the yield of Amaranthus

Hypothesis

Ho: NPK fertilizer does not have a statistical significant effect on the growth of Amaranthus.

Ho: NPK fertilizer does not have a statistical significant effect on the yield of Amaranthus.

Ho: Different concentration of NPK fertilizer does not have a statistical significant effect on the growth of Amaranthus.

Ho: Different concentration of NPK fertilizer does not have a statistical significant effect on the yield of Amaranthus .

Research Questions

- Does NPK fertilizer have a statistical significant effect on the growth of Amaranthus?
- Does NPK fertilizer does not have a statistical significant effect on the yield of Amaranthus?
- Does different concentration of NPK fertilizer does not have a statistical significant effect on the growth of Amaranthus?
- Does different concentration of NPK fertilizer does not have a statistical significant effect on the yield of Amaranthus ?

Result

Four experiments were conducted on the Research Farm of the Department of Agricultural Technology, Federal Polytechnic. The first experiment was to see the effect of nitrogen fertilizer on the growth of Amaranthus. The second was on the effect of nitrogen fertilizer on the yield of Amaranthus. The third was to compare the effect of different concentration of nitrogen fertilizer on the growth of Amaranthus. The fourth was compare the effect of different concentration of nitrogen fertilizer on the yield of Amaranthus. At the conclusion of the study, the results are displayed below.

In the experiment to determine whether nitrogen had a statistical significant effect on the growth of Amaranthus, this result shows that nitrogen fertilizer had statistical significant effect on the growth of Amaranthus ($p < 0.01$). See figure 1 below.

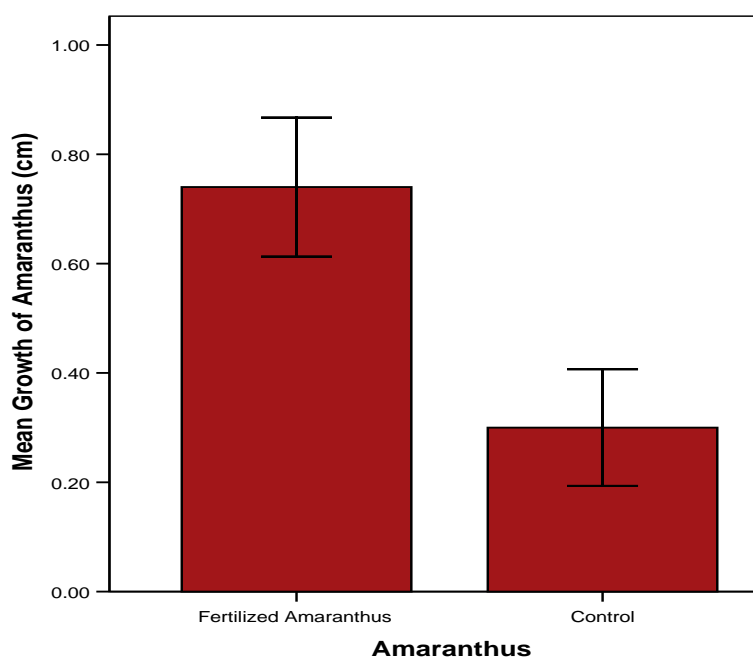


Figure 1. Mean growth of Amaranthus and the standard deviation. The value 0.74 ± 0.17 and 0.30 ± 0.14 are mean standard deviation of control and treatment respectively.

In the experiment to determine whether NPK had a statistical significant effect on the yield of Amaranthus, this result shows that NPK fertilizer had statistical significant effect on the yield of Amaranthus ($p < 0.01$). See figure 2 below

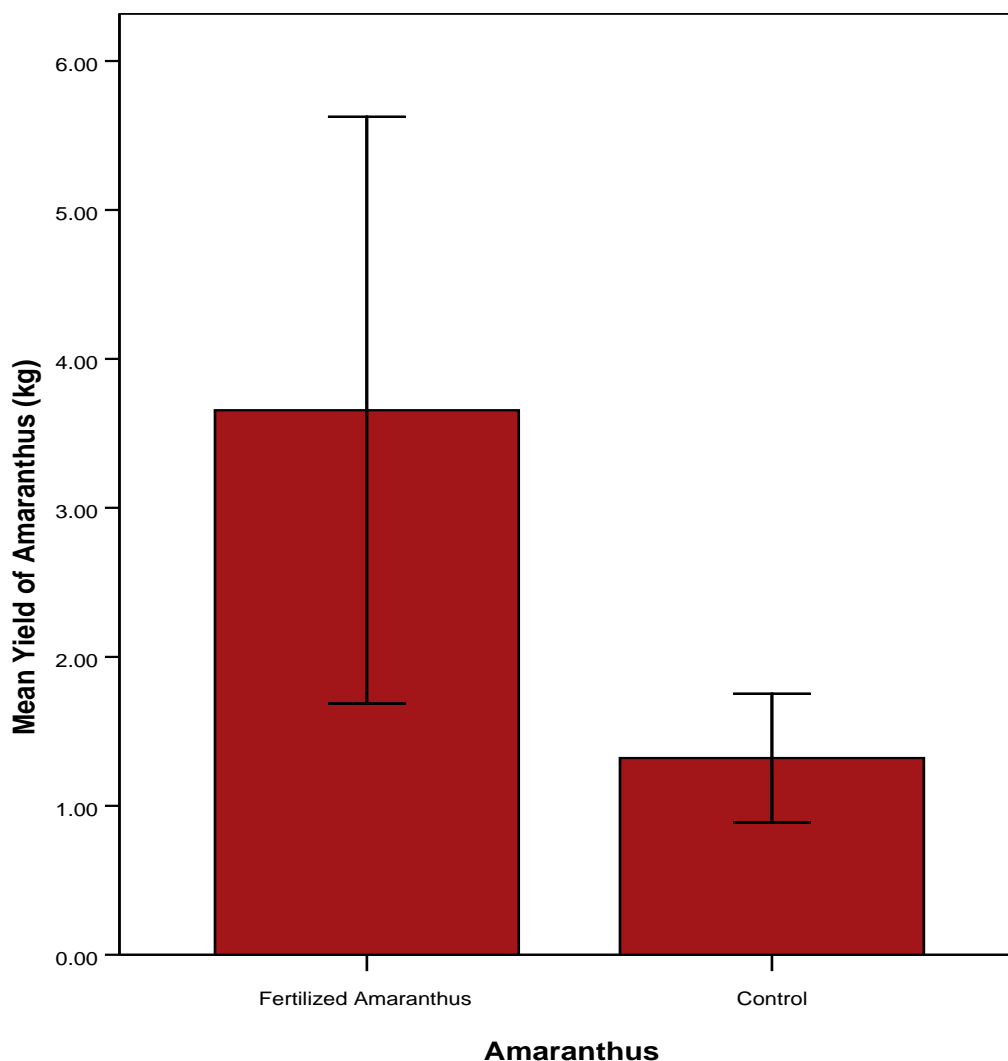


Figure 2. Yield of Amaranthus and the standard deviation. The value 3.66 ± 0.85 and 1.32 ± 0.19 are means standard deviations of control and treatment respectively.

In the experiment to determine to compare the effect of different concentration of nitrogen fertilizer on the growth of Amaranthus, this result shows that different concentration of nitrogen fertilizer had a statistical significant different effect on the growth of Amaranthus ($p < 0.01$). See figure 3 below

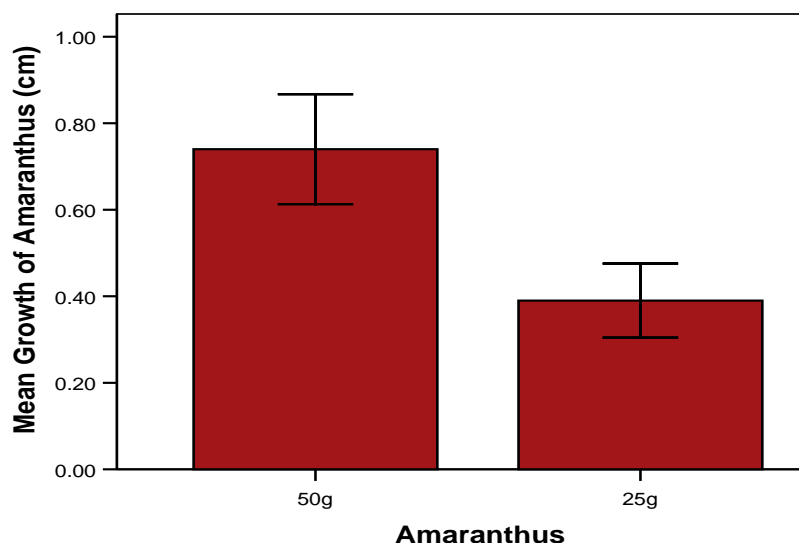


Figure 3. Mean growth of Amaranthus and the standard deviation. The value 0.74 ± 0.17 and 0.39 ± 0.11 are means standard deviations of control and treatment respectively.

In the experiment to determine to compare the effect of different concentration of nitrogen fertilizer on the yield of Amaranthus, this result shows that different concentration of nitrogen fertilizer had a statistical significant different effect on the yield of Amaranthus ($p < 0.05$). See figure 4 below.

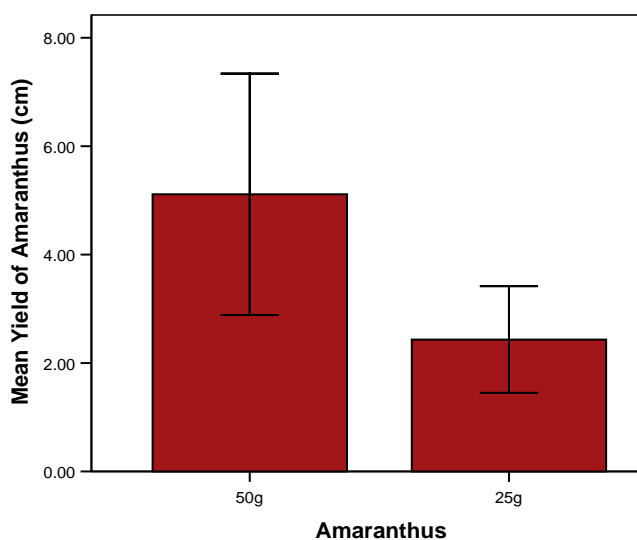


Figure 4. Mean yield of Amaranthus and the standard deviation. The value 5.11 ± 0.94 and 2.43 ± 0.42 are means standard deviations of control and treatment respectively.

Discussion of Findings

Effect of NPK fertilizer on growth of amaranthus

On the effect of NPK fertilizer on the growth of amaranthus, the original hypothesis was NPK fertilizer does not affect amaranthus growth. But, this result showed that fertilizer had a statistically significant effect on the growth of amaranthus as shown in figure 1 ($P < 0.01$). This result is similar with the result of Ayoola and adediran (2006) where they investigated the effect of NPK fertilizer on the growth amaranthus and found out that fertilizer had a statistically significant effect on the growth of amaranthus. According to the them, the nutrient content of NPK will improve the colour of chlorophyll for more solar absorption, increase the growth and the final yield. Also fertilizer application becomes necessary as a result of over cultivation, too much rainfall and bush burning. FAO (2000) reported that when inorganic fertilizer is applied to any crop, it will increase the growth and yield. On the process of compiling this research, no research written document obtained that showed that NPK had no statistically significant different on the growth of amaranthus. Finally, NPK fertilizer had a statistically significant effect on the growth of amaranthus.

Effect of NPK fertilizer on the yield of amaranthus

On the effect of NPK fertilizer on the yield of amaranthus, the original hypothesis was NPK fertilizer does not affect amaranthus yield. But, this result showed that NPK fertilizer had an effect on the yield of amaranthus ($P < 0.05$) as shown in figure 2. This result is similar with the result of Segura (2012) where he carried out an experiment to find out the effect of NPK fertilizer on the growth and yield of amaranthus, and he reported that NPK fertilizer had a statistically significant effect on the growth of amaranthus. The experiment was also conducted with sand mulched loamy soil and trickle irrigation, two factors were considered which were fertilization dosage and quality of irrigation water. Three NPK dosage equivalents to 50 and 100% of crops uptake under the local condition were established being the total NPK concentration of the treatment. The amaranthus showed a statistically significant increase in growth and yield to the applied NPK 15:15:15 (Segura et. 2012). According to Singh (2014), fertilizer when applied to a crop increases both the growth and the yield of that crop. They reported that they conducted a research on the effect of fertilizer on the growth of amaranthus and found that fertilizer increased both the growth and yield of amaranthus.

Effect of different concentration of NPK fertilizer on amaranthus growth

On the effect of different concentration of NPK fertilizer on amaranthus growth, the original hypothesis was different concentration of NPK fertilizer did not have different

effect on the growth of amaranthus. But, this result showed that different concentration of NPK fertilizer had a statistically different significant effect on the growth of amaranthus ($P < 0.01$) as shown in figure 3. This result is supported by the result of Neihikhere (2019) where a research was conducted to see whether different concentration of NPK fertilizer applied to amaranthus had a different effect on the growth of amaranthus. The concentrations were 3g, 6g 8g and 10g. At the end of the experiment the result showed that different concentration of fertilizer had a different yield. Also the result of ANOVA showed that the ($P < 0.01$) which showed that the effect was highly and statistically significant. Lawrence F. (2004) reported that NPK 15:15:15 applied at different rate gives different growth and yield. They conducted an experiment in 2002 on the effect of different concentration of NPK on the growth of amaranthus and found that the effect was statistically significant. The same experiment was repeated and the same result was observed. The ($P < 0.01$) for both researches. With this, this study also confirmed that different concentration of NPK fertilizer had a statistically significant different effect on the yield of amaranthus.

Effect of different concentration of NPK fertilizer on amaranthus yield

On the effect of different concentration of NPK fertilizer on amaranthus yield, the original hypothesis was different concentration of NPK fertilizer did not have different effect on the growth of amaranthus. But, this result showed that different concentration of NPK fertilizer had a statistically different significant effect on the yield of rice ($P < 0.01$) as shown in figure 4. This result is supported by the result of Steiner (2017) where a research was conducted to see whether different concentration of NPK fertilizer applied to amaranthus had a different effect on the yield of yield. The concentrations were 3g, 6g 8g and 10g. At the end of the experiment the result showed that different concentration of fertilizer had a different yield. Also the result of ANOVA showed that the ($P < 0.01$) which showed that the effect was highly and statistically significant. Lawrence F. (2004) reported that NPK 15:15:15 applied at different rate gives different growth and yield. They conducted an experiment in 2002 on the effect of different concentration of NPK on the growth of amaranthus and found that the effect was statistically significant. The same experiment was repeated and the same result was observed. The ($P < 0.01$) for both researches. With this, this study also confirmed that different concentration of NPK fertilizer had a statistically significant different effect on the yield of amaranthus.

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