



Effects of Plantain and Banana Peel Burn Ash on the Growth of Okra (*Abelmoschus Esculentus*)

Udoinyang, Anietie Peter¹, Emem Martin Eshiet², Dr Rosemary Collins Piate³

¹Directorate Of General Studies, Akwa Ibom State College Of Education, AFAHA NSIT anietieudoinyang1977@gmail.com

²Department Of Biology, Akwa Ibom State College Of Education, AFAHA NSIT

³Department Of Home Economics, Akwa Ibom State College Of Education, AFAHA NSIT

ABSTRACT

This study was carried out to examine the effects of Plantain Burn Peel Ash and Banana Burn Peel Ash on the growth of Okra (*Abelmoschus esculentus*). Both peels are common wastes that when properly processed, increased the organic matter content fertility status of soil.

Thus, the effect of Plantain Peel Burn Ash (PBPA) and Banana Peel Burn Ash (BPBA) as organic fertilizers on soil properties, crop growth was checked and recorded within eight (8) weeks at the three stands of Okra (*Abelmoschus esculentus*). At the first stand as Test 1 (T_1) was on the application of Plantain Peel Burn Ash, the second as Test 2 (T_2) was on the application of Banana Peel Burn Ash and the third one as Test 3 (T_3) was without the application of either peel ash. The T_3 stand was used as a Control Test (CT). In T_1 , it was observed that there is higher effectiveness in plantain peel burn ash within the two months (8 weeks) in height ranged from 5.0cm to 38.9cm with mean of 16.84 followed by T_2 that ranged from 4.0cm to 29.2cm with mean of 14.28 in height and that of T_3 which is the CT shows the range of 4.0cm to 19.2cm with mean 9.93. Both peels ash varies slightly with increase in the number of weeks. The height in CT was not rapidly increase compared to T_1 and T_2 since there was no application of any peel burn ash. Number of leaves were also varied as well as the girth stem of the three stands (T_1 , T_2 and T_3).

KEYWORDS: Plantain Peel Burn Ash, Banana Peel Burn Ash, Okra, Soil and Fertilizer

INTRODUCTION

Okra (*Abelmoschus esculentus*) is an annual erect herbaceous plant which a warm season vegetable crop grown in the tropics and subtropics, also propagated by seeds. It is known as lady's finger which is believed to have originated from Ethiopia. The optimum soil temperature for growth is about 24 – 32°C. Tender pods or fresh pods are used as vegetable in human diet. It is a good source of proteins, carbohydrate, vitamin C and Calcium (Kahlon et al., 2007; Arapitsas 2008).

Okra is a flowering plant in the Malvaceae family. It is one of the plants that can grow with less water and in hot weather condition. Okra plant grow up to 9ft in height with heart shaped-leaves that is palmate with 5 to 7 lobes. Okra flowers are large with 5 petals, coloured white or yellow and sometimes with redish-purple base. Okra fruits are 3 to 10 inches in length and about ½ to 1 inch wide. Okra fresh fruits or pods are usually green in colour. It is equally arranged in shape with ribs along its length.

Okra is a member of the family Malvaceae grown as annual crop. The popularity of okra in Nigeria has been attributed to its high nutritional composition and great medicinal value. The plant is also valued for its fibre. Vitamin A and B as well as Fe and phosphorus compositions. Some health benefits of okra include anti-ageing effect, immunity promoting potentials and cholesterol regulation abilities. The high fibre content of okra helps to maintain blood sugar by adjusting the rate at which sugar is absorbed from the intestinal tract. It helps improve heart potential and also improve the health of fetus during pregnancy. Other health benefits of Okra are;

- i. Okra is a supreme vegetable for those feeling weak, exhausted and suffering from depression.
- ii. Okra is used for healing ulcers and to keep joints limber. It helps to neutralize acids to alkaline and provides a temporary protective coating for the digestive tract.
- iii. Okra treats lung inflammation, sore throat, and irritable bowel syndrome.
- iv. Okra has been used successfully in experimental blood plasma replacements.
- v. Okra is good for summer heat treatment.

- vi. Okra is good for constipation
- vii. Eating okra helps to support the structure of capillaries.
- viii. Eating okra lowers the risk of cataracts.
- ix. Okra protects you from pimples and maintains smooth and beautiful skin.
- x. The leaves, stems and fruits are also economically important in glace paper production and pharmaceutical industries (Dilruba et al., 2009).

In crop cultivation, fertilizers application are important in order to improve the fertility of the soil for good growth and yield. Okra requires sufficient Nitrogen, Potassium for regular fruiting and subsequent picking (Premsekhar and Rajashree, 2009). However, the continuous and indiscriminate use of chemical fertilizers reduces nutritional uptake to the plant (Agarwal, 2003) and also causes environmental and human health problems. Most of chemical fertilizers mainly contain NPK, but crop needs other macro and micro nutrients for its better growth and development.

Thus, combining the chemical and organic fertilizers in soil amendments increasing crop production (Olaniyi et al., 2010; Imthiyas and Seram 2017; Pradhiepan et al., 2018).

Organic manure improves the soil chemical, physical, biological properties and also it is an alternative source to the inorganic fertilizers. Moreso, it improves public health and conservation of resources (Kurdali and Al-Shamm'a, 2010). Inorganic manures are inexpensive and they could be used to enhance the soil fertility and crop production (Shahardeen and Seran, 2013; Viharnaa and Seran, 2013). Amalgamation of leguminous crop to soil could increase the nutrients, particularly Nitrogen which is a vital nutrient to determine the crop production of okra in soils.

Most of the fruit peels are good source of nutrients for both plants and animals, as it contain K, Ca, Fe and vitamins which boost the crop yield. Potassium is one of the main nutrients in banana peels. Mercy et al, (2014) State that fruit peels extract enhance the growth and yield of okra.

The plantain plant is one of the world's larger herbs, and it is widely grown in developing countries. The plant has long, overlapping leafstalks and a stem that is 1.22 to 6.10 meters tall (Oladiji et al., 2010).

The fruits grow in clusters, with each individual plantain measuring around 1 inch in diameter and slightly longer. Plantain fruit takes between 2½ to 4 months after shooting to mature into harvestable fruit, or about eight to twelve months after planting. Plantains contain fibre as they can help decrease cholesterol and treat constipation, which can help prevent color cancer. Aside from that, it has high potassium content which prevent high blood pressure and the fruit stalk, bract, and fruit of plantain have been utilized for medical and domestic reasons.

Plantain (*Musa paradisiacal*) is a crop with permanent production and a major staple food for Ghanaians and many other countries worldwide. Plantain is either consumed in the unripe or ripe stage. These are abundance of plantain in the market from the months of September to March and scarcity from May to August (Dzomeku et al., 2011).

Plantain peels are the waste products generated in the consumption of plantain fruits after the removal of the inner fleshy portion, more often than not discarded as waste; dump in Landfills, unregulated grounds consisting a menace to the environment. Plantain peels are used as feed for livestock, fertilizers, remedy for relief of insect bites and treatment of dermatitis and string eczema (Okareh et al., 2015).

Plantain peels contain nutrients that are essential for health potted plants. As they decompose, plantain peels add potassium (K) as well as small amounts of Nitrogen (N), Phosphorus (P) and magnesium (Mg) to the soil in a similar fashion as slow release fertilizer. Most plants need a certain amount of these top three macronutrients; Nitrogen, Phosphorus and Potassium.

Some plants are more needful of nitrogen, while others are more needful of phosphorus and still others need a higher level of potassium.

Potassium helps plants move water and nutrient between cells. It is used to help the flowering process and is thought to be able to improve the quality of the fruit of your plants. Being a vital nutrient for plant, it helps plants regulate enzymes and distribute nutrient through their systems. It also encourages new growth and stronger stems. Potassium loving plants, like tomato plants can benefit throughout the growing season from a good potassium fertilizer, such as one from banana peels. At 42% potassium, plantain peels are a fantastic source (Wallingford, 1980). The peels are one of the highest organic potassium sources, and even leads higher in potassium than wood ash. The peels do not contain much nitrogen (N), which makes using this fertilizer for tomatoes and pepper a perfect choice because they both have a low nitrogen need.

Plantain peels also contain Calcium (Ca), which helps plants take up more nitrogen, which some potassium loving plants need. It also contains manganese which helps plant during photosynthesis; Sodium, which helps movement of water between cells. Plantain peels also contain magnesium and sulphur, both of which are helpful in the formation of chlorophyll. This facilitate the process of photosynthesis in plants by which plants harness energy from the sun.

Phosphorus on the other hand is a component of nucleic acid (DNA and RNA) and essential for energy within the plant. This element contributes to healthier plants with strong stem and root and it aids the growth of flower blossoms and pollen.

The used and benefits of unripe plantain peel are so distinguished. The potash serves different purposes depending on what it is used for:

- Potash is used for cooking purposes and is added to food like cowpea etc.

- It is also used for emulsification of oil and water
- Also, it is an ingredient in fertilizers, it increases plant resistance to disease and also maintain high water retention.

The extraction of potash from plantain peels always counters the negative effect of regular potash. Regular potash is known to contain a high amount of sodium and this poses health hazards to a human being.

Asia is the world's largest producer of bananas accounting for 50.82% of total production as stated by the Food and Agriculture Organization (2023). Asia's large banana producers are India, which produces 29 million tons per year and China, which produces 11 million tons. Due to the high volume of banana production, a large amount of banana peel waste has been generated causing Carbon(iv)oxide (CO₂) emission and thus significantly contributing to individual climate footprints. Banana peel waste contains carbon-rich organic compounds that can take up to 2 years to decompose and biodegrade, creating odour and producing excessive emission of greenhouse gasses that contribute to climate change.

The waste from banana peels is usually disposed in urban landfills, which contribute to existing environmental problems such as the excessive emission greenhouse gases. Waste from banana peels pose increasing disposal and pollution problems as they represent a large fraction of the fruits.

Bananas (*Musa sapientum*) are rich in potassium and phosphorus which are important to man to grow strong and healthy. Even plants need this kind of nutrients and these nutrients are mostly found in bananas. Bananas were eaten by man and as man eats bananas it also accumulates banana peelings which in return become as one of the problems in garbage disposal. Since banana is one of the most nutritious fruit many wants to eat, eating a lot of banana will end up with lots of banana peels and the peelings produced added as garbage to the environment. So instead of throwing it away, the researchers come up with an idea of making banana peelings as fertilizer to lessen the garbage and make it useful to plants.

Bananas peelings can be used as an organic fertilizer since it contains nutrients like Potassium (K), Phosphorus (P), Calcium (Ca), Iron (Fe) and more. These nutrient in banana peels are very effective for the growth of plant especially in tomatoes since tomato plant needs potassium which increases the ability of plants to produce fruits and flowers. In addition, banana peel contains important nutrients that upgrade quickly to the growth and development in plants.

Potassium deficiency can show as leaves turning yellow one falling off especially the older leaves. If you are growing your own banana and you get to harvest the fruits then you can use your peels to feed the plant and create your own fully self-sufficient gardening system. You can also make a banana peel fertilizer by soaking the peels in water.

Banana peel fertilizer can benefit a wide range of plants including vegetables, fruits, herbs and ornamental plants. In addition to providing essential nutrients, banana peels can also help improve soil quality, promote healthy microbial activity, and increase water retention in the soil. Using banana and plantain peels as organic fertilizer is a sustainable and environmental friendly option that can help reduce waste and greenhouse gas emission. Overall, banana peel fertilizer is a simple, inexpensive, and effective way to enhance plant growth and promote sustainable agriculture.

AIM AND OBJECTIVE

The formulation of fertilizers from plantain peels and banana peels is the main objective of this study. It is to know how this fertilizers could be effective on Okro in terms of germination and growth. This study also helps in controlling waste disposal.

LITERATURE REVIEW

Both the dry and liquid fertilizers from plantain peels have showed potential for the supply of nutrient to growing tomato (Hussein et al., 2019). Comparing its effect to the chemical fertilizer, plantain peels have showed a lower tomato yield since the nutrients were not readily available to the plant, even though the plantain peels being an organic by-product had no side effects (Ji et al., 2018). The use of the chemical fertilizers has been reported to have certain side effects such as acidification of the soil (Singh et al., 2013). Acidification occurs when too much chemical fertilizers are applied indiscriminately to the soil, thereby decreasing the organic matter in the soil. This exposes the soil to excess nitrogen which causes yellowing of leaves, thereby reducing crop yield. The plantain peel extracts, on the other hand, showed no negative influence on tomato health (Singh et al., 2013).

Other articles however show that, crop yield can be improved by the application of adequate quantities of plantain peel prior to planting of tomato to ensure effective synchronization of nutrient release. Prior application of the peel fertilizer before planting makes the nutrients readily to the plant, to enhance the rate of growth and increase production.

Chemical fertilizers, popularly known as inorganic fertilizer absorbs a lot of water from the soil. When water is absorbed from the soil, some of the chemicals are leached into the soil water, thereby resulting in soil water contamination and this may cause harm to the soil organic mater and other plants (Keeney, D., and Olson, R. A., 1986).

It may also cause soil degradation, Nitrogen leaching, loss of soil carbon and can also decrease crop yield when being used for a very long time. On the other hand, research on the effect of plantain peels shows that the application of plantain peels increased soil fertility and also ensured the growth of macro-organisms in the soil.

Banana peels are effective insect repellants because of the sodium in it, it also helps plants to move nutrient and water between cells. The contain not only potassium and sodium, but also calcium, which allows plants to take up more Nitrogen, Sulphur and Magnesium which are required for the formation of chlorophyll, and manganese, which aids in photosynthesis. It provides the nutrients that plant require to thrive when used in the garden.

According to Shah et al., (2005), 220 tons of by-products are generated per hectare per year, necessitating an innovative approach to converting these readily available resources into value-added commodities. Without a doubt, large amount of fruit peel waste accumulate on a daily basis in both the domestic and industrial sectors. Individuals frequently discarded these peels as waste. Fruit peels contain macro-and micronutrients that are vital for plant growth (Ibrahim et al., 2016).

In English, banana peels provide variety of nutrients that enhance plant growth and productivity, keeping young plants healthy (Kristi Stone, 2015). Your plants will not wilt if they contain these kind of nutrients.

Accordingly, you can perform a Do-it-yourself (DIY) project by putting a banana peel on the soil so that plant can absorb its nutrients. As an improved fertilizer, you can create fermented banana peels, granulated banana peels, or chopped banana peels (Kavili Sridhar, 2016).

Similar to this, according to Maat Van Uitert (2015), powdered banana peels, dried banana peels, or banana peel vinegar can also enhance the fertilizing effect of banana peels.

Placing banana peels under the plant will also repel insects and pests like aphids.

According to Alege, et al., (2022) examined the effects of selected fruit peels on growth and yield of Okra (*Abelmoschus esculentus*). 10g of ground fruit peels of banana, watermelon, pawpaw, pineapple, plantain, orange was applied to 7kg of soil and left for 7 days before planting of Okra seed. NPK (15:15:15) serves as positive control while groups without fertilizer served as negative control for the study. Each treatment was replicated five times in polythene bags used pots and watered every three days. The setup was arranged in Completely Randomised Block Design (CRBD). Plant height and stem girth were measured while number of leaves were also counted from week 1 – 8 after planting. The number of days to 50% flowering, pod length and pod diameter were also recorded from week 1 – 8 after planting.

Generally, results across weeks showed statistically significant difference for plant height, number of leaves, stem girth, days to different nutrient sources. Okra grown with banana and watermelon peels gave the best overall performance which indicates that they contained sufficient nutrients for optimum production of Okra.

This study clearly indicated that banana and watermelon fruit peels could be used singly or in combination to effectively boost yield of okra.

By the statistical analysis of Akanbi et al., (2004), there was no significant ($P < 0.05$) difference in average height of plant (Okra) among the treatment with banana peels. The maximum plant height (30.47cm) at 6th week after seeding was recorded.

The result obtained in this study confirm the work of Akanbi who reported that growth of Okra was remarkably increased by use of organic mineral fertilizer. Plant height is a significant trait associated with the biological and economic yield.

It was noted that there was reduction in plant height when applied relatively high rate (0.5mt/ha) of banana peel, but it was not significantly influenced. Hence, optimal amount of banana peels has considerable effects on crop growth. Lee et al., (2010) stated that banana peel extract contains high vitamins, flavonoids and potassium element which are essential for plant growth.

The potassium is a nutrient that protect the plant when the weather is cold or dry, strengthening it root system and preventing wilt. Plants that are potassium deficient typically show symptoms such as chlorosis (yellowing of leaf) followed by necrosis (wilting of leaves) at the tip and along the margin of leaves. Potassium deficiency reduces growth, resulting in smaller leaves and thinner stem. (Ali et al., 2021).

SAMPLE COLLECTION AND PREPARATION – (PLANTAIN AND BANANA)

Collection of plantain and banana from farmland was in Nung Ikot Asanga, Oruk Anam Local Government Area, Akwa Ibom State, Nigeria. Five (5) fingers of plantain were selected for peeling while ten(10) fingers of bananas were selected in the ratio of 5:10 (1:2) to equate the size of the peelings. They were peeled and the peels were washed in clean water to remove dirt or additional materials.

The peels of both plantain and banana were dried under sun by spreading them on a clean and plane surface in moisture free environment for three days. After drying, the dried plantain and banana peels were cut into small pieces separately to facilitate quick drying using sharp knife. Within firm 2 weeks, the peels were completely dried to a flammable state.

The air dried peels were carefully burnt separately on flat iron material to ashes in an open air and allowed to cool. These ashes were used after two (2) days.

Okro:

One dried pod of okra seed was purchase in a local market. The seeds were removed and put in a container with little water for one hour, nine seeds that settled first in the water were removed for planting.

GROUND PREPARATION:

Three different parts of the soil were prepared by tilling. First part of the soil was mixed with the plantain peel ash, the second part of the soil was mixed with banana peel ash while the third soil was with no peel ash.

Three seeds of okro each were planted in the prepared soil in the morning on Wednesday 27th March, 2024. After four days, germination started. All the nine seeds germinated, but two stands in each location were thinned remaining one stand each in the three soil location. Statistical analysis started after one week of germination (6th April to 25th May, 2024) using string and meter rule.

EXPERIMENTAL STUDIES/DATA COLLECTION

The three stands of okro with plantain peel burn ash, banana peel burn ash and with no peel burn ash were named as Test (1), Test (2) and Test (3) or Control Test (CT) respectively.

The effectiveness of Plantain Peel Burn Ash and Banana Peel Burn Ash as fertilizers were tested using the following parameters, plant's height, number of leaves and size of stem or stem girth at weekly interval.

For plants height, the measurement was with the aid of meter rule from the base of the Okro to the tip of the highest leaf. This measurement was done in the three stands of Okro. The stem girth measurement was with aid of string and meter rule, whereas the number of leaves were taken by counting.

RESULTS AND DISCUSSION**PLANT HEIGHT:**

Data recorded in table one shows that the application of plantain peel burn ash to okro is so effective in height with the mean of 16.84 compared to that of banana peel burn ash with the mean of 14.28 in table 2. In table 3, the mean height of okro with no peel burn ash i.e Control Test experiment (CT) is 9.93 which shows low growth rate.

Okro with plantain peel burn ash shows the highest height of 38.9cm in table one within 8 weeks. In table 2, which is organic fertilizer from banana peel burn ash indicates the height of 29.2cm while in table 3, with no application of peel burn ash shows the height of 19.2cm at the end of 8th weeks.

In figure 1, which is the histogram, shows that plantain peel burn ash on okro (T1) is the highest in height, seconded by that of banana peel burn ash (T2) while the plant with no peel burn ash as CT shows slow growth rates as indicated in the chats.

Table 1: Height, number of leaves, and stem girth with application of plantain peel burn ash as fertilizer

| Period | Plantain Peel Burn Ash (PPBA) | | |
|---------------------|-------------------------------|------------------|-----------------|
| | Height (cm) | Number of Leaves | Stem Girth (cm) |
| Week 1 6/4/2024 | 5.0 | 3 | 0.8 |
| Week 2 13/4/2024 | 8.0 | 4 | 1.0 |
| Week 3 20/4/2024 | 9.8 | 5 | 3.6 |
| Week 4 27/4/2024 | 13.9 | 7 | 4.7 |
| Week 5 4/5/2024 | 16.0 | 9 | 5.8 |
| Week 6 11/5/2024 | 19.1 | 10 | 6.8 |
| Week 7 18/5/2024 | 24.0 | 12 | 7.0 |
| Week 8 | 38.9 | 14 | 8.0 |

| | | | |
|-----------------|--------------|------------|-------------|
| 25/5/2024 | | | |
| Mean (x) | 16.84 | 8.0 | 4.71 |

Table 2: Height, number of leaves, and stem girth of Okro on application of Banana peel burn ash as fertilizer

| Period | Banana Peel Burn Ash (BPBA) | | |
|---------------------|-----------------------------|------------------|-----------------|
| | Height (cm) | Number of Leaves | Stem Girth (cm) |
| Week 1 6/4/2024 | 4.0 | 2 | 0.8 |
| Week 2 13/4/2024 | 6.0 | 3 | 0.9 |
| Week 3 20/4/2024 | 8.8 | 4 | 2.8 |
| Week 4 27/4/2024 | 12.0 | 6 | 3.5 |
| Week 5 4/5/2024 | 13.8 | 8 | 4.0 |
| Week 6 11/5/2024 | 17.3 | 9 | 5.0 |
| Week 7 18/5/2024 | 23.1 | 11 | 6.2 |
| Week 8 | 29.2 | 12 | 7.0 |
| Mean (x) | 14.28 | 6.88 | 3.7 |

Table 3: Height, number of leaves, and stem girth of okro with no application of any peel ash

| Period | No Peel Burn Ash (NPBA) | | |
|---------------------|-------------------------|------------------|-----------------|
| | Height (cm) | Number of Leaves | Stem Girth (cm) |
| Week 1 6/4/2024 | 4.0 | 2 | 0.6 |
| Week 2 13/4/2024 | 4.8 | 3 | 0.7 |
| Week 3 20/4/2024 | 6.4 | 4 | 1.0 |
| Week 4 27/4/2024 | 9.0 | 5 | 1.5 |
| Week 5 4/5/2024 | 10.0 | 6 | 2.8 |
| Week 6 11/5/2024 | 12.3 | 8 | 4.0 |
| Week 7 | 13.7 | 9 | 4.5 |

| | | | |
|-----------|-------------|-------------|-------------|
| 18/5/2024 | | | |
| Week 8 | 19.2 | 10 | 5.0 |
| Mean (x) | 9.93 | 5.88 | 2.51 |

NUMBER OF LEAVES

In table 1, the highest number of leaves of Okra with the application of plantain peel burn ash (T₁) is 14 with mean of 8.0 at 8th week, followed with the Okra that applied banana peel burn ash (T₂) with the number of 12 leaves with the mean of 6.88 at 8 weeks in table 2. In table 3, Okra with no peel burn ash (CT) indicates 10 leaves at 8th week with mean of 5.88.

In figure 2, which is the histogram of plantain peel burn ash, banana peel burn ash, and no peel burn ash showing the number of leaves of okra against number of weeks also shows that number of leaves is high in the tallest chat followed by the banana peel burn ash, then with CT. Although in week 1, 2, and 3, the number of leaves were 2, 3 and 4 respectively in both okra with BPBA and okra with NPBA, as also indicated in table 2 and table 3.

STEM GIRTH

In table 1, the stem girth of Okro with plantain peel burn ash (T1) shows the size of 8.0cm with mean of 4.71 using string and ruler at the 8th week as the biggest stem, compared to that of the plant, where banana peel burn ash was applied as fertilizer which shows the size 7.0cm with the mean of 3.78. The stem girth of Okro (CT) in table 3 with no peel burn ash shows 5.0cm with the mean of 2.51.

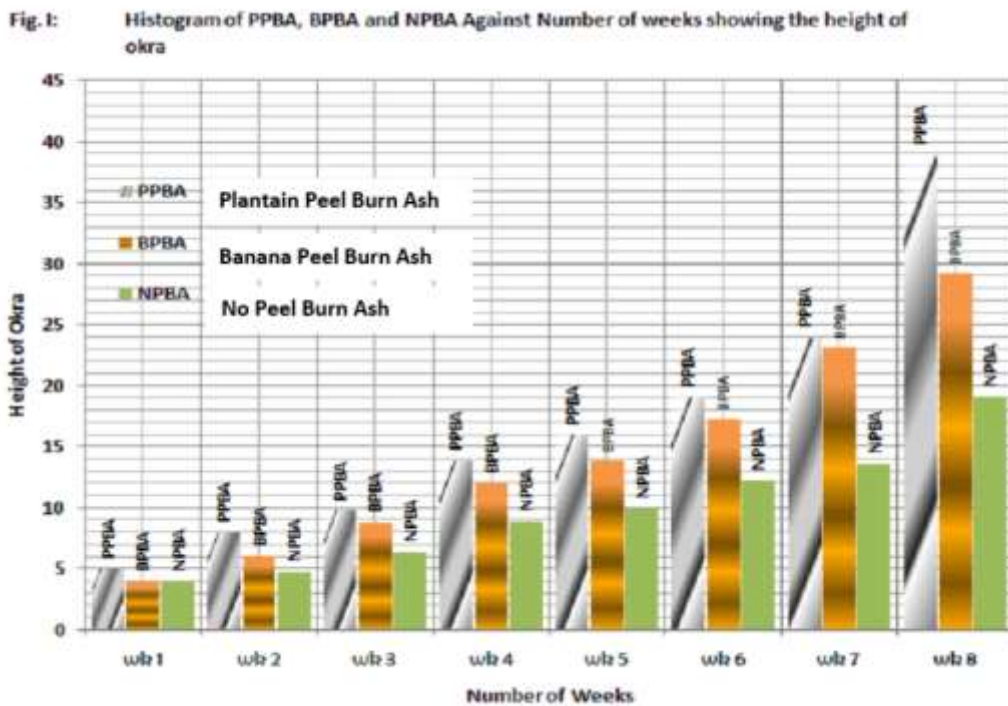
In figure 3, which is the graph of plantain peel burn ash, banana peel burn ash and no peel burn ash showing the stem girth of okro shows different levels of stem girth with the application of the two ashes as fertilizers.

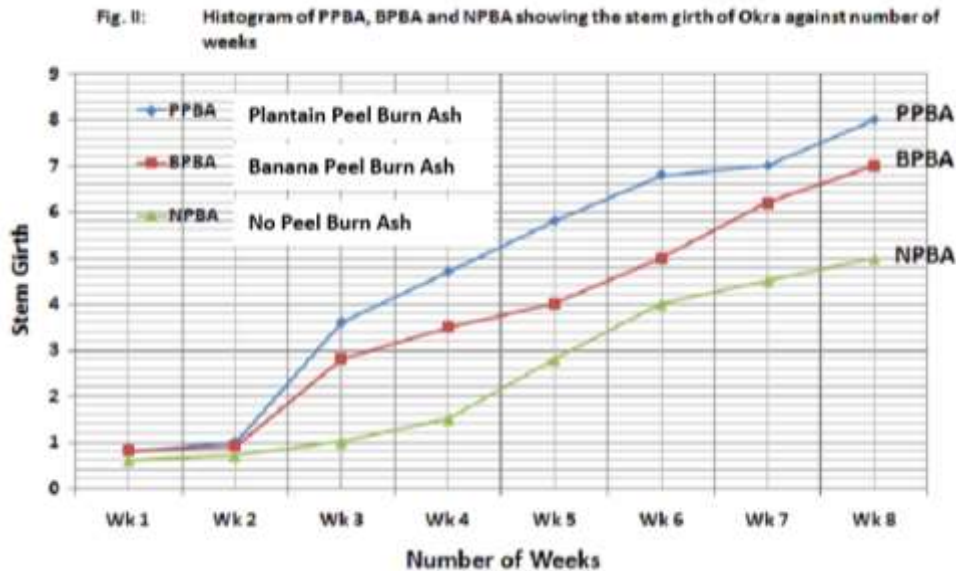
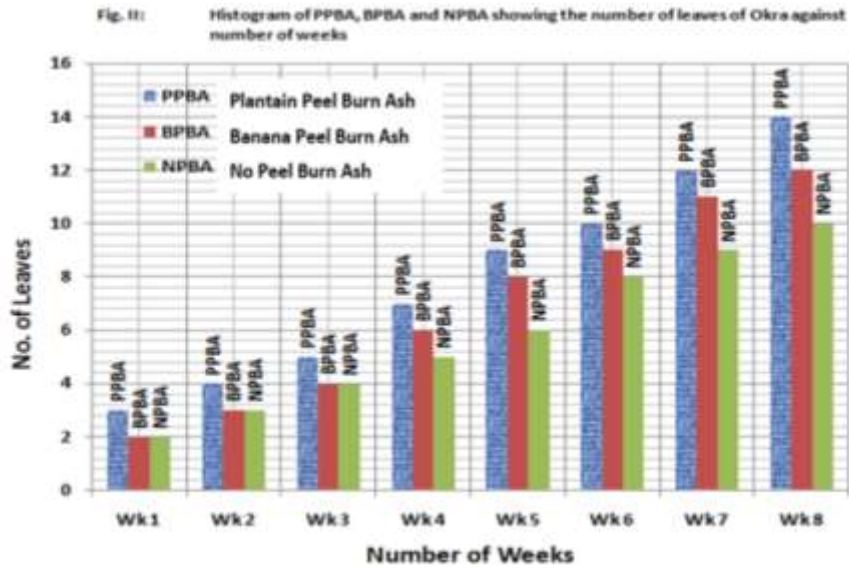
The stem girth of okro with PPBA has the biggest size as shown in the graph in figure 3. But in the first week the stem girth were at the same size.

The stem girth of the plant (CT) with no peel application was very slow as shown in the graph.

Based on the result shown above, the plant (okra) in the experimental treatment which is the soil with plantain and banana peels burn ash differently, it has proved that plantain peel burn ash contains high nutrient needed for germination of okra than the banana peel burn ash.

On the germination of tomato plant, plantain peel extract as fertilizer enhanced the first growth rate and good yield (Singh et al., 2013).





SUMMARY AND CONCLUSION

The plant (Okra) were planted in three locations with different treatment, but one with no application of the peel burn ash and were observed weekly within eight (8) weeks.

The table 1, 2, and 3, then figure 1, 2, and 3 show the comparison of height increase, number of leaves, and stem girth with the treatment of different fertilizers of plantain peel burn ash and banana peel burn ash.

The results also showed that plantain peel burn ash as organic fertilizer help in the increase of height, number of leaves, and stem girth. It also make the stem to be firm on its stand than the banana peel burn ash.

Therefore, it has concluded that the plantain peel burn ash as organic fertilizer is effective in okra than banana peel burn ash.

RECOMMENDATION

The use of plantain peel burn ash as fertilizer to okra plants showed successful results. This findings is beneficial to gardeners and farmers as this improve the health and productivity of their crops, resulting in better yield and quality. Since the both peel burn ash are alkaline in nature, reduces the acidity of the soil, that may came through the use of inorganic fertilizer. It contains calcium, potash and other micronutrients which improve the soil.

It is highly recommended because the plantain peel burn ash improve soil texture, it retains water longer and it increases microbial action in the soil.

Other than these, it increases the fast growth in okro than the banana peel burn ash. Hence, plantain peel burn ash should be used by farmers than the banana peel burn ash.

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