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## Research Article

# The use of unperforated cement sack with topsoil, dried grasses and rich organic manure as an innovative strategy in Yam production.

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**Keywords**

Innovative strategy,
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Top soil,
Soft dried grasses,
rich organic manure and
topsoil.

**Abstract**

The study investigated the use of unperforated 50kg cement sacks filled with topsoil, soft dried grasses and rich organic manure as an innovative strategy in the production of yam. Four purposes and four research questions guided the study. Two sets of procedural set ups in which ten (10) 50kg cement sacks were filled with top soil, soft dried grasses, rich organic manure and topsoil well compacted were kept on two different surfaces. One set was kept on an unfloored surface by the side of the fence and the other set was on a floored surface by the fence. Seed yam or yam sett was planted in each of the sack. 100 percent sprouting was observed. Each of the sprouted tendrils were led to climb the fence with the aid of a staking stick. Luxiriant growth was noticed. Eleven months later, harvesting was done. From the harvesting, the tubers from set up 1 produced longer and larger tubers that weighs higher than those from set up 2. The weights from both set ups were graphically represented. Further findings shows that some tubers from set up 2 developed flattened bottom because of the floored surface on which the sacks were placed and also the mixture of the contents in the unperforated cement sacks in both set ups, favours the growth and development f the yam tubers harvested. Sending extension workers on refresher training programmes, conferences and workshops on the innovative approach by the government; establishment of Small Plot Adoption Technique (SPAT) at strategic positions by extension workers and granting of soft loans to extension workers by Agricultural and credit banks owned by government at interest free rate were proffered as useful recommendations for improvement.

## Introduction

Yam is a tropical crop that belong to the genus Dioscorea specie. There are about 600 species of which six (6) are economically important staple species. These important staple species include: Dioscorea rotundata (white yam); Dioscorea cayensis (yellow yam); dioscorea bulbifera (aerial yam); Dioscorea alata (water yam); Dioscorea esculanta (Chinese yam) and Dioscorea dumetorium (trifoliate or three leaved yam). Out of these six (6), the most popular ones are Dioscorea rotundata (white yam) and Dioscorea alata (water yam).

Yam is an important food crop which is mainly grown in Cameroon, Nigeria, Benin, Togo, Ghana and Cote d'ivoire. About 90% of the total world production is usually grown within this zone. Yams has high cultural value and are major sources of income. Yam cultivation is very profitable despite its high production cost (International Institute for Tropical Agriculture (IITA), 2006). On the average, Nigeria alone produces above 70% of the world total (Food and Agricultural Organization (FAO), (2010). Available data has shown that yam is one of the Nigeria's leading root crops, both in terms of land under cultivation, the volume and value of production (FAO, 2002). In support IITA(2007) reported that Nigeria is the world leading producer of yam with 34 million tones.

Yam tubers are the consumable products of yam crop, and the tubers are sources of carbohydrate. The tubers can be prepared for consumption by boiling and eating with stew, roasted and eating with stew, boiling and pounding and eaten with stew, as pottage, yam balls, peeled, sliced and fried into yam chips (Opeke, 2006). Yams should be stored in a cool, dark and well ventilated placed where they will keep fresh for

a long time. Yam production in Nigeria has witnessed increased output yet has not been able to meet the demand of the people (FAO, 2002). Its insufficiency is as a result of an increase in the Nigeria population (Oyaide, 2002). From observation, a wide gap exist between domestic supply and demand and this is in favour of demand. Although yams are available throughout the year, their season runs from October through December when they are at their best.

Yams are good source of potassium and calcium which are minerals that help in general body development. Preliminary research suggests that dioscorin, a storage protein contained in yam can inhibit angiotension converting enzyme, which would therefore lead to increased kidney blood flow and reduced blood pressure (ASU, Lin & Lee, 2002). Because of the role of yam in the diet of man, its growth and production should be given wide popularity so that enough can reach the hands of the growing population. How can this be done? The answer can be through propagating and introducing other new procedures of growing yam outside ridge, heap and flat land surface planting approaches.

It is against the above background, that the study investigated into the use of unperforated 50kg cement sacks filled with topsoil, soft dried grasses and rich organic manure as innovative strategy in yam production.

**Purpose of the Study**

The main purpose of the study is to examine the use of unperforated 50kg cement sacks filled with topsoil, soft, dried grasses and organic manure in the growing of yam. Specifically, the study sought to:

1. determine the use of unperforated 50kg cement sack filled with topsoil, soft dried grasses and organic manure in the growing of yam.
2. determine the growth rate of yam sett or seed yam using unperforated 50kg cement sacks filled with topsoil, soft dried grasses and organic manure.
3. determine the effect of the use of unperforated 50kg cement sacks filled with topsoil, soft dried grasses and organic manure on the tuber size of yam.
4. examine whether the position of placing the unperforated 50kg cement sacks filled with topsoil, soft dried grasses and organic manure has any influence on the growth and tuber size production of yam.

**Research Questions**

Based on the purpose of the study, the following research questions were formulated:

1. Is it possible to use unperforated 50kg cement sack filled with topsoil, soft dried grasses and organic manure in the growing of yam?
2. Do yam sprout or grow well in an unperforated 50kg cement sack filled with topsoil, soft dried grasses and organic manure on tuber size of yam?
3. What is the effect of using unperforated 50kg cement sacks filled with topsoil, soft dried grasses and organic manure on tuber size of yam?
4. Do the position or placement of unperforated 50kg cement sacks filled with topsoil, soft dried grasses and organic manure any impact on the growth and tuber size of yam?

## Methodology

The materials used for the experiment include unperforated 50kg cement sacks, topsoil, soft dried grasses, rich organic manure, Aldex-T dust, a sizeable seed yam or yam sett and supporting or staking stick.

**Procedural set ups**

**Set up 1**

50kg unperforated cement sacks were filled with tops soil at the base followed by soft dried grasses, rich organic manure and top soil again at the top. In the cause of filling each of material, proper compaction was done until the sack was filled to the brim. Clean seed yams or yam setts were dusted with Aldrex-T dust and planted by making an opening through the top centre of the unperforated cement sack and cover it gently with the same topsoil. This was done to the ten (10) sacks. The sacks were lined up by the side of the fence whose ground base was not floored. This arrangement was done in the open where sunlight can be easily reached in December, 2013. The sacks were labeled A – J.

**Set up 2.**

50kg unperforated cement sacks were filled with topsoil at the base followed by soft dried grasses, rich organic manure and topsoil again at the top. Proper compaction should be done at the time of filling. The sacks were filled to the brim. Clean seed yams or yam setts were dusted with Aldrex-T dust and planted by making opening through the top centre of the unperforated cement sacks and cover it gently with the same topsoil. This was done to the ten (10) sacks. The sacks were lined up by the side of the fence whose ground base was floored. The set ups were left in the open to receive sunlight. The sacks were labeled A – J. The planting was done in December, 2013.

The diagrammatic representation of the two set ups are as follows

**Observations**

Two months after planting, multiple sprouting emerged. Each of the sprouted tendrils were supported with a staking or supporting stick which was slantly leaned on the fence. The tendrils were trained to follow and climb the supporting sticks. 100 percent sprouting was observed. In both set ups. Leaf growth emerged in multiple form.

The growth rate was found to be rapid and luxuriant and tendrils developed rapidly and spread widely too.

## Results

From the two set ups, the following results emerged. At the 11th month of planting, harvesting of the tubers were all done and each of the tuber was weighed with the results tabulated below:

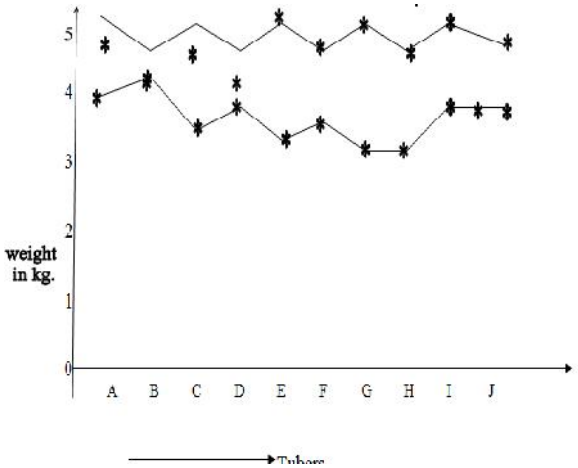
**Table 1: Weight of the produced tubers in the two set ups:**

| Label on sack | Weight of tubers produced in kilogram | |
|---|---|---|
| | Set up I | Set up II |
| A | 4.8 | 3.8 |
| B | 4.6 | 4.0 |
| C | 4.9 | 3.5 |
| D | 4.7 | 3.8 |
| E | 4.4 | 4.1 |
| F | 4.8 | 3.6 |
| G | 4.9 | 3.7 |
| H | 4.5 | 4.1 |
| I | 4.7 | 4.0 |
| J. | 4.5 | 3.9 |
| Total | 46.9 kg | 38.5 kg |

Table 1 above shows that the total harvested tuber weights for set up 1 was higher than that of set up 2. The tuber weights in set up 1 was between 4.4 – 4.9 kilogram while that of set up 2 was between 3.5 – 4.1 kilogram. In the cause of harvesting, some tubers in set up 1 were observed to grow longer and fatter and were able to perforate the sacks. This was observed in sacks A, B, C, D, F, G and I respectively. Tubers in the remaining three sacks – E, H and J was robust in size but not long enough to perforate the sacks.

In set up 2, the tuber size were fat but could not penetrate and perforate the sacks. They developed flat base tubers showing the impact of the cemented floor on which the ten (10) bags were placed. The cemented floor prevented the further elongation of the tubers thus leading to disparity in weight. The total weight in kilogram of the ten (10) tubers in set up 1 was 46.9kg while those in set up 2 was 38.5kg creating a difference of 8.4kg. The difference may be because some of the tubers could not perforate the sacks and grow extensively into the soil below.

Table 2: Graphical Representation of the Growth of yam tubers expressed in kilogram.




From the graph above, the tuber weight is highest with yams in sacks c (4.9kg) and sack G (4.9 kg) but lowest in sack E (4.4kg) in set up 1 while the highest weight was noticed with yams in sacks E (4.1kg) and sack H (4.1kg) but with lowest weights in sacks F (3.6 kg) and G (3.7 kg) in set up 2.

**Major Findings**

The following findings were deduced from the study:

1. 100 percent of the seed yam and yam sett planted sprouted.
2. The sprouted seed yam and yam sett grows luxuriantly.
3. The tuber sizes of yam in set up 1 were large, long and weighs higher in kilogram than those in set up 2.
4. Some tubers grow to the extent that they perforated the unperforated 50 kg cement sacks.
5. Some tubers in set up 2 developed flattened bottom because of the flooring nature of the surface on which the unperforated cement sacks were placed.
6. The mixture of the contents in the unperforated cement sacks in both set ups favour the growth and development of the yam tubers harvested.
7. Apart from growing yam sett and seed yams on ridges, heaps and flat land, yam can still be planted using medium like unperforated sacks with well compacted topsoil, dried grasses and organic manure.

8. Generally, growth of yams in both set ups were very encouraging.

## Discussion

The seed yams and yam setts planted sprouted because clean and viable type were used as planting materials. In addition, the seed yam and yam sett used were dusted with Aldrex-T dust which prevent soil borne disease attack. This agrees with Damudi (2013) when he stated that for any planting materials to germinate and sprout well, they need to be adequately treated with recommended chemicals in which Aldex-T dust is inclusive.

Staking and well compacted samples in the sacks favours the growth of yam. They both serve as factors that promote tuber size increase. This is in agreement with Akoh, 2012; Manu, 2010 & Ajih, 2009 when they observed that the presence of organic manure and staking process assist in tuber elongation and size increase in tuberous crops in which yam is inclusive.

The increase in the growth of the tuber size can also be attributed to the composition of the sack contents i.e. topsoil, dried grasses, organic manure, top soil and treated yam sett or seed yam. In support, Adejoh, 2013; Daluba, 2010; Edibo, 2008; Ezekiel, 2006 and Olazide 2004 when they observed and stated that fertile topsoil, mulches, organic manure with proper staking help to boost the tuber yield of yams most especially in tropical zones.

## Conclusion

To get good tuber size of yam, its planting materials must be planted on a fertile medium. Because of the time and energy involved in land clearance and construction of ridges and heaps for yam planting, other energy and time saving strategy like the use of unperforated cement sacks with topsoil, dried grasses, organic manure and topsoil should be sought for. In addition to energy and time saving, weed growth and effective management can be handled with ease and space can also be conserved.

## Recommendations

The following recommendations are proffered based on the findings and discussions of the study:

1. Unused cement bags should not be carelessly disposed off.
2. Extension workers should be sent on refresher training programmes, conferences/workshops on this innovative approach of cultivating yam by the government and other non governmental agencies/parastatals concerned.
3. Small Plot Adoption Technique (SPAT) should be established at strategic locations by extension workers so that our local farmers can see and go into practicing it on their own. In addition, open campaign can be done to keep the farmers aware of the new innovation of yam production.
4. Soft loans should be granted to extension workers by Agricultural and credit banks owned by the government at interest free rate.
5. Mini sett technique can be embarked upon using the approach as the cost of yam sett or seed yam may be high to be afforded by the local farmers.

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