

A Comparative Analysis of the Use of Purdue Improved Cowpea Storage Bags, Sealed Jericans, Azaradirachta Indica (Neem) and Actellic in Cowpee Preservation

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Abstract

The research work made a comparative analysis between four different methods of preserving cowpea grains for the purpose of determining the most effective. Two purposes and two research questions guided the study. Materials such as dry clean cowpea grains, Purdue improved cowpea storage (PICS) bags, Jerican with lid, Dried leaves of Azaradirachta Indica (NEEM), Actellic (storage chemical), sacks, weighing balance and string/twine. The study was conducted using five different methods which include the use of Purdue Improved Cowpea Storage (PICS) bags; use of Jerican with lid; use of dried leaves of Azaradirachta Indica; Spraying cowpea grains with diluted Actellic before bagging and bagging dry clean cowpea grains directly without any treatment. The five different set up were kept under the same condition. The use of Purdue Improved Cowpea Storage (PICS) bags and sealed Jerican proves to be the most effective methods. They both recorded 100% effectiveness as the same weight 50kg was maintained at the pre and post experimental period. This was followed by the use of Azaradirachta Indica leaves with 95.12% and the use of diluted Actellic with 91.22% respectively. The control method recorded the least weight percentage of 49.44. Useful recommendations such as the need for massive production of Purdue Improved Cowpea Storage (PICS) bags for distribution to farmers at subsidized rates, need for sponsoring of extension workers/agents for induction training/conferences by both the state and federal governments and use of campaign medium to encourage farmers to make use of sealed containers like Jericans, clay pots among others were proffered.

Keywords: Comparative Analysis, Purdue, Azaradirachta Indica, Actellic and Preservation

Introduction

Nigerian population is growing geometrically. Presently, Nigeria has a total population of about 250 million people (National Population Census (NPC), 2006). The high growth in population has led to high demand for assorted foods for survival. To promote longevity of the populace, the foods to be consumed must be in the balanced state. In essence, the food nutrients in the food to be supplied and consumed should be in the right proportion. To one's greatest dismay, most of the populace are undernourished as the foods they take are not proportional in terms of their nutrient contents (Daluba, 2010).

Ibitoye (2011), observed and stated that most Nigerian population are predominantly involved in the consumption of carbohydrate containing foods neglecting other aspects of food nutrients like proteins, mineral salts, fats and oil, vitamins and water. He further added that, absence of these nutrients made most people suffer from deficiency/malnutritional diseases which invariably lead to mortality rate among the young and the old.

For man to exist and perform effectively, adequate quantity and quality of food containing the required nutrients in the right proportion is very much needed. There is always a saying that "the growth and strength of any nation is dependent on the healthy state of its citizens". Food being a booster of one's state of health should adequately be catered for without delay. The extraction of the food nutrients are majorly derivable from animals and crops reared and grown by man. Animal protein demand by man appears very low. This is because, its cost is high and cannot be borne by most of the populace. As a result of this, alternative source has to be resorted to, thus the need to go in for plant protein like Cowpea (*Vigna spp*) of which different varieties exist and are grown.

It is in line with the above, that the production, harvesting, processing and storage should be given adequate attention so as to check, maintain and sustain the quality and durability of the grains. But ironically, most farmers dispose or market their Cowpea grains immediately after processing because of their susceptibility to pest attack and lack of reliable preservative measures. The early disposal of cowpea products (grains), has greatly affected farmers gain margin. For this reason, reliable preservative measure(s) need to be sort for.

It is on the above premise, that the researchers intends to make a comparative analysis of the effectiveness of the use of Purdue Improved Cowpea Storage (PICS) bag, use of Jerican with cover, Dried leaves of Azaradirachta Indica (NEEM) in ordinary sack, with grains, sprayed grains with Actellic in sack as experimental set ups A, B, C and D and the ordinary cowpea grains in sack as control set up.

Purpose of the Study

The main purpose of this study is to make a comparative analysis of the effectiveness of the use of Purdue Improved Cowpea Storage (PICS) bag, Dried leaves of Azaradirachta Indica (NEEM), Jerican with lid, sprayed cowpea grains with Actellic in sack and use of ordinary sack as procedures for the preservation of cowpea grains. Specifically, the study sought to:

1. determine the state of the cowpea grains at the end of six (6) months duration period of storage via the various methods as stated above.
2. determine the most effective preservation procedure for the storage of cowpea grains that will be useful for the farmers to adopt.

Research Questions

The following research questions guided the study:

1. What is the state of Cowpea grains at the end of six months storage period employing the various selected preservative measures?
2. Which of the selected preservative measures proves more effective to be employed by the farmers in the storage of cowpea grains?

Materials and Methods

The materials used for the conduct of this research work include clean and well dried debris free cowpea grains (Chad Variety). Purdue improved Cowpea Storage (PICS) bag, Jerican with Lid, String/Twine, Weighing balance, Dried leaves (bristle) of Azaradirachta Indica (Neem), sacks and Actellic (Storage chemical).

Equal quantities of cowpea grains (Chad variety) of 25 litre Jerican equivalent in weight to 50 kilogram were separately measured and kept in containers labeled as follows:

Container A – Purdue Improved Cowpea Storage (PICS) bag.

Container B – Jerican with Lid with Cowpea grains.

Container C – Ordinary Sack with Bristle dried leaves of Azaradirachta Indica (Neem).

Container D – Ordinary Sack with sprayed grains of cowpea with Actellic

Container E – Ordinary sack and cowpea grains.

Containers A, B, C, and D were used for each of the experimental method while container E was the control.

The experiment was conducted as follows:

Method 1:

Container A which is the Purdue Improved Cowpea Storage (PICS) a bag gotten from an approved merchants was filled with 50kg of dry and clean debris free cowpea grains. The bag is of three layers. Ensure the inner bag has no holes or tears. Pour into the inner bag gentle the cowpea grains (Chad variety) and make sure no air pockets are found at the bottom. Put the three bags together (one inside and the other) and fill the inner with more cowpea grains and ensure that no grain gets between the bags. Pack the grain tightly to remove air. Twist the lip of the first bag rightly shut. Fold it over and tie firmly with a heavy string or twine at the base of the twist and over the folder first. Pull the middle bag up over the first one so that it completely surrounds it and twist the lip shut, fold over and tie, as before. The same method was applied to the outer bag. Leave the bag and the contents to stay for a period of six (6) months in the store.

Method 2:

Container B which was Jerican with laid was filled with cowpea grains to the brim with thorough consolidation to avoid trapping of air. The Jerican was then corked or tightened with the lid. The jerican and the content were kept in the store for a period of six (6) months.

Method 3

Here the leaves of Azaradirachta Indica (Neem) were dried to the stage of bristleness. The bristle leaves were then mixed thoroughly with debris free dry clean cowpea grains. The grains were then poured into an ordinary sack. The sack was then tied with astring. Both the sack and the content were moved to the store and allowed to stay there for a period of six (6) months.

Method 4:

Here ordinary sack was used. The dry clean debris free cowpea grains was spread on a slab or mat Actellic, a preservative chemical for storage of grains in mixture with water to moderate level according to specification by the manufacturer was sprinkled on it. The sprinkled grains was given several turning for thorough mixing and allowed to stay in the open for a period of time.

The sprayed grains was then packed into the sack with proper consolidation. The twisted lip of the sack was then tied with astring and kept in the store for a period of six (6) months.

Method 5

This is the control method. Here the ordinary sack was used. the dry clean debris free cowpea grain was gradually powered into the sack and well consolidated. The remaining portion of the sack tip was twisted strongly and tied thoroughly with a string. The tied sack and the content was kept in the store for a period of six

(6) months.

Note:

It should be noted in this experiment that the contents as in method 1, 2, 3, 4, and 5 were kept in the same store under the same conditions for the said period of six (6) months.

Results

As the pre weighing of the cowpea grains [chad variety] was done before the real experiment, The grains from each of the experimental methods were evacuated, observed and post weighting was determined after the duration of six (6) months of storage had elapse and the results and observations were tabulated on table one below:

Table 1: Determination of pre and post weight of cowpea grains including observations under different methods of preservation

Procedure	Pre-weight	Post-weight	Observation(s)
Method 1	50kg	50kg	The cowpea grains were dry and clean. No holes were found on any. The same weight of 50kg was still maintained after the storage period.
Method 2	50kg	50kg	The cowpea grains were all very dry and clean. The weight before and after storage was still the same.
Method 3	50kg	47.56kg	Winnowing was done to separate the cowpea grains from the Azaradirachta Indica (Neem) leaves. The cowpea grains was then weighed. Its weight was 47.56kg showing a reduction of 2.44kg compared with pre-weight some of the cowpea grains were found to have developed holes which serves as indicator of weevils attack.
Method 4	50kg	45.61kg	The cowpea grains still maintain their original colour. Areduction in weight of about 4.39kg was observed. More cowpea grains developed holes still indicating the attack of weevils.
Method 5	50kg	24.72kg	Some of the cowpea grains still retain normal shape and colour. Almost 50% and above of the cowpea grains developed holes indicating weevil infestation.

Major Findings

From the set up, results and observations, the following were the major findings from the study:-

- i. There was no loss in weight in the cowpea grains preserved with the use of Purdue Improved Cowpea Storage (PICS) bag and corked Jerican when both the pre-weight and post-weight were compared.
- ii. The use of Azaradirachta Indica (Neem) leaves has high preservative score rate of 95.12% as compared with the spraying of Actellic (chemical) with percentage rate of 91.22%.
- iii. Weight loss exist when Azaradiachta Indica leaves and Actellic (Chemical) are used as preservative measures for cowpea grains but the loss in weight differs.
- iv. The highest weight loss of 25.28kg representing 50.56% was recorded in method 5 which was the control.
- v. Out of the four (4) experimental methods, methods 1 and 2 which was the use of Purdue Improved Cowpea storage bag and sealed Jerican Proves to be the best methods of preserving cowpea grains
- vi. The use of ordinary sack may be responsible for the decline in weight loss of the cowpea grains as this may pave away for weevil infestation.

Discussion

No loss in weight was noticed in the cowpea grains preserved with the use of Purdue Improved Cowpea Storage bag and use of sealed Jerican container. The reason for this may be that the cowpea grains are kept under an airtight condition using both methods. The airtight condition hinder the existence of pest like weevil from surviving thus making the grains to be in their normal condition and quality. This agrees with International Institute for Tropical Agriculture (IITA) (2012), when they saw the need and introduced the use of Purdue Improved Cowpea storage bags because of its durability and reliability in maintaining the quality of cowpea grains after a given period of storage. They also added that, it is a dependable preservative measure for grains including cowpea. Faruna (2013) confirmed that cowpea grains preserved with the use of Purdue Improved Cowpea Storage (PICS) has high viability and germination percentage than those preserved ordinarily with the used of local sacks. The use of sealed pots and Jericans has also proved very useful in the preservation of grain crops. Supporting this, Omalle (2010), observed and stated that in most parts of the middle belt and the northern end of the country, the method has yielded positive results. This, he said that grains stored with sealed container(s) still maintain their colour and quality thus facilitating the marketability of such grains. The

disadvantage, which he pointed out, was that the method can only be employed by subsistence farmers who grow cowpea on a small scale.

The use of Azaradirachta Indica (Neem) leaves has proved abit effective in the preservation of cowpea grains than the use of Actellic. The Azaradirachta indica as a preservative measure for grains has not been pronounced when compared to the use of Actellic. The main advantage of Azaradirachta Indica was that it is cheaper and common for peasant farmers to employ than the use of Actellic which is more costly to afford. The development of holes by some grains preserved by the use of Actellic may be as a result of improper mixing of the chemical with water thus paving way for the weevils to invade. Again, because the sacks are the local type which are usually porous, it will give rise to admission of air that favours the existence of weevils to attack the grains. Okeme (2011), in support of the above, stated that when porous containers like local sacks/bags are used for the preservation of grains (cowpea inclusive), air admission and high weevil infestation will be facilitated. He still added that attack of grains by weevils devalue the product and lead to loss of weight and poor marketability of the product.

Recommendations

Based on the findings and discussion of this, the following recommendations were made:

- There is the need for mass production of Purdue Improved Cowpea Storage (PICS) bags for distribution to farmers at subsidized rate for the storage of their grains most especially cowpea by the Ministry of Agriculture should be encouraged.
- Induction course and conferences should be organized for extension workers by both the state and federal ministry of agriculture. Resource personnel who are experts in the area of crop protection and preservation process with the use of Purdue Improved Cowpea Storage (PICS) bag should be invited to give talks and the practice too should be practicalised and demonstrated to participants.
- The knowledge gained from the conferences and induction course by the extension agents should be disseminated to farmers via effective encouragement and sponsorship by the government through the ministry of agriculture.
- Again, as a way of saving cost, farmers need to be exposed to the use of sealed containers and neem via effective campaign process by the extension agents at the various localities.
- Finally, the production of storage sacks need to be improved up by the various companies concerned. Efforts should be made to make these sacks airtight as a way of preventing weevil and other storage pest attacks.

Conclusion

Protein products are very much required in the diet of man for normal growth and development. For this reason, protein containing food crops including cowpea should e grown on a large scale to accommodate the above function. Their growth alone should not be the focus of the growers (farmers) but how these crops are to be preserved for future use as a way of minimizing starvation should be given priority. For effective preservation to the done, different methods need to be employed. The methods such as the Purdue Improved Cowpea Storage (PICS) bag and use of sealed containers like Jericans or Tins should be embraced as they help greatly to maintain the quality, marketability and taste of cowpea products and they are also the most effective.

Farmers should ensure not to depend solely on the use of local bags/sacks and spraying of chemicals like Actellic for the preservation of their grain crops. They should seek the attention and assistance of the extension workers for proper induction on the procedure of using the bags and chemicals for the preservation of the cowpea grains.

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