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**Original article**

## **Salient factors in the low utilization of PICS bags (triple-bagging) in Nasarawa local government area of Kano state, Nigeria**

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**ABSTRACT**

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The paper asserts that cowpea is a major nutritional legume in West Africa and that the grain experiences great losses at postharvest stages especially at storage. It posits that hermetic storage which the PICS is one of have proved to be a very successful storage option for cowpea storage without the use of agro chemicals but that there are daunting problems with its utilization. The study revealed among others that having outlets where the PICS can be bought(29%), making the PICS cheaper (45%), convince grain merchants that the PICS is more effective than regular storage bags(19%), and lastly forcing it on grain merchants by government would lead to more usage of the PICS (7%). Based on the opinion of the cowpea merchants it was recommended that the selling price of the PICS be reviewed downwards, and that there should be a massive enlightenment campaign for the use of the PICS; advantages of the PICS over regular bags and how to use the PICS should be demonstrated in all grain markets in the region by extension bodies both public and private.

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## 1. Introduction

Cowpea (*Vigna unguiculata*) is one of the most important economical and nutritional African legume crops, it is very rich in protein and it is also a staple food for people in West and Central Africa. Nigeria is the highest producer and consumer of cowpea in the world; it is responsible for about 58% of global production (IITA). Cowpea is used in Nigerian for everyday delicacies like moi-moi (steamed cowpea paste), akara (fried cowpea paste), and danwake (cowpea dumplings) amongst others. Significant effort have been skewed towards increasing food production in sub- Sahara Africa but the effect of these are cut short by lack of efficient postharvest system especially those that prevent deterioration and destruction of crops from both pathogens and insects. In the 1990s cowpea production in this region is estimated to be 2.6 million tons and this accounts for 69% of the total world production (Langyintuo et al, 2003). However, storage and marketing of cowpea is often dealt a major blow by insects attack especially Beans weevil (*Acanthoscelides obtectus*) (Murdock et al, 1997). Boys et al (2007) posits that 25% of all cowpea stored is loss to cowpea bruchids and seed beetles that develop and reproduced in stores for cowpea. Anankware et al (2012) painted a direr picture when they maintained that insect pest infestation for grains is between 20 to 50%.

Hermetic storage has proved a successful storage method for protection of cowpea without the use of fumigants or contact pesticide for insect control and quality preservation; for a fact putting infested grains in airtight plastic bags is sufficient to arrest cowpea bruchids infestation (Murdock et al, 2003).

According to Obeng-Ofori (1995) the origin of hermetic storage dates back to ancient times. Hermetic storage technology has emerged as a potent alternative to other methods of storage that protect commodities from insect and moulds and it is based on the principle of generating an oxygen- depleted-carbon dioxide- enriched atmosphere caused by the respiration of living organism in the ecological system of a sealed storage structure (Vachanth et al, 2010). Hermetic structures suitable for long and intermediate term storage have been developed and applied and they abound in types and the PICS is just one of these. Villers (2006) posits that studies in various countries including Mexico and Bangladesh have shown that hermetic storage maintains germination of 85% or more for periods of up to 9 months, while conventional storage in jute bags reduces germination down to 76% within three months.

The PICS (Purdue Improved Cowpea Storage) is a triple layered bag that consist of two inner bags which are polyethylene plastic bags that are 80 microns thick and a third sack or outer bag made of woven polypropylene; the 'triple bagging' refers to the combination of two inner polyethylene bag and an outer woven bag (Moussa et al, 2011).The bag owes its effectiveness to the airtight storage enable by the bag (Baributsa et al, 2010), the triple layer technology was originally developed in Cameroon to enable cowpea farmers to store their cowpea safe from losses to insect pest and thereafter the technology got across to other West African countries. A number of these bags have been produced and sold; however, there lies problems with its patronage, adoption, and usage despite its plethora of advantages. Although cowpea merchants were not the intended target group for which this technology was developed, they should not be overlooked given that they store large quantities of cowpea.

## 2. Materials and methods

The survey was carried out in two locations in Nasarawa local government area of Kano state. Nasarawa was selected because the International Institute for Tropical Agriculture (IITA), Nigerian Stored Products Research Institute (NSPRI), and Kano State Agricultural Development Agency (KNARDA) who are major organizations championing the use of the PICS are located in this Local government area. Nasarawa Local Government area is in coordinate 11o58'37"N 8o33'45"E, it has an area of 34 km<sup>2</sup>, and a population of 596,669 according to the 2006 National census figures. The survey was done in the months of September and October of 2012 in Yankaba and Dakata markets. Yankaba and Dakata markets are daily-markets, and apart from cowpea other grains sold and stored in these markets include sorghum, millet, and maize. A total of 62 respondents who are identified as professional cowpea merchants and who have significant cowpea stored in their stores were randomly selected for the survey: 31 merchants each were randomly selected in each of the markets. Apart from other criterion, a minimum of five years experience was used as criteria for the selection. The survey was carried out using the Investigative Survey Research Approach. Data was collected from respondents by means of structured questionnaire; however, questions had to be read out to most of the respondents because they are illiterates.

Again, statistical tools used for data analysis include simple statistical tools like the mean, and frequency distribution.

### 3. Results and discussion

Table 1 reveals that about 97% (60) of respondents is male, this vividly shows that grain sale and storage in this part of Nigeria as an occupation is almost exclusively for the male folk. This might not be unconnected with the norm of this area which restricts the women folk especially those of them that are married to stay at home and take care of their families and which also require their husbands to take care of all their needs. 45% (28) of respondents fall under age bracket 30-40 years; this could be a pointer to the fact that the occupation needs a lot of raw human energy which is often very abundant in this phase of life. However, respondents who are over 61 years make up a meager 3% (2) of the respondents. The table also reveals that 35% (22) of the respondents have been in the business for between 11-15 years, this shows that the respondents are no green horns and that they are well experienced in their profession. Furthermore, the table reveals that the lower the level of education the more respondents who fall into such strata; 35%, 32%, 29%, and 4% fall into no formal education, primary education, secondary education, and tertiary education respectively. Table 2 reveals that 60% (62) of persons asked know the PICS and 40% (41) of them do not, that is 62 out of 103 persons asked know the PICS and 41 do not know. It is however those who know the PICS (62 out of 103) that were interviewed for the survey. The percentages of those who do not know talk less of using it leaves much to be desired. It shows that more needs to be done to bring the PICS out of its seeming obscurity and bring it to the limelight so that intended users will know and use it. It is a truism that people would only use the PICS if they know it in the first place.

**Table 1**  
Personal characteristics of respondents (N = 62).

Variables	Frequency	Percentage
<b>Gender:</b>		
a. Male	60	97
b. Female	2	3
<b>Age:</b>		
a. 30-40	28	45
b. 41-50	22	35
c. 51-60	10	16
d. 61 and above	2	3
<b>Level of education</b>		
a. No level of education	22	35
b. Primary school	20	32
c. Secondary school	18	29
d. Tertiary education	2	4
<b>Level of experience</b>		
a. 5-10 years	18	29
b. 11-15 years	22	35.4
c. 16-20 years	10	16
d. 21 years and above	12	19

**Table 2**  
The Knowledge of the PICS existence.

Variable	Frequency	Percentage
<b>Do you know the PICS</b>		
a. Yes	62	60
b. No	41	40

**Table 3**

General information about PICS from respondents.

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>How do you get to know PICS</b>		
a. Saw it with other grain merchants	16	26
b. Through extension workers	2	3
c. The new media	32	52
d. Cannot remember	12	19
<b>Do you know who sells the PICS here</b>		
a. Yes	2	3
b. No	60	97
<b>Does anyone sell it in this market</b>		
a. Yes	0	0
b. No	62	100
<b>Have you ever used the PICS</b>		
a. Yes	3	5
b. No	59	95
<b>Why do you not use the PICS</b>		
a. Cannot find it	34	55
b. It expensive	12	19
c. Do not think it can work better	8	13
d. Others are not using it	8	13
<b>Has the PICS and its advantages ever been demonstrated in this market</b>		
a. Yes	0	0
b. No	62	100
<b>Do you think PICS is expensive at #300</b>		
a. Yes	56	90
b. No	6	10

Table 3 shows 26%, 3%, 52% and 19% got to know the PICS via: saw it with other grain merchants, got to know it through extension workers, through news media and cannot remember. This shows that the most potent tool for dissemination of the PICS is the news media, however, a worrisome picture is painted here by the fact that a meager 3% of the respondents know the PICS through extension workers whose primary responsibility it is to disseminate information of this nature. Again, 3% (2) of the respondents know where to get the PICS around, while 97% (60) of the respondents do not know where to get it. Furthermore, 100% (62) of the respondents agree that the PICS is not sold in the market, again only a token 5% (3) of the respondents have ever used the PICS while 95% (59) have not. It is logical that cowpea merchants would not use what they do not know where to get it around. 55% of the respondents said they do not use the PICS because they cannot find it around, 19% said it is because it is expensive, 13% maintained that it is because they felt it cannot do a better job than what they are currently using, another 13% said they are not using the PICS because others are not using it. Furthermore, the PICS and its advantages have never been demonstrated to them in these grain markets. Conclusively on Table 3, 90% of the respondents believe the PIC is expensive at the current selling price of N300.

**Table 4**

Factors that would lead to usage of the PICS (N = 62).

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>What in your view can lead to more usage of the PICS</b>		
a. Have places where it can be bought in this market	18	29
b. Make it cheaper	28	45
c. Convince grain merchants that PICS is effective	12	19
d. The government should force merchant to use it	4	7

Table 4 shows that 29%, 45%, 19% and 7% feel that having places where PICS is sold in the market, make the PICS cheaper, convince grain merchants that PICS is effective, and that the government should force it on grain merchants would lead to more usage of the PICS respectively.

#### 4. Conclusion and recommendation

From the foregoing we can infer categorically that among others factors, not having of sales outlets in the markets for the PICS, not knowing where to get the PICS even outside the markets, non-demonstration of the use of PICS and its advantages over regular bags have not been demonstrated in their markets, and the bag being seen as expensive are salient factors in the slow pace of use of the PICS. Again, about 40% of those merchants pooled do not even know that the PICS existed let alone using it. This trend needs to be reversed and more needs to be done in propagation of the PICS. Hierarchically, from the survey the following factors would lead to more usage of the bag:

- i. Making the it cheaper
- ii. Have places or outlets it can be bought in the markets
- iii. Convince grain merchants that the PICS is more effective and advantageous over their regular bags
- iv. The government should force it on merchants; a meager 7% of respondents subscribed to this; this seems most impractical.

Finally, as part of measures to making more farmers and cowpea merchants use the PICS, it is recommended that the government at all levels make it mandatory for all cowpea supplied to its institutions and organizations, be it schools, prisons, camps, orphanages, and canteens etc be cowpeas that have been stored with the PICS and devoid of pesticides.

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