

*Full Length Research Paper*

## Increasing women's participation in cowpea storage activities: The case of Burkina Faso

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Accepted 13 September, 2013

Cowpea is a major staple and cash crop in West and Central Africa but it suffers serious losses to insects during post-harvest storage. To prevent these losses, triple bagging in polyethylene and polypropylene sacks, a simple, low-cost hermetic technology, has been disseminated over the last five years through village activities in ten countries in West and Central Africa. Participation of women in these extension activities was low in some countries even though they play a major role in the cowpea value chain. To promote use of the storage technology by women, a cowpea storage competition with 286 women participants was organized in the province of Sourou in Burkina Faso. Sixty randomly selected participants were assessed to learn more about their role in the cowpea value chain and about the benefits that accrue from adoption of the hermetic storage technology. Results showed that 96.7% of women participated in cowpea production while 71.7% were involved in storage. The storage competition provided a learning opportunity for 85% of the participating women compared to only 40% who attended village demonstrations. The percentage of cowpea stored in Purdue Improved Cowpea Storage (PICS) bags increased from 10% in 2007 to 96.5% in 2009. Women sold significant amounts of stored cowpea, proving this is an income-generating activity. Activities targeting women can increase their participation in outreach efforts and provide opportunities for them to improve storage and market access.

**Key words:** Women, cowpea, storage, hermetic, West Africa, Burkina Faso.

### INTRODUCTION

Agriculture plays an important role in many African economies by being the largest contributor to Gross Domestic Product (GDP) and providing up to 60% of all employment in some countries. In rural areas, agriculture supports the majority of the population, with women being the main labor force and contributing the most to economic development. In sub-Saharan Africa, women provide up to 80% of the labor used to produce food destined for household consumption or for sale

(FAO, 1995). Improving agricultural production can increase rural incomes and purchasing power for large numbers of people, especially for women. Unfortunately, research and development programs rarely target rural women; as a result they are denied access to skills and new technologies (Satyavathi et al., 2010). Women's participation in extension activities is often constrained by many factors including socio-cultural traditions and time constraints. Despite efforts by the development

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community to address some of these issues, the number of female farmers receiving extension services is still much lower than for men. Several studies have alluded to the need to develop suitable extension activities that target women farmers (Odurukwe et al., 2006; Satyavathi et al., 2010).

Cowpea is grown almost everywhere in West and Central Africa because it is an important cash and staple food crop. Women play an important role in the cowpea value chain because cowpea offers a profitable and viable way to earn their livelihood, and is also an affordable source of protein (Modu et al., 2010; Osho and Dashiell, 1997). Post-harvest losses by insect damages cause significant challenges in the cowpea value chain. A study conducted in West Africa including Burkina Faso showed that women use all the available improved storage techniques, but favor those which accommodate their production levels, which are usually less than male headed households (Moussa, 2006). The triple bagging technology developed by Purdue University's scientists working with African collaborators is an effective chemical-free hermetic bag for cowpea storage (Murdock et al., 2003). Thus, women need to be knowledgeable about the improved cowpea storage technologies and trained in their use.

The Purdue Improved Cowpea Storage (PICS) project was funded by the Gates Foundation with overall objective to have 50% of cowpea grain in West and Central Africa stored using non-chemical hermetic storage methods by 2012 (Baributsa et al., 2010). The PICS project laid out a general plan to maximize women's involvement and set a goal of 30% women's participation in all village-level activities. Methods used to increase women's participation included recruiting female field technicians, organizing demonstrations for women only, and working with women's associations. Having PICS village activities tailored to women encouraged their participation and facilitated communication.

Despite efforts to increase attendance of women in PICS cowpea storage extension activities, participation of men was usually higher than of females. To increase the women beneficiaries of the cowpea storage technology even more, the Regional Association of Women in the Province of Sourou requested that the project expand these activities. The PICS project worked with the Association of Women in Sourou to implement a cowpea storage competition. PICS partners implemented this competition and conducted a study to assess its impact. The goal of this case study was to document the methodology and impact of this extension approach in increasing women participation in development activities. The objectives of the study were to: (1) Assess the role of women in the cowpea value chain; (2) Determine their source of information, degree of awareness and appreciation of hermetic technology; and (3) Assess if and how women benefited from the participation in the cowpea storage competition and draw lessons from this activity.

## RESEARCH METHODOLOGY AND DATA SOURCES

### Cowpea storage competition

In 2009, the PICS project implemented a cowpea storage competition for women in the province of Sourou, in the region of Boucle du Mouhoun, Burkina Faso. Criteria for participation included (1) being a woman from the province of Sourou; (2) having cowpea to store for the duration of the competition; and (3) ability to purchase one or more 50 or 100 kg hermetic triple bags (PICS bag). A total of 286 women from seven departments took part in the competition and stored cowpea in a total of 512 PICS bags (Table 1).

Radio and meetings were used to build awareness among women regarding the cowpea storage competition. Radio messages were aired and live talk shows organized. Topics discussed during live talk shows included the importance of the technology and its benefits to improve income, health and food security. The cowpea storage competition involved the established PICS project extension approach: (1) Awareness building; (2) Demonstrations; (3) Follow-up visits; and (4) Open-the-bag events. Goals were to train women how to properly use PICS bags and to demonstrate the effectiveness of the technology through testing. Demonstrations on use of the PICS bags were conducted in each of the seven departments before the competition. Cowpea-filled bags were kept by women in village storerooms or in their houses. During follow-ups, women were sensitized on how to avoid losses during storage, both in their households and community warehouses. No repayment of stored cowpea was guaranteed in case of losses due to bruchids or for other reasons such as damage by rodents. At the end of the competition, public open-the-bag events were organized to assess the quality of the stored cowpea after about five months of storage. Prizes were given to women based on the duration of storage, quantity stored and the quality of the cowpea. Prizes included improved cowpea seed, PICS bags, PICS posters that show how to use the technology.

### Study on storage competition

After the competition, a study was conducted among women participants to determine their involvement in cowpea value chain, and their knowledge of PICS bag and its benefits. Five out of the seven departments were selected based on proximity and accessibility to facilitate data collection by the enumerators. A sample of 60 respondents was randomly selected from among the participants from 10 villages in five departments. A questionnaire was administered to the respondents for data collection. Questions were asked about each individual women's role in the cowpea value chain, amount of cowpea produced, stored and sold in the last few years, knowledge of or participation in PICS activities, use of PICS technology, and assessment of its effectiveness and benefits. Data collected was coded and analyzed using SPSS 18.0 for windows. Descriptive statistics were generated during the analysis.

## RESULTS AND DISCUSSION

### Storage activities in Burkina Faso

The PICS project launched village activities on hermetic storage in Burkina Faso in 2007. Awareness building, demonstrations, follow-ups and open-the-bag events were implemented in 4196 villages (105 villages in 2007, 3642 villages in 2008 and 449 villages in 2009). In 2008,

**Table 1.** Women's participation in the cowpea storage competition by Department, number of bags used to store cowpea grain and number of women selected for the study in the Sourou Province, Burkina Faso.

Department	Number of women	PICS bags stored	Number of women selected for the study
Di	15	17	2
Kassoum	16	32	1
Kiembara	78	172	12
Lanfiéra	20	20	--
Lankoué	99	196	27
Toéni	14	15	--
Tougan	44	60	18
Total	286	512	60

Source: Report by INERA Burkina Faso and survey study.

**Table 2.** Participation in storage demonstration activities in the province of Sourou, Region of Boucle du Mouhoun and in all regions where PICS had implemented village activities during the 2008-2009 cowpea season in Burkina Faso.

Province/Region	Number of villages	Number of participants			Percent women
		Women	Men	Children	
Province of Sourou	143	1413	2561	1203	35.6
Region of Boucle du Mouhoun	344	3701	6564	2544	36.0
All regions	2681*	105678	47759	23054	42.2

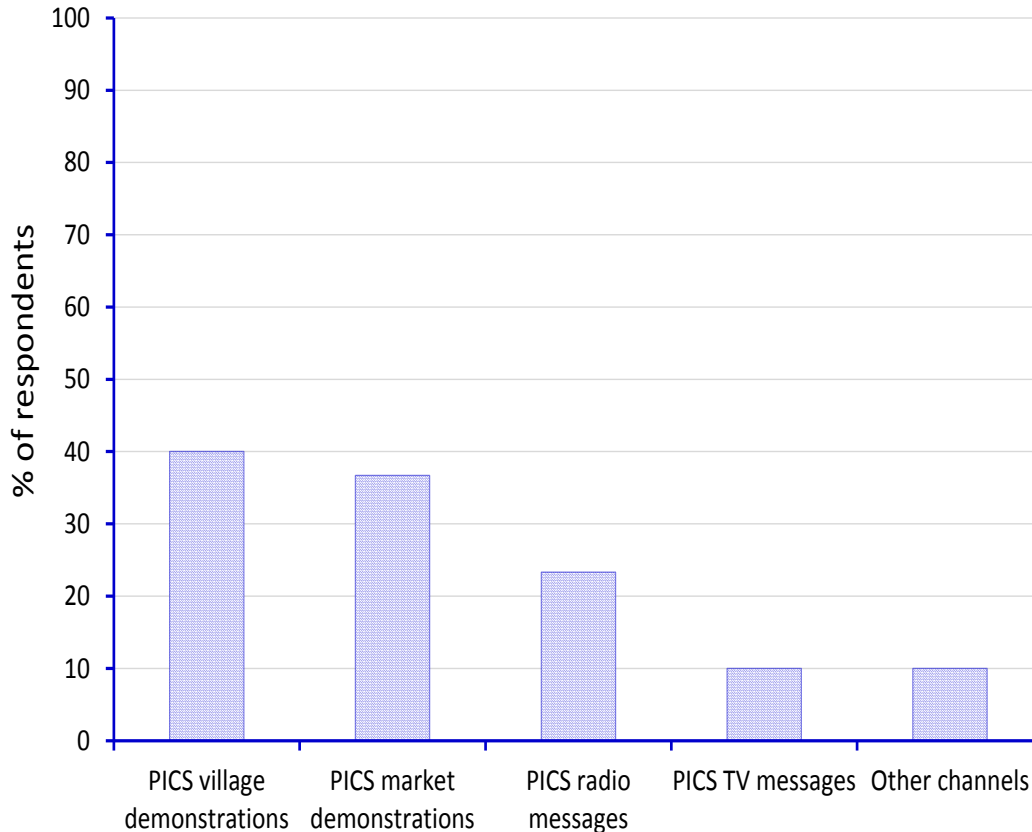
Source: Annual report PICS Project, 2009. Data provided by INERA, Burkina Faso. \*Data was available for only 2681 villages on a total of 4196 villages that benefited from PICS project's activities.

extension activities were implemented in 11 of the 13 regions. The provinces of Sourou, Nayala and Kossi in the region of Boucle du Mouhoun benefited from this effort. Farmers in 143 out of the 155 villages in the Sourou province were trained to use hermetic storage. These efforts were intended to address three major challenges with regard to improving cowpea storage: (1) Improve availability and access to good storage material; (2) Increase knowledge about how to use the technology and (3) reduce post-harvest losses. Moussa et al. (2010) reported an adoption rate of hermetic storage of up to 30% in Burkina Faso two years after the launch of extension storage activities. Although the program was extensive with high impact, women's participation was lower than that of men. For example, women's attendance at demonstration activities in the Sourou province was 35.6%, lower than the national average (42.2%) but higher than the 30% target set by the project (Table 2). Efforts to recruit female extension agents (at least 30% of all extension agents) and coordination at the national level led by a woman helped increase the participation of women farmers. All extension agents including women were required to make concerted efforts to get at least 30% of women participants in all village activities.

Among the 60 survey participants, 16 women were from villages that benefited from PICS activities in 2007 and the rest from villages that were involved with PICS in 2008. All respondents were married and none were

heads of household. The size of the typical household was large -- 13% had less than 5 people, 44% between 6 and 10 people and 47% more than 11 people. Nearly all of the women were involved in cowpea production (96.7%) and most of them participated in storage (71.1%). This high percentage in production may be explained by the fact that women represent a significant portion of the farm labor force in production on family plots as well as in their individual plots. Few women were involved in cowpea processing. Less than a third of the women participated in cowpea sale or marketing. This finding is in agreement with results of Schultz (1993) who found that in Cameroon relatively few women were responsible for cowpea storage intended for sale. Though women play an important role in production and storage, the low involvement in sale/marketing indicates the existence of barriers to women's decision-making and control over resources. The majority of women (73%) were involved in two or three activities (production and storage, storage and sale, and production, storage and sale). The study clearly shows that women play an important role throughout the cowpea value chain that should be recognized. It is clearly imperative that efforts seeking to improve cowpea value chain enlist women as key players and beneficiaries.

Women utilized different sources of information about the PICS technology than did men (Figure 1). Most women heard about PICS technology through village and market demonstrations (76.9%). Demonstrations in



**Figure 1.** Sources of information about the PICS technology among the women who participated in the cowpea storage competition.

villages and markets appeared to be the most effective channels to reach them. Radio was the third most important source of information for women. Over 90% of women heard about the technology through a single channel, which emphasizes the importance of diversifying information sources. Other studies have shown that the availability of multiple sources of information increases access (Doss, 1999).

More women participated in demonstration activities organized for the competition (85%) for demonstrations organized for the villages (40%). Not all women who stored cowpea as part of the competition attended the demonstration activities organized for the competition. Organizing extension activities explicitly for women provided them the opportunity to increase their participation and learn about the benefits of using the technology. The higher participation seen during the cowpea storage competition was probably due to the timing of the events because they were organized at times when most of the women were available. The standard PICS village activities did not always take into account the availability of women who are often busy with field work or household chores. Organizing demonstrations for women by working with women's associations appear to address challenges that otherwise

hinder their involvement in extension activities. With the standard approach, extension agents worked with community leaders to plan storage extension activities, often without much consideration of the availability of women. However, demonstrations planned with women's associations always considered the availability of women and so ensured greater participation.

Although, most women were involved in cowpea production and storage, they commonly purchased cowpea grain to store because they did not produce enough for their needs. The quantity of cowpea purchased decreased as the amount of cowpea they produced increased (Table 3). Targeting these women and helping them to increase cowpea production could help them improve their livelihoods. Cowpea production significantly increased from 2007 to 2009. Some extension agents in the area declared that better storage technology had provided an incentive to farmers, including women, to increase their production. Among constraints noted by the women as well as extension agents, during village meetings, to increased cowpea production included pest management in the field, access to improved cowpea seed, market access, and access to improved technologies such as sprayers and threshers. Modu et al. (2010) reported similar constraints by women

**Table 3.** Quantity (kg) of cowpea produced, purchased, stored, sold and consumed, different storage methods used, and PICS bags used, purchased and reused from 2007 to 2009 by women who participated in the cowpea storage competition in the Province of Sourou, Burkina Faso.

Variable	2007	2008	2009
	Quantity (kg) of cowpea stored each year		
Cowpea produced	4420	17995	20440
Cowpea purchased	10380	16425	15730
Cowpea stored*	14525	33150	34750
Cowpea sold	12725	23175	23950
Cowpea consumed	1800	9975	10800
Cowpea stored with other methods	12820	14265	9290
Cowpea stored with PICS bags	1450	18450	32700
Cowpea stored during competition	-	-	19150
	Number of bags		
PICS bag used	15	185	323
PICS bags purchased	15	175	218
PICS bags reused	-	10	105

Source: Data collected during the interview of 60 women who participated in the cowpea competition; \*Cowpea stored is lower than cowpea produced and purchased. Some cowpea may have been consumed before storage.

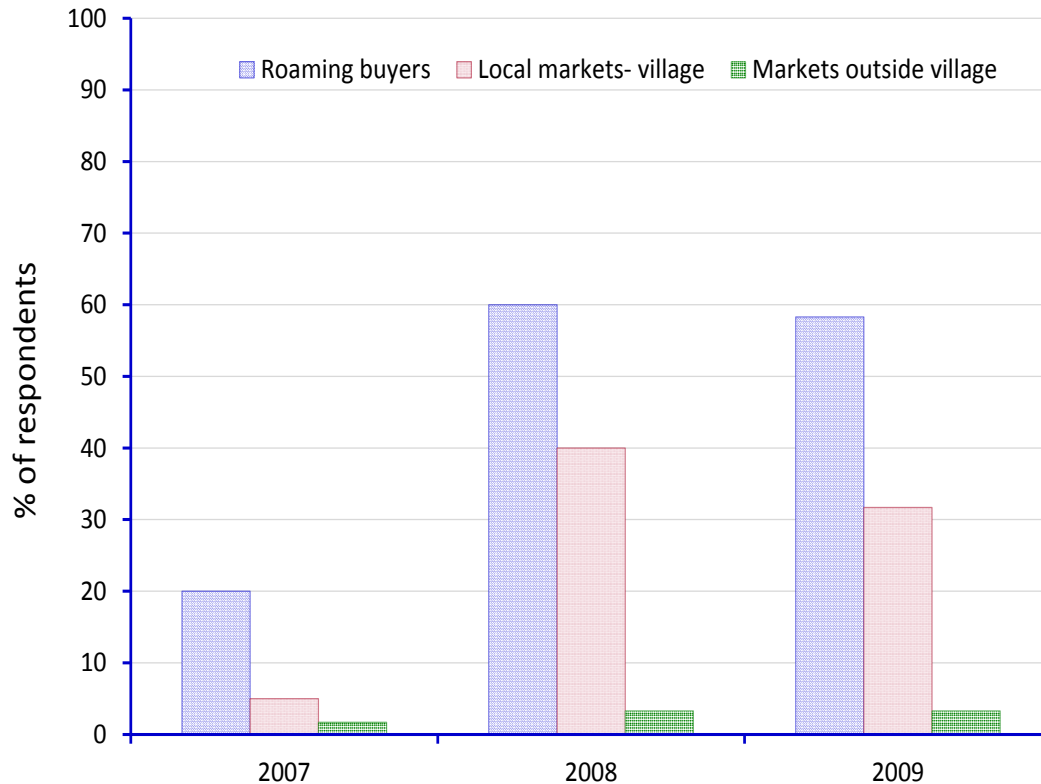
cowpea producers in Borno State in Nigeria, where inadequate capital or access to credit and lack of outlet markets were the major constraints for increasing cowpea production.

Cowpea storage methods used changed from the first year to the last year of the project (Table 3). The percentage of cowpea stored in PICS bags increased from 10% in 2007 to 96.5% in 2009. The quantity of cowpea stored with non-PICS methods (insecticide, ash, plastic jerricans, and metal drums) did not decrease from 2007 to 2008 but did decrease drastically from 2008 to 2009. The use of PICS bags increased considerably from 2007 to 2008 because there was a full-scale extension activity in 3642 villages across the country. In 2007, only 105 villages were part of PICS activities in all of Burkina Faso. In relation to PICS village activities cowpea stored in PICS bags increased by 62% from 2008 to 2009 despite fewer village activities in 2009. Many farmers were reluctant to adopt PICS technology during the first year, before the village demonstration activities had been completed. Once farmers were convinced that PICS technology worked (four to six months of storage in PICS bags), they purchased bags the following season. During the first year of the introduction of the technology, some farmers used the old storage methods alone or in combination with PICS technology. For example, in 2007 some farmers used insecticides in combination with PICS bags. Growing confidence in the PICS technology explains the 35% reduction of use of other methods from 2008 to 2009.

Despite this significant increase in the use of PICS bags from 2008-2009, the participants in the survey complained that bag availability hindered adoption. As these outreach activities were being implemented, the

project was developing the PICS bag supply chain to meet demand by farmers and others. However, the scarcity of retail outlets in rural areas has hindered PICS technology adoption. The challenge in expanding PICS distribution to rural areas is linked to capital constraints and trust issues among business entrepreneurs (Baributsa et al., 2010). Some rural retailers have difficulty acquiring PICS bags from semi-wholesalers because they have limited capital to purchase PICS bags with cash. Given the weak legal system and the fact that most rural retailers do not have working relation with other members of the supply chain, providing PICS bags on credit is unattractive. Moussa et al. (2010) showed that the density of PICS bag retail outlets and the distance to where PICS bags are sold are important determinants of adoption of the PICS technology in both Burkina Faso and Niger. If bags are sold far from the village, all rural people and especially women will have difficulties accessing them.

Most of the stored cowpea was sold, suggesting storage was an income-generating activity. The amount of cowpea grain stored increased by 128% from 2007 to 2008. Similarly from 2007 to 2008 there were increase of cowpea sold and consumed by 82 and 454%, respectively. This dramatic increase in cowpea consumption may suggest that better storage methods provide opportunities to improve food security in the household in addition to being a source of income (Ogunlela and Mukhtar, 2009). Providing training to women through women's group expanded the role of women in marketing of cowpea. Our findings are in agreement with results by Evenson and Siegel (1999) showing that economic activity by women is stimulated by extension activities. Training women's groups in hermetic



**Figure 2.** Sales channels of cowpea stored in PICS bags by women who participated in the cowpea storage competition in the province of Sourou.

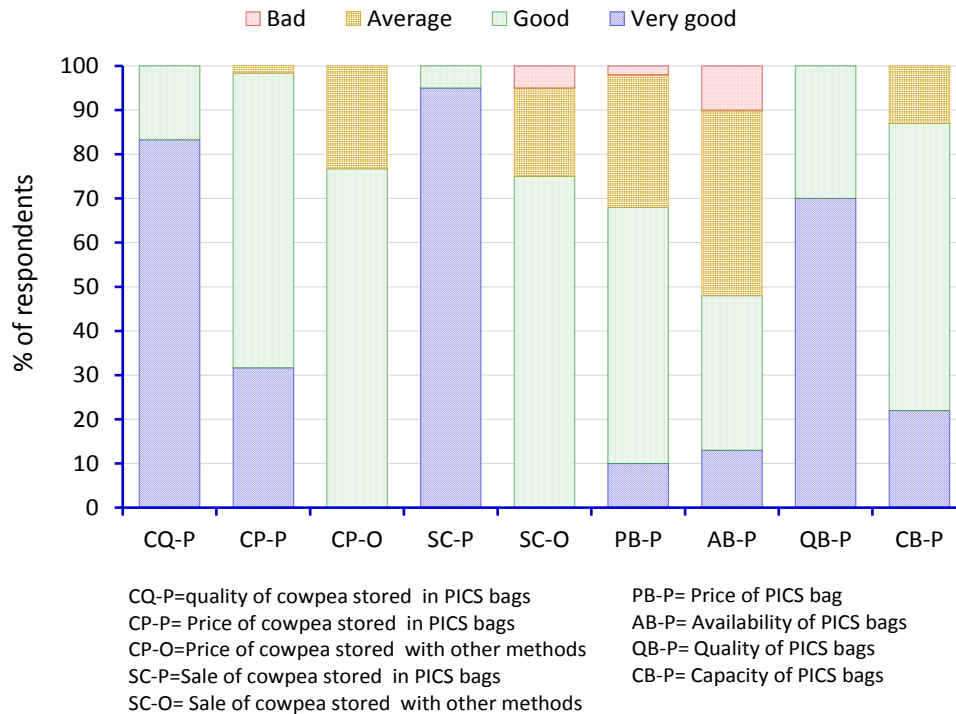
storage technology provided them the opportunity to capitalize on cowpea business- buying cowpea when the prices are low and selling later when cowpea is scarcer on the market and command higher prices.

Data on sales of stored cowpea show an increase in sales to roaming buyers from 2007 to 2008 (Figure 2). Cowpea is traditionally sold to these roaming buyers who come to the village or it is sold in markets in the village. Most women do not attend markets that are far from the village, suggesting that they have difficulties in benefiting from the technology if retail outlets are not available closer to their villages. The difference in bags purchased and used in 2008 and 2009 may be due to bags received for village demonstrations from the project or reused from the previous year.

All women were satisfied with the quality and sale of cowpea stored in PICS bags (Figure 3). PICS bags are as effective as the other storage methods currently being used by African farmers including insecticides, ash, sand, botanicals, etc. (Baoua et al., 2012). Unlike chemical storage, cowpea stored in PICS bags does not have chemical residues or unpleasant odors. Death of consumers has been linked to misuse of chemicals for cowpea storage in some countries such as Nigeria, where the toxic grain is referred to as “killer beans”. This has sensitized cowpea users to be skeptical or suspicious of cowpea treated with insecticide. PICS bag

naturally controls cowpea bruchids by oxygen deprivation which stops population expansion and eventually causes death by desiccation (Murdock et al., 2012). This address a major risk associated with inappropriate use of insecticides for cowpea storage. As a chemical-free method, this may explain the increase in roaming buyers during 2007 and 2008. Women who stored cowpea in PICS bags reported good sales. Customers preferred cowpea that had been stored in PICS bags over cowpea stored with other methods. Some women reported getting price premiums for cowpea stored in PICS bags.

Most of participating women were content with the performance of the bags for safely storing their cowpea grain and the price of approximately US \$ 2.00 per 100 kg capacity bag. Issues that have been raised about the PICS technology relate to (1) the capacity of the bag, (2) the availability of the bag in local markets and villages, and (3) rodent attacks (23%). Our data is in accordance with findings by Moussa et al. (2010) who showed that 53% and only 14% of farmers in Burkina Faso complained about the availability and price of the PICS bags, respectively. It is interesting to note that 65% of those who complained about rodents used cats to control them. Bags preferred by cowpea merchants would be larger (hold 150 bowls, 120 kg) than PICS bags (100 kg). Gomez (2004) mentioned that cowpea merchants at harvest tend to heap their measures to get more grain



**Figure 3.** Sales channels of cowpea stored in PICS bags by women who participated in the cowpea storage competition in the province of Sourou.

from farmers. During meetings with women's participants in the competition, it was suggested that they create localized women's groups to help increase their bargaining power during cowpea sales and to address the challenges related to availability of agricultural inputs such as PICS bags. The provincial association of women was too large to address challenges in each of the individual departments or clusters of communities. Cohen and Lemma (2011) found that local women's organizations in Ethiopia offered women an important vehicle for gaining access to services and resources. Odurukwe et al. (2006) argues that the establishment of farmers' groups would provide women farmers with better access to farm inputs and credit than they would have as individuals. To increase women's adoption and so promote the benefits of technologies, there is a need for tailored trainings and effective dissemination methods accompanied with improved access to credit, inputs and facilities (Satyavathi et al., 2010).

## CONCLUSIONS AND RECOMMENDATIONS

The present case study shows that efforts focusing specifically on women do in fact increase their participation in extension activities because constraints limiting their involvement are addressed. Women's workloads in household and agricultural activities mean that they often have less time and less time-flexibility to

devote to extension meetings. Channeling extension efforts through women's groups instead of focusing on communities can increase their participation. The cowpea storage competition described here increased women's knowledge, adoption and benefits of PICS technology. More cowpea stored resulted not only in more cowpea sold but also in more cowpea used for home consumption. Increasing women farmers' access to PICS technology may both increase their income and also improve food security in their households. As noted, access to the PICS technology was limited by the scarcity of retail distribution networks.

Considering the role of women in agriculture, there is a need to increase their access to technologies and practical knowledge. To sustain the adoption of improved storage technology, there is also need to address the issue of the distribution system of PICS bags. To increase the benefits of PICS technology to women and sustain these efforts, there is need for:

1. Continued awareness-building and adoption through gender-focused activities to increase participation of women in cowpea storage activities. These activities could target women's associations or women in communities across the country;
2. Improved access to PICS technology by creating groups or using women's associations as a platform to order PICS bags from vendors or distributors. In addition, the women's groups could be used as a platform to

market cowpea stored by its members. Purchasing the PICS bags as a group and selling stored cowpea through the group would increase bargaining power;

3. Sensitizing micro-lending institutions to initiate inventory credit activities targeted at women to improve access to the bags and cash at harvest when cowpea prices are low. This would allow women to obtain cash to address pressing needs at harvest while waiting for the cowpea price to increase, as it does annually.

Facilitating women's access to improved cowpea technology through activities that strengthen the supply chain and increase access to credit will help empower them by improving their economic situation and food security. Working with women through women's groups should increase their economic condition and provide an opportunity to gain a political voice in the community and beyond. This requires mobilization of government and development agencies, as well as private enterprise, to coordinate their efforts and achieve these goals.

## ACKNOWLEDGEMENTS

The Women's Association of the Sourou Province in Burkina Faso.

## REFERENCES

- Baoua IB, Amadou L, Margam V, Murdock LL (2012). Comparative Evaluation of Six Storage Methods for Postharvest Preservation of Cowpea Grain. *J. Stored Prod. Res.* 49:171-175.
- Baributsa D, Lowenberg-DeBoer J, Murdock L, Moussa B (2010). Profitable Chemical-Free Cowpea Storage Technology for Smallholder Farmers in Africa: Opportunities and Challenges. Proceedings of the Tenth International Working Conference on Stored Product Protection, 27 June-2 July 2010, Estoril, Portugal. pp. 1046-1052.
- Cohen MJ, Lemma M (2011). Agricultural Extension Services and Gender Equality: An Institutional Analysis of Four Districts in Ethiopia. International Food Policy Research Institute Discussion Paper 01094.
- Doss CR (1999). Twenty-Five Years of Research on Women Farmers in Africa: Lessons and Implications for Agricultural Research Institutions; with an Annotated Bibliography. CIMMYT Economics Program. Mexico D.F.: CIMMYT. pp. 99-102.
- Evenson RE, Siegel M (1999). Gender and Agricultural Extension in Burkina Faso. *Afr. Today* 46:1-74.
- FAO (1995). A Synthesis Report of the African Region: Women, Agriculture and Rural Development. Report prepared under the auspices of FAO's Programme of Assistance in Support of Rural Women in Preparation for the Fourth World Conference of Women; Food and Agriculture Organization of the United Nations, Rome, Italy.
- Gomez C (2004). Cowpea Post-harvest Operation. Edited by AGST/FAO: D. Mejia, FAO (Technical). (unpublished).
- Modu Y, Putai AJ, Petu-Ibikunle AM (2010). An Economic Analysis of Cowpea Production Among Women Farmers in Askira/Uba Local Government Area Borno State Nigeria. *Afr. J. General Agric.* 6:1.
- Moussa B (2006). Economic Impact Assessment of Cowpea Storage Technology. Master of Science Thesis, Department of Agricultural Economics, Purdue University, West Lafayette, IN, USA.
- Moussa B, Lowenberg-DeBoer J, Baributsa D (2010). Adoption of Hermetic Storage for Cowpea in Niger and Burkina Faso in 2010. Poster presented during the Fifth World Cowpea Research Conference, 27 September to 1 October 2010, Saly, Senegal.
- Murdock LL, Margam V, Baoua I, Balfe S, Shade RE (2012). Death by Desiccation: Effects of Hermetic Storage on Cowpea Bruchids. *J. Stored Prod. Res.* 49:166-170.
- Murdock LL, Seck D, Ntougam G, Kitch L, Shade RE (2003). Preservation of cowpea grain in Sub-Saharan Africa – Bean/Cowpea CRSP contributions. *Field Crops Res.* 82:169-178.
- Odurukwe S N, Matthews-Njoku E C, Ejiogu-Okereke N (2006). Impacts of the women-in-agriculture (WIA) extension programme on women's lives; implications for subsistence agricultural production of women in Imo State, Nigeria. *Livestock Research for Rural Development*. Volume 18, Article #18. Retrieved online from <http://www.lrrd.org/lrrd18/2/odur18018.htm>.
- Ogunlela Y, Mukhtar A (2009). Gender Issues in Agriculture and Rural Development in Nigeria: The Role of Women. *Hum. Soc. Sci. J.* 4(1):19-30.
- Osho SM, Dashiell K (1997). Expanding Soybean Production, Processing and Utilization in Africa. GTZ. Post Harvest Systems. The newsletter for post-harvest systems development in Africa No. 1. In: Gomez, C. (unpublished). Cowpea Post-harvest Operation. 2004. Edited by AGST/FAO: D. Mejia, FAO (Technical).
- Schultz MA (1993). Economic Assessment of Cowpea Grain Storage Technologies: A Case Study of North Cameroon," MS Thesis, Department of Agricultural Economics, Michigan State University, East Lansing, MI, USA.
- Satyavathi TC, Bharadwaj C, Brahmanand PS (2010). Role of Farm Women in Agriculture: Lessons Learned. *Gender Technol. Dev.* 14(3):441-449.