

# PICS

# NEWSLETTER

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## Purdue Improved Crop Storage

### PICS Updates – Year 4

*Dieudonné Baributsa; Purdue University, USA*

In 2017, PICS continued to strengthen the supply chain with a focus on recruiting more distributors and vendors to make bags more available. Manufacturers and distributors sold 4.2 million bags in 2017, up from 2.8 million in 2016. From 2007 to February 2018, 14 million PICS bags were sold. The demand for PICS bags continues to grow, including exports to several countries around the world (e.g., Somalia, South Sudan, Mozambique, and Haiti). PICS licensees are winning awards. Bell Industries in Kenya received a \$750,000 cash prize for reaching the goals of the AgResults project in the Rift Valley of Kenya (<https://www.youtube.com/watch?v=ye2BRk41Plg>). The private sector continues to invest in manufacturing and distribution to meet the growing demand for PICS bags. Investments by the Bill and Melinda Gates Foundation (BMGF) have helped PICS manufacturers and distributors expand their PICS market beyond the targeted countries.



PICS creating jobs. A woman uses a sewing machine to stitch the lip of the outer layer of a PICS bag at PPTL, a plastic manufacturer in Tanzania.

Partners continue to invest in the promotion of PICS and other hermetic technologies. In 2017, about \$1.6 million was invested by partners to promote PICS in several countries in Africa and Asia. Partners trained 956 field agents during 49 Training of Trainers events; conducted 2,247 demonstrations; and reached 169,468 farmers. The commercialization of the PICS technology is transitioning to the private sector led by PICS Global Inc.



A PICS advertisement stands outside a vendor shop located at Malaya junction of Bagamoyo and Chalinze in Tanzania.



To improve the supply of PICS bags, in 2017 several manufacturers and distributors were licensed in Africa, Asia and Latin America. The technology continues to have a profound impact on farmers and the private sector. With 4.2 million PICS bags sold in all PICS countries around the world in 2017, this is estimated at a total value of about \$84 million gained by farmers for storing one time in PICS bags (\$20 per bag), and about \$4 million profit made by the private sector, including manufacturers, distributors and vendors.

## Feed the Future Food Processing Lab at Purdue Makes Great Strides Toward the Finish Line

Betty Bugusu, Purdue University - USA

The Food Processing and Post-harvest Handling Innovation Lab (FPL) at Purdue, one of the 24 Feed the Future Innovation Labs, aims to increase access to safe and nutritious foods along the value chain by improving the drying and storage capacity of smallholder farmers and expanding market opportunities through diversified processed products that address quality in the market and nutritional needs. The project operates in Kenya and Senegal, focusing on cereals, grain legumes, and locally grown nutrient-dense value chains. In its fourth year of operation, FPL has made great progress toward its goals as highlighted in this article. The accomplishments made under the drying and storage component of the project include:

1) developed a low-cost moisture measurement protocol using the hygrometer that is conventionally used to measure relative humidity in the air and costs approximately USD 2.00 per unit; 2) developed two low-cost solar dryers that are currently being tested on-farm in the focus countries; and 3) developed cost-effective aflatoxin reducing

innovation packages that consist of combinations of training on best post-harvest handling practices, use of low-cost grain moisture verification tools, tarps to eliminate drying on the ground, and hermetic storage bags. Over 2,000 farmers and traders have been trained on best practices for post-harvest drying and storage in both Senegal and Kenya.



A hygrometer measures the relative humidity of the air inside this bag of grains.

The FPL also works on the processing segment of the value chain with key accomplishments such as introduction of novel food processing technologies including the extrusion technology (a precooking process used to produce instant or ready to eat flour-based products); development of high quality, market competitive, and nutritious food



Extrusion technology produces instant or ready to eat products.

products that meet consumer demands; and introduced Incubation Centers to disseminate food and nutrition technologies and to strengthen food processing enterprises.

In its fifth and final year of operation, the FPL is ramping up efforts to disseminate the developed technologies. We are

working closely with the PICS program to increase availability of the PICS bags to enhance grain quality and safety for smallholder farmers in the focus countries. The FPL will also work to link the two project components to enable food processors to source clean and safe grain from farmers.



A variety of packaged cereal samples.

For more information please contact Betty Bugusu, Ph.D., Project Director at [bbugusu@purdue.edu](mailto:bbugusu@purdue.edu)



Farmers practice filling and closing a PICS bag.

## Using PICS Bags to Store Green Coffee in Colombia

Natalie Donovan and Ken Foster; Department of Agricultural Economics, Purdue University - USA

Colombian coffee farmers face many environmental and economic challenges. The high humidity in the Central Mountain Range of Colombia, where most coffee is grown, plagues farmers; the threat of quality damage and decreases in price caused by high moisture forces farmers to sell yields immediately after harvests and accept generally lower prices. Coffee cooperatives, which must store their coffee to accumulate enough volume for export, also face significant challenges and price losses. The high humidity, coupled with a lack of technologically and culturally sound solutions, leave farmers and cooperatives vulnerable and unable to capitalize fully on the potentially more profitable coffee industry.



Overlooking a coffee farm near Manizales, Colombia.

While high humidity can cause significant quality damage to green coffee, there are potential solutions for mitigating these losses. The Purdue Improved Crop Storage (PICS) bags have been a viable solution for mitigating quality loss due to moisture or insect damage during storage for various other crops. Our study aimed to determine the quality and economic effectiveness of using PICS bags for green coffee storage. Quality and price changes were measured for green coffee beans stored in PICS bags and traditional jute sacks for 6 months. Additionally, because insect damage is not a significant cause of deterioration, analysis was also



Undergraduate students at the Universidad de Caldas helping to fill the PICS bags with green coffee.

completed on a two bag layer PICS bag (one outer layer bag of the woven polypropylene and one inner layer bag of HDPE). Hereafter, this is referred to as PICS2 and the normal three bag system is referred to as PICS3. Quality indicators measured included water activity, moisture content, and cupping score. A cupping score is a qualitative analysis of brewed coffee samples by certified cuppers. Economic indicators measured include sample prices and historical green coffee price data.



Natalie picking coffee on a small farm near Pereira, Colombia.

The results of the quality analysis showed that storing green coffee beans in PICS bags maintained quality for 6 months of storage when compared to coffee stored in traditional bags. Water activity decreased over time in storage (most likely due to beans finding equilibrium throughout the bag), while moisture content and cupping score were maintained. There was also no statistically significant difference between the quality of green coffee beans stored in PICS2 and PICS3 bags. Economic analyses showed that the PICS2 and PICS3 bags received statistically significantly higher prices than green coffee stored in traditional bags and there was no statistically significant difference between the prices that PICS2 and PICS3 bags received over the 6 months. Seasonality analysis showed that there was significant seasonality throughout the year in coffee prices received by Colombian farmers, indicating a potential to capitalize on higher prices through effective storage. Net present value analyses for all bag types were completed to estimate the return over time from investing in different bag types. It was found that storing green coffee in PICS3 bags could lead to a net additional 4895 COP (1.74USD) per bag over the three-year lifespan of the PICS bags after accounting for the assumed expense of the PICS bag. The PICS2 option also returned a positive Net Present Value. However, that Net Present Value was lower (3427 COP) than PICS3 even though a lower initial bag cost was assumed.

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## PICS: Changing Lives in Tanzania

Bernadette Majebelle, PICS3 Project - Tanzania

In the village of Mnanje in the Masasi District of the Mtwara Region of Tanzania, a woman is using PICS bags and her ingenuity to provide ample food for her family each year while turning a large profit on the grain she stores. Mwajuma Ali is 55 years old with a husband, three children and four grandchildren. With a large family, Mwajuma has been able to use PICS bags to provide for her relatives far more than she ever expected.



Mwajuma Ali with her husband and three of their grandchildren.

In July 2014, Mwajuma took part in PICS demonstrations in her village by volunteering to be a pilot farmer. The task was simple – she was given a PICS bag in which to store her grain. She promised to return six months later, in January 2015. That was the date of the Open the Bag Ceremony in which she and other pilot farmers would finally open their bags and discover how well their grains had been safely preserved from insects. “This small trial greatly impressed upon her how well the bags worked. Accordingly, she decided to buy 15 PICS bags and store maize in them. She kept five PICS bags for family consumption and saved the rest for later sale. She waited to sell her maize until the price increased, during the off season. She sold her PICS-

bagged maize at the price of Tshs. 72,000 per 100kg bag and made a total of Tshs. 720,000. With this money and some other savings, she and her husband were able to purchase a motorcycle.



In 2016, she planted 1.3 hectares of maize and cowpea from which 25 bags were harvested and stored in PICS bags. Again, she kept five bags for her family and sold the other 20 bags. She made Tshs. 1,440,000! With this money, she and her family began building a second house. The next year, 2017, Mwajuma planted 1.2 hectares of maize, cowpea and cashew nuts



Mwajuma Ali.

and harvested 26 bags. This time she kept six bags for her family and sold the remaining 20. She made another Tshs. 1,440,000. With this money she was able to finish the new house and make some repairs on her first home.



Mwajuma Ali and her husband outside their newly built second house.

Mwajuma is delighted with PICS technology because it has changed her life, not only by securing food for her family and providing them with extra money, but through her investment in the new family home. With plans to rent out the new house, she will soon be earning extra income year-round.



## COFFEE - continued from page 3

PICS bags were found to be an effective solution for mitigating the quality and price loss for coffee farmers and cooperatives who battle high humidity during storage. By utilizing the PICS bags, Colombian coffee farmers and cooperatives can become more independent in their industry decisions and less vulnerable to environmental and market variability.

[View a YouTube video on this topic.](#)

## NANE NANE DAY in Tanzania

Jovin Rugambo, Paladin - Tanzania



PICS is featured in this display as part of the Nane Nane Day Exhibition.

Nane Nane Day is celebrated annually in Tanzania on August 8th. Nane Nane recognizes the important contribution of farmers to the national Tanzanian economy. It is also referred to as the Agricultural Exhibition, a one-week fair that takes place during the week of August 8 (8/8) in various locations across the country. At the Nane Nane Agricultural Exhibition, farmers and other agricultural stakeholders (e.g., universities and research institutes, input suppliers or fertilizer producing industries) showcase new technologies, ideas, discoveries and alternative solutions relevant to the agricultural sector. Government and private firms also present their services and activities to the public during the fair.



A PICS agent demonstrates how to tie a bag properly.



Exhibition-goers gather to listen to a short presentation on the success of PICS bags in protecting stored crops from insect infestation.

The official opening of the 2018 Nane Nane took place on August 3, 2018 with the main exhibition occurring on August 8th. The PICS brand was displayed in booths in the following zones:

- East Lake zone: Simiyu, Mara, & Shinyanga regions
- West Lake zone: Mwanza, Kagera & Geita regions
- West zone: Tabora, Kigoma, & Katavi regions
- East zone: Morogoro, DSM, Pwani, & Tanga regions
- South zone: Lindi, Mtwara, & Ruvuma regions
- Southern Highlands: Mbeya region

Throughout the event, the PICS team attracted different stakeholders of the public at large to participate in live and recorded brand education and demonstration. Take-home flyers were available with direct communication details to enable communication to continue subsequent to the event.



### D-Prize - Apply for Funding Awards

D-Prize is a call to the world's boldest social entrepreneurs. Who Should Apply? You should have enormous ambition, and can imagine yourself as a successful entrepreneur. You are ready to launch your new venture, and - if a pilot proves successful - you are excited to grow it into a world changing organization. If you are still a student or have an existing job, you should have a clear idea how to transition into a full-time founder. D-Prize is exclusively interested in ventures that will scale distribution of an already proven poverty intervention in the developing world. They do not fund prototypes of new interventions. Up to 25 of the most promising proposals will be selected for funding awards (seed grants of up to \$20,000), regardless of which challenge track was selected. An ideal D-Prize candidate or candidate team is focused on distributing a proven poverty intervention in the fields of education, girls' education, agriculture, energy, global health, and governance and infrastructure (see our <https://www.d-prize.org/#challenges> for more details).

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If you have a PICS story to share,  
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