



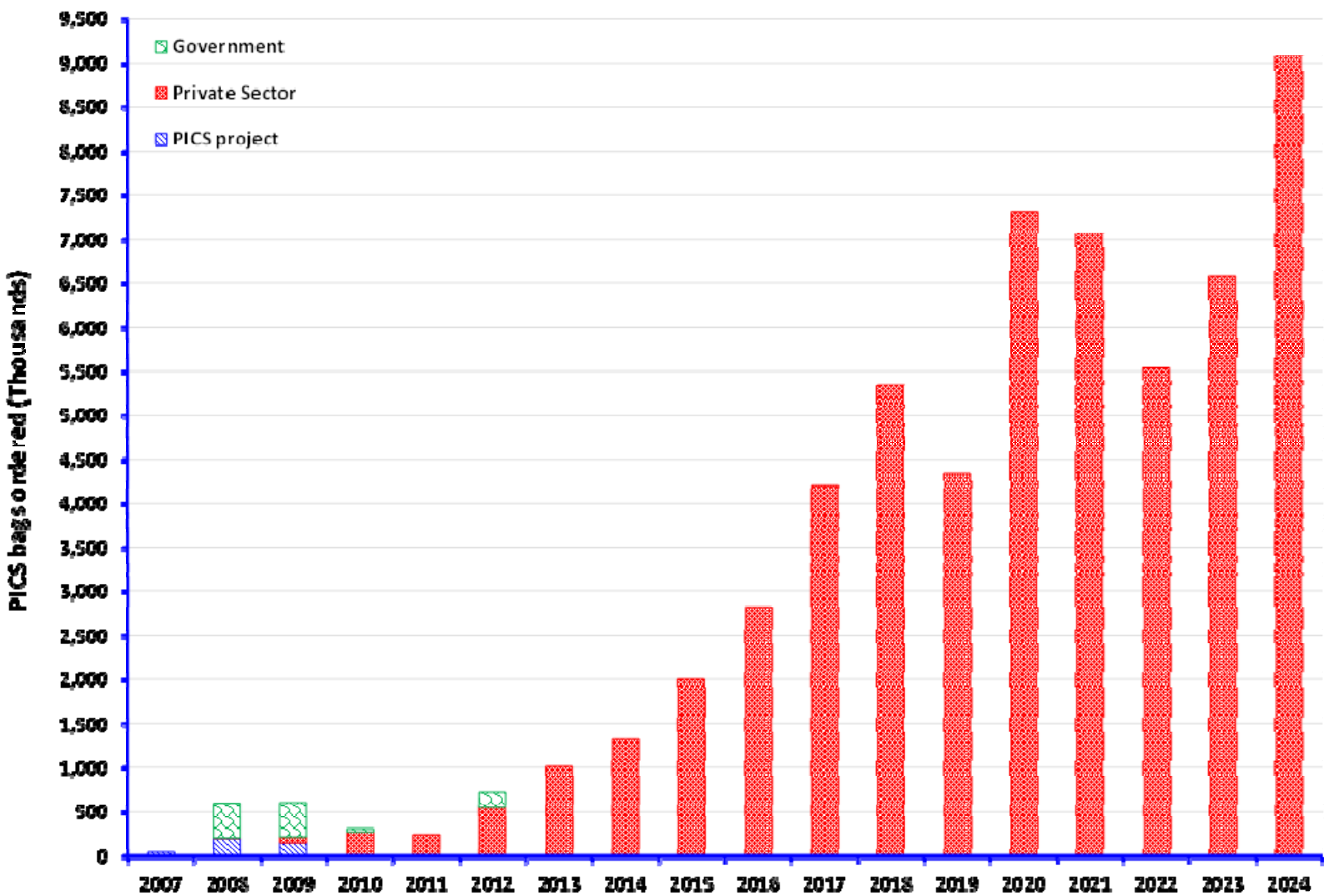
Summer 2025



Another Record-Breaking Year: 9.1 Million PICS Bags Sold Globally in 2024

By Dieudonne Baributsa, Director, PICS Program, Purdue University

PICS bags reached a historic milestone in 2024, with over **9.1 million bags sold** globally, mostly in sub-Saharan Africa. This remarkable achievement underscores the growing trust in PICS technology for improving food security by reducing post-harvest losses.



Several key factors contributed to this success:

- **Strengthened supply chains:** Improved logistics and distribution networks in major markets such as Tanzania and Ethiopia were pivotal in enabling greater access to PICS bags. Their availability in rural markets and in a timely manner has helped more farmers access the technology. The enhanced efficiency in these countries allows manufacturers and distributors of PICS bags to meet rising demand more consistently and reliably.
- **Rising awareness and demand for grain storage solutions:** A significant portion of the growth can be attributed to increasing awareness, leading farmers to demand PICS bags for storing staple food security crops like maize and cowpea. Village demonstrations, farmers' field days, radio and TV broadcasts, and mass SMS campaigns have all contributed to raising awareness and improving access to PICS bags. With insect threats,

food safety linked to aflatoxins, and health hazards linked to chemical insecticides, PICS bags have become an essential tool for preserving harvests and maintaining grain quality throughout the storage period.

- **Expanding applications beyond grain storage:** The demand for PICS technology is diversifying beyond traditional use. The versatility of PICS bags is being recognized across a growing number of value chains. New and emerging uses include: (i) Preservation of high-value commodities such as spices including ginger, (ii) Maintaining product integrity during transport of goods such as coffee and fresh fish, and (iii) Improving transport logistics, particularly in the aquaculture sector, where PICS bags are now being used to transport fingerlings with reduced mortality rates.



Rolls of PICS liners being cut and sealed in the P.P.T.L. factory, Tanga, Tanzania

Challenges in select markets

While most regions experienced strong growth, expansion in some major markets such as Kenya, Nigeria and Niger, has been limited. This is primarily due to increased competition and/or the presence of counterfeit products. Weak supply chain performance has allowed competitors to enter and gain footholds in these markets. To address these challenges, sustained extension activities, outreach efforts, and supply chain improvements are essential for reinforcing the value and authenticity of genuine PICS bags in these markets.

Moreover, efforts to introduce or expand the use of PICS bags in both new and existing countries have been significantly constrained by limited funding. Despite these challenges, we remain committed to increasing access to hermetic storage solutions worldwide, aiming to reduce storage losses and improve food security for underserved rural communities in developing countries.



Women sewing the bottom and stitching the top of PICS woven bags in the P.P.T.L. factory, Tanga, Tanzania.



PICS Technology: Unlocking Premium Cocoa Beans Markets

By Ken Foster, Department of Agricultural Economics, Purdue University

In the heart of Colombia's cocoa-growing regions, a [study](#) has revealed the transformative potential of PICS (Purdue Improved Crop Storage) technology for storing fermented cocoa beans. This research, conducted with the Asocaco cooperative in Belén de Umbria, Risaralda, offers new hope for smallholder farmers striving to preserve cocoa quality and access premium markets.



Farmers harvesting cocoa beans in Colombia

The Cocoa Storage Challenge

While cocoa isn't a seasonal crop like coffee, it faces unique storage challenges. The growing interest in artisanal chocolate production and high-value export opportunities requires the ability to accumulate larger quantities of quality cocoa beans. Traditional storage methods often fall short, leading to quality degradation and economic losses for farmers.

Water activity (the amount of chemically free water) is highly correlated with moisture content and thus indicates potential for spoilage during storage, and it also aids in important browning reactions during roasting that give chocolate its unique aromas and flavors - too high and spoilage occurs but too low and aroma and flavor are adversely impacted.

PICS Technology: A Solution for Cocoa Bean Storage

The study, led by a team of researchers from Purdue University and Universidad Tecnológica de Pereira, Pereira, Colombia, has been published in the [Journal of Stored Products Research](#). The study compared four storage methods over a 12-month period: original PICS bags (two liners in one woven bag), modified PICS bags (a single liner in one woven bag), Ecotact® bags, and traditional jute bags.

Key findings include:

1. Superior Pest and Mold Control: Original PICS bags significantly outperformed other methods in reducing insect damage and mold presence. The triple-layer design creates an oxygen-deprived environment, inhibiting pest and mold growth.

- 2. Optimal Moisture Management: PICS bags maintained ideal moisture content and water activity levels, crucial factors in preserving cocoa bean quality during storage.
- 3. Consistent Quality Preservation: Original PICS bags consistently outperformed other storage methods, including the modified PICS bags and Ecotact® bags, in maintaining overall cocoa bean quality.
- 4. Extended Storage Potential: The study demonstrated that PICS technology allows for extended storage periods without significant quality degradation, a game-changer for smallholder farmers.
- 5. Comparative Advantage: Traditional jute bags showed higher insect damage and lower moisture content, potentially leading to poor roasting outcomes and lower quality chocolate.

Implications for Cocoa Farmers and the Industry

The adoption of PICS technology for cocoa bean storage offers several significant benefits:

- Quality Assurance: By maintaining optimal storage conditions, farmers can ensure their cocoa beans meet the high standards required by premium chocolate makers.
- Market Flexibility: Extended storage capabilities allow farmers to accumulate larger quantities of beans, potentially accessing better markets and prices.
- Value Addition: The ability to store high-quality beans opens up opportunities for farmer cooperatives to engage in artisanal chocolate production, adding value to their crop.
- Sustainable Practices: PICS technology aligns with the growing demand for sustainably produced cocoa, potentially opening doors to niche markets.

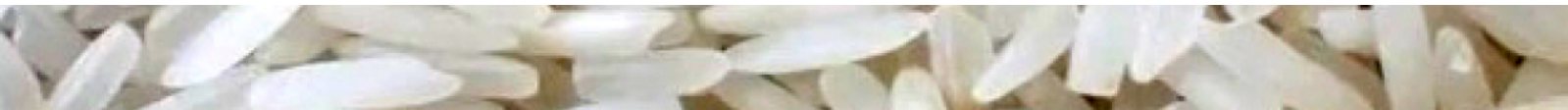
Broader Impact and Future Prospects

The success of PICS bags in cocoa storage has implications beyond just quality preservation:

- 1. Economic Empowerment: By mitigating quality losses and enhancing marketability, PICS technology provides farmers with a tool to improve their income and bargaining power.
- 2. Supply Chain Improvement: Consistent quality preservation could lead to more stable supply chains, benefiting both farmers and chocolate manufacturers.
- 3. Community Development: In Colombia's post-conflict context, technologies that enhance the profitability of crops like cocoa play a crucial role in sustainable rural development and transitioning away from illicit crops.
- 4. Innovation in Chocolate Production: With better-preserved beans, there's potential for innovation in chocolate making, especially in origin-specific and high-quality artisanal products.

As the global demand for high-quality, sustainably produced cocoa continues to grow, technologies like PICS bags become increasingly vital. They not only preserve the unique qualities of Colombian cocoa but also empower farmers to take control of their product's quality and value.

This research demonstrates that sometimes, the secret to unlocking the full potential of cocoa lies not just in how it's grown and fermented, but in how it's stored. With PICS technology, Colombian cocoa farmers are well-positioned to meet the challenges and opportunities of the evolving global chocolate market.



Leveraging PICS Bags for Sustainable Development in Niger

By Sadou Soumana, WA Regional ERD Lead, International Rescue Committee

In Niger, where agriculture sustains 86% of the population and contributes 40% of GDP, post-harvest losses remain a critical challenge. Limited storage options, climatic shocks, pest infestations, and economic instability exacerbate food insecurity and poverty.

The International Rescue Committee (IRC) launched the Integrating Warrantage into Agricultural Markets in Niger (IWAMN) project to address these issues through innovative solutions like hermetic storage, specifically Purdue Improved Crop Storage (PICS) bags. In collaboration with local partners, the Ministry of Agriculture, and local authorities, the IRC tailored the IWAMN intervention to reduce post-harvest losses, improve farmer incomes, and strengthen storage practices.



Farmers storing PICS bags in a warehouse for warrantage.

Post-harvest losses in Niger range from 8% to 40%, particularly in regions like Tillabéri, where erratic rainfall, drought, and degraded farmland worsen chronic cereal deficits. Farmers often sell produce immediately after harvest due to

cash flow constraints, missing higher prices during the lean season. Traditional storage methods fail to protect crops from pests, moisture, and contamination, exposing farmers to economic losses and health risks from mycotoxins.

The IWAMN project sought to transform storage and market participation by promoting hermetic storage, strengthening cooperatives, and linking farmers to financial services through warrantage systems. Key actions included organizing farmers into cooperatives, establishing secure warehouses, training farmers on PICS bags, and building partnerships with enterprises like Husa’a for better access to seeds, storage solutions, and markets.

PICS bags, a simple and effective solution, protect crops from pests and moisture without chemicals. During the project, 5,392 farmers adopted these bags, achieving 87% of the target. Farmers reported significantly reduced losses and improved grain quality.

The warrantage system allowed farmers to store crops and secure loans using stored goods as collateral, reducing distress sales. Over 307 million CFA francs (\$520,468) were granted in loans, improving cash flow by 80% and increasing average household incomes by 40%. Women represented 58.8% of participants, underscoring the project’s inclusivity.

Training was pivotal, with 6,522 farmers learning improved storage, agricultural practices, and business planning. Equipped warehouses ensured crop security, while cooperatives enhanced farmers’ bargaining power.

The project’s success in Tillabéri demonstrates its potential for scaling to regions like Zinder and Maradi. Future plans include linking more farmers to financial institutions and enterprises like Husa’a, expanding the use of PICS bags and warrantage systems to reduce poverty, enhance food security, and improve livelihoods.

The IWAMN project highlights the transformative impact of innovative post-harvest solutions. By addressing storage challenges and equipping farmers with financial and technical tools, the initiative fosters long-term sustainability and resilience in Niger’s agricultural sector.



Insights Into the Price Premium for Cowpea Stored in PICS Bags

By Bokar Moussa, INRAN - Niger

Quality signals can reduce the information gap between buyers and sellers, which is important for market development and food safety in sub-Saharan Africa (SSA). Food quality can be divided into **observable quality** and **unobservable quality**. Observable quality in grain include size, color, and texture of kernels, along with visible signs of mold and/or insect damage. A consumer can inspect a product to check for observable quality and discount the price they pay when low-quality grain is sold in the market.

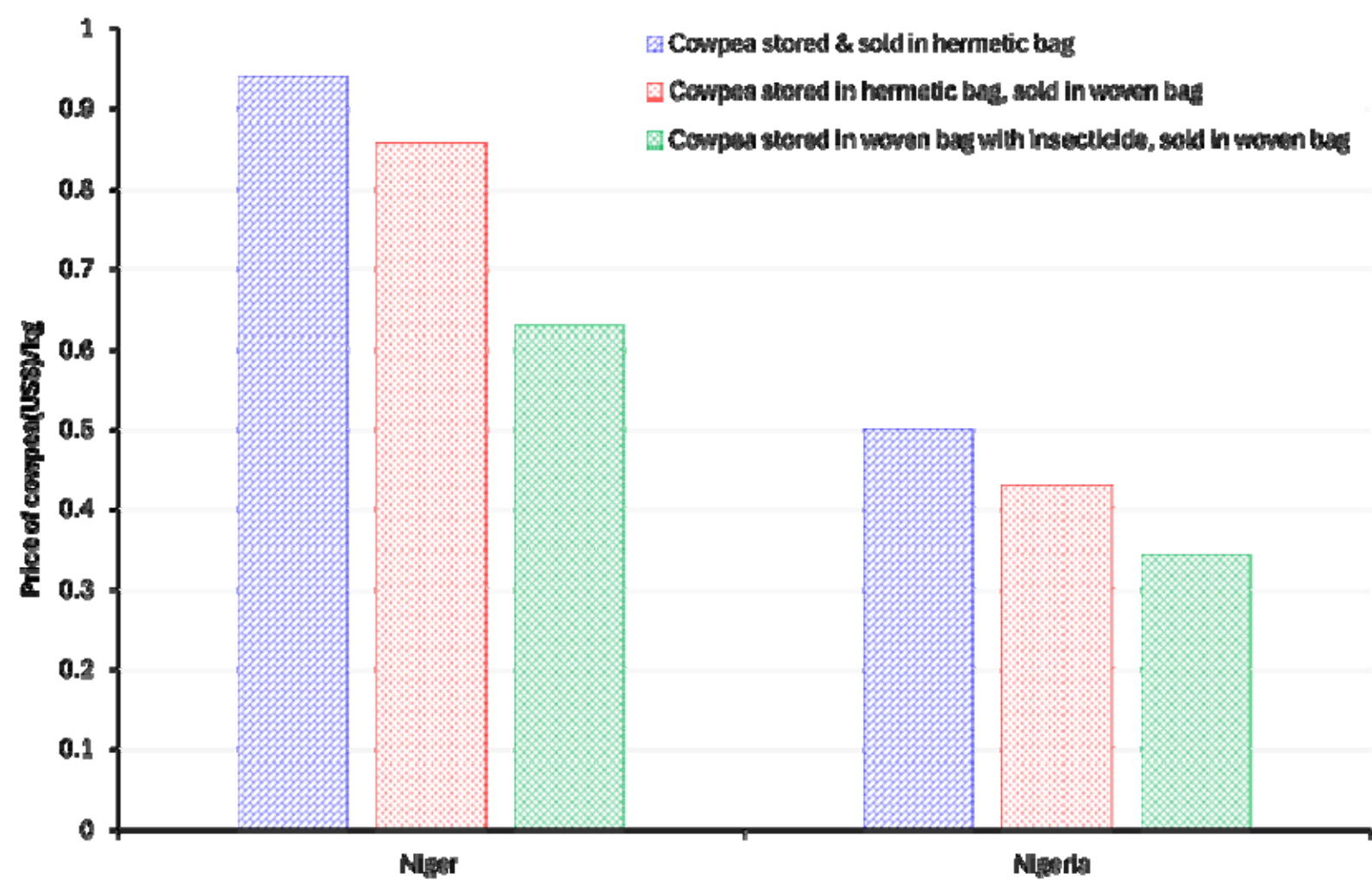


PICS bags outside a warehouse in Tahoua region, Niger in October 2024.

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In contrast, identifying unobservable quality attributes is much more difficult in rural markets of developing countries. Unobservable quality attributes in grain include food safety contaminants such as pesticide residues and aflatoxin, a harmful toxin that causes stunting and cancer. Unfortunately, no cost-effective testing mechanisms for aflatoxin or chemical residues are readily available in informal rural markets of SSA. This creates an information gap between buyers and sellers, leading to a market problem where low, unobservable quality dominates rural markets.

This study was conducted in Niger and Nigeria to estimate the extent to which rural consumers in SSA value quality signals about their food. In each country, 600 farmers were surveyed in six different states in Nigeria and three regions in Niger. We randomly selected the participants from the most important cowpea production and consumption areas. Respondents were chosen from villages with and without hermetic bag demonstrations.



Mean willingness to pay for cowpea by storage and presentation method in Niger and Nigeria (USD\$/kg)

We implemented an auction among consumers in Niger and Northern Nigeria to estimate their willingness to pay (WTP) for cowpea: (i) stored and sold in PICS bags, (ii) stored in PICS bags and sold in woven bags, and (iii) stored with pesticides in woven bags and sold in woven bags. The size of the price differential (premium) that the average consumer placed on unobservable grain quality was estimated. Thus, the unobservable grain quality was measured through the WTP premium for grain sold in the bag with a PICS label. The authors also estimated the effect that consumers' previous brand awareness had on their valuation for observable and unobservable qualities. On average, consumers in Niger were willing to pay a 10% premium for cowpea stored and sold in the branded storage bag compared to cowpea of the same observable quality that was sold in a bag with no branding. The same branded quality premium was 17% in Nigeria.

Interestingly, consumers in Niger who had previous experience with the PICS bag brand were willing to pay twice the premium for cowpea stored and sold in the branded bag compared to consumers who were not familiar with the brand. However, no such premium existed among consumers in Nigeria, likely because of problems with counterfeit bags sold on the market there.

In conclusion, the results from this study provide evidence that there may be a latent demand for quality, as indicated by food safety, among limited-resource people in SSA and that improved products with branded labels can potentially provide a quality indication to the market.

This research was published in the [Food Policy](#) journal.



From Purdue to Rural Zambia: Fighting Food Insecurity with PICS Bags

By Keith Gelber, Former Peace Corps Volunteer, Zambia

As a graduate of Purdue University’s School of Agriculture (ASM, '95), I joined the U.S. Peace Corps in 1997. My assignment was in Eastern Province, Zambia, where I served as a Water, Sanitation, and Hygiene Education

Volunteer. Living and working in a rural, subsistence farming village for five years was a transformative experience—one for which I am forever grateful.

Staying connected to the village after returning to the U.S. was initially challenging. However, the widespread adoption of mobile phones and mobile banking in Zambia has made it easier to maintain those ties. This connectivity has enabled me to provide support during times of food insecurity and to collaborate on initiatives like a household survey, which I conducted with the help of two Zambian Teacher College graduates awaiting job placements.

In January 2024, we surveyed 100 village households. The results revealed that 30–60% of their annual post-harvest maize crop was lost to spoilage, primarily due to insects, mold, and rodents. This significant loss of a staple crop contributes to ongoing food insecurity among subsistence farmers.

Seeking solutions, we identified the Purdue Improved Crop Storage (PICS) bags as a promising option. We were thrilled to find that PICS bags are already available in Zambia and could be sourced from a nearby town. With 200 bags in stock, we launched a trial program.

The teachers helped organize 200 farmers from 20 villages into training groups, each receiving one free PICS bag. We were excited to discover excellent PICS training resources on the Purdue website, including a Hermetic Seed Storage video in Chichewa, a local Zambian language. Participating farmers have agreed to store maize in the PICS bags for at least four months and will report their results.

To raise awareness and drive adoption, we’re planning outreach strategies such as social media, local influencers, drama groups, live demonstrations at community events, and distributing sample bags. We’re also exploring microcredit options to make the bags more accessible. In Zambia, PICS bags cost 5–7 times more than single-ply bags, which can be cost-prohibitive for many farmers. In 2026, we hope to pilot a loan program for farmer groups to finance PICS bag purchases.

PICS bags offer a practical, scalable way to improve food security, nutrition, and financial resilience for Zambian subsistence farmers. I’m eager to see the results from the first 200 farmers in the coming months and to continue building on this momentum.

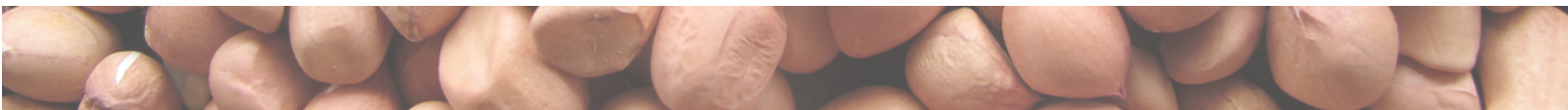


PICS bags in Chipata, Zambia

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