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The U.S. Government's Global Hunger & Food Security Initiative

AGRILINKS

Securing the Harvest: Post-harvest Strategies to Increase Resilience

Panelists: **Ahmed Kablan,** *USAID Bureau for Resilience and Food Security*

Jagger Harvey, *Kansas State University*

Georgina Bingham, *Vestergaard SA*

George Opit, *Oklahoma State University*

Moderator: **Julie MacCartee,** *USAID Bureau for Resilience and Food Security*

Date: *April 30, 2020*

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FEED THE FUTURE INNOVATION LAB FOR THE REDUCTION OF POST-HARVEST LOSS

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Agenda for the Webinar

The importance of reducing post-harvest loss to nutrition and food
Dr. Ahmed Kablan

Creating resilient communities through reduced post-harvest loss
Dr. Jagger Harvey

Using postharvest loss mitigation technologies to build resilience in poultry farms in Dormaa, Ghana
Dr. George Opit

Improving livelihoods of smallholder farmer communities with post-harvest storage & grain trading platform
Dr. Georgina Bingham

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Post-harvest Strategies to Increase Resilience

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AHMED KABLAN - SENIOR SCIENCE & RESEARCH ADVISOR, FOOD SAFETY DIVISION, CENTER FOR NUTRITION, BUREAU FOR RESILIENCE AND FOOD SECURITY, USAID

Dr. Kablan is an International Nutrition and Public Health Advisor at USAID Bureau for Food Security. Dr. Kablan is a biotechnologist and has over 14 years of research, teaching and science policy and regulatory experience. Dr. Kablan is the program manager for the Feed the Future Soybean Innovation Lab, Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss and the Feed the Future Nutrition Innovation Lab, and manages part of the USAID-CGIAR partnership.

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JAGGER HARVEY - DIRECTOR, POST-HARVEST LOSS INNOVATION LAB, KANSAS STATE UNIVERSITY

Jagger Harvey serves as Director of the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss, at Kansas State University. His work on addressing fungal toxin (mycotoxin) contamination of crops spans more than 15 years. At the Innovation Lab, he is working with the team to ensure that their work is effectively translated into information, interventions and capacity to address post-harvest loss issues in Bangladesh, Ethiopia, Ghana, Guatemala, Honduras, Nepal and beyond.

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GEORGINA BINGHAM - SENIOR TECHNICAL SPECIALIST & GLOBAL PARTNERSHIPS, FOOD SECURITY, VESTERGAARD SA

Georgina Bingham serves as the senior technical advisor and global partnerships manager of the Food Security business at Vestergaard. Within this role she has successfully brought two new food security products, under the ZeroFly® brand, from development to launch. Georgina has more than 15 years experience working in developing regions including sub-Saharan Africa and Southeast Asia, and holds qualifications for project management and good clinical practice.

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GEORGE OPIT - PROFESSOR, DEPARTMENT OF ENTOMOLOGY AND PLANT PATHOLOGY, OKLAHOMA STATE UNIVERSITY

Dr. George Opit is a Professor of Stored Product/Post-Harvest Pest Management in the Department of Entomology and Plant Pathology at Oklahoma State University. His broad research interests are integrated pest management and biological control of arthropod pests. He has conducted important research on ZeroFly® Hermetic bags. In Ghana, Dr. Opit is the team leader for the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss (PHLIL).

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Creating resilient communities through reduced post-harvest loss

Jagger Harvey, PhD
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Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss
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Post-harvest losses reduce resilience

- Up to 1/3 or more lost after harvest
- Sub-Saharan Africa grain post-harvest losses are greater than USA global food aid (USD)
- Readily addressable through targeted R4D: capacity development → adapted interventions
- Research investments: 95% production vs. 5% postharvest

Post-harvest losses reduce resilience

- FAO, Feed the Future countries predict multiple "biblical" famines due to the COVID-19 pandemic, and recognize importance of aggressively reducing post-harvest loss.

- Post-harvest mitigations reduce hunger, increase income and nutritional status

- Post-harvest loss innovations and partnerships are available and ready to be scaled in ways that would address COVID-19 spread and reduce food security issues.

DAILY NATION

Kenya alert over 2.3m bags of bad maize

SHARE BOOKMARK PRINT RATING

Farmers spread their maize to dry in Kibwezi. Researchers say spreading maize on the ground increases its contact with the soil, where the fungus that produces aflatoxins resides. Photo/FILE

By LUCAS BARASA
Posted Monday, May 31 2010 at 19:44

WATTAgNet.com
Information on global poultry, pig and animal feed markets.

Mycotoxins confirmed across US during harvest

freeimages.com/Elizabeth Thompson | The Monday Mycotoxin Report from Neogen on October 5 highlighted new confirmed reports of mycotoxins in corn across the country.

Postharvest losses in:

Stored product crops (grains, legumes, roots and tubers, oilseeds,…)

Horticultural products

Animal-source foods

Quantity losses

Quality losses (economic, health)

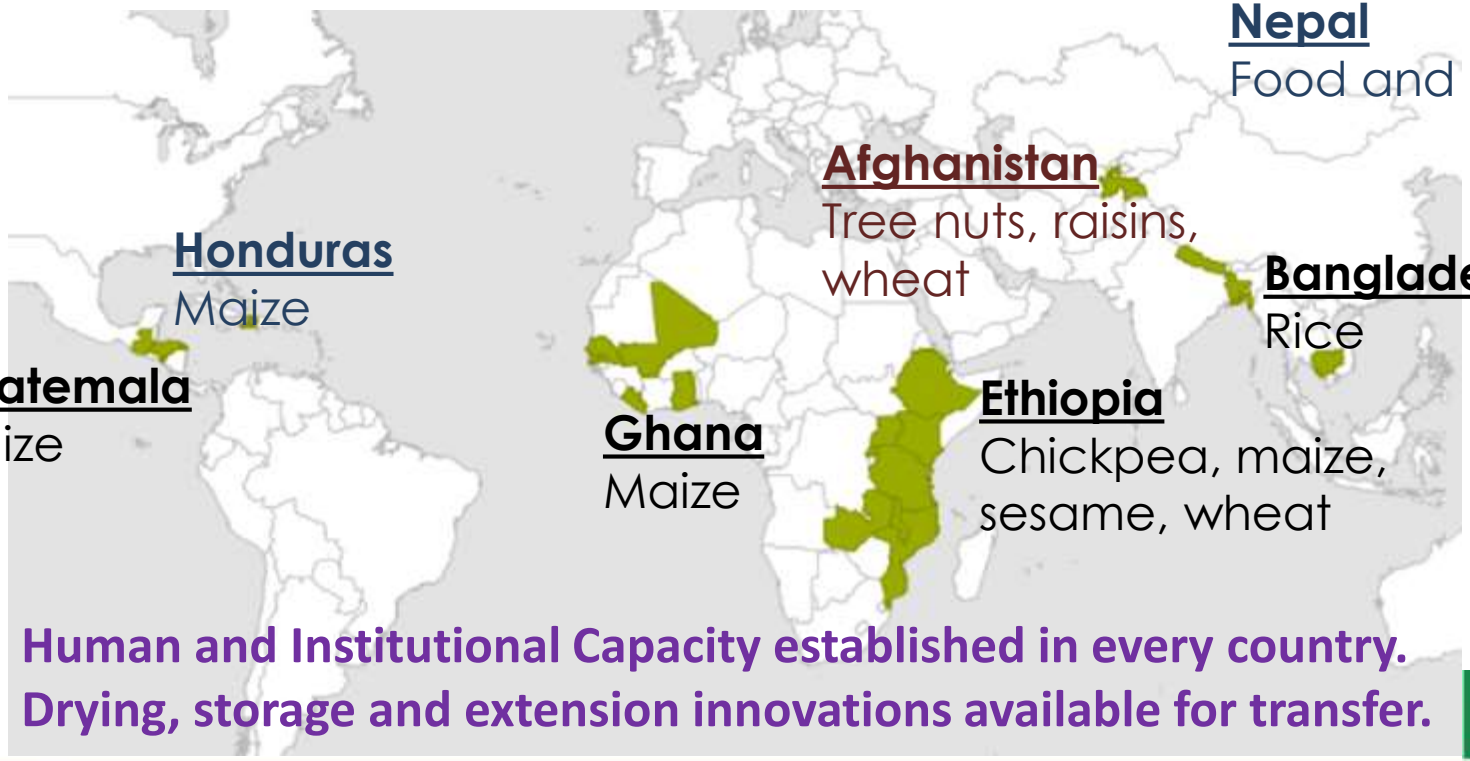
- Nutrient content
- Food safety issues (can spike with shocks)
- Mycotoxins (also a USA Ag issue)
- Pesticide residues

Toward resilience: scaling of IL interventions

Marketplace of postharvest loss interventions include

- Drying and storage
- Processing
- Diversified uses (eg, of mycotoxin contaminated commodities)

Post-Harvest Loss Innovation Lab



Human and Institutional Capacity established in every country.
Drying, storage and extension innovations available for transfer.

PHLIL Diversified R4D strategy

- Align with Feed the Future and Mission priorities
- Empower national research leaders
- Conduct multidisciplinary research to inform evidence-based, stakeholder-driven strategies
- Cultivate a marketplace of tailored innovations, for different value chain actors
- Use private sector partnerships to research and propel innovations into use
- Leave a more resilient system with self-sustaining post-harvest loss mitigation measures

Integrating approaches: Ghana

Feed issues:
Poultry for nutrition and income

Drying, moisture measurement, storage strategies for smallholder farmers and meso level actors (aggregators,…)

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Using Postharvest Loss Mitigation Technologies to Build Resilience in Poultry Farms in Dormaa, Ghana

George Opit, PhD

FEED THE FUTURE INNOVATION LAB FOR THE REDUCTION OF POST-HARVEST LOSS

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FtF Innovation Lab for the Reduction of Postharvest Loss (PHLIL) Ghana Team

Kansas State University Management Entity

Jagger Harvey

Dena Bunnel

Caroline Kolins

Catherine Hickman

Ghana In-Country Coordinator

Kwabena Adu-Gyamfi
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Ag Engineering

Paul Armstrong
USDA ARS
CGAHR

Engagement

Jonathan Ulmer
Kansas State University

Misty Lambert
Iowa State University

Gender and Youth

Paul McNamara
UIUC

Anna Snider
UIUC

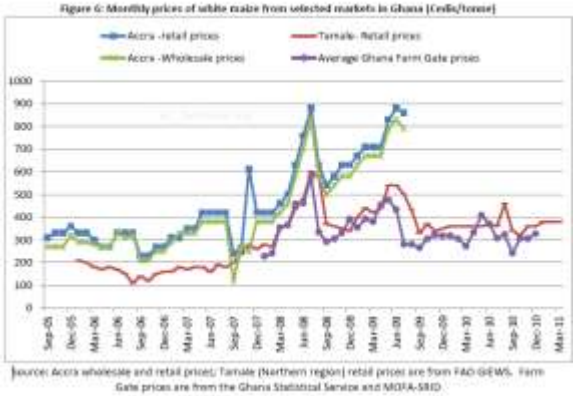
Food Safety

Mathew Staciewicz
UIUC

Operations management factors that increase profitability should also enhance resilience of a poultry business

Key Challenges Targeted by PHLIL

- Seasonal Maize price fluctuation.
- Feed-based fluctuation in egg production.
- Feed-based mortality of birds.



Postharvest Loss Mitigation Technologies for Enhancing Resilience

GrainMate Moisture Tester

@ GHS500–550 (~US$90–100) each

ZeroFly® Hermetic (ZFH) Bags

@ GHS9–12 (US$ ~1.6–2.2) each

GrainMate and ZeroFly® Hermetic bags

- Long-term safe storage of maize can be a solution to seasonal price fluctuations.
- Feed-based fluctuations in egg production and mortality of birds can be addressed by using good quality maize.

Approach for Scaling GrainMate and ZFH Bags

On-farm demonstrations have been highly effective

- To date, at least 22 devices purchased by poultry farmers in Dormaa.
- Nearly all were purchased during or as a result of the demonstrations.

- Mean weight loss in a 50-kg polypropylene bag over 3 months is 5 kg (10%).
- To date, ~3,700 ZFH bags purchased by poultry farmers in Dormaa.
- There are currently pending orders.

EvansJones Poultry Farm

- Owned by Evans and Josephine Yeboah.
- Currently have maize in 1,750 ZFH bags.
- Need more ZFH bags.
- Marketing agents for ZFH bags.
- Their example has made marketing of ZFH bags easier among poultry farmers in Dormaa.

Next Steps

- Importation of 45,000 ZFH bags from Nigeria to meet increasing demand.
- Optimize distribution channels for ZFH bags.
- Increase use of hermetic bags by smallholder farmers in northern Ghana.

Limited use of hermetic bags in northern Ghana

- PICS bags being used in some Crop Aggregation Centers (CACs) in northern Ghana.
- In November and December 2019, 750 ZFH bags sold in northern Ghana.

Research Areas

- Assessing the performance of broiler birds raised on feed from maize stored in ZFH bags.
- Determining effectiveness of elevated platforms in reducing mycotoxin contamination in heaped maize in the field.
- Testing small-scale kernel sorting as an avenue to remove mycotoxin-contaminated maize.
- Promoting awareness and adoption of technologies by women and youth in the agriculture sector.
- Researching effective training methods to increase technology adoption.

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Improving Livelihoods of Smallholder Farmer Communities; with Innovative Post-Harvest Storage & an Inclusive Peer-To-Peer Micro Warehouse Grain Trading Platform.

Agrilinks Webinar; 04.30.2020

Dr. Georgina V Bingham; gvb@vestergaard.com

ZeroFly® by VESTERGAARD

VESTERGAARD
A HUMANITARIAN ENTREPRENEURSHIP

Mission: Vestergaard's innovation in disease control textiles is fueled by our humanitarian entrepreneurship to create a healthier planet.

ZeroFly® by VESTERGAARD

ZeroFly® Post-harvest Technology

ZeroFly® Storage Bag | by VESTERGAARD

A unique long-lasting protective packaging technology

Providing safe storage of grain & other edible commodities, developed over a decade of research & development

- ✓ Proven physical durability & protection against pests
- ✓ Improved nutritional content & food safety; WHO, FAO, EPA, FDA, EU
- ✓ Responsible pesticide usage: Unique formulation protects consumers, users & the environment
- ✓ Proven safety profile: Independent residue analysis & toxicological evaluation
- ✓ Confirmed protection & provision of safe storage: Independent field evaluations across key agro-ecological zones; validated by USAID FtF PHIL
  - ✓ Stops grain damage by key insect pests, rodent impact & aflatoxin proliferation; Protects seed viability & grain quality throughout storage period

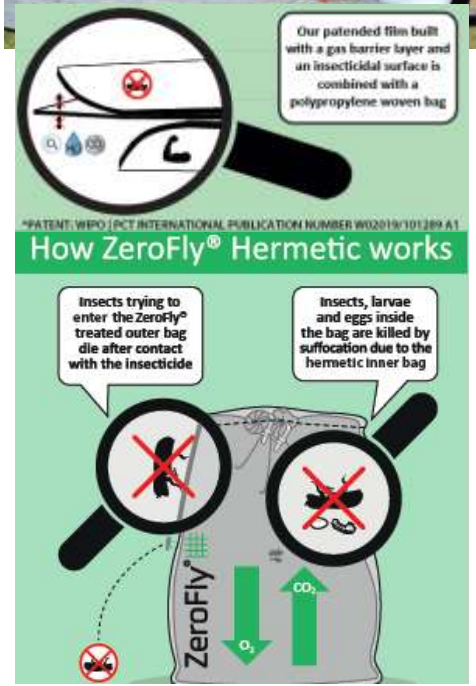
ZeroFly® by VESTERGAARD

New ZeroFly® Hermetic Storage Bags

Upgrading using ideas from food packaging industry:

Technology Plastic

- The insecticide coating technology protects the hermetic properties from insects
- The hermetic technology kills insects inside the bag & grain is not in direct contact with insecticide



Field Impact (1 yr) & USAID FtF PHLIL

Journal of Stored Products Research

Efficacy of phosphine and insect penetration ability in ZeroFly® bags

Field evaluation of the long-lasting treated storage bag, deltamethrin incorporated, (ZeroFly® Storage Bag) as a barrier to insect pest infestation

Journal of Stored Products Research

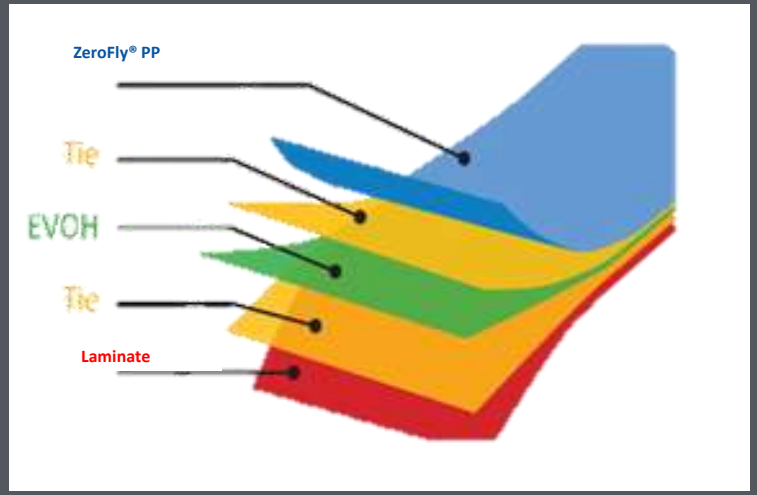
Assessing efficacies of insect pest management methods for stored bagged maize preservation in storehouses located in Nigerian markets

Effectiveness of the ZeroFly® storage bag fabric against stored-product insects

29-04-2020

ZeroFly® Hermetic Technology

Innovative approaches to cutting price & carbon footprint



New ways to introduce local production

THE PROBLEM

Smallholder farmers account for 3.8 billion of the world's population contributing 50% of all food calories produced globally.

Most of them are challenged by volatile market conditions and post-harvest losses of up to 20-40%.

What if

We could create a “micro warehousing” system that addressed these challenges by being:

– close to farmers everywhere (community based)
– run by local entrepreneurs or cash farmers
– cost efficient and CO2 friendly
– safe and easy to use
– decentralized
– highly scalable
– based on sharing profit back to farmer

Chombo®

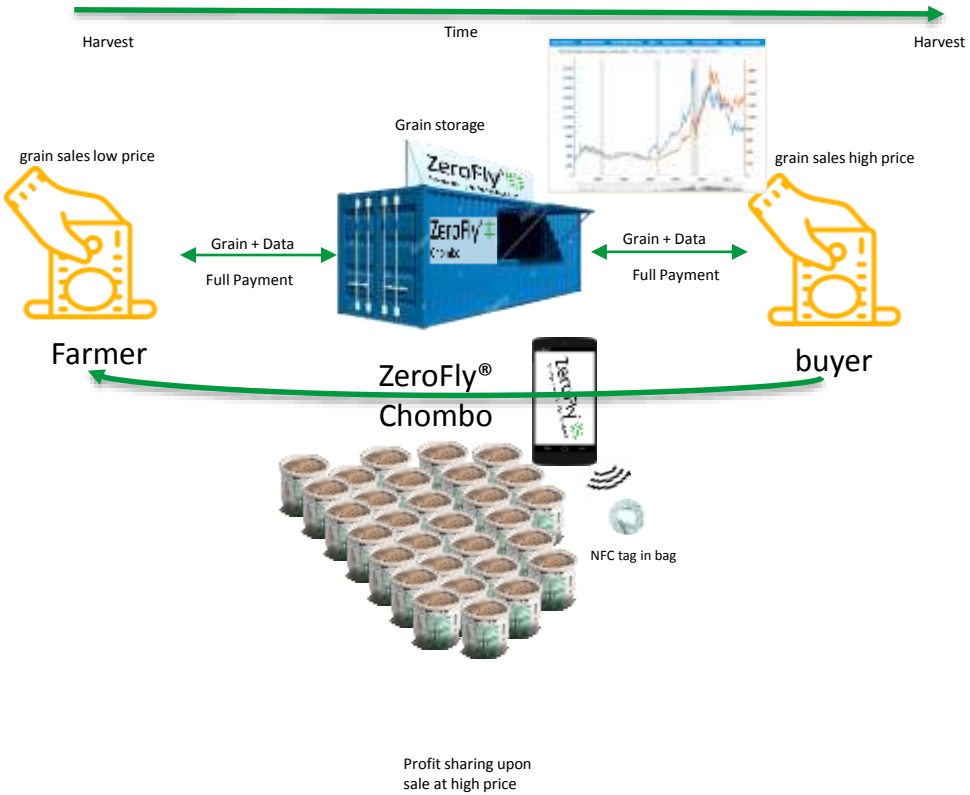
by VESTERGAARD

Micro Warehousing Platform

VESTERGAARD & Local Food Security Partnerships

Transforming agriculture for smallholder farmers

Simple ZeroFly® Chombo Actor Overview



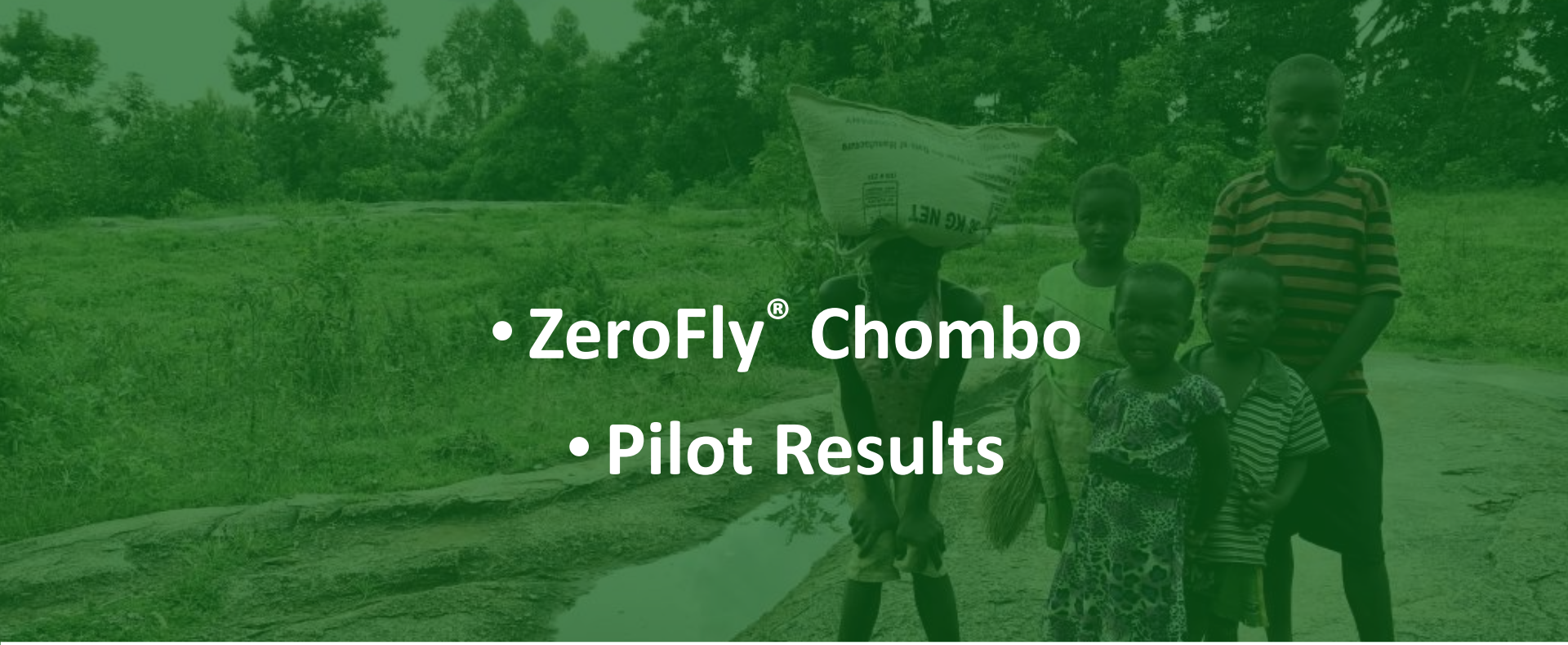
1. Farmer decides to sell his harvested grains
2. Goes to ZeroFly® Chombo owner - an independent entrepreneur signed up to our business model
3. ZeroFly® Chombo owner agrees with farmer quality, quantity and price and pay through app mobil money
4. ZeroFly® Chombo owner stores and later sells grains with profit
5. Profit is shared between ZeroFly® owner and farmer (e.g. 85-15)

- Farmer get what he normally gets when he wants to sell but get an additional share of the profits from the additional storage

- ZeroFly® Chombo owner gets a loyal supplier.

ZeroFly® by VESTERGAARD

PLATFORM
THE FARMER
THE ENTREPRENEUR
EARNS ADDITIONAL PROFIT FROM VALUE INCREASE
MAKES MONEY FROM RUNNING A MICRO WAREHOUSE
ZeroFly Chombo
SELL CROPS
BUY INSURANCE
BUY FERTILIZER
BUY SEEDS
ZeroFly Chombo
TRANSACTION COMPLETED
EARNS PROFIT FROM BUSINESS MODEL
ZeroFly Chombo
chombo



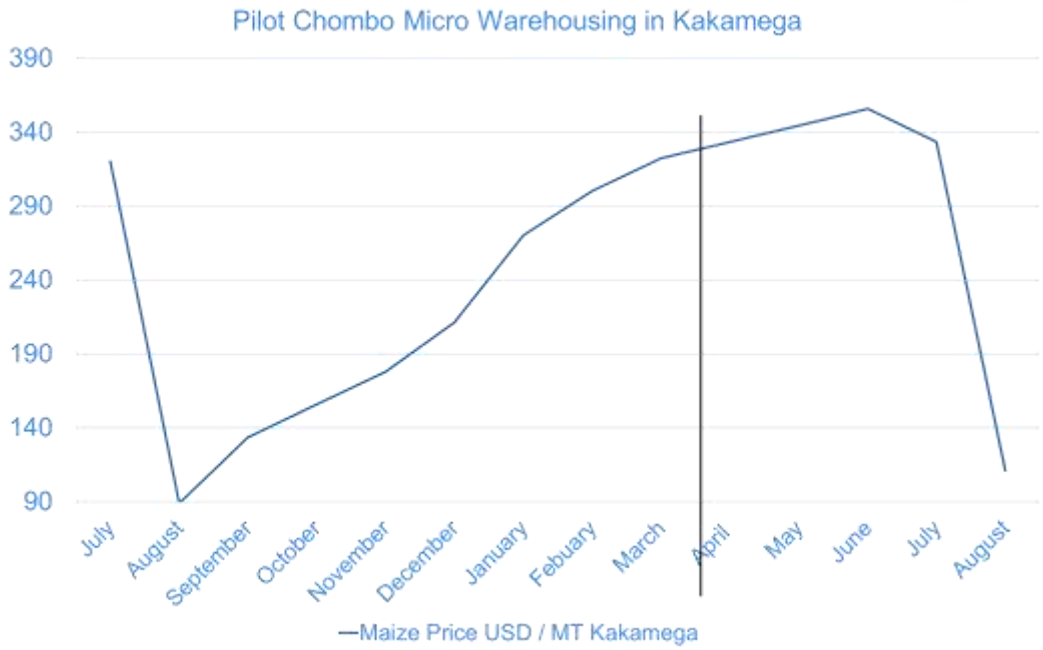
- ZeroFly® Chombo
- Pilot Results

Targeted smallholder farmers selling at harvest in Western Kenya

The Poverty Gap is limiting back small holder farmers...

- Vestergaard sponsored three local Chombo entrepreneurs
- Warehouses in 3 different locations in Kakamega County in W. Kenya
- Offered up to 10,000 USD interest free to buy grains & store in ZeroFly® Hermetic for one season then sell

- Buying price at harvest 2018:
  90 USD/ton
- Selling price in May 2019
  300 USD/ton
- **Profit: 210 USD/ ton**



Positive Social Impact Visions from a CSR Company at Heart

Partners are key to tackle targets based on the SUSTAINABLE DEVELOPMENT GOALS

- Together with the USAID FtF Innovation Lab partnerships we have merged research & private sector scaling potential

The key next steps are to

- **Establish a scaling business model**

→ 500-1,000 ZeroFly® micro warehouses

→ 2,000 micro-warehouses in 3 years

An introductory video can be found at:

Chombo Micro Warehousing Platform Youtube Video

Next Steps: Based on Sustainable Development Goal Driven Targets

- ✓ **Reduction of post-harvest losses** SDG 12.3: 11,000 to 27,000 mt of post-harvest losses prevented. Market size: 0.6 – 1.6 m mt of post-post-harvest losses.
- ✓ **Increased incomes for smallholder farmers** SDG 2.3: € 1.5m of increased income to smallholders with 20% profit share and a crop/ crop/ food commodity price increase of 50% (or 10% higher income income for smallholders).
- ✓ **Jobs for entrepreneurs in rural communities** SDG 8.3: € 5.6 m in annual EBIT for 2,000 rural entrepreneurs.
- ✓ **Food security improvements** SDG 2, health improvements SDG 3, improved community resilience SDG 9.1: Food security will be improved , and health improvements include prevention of aflatoxin aflatoxin intake or intake of harmful chemicals used to kill insects.

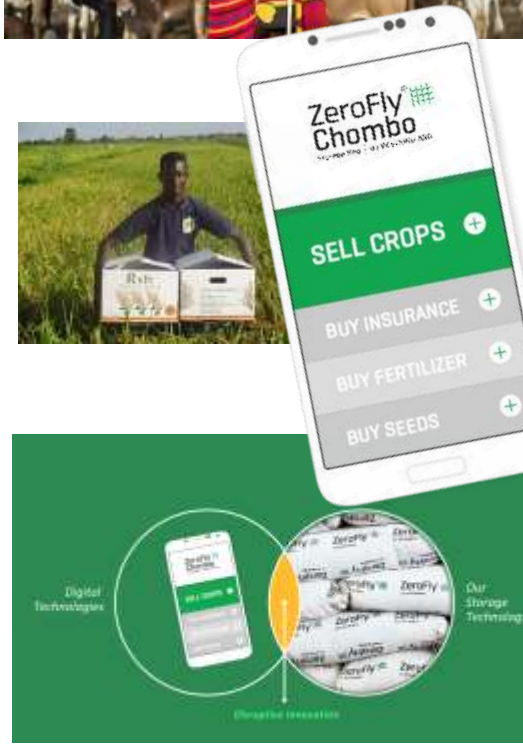


Photo: CIAT

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