Ghana PHLIL: Progress and Future Plans
### Major Season Maize Post-Harvest Losses in the Middle Belt of Ghana

<table>
<thead>
<tr>
<th>Activity</th>
<th>% Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field (Over-Maturity, Harvesting, Heaping)</td>
<td>5.0</td>
</tr>
<tr>
<td>Shelling or Threshing</td>
<td>1.5</td>
</tr>
<tr>
<td>Drying</td>
<td>0.5</td>
</tr>
<tr>
<td>Storage (Mold)</td>
<td>15.0</td>
</tr>
<tr>
<td>Storage (Insect Pests)</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30.0</strong></td>
</tr>
</tbody>
</table>
### Minor Season Maize Post-Harvest Losses in the Middle Belt of Ghana

<table>
<thead>
<tr>
<th>Activity</th>
<th>% Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field (Over-Maturity, Harvesting, Heaping)</td>
<td>6.0</td>
</tr>
<tr>
<td>Shelling or Threshing</td>
<td>1.0</td>
</tr>
<tr>
<td>Drying</td>
<td>0.2</td>
</tr>
<tr>
<td>Storage (Mold)</td>
<td>2.0</td>
</tr>
<tr>
<td>Storage (Insect Pests)</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19.2</strong></td>
</tr>
</tbody>
</table>
Key Accomplishments in 2016 and 2017
Postharvest Loss Mitigation Workshop — January 10–12 2017, CSIR-Crops Research Institute and PENS Food Bank
Postharvest Loss Mitigation Workshop — January 2017

- A three-day workshop in the Middle Belt.
- Four US Institutions of Higher Education, USDA-ARS CGAHR, KNUST, PENS Food Bank, a representative from SAWBO and the Ghana ICC conducted the workshop.
- The 43 participants were personnel from Ministry of Food and Agriculture Extension, Non-Ministry Extension (ADRA), Private Company Extension, and Traders.
- Thirty-eight of the participants documented their sex on the evaluation, 12 were women and 26 were men.
Lecture-Type and Hands-On Instruction Indoors
Field Training on PHL Mitigation Technologies in Ejura
Field Training on PHL Mitigation Practices in Ejura
Solar Biomass Hybrid Dryer (SBHD)

- Two new 5-MT solar biomass hybrid dryers (SBHDs) constructed in Wenchi and Jamasi by Mr Joe Akowuah, KNUST Agric. Engineer.

- Wenchi SBHD funded by the USDA-FAS Scientific Cooperation Research Program (SCRP); Jamasi SBHD funded by Assisting Management in the Poultry and Layer Industries by Feed Improvement and Efficiency Strategies (AMPLIFIES) project.

- Two prototypes of 1-MT portable SBHD produced by Mr Joe Akowuah and Mr. Peter Evans Nsiah.

- The GIZ-funded Green Innovation Center has submitted a procurement request, awaiting approval formalities by the Ghana Government, for the construction of 20 mobile 1-MT SBHDs.
Wenchi Dryer — 2016  

Jamasi Dryer — 2017
PHL Moisture Meter
PHL Moisture Meter

• Title of manuscript submitted to ASABE — Development and evaluation of a low cost probe-type instrument to measure the equilibrium moisture content of grain

• 20 PHL moisture meters have been ordered by the Ghana Grains Council.

• The GIZ-funded Green Innovation Center has submitted a procurement request for 30 PHL moisture meters, awaiting approval formalities by the Ghana Government.

• To meet these orders, KNUST will start producing PHL meters locally, with training from Paul Armstrong (USDA-ARS CGAHR).
First All-Africa Post-Harvest Congress and Exhibition
(March 28–31, 2017 Nairobi, Kenya)
First All-Africa Post-Harvest Congress and Exhibition Conference

Enoch Osekre, Samuel McNeill, George Opit, and Jagger Harvey attended.

1. Influence of moisture content on insect pests and mycotoxin levels of maize in farms in the Northern Region of Ghana.

2. Moisture content, insect pests, mycotoxin levels in maize in three districts in the Middle Belt of Ghana.


4. Development of a low-cost moisture meter for the grain trade.
Publication of Research Data

• Two publications in peer reviewed journals.
• Three publications currently submitted to peer reviewed journals.
• Seven manuscripts in preparation.
Collaboration with Vestergaard Frandsen has helped produce a new generation of more effective ZeroFly bags, the ZeroFly® Hermetic bag.
Two MPhil in Entomology students successfully defended their theses at Kwame Nkrumah University of Science and Technology — Ms. Naomi Manu and Mr. James Kofi Danso
Theses Titles

**Naomi:** Insect infestation, Moisture Content and Mycotoxin Levels of Maize (*Zea mays* L.) in Four Districts in Northern Region of Ghana

**James:** Insect Pests and Mycotoxin Levels of Maize (*Zea mays* L.) On-Farm, in Markets and Stores in the Middle Belt of Ghana
Assisting Management in the Poultry and Layer Industries by Feed Improvement and Efficiency Strategies (AMPLIFIES) PHL Mitigation Training (TOT) CSIR-CRI, Kumasi, March 21–23, 2017

Ghana PHLIL training materials used as blueprints for the training and AMPLIFIES training manual preparation
Past and Current Challenges

- Lack of successful collaborations with other USAID-funded projects operating in Ghana.
- Existing supply chains for some of the PHL mitigation technologies not working as well as desired (PICS, ZeroFly Hermetic, GrainPro SuperGrain Bags, and ZeroFly Storage Bags).
- Lack of supply chains for technologies such as the PHL meter and SBHDs (1- and 5-MT).
- Lack of resources for identifying and engaging innovators and early adopters of the PHL mitigation technologies that have been proven practical.
Plans for 2018

• Conduct a postharvest loss mitigation workshop in January 2018.

• Publication of all manuscripts.

• Continue to work with the Green Innovation Center and others to increase awareness and adoption of PHL mitigation technologies.

• Efficient assembling of PHL moisture meters at KNUST.
The **technology adoption lifecycle** is a sociological model that describes the adoption or acceptance of a new product or innovation.

The model indicates that the first group of people to use a new product is called "innovators," followed by "early adopters".

- Innovators – had larger farms, were more educated, more prosperous and more risk-oriented
- Early adopters – younger, more educated, tend to be community leaders, less prosperous
Focus Areas for Potential Greatest Impact After 2018

Sustainable recurrent capacity building that targets all stakeholders along the maize value chain

**Figure I-1. Ghana: Post-Harvest Loss and Mitigation**

**Pre-Harvest losses from:**
- Insect, molds and birds
- Harvesting & handling
- Fire

**Post-Harvest losses from:**
- Molds, insects & rodents
- Handling & transport

**Problems:**
- Grain spoilage
- Mycotoxin contamination
- Quality loss
- Market value loss

**On-Farm Intervention:**
- Timely harvest
- On-farm storage
- Timely off-field transport

**Post-Harvest Intervention**
- Timely drying
- Timely and appropriate shelling and cleaning
- Timely handling/transport
- Grain & pest management
- Grading and Sorting
- Improved logistics

**Post-Harvest Intervention**
- Provide recurrent training to staff in warehouse operations management through a certified training and licensing program for warehouse operators and staff.
- Grain & pest management
- Improved logistics

**Post-Harvest Intervention**
- Provide recurrent training to staff in grain facilities operations management through a certified training and licensing program for facilities operators and staff.
- Grain & pest management
- Improved logistics

**Post-Harvest losses from:**
- Poor receiving operations
- Poor quality grading system
- Poor stored grain management
- Poor supply chain management
- Poor marketing strategy

**Product quality losses from:**
- Poor in-house storage
- Poor supply chain logistics/mgt
- Poor storage during marketing
- Poor end-use storage/mgt

**Target end-use as Food and Feed**
Focus Areas for Potential Greatest Impact after 2018

- Increasing adoption of the PHL mitigation technologies identified as practical and most impactful.
- Facilitation of data collection, increased awareness, and ultimate widespread adoption of Aflasafe and Aflasafe-based integrated aflatoxin management.
- Continue to build collaborations with the public and private sectors.
Acknowledgements

• Ghana PHLIL team.
• KSU leadership team.
• USAID/Ghana Mission Office — Office of Economic Growth.