



# **Overview of Ghana Value Chain** US - <u>NCSU</u>, UGA, UFL, UC, VT

# Ghana - SARI, CRI, KNUST

## **Project Objectives**

Village studies (field, drying, storing)

Detailed studies (field, drying, storing, processing)

Variety development

Outreach and delivery

Farmer practices and surveys

Storing and processing

Graduate student education







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# Mycotoxin Contamination Food Safety









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Figure 2 Aflatoxin and disease pathways in humans. Source: Wu (2010).







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# **PRE Harvest POST Harvest** Drying Storing [local bank] Food safety Quality **Markets**









# Summary of Village Trials Crops Research Institute Yield, Aflatoxin, Good Kernels, Economic Return









# The Village Value Chain Brief Description

- Five village clusters
- 2-3 years
- 12 farmers per village

# 2 ×2 ×2 Factorial

- Field (FP versus IP)
- Drying (FP versus IP)
- Storage (FP versus IP)

Yield, Aflatoxin, Economic return, Farmer surveys (PMIL, Spillover, Control group)









# **Abbreviations and Interventions**

F = Field, D = Drying, S = Storage

## FPs = Farmer practices

- Field No fertilizer and one weeding
- <u>Dry</u> Ground
- Store Poly bag

## *IPs = Improved practices*

- Field Calcium, local soap, extra weeding
- <u>Dry</u> Tarp
- Store Sealed bags









### Aflatoxin Contamination (ppb) in the Field Note scale in ppb Farmer Practice Only











### Aflatoxin Contamination (ppb) after Drying Note scale in ppb Farmer Practice Only











### Aflatoxin Contamination (ppb) after Storing Note scale in ppb Farmer Practice Only











### Good Kernels after Storing (g/500g) Farmer Practice Only









# Field Response – Yield (kg/ha) and Aflatoxin Contamination (ppb)Note scale in ppbData are pooled over 6 trials







Significant at  $p \le 0.05$ 







## Drying Response – Aflatoxin Contamination (ppb) Note scale in ppb Data are pooled over 6 trials











### Storing Response – Aflatoxin Contamination (ppb) Data are pooled over 6 trials











## Storing Response – Good Kernels (g/500g) Data are pooled over 6 trials











### Economic Returns (cedis/ha)

Yield Adjusted to Approximate Country Average

Data are pooled over 6 trials









# PI may be considered an expert – by accident

# Preventing mycotoxin contamination in groundnut cultivation

David Jordan, Rick Brandenburg and Gary Payne, North Carolina State University, USA; David Hoisington, Nick Magnan and James Rhoads, The University of Georgia, USA; Mumuni Abudulai, Savanna Agricultural Research Institute, Ghana; Koushik Adhikari and Jinru Chen, The University of Georgia, USA; Richard Akromah, William Appaw and William Ellis, Kwame Nkrumah University of Science and Technology, Ghana; Maria Balota and Kumar Mallikarjunan, Virginia Polytechnic Institute and State University, USA; Kenneth Boote and Greg MacDonald, University of Florida, USA; Kira Bowen, Auburn University, USA; Boris Bravo-Ureta and Jeremy Jelliffe, University of Connecticut, USA; Agnes Budu, University of Ghana, Ghana; Hendrix Chalwe, Alice Mweetwa and Munsanda Ngulube, University of Zambia, Zambia; Awere Dankyi and Brandford Mochia, Crops Research Institute, Ghana; Vivian Hoffmann, International Food Policy Research Institute, USA; Amade Muitia, Mozambique Institute of Agricultural Research, Mozambique; Agnes Mwangwela, Lilongwe University of Agriculture and Natural Resources, Malawi; Sam Njoroge, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) (ICRISAT), Malawi; David Okello, National Semi-Arid Resources Research Institute (NaSARRI), Uganda; and Nelson Opoku, University for Development Studies, Ghana







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# The Global Food Security Strategy USAID – Feed the Future

## **Ghana Country Plan - Program Components**

Enhance agricultural productivity and profitability

- Strengthen competitive market systems
- Increase access to finance
- Promote resilience
- Optimize economic inclusion
- Improve nutrition
- Advance country leadership (Policies and Institutions)
- Washington/Regional investments that complement GFSS







# **Enhance Agricultural Productivity and Profitability**

# Maize intercropped or rotated with soybean, groundnut, or cowpea

## Digital tools and technologies

Drought resistance varieties and seed distribution

Pro-Vitamin A Maize

In-date pesticides and biocontrols with stewardship

Aflatoxin mitigation

Fall armyworm management







# **New Project**

Farm-size comparisons of technologies based on PMIL results

Purity and quality of seeds in local markets

Rotation and management inputs Low, Moderate, High Input Packages

- Peanut Risk Tool for Ghana (and Malawi)
- Groundnut Working Group (APRES model)









# **Agricultural Diversification in Malawi**

- USAID Feed the Future
- Palladium and Peanut Innovation Lab (UGA)
- ICRISAT
- LUANAR, DARS-Chitedze
- North Carolina State University
- Limbe Leaf
- Pyxus







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# Agricultural Diversification in Malawi

- Demand for tobacco decreasing
- Demand for quality of tobacco increasing
- Over production leads to lower price
- Alternatives to tobacco
- Greater diversification in cropping systems considered positive but requires greater management
- North Carolina and Malawi (tobacco and peanut)









# Ag Diversification in Malawi (2018) Peanuts 101

Digging and harvesting peanut Minimizing aflatoxin in peanut

# Ag Diversification in NC (early 2000s) Peanuts 101 Digging and harvesting peanut







#### Peanut Acreage in North Carolina

| County      | 1991   | 1999   | 2004   | 2010  | 2015-17 |
|-------------|--------|--------|--------|-------|---------|
| Northampton | 27,740 | 20,465 | 4,211  | 3,287 | 4,543   |
| Halifax     | 26,690 | 20,490 | 10,604 | 4,784 | 7,022   |
| Bertie      | 22,420 | 16,480 | 12,654 | 8,297 | 8,687   |
| Martin      | 17,120 | 13,330 | 12,650 | 8,651 | 8,046   |
| Hertford    | 14,680 | 10,705 | 7,148  | 3,987 | 3,048   |
| Edgecombe   | 14,830 | 12,335 | 12,196 | 7,640 | 5,559   |
| Chowan      | 6,735  | 5,405  | 6,962  | 3,600 | 2,676   |
| Gates       | 7,690  | 6,225  | 6,791  | 3,054 | 2,927   |
| Perquimans  | 3,235  | 2,910  | 4,659  | 1,102 | 647     |
| Pitt        | 5,680  | 4,380  | 4,715  | 3,098 | 7,637   |
| Bladen      | 4,430  | 2,925  | 6,164  | 4,947 | 5,546   |
| Columbus    | 1,040  | 695    | 2,879  | 4,959 | 6,183   |
| Sampson     | 345    | 265    | 1,857  | 4,665 | 5,602   |
| Duplin      | 10     | 10     | 1,405  | 3,450 | 6,830   |











![](_page_28_Picture_4.jpeg)

![](_page_28_Picture_5.jpeg)

### Malawi – 700 lbs/acre NC – 4000 lbs/acre Quality and food safety

![](_page_28_Picture_7.jpeg)

![](_page_28_Picture_9.jpeg)

![](_page_29_Picture_0.jpeg)

# Optimizing Yield and Minimizing Aflatoxin in Ghana and Malawi

- Plant as soon as possible when rains begin
- Establish groundnut at a distance of 8 cm apart
- Protect groundnuts from pests
- Establish optimum pH and fertilize groundnut
- Apply calcium at peak flowering
- If drought is present at harvest, dig groundnut 5-7 days before optimum maturity
- Dry groundnut as quickly as possible

Store groundnut at optimum moisture content

![](_page_29_Picture_11.jpeg)

![](_page_29_Picture_12.jpeg)

Response to gypsum and inoculant is pH dependent... Maybe you need to remind NC growers of this basic principle...

![](_page_30_Picture_0.jpeg)

![](_page_30_Picture_1.jpeg)

![](_page_30_Picture_2.jpeg)

![](_page_30_Picture_3.jpeg)

![](_page_30_Picture_4.jpeg)

![](_page_31_Picture_0.jpeg)

![](_page_31_Picture_1.jpeg)

# **Segments of the Farming Community**

- Small-holder farmers
- **Commercial farmers**
- People getting left behind (spillover?)
- What will drive it forward?
- Access to knowledge
- Access to inputs and the credit to purchase inputs
- Cooperatives
- Safety nets

![](_page_31_Picture_11.jpeg)

![](_page_31_Picture_12.jpeg)

![](_page_32_Picture_0.jpeg)

# Perspective

So, you are paid to support North Carolina peanut farmers, are you sure you are not helping create competition?

# That's a great and valid question...

Peanut research and extension at NC State is well supported by NCPGA and NPB, put acreage is relatively low and check off funds are limited

Very applied research/extension program

Funds from *Peanut Innovation Lab* projects have dual value (Risk Tool, graduate student programs, operating funds)

Helps maintain a peanut focus

Involvement is creating value to NC farmers

![](_page_32_Picture_10.jpeg)

![](_page_32_Picture_11.jpeg)

![](_page_33_Picture_0.jpeg)

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Peanuts are important! Look how much soil that one plant is holding back! Maybe it was diverting the water?

![](_page_33_Picture_4.jpeg)

![](_page_33_Picture_5.jpeg)