USAID FROM THE AMERICAN PEOPLE HORTICULTURE INNOVATION LAB UCDAVIS UNIVERSITY OF CALIFORNIA

We build international partnerships for fruit and vegetable research to improve livelihoods in developing countries.

Importance of Horticultural Research for International Development

Dr. Elizabeth Mitcham, Director
Horticulture Innovation Lab
University of California, Davis

Food Security – Worldwide

- Access to sufficient, safe, nutritious food
- Meets dietary needs for an active and healthy life
- Hidden Hunger – Malnutrition
  - 2–3.5 billion lack vitamins and minerals (28–50%)
  - Stunts the mental and physical capacity of individuals
  - Robs the poor of a healthy, productive life
- Essential to unlock the potential for human development and economic growth over time

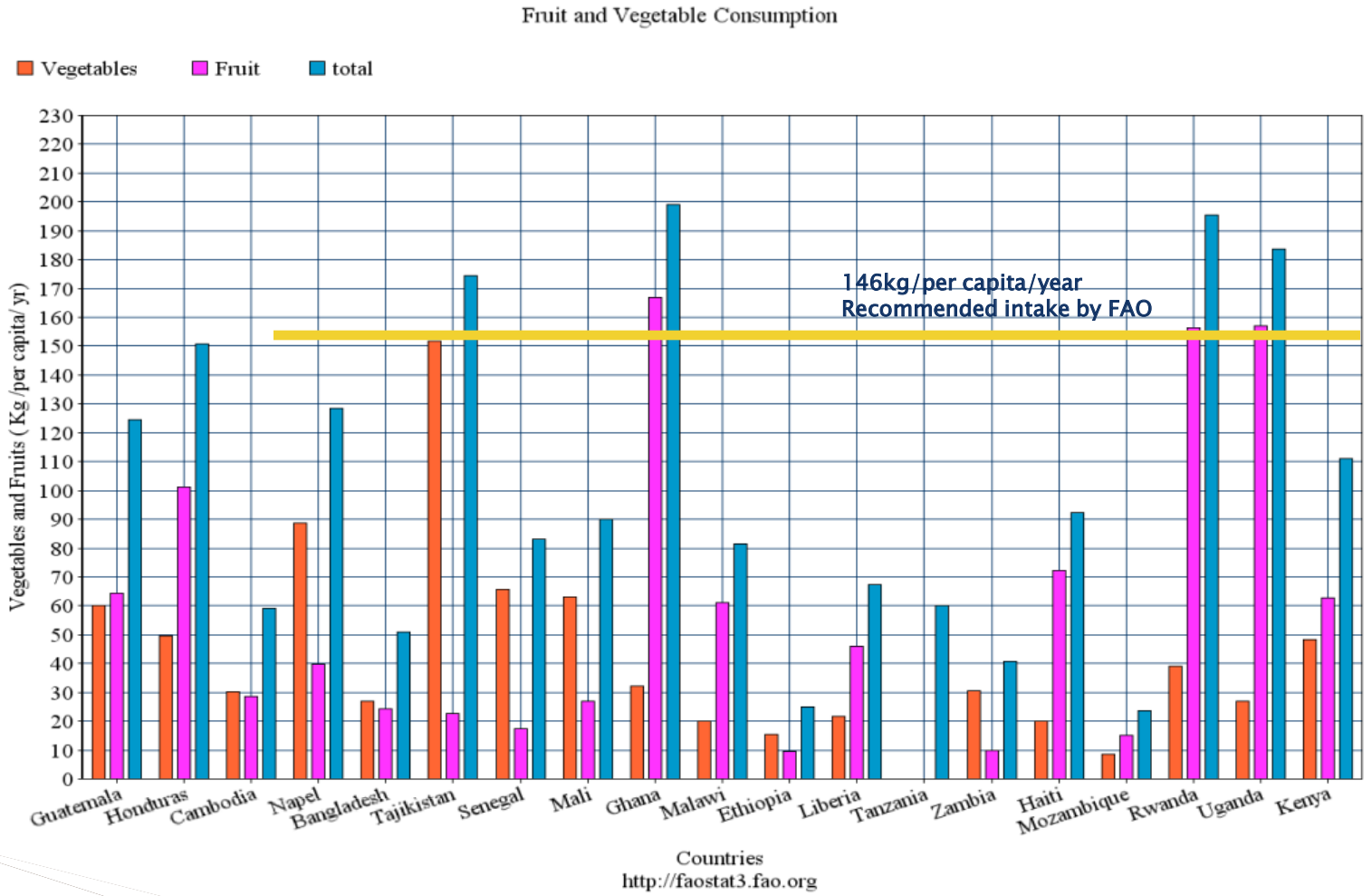
Feed the Future

What role can horticulture play?

- High value crops – income generation and diversification
- Intensive farming on small plots possible
- Nutritional benefits of diet diversification
- Women are heavily engaged in horticulture crop production and marketing

Global Horticulture Assessment
http://horticulture.ucdavis.edu/main/background.html

Consumption of Horticultural Products Remains Very Low in Much of the Developing World



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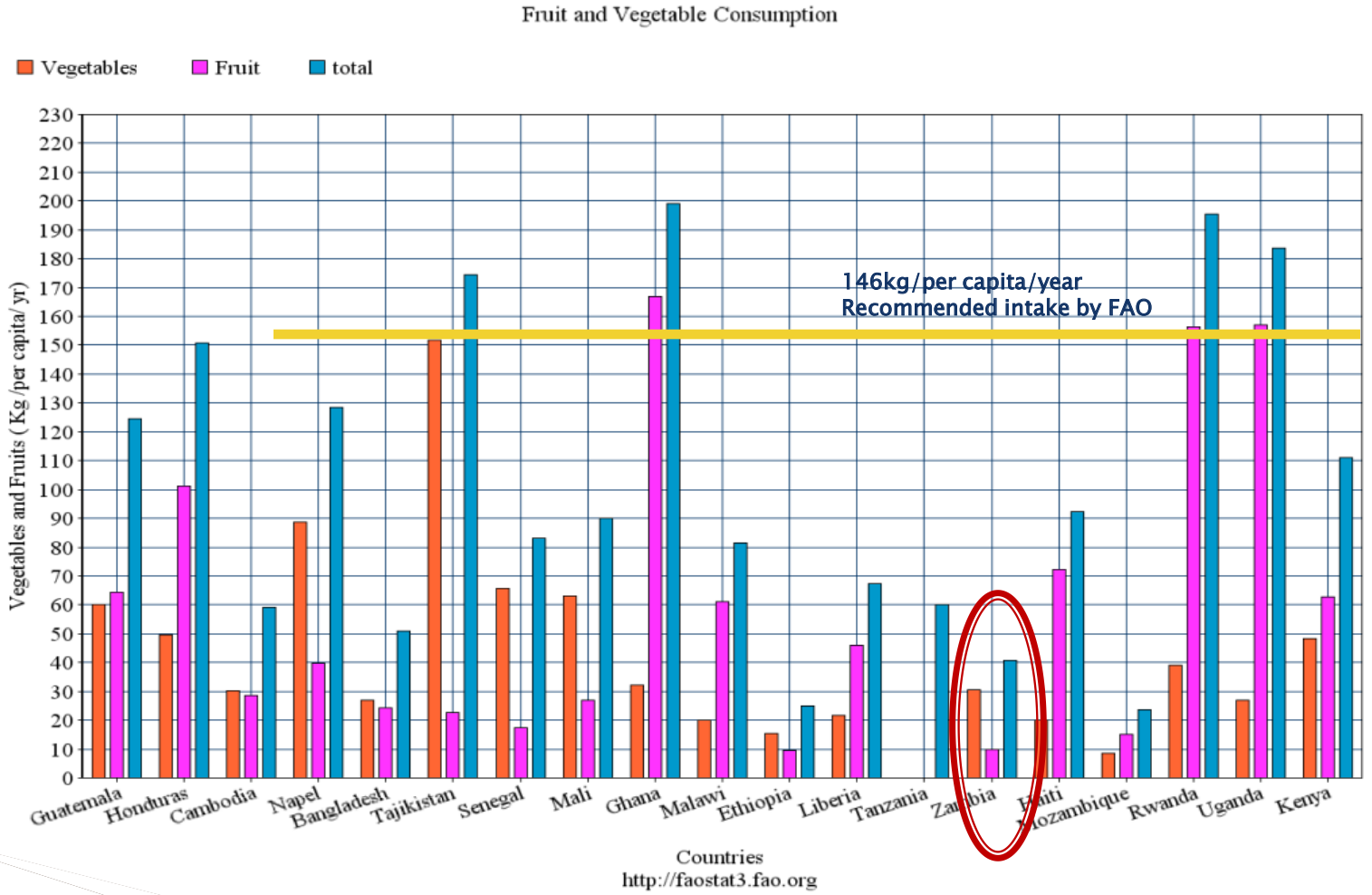
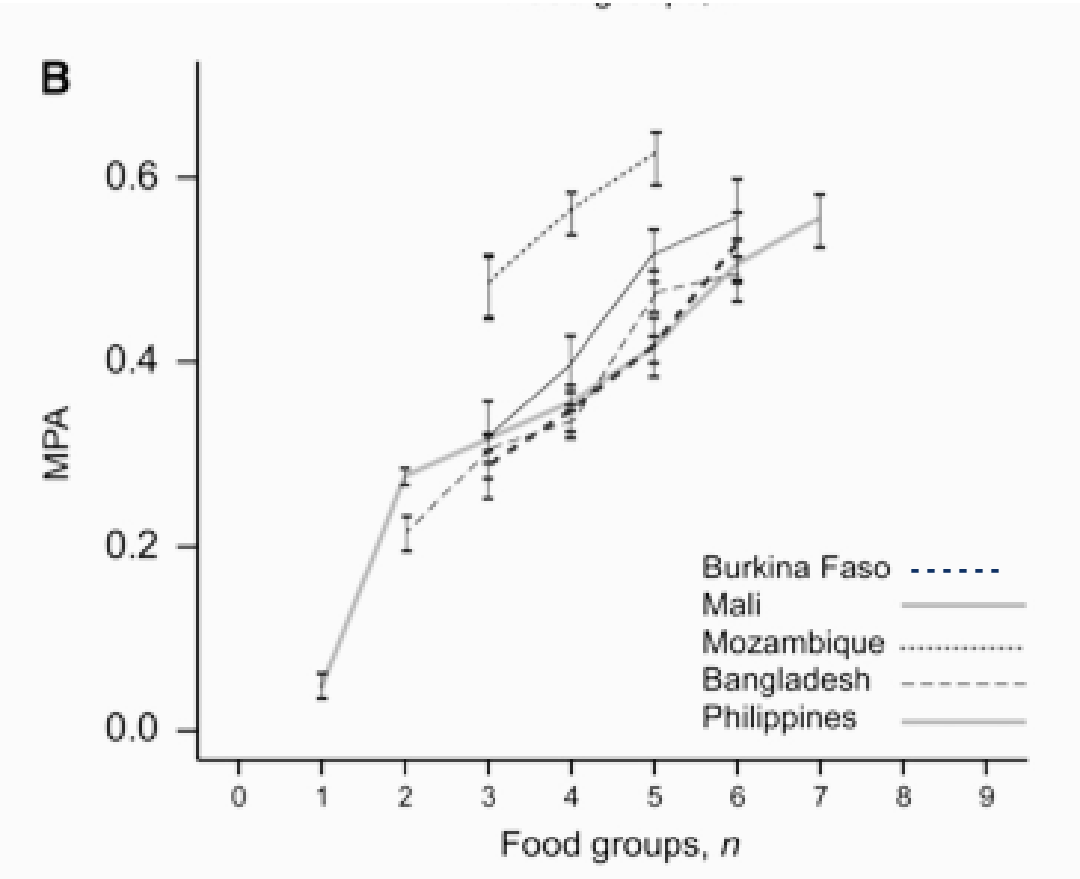


The more diverse the diet, the better the chance of adequate nutrition

Dietary diversity has been associated with nutrient adequacy and nutritional status (independent of socioeconomic status)

MPA = Mean probability of adequacy



- Low dietary diversity is linked to higher rates of malnutrition among infants and young children
- Improving on-farm crop diversity through horticulture increases the likelihood that a family will diversify their diet
- Nutrient-dense foods, including fruits and vegetables, are necessary for optimal mental and physical growth throughout development

(Arimond & Ruel, 2004; Arimond et al., 2010; Ruel, 2003)

IFPRI Discussion Paper 01346

April 2014

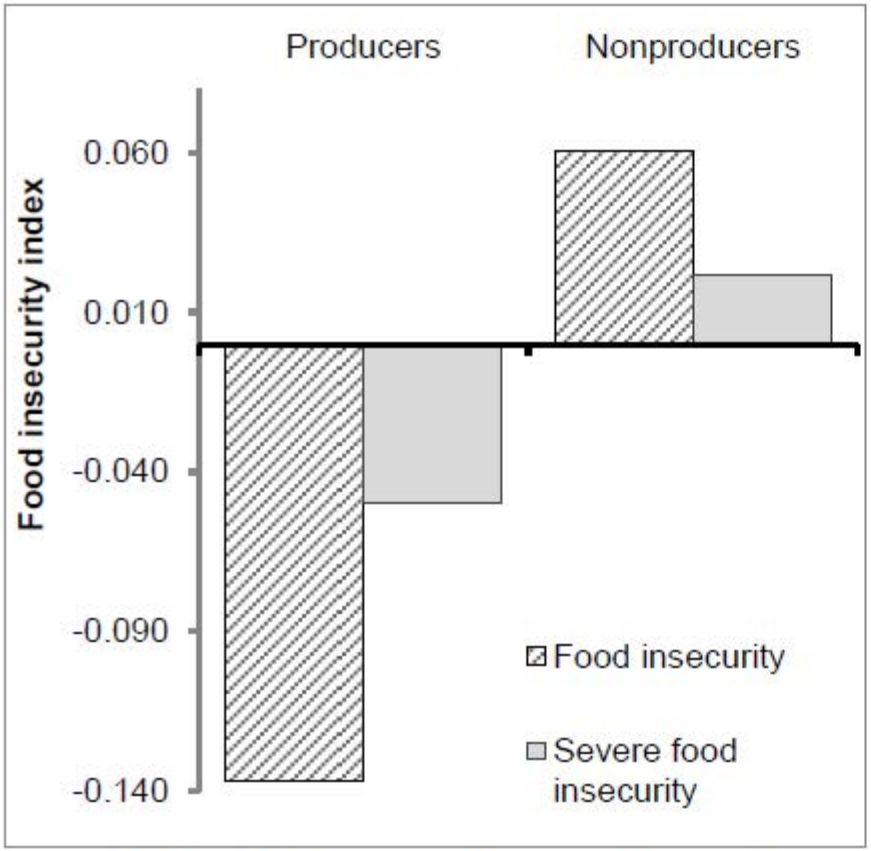
Can Smallholder Fruit and Vegetable Production Systems Improve Household Food Security and Nutritional Status of Women?

Evidence from Rural Uganda

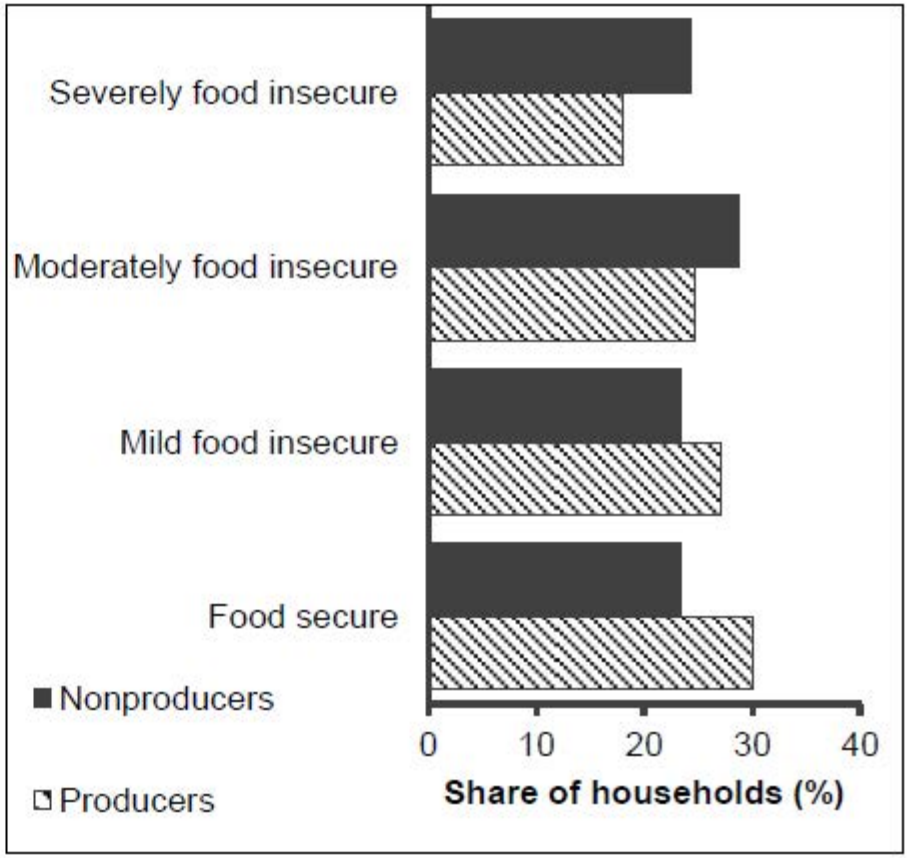
Nassul Kabunga

Shibani Ghosh

Mean Relative Food-Insecurity Scores by Fruit and Vegetable Production Status



Proportion of Food-Insecure Households by Fruit and Vegetable Production Status



Source: Author calculations based on survey data (2012).

IFPRI and Nutrition Innovation Lab, 2014

Why has horticulture not been a focus?

- Perishable crops
- Knowledge intensive/Lack of knowledge
- Lack of market-linkages
- Inability to store
  - Lack of cold-chain
  - Lack of dry-chain (for staple crops too)
- Considered too difficult for poorest farmers

In 2009, USAID initiated the Horticulture Innovation Lab

- Managed by the University of California, Davis
- University of Florida, North Carolina State & University of Hawaii Manoa (partners)
- Focused on the entire value chain
- Themes
  - Information Accessibility
  - Technological Innovation
  - Gender Equity

Research Needs for Horticulture

- Variety testing and adaptation
- Pest and disease control
- Protected culture and irrigation
- Climate resilience
- Appropriate technologies
- Postharvest and storage
- Market linkages
- Socioeconomic factors

Focal Areas for Horticulture Innovation Lab

- Horticultural value chain research
- Innovation and scaling
- Capacity building
- Nutrition sensitive horticulture
- Empowering women and the most vulnerable
- Sharing information

Highlights of Horticulture Innovation Lab Projects

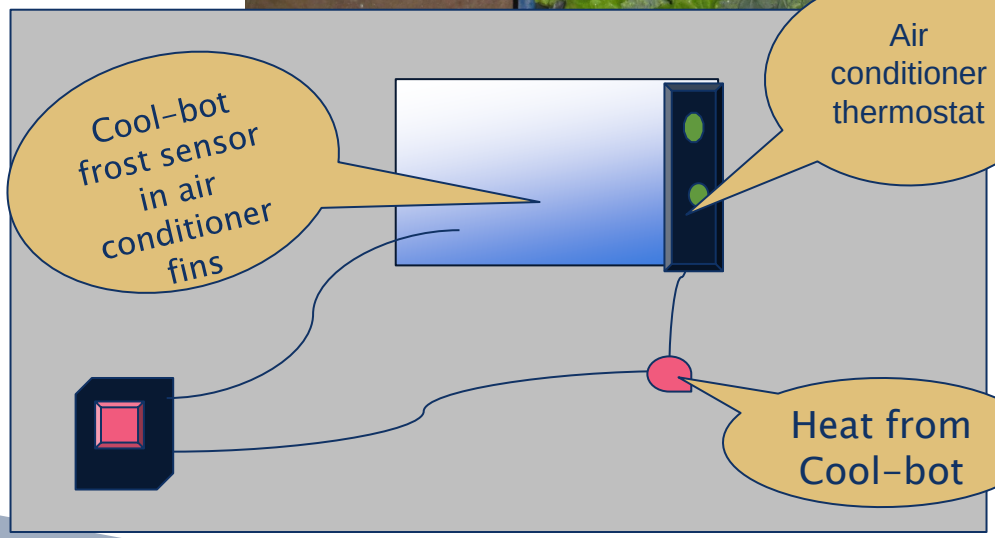
Strengthening the value chain for indigenous vegetables

- Improving the African indigenous vegetable value chain
  - Varieties
  - Production practices
  - Marketing
  - Nutritional value

Linking farmers to markets in Zambia

- Linking new woman farmers to buyers at local hotels and supermarkets
- Strengthening production practices and the postharvest value chain

CoolBot and Cold Rooms



Potato Storage in Bangladesh

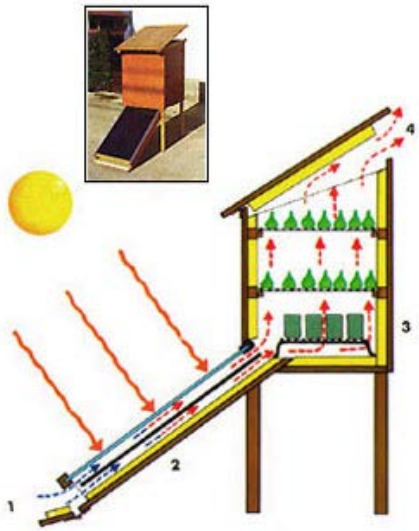
We have compared CoolBot cold rooms with simple ‘ambient’ storage rooms

Ambient

CoolBot with AC

Solar Drying

- Drying horticultural crops
  - Adds value
  - Use for excess product
  - Provides off-season nutrition
- Solar drying
  - Cabinet dryers are common

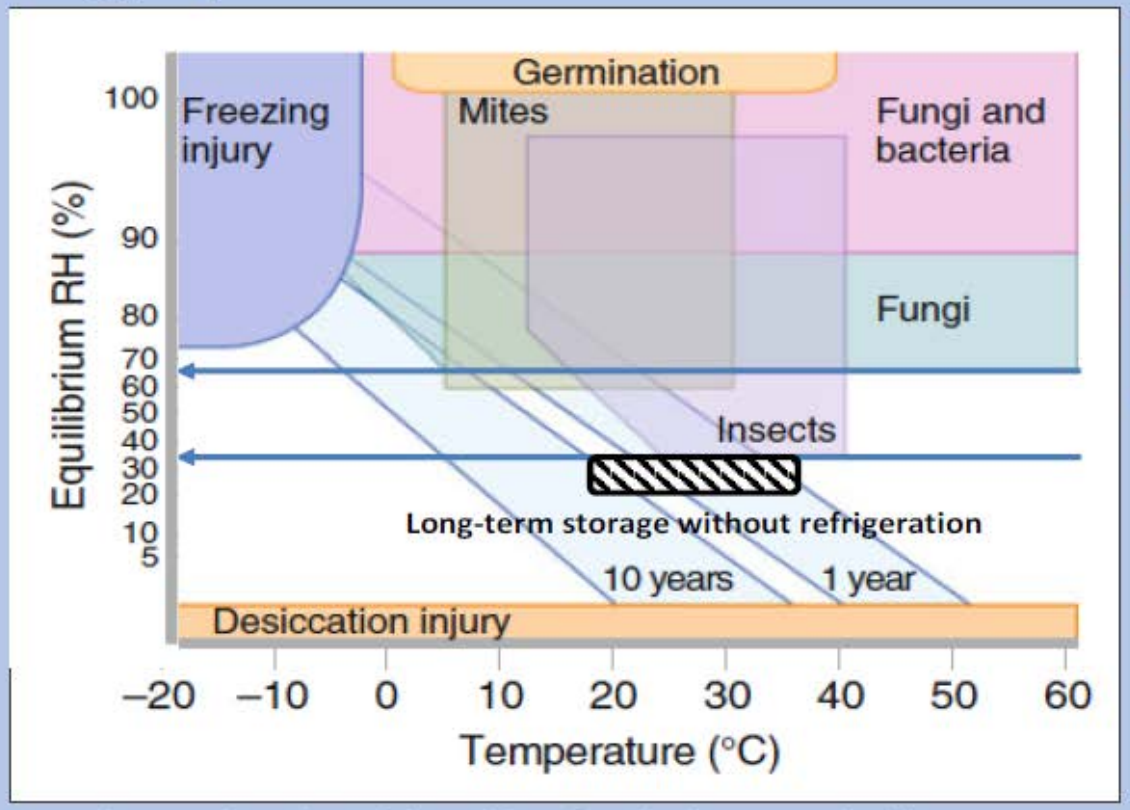


Horticulture Innovation Lab Chimney Dryer

- Inexpensive
- Efficient
- High air speed

Dry Chain Concept
Get it Dry – Keep it Dry

Storage problems are reduced at low moisture



Based on EH Roberts (1972) The Viability of Seeds. Chapman and Hall.

Courtesy of K. Kunusoth

Critical to Prevent Aflatoxin Development

Seed drying beads

- High humidity reduces seed viability and encourages aflatoxin development and insect activity
- Drying beads
  - Made of special type of zeolite clay that absorbs water
  - Can be reused indefinitely
  - Can be used for seeds and food products
- Can dry products to very low moisture content
- Increased yield and germination/no aflatoxin or insect damage

Keeping seed dry improves germination

- Most vegetable seeds dried with the beads germinated better than those dried in the sun

Various Application Methods

- 1.6 liter DryBox
- 8.0 liter DryBox
- 16.0 liter DryBox
- 50 liter DrumDry
- 100 liter DrumDry

Regional Centers

- Build connections between regional horticultural players
- Established in recognized regional institutions
- Regional foci for Horticulture Innovation Lab activities
  - Training
  - Research
  - Outreach
  - Information

Horticulture Innovation Lab Regional Centers

- Central America
  - Zamorano University, Honduras
- Southeast Asia Center
  - Kasetsart University, Thailand
- Africa Center – under development

We were innovation before innovation was cool!

Current focus of the Horticulture Innovation Lab

- Small-scale coolroom
- Solar drying
- Vegetable grafting
- Gender impacts of horticulture
- Seed drying beads/ Dry Chain
- Pest exclusion nets
- Nutritional benefits of indigenous vegetable production/marketing
- Irrigation and water systems
- Conservation agric. for vegetables
- Improved postharvest practices

New Project: Horticulture for Nutrition

- Indigenous vegetables in Kenya and Zambia
- Enhance value chain
- Promote demand
- Determine impacts on market price, availability and household consumption (dietary diversity)

Improving Nutrition and Income of Smallholder Farmers in Eastern Africa using a Market Driven Approach to Enhance Value Chain Production of African Indigenous Vegetables 2015-2020.

Led by: **Rutgers University (Jim Simon, PI)**
Co-PI's: **Dan Hoffmann, Ramu Govindasamy (Rutgers)**
Steve Weller, (Purdue University)

Zambia: ASNAPP-Zambia; Catholic Relief Services, MAWA; Univ. of Zambia

Kenya: AMPATH, Family Preservation Initiative, Eldoret Univ. & KALRO

Tanzania: World Vegetable Center

Program Objectives

Determine best management practices for AIV production; increase capacity and access to nutritional aspects AIVs

Promote availability and demand for AIVs

Verification of '*Nutrient –Rich Status*' of fresh and processed AIVs as they are consumed

Evaluate impact of AIV program for increased access to and consumption of AIVs

Final Data Analyses and Report Dissemination

Increased:
Access
Availability
Affordability
Adoption

Impact of Interventions on Nutrition

- In both Kenya and Zambia, one intervention and one control community selected
- For each community, 200 households randomly selected (400 AIV; 400 Control)

Intervention (200 households)		Control (200 households)	
Baseline nutrition, income and purchasing surveys		Baseline nutrition, income and purchasing surveys	
BCC (100 households)	No BCC (100 households)	BCC (100 households)	No BCC (100 households)
Follow-up surveys	Follow-up surveys	Follow-up surveys	Follow-up surveys

Horticulture Innovation Lab Future Project Calls in 2017 & 2018

- USAID Mission service projects (4) in 2017 & 2018
- Additional projects (2017 & 2018)
  - Possible topics: Mixed animal agriculture, value chains, food safety, and capacity building

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Thank you!

For more information:

http://horticulture.ucdavis.edu

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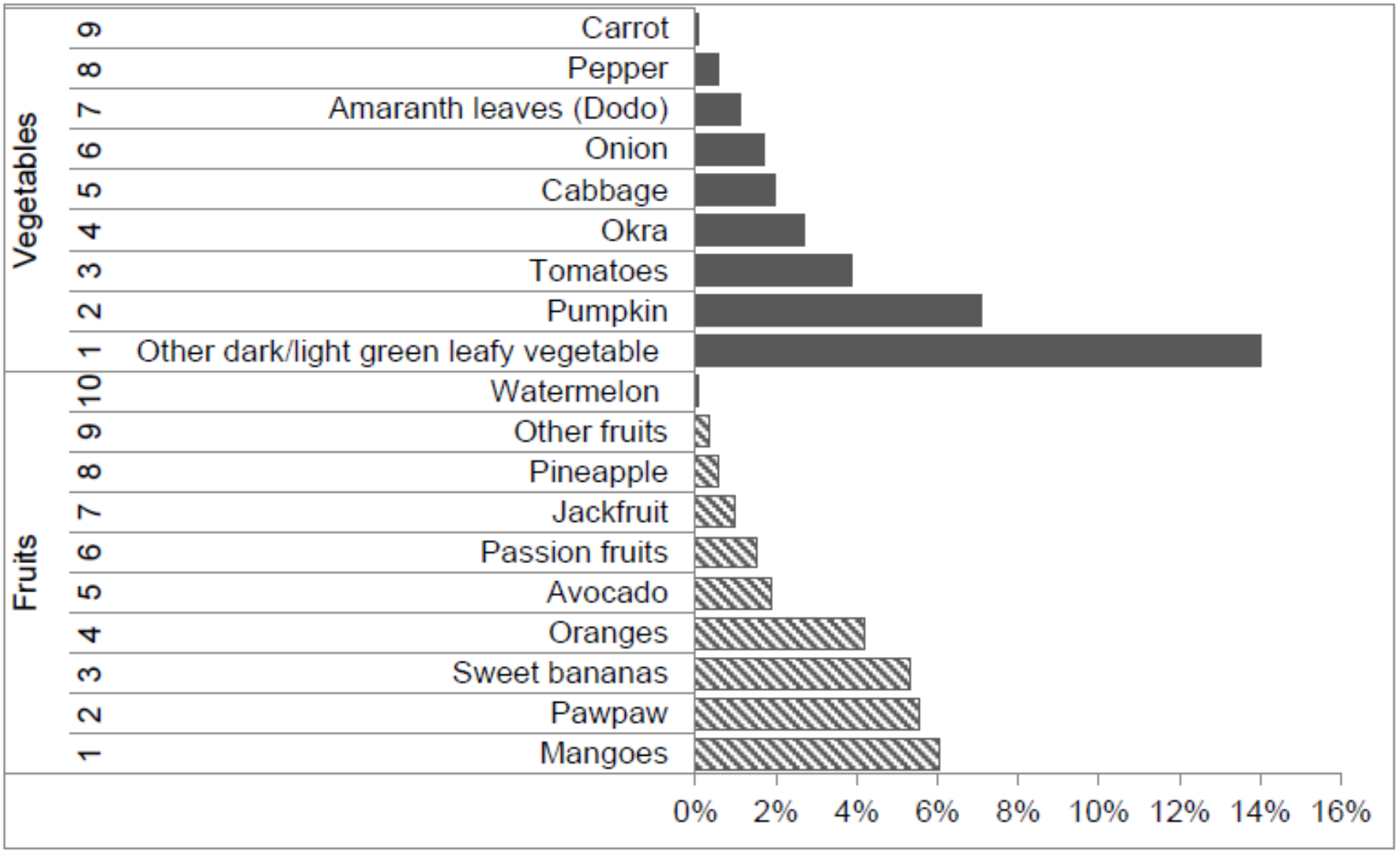
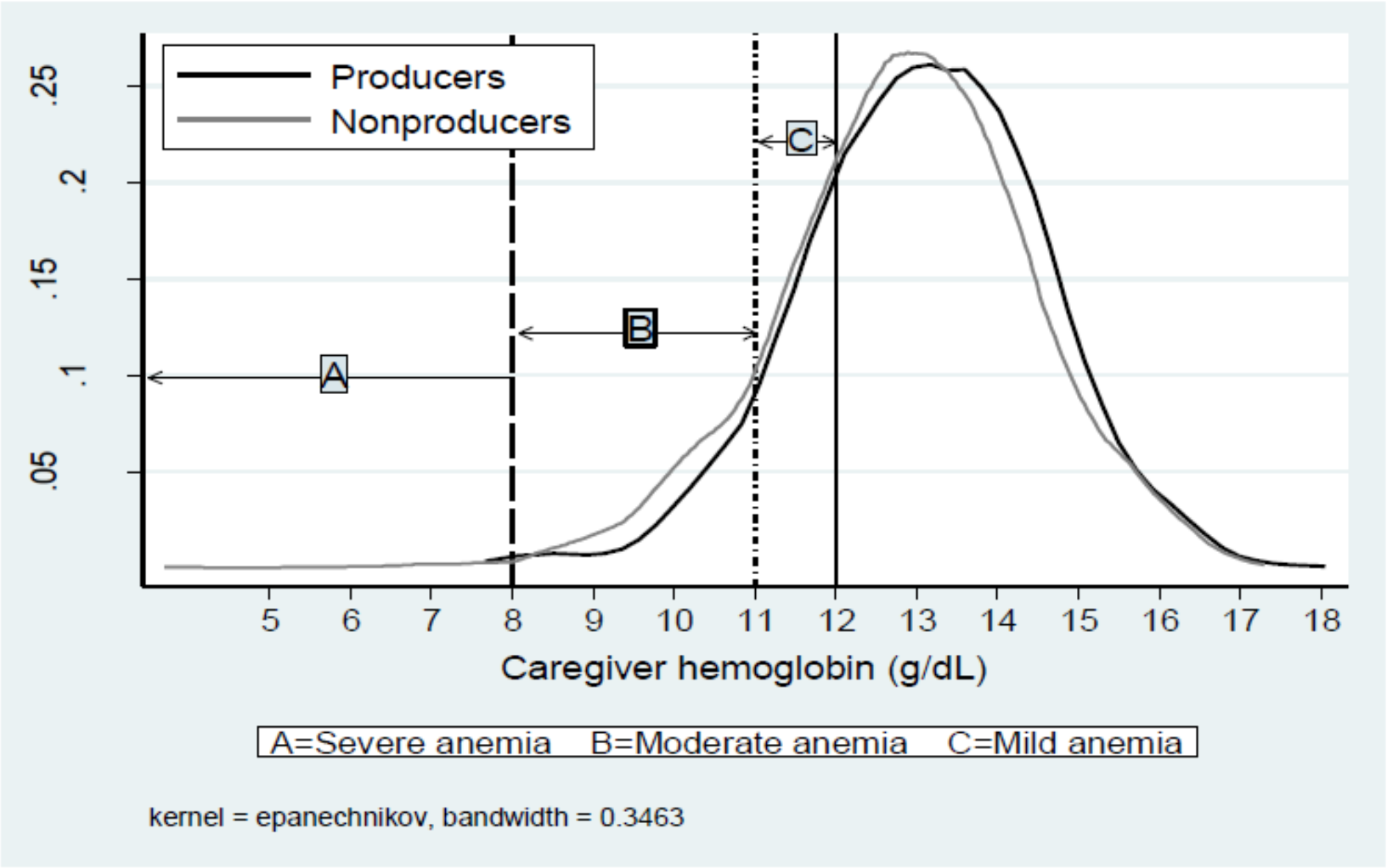
- On Facebook.com/HortInnovLab
- Videos on YouTube.com/HortCRSP
- Subscribe to our newsletter: http://blog.horticulture.ucdavis.edu

Common Fruit and Vegetables Produced in Uganda and their Incidences



Source: Author calculation based on survey data (2012).

Kernel Density Curves for Hemoglobin Levels in Caregivers Living in Matched Producer and Nonproducer Households



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