Sweetpotato for Profit and Health in sub-Saharan Africa:

Improving livelihoods under climatic uncertainty

Prepared by

Putri E Abidin
Sweetpotato Seed Systems Specialist-
CIP Malawi
Email:
p.abidin@cgiar.org

Edward E Carey
Regional Sweetpotato Breeder – W. Africa
CIP Ghana
Email:
e.carey@cgiar.org

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Overview of presentation

- Overview of the Sweetpotato for Profit and Health Initiative
- Rooting out Hunger in Malawi with Orange-fleshed Sweetpotato and The Sweetpotato Action for Security and Health in Africa (SASHA) (e.g. West Africa)
- Understanding and improving resilience of sweetpotato to climatic uncertainty

Opportunities and Challenges

Maintaining good caloric intake in sub-Saharan countries → a challenge, this is due to adverse

- **-climatic effects,**
- **-declining soil fertility,**
- **-small landholding size,**
- **-high levels of poverty and under-nutrition.**

White-fleshed sweetpotato varieties are predominantly grown, while vitamin A deficiency is as high.

SPHI is a multi-partner, multi-donor initiative that seeks to reduce child undernutrition and improve smallholder incomes in 10 million African families by 2020 through the effective production and expanded use of sweetpotato.

Rooting out Hunger in Malawi with Orange-fleshed Sweetpotato

Rooting out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato is a 4.5-year program led by International Potato Center (CIP)

- To improve vitamin A and energy intake for at least 115,000 rural households with women and young children using orange-fleshed sweetpotato-based approaches
- To ensure that at least 20% of households growing OFSP earn at least $ 40 USD per year from OFSP sales and increase average sweetpotato yields 50%

The Sweetpotato Action for Security and Health in Africa (SASHA) Project is a 5 year project led by the CIP that will develop the essential capacities, products and methods to reposition sweetpotato in the food economies of Sub-Saharan Africa. It serves as the foundation for the broader Initiative.

Development of the Sweetpotato for Profit & Health Initiative

SASHA
Sweetpotato Action for Security and Health in Africa

Features

- 10 months (2008/2009) process seeking input from stakeholders through field visits, multi-disciplinary theme papers, internet survey, and a series of five workshops
- Working paper published on 6 major themes
  - -- Breeding
  - -- Seed systems
  - -- Crop Management
  - -- Nutrition
  - -- Value Chains
  - -- Partnerships
- Writing of the SASHA proposal to support 1st five years
- Writing of the Rooting out Hunger Proposal to support 1st 4.5 years

7 Major Constraints Identified and Prioritized

- Lack of timely availability of adequate quantities of disease-free planting material
- Varieties with limited yield potential in specific agro-ecologies & quality characteristics that do not meet demands of specific target groups
- Damage due to the sweetpotato weevils in drier zones
- Limited demand and inadequate markets
- Poor agronomic practices
- Limited awareness of decision makers about potential contribution of the crop to poverty and malnutrition reduction due to an inadequate evidence base
- Need for a critical mass of informed stakeholders with good information exchange to maximize investment return

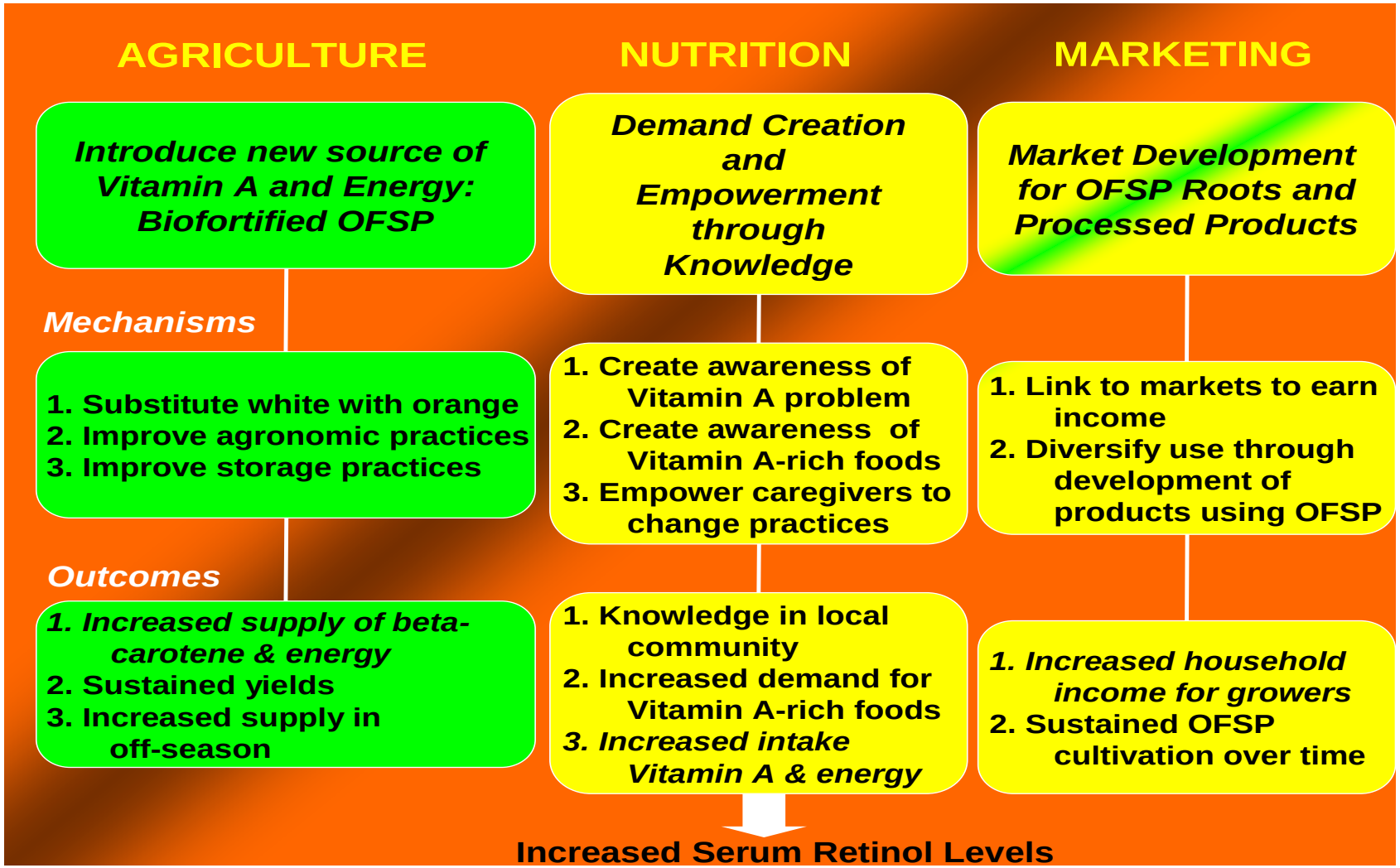
Participants at the Challenge Workshop Reached Consensus on the Following Vision

SASHA
Sweetpotato Action for Security and Health in Africa

Repositioning sweetpotatoes in African food economies, particularly in expanding urban markets, to reduce child malnutrition and improve smallholder incomes

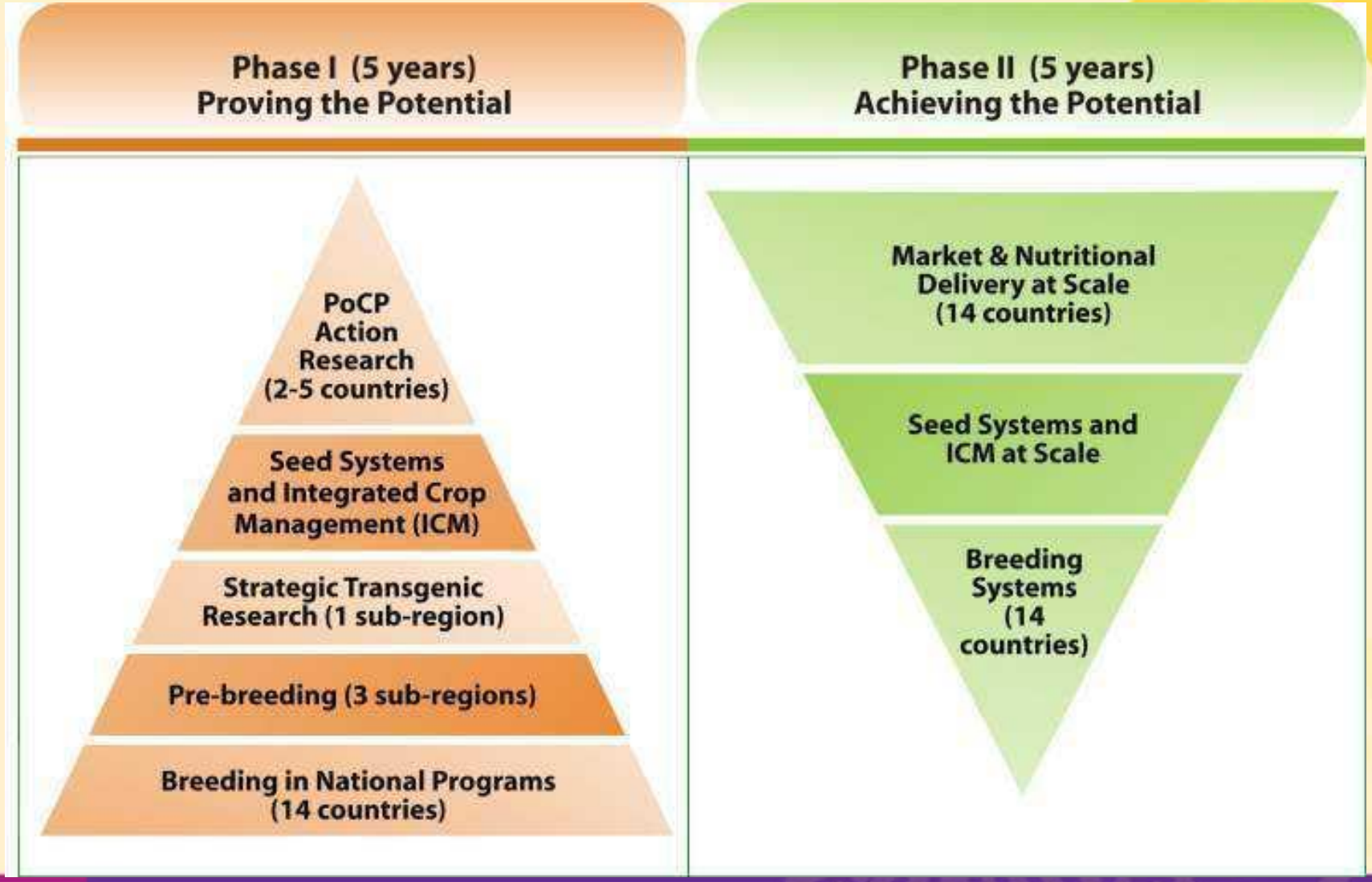
Rooting out Hunger in Malawi

Conceptual framework for an integrated, OFSP-led food-based approach



Two Phases: Greater Emphasis in the first 5 years on R&D as the Foundation

SASHA
Sweetpotato Action for Security and Health in Africa



Improving lives for women

Rooting out Hunger in Malawi

SASHA
Sweetpotato Action for Security and Health in Africa

Women are the main producers of sweetpotato, but the extent of their control over the benefits from selling the crop varies in different social and economic settings. SPHI seeks to ensure that women have a full voice in and gain equitably from any intervention.

Four major technical components

SASHA
Sweetpotato Action for Security and Health in Africa

Rooting out Hunger in Malawi

1. **Population Development & Varietal Selection**
   - a. East & Central Africa: Virus resistance
   - b. Southern Africa: Drought tolerance
   - c. West Africa: Less sweet types
   - d. CIP-HQ (Lima, Peru): Global germplasm/methods

2. **Weevil Resistant Sweetpotato using Transgenics**

3. **Seed Systems**
   - a. Seed Systems Research: Degeneration, sprouted roots
   - b. Tanzania going-to-scale with vines (Marando Bora)
   - c. "1, 2, 3 vine multiplication" approach in Malawi

Major Focus: Breeding & Varietal Development

seeks to generate a radically expanded range of sweetpotato varieties that combine different quality characteristics with significant improvements in yielding ability

- **Generate populations to meet dominant needs of users**
  - All sites: High dry matter
  - East & Central Africa: virus-resistance, orange-fleshed dual purpose for animal feed
  - Southern Africa: drought resistance, orange-fleshed
  - West Africa: non-sweet sweetpotato, orange & white-fleshed
- **Redesign sweetpotato breeding systems in Africa to produce varieties in fewer years (3-4) than currently (7-8 years): "accelerated breeding"**
- **Additional new breeding methods tackled:**
  - heterosis into sweetpotato breeding
  - molecular markers for breeding for virus resistance

Major Focus: Weevil Resistant Varieties

to develop weevil-resistant sweetpotato varieties for SSA within 5 years

Sweetpotato with weevil damage

- **Focuses on transgenic approaches using *Bacillus thuringiensis (Bt)* sources for weevil resistance**
  - 20 years of conventional breeding failed to identify suitable sources

- **Heavy emphasis on training African biotechnologists** (2 Phds, 4 technicians) for Kenya and Uganda utilizing new BeCA platform facilities

Major Focus: Seed Systems Research

establish demand-led cost-effective seed systems for the dissemination of new varieties and high quality planting material

- **Develop and test strategies for the multiplication and dissemination of sweetpotato varieties**
  - enhanced farmer-based capacities to maintain quality planting material
  - cost-effective public sector distribution programs
  - potential for for-profit nurseries
- **Study the marginal costs in adding sweetpotato to an existing clonal crop (cassava) seed dissemination program in Tanzania**
- **Assure sweetpotato varieties can be maintained in a disease-free state over time at the sub-regional level and that safe and efficient germplasm exchange occurs between countries**
  - develop field level diagnostic kits for virus detection

Four major technical components

4. Effective Delivery Systems

Proof-of-Concept Projects (must have a control group)

A. Kenya Agriculture-Health PoCP

B. Rwanda Value Chain Project

Feasibility Studies

A. Sweetpotato as an Animal Feed

Zero grazing systems dairy, pork

B. Potential for Sweetpotato Processed Products in Nigeria

Research Program 5: Management & Sweetpotato Support Platforms

to organize the work around research for development platforms that integrate and support the work of institutional partners in each sub-region

- **Provide technical backstopping**
  - Special emphasis on Alliance for a Green Revolution (AGRA) supported national breeding programs and PhD training programs (ACCI & WACCI)
- **Assure clean germplasm exchange**
- **Assure gender-sensitive design and implementation**
- **Assure comparable data collection** between countries engaged in the breeding and germplasm exchange
- **Facilitate information exchange**
- **Support advocacy work for promoting Vitamin A Sweetpotato**

SPHI Sweetpotato for Profit and Health Initiative

16 priority countries, 3 sub-regions

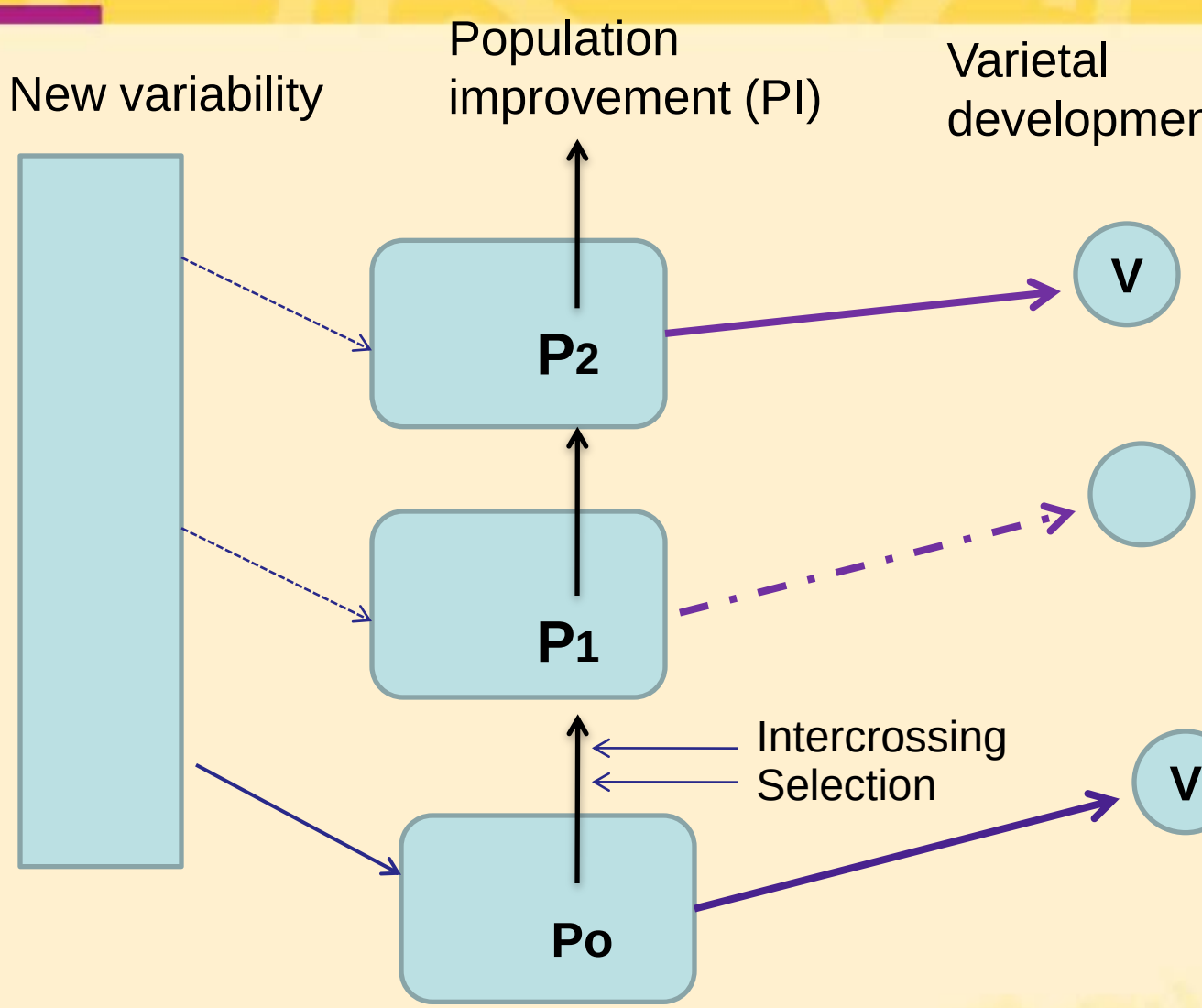
Under SASHA, activities in 8 countries

Rooting out Hunger Project in Malawi

Sweetpotato Support Platform – West Africa

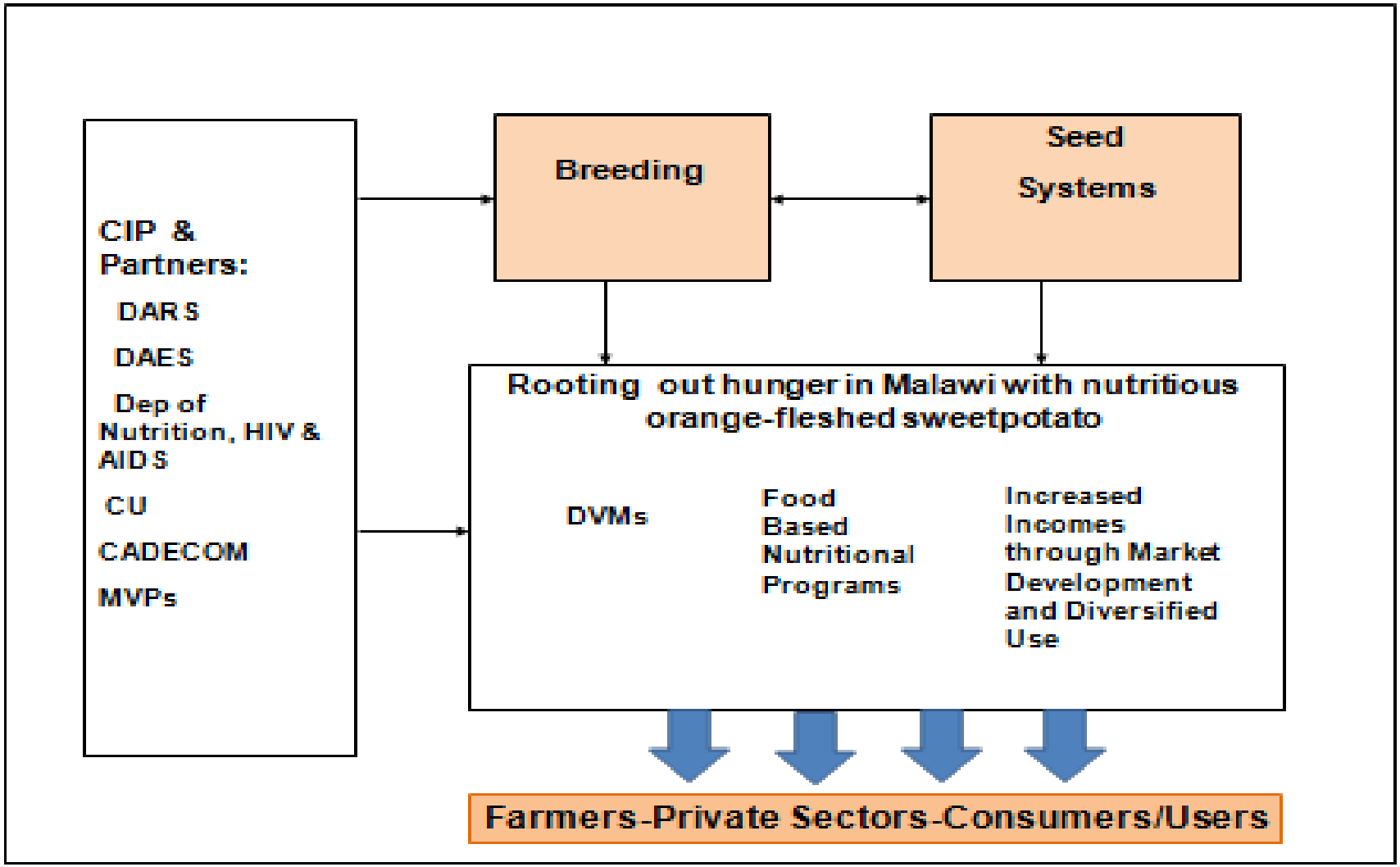
- Population development (less sweet types for use in staple foods and new products)
- Develop capacity to serve as a regional center for germplasm and distribution
- Backstopping/strengthening of national (specific focus on Ghana, Nigeria, Burkina Faso) breeding programs for the successful development and dissemination of new sweetpotato cultivars for profit and health
- Establish a governance structure for the SSP-WA

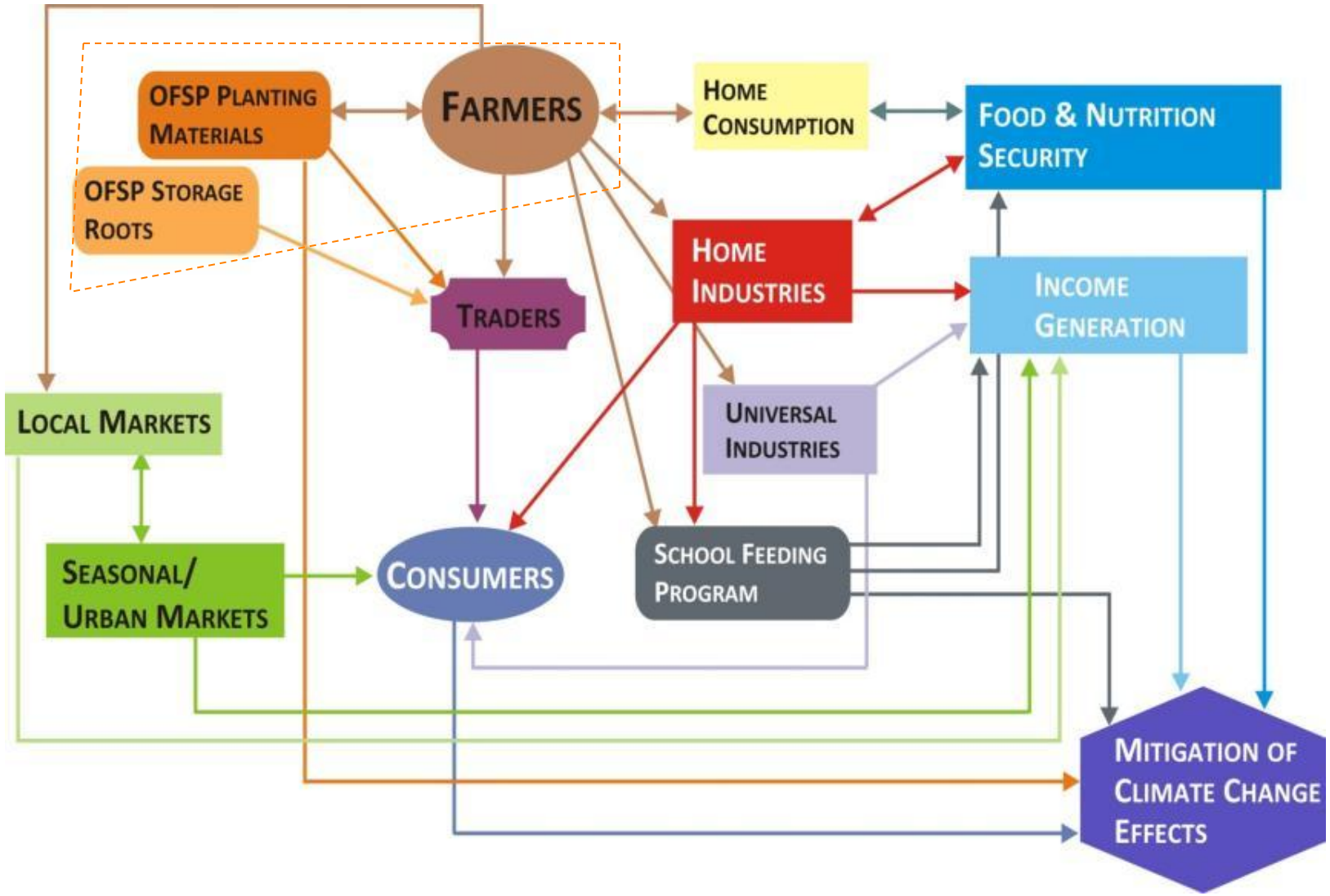
Sweetpotato Support Platform (SSP) Breeding Activities



- **PI** by SSP – long term by SASHA : use distinct populations to exploit heterosis to improve e.g. yield, disease resistance
- **VD** by sweetpotato National programs – short term (AGRA or other support)

In Malawi: CIP working with partners and Irish Aid a founding partner in SPHI





A scheme showing potential market and product development options

Training of Trainers on OFSP utilization in SSA

Current situation of orange-fleshed sweetpotato (OFSP) in Malawi

- The dissemination of OFSP with subsidized vouchers is reaching over 10,000 farming households in 4 districts in Malawi using an implementation strategy that includes six integrated components:

1. strengthening the partnership with government, NGOs, and private sector
2. seed system establishment
3. training, visits, and field days
4. demand creation campaign through behavior change communication (theatre, dance, poetry, songs, and banners)
5. voucher systems for vine dissemination
6. product development and markets.

- Implement Integrated Crop Management (ICM) research related to soil fertility, crop diversification and water management

OFSP Planting Material, Subsidized Vouchers and Beneficiaries, and Area of Production: Achievement of Years 1 and 2 of the Project (1 October 2009–March 2011) in Malawi

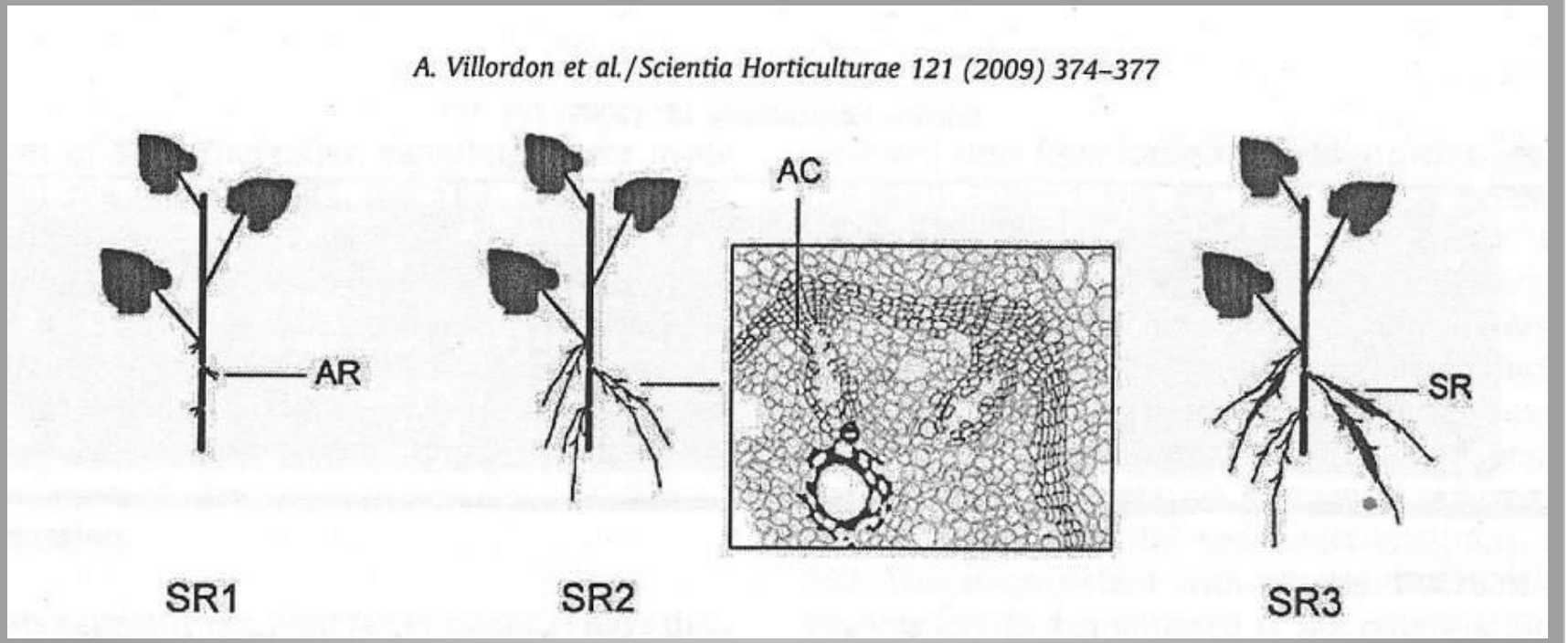
NGO	District	Subsidized Vouchers		Area of Production (ha)
		No. of Households	No. of Planting Materials	
Concern Universal	Dedza	4,733	1,419,900	32.0
Concern Universal	Phalombe	859	257,700	5.8
Millennium Villages Project	Zomba	3,250	975,000	21.9
Catholic Development Commission	Chikhwawa	2,027	608,100	13.7
Total	**4**	**10,869**	**3,260,700**	**73.4**

OFSP Planting Material and Beneficiaries: Irish Aid funded project after 4.5 year program

No.	NGO	District	Subsidized vouchers		Area of production (ha)	
			No. of households	No of planting materials	75 cm between ridges	90 cm between ridges
1	CU	Dedza	26,000	7,800,000	175.50	210.60
2	CU	Phalombe	24,620	7,386,000	166.19	199.42
3	MVP	Zomba	26,450	7,935,000	178.54	214.25
4	CADECOM	Chikhwawa	26,027	7,808,100	175.68	210.82
After 4.5 year program			103,097	30,929,100	695.90	835.09
Addition from free market			11,903	3,570,900	80.35	96.41
Total after 4.5 year program			**115,000**	**34,500,000**	**776.25**	**931.5**

Understanding sweetpotato to improve resilience

- Phenological stages of 'Beauregard'



1 to 4 days | 14 to 21 days | 30 to 60 days

SR=Storage Root; AR=Adventitious Root:
AC=Anomolous Cambium, an indicator of SR initiation;

Understanding sweetpotato to improve resilience

- Temperature and water critical at SR1 and SR2 (20 to 30 C)
  - Initial adventitious roots will become storage roots, so damage to them can reduce yield
  - Stress at SR2 can result in failure of storage root induction (pencil roots)
  - There are clear differences among genotypes with respect to ability to tolerate stress and yield reliably (important to farmers)
- Crop models need to take these differences into account
  - At CIP, Roberto Quiroz + Lieven Claessens

Concluding Remarks

- Sweetpotato with its creeping vines provides good soil cover, protecting soils from erosion during peak rainfall events and conserving soil moisture between rains
- Sweetpotato produces very well in favorable environments, and reliably yields something under marginal conditions of drought, temperature extremes, and low soil fertility. It is, thus, an excellent food security crop. Tolerance to environmental extremes can be improved through breeding
- Activities of SPHI are significantly and sustainably helping to protect farming communities from risks of climate change

Acknowledgement

- Irish Aid –Malawi
- Bill and Melinda Gates Foundation
- AGRA
- Wageningen University for giving the opportunity to present this ppt

Thank you for your attention!

Cake

OFSP with small fish

mandazi