Highlights from 3.5 Year of Implementation of SASHA

Sweetpotato Action for Security and **Health** in **Africa**

Jan Low, Project Manager

22 April 2013

Sweetpotato Speedbreeders, Kigali, Rwanda

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.

The Sweetpotato Action for Security and Health in Africa (SASHA) Project is a 5 year project led by the International Potato Center 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.


SASHA


SASHA


SPHI

7 Major Constraints Identified

- 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 market
- Poor agronomic practices
- Limited awareness of decision makers about potential contribution of the crop
- Need for a critical mass of informed stakeholders with good information exchange to maximize investment return

Five Major Programs under SASHA

SASHA
Sweetpotato Action for Security and Health in Africa

1. Population Development & Varietal Selection
2. Weevil Resistant Sweetpotato using Transgenics
3. Seed Systems
4. Delivery Systems (proof-of-concept)
5. Management and Sweetpotato Support Platforms

Major Focus: Breeding & Varietal Development

SASHA
Sweetpotato Action for Security and Health in Africa

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

1) 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 (130 parents)
- Southern Africa: drought resistance, orange-fleshed (56 parents)
- West Africa: non-sweet sweetpotato, orange & white-fleshed (59 parents)

Partners: National sweetpotato programs in Uganda, Ghana, Mozambique

Major Focus: Breeding & Varietal Development, cont.

SASHA
Sweetpotato Action for Security and Health in Africa

2) Redesign sweetpotato breeding systems in Africa to produce varieties in fewer years (3-4) than currently (7-8 years): "accelerated breeding"

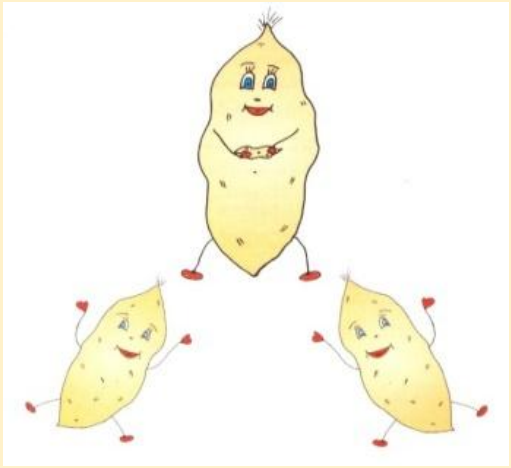
- More sites at the earliest stages of breeding to substitute for fewer sites over more seasons
- At least one site being the "tough" selection conditions; for instance, *consistently drought stressed*
- In February 2011, released 15 new, more drought tolerant OFSP in Mozambique
- Also released varieties using accelerated breeding in Malawi and Rwanda

Major Focus: Breeding & Varietal Development, cont.

SASHA Sweetpotato Action for Security and Health in Africa

3) Additional new breeding methods tackled:

- **Demonstrated that "hybrid vigor" or heterosis exists for root and foliage leaves weight, but not for quality traits**



A) Working with two heterotic genepools, on average for first hybrid population:
   - 22.9% root yield jump (dry matter basis)
   - 7.8% more biomass production.

B) Potential of further yield jumps by selecting the best "hybrid family parents"
   - up to 100% more root yield (dry matter basis)
   - up to 85% more biomass production.
     - *These 2nd hybrid populations now underway in Uganda, Mozambique, and Peru*
     - In Uganda, distinct populations formed using molecular markers

Major Focus: Management & Sweetpotato Support Platforms

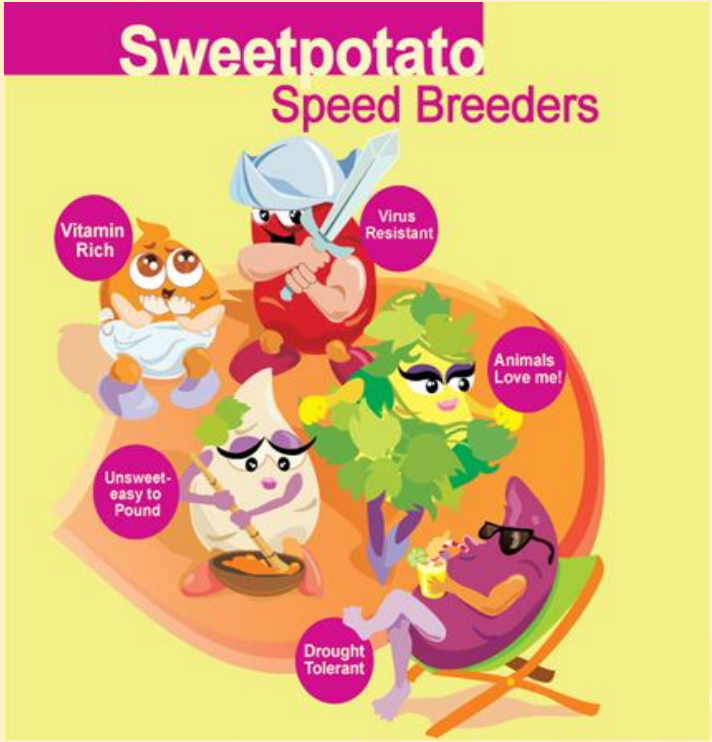
to organize the work around research for development platforms that integrate and support the work of institutional partners in each sub-region

- **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**

Strengthen Sweetpotato Breeder Community of Practice

SASHA
Sweetpotato Action for Security and Health in Africa

- Hold annual Sweetpotato Speed Breeders meeting with 15 SSA countries participating
  - Uganda, Mozambique, Belgium
- Agree upon standard protocols for collecting data for sweetpotato breeding
- Developed CloneSelector to ease data entry and analysis for breeding trails
  - Goal: To greatly increase the power and efficiency of the community of practice



Sub-regional Support Platforms Facilitate Information Exchange

SASHA
Sweetpotato Action for Security and Health in Africa

- Held every 6 months in each sub-region
- Content varies between sub-platform meetings
- Training topics held include: communication skills, seed systems & Marando Bora, gender training
- Links to scientific meetings

Each Platform with Quality Lab and Clean-up Capacity

Near Infrared Spectrometer enables rapid (2 minutes) assessment of major macro- and micronutrients

Screen houses essential for maintaining stocks of disease free vines as primary foundation material

Improving Germplasm Exchange Infrastructure & Service

Kenya Plant Health Inspectorate Service

The new propagation house, with temperature-control capabilities

CIP storage facility

3 new screenhouses

10 rehabilitated glass houses

Tissue lab renovations set to begin in fall 2011

A Key Goal for the Sweetpotato Support Platforms

Implement ISO 17025-like standards with partners at the SSPs in Kenya, Mozambique and Ghana by Oct 2013

- Distribute clean, identity-verified sweetpotato germplasm designated under FAO and transferred via the Standard Material Transfer Agreement (SMTA)
- Training and visits by relevant resource people from CIP-HQ, and within the region: pathogen-testing, tissue culture procedures, bar-coding technology for improved information systems.

Major Focus: Weevil Resistant Varieties

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

- **Focuses on transgenic approaches using *Bacillus thuringiensis (Bt)* sources for weevil resistance**

Sweetpotato with weevil damage

- **Heavy emphasis on training African biotechnologists: 3 PhD students, several technicians**

Partners: NaCRRI, Universities of Jomo Kenyatta, Valencia, Ghent, and Puerto Rico; Danforth

Weevil Resistance, cont.

We have successful transformed African varieties, but roots with the genes failed to kill the weevil in 2012. Now have new gene constructs with enhanced expression to test in 2013/14.

Major Focus: Seed Systems Research

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

1) **Develop and test strategies for the multiplication and dissemination of sweetpotato varieties**
   - understand existing sweetpotato “seed” systems
   - enhance farmer-based capacities to maintain quality planting material
   - better understand varieties degenerate due to viruses
   - test improved public sector distribution programs
2) **Develop field level diagnostic kits for virus detection**

Partners: NRI, FERA, MARI, LZARDI, KARI, CRI, NaCRRI, Makerere University

Technological Innovation #1

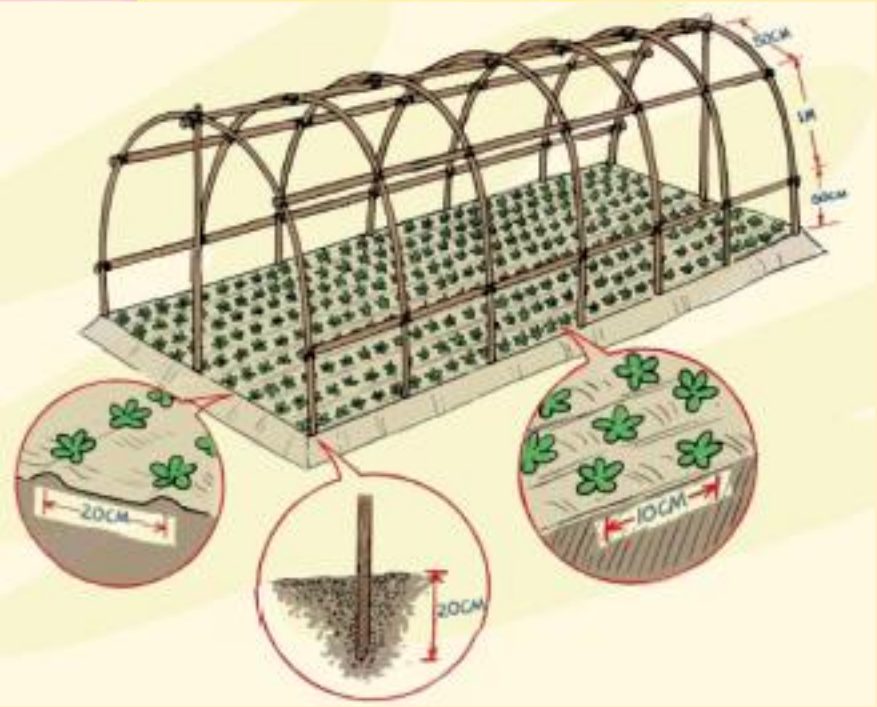
After 4 years of research, we have successfully Improved on an existing practice to help farmers in areas with a prolonged dry season access vines at the beginning of the rains.

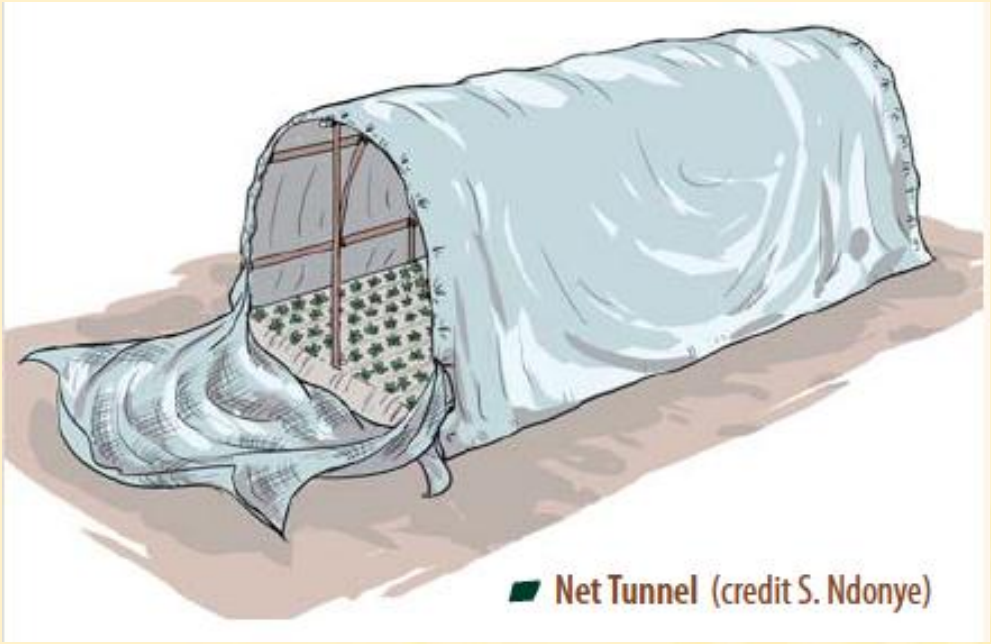
The Triple S System

Storing roots

Sprouted roots planted out to produce vines

Technological Innovation #2





Net Tunnels

– protecting planting materials

Net Tunnels – protecting planting materials

Findings of KARI/CIP study (Kenya, 2009-2012)

1. Net tunnels are technically and economically feasible and can be maintained for at least 33 months
2. From second cutting onwards, protected vine stock produce much higher numbers of cuttings
3. Roots from protected stock are higher yielding (30-50% gains)

Net Tunnels – protecting planting materials, cont.

Average $839 gain per tunnel after 3 years compared to $120 cost

Marando Bora ("Better Vines") Dissemination Effort Completed

SASHA
Sweetpotato Action for Security and Health in Africa

Marando Bora, working with 8 Implementing Partners has covered 16 districts and an accumulative total of 112,000 households (74% of the original target; 76% women) received vines over three dissemination seasons. There have been many lessons learned which will shape our thinking on going-to-scale with vines.

Partners: Catholic Relief Services, LZARDI, MARI, Helen Keller Intl, 7 local NGOs

Dissemination Models

- Trained Decentralized Vine Multipliers (DVMs) multiply & distribute vines to neigbouring farmers (~10-12km) targeted through a voucher system. DVMs source of knowledge for farmers. (12 districts)

- Mass multiplication of planting material at centralised sites, where vines were then harvested & transported to central points for mass dissemination. (4 districts)

- Research to compare cost-effectiveness of models & initial adoption of improved varieties

Emerging Lessons: Design

- Marando Bora was designed as an add on to the Great Lakes Cassava Initiative
  - Same multipliers
  - Same Implementing Partners & field staff
  - Sharing transport & training
  - Limited budget
- However….
  - Cassava is a “male” crop & SP is a “female’ crop
  - SP & cassava agro-ecologies not the same
  - SP requires higher water & management requirement
  - Higher supervision from field staff

Varietal choice & adaptability?

- Kabode & Polista best bets
- Nationally released varieties: less adapted to the Lake Zone

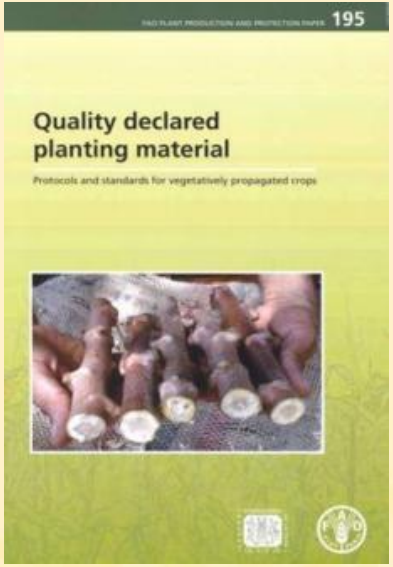
Lessons:

- Use regional accelerated release process e.g. Kabode now in pipeline for Tanzania
- Ensure longer period for farmers to evaluate varieties before going-to-scale
- Link to strong national breeding & release programme
- Different characteristics for different end users
- Establish demo plots before multiplication

Preliminary Results from QDPM Research

SASHA
Sweetpotato Action for Security and Health in Africa

- Polista & Kabode highest % of “acceptable” inspections; Ejumula & Jewel lowest % of “acceptable” inspections;
- “Best performing” DVMs
  - NE (“low virus pressure”); DVM maintained all varieties,
  - NW (“higher virus pressure”); DVM reduced to Polista and Kabode
- Difference between FAO and MB tolerance levels was due to weevil infestation
- Little difference between team inspection & external inspection method



Multiplication Practices

- DVMs are combining Rapid Multiplication Techniques (RMT) for dry season
  - Small quantities, minimum space, irrigation
  - Vines ready at beginning of rains & higher price
- With conventional spacing once rains start
  - Upland, larger areas, vines and roots
  - Diversifies risk and roots bring income in hunger period

13% Dropped Out
--profitability
--damage
--problems with voucher redemption

Major Focus: Proof-of-Concept Projects (PoCPs)

to understand the entry points in the value chain to improve market efficiency or diversify use especially for women, and design and test scalable approaches for improving food-based nutrition programs based on OFSP to combat vitamin A deficiency.

Two major studies
1)Mama SASHA: Agriculture-Health Proof-of-Concept Project
2)Rwanda Super Foods: Sweetpotato Value Chain Project

Two smaller efforts:
3)Sweetpotato as an Animal Feed for Dairy Cows and Pigs
4)Potential for Sweetpotato Processed Projects in Nigeria

Objectives

Main Study

- Does integration of an OFSP agricultural-nutritional intervention into health service delivery for pregnant women and their children <2 years old lead to higher *increases in consumption of OFSP and other vitamin A rich foods* than existing primary health services and varietal access alone?
- Can linking an agricultural intervention and nutritional training to existing health services provide an incentive to pregnant women to increase health service utilization?

Longitudinal Nested Cohort Study (500 women)

- COVA: Biochemical & other indicators at key points:
  - Enrollment (1st or 2nd trimester); 4-6 weeks before delivery, 4 months postpartum, 9 months postpartum

Partners: PATH (International Health NGO), 2 national NGOs

Achievements to Date

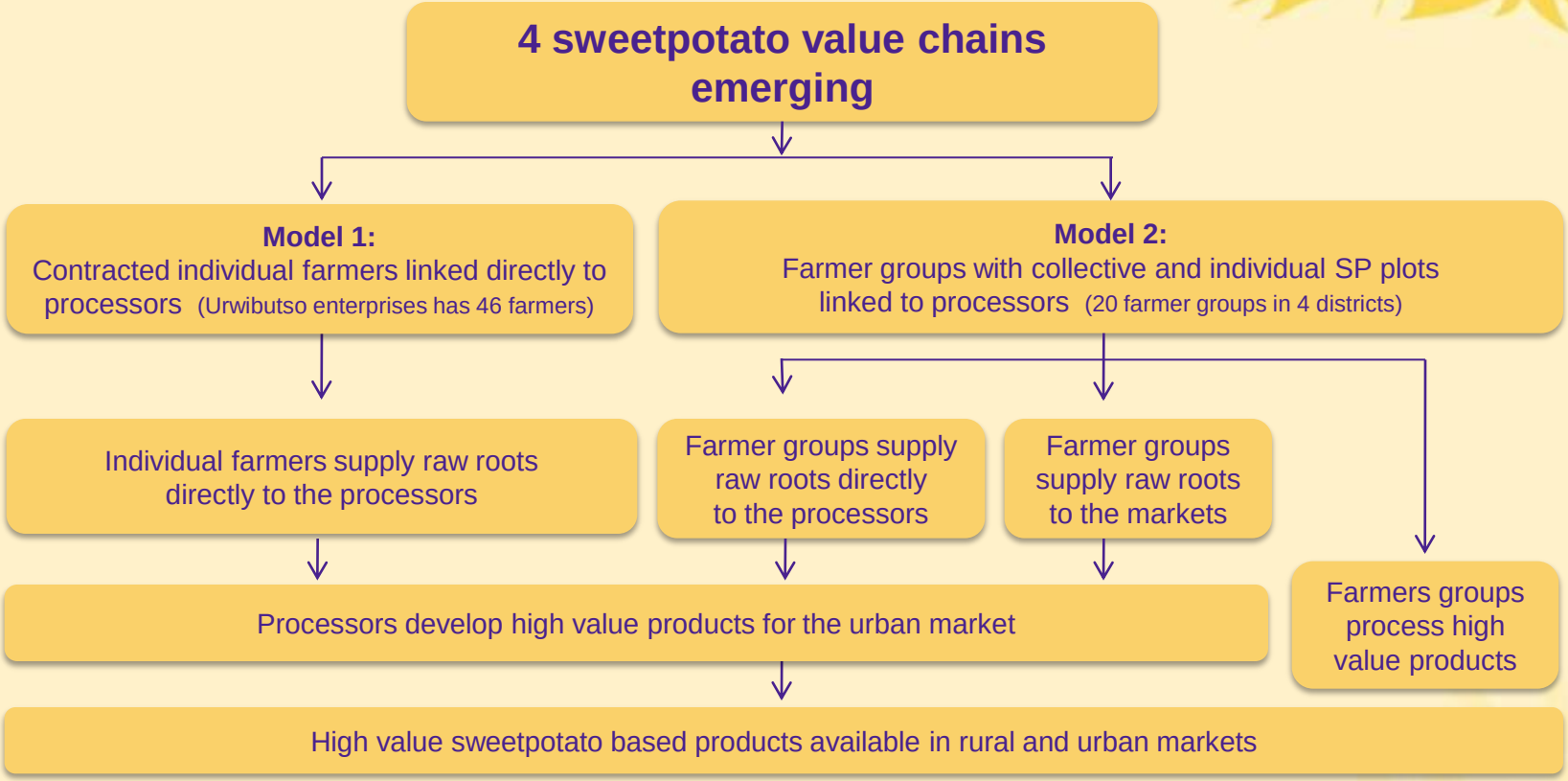
- Baseline study conducted among 968 pregnant women & 1,918 mother-child pairs
- Operations research at end of 1 year pilot phase
- 2nd Operations research after 1 year of full implementation
- 8 intervention; 8 control health facilities with trained nurses
  - July 2011-June 2012: 3,151 pairs vouchers given; 74% redeemed
  - July 2012-December 2012: 1,503 pairs vouchers given; 68% redeemed
- 225 pregnant women/lactating mothers clubs meeting monthly
- 13 DVMs provided vines
- Monthly feedback meeting; monitoring data updated
- COVA: By end of January 2013: 411 women out of 500 enrolled

Objectives

- Can the development of a value chain based on a sweetpotato processed product help re-position white and orange-fleshed sweetpotato and their products in the urban consumer market?
- Do men and women farmers will have increased income through accessing high value sweetpotato markets and benefit through access to high quality planting material?
  - Do benefits differ between contracts with individual farmers and access through farmer group membership?

Partners: RAB, SINA Enterprises (private sector), CRS, Imbaragga, YWCA

Emerging Chains



Ensuring Sufficient Supply

RAB produces 3-4,000 tissue culture plantlets per month & hardens

All groups/ contracted growers given quality material

Farmers trained by extension personnel

Yields have increased

Net tunnels for groups in Aug 2012

Does it make Economic Sense?

SASHA
Sweetpotato Action for Security and Health in Africa

Sweetpotato puree+wheat flour+other ingredients

Bread (30% SP+70% wheat)+others	**Doughnuts** (Mandazi) (40% SP+60% wheat)+others	**Biscuits** + other cookies (45% SP+55% wheat)+other
7% decrease in per unit production cost	15% decrease in per unit production cost	12% decrease in per unit production cost

Progress in Biscuit Development

SASHA
Sweetpotato Action for Security and Health in Africa

Old technology

Manual biscuits making

Wheat flour Biscuits

Biscuits packaged

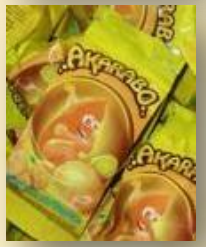
Farmer sorting out SP roots

New technology

The Golden Power Biscuit

Packaging targeting high end consumer

Packaging targeting lower end consumer



Study of Sweetpotato Marketing Opportunities in Nigeria

SASHA
Sweetpotato Action for Security and Health in Africa

NRI economist Gideon Onumah led
The study in September-October 2011

Over 100 participants at stakeholder meeting held in Abuja
on 19-20th July 2012

Objectives of Animal Feed Component

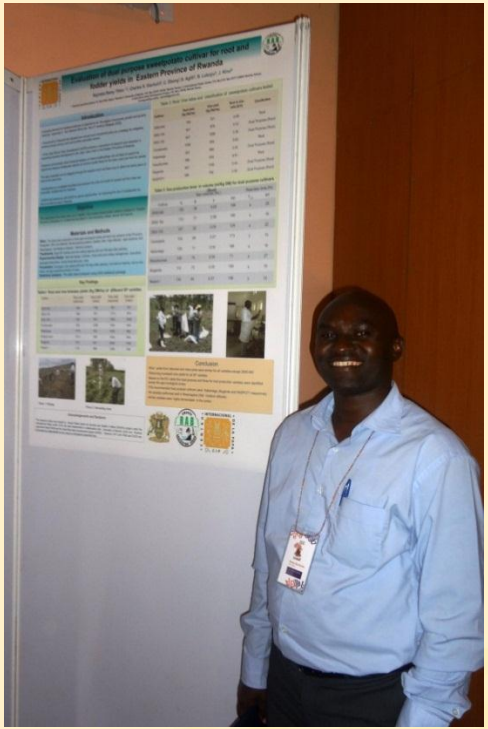
1) Identify the appropriate adapted dual purpose and forage sweetpotato (SP) varieties for specific agro-ecologies

2) Determine the most appropriate low-cost combination of sweetpotato vines/roots with other available feedstuffs in SP silage

3) Model and test feeding strategies based on optimizing sweetpotato combined with other feed resources in pigs

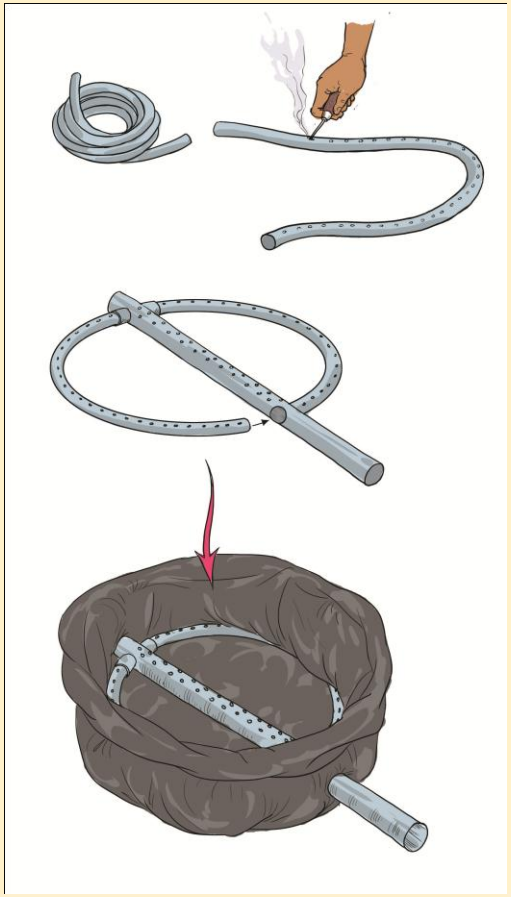
Strong Capacity Strengthening Component: 4 Masters students

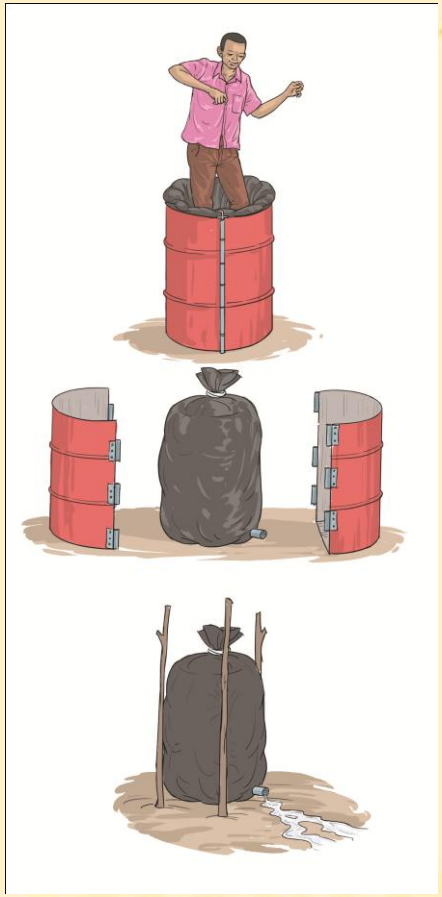
1) 2 students identified dual purpose varieties for Kenya and Rwanda
   Kenya: Kemb-23, Naspot-1, Wagabolige and Kemb 36
   Rwanda: 2002-154, 2002-155, Kakamega, Kwezikumwe and Mugande
2) One student conducted study of appropriate ingredients to mix with SP in silage
   75% SP vines: 25% SP roots, plus molasses best from initial trials
3) One student conducted study of pig farming practices and the SP silage feeding trial



Technological Innovation: Improved Silage Tubing

Problem of excessive moisture leading to rotting of silage





Bags of 500 kgs of silage for $0.06 per kg in 2011.

Brochure is available.

8 Week Long Pig Feeding Trial

Four treatment/feeding levels:

- T1-100% concentrate (control)
- T2-15% silage,
- T3- 30% silage,
- T4- 45% silage

9 farms, 12 pigs per farm

Results:

- Best growth on 100% concentrate
- Average weight gain & cost of silage decreased with increasing silage %
- Trade-off between cost of feed & time to reach full weight
- 5 out of 9 trial farmers still using sweetpotato silage

Keeping Ourselves on Track

- Quarterly Program Management team meetings
- Biannual Senior Management team meetings to review mid-term & annual progress reports
- Annual Technical Meeting and Executive Steering Committee meeting (Sept.)

Members of ESC at 3rd Annual Meeting

Quarterly milestone & expenditure monitoring

- 180 milestones: 51% achieved; 18% on track; 16% behind

Keeping Ourselves on Track by Mainstreaming Gender

SASHA
Sweetpotato Action for Security and Health in Africa

Commitment to gender analysis, with a focus on ensuring that women in particular benefit from interventions, given that women are:

- Key players in sweetpotato production systems in SSA
- Responsible for the nutritional well-being of their families
- At risk of being excluded from market opportunities
- At risk of micronutrient deficiencies, especially when pregnant or lactating

Specific Actions:

- Gender variables in baseline/endline surveys & monitoring tools
- Targets for number of women benefitting in delivery system projects
- Training on *Learning to Use a Gender Lens;* gender situation analysis tool
- Special studies, i.e. Gender and Vines in Tanzania

Partner: Hellen Keller International, specialist seconded to SASHA

Keeping Ourselves on Track through Health Check-ups

- **"Partnership Health Check-up" self assessment tool**
- Focus on SPHI delivery system components with multiple partners from different organisational & disciplinary cultures
- Focus on review of *partnership processes* and not LoU compliance issues
- Rapid check-list (19 items) developed to assess perceptions around "key elements of success". Use of Liekert Scale (1-5)
- Invitation through email to all partners (incl. CIP) to participate, with option for confidentiality
- Results aggregated and feedback by email
- Discussion session during annual meetings:
  - Issues brought to table in "neutral" way
  - Further discussion to clarify concerns
  - Action points identified

Sharing our Knowledge

www.sweetpotatoknowledge.org

Public space: all can register & contribute to

By December 2012:

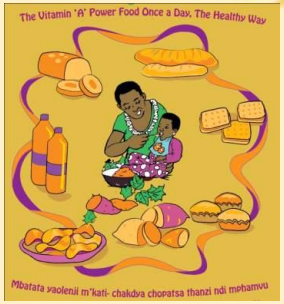
- 799 registered users
- 5,873 content items
- 35 different African countries, also heavy use from USA, Philippines, India, Peru

Sharing our Knowledge: Associated Projects at Annual Meeting

SASHA
Sweetpotato Action for Security and Health in Africa

Ethiopia

Malawi



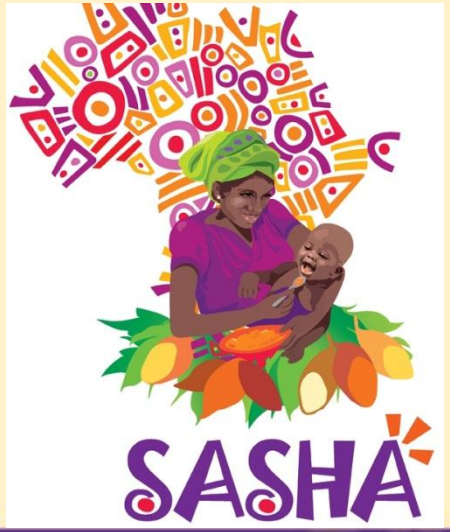
Zambia

Angola

Uganda

Mozambique

DONATA & Agricultural Innovation System



MAMA SASHA
COVA—Cohort Study

SPHI Sweetpotato for Profit and Health Initiative

Enhancing the Lives of 10 million African households by 2020

17 priority countries, 3 sub-regions

Now, 12 with Activity under SPHI Umbrella

Through Visits & Global Events, Awareness *is* Increasing

SASHA
Sweetpotato Action for Security and Health in Africa

May the Passion Continue to Spread!

SASHA
Sweetpotato Action for Security and Health in Africa