Report of the Sweetpotato Support Platform – W.A.

Demand-Driven Breeding and Germplasm Distribution

Sweetpotato Breeders Meeting 2015, Mukono, Uganda

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SWEETPOTATO ACTION FOR SECURITY AND HEALTH IN AFRICA

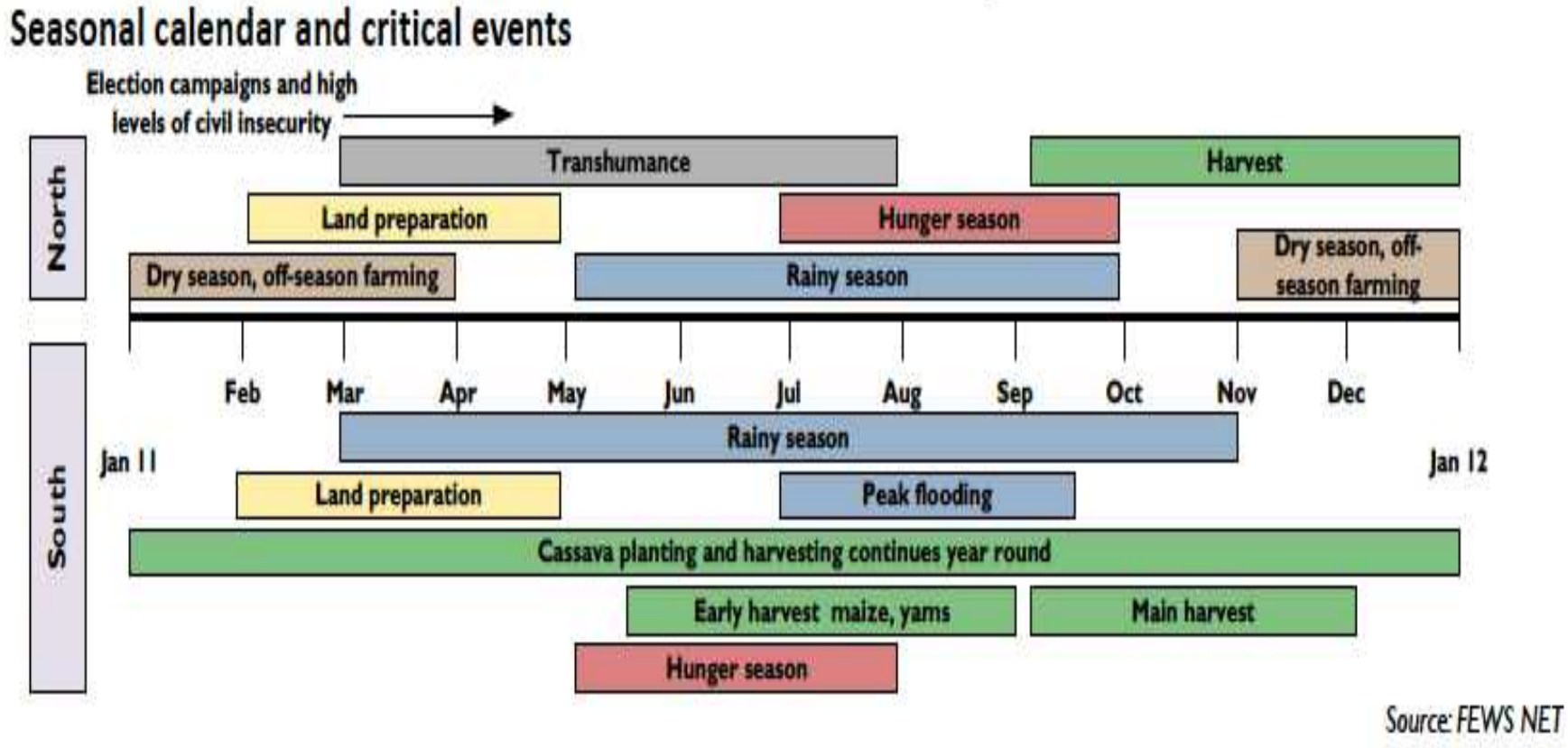
Sweetpotato Support Platform West Africa

SASHA Sweetpotato Action for Security and Health in Africa

SASHA Breeding Approach

- Population improvement program at a sub-regional level
- Link with participatory varietal selection at the national level
  - Theme attribute - Less sweet sweetpotato (unsweetpotato)
  - Reduced perishability

Seasonal Agric Calendar

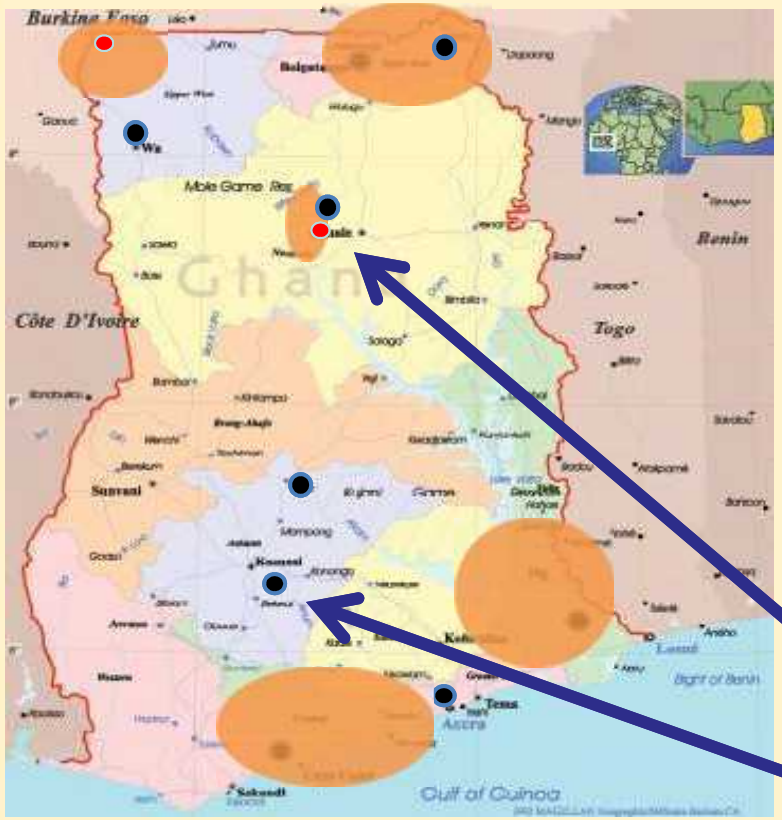


Updates

- Key attributes progress
  - Unsweetpotato and consumer acceptance
  - Storability/perishability
- Germplasm cleanup and distribution
  - Clones and seeds
  - Methods
- Accelerated breeding/varietal release
  - On-farm trials (mother-baby)
  - Seedling Nurseries –toward 2 seasons trials
- Methods/approaches
  - Population A + B + heterosis
  - Phenotyping and GT4SP
  - Gadgets
- Capacity development

Sweetpotato Breeding Selection Sites and Target Zones in Ghana

SASHA
Sweetpotato Action for Security and Health in Africa



Target areas where sweetpotato Is currently important, or benchmark sites for CRP Dryland Systems

Breeding selection sites

Consortium Research Program (CRP) benchmark sites

CSIR - Savanna Agricultural Research Inst.

CSIR – Crops Research Inst.

Some characteristics of selection sites in Ghana

Region	AEZ	Role of sweetpotato	Preferred type of SP (vars)
Ashanti	Forest	Insignificant	Not preferred
Central	Coastal Savanna	Commercial	Yellow skin, yellow flesh (Blue Blue)
Volta	Coastal Savanna	Commercial/Food security	Red skin, white flesh (CRI-Ogyefo)
Upper East	Guinea/Sudan Savanna	Food security/less commercial	Skin color less important, OFSP exist ("landraces")

Constraints: **Drought** can be a constraint in any AEZ, but tends to be worse in savanna AEZs, **SPVD** tends to be worst in forest zone, **Soil fertility** tends to be low in most places, **Weevils** are a significant constraint.

Accelerated Breeding Scheme Ghana

Year 1	Crossing block (50 parents)					
Year 2	Seedling nursery (~240 families, 5000 genotypes)					
	OT - Kumasi (virus + proximity)			OT – Tono (key production area)		
	~250 clones selected with top selections going for recombination					
Year 3	PT – UE	PT – CR		PT – VR	PT - AR	
	~25 clones selected					
Year 4	AT + OFT	AT + OFT	AT + OFT	AT + OFT	AT + OFT	AT + OFT
	Decentralized testing and multiplication					
Year 5	Official release					

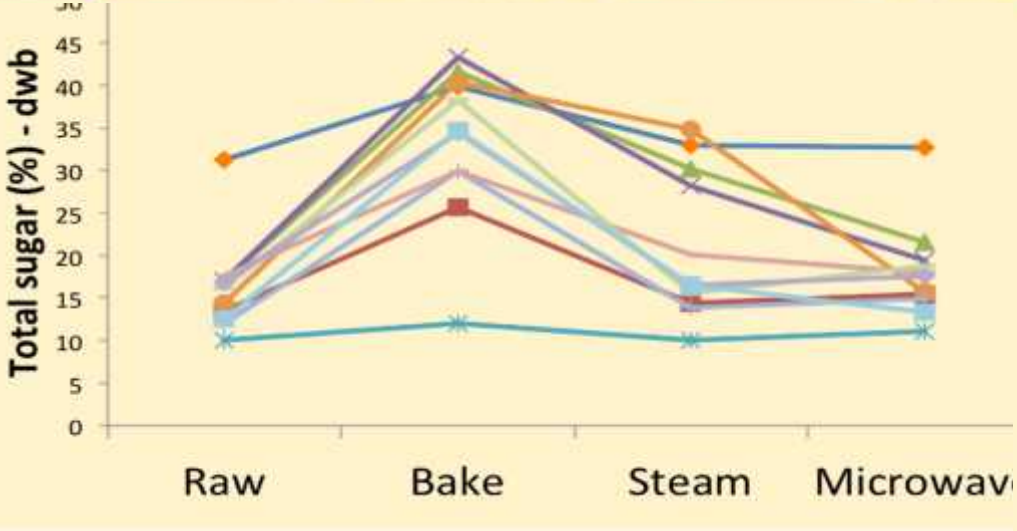
OT – Observational Trial (3-plant plots, no reps)
PT – Preliminary Trial (>14-plant plots, 2 reps)
AT – Advanced Trial (75 plants, 2 reps); OFT – On-farm Trial
UE – Upper East, CR – Central Region, VR – Volta Region, AR – Asante Region

Predominant Allocation of Responsibility

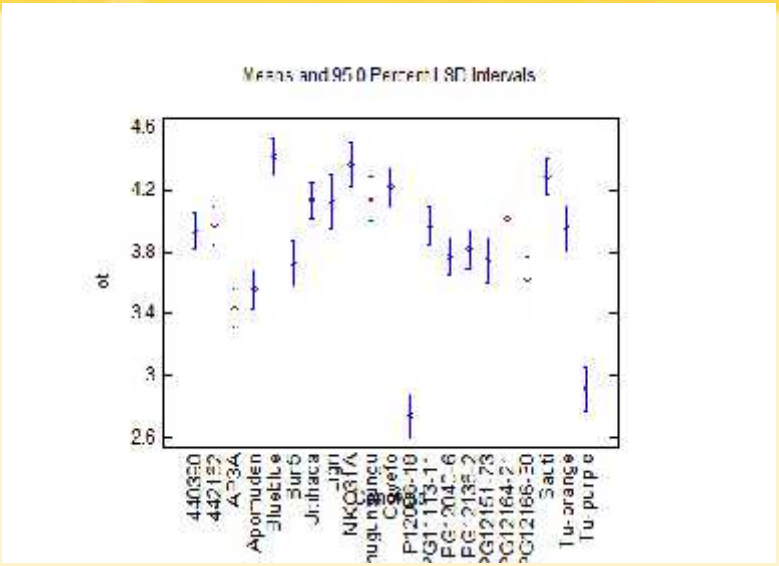
--SASHA

_ National Program

Unsweetpotato, consumer acceptance, and breeding for quality attributes



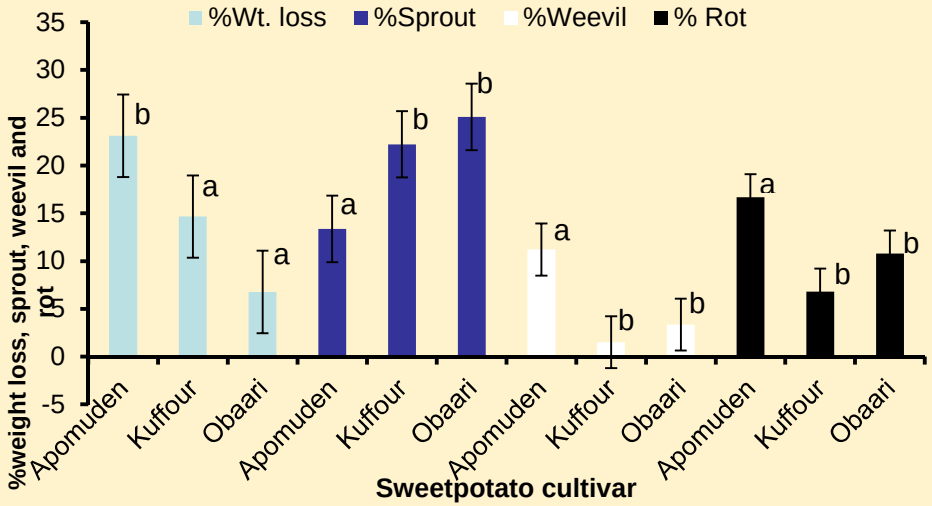
- Cooking method influences sweetness
- Ghanaian sweetpotato mostly staple type (fr wt)
- Implications of amylase levels for processing

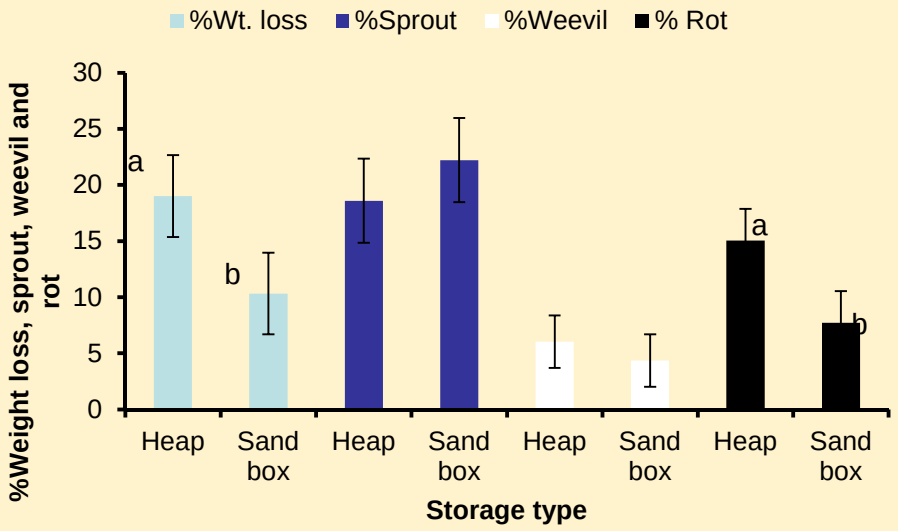


- Consumers; 5 ATs, 5 attributes
- Women and children less picky
- Breeding selections acceptable

- **NIRS lab helps with selection; increasingly provides service**
- **Rapid Visco-analyzer just purchased – NIRS calibrations for quality**

Storability/perishability





10 week storage in sand box or moistened heap at sites around Bawku
weight loss, sprouting, weevil infestation and rots

Swetpotato Breeding Trials Ghana, 2014

Region	Location	Hybrid	Seed Nurs	OT	PT	AT	OFT
Asanti	Fumesua	1 1	1	1	1	1	
G. Accra	Pokuase					1	
Volta	Ohawu				1	1	x
Central	Komenda			1	1	1	x
Upper East	Nav+Bawk	1		1	1	2	mb*4
Northern	Nyankpala					1	mb*3
Upper West	Wa					1	mb*4
	Total	**3**	**1**	**3**	**4**	**8+**	**14**

SASHA, WAAPP, Other sources; mb=mother/baby

Moving toward:

- More than one selection cycle per year (dry season seedling nursery; possibly trials)
- Two populations, A and B, in order to exploit heterosis in coming years
- Separation of early and later-maturing material at PT in order to ensure advance of OFSP
- Strengthening breeding capacity in northern Ghana through expansion of ATs and OFTs linked to seed program
- Recurrent selection of breeding populations while also identifying good parents

Rapid proximate analysis for minerals, sugars and β-carotene done using NIRS

Workflow for sample preparation and NIRS analysis of sweetpotato samples at Quality and Nutrition Laboratory

Barcode Labels and PDAs for Use at SSP-WA

Capacity Building – Students

Ernest Baafi, WACCI

Vivian Oduro, WACCI

Victor Amankwaah, AGRA

Not shown:

- SOME Koussao, WACCI; Solomon Afruape, WACCI
- Eric Owusu-Mensah evaluating amylase activity in relation processing potential, Ph.D, Food Sci + Technol KNUST
- Jebeh Samba, Hybridization efficiency. MS-AGRA, KNUST
- John Saaka, net tunnels, Undergrad thesis, UDS
- Yussif Alhassan, MS – Root system architecture
- Daniel Akansake MS – Evaluation for dual purpose management

Germplasm cleanup and distribution Clones and seeds

Clean up at CSIR-CRI - 2014 to 2015

Source Country	No Clean	Materials in the pipeline
Ghana	9	8 by 12/2015 or 2016
		Additional 2015 AT/VT
Nigeria	2	
Burkina Faso	3	10 by 12/2015

Prebasic screenhouse, CRI

Seed distribution from Platform - 2014 from 2013 block

Nigeria: 3650 – OP 24/PC 15 (NARS – 2850; SASHA – 800)

Burkina Faso: 2750 – OP 24/PC 15 (NARS – 2200; SASHA – 550)

Accelerated breeding/varietal release Seedling Nurseries –toward 2 seasons trials

- The harsh W. African environment consistently presents us with challenges to get more than one trial per year.
- 2013/2014. A seedling nursery planted early in the dry season let's selection for virus resistance predominate. (<10% survived)
- 2014/2015. A seedling nursery planted late did not develop much virus, so hill selection before going to the OT (~10% selected)

Scenes from the 2014/2015 nursery harvest

- **Seeds germinated in trays in the screenhouse**
- **Transplanted to the field**
- **Selected and cuttings taken for planting OT and for nursery for planting in the north in July.**

Population A + B + heterosis Phenotyping and GT4SP Gadgets

- Population A and B
  - Going for northern (lower virus pressure) and southern (higher virus pressure) environments
  - GTSPI and Phenotyping
    - Northern = drought
    - Southern = virus
    - Quality attributes across
  - Gadgets and tools. CloneSelector and Accudatalogger work well, but ooops!

Capacity Building – Students infrastructure and other

- New WACCI cohorts –
  - Nigerian aspirant from Jos
  - Burkina Faso from INERA
  - Ghana – from CIP…
- Other students and programs
  - Entomologists (SARI scientist at KNUST / work on IPM of weevil)
  - V. Amankwaah will probably go to NCSU under GT4SP
- PEARL grantee (Benin/Ghana, weevil resistance – biocontrol)
- Additional value chain work, letting demand pull us to the goals of the SPHI

Objective under Seed Systems Research Program

- Establish a regional platform for safe and efficient exchange and maintenance of germplasm
  - Improved indexing, virus cleaning, in vitro maintenance and genetic fingerprinting in each sub-region
  - ISO 17025-compliant germplasm indexing and distribution capacity
  - Upgrade in vitro facilities and tissue culture staff to ensure safe receipt and shipment of germplasm

Regional germplasm distribution – SSP-WA by October June 2014

SCREENHOUSE FOR PRODUCTION OF CLEAN PLANTS

REFURBISHED HOUSE FOR GRAFTING/ QUARANTINE

In vitro maintenance and multiplication routine, and 4 PT clones confirmed. Ongoing cleanup of remainder of Ghana, BF and Nigeria

Clean foundation seed is Integral to success of the breeding effort

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Thank you

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Our vision is roots and tubers improving the lives of the poor

CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

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