

# Sweetpotato Support Platform Southern Africa

Maria Andrade, Jose Ricardo  
& Wolfgang Gruneberg

**SASHA** 

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

*Annual Sweetpotato Breeders  
Meeting, Kigali, Rwanda, April, 22-26,  
2013*



# Objective



## Develop orange-fleshed sweetpotato (OFSP) populations for drought-prone areas in Southern Africa



- The activities of the Southern Africa sweetpotato platform concentrate mainly on developing breeding populations of OFSP for drought prone areas and quality characteristics

# The Four Breeding Sites

## Angónia

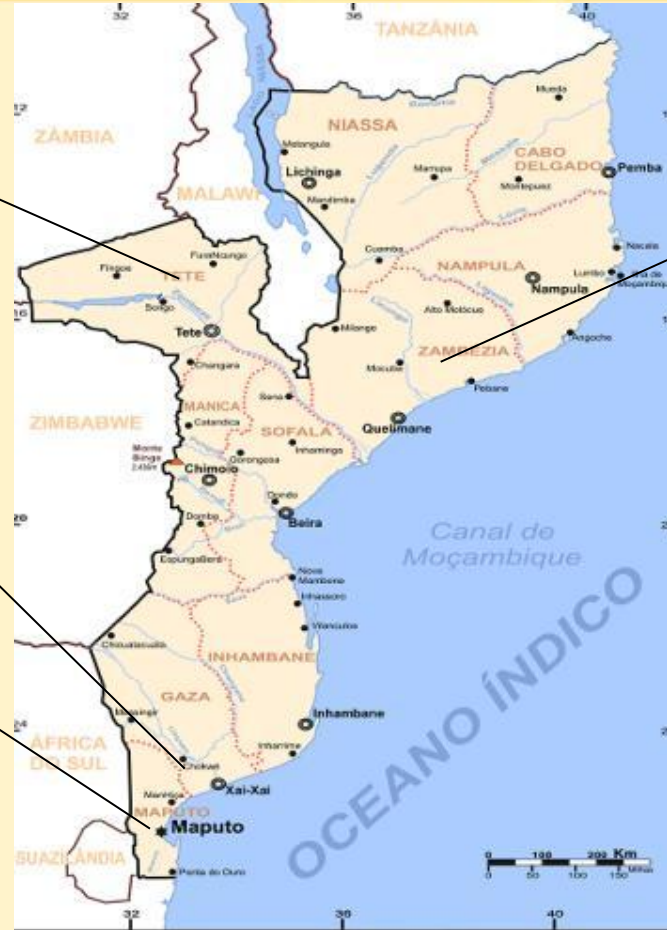
Temperate Humid,  
725-1,140 mm ppt

## Chókwe

Dry/Arid, 32 masl,  
623mm ppt

## Umbeluzi,

Semi-Arid to Arid,  
12 masl, 679mm ppt



## Gurue

Humid, Altitude  
500-1000m,  
1995 mm ppt



# Accelerated breeding Scheme



Replace TEMPORAL variation with SPATIAL variation



2 Populations  
Small Plots  
  
5000-8000  
Genotypes



#1  
Drought Stress  
with Farmer  
Participation

#2  
Normal at  
5 months  
( & accepted  
in drought)

#3  
Normal at  
7 months  
( & accepted  
in drought)

#4  
High Virus  
Pressure  
(**only** those  
from #1, 2, 3)

Quality screening with Near-Infrared

100-150 clones for varietal evaluation annually

# Major Achievements to Date



- Release the first 15 OFSP drought tolerant varieties bred using ABS in February 2011. Work was initiated in 2006 with funding from AGRA, USAID and HarvestPlus (prior to SASHA). About 430 trials were established.
- Funds from SASHA supported the last phase of this work in 2009-2011
- ASPB enabled the development to these varieties in 4 years in contrast to the 8 to 10 years typically required for sweetpotato variety development



# Major Achievements to Date, cont.



- Two genetically separate populations developed with new drought screening techniques
- First recurrent selection cycle for drought stress adaptation in two independent controlled cross populations in Mozambique by an accelerated breeding scheme (ABS) achieved in **2011**
- Drought adapted population disseminated as true seed (Half-sib) to NARS breeding programs from 12 SSA countries (5,000 seeds each) in June 2011

# Major Achievements to Date, cont.




**After the release in 2011 about 186 trials were established**

**In 2012, 96 advanced clones** were selected from several AYT for multi-location trials and on-farm to be planted in April and December 2013 for varietal release in 2014



# Major Achievements to Date, cont



2011 Seeds from 2 independent populations (CB with 56 parents)								
Gurue					Maputo/Chokwe			
	Seedling	OT	PYT	AYT	Seedling	OT	PYT	AYT
 # Clones	1700	680	236 & 268	110	1,658	641	133 Chokwe  91 Umbeluzi	44 Chok  59 Umb
2012 Seeds from 2 independent populations (CB with 56 parents)								
Gurue					Maputo/Chokwe			
	Seedling	OT	PYT	AYT	Seedling	OT	PYT	AYT
# Clones	5,800	2,813			2,969	2,174		



# Crossing blocks with 56 parents



**2011**

Number  
Seeds  
Harvested

**Gurue**

**Umbeluzi**

Controlled

Polycross

Controlled

Polycross

18,185

46,507

1,472



**2012**



**Gurue**

**Umbeluzi**

Controlled

Polycross

Controlled

Polycross

Number  
Harvested

30,872

115,223

1,713

8,147



# Seeds in storage to be distributed in 2013



Location	2011		2012	
	Controlled	Polycross	Controlled	Polycross
Umbeluzi	8,482	44,157	1,713	8,147
Gurue	14,498	30,569	30,847	115,223
<b>Total</b>	<b>22,980</b>	<b>74,726</b>	<b>32,560</b>	<b>123,370</b>

# Number of Trials and Samples Processed and Analysed by NIRS



Year	Total of trials harvested	Total of samples	Total of Samples Processed		
			Fresh samples in the freezer	Dried samples in the freezer	Analysed by NIRS
2010	46	2937	0	0	2937
2011	26	2939	2435	384	120
2012	25	2371	727	578	1066
<b>Total</b>	<b>97</b>	<b>8247</b>	<b>3162</b>	<b>962</b>	<b>4123</b>



# Tissue Culture Lab Output: 2012



<b>Multiplication in the laboratory</b>				
	Total Genotypes	Total Plantlets	Number Genotypes free from virus	Number of plantlets free from virus
Number	<b>93</b>	<b>8,993</b>	<b>44</b>	<b>3,959</b>
<b>Multiplication in the screen house</b>				
Number clones free from virus	44			
Number plants in pots	<b>2,620</b>			



# Platform Removing Viruses for Zambia & Malawi

SSP to have service function for Southern Africa

- Zambia: 9 varieties sent for clean-up in June 2010
  - 5 have been successfully cleaned up
- Malawi: 4 varieties received for clean-up
  - All cleaned and sent back to Malawi in 2012



# Trainings carried out in Mozambique & Zambia

		# Male	# Female	# Organization
<b>Total trained</b>		<b>588</b>	<b>431</b>	<b>67</b>
<b>Total number days</b>	<b>272</b>	<b>Total location</b>	<b>32</b>	



# Area planted & no. of families who received vines 2011/2012

Type of dissemination	2011/2012		
	Planted Area (ha)	Quantity of Material (Kg)	Beneficiaries (Families)
DVM	57.5	575000	71875
Conventional multiplications (SDAE/Stations)	14.5	145000	18125
Conventional multiplications (Stations)	9	90000	11250
Rapid multiplication	1.4	11000	1750
CIP with partners	9	89100	11137.5
Other areas	0.6	5940	742.5
<b>Total</b>	<b>92</b>	<b>916,040</b>	<b>114,880</b>

Joint funding:  
SASHA/USAID  
4 seasons





Roots of the new release varieties sold at Pick N pay





# Understanding G X E Interactions in Drought Prone Environments



1. To determine G x E interactions – especially G x E interactions – for yield and the quality trait (root dry matter) in drought prone environments with unstable rainfalls
2. To obtain information about adaptation patterns and to identify genotypes adapted to drought prone environments
3. To determine associations among yield under drought stress levels and among yield stability and harvest index stability parameters
4. And to assess index selection options to enhance the chances of right selection decisions under drought stress conditions

# Environments & Genotypes



Maputo / Umbeluzi during dry season 2006, 2008 and 2009

Treatments: With and without irrigation – irrigation only during the first 42 days after planting => all environments were drought stressed

Rainfall: Rains during experimental season in 2006 (703.6 mm), 2008 (535.3 mm), and 2009 (478.7 mm) were 218.6 mm, 43.2 mm, and 87.5 mm

Irrigation: Furrow irrigation was used and applied once per week. In each irrigation application the soil was irrigated up to field capacity, so that the available water capacity was about 200 mm

Genotypes: 58 clones comprising 37 FV farmers from Mozambique, 3 FV from other EA countries, 18 Breeding lines or MV

Check Clones: Resisto (MV), Jonathan (MV), Tanzania (FV)

# Summary of Results

- Sweetpotato genotypes were found which exhibited elevated yields at both IRR and not IRR conditions
- Sweetpotato clones are extremely different in harvest index stability and it merits further studies to estimate the heritability of harvest index stability
- Harvest index stability is highly correlated with storage root yield GxE and storage root stability parameters
- Obviously, the response to selection in drought stress environments was not large, whereas the response to selection in “no-stress” (certainly there was also drought stress) was significant



# SSP

- Exchange information
- Training/capacity building
- Knowledge management



# *Lessons Learned/Risks*



- **Partnerships is a key aspect of the project**
- **Right variety**
- **Proper communication skills are needed**
- **Capacity building throughout is a must in all aspect, TC, Capacity on the Management aspect of the TC lab, quality laboratory**
- **Knowledge in the seed system is very important for good dissemination strategy**
- **Supplies and machine repair is challenging**
- **Transport sample by plane from far away site is a challenging**

# 10 Downing Street



View of Dr Maria Andrade intervening during the round table with different world leader and personalities in London, August 2012

# Collaboration with Other Partners



- Networks, Universities, IIAM, organizations on multiplication, dissemination, agro-processing & market related activities:

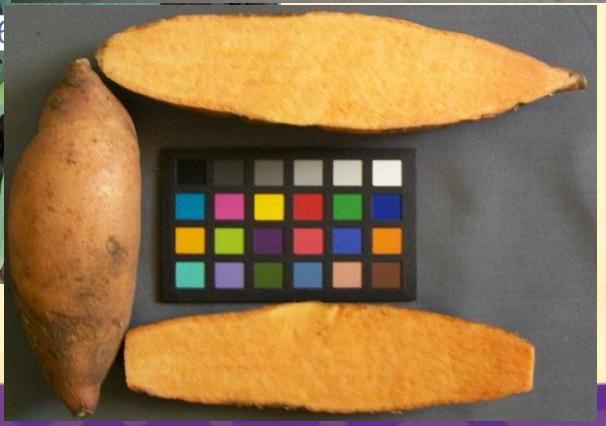
- Jose Ricardo (IIAM)
- Felistus Chipungu (Malawi),
- Britta (CIP Angola),
- Martin Chiona (Zambia),
- Jean Marc (Madagascar),
- Sunette (South Africa),

- Private sector,
- Individual Farmers,
- Farmers Associations,

- Helen Keller,

- Government Extension,
- Ministry of Health
- And Ministry of Education,





Thank-you for your  
Attention