# PROGRESS OF SWEETPOTATO BREEDING IN MALAWI

F. Chipungu, K. Masamba, M. Chiipanthenga, E. Abidin, I. Benesi and M Chitete,

SWEETPOTATO ACTION FOR SECURITY AND HEALTH IN AFRICA

# Objectives

**The national sweetpotato breeding program in Malawi is mandated to develop varieties that:**

Give high and stable yields (≥20t/ha) per unit area and time

Are resistant/tolerant to major and prevalent diseases (SPVD and Alternaria) and sweetpotato weevil (SPW) in Malawi

Give desired root quality colour (white, cream, yellow, orange) to meet local cooking and consumption requirements (high dry matter content, sweetness)

Wide and specific adaptability to environmental conditions and cropping systems

Contribute to vitamin A source

# Most important landraces in Malawi

| Country/ | Root yield | Flesh | Dry matter | Earl | SPVD | Alt | Remarks |
|---|---|---|---|---|---|---|---|
| Name of landrace | t/ha | color | (%) | | | | |
| Malawi | | | | | | | |
| Zondeni | 8-16 | o | 32 | L | | r | widely grown |
| Yoyera | 3-7 | w | 36 | L | | r | Low yields |
| Kamchiputu | 3-7 | lo | 36 | L | | r | Low yields |
| Babache | 5-7 | cr | 34 | L | | r | widely preferred |
| Mfumu | 7 | cr | 34 | L | | r | widely preferred |

Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep
Earl (Earliness: Early (E) (about 4 months), late (L) about 5 or more months
SPVD resistance (r: resistant, s:susceptible)
Alt (Altenaria blight resistance, r: resistant, s: susceptible

# Most important bred varieties in Malawi

| Given name | Yield t/ha | Flesh Colour | dry matter % | Early | SPVD | Alternaria | Remarks |
|---|---|---|---|---|---|---|---|
| Sakananthaka | 20 | cr | 31 | L | r | r | |
| Lunyangwa | 20 | cr | 31 | L | r | r | |
| Nyamoyo | 35 | cr | 33 | L | r | r | |
| Sungani | 35 | cr | 32 | L | r | r | |
| Anaakwanire | 25 | o | 30 | L | r | r | 6 to 8 roots/plant |
| Mathuthu | 25 | o | 29 | L | r | r | soft good for children |
| Kaphulira | 35 | lo | 30 | E | r | r | very early maturity allow peace meal harvesting in lean times |
| Chipika | 35 | lo | 30 | L | r | s | Wide adaptation |
| Kadyaubwerere | 30 | o | 31 | L | r | r | Sweet taste, keeps longer under open air storage |

Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep
Earl (Earliness: Early (E) (about 4 months), late (L) about 5 or more months
SPVD resistance (r: resistant, s:susceptible)
Alt (Altenaria blight resistance, r: resistant, s: susceptible

# Summary of progress 2012- 2014

| Type of trial | Details | 2011/12 | 2012/13 | 2013/14 |
|---|---|---|---|---|
| **Crossing block** | No. of parents in crossing block | 29 | 36 | 39 |
| | No. of seed collected from OP | 11,400 | 16,000 | |
| | Total No. of families of OP seed | 17 | 20 | |
| | No. of seed collected from crosses | 1200 | 800 | |
| | Total No. of families of controlled crosses | 30 | 29 | |
| **Seedling nursery** | No.of seeds planted | 8900 | 11,400 | 16,000 |
| | No. of seedlings established | 8000 | 6,000 | 9,000 |
| | Total No. of families planted | 30 | 17 | 20 |

# Summary of progress 2009- 2014

| Trials | | 2011/12 | 2012/13 | 2013/14 |
|---|---|---|---|---|
| **Observational trial (Clonal)** | | | | |
| | N0.of clones planted | 43 w & 50 o | 98 w & 372 o | 134 w, 235o |
| | N0. of checks (check clones) planted | 2 w & 2 o | 2 w & 2 o | 2 w & 3 o |
| | N0. of locations | 2 | 2 | 1 |
| **Preliminary yield** | N0.of clones planted | 16 w & 64 o | 14 w & 27 o | 26 w & 17 o |
| | N0. of checks (check clones) planted | 2 w & 2 o | 2 w & 2 o | 3 w & 3 o |
| | N0. of locations | 2 | 2 | 2 |
| **Advanced yield trial** | N0.of clones planted | | | 13 w & 17 o |
| | N0. of checks (check clones) planted | | | 3 w & 3 o |
| | N0. of locations | | | 4 |

**w= white; o = orange**

# Summary of progress 2009- 2014

| | | | | |
|---|---|---|---|---|
| | 1 | No of farms/farmers per region/district / province | | |
| | | | 6 | 9 |
| | 2 | Total no. of trials whole country | | |
| | | | 18 | 28 |
| No of varieties released | | | 0 | 0 |
| | | | | |
| No. of clones in pipeline for release by 2014 | | | | 3 |
| Package used for analysis: | | | | |
| 2009-2012 | | | GenStat | |
| 2013/14 | | | | GenStat and CloneSelector |
| | | | | |
| | | | | |

# Number of SP varieties released 2009 - 2014

| No. of varieties released | | No. of release document(s)* | No. of release papers /Manuscripts** |
|---|---|---|---|
| Non-orange | Orange | | |
| 2 | 5 | 1 | 1 |
| **No. of clones in pipe in pipeline for release (final tests/data already compiled)** | | | |
| Non-orange | Orange | | |
| 3 | 2 | 1 | 0 |

* Document submitted to Variety Release Committee/Authority; Each release has a separate document (several varieties released at the same time have one document)
**Papers published in journal(s) or manuscript for journal/submitted/to be submitted

# Detailed information of variety release documents (2009-2014)

F Chipungu, T Mkandawire, I Benesi, P Pamkomera, O Mwenye, E Abidin, M Andrade, M Chiipanthenga, Paul Demo, A Mtonga, M Mantchombe and S Chilungo. 2011. Proposal to release LU06/0146, LU06/0252, LU06/0527, LU06/0428, BVU07/028, BV07/008 and BV07/016 sweetpotato varieties in Malawi. A paper presented to Agricultural Technology Clearing Committee. Ministry of Agriculture and Food Security

# Papers published/Manuscripts (2013)

**Publications**

Chipungu F, F Chipojola, M Maliro, AO Maluwa, J Njoloma, R Chimsale, I Benesi and M Chiipanthenga Innovative and biotechnology approaches for increased sweetpotato productivity along the value chains in Malawi. 2013. A poster presented at the Regional Agricultural and Environmental Innovations Network-Africa (RAEIN-Africa) International Conference entitled "Innovation Systems for Resilient Livelihoods: Connecting Theory to Practice." Johannesburg, South Africa, 26-28 August 2013

Chipungu FP, T Mkandawire, M Chitete1 IR Benesi, P Pamkomera, O Mwenye, EP Abidin, M Andrade, W Gruneberg and M Chiipanthenga. 2013. Speed breeding and variety release for orange fleshed sweetpotato cultivar diversity in Malawi. Proceedings of the 12th Triennial Symposium for International Society for Tropical Root Crops-Africa Branch, Accra, Ghana, 30th Sep to 5th Oct 2013. *In press*

Chipungu FP, T Mkandawire, MJ Chitete, IR Benesi, P Pamkomera, OJ Mwenye, EP Abidin, M Andrade, W Gruneberg and M Chiipanthenga. 2013. An analysis of genetic gain for sweetpotato root yield, varieties released and adoption in Malawi. A poster presented at the 9th Triennial African Potato Association (APA), Naivasha, Kenya, 30th June to 4th July 2013

# Manuscripts 2014

Chipungu F., G Wolfgang et al. Breeding of efficient varieties for the changing environments in Malawi- an analysis of variance to predict selection of stable genotypes for root yield. 2014

Chipungu F., G Wolfgang et al. Breeding of efficient varieties for the changing environments in Malawi- an analysis of variance to predict selection of stable genotypes for root yield. Plant genetic resources. 2014

# Update Other Project Information

**Funding source/amount /duration**

Government resources

**Proposed future activities**

AGRA phase II on sweetpotato breeding

Variety dissemination

**Number of scientists and technicians in program**

7 scientists; 16 technician

# Acknowledgement


- To all partners in the breeding, seed systems and post harvest initiatives in Malawi

# Thank you for listening