



○  
**Sweetpotato Breeding  
Activities for 2013 at  
the NRCRI Umudike,  
Nigeria.**

# Main objectives



- Development of new sweetpotato varieties that satisfy the agronomic, processing and nutritional requirements of various end users.
- Population improvement for high carotenoid, high dry matter and virus resistance.

# Specific objectives



- Development of OFSP population with high dry matter through OP and controlled crosses;
- Evaluation of promising progenies at various yield trial stages for yield, SPVD resistance, dry matter and carotenoid content;
- Conduction of varietal release-targeted multi-locational trials;



# Most important bred SP varieties in Nigeria



| Name of variety  | Root yield (t/ha) | Flesh color | Dry matter (%) | Early | SPVD | Alt | Remark           |
|------------------|-------------------|-------------|----------------|-------|------|-----|------------------|
| King J.          | 35                | LO          | 30             | E     | R    | n.a | Released in 2013 |
| UMUSP/2          | 30                | W           | 27             | E     | R    |     | Released in      |
| Mother's Delight | 31.4              | O           | 26             | E     | S    | n.a | Released in 2012 |
| TIS 87/0087      | 35                | W           | 32             | E     | R    | n.a | Released in 2006 |
| TIS 8164         | 30                | W           | 30             | E     | R    | n.a | Released in      |
| TIS2532.O P.1.13 | 25                | W           | 30             | E     | R    | n.a | Released in 2006 |

Flesh color: White (w), cream (cr), yellow (y), light  
 Earl (Earliness: Early (E) (about 4 months), late (L  
 SPVD resistance (r: resistant, s:susceptible)  
 Alt (Altenaria blight resistance, r: resistant, s: susc

# Summary of progress 2009- 2014



| Type of trial           |   | Details  | 2009  | 2013/14 |
|-------------------------|---|--|-------|---------|
| <b>Crossing block</b>   |   |  |       |         |
|                         | 1 | No. of parents in crossing block               | 15    | 20      |
|                         | 2 | No. of seed collected from OP                  | 1,520 | 4281    |
|                         |   | a. Total no. of families of OP seed            | 13    | 11      |
|                         | 3 | No. of seed collected from crosses             | 0     | 0       |
|                         |   | a. Total no. of families of controlled crosses | 0     | 0       |
| <b>Seedling nursery</b> |   |  |       |         |
|                         | 1 | No of seeds planted                            | 921   | 2,325   |
|                         | 2 | No of seedlings established                    | 582   | 2,009   |
|                         | 3 | Total no. of families planted                  | 10    | 19      |



# Summary of progress 2009- 2014



| Type of trial                    |   | Details                             | 2009 | 2013/14 |
|----------------------------------|---|-------------------------------------|------|---------|
| <b>Observation trial</b>         |   |                                     |      |         |
| <b>(OT)</b>                      | 1 | No of clones planted                | 0    | 844     |
|                                  | 2 | No of checks (check clones) planted | 0    | 3       |
|                                  | 3 | No. of locations                    | 0    | 3       |
| <b>Preliminary yield (PT)</b>    |   |                                     |      |         |
|                                  | 1 | No of clones planted                | 22   | 33      |
|                                  | 2 | No of checks (check clones) planted | 2    | 3       |
|                                  | 3 | No. of locations                    | 2    | 3       |
| <b>Advanced yield trial (AT)</b> |   |                                     |      |         |
|                                  | 1 | No of clones planted                | 20   | 12      |
|                                  | 2 | No of checks (check clones) planted | 2    | 3       |
|                                  | 3 | No. of locations                    | 3    | 3       |

# Summary of progress 2009- 2014



| Type of trial                                 | Details | 2009   | 2013/14                         |
|---|---------|--|---------------------------------|
| On-farm trials                                |         |  |                                 |
|   | 1       | No of farms/farmers per region/district / province |                                 |
|   |         | 0  | 0                               |
|   | 2       | Total no. of trials whole country                  |                                 |
|   |         | 0  | 0                               |
| No of varieties released                      |         | 0  | 1                               |
| No. of clones in pipeline for release by 2014 |         |  | 0                               |
| Package used for analysis:                    |         |  |                                 |
| 2009-2012                                     |         | GenStat?<br>CloneSelector?<br>SAS?                 | GenStat<br>CloneSelector<br>SAS |



# Sweetpotato Foundation Seed system



| <b>Tissue culture lab:</b>   | <b>Response (a)</b>                        | <b>Response (b)</b> |
|--|--|---------------------|
| No. of lamina flow benches (a)   | 3  |                     |
| No. of CVs maintained in tissue culture (a)  | 15   |                     |
| No. of screenhouses/need repair (a)  | 3  |                     |
| No. of good screenhouses (a)   | 0  |                     |
| <b>No. of in vitro plantlets weaned:</b>   |  |                     |
|  | 0 (essentially for germplasm conservation) |                     |
| a) Every 3-4 months (b) every year   |  |                     |
| <b>No. of vine cuttings:</b>   |  |                     |
| a) Distributed every 4-5 months (b) every year   | n.a  |                     |
| a) Sold every 4-5 months [(b) every year]  | n.a  |                     |
| <b>How long does it take to breed a variety (years)?</b>   | 4-5  |                     |
| How long does the variety release process take?<br>(Assuming all data is available)/1 season/1 year (a)? | 1 year                                     |                     |

# Linkage to Vine multipliers for further multiplication



| Linkage to vine multipliers     | Proportion | Comment |
|---------------------------------|------------|---------|
| Government institutions (list): | %          |         |
| R-TEP                           | 5          |         |
| ADPs                            | 5          |         |
| NGOs (list):                    | %          |         |
|                                 |            |         |
| Farmer multipliers              | %          |         |
| POFAN                           | 1          |         |
|                                 |            |         |
| Others (list them)              | %          |         |
|                                 |            |         |
|                                 |            |         |
|                                 |            |         |

# Status of AGRA grant (delete what is not applicable)



| <b>Project title:</b>   | <b>Response</b> |
|---|-----------------|
| Rapid release of SPVD resistant orange-and white-fleshed and high dry matter sweetpotato varieties that meet the agronomic and industrial quality requirements of end-users in Nigeria. |                 |
| Funded since  | 2010            |
| Amount  | USD 158,700     |
| Expiration date   | 2013            |
|   |                 |
| Renewal proposal (delete what is not applicable):   |                 |
| Not yet written/ In process of writing  | Yes             |
| <b>Other information on AGRA grant:</b>   |                 |
|   |                 |
|   |                 |

# Number of SP varieties released 2009 - 2014



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



\*Document submitted to Variety Release Committee/Authority

Author(s), Title, Year of submission, Organization, City, Country

- Afuape, S.O., Nwankwo, I.I.M., Echendu, T.N.C., Njoku, J.C., Low, J. And Egesi, C.N. (2012). Nomination of new sweetpotato varieties with nutritional qualities for naming, registration and release. Submitted to National Variety Release Committee in Nov. 2012
- Afuape, S.O., Nwankwo, I.I.M., Echendu. T.N.C., Njoku, J.C. and Egesi C.N. (2013). Nomination of Pro-vitamin A rich Sweetpotato Variety for Registration and Release. Submitted to National Variety Release Committee in June 2013.

# Journal Papers published/Manuscripts (2009-2014)



**Afuape, S.O.**, Nwankwo, I.I.M., Omodamiro, R.M., Echendu, T.N.C. and Toure, A. (2014). Studies on some important consumer and processing traits for breeding sweetpotato for varied end-uses. *Amer. J. Experim. Agric.* 4(1): 114-124.

Nwankwo, I.I.M. and **Afuape, S.O.** (2013). Evaluation of high altitude orange-fleshed sweetpotato (*Ipomoea batatas*) genotypes for adaptability and yield in lowland rainforest ecology of Umudike, Southeastern Nigeria. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* 5(6): 77-81.

Omodamiro, R. M., **Afuape, S. O.**, Njoku, J.C., Nwankwo, I.I.M., Echendu, T. N.C. and Carey. E. (2013). Acceptability and proximate composition of some sweetpotato genotypes: Implication of breeding for food security and industrial quality. *International Journal of Biotechnology and Food Science*, Vol. 1(5): 97-101.

Nwankwo, I.I.M., Basse, E.E. and **Afuape, S.O.** (2014). Yield evaluation of open pollinated sweetpotato (*Ipomoea batatas* (L.) Lam) genotypes in humid environment of Umudike, Nigeria. *Global J. Biol. Agric. Health Sci.*, 3(1):199-204



# Papers published/Manuscripts (2009-2014)



Atayese, M.O., Lawal, I.O., **Afuape, S.O.**, Olowookere, F., Sakariyawo, O.S., Olaiya, A.O., Fetuga, O.G. and Idowu, H.T. (2013). Evaluation of growth and yield response of sweetpotato (*Ipomoea batatas* L.), to different rates of poultry manure in Abeokuta south-western Nigeria.

Egbe, M.O., **Afuape, S. O.** and Idoko, J. A. (2012). Performance of improved sweetpotato (*Ipomea batatas* Lam.) varieties in Makurdi, southern guinea savanna of Nigeria. Amer. J. Experim Agric., 2 (4): 573-586.

Ehisianya, C. N., **Afuape, S.O.** and Echendu, T. N. C. (2012). Varietal response of selected orange-fleshed sweetpotato cultivars to yield and the sweetpotato weevil, *Cylas puncticollis* (Boheman) (Coleoptera: Brentidae) at Umudike, Abia State, Nigeria. Intern. J. Agric. Sci. Vol. 2 (9): 251-255.

## Papers published/Manuscripts (2009-2014)

- Etudaiye H. Adinoyi, H.E., Oti E., Sanchez, T., Omodamiro R. M., **Afuape S.O.** and Ikpeama A. (2012). Effect of variety and influence of starch-hydrolyzing enzyme and yeast on the yield of ethanol generated from sweetpotato flours and starches. *Advances in Applied Science Research*, 3 (5):2774-2778.
- **Afuape, S. O.**, Okocha P. I. and Egesi, C.N. (2011). Genetic variability, correlation and path coefficient analysis in quantitative characters of sweetpotato (*Ipomoea batatas* (L.) Lam). *Nigerian Agricultural Journal*, 42: 84-93.
- Ibitela, I., **Afuape, S.O.**, Paliwal, J. and Nwauzor, E.C. (2009). Screening sweetpotato germplasm for starch, flour and fed quality characteristics. *Fruit, Vegetable and Cereal Science and Biotechnology* Vol. 3 (1): 62-67.

# Local and International Conference Proceedings



- Afuape, S.O.**, Nwankwo, I.I.M. , Njoku, J.C. , Echendu, T.N.C. and Egesi, C.N. (2013). On-farm assessment of yield and culinary attributes of selected sweetpotato genotypes by farmers for varietal release. 12TH ISTRC-AB Triennial Symposium in Accra from Sept. 30-Oct.5, 2013.
- Afuape, S.O.**, Njoku, C.J., Njoku, D. N. and Nwankwo, I.I.M. (2013). Development of new sweetpotato varieties: evaluation of advanced sweetpotato breeding lines at the uniform yield trial stage in contrasting agroecologies in Nigeria. 37<sup>th</sup> Annual Conference of Genetics Society of Nigeria (GSN), Lafia, Nasarawa state, Nigeria (21st- 24th October, 2013).
- Omodamiro, R.M., **Afuape, S.**, Nwankwo, I.I.M. and Ofoeze, M.A. (2012). Quality evaluation of selected preliminary yield trial sweetpotato genotypes: Implication in sweetpotato breeding. Proc. 36<sup>th</sup> Annual Conf. of Nigerian Institute of Food Science and Technology, held at Auditorium of University of Lagos, Akoka, Lagos, 15<sup>th</sup>-19<sup>th</sup> October, 2012, pp 531-532.
- Omodamiro, R.M., **Afuape, S.O.**, Oti, E. and Echendu, T.N.C. (2012). Effect of method of processing on the sensory attributes of sweetpotato chips. Proc. 36<sup>th</sup> Annual Conf. of Nigerian Institute of Food Science and Technology, held at Auditorium of University of Lagos, Akoka, Lagos, 15<sup>th</sup>-19<sup>th</sup> October, 2012, pp 529-531.

- Omodamiro, R.M., Ukpabi, U.J. and **Afuape, S.O.** (2010). Assessment of quality characteristics of exotic sweet potato genotypes for suitable food traits and processing attributes in Nigeria. Proceedings of the 11<sup>th</sup> Triennial Symposium of the ISTRC-AB held at Memling Hotel, Kinshasa, Democratic Republic of Congo, 4-8 Oct., 2010, pp 423-427.
- Omodamiro, R.M., Oti, E., **Afuape, S.O.**, and Etudaiye, H.A. (2010). Sensory evaluation of orange-fleshed sweetpotato extract drinks. Proc. 34<sup>th</sup> Annual Conf. of Nigerian Institute of Food Science and Technology, held at the Banquet Hall, government House, Yola, 12<sup>th</sup>-16<sup>th</sup> October, 2009, pp 171-172.

## Update Other Project Information

**Funding source**

**AGRA**

**Amount**

**\$158,700**

**Duration**

**3 years**

**\* AGRA funding has ended.**

**Number of scientists in program**

**9 (2 PhD; 4 M.Sc; 3 B.Sc)**

**Number of technicians in program**

**4**

**Constraints: Ability to properly phenotype SPVD.**

**Maintenance of germplasm over the dry season.**

**Adequate laboratory for quality traits analyses**

**Lack of good screen house**

# Current staff on sweetpotato research (replace example with yours)



| <b>Sweetpotato (SP) Staff Category</b>             | <b>No.</b> | <b>Gender (M/F)</b> | <b>Age &lt;35 / &gt; 35 years</b> |
|--|------------|---------------------|-----------------------------------|
| Full/Part time on SP (%) (indicate qualification): |            |                     |                                   |
| PhD (Agronomist) Plant breeder, 100%)              | 1          | M                   | >35                               |
| PhD Entomologist (100%)                            | 1          | M                   | >35                               |
| M.Sc Sweetpotato Breeding (100%)                   | 1          | M                   | >35                               |
| M.Sc Weed Science (100%)                           | 1          | M                   | >35                               |
| M.Sc Microbiology                                  | 2          | 1M,1F               | >35; <35                          |
| B.Sc Agric. Economics                              | 1          | M                   | >35                               |
| B.Sc. Agronomy                                     | 1          | F                   | <35                               |
| Technicians:                                       |            |                     |                                   |
| Higher Diploma (tissue culture, 10%)               | 1          | F                   | <35                               |
| Diploma (breeding & seed systems, 50%)             | 2          | M;F                 | >35                               |
| <b>Total</b>                                       | <b>11</b>  | <b>(7 M:4F)</b>     |                                   |
| Comment:   |            |                     |                                   |



# Information On OFSP Utilization Study

**Afuape, S.O., Omodmiro, R.M.,  
Ogbo, E., Akinpelu, O.A.**

| Location                  | Enterprise          | OFSP Type        | Trait                        | # Respondents | # That liked product |
|---------------------------|---------------------|------------------|------------------------------|---------------|----------------------|
| Ibadan                    | Orange French Fries | Mother's Delight | Low dry matter               | 70            | 68                   |
| Ibadan, Benue, Lagos, Jos | Fries               | King J.          | -High d.m.<br>-Orange color  | 30            | 18                   |
| Benue, Jos                | Kunnu               | Mother's Delight | -Deep orange color<br>-Taste | 8             | 8                    |
|                           |                     | King J           | -Orange color<br>-High d.m   |               |                      |
| Benue, Jos                | Kambar              | Mother's Delight | -Low d.m.<br>-Orange color   | 4             | 4                    |

# Segregation pattern of flesh colour of progenies from CIP-Mozambique germplasm.



| Families name    | No. of seedlings harvested | No. White Fleshed | No. Cream fleshed | No. Yellow fleshed | No. Orange fleshed | No. Purple colour |
|------------------|----------------------------|-------------------|-------------------|--------------------|--------------------|-------------------|
| MUSG 066-6-15    | 194                        | 0                 | 11                | 23                 | 159                | 1                 |
| MUSG 0608-61     | 292                        | 12                | 19                | 140                | 120                | 1                 |
| MUSG 0614-22     | 203                        | 0                 | 7                 | 56                 | 137                | 3                 |
| MUSG11006-3      | 21                         | 2                 | 1                 | 2                  | 16                 | 0                 |
| NCPP573,50-17-02 | 134                        | 0                 | 0                 | 9                  | 124                | 1                 |
| <b>Total</b>     | <b>844</b>                 | <b>14</b>         | <b>38</b>         | <b>230</b>         | <b>556</b>         | <b>6</b>          |

THANK YOU

- 

- 

- 

-