

SWEETPOTATO BREEDING IN WEST AFRICA

PROGRESS IN BURKINA FASO, GHANA AND NIGERIA

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SWEETPOTATO ACTION FOR SECURITY AND HEALTH IN AFRICA



Introduction



- ❑ This is a composite progress report for West Africa
- ❑ Countries covered include Burkina Faso, Ghana and Nigeria
- ❑ Important constraints across these countries include
 - Susceptibility to *Cylas* sp., *Alcidodes* sp and SPVD
 - Drought and shortening rainy season (irregular rainfall pattern)
 - Low yields, root dry matter content, low beta-carotene levels in farmer preferred cultivars
 - Weak seed system
 - Declining soil fertility
 - High Post-harvest losses
 - Low level commercial utilization
 - Less structured marketing system



Objectives



- Develop **high yielding and drought tolerant OFSP varieties** adapted to the Sudano-Sahelian zone (BF)
- Development of **high and stable yielding, disease and pest** (SPVD, Cylas sp., Alcidodes sp.) **resistant** varieties with **high nutrition and processing qualities** (Dry matter, Beta-carotenoids, starch, flour yield, minerals) and highly accepted, utilized and consumed (GH & NG)
- Population improvement for **earliness, high carotenoid, high dry matter, Cylas sp. and virus resistance**

Widen the genetic pool through introductions from other parts of the world



Most important landraces in Burkina Faso



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β-carotene (mg/100g fwb)	Dry matter (%)	Earl	SPV D	Alt	Wee vil	Remarks (E.g. Yr/released)
Nakalbo	L	24.2	Cr		30	E	R		S	Recommended
Saafare	L	17.5	W		25	E	R		S	Recommended
Patate	L	18.6	W		29	E	R		S	Recommended
Tiebele-2	L	20	O		26	E	S		S	Registered in 2014
Wosso-woule	L	15.7	W		32	E	R		S	Recommended

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s: susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important landraces in Ghana



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPVD	Alt	Weevil	Remarks (Yr/released)
Blueblue			Yellow				R			common in central region
Akaten red			Yellow							
Jukwa orange			Yellow				R			common in central region
shashango			Yellow							
Kuffour			Orange							common in N. Ghana
Asamare			White							
Sankase nabogro			White							
Obare			White							common in N. Ghana
Nanugungungu			Orange							



Most important landraces in Nigeria



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPV D	Alt	Wee vil	Remarks (E.g. Yr/released)
Ex-Igbariam	L	20	Y	0.273	32	E	S	R	S	Not released;
Atsaka pupu	L	15	W	n.a	30	E	R	n.a	MR	Not released;
Buttermilk	L	15	Y	n.a	30	E	S	n.a		Not released;
Danzaria	L	15	Y	n.a	30	E	S	n.a		Not released;

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important released varieties in Ghana



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPVD	Alt	Weevil	Remarks (Yr/released)
CRI-Okumkom		20	W		31	E	MR			1998, released
CRI-Faara		22	W		36	E	MR			1998, released
CRI-Sauti		19	Y		40	E	MR			1998, released
CRI-Santom pona		17	Y(light)		34	E	MR			1998, released
CRI-Apomuden		35	DO	21000-40000 μ g	21	Extra E	MR			2005, released
CRI-Otoo		23	LO	545	32	E	MR			2005, released
CRI-Ogyefo		20	W		40	E	MR			2005, released
CRI-Hi starch		18	W		40	E	MR			2005, released
CRI-Patron		20	Y	2800	34	L	MR			2012, released
CRI-Bohye		22	LO	5500	31	L	MR			2012, released
CRI-Ligri		22	Y(light)		35	L	MR			2012, released
CRI-Dadanyuie		18	W		35	L	MR			2012, released

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s: susceptible, mr: moderately resistant). Alt (Alternaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important released varieties in Nigeria



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β-carotene (mg/100g fwb)	Dry matter (%)	Earl	SPV D	Alt	Weevi I	Remarks (E.g. Yr/released)
King J	B	35	LO	0.714	30	E	R	n.a	S	2012/released
UMUSP/2	B	30	W	0.241	27	E	R	n.a	S	2012/released
Mother's Delight	B	31.4	O	2.082	26	E	S	n.a	S	2013/released
TIS 87/0087	B	35	W	0.238	32	E	R	n.a	mr	2006/released
TIS 8164	B	30	W	n.a	30	E	R	n.a	S	2006/released
TIS 2532.OP.1.13	B	25	W	n.a	30	E	R	n.a	S	2006/released

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most widely grown variety in Burkina Faso



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPV D	Alt	Wee vil	Remarks (E.g. Yr/released)
Nakalbo	L	24.2	Cr		30	E	R		S	Recommended
Saafare	L	17.5	W		25	E	R		S	Recommended
Patate	L	18.6	W		29	E	R		S	Recommended
Tiebele-2	L	20	O		26	E	S		S	Registered in 2014
Wosso-woule	L	15.7	W		32	E	R		S	Recommended

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most widely grown variety in Nigeria



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPVD	Alt	Wee vil	Remarks (E.g. Yr/released)
Mother's Delight	B	31.4	O	2.082	26	E	S	n.a	S	2013/released
TIS 87/0087	B	35	W	0.238	32	E	R	n.a	mr	2006/released
Ex-Igbariam	L	20	Y	0.273	32	E	S	R	S	Not released;
Buttermilk	L	15	Y	n.a	30	E	S	n.a		Not released;

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important OFSP varieties in Burkina Faso



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earl	SPVD	Alt	Weevil	Remarks (E.g. Yr /released)
Tiebele-2	L	20	O		26	E	S		S	Registered /2014
Bagre	Int	22.7	O		27	E	S		S	Registered /2014
Joel	Int	16.2	O		24	E	S		S	Registered /2014
Nanyoumondo-1	L	22.5	O		26	E	S		S	Registered /2014
Nanyoumondo-2	L	28	O		25	E	S		S	Registered /2014

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important OFSP varieties in Ghana



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earliness	SPVD	Alt	Weevil	Remarks (Yr/released)
CRI-Apomuden	B	35	DO	21000-40000 μ g	21	Extra E	MR		S	2005, released
CRI-Bohye	B	22	LO	5500	31	L	MR		MR	2012, released

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)



Most important OFSP varieties in Nigeria



Name variety	Status (L/B)	Root yield (t/ha)	Flesh color	β-carotene (mg/100g fwb)	Dry matter (%)	Earl	SPVD	Alt	Wee vil	Remarks (E.g. Yr/released)
Mother's Delight	B	31.4	O	2.082	26	E	S	n.a	S	2013/released
King J	B	35	LO	0.714	30	E	R	n.a	S	2012/released

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s:susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)

Most important OFSP varieties in West Africa



Name Country variety	Status (L/B)	Root yield (t/ha)	Flesh color	β -carotene (mg/100g fwb)	Dry matter (%)	Earliness	SPVD	Alt	Weevil	Remarks (Yr /released)
Mother's Delight (Nigeria)	B	31.4	O	2.082	26	E	S	n.a	S	2013/released
King J (Nigeria)	B	35	LO	0.714	30	E	R	n.a	S	2012/released
CRI-Apomuden (Ghana)	B	35	DO	2.1 – 4.0		Ex. E	R	n.a	S	2005, released

Status: Landrace (L), breeding line (B). Flesh color: White (w), cream (cr), yellow (y), light orange (lo), orange (o), deep orange (do). Earl (Earliness: Early (E) (about 4 mo), late (L) about 5 mo or more. SPVD/Weevil resistance (r: resistant, s: susceptible, mr: moderately resistant). Alt (Altenaria blight resistance, r: resistant, s: susceptible, mr: moderately res.)

Sweetpotato trials / No. of clones planted last season 2014 / 2015



Trial	Country / No of clones		
	Burkina Faso	Ghana	Nigeria
Crossing block	20	18	15
Observation (OT)	272	6817	600
No. of checks	2	5	3
Preliminary yield (PT)		3	N.A
No of checks		3	N.A
No. of locations		3	N.A
Advanced yield (AT)	10	6	20
No. of checks	2	3	2
No. of locations	2	6	6
On-farm		-	N.A

Last season (2014) analysis done in CloneSelector (Yes/Y, No/N)



Trial	Country / Analysis		
	Burkina Faso	Ghana	Nigeria
Observation (OT)	N	Y	N
Preliminary yield (PT)		Y	N
Advanced yield (AT)	Y	Y	N
On-farm			
No. of varieties released 2014		-	0
[No. of OFSP]		-	0
No. of clones earmarked for release by 2015	3	-	2
Foundation seed/ available (No. of plants)	Y	-	Y

Funding source for sweetpotato breeding / Foundation seed activities



Source of funding	Country/Amount		
	Burkina Faso	Ghana	Nigeria
Donor (breeding)	177, 500	30, 000	N 1.5M (Rainbow Project) + \$ 8000 (WACCI PhD Res. Grant)
Donor (Foundation seed)	185, 000	4, 000	Not Available
Stock/Foundation seed available (No. varieties)	6	12	2
Number of plants	70, 000	6,000	-

Stock/Foundation seed

700, 000

34, 000
(Non-collection)

N 250, 000 Jumpstarting On-farm
varietal testing and seed system

List of papers published in 2014/2015



Journal papers

- Somé K., Gracen V., Asante I.K., Danquah E. Y., Ouedraogo J.T., Tignegre J. B., Belem J. and Tarpaga M.V., 2014. Diversity analysis of sweet potato (*Ipomoea batatas* [L.] Lam) germplasm from Burkina Faso using morphological and simple sequence repeats markers. *Afr. J. Biotechnol.*, 13(6):729-742.
- 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., Bassey, 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

Conference proceedings

- Breeding for high beta-carotene, dry matter content and yield in sweetpotato in Burkina Faso. CABI
- S.O. Afuape, S. Sa'ad, E. Ogbo and I.I.M. Nwankwo. (2014). Identification of important traits for consumer-targeted breeding for enhanced sweetpotato commercial product development in Benue State. Proc. 48th Annual Conf. Agric. Soc. Nigeria (ASN), Univ. Abuja, 24th – 27th November 2014.
- Afuape, S.O., Egesi, C.N., Kahya, S.S., Umezurumba, I.C. and Nkaa, F.A. (2014). Growth differential of cassava cultivars in the production of cassava organized embryogenic structure (OES) for cassava transformation. Proc. 38th Annual Conf. Genet. Soc. Nigeria, Bishop Kelly Pastoral Centre, Benin City, Nigeria, 19 – 24, Oct., 2014.



GREAT THANKS FOR YOUR ATTENTION