

The Value of Farmer Varieties and Indigenous Knowledge in Cassava Breeding in Uganda

Kawuki Robert

NaCRRI/NARO



Key Milestones in History of Cassava Breeding in Uganda

Year	Status
1860s	Cassava introduced into Uganda; promotion not by scientists, but local chiefs
1930 to 1940	1 st wave of CMD epidemics
1941	Colonial Government made the 1 st breeding attempt through variety selection
1950 to 1960	Introductions from Amani & few local varieties screened for CMD resistance; 13 varieties released
1958	Varied adoption: long soil storability; bitterness vs resistance; and adaptability of introductions.
1980s	2 nd wave of CMD epidemics
Early 1990s	Intensive selections from IITA germplasm; reduction of CMD
Late 1990s	Preference to CMD susceptible local varieties;
2005 to date	CBSD epidemics; changes in cassava breeding and seed system; increased responsiveness to threats and needs

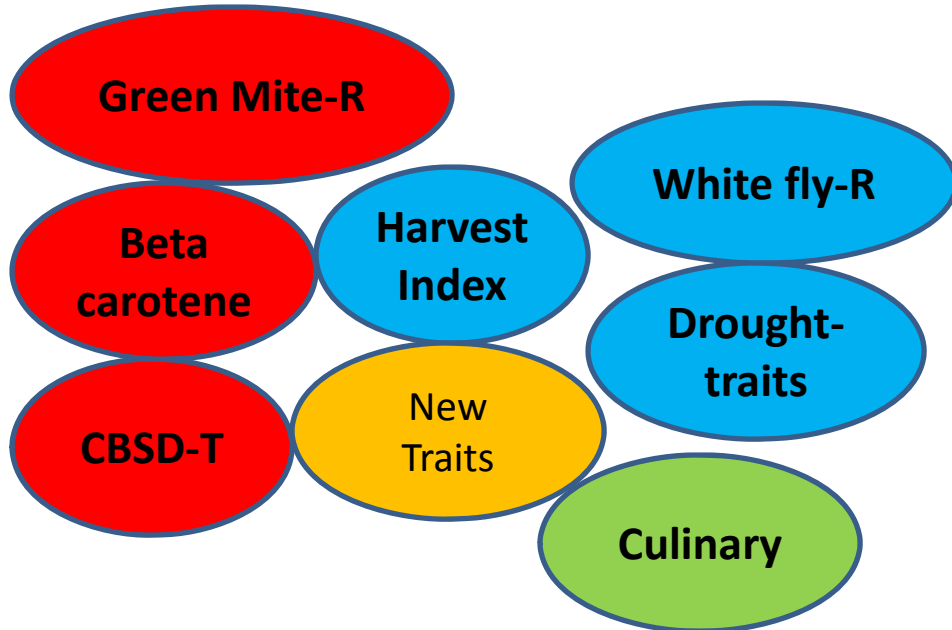
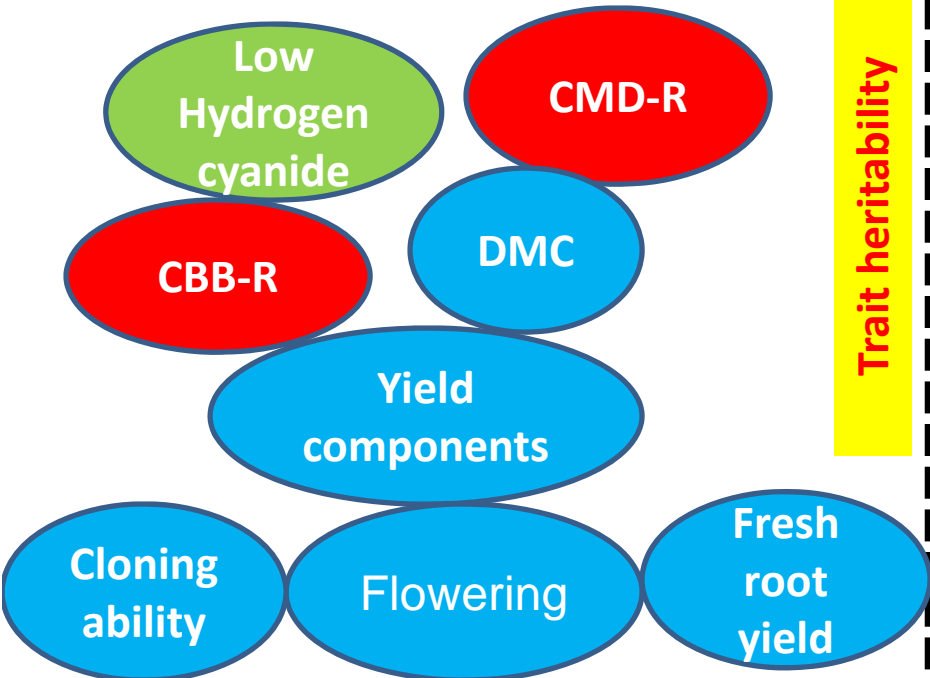
Key Trait Sources

Elite

Landrace

Landrace + Elite

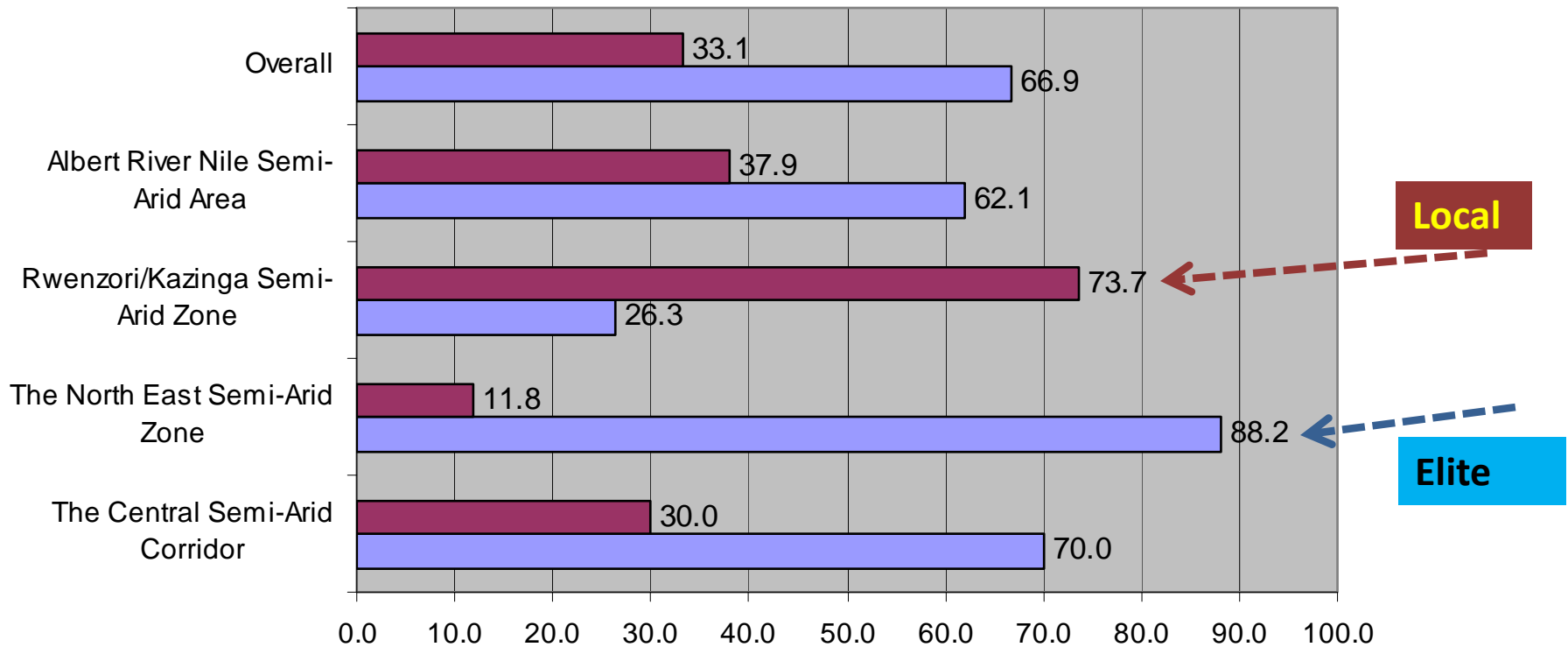
Trait heritability



Old traits (1860 - 1960)

New traits (after 1960)

Farmers Growing Local Varieties (n = 1068; CRCoE, 2011)



Elite Genotypes

TME 14 (31%),
Nase 3 (23%)
I92/0067 (14%)
TME 204 (12%).

Local genotypes

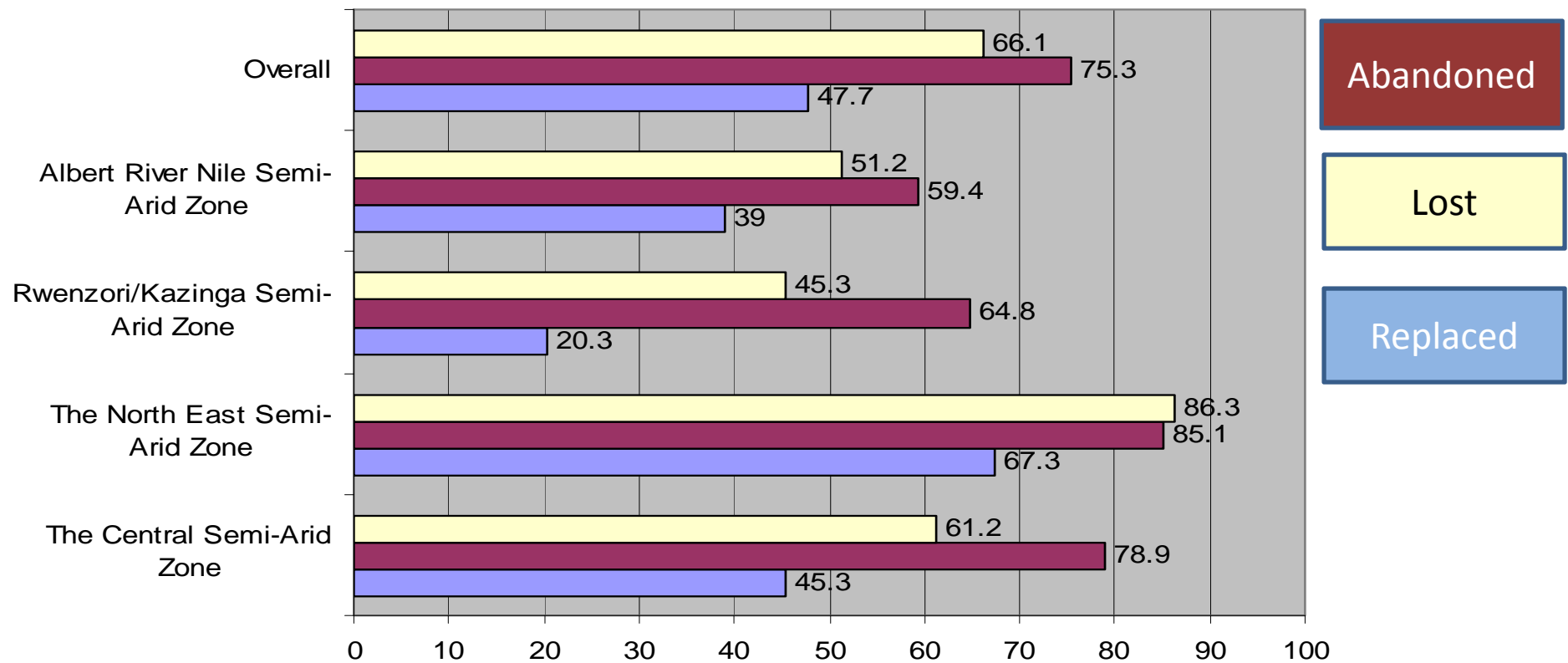
Bukalasa (23%),
Kidimumpale (14%),
Gwanlada (12%)
Kalinga (9%).

Acreege of varieties

Improved 1.7 acres

local 1.4 acre).

Replacement, Abandonment and Lose of cassava varieties



Main reasons for loss: **Diseases and pests (60%)**; **decrease in yield (47%)**; **bad test (13%)**; and **coming of better varieties (14%)**.

The most common varieties lost are: Bukalasa, Ebwanatereka, Kwantamumpale, Mutesa and Akena.

Progress in Using Local Varieties in Cassava Breeding

Clonal evaluation trial NaCRRI during growing season 2005/2006

Family	Block	No. of Clones	Mean CMD	Mean HI	Min. SI	Max. SI	Selected clones
Bamunanika	1	37	1.3	0.57	-12.0	13.3	4
Bamunanika	2	35	1.1	0.30	-7.6	10.9	2
Bamunanika	3	34	1.2	0.27	-10.1	6.4	2
Bao	1	8	1.2	0.41	-14.3	7.9	1
Bao	2	9	1.2	0.36	-5.5	13.3	4
Bao	3	6	1.5	0.25	-14.5	4.9	0
Kakwale	1	39	1.1	0.68	-13.2	20.2	6
Kakwale	2	31	1.1	0.38	-13.7	9.3	5
Kakwale	3	34	1.2	0.28	-14.2	13.7	4
NASE10	1	81	1.1	0.58	-12.9	15.2	8
NASE10	2	82	1.1	0.39	-13.7	14.1	18
NASE10	3	83	1.1	0.35	-10.9	12.2	18
NASE12	1	9	1.0	0.51	-2.0	10.6	1
NASE12	2	10	1.0	0.41	-5.3	30.9	6
NASE12	3	9	1.0	0.24	-9.5	11.8	3
Nyaraboke	1	27	1.5	0.57	-7.8	10.8	3
Nyaraboke	2	28	1.2	0.37	-10.8	9.5	2
Nyaraboke	3	26	1.2	0.30	-10.5	8.8	3
TME14	1	29	1.3	0.51	-11.6	15.2	7
TME14	2	30	1.2	0.41	-6.8	11.2	8
TME14	3	28	1.2	0.35	-8.1	11.4	9

Comparison Local x Local/Elite vs Elite x Elite Crosses; one round of selection 2012

Cross combination	No. of Clones	DMC
Kakofira x AR9-15	2	32.1
Kakofira x AR6-95	1	35.5
Gwalanda x CR24-3	19	34.6
Bamunanika x CR10-6	1	40.2
Kibao x Nase 12	1	39.9
Egabú x Nase 3	2	34.7
Nyaraboke x TME 14	2	28.3
Njule red OP	14	37.7
Nase 14 OP	10	35.9
SE95/00036 OP	10	35.2
Nase 14 x MM96/0686	4	39.1
Nase 14 x MH02/056HS	8	31.7
Nase 3 OP	10	36.3
CR36-2 OP	24	35.7
CR24-3 OP	20	36.4

Field phenotyping: Kawuki et al 2011. *Field Crops Res.* 122: 156-156

Root Dry Matter Content

Country	Elite genotypes	Local genotypes	Min DMC	Max DMC	Mean	Variance
DRC	37.5 (82)	33.6 (78)	22.4	48.9	35.6	26.8
Kenya	37.2 (50)	38.3 (26)	27.9	44.8	37.6	16.4
Madagascar	32.7 (33)	33.0 (110)	16.3	42.4	32.9	14.1
Rwanda	33.0 (74)	34.7 (43)	20.7	48.1	33.6	41.3
Tanzania	31.2 (3)	30.1 (133)	24.3	35.5	30.1	5.1
Uganda	39.3 (78)	37.2 (242)	16.4	49.6	37.7	25.5
Mean	36.32	34.4				

Harvest Index

Country	Elite genotypes	Local genotypes	Min HI	Max HI	Mean	Variance
DRC	0.57 (89)	0.42 (100)	0.06	0.83	0.49	0.019
Kenya	0.35 (56)	0.26 (35)	0.06	0.77	0.32	0.013
Madagascar	0.32 (34)	0.32 (109)	0.04	0.68	0.32	0.014
Tanzania	0.62 (4)	0.53 (144)	0.14	0.75	0.54	0.012
Uganda	0.66 (77)	0.59 (249)	0.20	0.90	0.60	0.011
Rwanda	0.43 (124)	0.46 (50)	0.24	0.71	0.44	0.008
Mean	0.49	0.48				

Root cortex thickness (mm) of cassava germplasm

Country	Elite genotypes	Local genotypes	Min cortex	Max cortex	Mean	Variance
DRC	2.24 (46)	1.88 (85)	0.55	4.89	2.00	0.35
Kenya	2.22 (64)	1.61 (34)	0.83	4.44	2.01	0.42
Madagascar	1.26 (37)	1.33 (126)	0.34	2.30	1.31	0.15
Tanzania	1.13 (5)	1.24 (105)	0.62	2.26	1.23	0.10
Uganda	1.98 (83)	1.84 (240)	0.95	3.87	1.88	0.22
Mean	1.96	1.62				

Evaluation of local and introduced germplasm for resistance to CBSD; *Abaca et al 2012 J. Agron. DOI:10.3923/ja.2012*

Category	No. of clones	CBSD foliar		Root Necrosis	
		Severity	Incidence	Severity	Incidence
Local	71	1.4 - 3.2	8.3 - 98.5	1.0 - 5.0	0 - 100
Elite	45	1.0 - 3.2	0 - 93.9	1.0 - 4.3	0 - 100

Equal Efforts to Reduce Error Rates in Clone Identity

Unknown wild relative



Nase 3 – Elite variety



Magana – Local variety