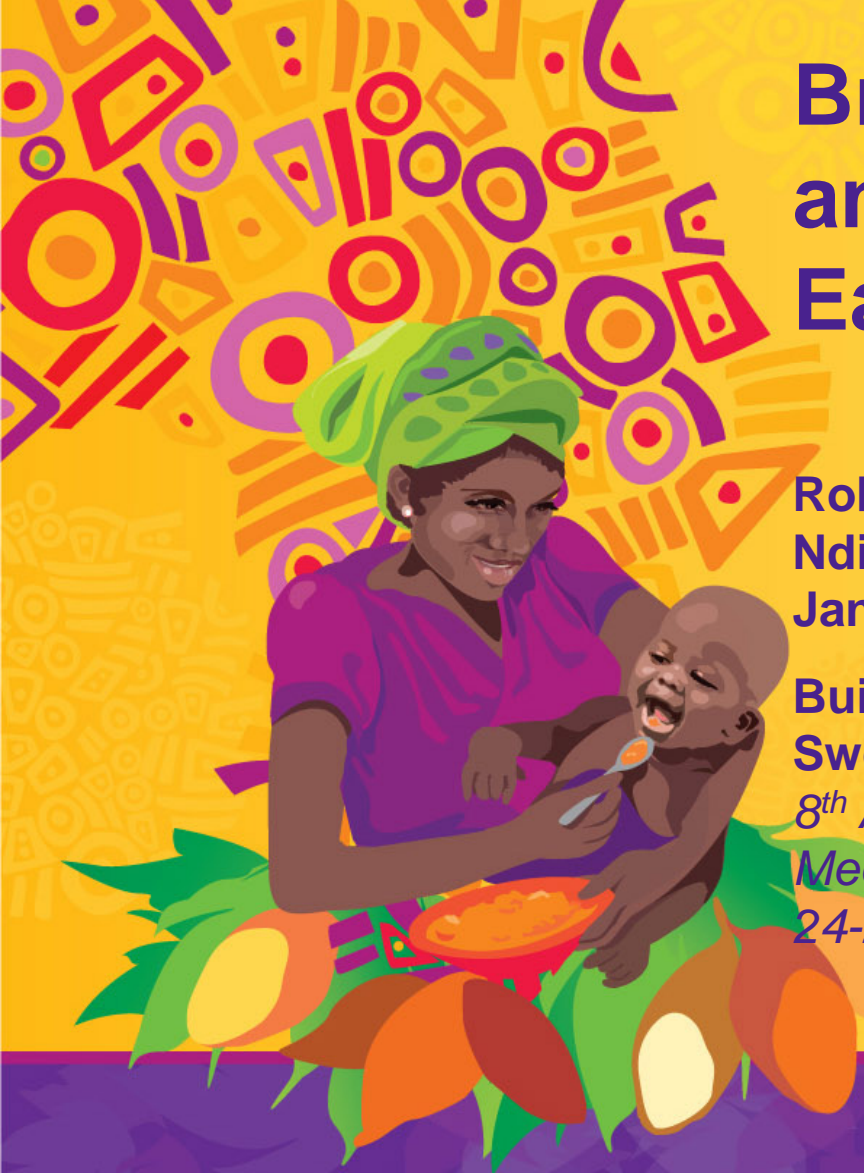


# Breeding for cold tolerance and dual purpose in the East African Highlands

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**Building Resilient Food Systems with Sweetpotato**

*8<sup>th</sup> Annual SPHI Technical and Steering Committee Meeting, Dar es Salaam, Tanzania  
24-26 September 2017*



# Outline of presentation

- Background on need for breeding for cold tolerance
- Objective
- Progress on breeding for cold tolerance



# Background on breeding for cold tolerance

- Source of food, feed, and income
- Mixed crop-livestock systems by using vines as animal feed
- OFSP is important source of  $\beta$ -carotene
- Grown in varied agroecologies, 0-2,200 masl
- Dual-purpose SP varieties required in East African highlands, due to diminishing pasture land
- Sweetpotato forage improves milk production
- Aim at developing cold tolerant dual purpose varieties of vine/root ratio:1.5 - 3.0.



# Objective

- Develop and release high yielding sweetpotato varieties
- for human consumption
- and for alternative uses, with emphasis on animal feed

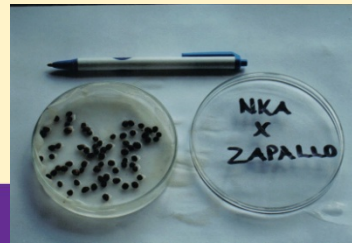


# Materials and methods



- 5,380 clones **Observational trial** at Rubona, Karama and Ngoma during 2011
- randomized complete block design (RCBD)
- Single row, 3 plants, 30 x 80 cm
- 2012 season A, 250 genotypes **Preliminary trials** Rubona, Karama and Ngoma
- 20 plants, 2-row plot, RCBD
- 25 clones **Advanced trial** advanced, 2-row plots, 3 Reps, RCBD
- **On-farm trials (Participatory evaluation)**
- 10 selected clones, nine sites located in five districts Huye, Nyamagabe, Muhanga, Bugesera and Ngoma
- Analysis of variance (ANOVA), GenStat
- Fisher's Protected Least Significance Difference test (LSD) at  $P = 0.05$


# Experimental materials

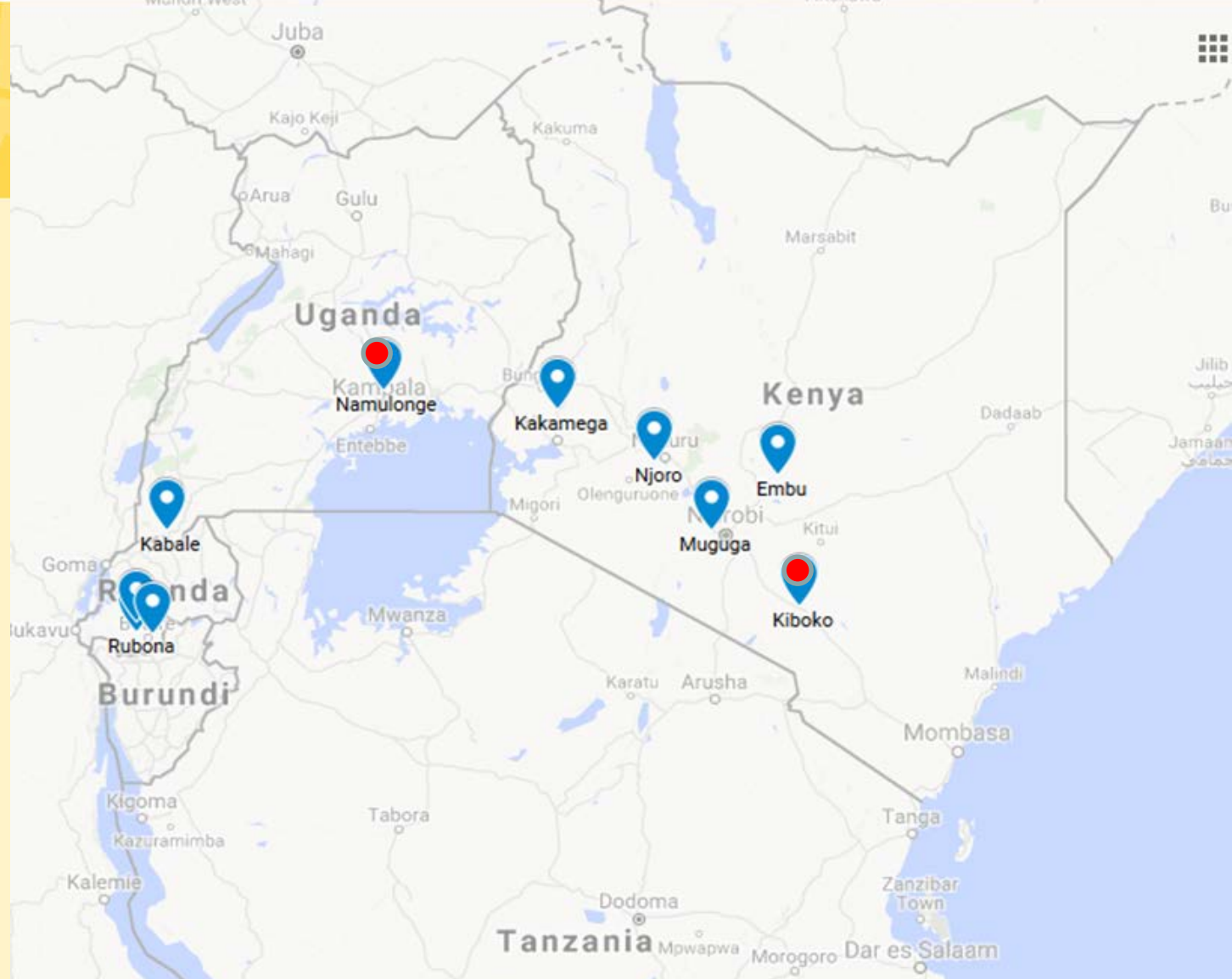


- Breeding populations (seed) were generated in crossing blocks at:
  - a) Namulonge, Uganda, (80 x 50 parents) and sent to Kiboko, Kenya
  - b) Rubona, Rwanda – 60 parents
- Seedling nurseries were established, Kiboko and Rubona

## Rwanda sites:

Rubona  
Ngoma  
Karama

 Sites for establishing seedling nursery



**High altitude sites 1,400-1,810 masl for testing dual purpose sweetpotato**

**Table 4. Attributes of dual purpose s/potato cultivars released in Rwanda in Feb. 2014 (C=cream; PY=pale yellow; W=white; L/I/DO=light/intermediate/dark orange**

Attribute	RW11-17 (C)	RW11- 1860 (PY)	RW11- 2419 (W)	RW11- 2560(DO)	RW11- 2910(LO)	RW11- 4923(IO)	Check (Kwezikum we) (C)
Mean storage root (SR) yield (t/ha)	12.9	9.8	11.8	13.4	8.3	9.1	6.9
Mean SR yield (% of local check)	187	142	171	194.2	120.4	131.8	100
Dry matter (DM) content of SR (%)	30.8	37.8	24.9	21	31.1	37.3	30
DM content (%) of vines	17	20.7	17.6	20.6	18.3	19.2	18
DM yield of roots (t/ha)	4	3.7	2.9	2.8	2.6	3.4	2.1
DM yield of vines (t/ha)	4.1	4.8	3.4	2.7	3.9	4.4	2.6
Fresh weight root to vine ratio	2	1.9	1.9	2	2	2	2.1
Maturity (days)	135 - 150	120-135	135-150	120-135	120-135	135-150	120-135
Taste test rank (n = 32; 19 female, 13 male farmers) <sup>z</sup>	Excellent	Excellent	Good	Good	Good	Very good	Very good

<sup>z</sup>Taste test rank/ aggregate pair-wise comparison of cultivars of taste, flavor, flesh color, skin color, and general acceptability (Shumbusha et al. 2014)



# Five dual purpose clones to enter into NPT evaluated for October 2017 in Kenya



ID	Genotype	Forage Yield t/ha	Root Yield tha	Forage/Root yield ratio	Mean Taste Score
1	SHOCK 5	48.1	20.0	2.4	8.0
2	KIGABALI 16	41.7	8.7	4.8	8.0
3	NASPOT II 13	40.5	8.3	4.9	7.0
4	KIGABALI 6	38.8	20.4	1.9	6.0
5	NASPOT II 2	31.5	24.5	1.3	6.0
6	MAGABALI 3	30.6	20.7	1.5	9.0
7	MAGABALI 1	30.4	18.5	1.6	5.0
8	KYEBANDULA 9	29.5	18.0	1.6	5.0
9	BND1	27.3	17.5	1.6	9.0
10	SILKLOW 6	30.1	21.1	1.4	8.0
11	SILKLOW 2	43.4	12.3	3.5	7.7
12	KYEBANDULA 16	35.2	22.5	1.6	6.0
13	NEW KAWOGO 7	33.6	21.9	1.5	7.0
14	KIGABARI 15	28.6	18.8	1.5	6.8
15	MUGANDE (Control)	25.6	11.6	2.2	5.0

# Conclusion

- Population density is increasing, agricultural land is decreasing
- Zero grazing is increasing in importance in East Africa
- Rwanda and Kenya have demonstrated the potential of exploiting dual purpose sweetpotato; breeding can be used to improve performance



# Acknowledgement



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