Development and Evaluation of New Sweetpotato Varieties through Farmer Participatory Breeding for High Altitudes in Kenya

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Introduction

- Approximately 50.6% of the population lack access to adequate food and what is available is of poor nutritional value and quality (CBS, 2010)
- Sweetpotato is a cheap source of carbohydrates and Vitamin A in OFSP varieties
- Contributes to agro-processing and rural industries, trade, poverty alleviation, improved nutrition and natural resource management
- 10 million people and over 2 million households are involved in production

Introduction

- Although a traditional high value crop, productivity low (5-12 tons/ha) compared to potential (30-50 tons/ha)
  - Susceptibility of varieties to virus disease (SPVD) and weevils
  - Low genetic potential in some varieties and unsuitable varieties for high altitude agro-ecosystem

Introduction

- Inadequate access to timely & sufficient quantities of quality planting materials (vines) (Gibson, 2008)
- Poor market linkages

- Emerging agro-ecological areas are highlands lying between 1700 – 2200 masl in Central Rift valley for which KARI Njoro has developed varieties tolerant to cold nights and high altitudes.

Objectives

- Research focused on solving the problem through development of new varieties for high altitudes -1700 -2200 masl
  - with improved yields,
  - resistance to viruses and weevils,
  - improved food quality
  - wide adaptability
  - acceptability by consumers and market standards

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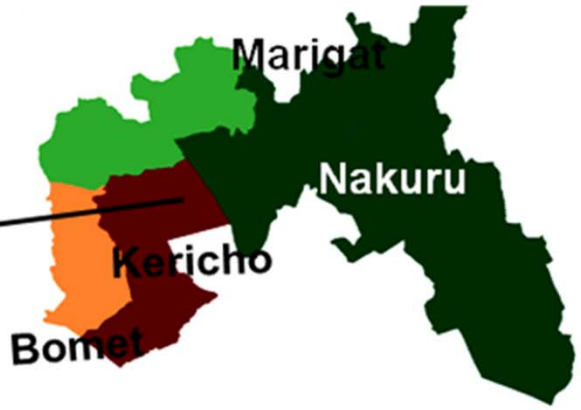
Methods: Study Site



District Target Zone

Nakuru - LH_2-LH_3

Kericho (Kabianga)–LH_1

Bomet (Kaboson)-UM_4

Marigat LM_5

Materials and Methods

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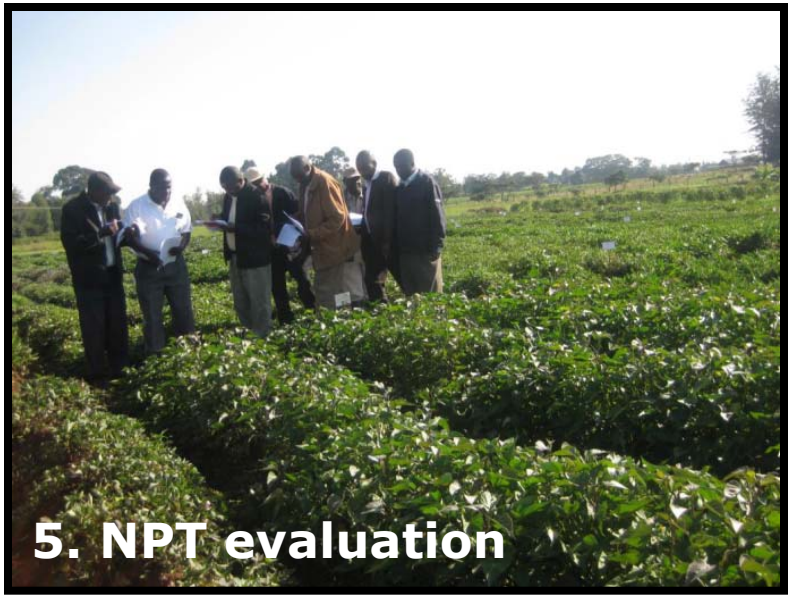

5. NPT evaluation


7. Breeders seed multiplication


6. Participatory farmer evaluation and harvesting

Data analysis

- Trial data management done using CloneSelector
  - Germplasm list
  - Field data collection
  - Basic analysis

- SAS used for advanced analysis

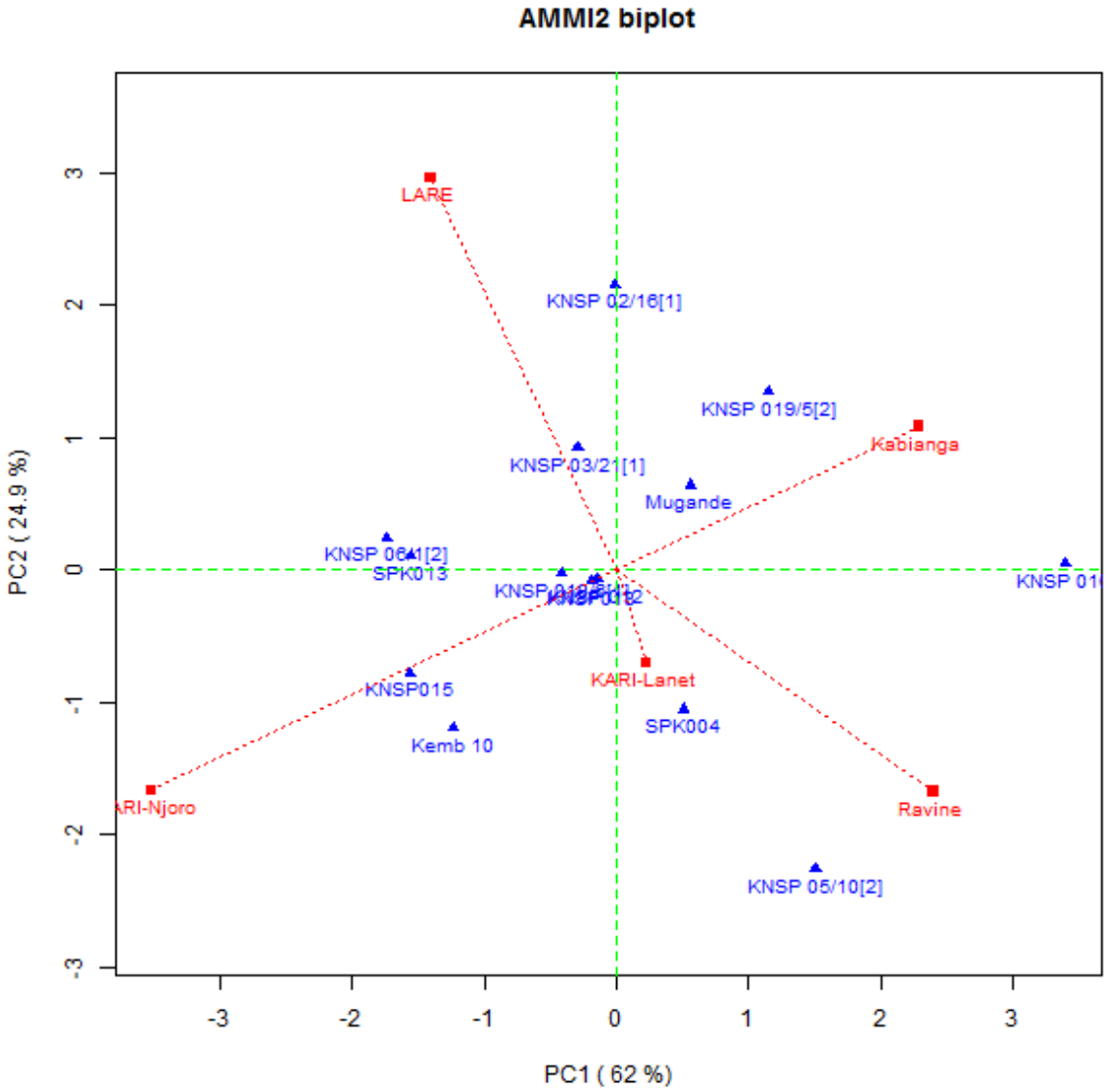
Results: Yield

Genotype	Kabianga	Lanet	Njoro	Lare	Ravine	Means
Kenspot-1	15.00	**17.33**	**26.36**	**25.58**	**25.67**	**21.99**
Kenspot-2	46.00	19.33	.	15.44	14.00	**24.35**
Kenspot-3	10.33	11.67	26.90	9.26	24.33	**16.50**
Kenspot-4	18.67	11.33	22.00	9.97	26.80	**17.75**
Kenspot-5	16.83	9.67	11.49	4.11	23.33	**13.09**
Mugande	15.00	12.00	28.02	7.24	25.00	**17.45**
SPK004	5.17	3.33	4.86	6.91	8.67	**5.79**
Means	**14.81**	**11.95**	**18.52**	**10.65**	**20.90**	**15.28**
R^2	**0.93**	**0.87**	**0.93**	**0.86**	**0.69**	**0.70**
LSD (5%)	**6.40**	**5.56**	**9.16**	**5.74**	**11.15**	**7.68**

Results: Quality

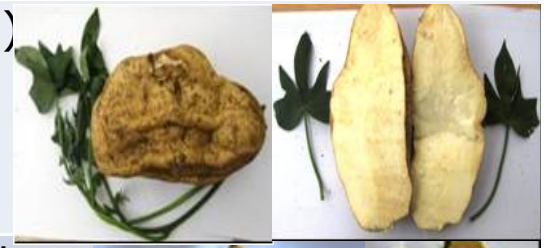
Variety	Marketable	Dry matter	Beta carotene	Virus rating
Kenspot-1	23.01	29.37	0.55	**4.04**
Kenspot-2	20.93	26.19	0.25	**4.65**
Kenspot-3	18.69	32.52	1.08	**3.75**
Kenspot-4	**17.14**	**30.41**	**3.08**	**4.29**
Kenspot-5	14.57	27.63	4.45	**3.58**
Mugande	16.22	28.56	0.01	**4.50**
SPK004	8.32	30.67	1.41	**4.29**
Means	**16.03**	**28.18**	2.09	**4.24**
R2	**0.69**	**0.82**	**0.87**	**0.92**
LSD (5%)	**6.15**	**2.00**	**1.06**	**0.58**

Results: stability



Data management and analysis done using CloneSelector and R

Variety	Region (MASL)	Duration	Yield (T/Ha)	Special Attributes
Kenspot-1	1700-2300	6 to 7	15-25	Av. Yield -23 t/ha; Mod. DM-29.4%; Yellow- fleshed Acceptability -3.3
Kenspot-2	1700-1900	6 to 7	15 to 46	Av. Yield - 21 t/ha) DM-26.2 Acceptability -3.6 white fleshed
Kenspot-3	1900-2300	6 - 7	10 to 27	Av. yields -18.7 t/ha DM -32.5 Orange- fleshed -1.08 , acceptability -3.3
Kenspot-4	1700-2300	6- 7	10 to 26	High DM -30.4 Orange fleshed B-carotene -3.08 Acceptability -3.2
Kenspot-5	1700-2100	6- 7	10 to 23	Orange fleshed – high B-carotene -4.7 DM-25.9 MR to SPVD Acceptability -3.0




Discussion

- Good agronomic traits; moderately resistant and acceptable to farmers across multilocational sites
- Higher yield, Beta-carotene, DM and adapted to highland AEZ. Hence food security and better health
- Stable across the site & season – suitable for
- lower altitudes
- An important emerging food staple likely to supplement maize because of emerging maize disease.
- Higher and vitamin A

Discussion

Implications for agricultural dev.

- Reaching non-traditional sweetpotato areas mean expanded production unit and area hence better income and life style change
- There is also an emerging export and local industrial market for sweetpotato roots.
- Results of the experiments were based on high altitude zones
- Possible to combine orange flesh and high dry matter at high altitudes

Conclusion

- Five new varieties perform well in AEZ with moderate SPVD pressure and well distributed rainfall-2-3m
- Adequate and quality planting material
- Tolerant or partially resistant varieties reduces use of chemicals hence environmental protection
- Promotion of food security

Conclusion

- Rapid multiplication and delivery system in place and currently new varieties already in seven counties
- Sense of ownership of varieties by farmers and extension staff due to participatory involvement
- Farmers more willing to adopt agronomic practices for better production

Recommendation

- Conduct a baseline survey on adoption and performance of the disseminated varieties in all parts of the country with high altitudes
- Improve on the levels of orange flesh in high DM varieties
- Continue with breeding for SPVD and emerging virus resistance

Acknowledgements

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