Evaluation of pre-screened sweet potato germplasm for biomass production under different cropping regimes and their potential as dual-purpose varieties in Kenya

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Why sweetpotato as animal feed?

- Quality feed concentrates are too expensive for many farmers, so they tend to use locally available feed ingredients
- Outbreak of Napier grass diseases have necessitated for alternative feed resources
- Sweetpotato vine provides more protein and dry matter per unit area than other staple feeds and requires less land to produce
- Kenyan researchers have found that 4 kgs of vines could replace 1 kg of dairy concentrate.
- In contrast to China, where 25-30% of sweetpotato is used as animal feed, the potential of dual purpose and forage varieties in SSA has not been fully exploited.

Objective of the study

- Identify the appropriate adapted dual purpose and forage varieties for specific livestock production systems and specific agro ecologies

Results

Table 1: Effect of harvesting (days) on mean vines and root DM yield (t/ha)

Harvest stage (days)	Mean DM yield (t/ha DM) at different harvest stages		R:V ratio
	Vines	Roots	
75	1.6_{ax}	-	-
150 (re-growth	2.4_{by}	2.3_{a}	1.3_{a}
150 (full growth)	5.3_{cz}	3.9_{b}	1.0_{a}

- Factors bearing the same letters (a-c) are not significantly different at $p \leq 0.05$ under Bonferroni mean test
- Harvetsing twice (x + y) did not yield statistically more forage from a single harvest (z) at $p \leq 0.05$

A cow feeding on sweetpotato vines

Table 2: Root: vine (R:V) ratios of different cultivars across the AEZs in Kenya

AEZ	103001.152	Gweri	Kemb 23	Kemb 36	Naspot 1	Wagabolige
High altitude (wet)	0.8	0.2	0.4	0.4	0.5	0.4
Mid altitude (wet)	0.7	0.2	0.4	0.3	0.4	0.2
Mid altitude (dry)	0.6	0.2	0.3	0.3	0.5	0.4
High altitude (dry)	0.4	0.1	0.1	0.1	0.2	0.1
Mean	0.6	0.2	0.3	0.3	0.4	0.3
Classification	R	F	DPH	DPH	DPL	DPH

Classification	R:V ratio	Classification	R:V ratio
Forage (F)	≤ 0.2	Dual purpose -low (DPH)	0.31 > RV < 0.55
Root (R)	RV > 0.55	Dual purpose -high (DPL)	0.2 1 > RV < 0.3

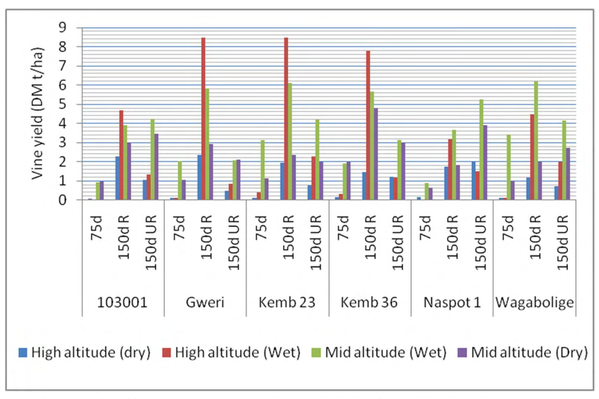


Figure 2: Sweetpotato vine yield (DM t/ha) of different cultivars across the AEZs

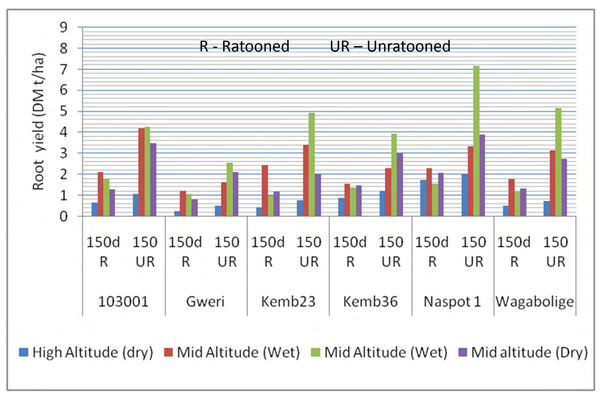
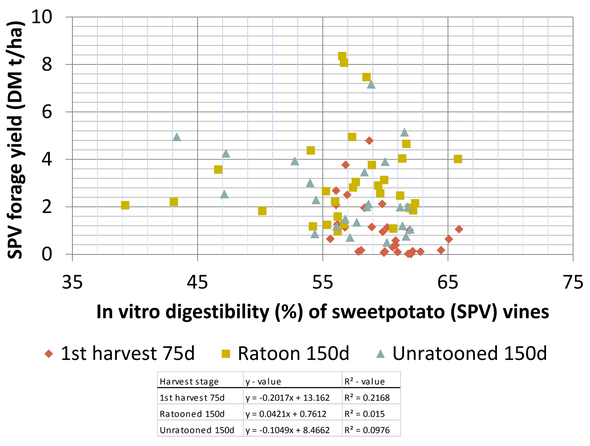
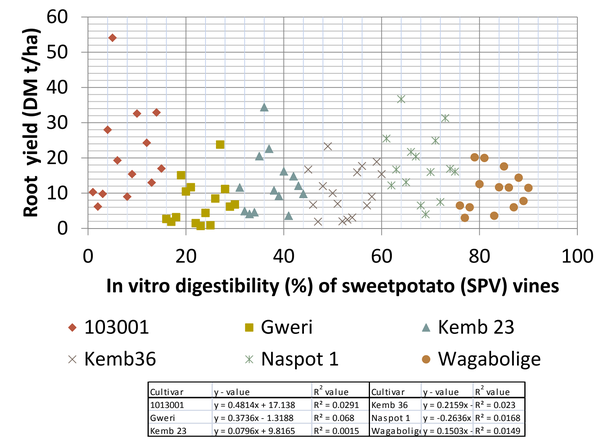


Figure 3: Sweetpotato root yield (DM t/ha) of different cultivars across the AEZs



Harvest stage	y - value	R^2 - value
1st harvest 75d	y = -0.2017x + 13.162	R^2 = 0.2168
Ratooned 150d	y = 0.0421x + 0.7612	R^2 = 0.015
Unratooned 150d	y = -0.1049x + 8.4662	R^2 = 0.0976

Figure 4: Correlation between sweetpotato (SPV) vine yield (DM t/ha) and *In vitro* digestibility (%) at different harvest stages



Cultivar	y - value	R^2 value	Cultivar	y - value	R^2 value
1013001	y = 0.4814x + 17.138	R^2 = 0.0291	Kemb 36	y = 0.2159x -	R^2 = 0.023
Gweri	y = 0.3736x - 1.3188	R^2 = 0.068	Naspot 1	y = -0.2636x	R^2 = 0.0168
Kemb 23	y = 0.0796x + 9.8165	R^2 = 0.0015	Wagabolig	y = 0.1503x -	R^2 = 0.0149

Figure 5: Correlation between sweetpotato (SPV) root yield (DM t/ha) and *In vitro* digestibility (%) of cultivars

Acknowledgement and disclaimer

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Design

Comprised 4 AEZ's x 6 varieties (including 2 local checks) x 2 harvesting regimes of 75 days (vines only) & 150 days (vines and roots)] post planting

Approach to the study

- The on farm participatory trials were researcher led and farmer managed
- The dairy management groups (DMGs) belonging to the Dairy Farmers Business Association (DFBA) were used as a platform for introducing and screening the sweetpotato varieties
- At least one representative DMG was selected from each of the four AEZs
- Trials were replicated on three (3) farms selected by each DMG members in each AEZ
- Farmer group meetings were held in each AEZ to sensitize farmers about the trials, develop work plans, and agree on the *modus operandi* with farmers
- Researchers provided inputs and collected data while farmers provided labour and managed the plots

Data collection: parameters measured

- Total yield (forage and root)
- Nutritive value (NIRS)
- Climatic data (rainfall)
- Pre and post planting soils samples (N, P and K), data not shown
- Participatory farmer evaluation (150 days), data not shown

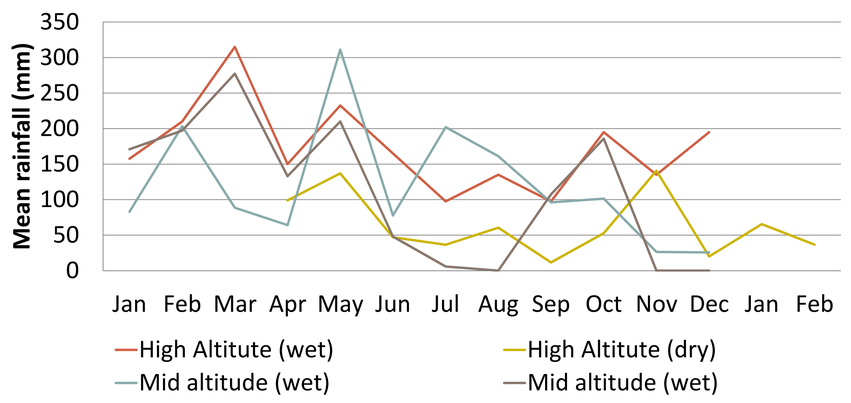

Figure 1: The mean rainfall received across the AEZs during the trial period

Data collection

Group member harvesting vines

Main findings and conclusions

- Overall, low vine and roots yields were realized across all sites probably due to the low rainfall levels in the year
- One variety (Gweri) has been identified as the most promising for forage
- Four other varieties (Kemb-23, Naspot-1, Wagabolige and Kemb 36) have been identified as "best bet" dual purpose varieties
- Another (103001.152) was for good root but poor vine production
- There is no clear correlation between root and vine digestibility however there are distinct cultivar differences.
- Varieties performed well across different agro ecological zones, ensuring that farmers in each zone have at least one suitable dual purpose variety
- Farmers will have to make tradeoffs between forage, dual purpose, and root varieties depending on feed needs on farms. It is likely that farmers facing acute feed shortages will opt for forage or dual purpose varieties.