Use of sandponics for cost effective sweetpotato seed production: current recommendations.

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Reuben Ssali,
Srini Rajendran,
Phabian Makhoka
Margaret McEwan

CIP – SweetGAINS project

Sandponics

- Sweetpotato production constrained by shortage of quality planting materials in most of sub-Saharan African (SSA).
  - High virus pressure & prolonged droughts

- Adequate pre-basic seed to drive multiplication of quality planting material of new and improved varieties by trained farmer multipliers.
- *in-vivo* production in screen houses, is expensive
  - forest soil
  - labour
  - steam sterilization-diesel/firewood
- Low willingness to pay for planting material

Can we produce low cost high quality planting materials?

Steam sterilization using either diesel or firewood

The sandponic system

- Replace soil with sand

Sand

- Locally available

- Chemically inert

- Can be sterilized at a reasonable cost with sodium hypochlorite (a common household bleach)
- Re-usable across seasons

- Sand sterilization10% sodium hypochlorite solution
- Rinse to remove the sodium hypochlorite

The sandponic system

PE or PVC distribution pipes and fittings

Trellising the sweetpotato vines

Optimized the nutrient media for sweetpotato vine multiplication using sandponics

Nutrient	Optimal application rate (ppm)	Nutrient deficiency symptoms
Nitrogen	200	Stunted plants, minimal leaf area expansion, reddening of basal leaf edges advancing to younger growing leaves
Calcium	200	Chlorosis, cupping, curling and distortion of younger growing apical leaves, root rot
Phosphorus	60	Yellowing of older leaves spreading from discrete interveinal patches
Sulfur	120	Yellowing of middle growing leaves succeeded with entire yellowing of the whole plant
Boron	0.3	Chlorosis in the apical leaves spreading to the basal foliage in the later stages of growth. Necrosis in the symptomatic leaves at advanced stage, death of severely affected leaves leading to premature plant senescence

Alternative sources of Nutrient media

- Areas where fertilizers are not readily available
- Pig manure can be a good source of nutrients

Cost effectiveness analysis of using sandponics system

Average value for the cost (KSH) of producing one sweetpotato node in sandponics compared to conventional after 6 harvests (ratoons) for the four sweetpotato

Genotype	Sandponics system	Conventional soil substrate method	Difference	p value	Bartlett's test	Kruskal-Wallis equality-of-populations rank test
Irene	2.449	3.141	–0.692	<.0001**	0.845	-
Kabode	3.949	4.997	–1.048	<.0001**	0.299	-
Ejumula	3.284	4.465	–1.181	<.0001**	0.020**	0.0001**
Gweri	4.37	5.049	–0.679	0.0002**	0.175	-
Overall (all genotypes)	**3.513**	**4.413**	**–0.9**	**<.0001****	**0.331**	**<.0001**

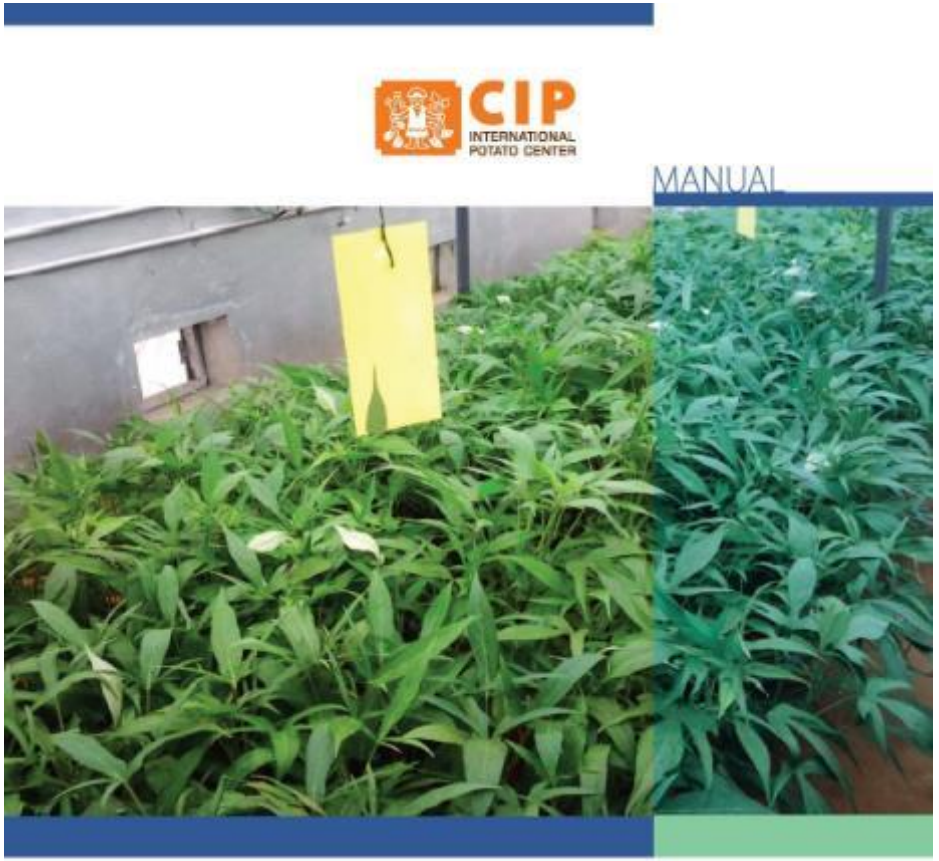
Exchange rate 1 US{{footpara}}nbsp;= 100 KSH in the year 2019

*, ** indicates 5% & 1% level significant, respectively

- Cost of producing one sweetpotato node with the sandoponic system is lower by 0.9 KSH(0.009 USD)
- Cost effectiveness is better for some genotypes
- Higher multiplication rate 21.8% with sandponics

Manual with a detailed explanation on

- set-up,
- costs of establishment,
- nutrient mix,
- irrigation regimes,
- crop management practices
- harvesting regimes for sweetpotato business enterprises.



https://www.sweetpotatoknowledge.org/?s=sandponics

CIP is a research-for-development organization with a focus on potato, sweetpotato and Andean roots and tubers. It delivers innovative science-based solutions to enhance access to affordable nutritious food, foster inclusive sustainable business and employment growth, and drive the climate resilience of root and tuber agri-food systems. Headquartered in Lima, Peru, CIP has a research presence in more than 20 countries in Africa, Asia and Latin America.
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