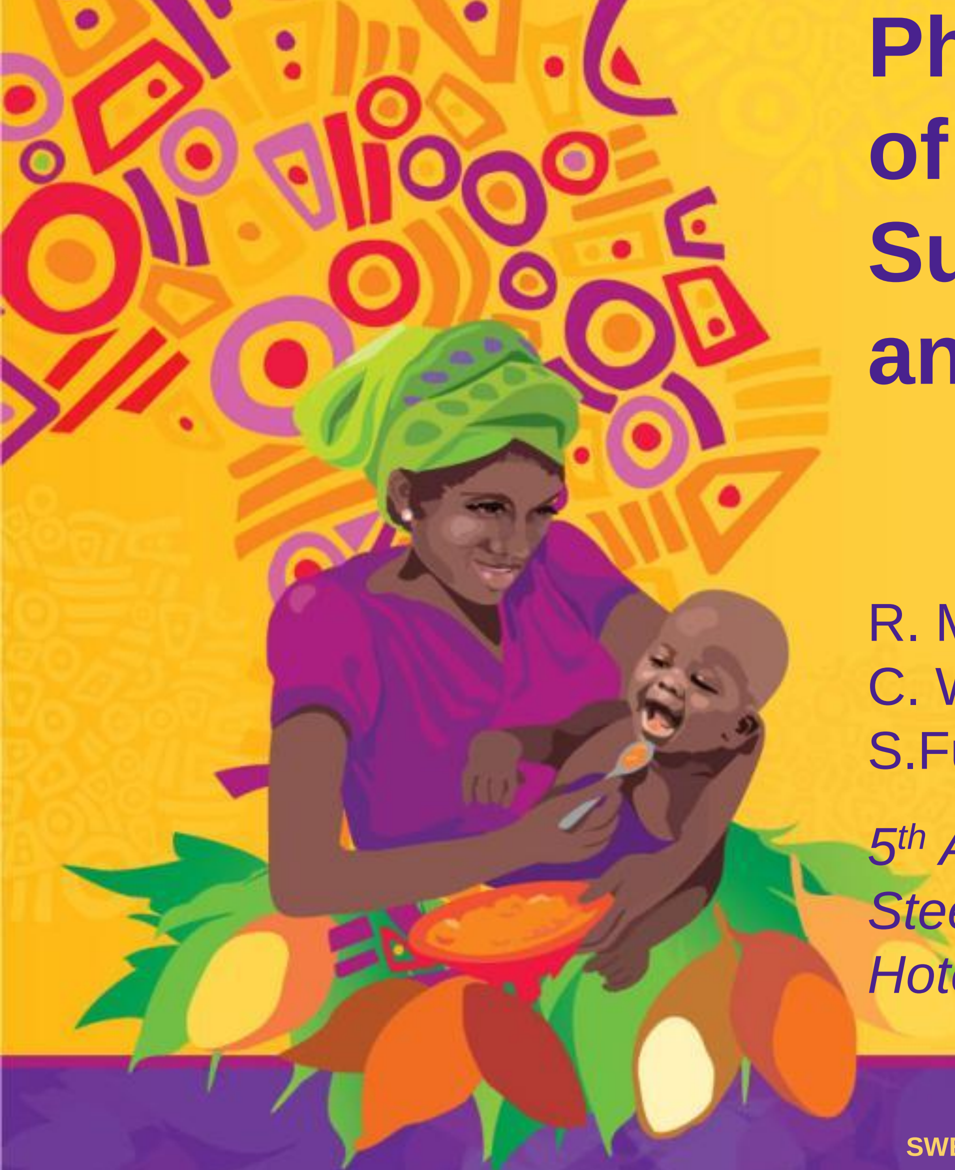

Phase 1 Achievements of the Sweetpotato Support Platform – East and Central Africa

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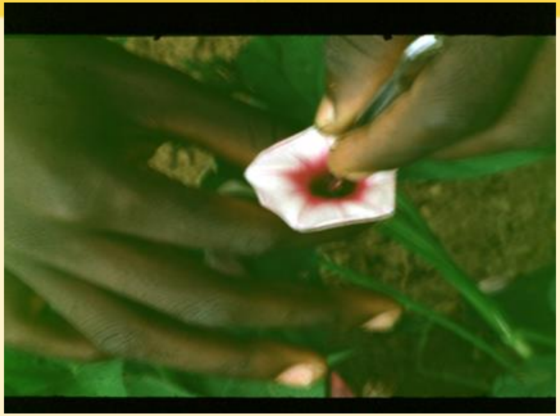
5th Annual SPHI Technical & Executive Steering Committee Meeting, Jakaranda Hotel, Nairobi, Kenya, 9-12 Sept 2014

Outline of presentation

- Main objectives of sweetpotato breeding in East and Central Africa
- Main Achievements



Objective: breed new populations with new methods & varietal development

- Generate a radically **expanded range of sweetpotato varieties** that combine different quality traits with significant improvements in yielding ability
- Generate by **population improvement** new populations for major needs of users:
    - **Sweetpotato virus disease (SPVD) resistance (East Africa**)
    - **Incorporate important traits** e.g. high beta-carotene content, dual purpose types for animal feed

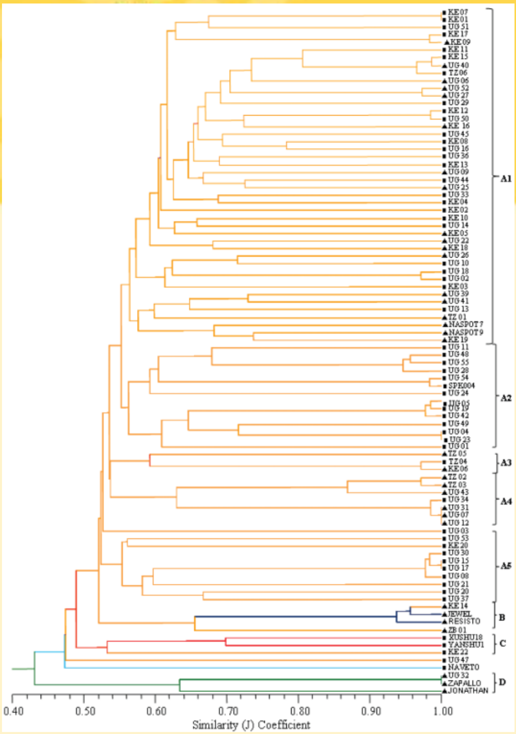
Main Objective, continued

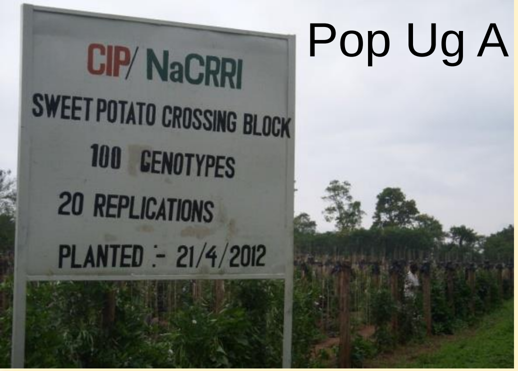
- Other new breeding methods to use:
  - heterosis into sweetpotato breeding
  - molecular markers for breeding for virus resistance

- Redesign the sweetpotato breeding systems in the region to produce varieties in 3-4 years instead of the current 7-8 years: **accelerated breeding**

Developing populations for SPVD resistance and quality traits

- Two distinct genepools (Population Uganda A and Pop Ug B) were formed using molecular markers (18 SSR markers)
- Controlled crossing (inter- and intra-gene-pool) for population improvement and polycross crossing are in progress





Pop Ug A

Pop Ug B

Crossing between populations

Small crossing block (CB)						
Big CB	A1 Eju	A3 Dimb	A4 NAS5/58	A5 NAS7	A7 NAS10O	A8 NK297L
B1 Res	1c 207-52	3C 123-72	4C 200-7	5C 261-112	7C 98-86	8C 239-174
B2 Mag	9c 156	11c 363-2	12c 280	13c 150-243	15c 201-222	16c 262-80
B5 Mug	33c 426	35c 481	36c 16-473	37c 108-166	39c 85-39	40c 216-190
B7 N[illegible]	49c 136-81	51c 53-226	52c 13-4	53c 259-17	55c 32-3	56c 559-143
B8 [illegible]	57c 890-77	59c 1543-171	60c 0-121	61c 233-125	63c 466-272	64c 495-219

(yellow) Susceptible by less susceptible/resistant crosses

(green) Resistant by resistant crosses

Total of 64 crosses
Shown: 30 crosses

Crosses within small crossing block

Parent	A1 Eju	A2 NAS1	A3 Dimb	A4 NAS/58	A5 NAS 7	A6 SPK004	A7 NAS10	A8 NK259L
A1 Ejumula	x	317-237	850-144	364-396	361-180	98-825	299-22	401 -209
A2 NASPOT 1		x	27-0	339-1089	104-4	58-54	61-160	27-17
A3 Dimbuka			x	622-684	30-19	24-6	56-723	311-320
A4 NASPOT5/58				x	320-146	153-62	5-5	299-180
A5 NASPOT 7					x	42-17	86-8	310
A6 SPK004						x	218-8	95
A7 NASPOT 10 O							x	453-187
A8 NK259L								x

Total of 28 crosses

Crosses within big crossing block (Population Uganda B)

Parent	B1 Res	B2 Mag	B3 NAS 5	B4 Wag	B5 Mug	B6 NAS11	B7 Nka	B8 Hua
B1 Resisto	x	256	367-45	124-15	451	69	666-311	453
B2 Magabali		x	154-248	223	170-50	197	680-512	43-337
B3 NASPOT 5			x	81-212	117-110	5-5	64-81	224-31
B4 Wagabolige				x	284-30	819-380	587-587	803-154
B5 Mugande					x	304-8	194-122	305-321
B6 NASPOT 11						x	65-2	224-285
B7 New Kawogo							x	1404

Total of 28 crosses

Sweetpotato trials, 2013/2014

Trial	No. of clones	Sites
1) Preliminary trial (PT)	41	3 (NaCRRI, Serere, Kachwekano)
2) SPVD resistance*	81	2 (NaCRRI, Kachwekano)
3) Dual purpose/ high altitude	50	3 [Kachwekano (Uganda), Runyenjes, Manyatta (Kenya)]
4) Controlled Vs OP		3 (NaCRRI, Serere, Kachwekano)
Ejumula x NKA	50	
OP Ejumula	105	
Wag x NASPOT 1	227	
OP Wagabolige	104	

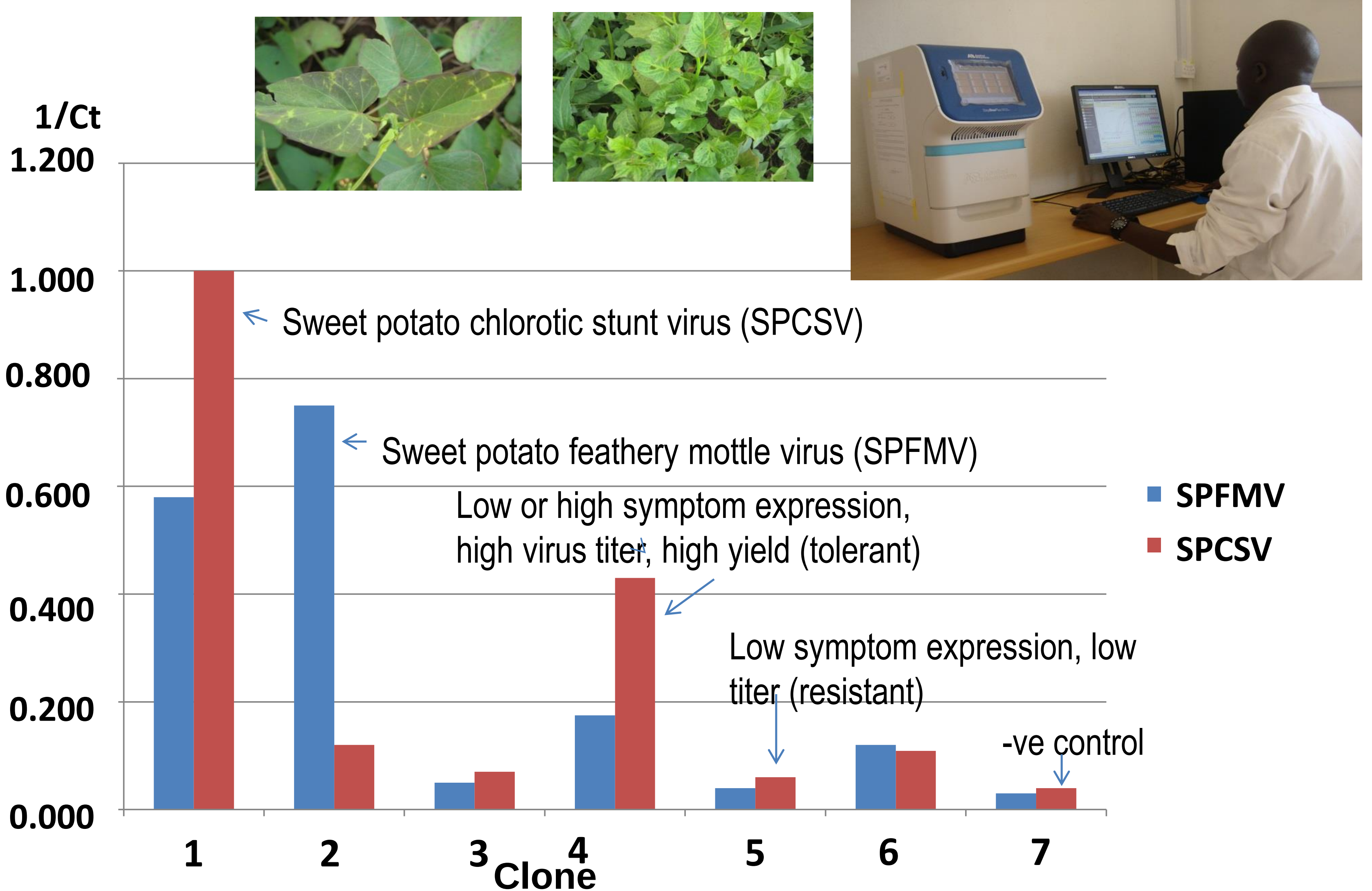
SPVD

* From CIP/Lima

Alternaria blight

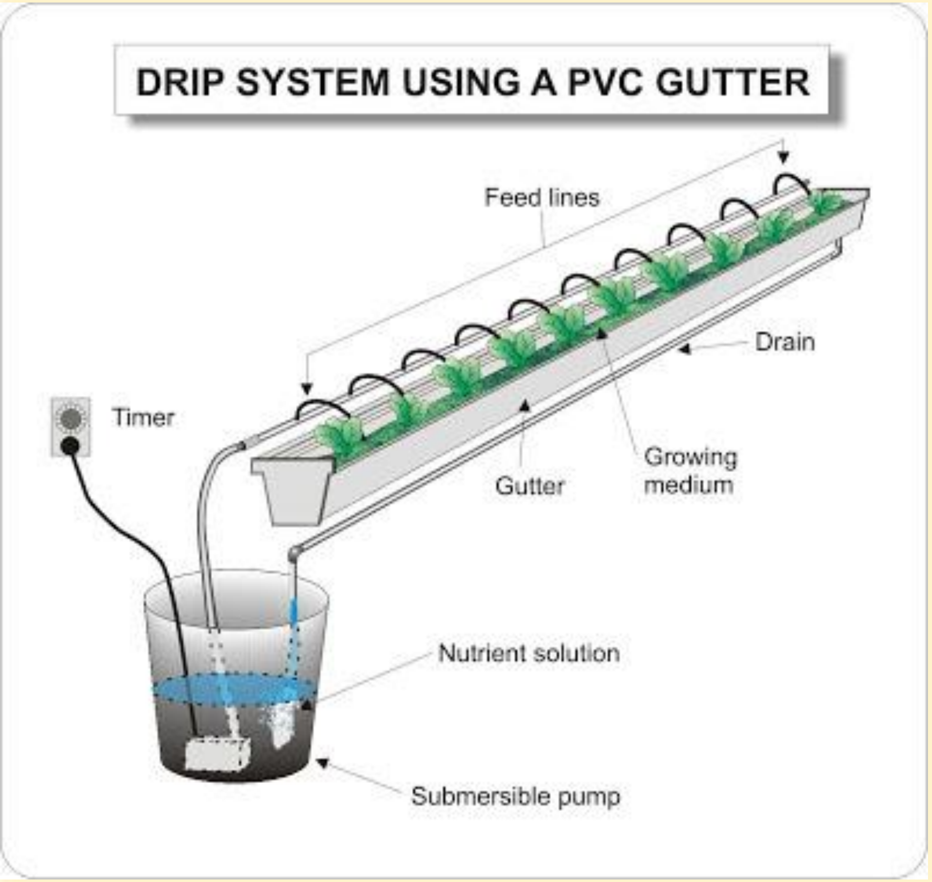
Sweetpotato Virus Disease (SPVD) Causes Significant Yield Losses (50->90%)

Clark et al. 2012: Plant Disease



Discrimination of resistant and tolerant clones using real-time PCR (Ct = cycle threshold)

Hydroponics (sand/aero)



Nutrient content of the solution (220 l)

Nutrient		weight (g)	Details
Calcium nitrate	Ca(NO3)2.4H2O	11.8	NPK, 15-0-0
Potassium phosphate	KH_2PO_4	6.8	NPK, 52% P_2O_5 and 34% K_2O, or 0-52-34
Potassium nitrate	KNO_3	25.2	NPK, 13-0-44
Magnesium sulphate	$MgSO_4 \cdot 7H_2O$	5.0	16% MgO, 13% S
Micronutrients		0.6	Fe 6.5%, Mn 2%, Zn 1%, Cu 0.25%, B 2.1%, Mo 0.25% B, from Solubor, Mo from sodium molybdate and Fe, Mn, Zn, Cu micronutreints are in EDTA form

Sand hydroponics set up

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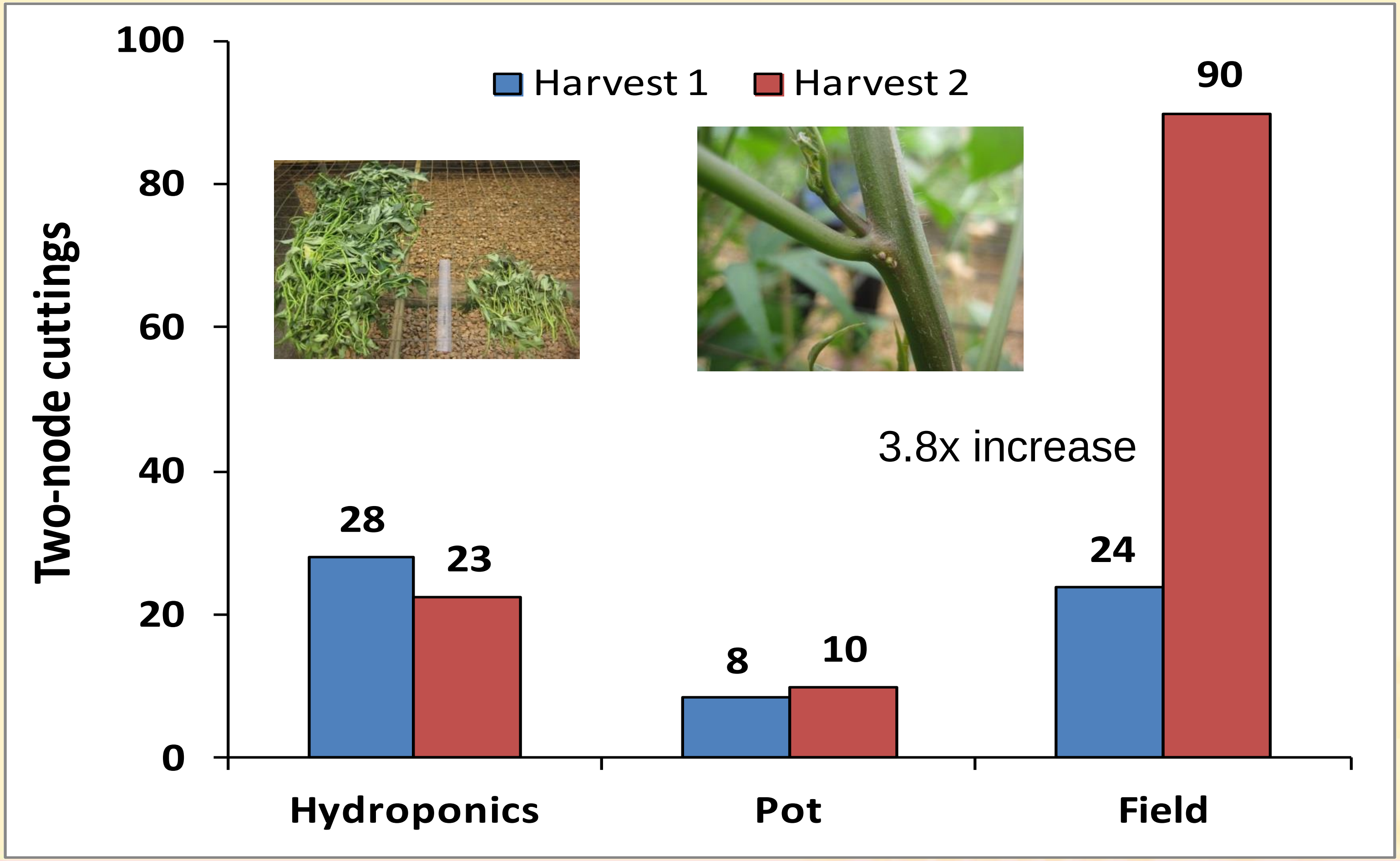
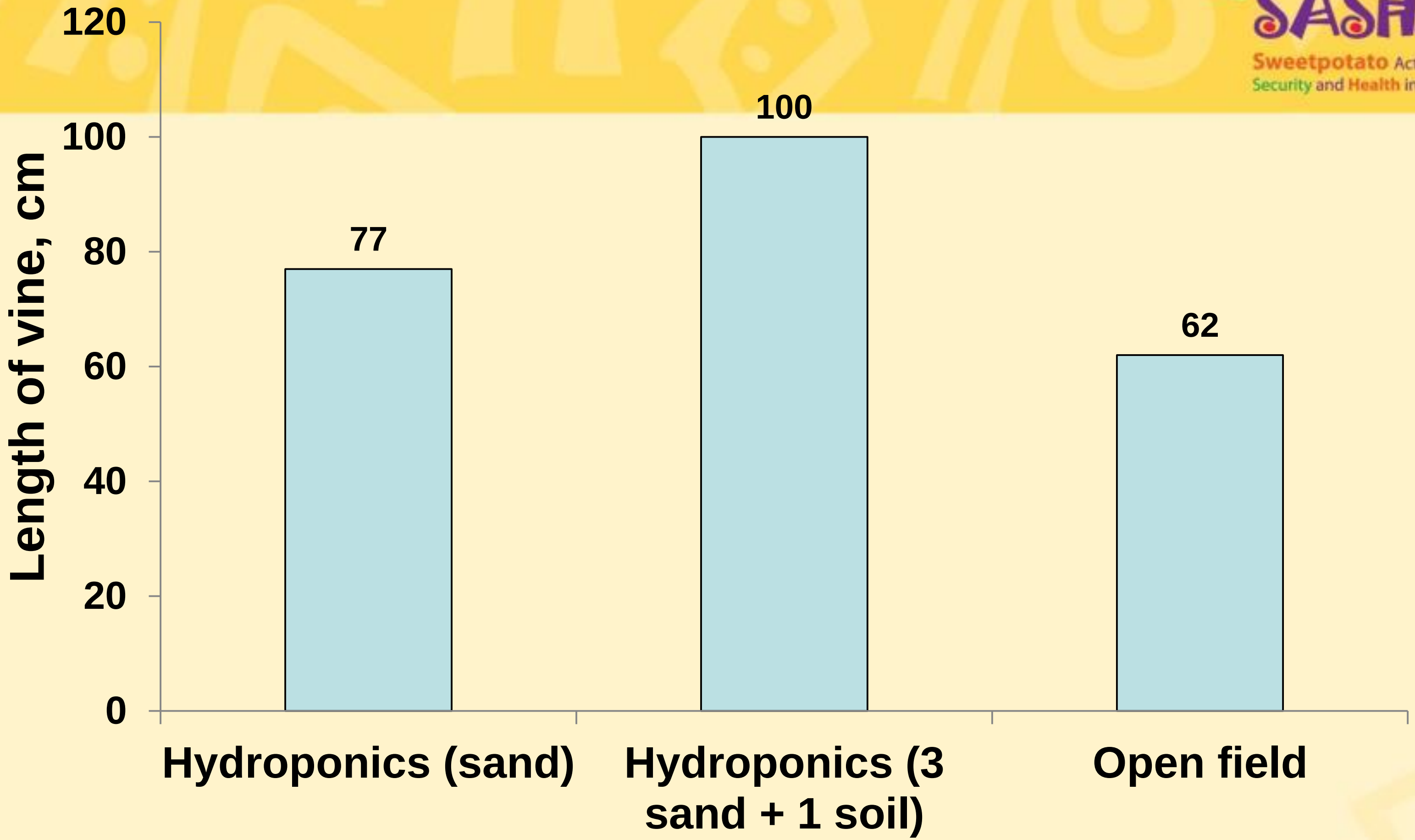
Sand hydroponics

Sand hydroponics (left) and buckets (right)

Two-node cuttings, 72 (harvest 1) and 46 days (harvest 2) after 1st and 2nd cutting



Optimizing sand hydroponics



Length of sweetpotato vines at seven weeks after planting

Potential and Challenges

- Potential to produce clean stocks at low cost (vs tissue culture)
- Multiplication rate in sand hydroponics still low
- Optimize sand hydroponics conditions
- Determine economics of sand hydroponics under local conditions

Thank you for your attention

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