GROWTH AND YIELD RESPONSES OF ORANGE-FLESHED SWEETPOTATO VARIETIES TO PROPAGULES SOURCES IN RAINFOREST AND SAVANNAH ZONES OF NIGERIA.

Seed System & Crop Management

Jude Njoku[1], Solomon Afuape [1], Collins Ehisianya[1],. Davison Korieocha[1] and Olupeju Phorbee[2].
[1] National Root Crops research Institute, Nigeria. [2] International Potato Center, Nigeria

ABSTRACT

In Nigeria, many farmers use planting material from a previous. As it is a vegetatively propagated crop, sweetpotato vine cuttings are prone to disease and pest build up which is transferred from one generation to the next resulting in low yield (6-7ton/ha) in farmers field. A field trial was conducted over two seasons (2013 - 2014) at NRCRI, Umudike and Nyanya stations representing rainforest and savannah agro-ecological zone respectively, to examine yield variation from different propagule sources and varieties. The trial was laid out as a 4 x 2 factorial in a randomized complete block design replicated three times. The treatments comprised two improved Orange-fleshed sweetpotato (UMUSPO1 (KingJ) and 3 (Mothers delight)) in combination with 4 propagule sources ((net tunnel, Negative selection, regrowth and regrowth treated with carbonfuran).

RESULTS

•The results showed that in most cases, high virus incidence were prevalent at Umudike than in Nyanya with low incidence obtained from propagules sourced from net tunnel compared to other sources. UMUSPO1 showed high level of virus tolerance compared to UMUSPO3 when propagules from negative selection and other sources were involved but not with those from net tunnel. Treating regrowths with carbonfuran did not record any advantage over regrowths untreated. In general, growth responses were influenced by propagule sources. Shoot growth was enhanced at different periods of growth (8 and 12 weeks after planting) when vine cuttings from net tunnel and negative selection were applied than other sources. However, they effect was more pronounced in Umudike than Nyanya location. On the basis of yield and yield advantage, higher yields were obtained in Nyanya (35.5tons/ha) than in Umudike (12.6t). Propagules from net tunnels had greater yield than other sources and with highest yield advantage when compared to regrowths especially at Umudike.

BACKGROUND

- Inadequate quality planting materials prevail in farmers field
- Regrowth from the wild often used by farmers result to poor yield
- The use of new technology for vine production and improved yield becomes apparent.
- Sweet Pootato is a vegetative crop with accumulated systemic diseases such virus and pest. (Scovia et al 2015)
- Evidence abound that yield depression in some virus susceptible varieties are as high as 90% (Karyeija et al 1998)

Objectives

To determine the appropriate methodologies for producing clean vine cuttings for improve yield

To determine growth and yield responses of sweetpotato varieties to propagation methodologies.

MATERIALS & METHODS

- Trials conducted in 2013 and 2014 at Umudike and Nyanya substation
- 4x2 factorial replicated 3 times
- 2 varieties: 1. UMUSPO3(OFSP)
  2. UMUSPO1(OFSP)
- 4 propagule sources:
  - Net tunnels(NT)
  - Negative selection(NS)
  - From regrowth (RG)
  - From regrowth treated (RT)

Table1. Mean vine lengths (cm) at different weeks of growth (Umudike)

Varieties (var.)	Propagule sources (ps)				
	NT	NS	RG	RGT	Mean
Vine length@ 8WAP					
UMUSPO3	180.6	168.2	119.3	126.6	138.7
UMUSPO1	112.4	98.2	101.2	96.6	108.1
Mean	166.5	133.2	110.2	111.6	
LSD (0.05) Var.= 10.13*, PS= 14.3*					
Vine length@ 12WAP					
UMUSPO3	272.1	190.3	143.5	148.3	222.6
UMUSPO1	181.3	128.5	111.5	124.6	172.7
Mean	226.6	159.4	129.5	160.3	
LSD(0.05) Var. =20.13*, PS=35,4*					

Table2. Mean vine lengths (cm) at different weeks of growth (Nyanya)

Varieties (var.)	Propagule sources (ps)				
	NT	NS	RG	RGT	Mean
Vine length@ 8WAP					
UMUSPO3	240.5	195.3	184.8	164.2	196.2
UMUSPO1	141.1	100.3	138.1	103.2	120.8
Mean	190.8	147.8	161.5	133.9	
LSD (0.05) Var.=25.82**, PS=36.52*, Var. x PS=51.65^{ns}					
Vine length@ 12WAP					
UMUSPO3	340.9	283.7	234.4	302.6	290.4
UMUSPO1	145.6	146.3	134.2	145.6	145.6
Mean	243.3	215.0	184.3	224.1	
LSD(0.05) Var. =37.81**, PS=53.48^{ns}, Var. x PS=75.63^{ns}					

Table3. Mean virus incidence in Umudike and Nyanya in 2014 cropping season

Varieties (var.)	Propagule sources (ps)				
	NT	NS	RG	RGT	Mean
	Umudike Virus scoring scale (1-5)				
UMUSPO3	0.7	2.0	3.3	3.0	2.3
UMUSPO1	0.3	1.0	1.0	1.0	0.8
Mean	0.5	1.5	2.2	2.0	
LSD(0.05) Var. = 0.32*, PS=0.45* , Var. x PS= 0.65* CV= 24%					
Nyanya					
UMUSPO3	0.5	1.0	2.2	1.3	1.2
UMUSPO1	0.0	0.0	1.0	1.7	0.7
Mean	0.3	0.5	1.5	1.5	
LSD(0.05) Var. =0.24*, PS=0.3* , Var. x PS= 0.49* CV= 31%					

Table4. Mean total root yield (t/ha) in Umudike for 2013 and 2014 cropping season

Varieties (var.)	Propagule sources (ps)				
	NT	NS	RG	RGT	Mean
2013					
V1 UMUSPO3	18.7	6.1	2.6	4.0	7.8
V2 UMUSPO1	19.1	9.8	10.8	14.0	13.4
Mean	19.9	8.0	6.7	9.0	
LSD (0.05) Var.=4.16**, PS=5.88**, Var. x PS=8.31* CV= 38%					
2014					
V1 UMUSPO3	17.6	9.5	6.1	6.3	9.9
V2 UMUSPO1	16.7	14.0	11.8	14.3	14.2
Mean	17.2	11.8	9.0	10.3	
LSD(0.05) Var. = 4.05*, PS= 5.73*, Var. x PS= 8.11 CV= 36.5					

Table5. Mean total root yield (t/ha) in Nyanya for 2013 and 2014 cropping season

Varieties (var.)	Propagule sources (ps)				
	NT	NS	RG	RGT	Mean
2013					
V1 UMUSPO3	50.8	49.3	41.4	49.7	47.8
V2 UMUSPO1	46.9	43.6	29.9	41.8	40.6
Mean	48.9	46.5	35.7	45.8	
LSD (0.05) Var.=5,45** PS= 7.71* , Var. x PS = 10.91ns					
2014					
V1 UMUSPO3	33.0	29.3	25.2	27.7	28.8
V2 UMUSPO1	29.4	27.2	20.6	21.9	24.8
Mean	31.2	29.1	23.4	24.8	
LSD(0.05) Var. = 3.50*, PS=4.94*, Var. x PS= 6.98 CV=16.4					

Table6. Yield (T/Ha) advantage of different propagule sources

Umudike location			
Variety	Regrowth	Net tunnel	Difference
UMUSPO3 (MD)	4.4	18.2	13.8
UMUSPO1 (KJ)	11.3	17.6	6.6
Total	15.7	35.8	20.1
Mean	7.4	19.0	11.5
Nyanya Location			
UMUSPO3 (MD)	33.2	41.9	8.7
UMUSPO1(KJ)	25.3	38.2	12.9
Total	58.5	80.1	22.0
Mean	29.3	40.1	10.8

CONCLUSION

- Virus incidence were high in Umudike compared to Nyanya and reduced where planting materials were obtained from Net tunnel and negative selection
- Growth and yield of OFSP varieties were influenced by propagule sources in both locations(Umudike and Nyanya)
- In most cases, high significant yield was obtained were vine cuttings were sourced from the Net tunnel and Negative selection compared to other sources in both locations
- UMUSPO3 had improved growth and yield in Nyanya compared to Umudike location.
- Yield increases of 155% and 36% were obtained from Umudike and Nyanya respectively when planting materials were obtained from net tunnels compared to regrowths
- Yield increases of 155% and 36% were obtained from Umudike and Nyanya respectively when planting materials were obtained from net tunnels compared to regrowth
- RECOMMENDATION
- The use of net tunnel and negative selection procedures to multiply vines in areas of virus pressure will guarantee improved and stable growth and yield of OFSP varieties.

References
Karyeija, R.F., Gibson. R.W., and Valkonan, J.P.F (1998). The significant of sweetpotato feathery mottle virus in subsistence sweetpotato production in Africa. Plant Dis. 82:4-15.
Scoviat A., Salumba, P.M., Rolletto, C.M., and Gibson, W.R. (2015). Sweetpotao cultivar degeneration rate under high and low virus disease pressure zones in Uganda. Can. J. Plant Pathol. Vol. 37, No. 1, 136-147.