



Ware Yam Production Demonstrations in Nigeria using Good Agronomic Practices and Some Seed Production Options

Beatrice Aighewi*, N. Maroya, D. Mignouna, O. Azeez, D. Aihebor, M. Balogun, B. Akinribido and R. Asiedu

*Yam Seed System Specialist
b.aighewi@cgiar.org

- The most important challenges of the seed yam value chain are related to:
 - Quality
 - Availability
 - Accessibility
 - Affordability
- The YIIFSWA project has worked extensively to improve seed quality.
- Poor agronomic practices with good seed will still hold down productivity.
- Good Agronomic Practices (GAP) for increased productivity of ware yam was a focus in 2019.
- Efforts are being made to address the “A” challenges.

Primary Outcome 2: Established functional, scalable and sustainable basic and commercial seed system driven by private sector

Intermediary Outcome 2.2: Increased understanding of benefits of purchasing improved varieties and using improved agronomic packages.

Output 2.2.1: At least 80,000 seed yam tubers (IITA production in 2018) of **improved varieties available in Nigeria and Ghana for ware yam demonstration sites by 2019**

Establishment of Demo Plots by Seed Companies

1. *Biocrops Biotechnology Company Limited, FCT = Biocrops*
2. *Da-Allgreen Seeds Limited, Kaduna = DaAllgreen*
3. *Nwabudo Agro Seeds Limited, Abia = Nwabudo*
4. *Strategic Seeds Nigeria Ltd, Ebonyi = Strategic Seeds*
5. *PS Nutraceuticals International Limited, Lagos = PS Nutrac*

Training of Trainers on Good Agronomic Practices (GAP)



- At least two staff from each seed companies were trained from 27th - 30th March 2019 at IITA Station, Abuja.
- The aim was for participants to appreciate the effect of using GAP with certified seed for ware yam production.
- The training composed of presentations, discussions and hands-on learning.





Training on land preparation to achieve optimum plant population

Seed company	Training locations	State	Date (April 2019)	No. of trainees	
				F	M
Nwabudo	Umuahia	Abia	12	2	17
PS Nutrac	Olodo	Ogun	15	7	12
	Tokun	Oyo	16	2	15
	Igboho	Oyo	17	2	10
Strategic Seeds	Abakaliki	Ebonyi	24	12	8
Biocrops	Abuja	FCT	11	7	17
	Lafia	Nasarawa	12	4	18
Da-Allgreen	Kafanchan	Kaduna	15	6	9
	Minna	Niger	17	10	14
Total				52	120



Seed Company	Kpamyo		Asiedu		Swaswa		Delivery date April 2019
	Tuber No.	weight (kg)	Tuber No.	Weight (kg)	Tuber No.	weight (kg)	
Biocrops	2277	348.1	1951	131.71	896	320.2	7 th
DaAllgreen	2321	359.8	1483	142	607	308.95	7 th
Nwabudo	2456	362.75	1445	134.2	0	0	8 th
PS Nutrac	2179	320.26	2221	132.05	1374	306.41	9 th
Strategic	2236	191.75	773	65.45	225	180.25	8 th
Total	11469	1582.66	7873	605.41	3102	1115.81	

Seed source: Harvest from IITA Ibadan Research Fields in the 2018/2019 season, which were initially derived from the aeroponics system.

Set up of Demo Plots by Seed Companies in Nigeria in 2019

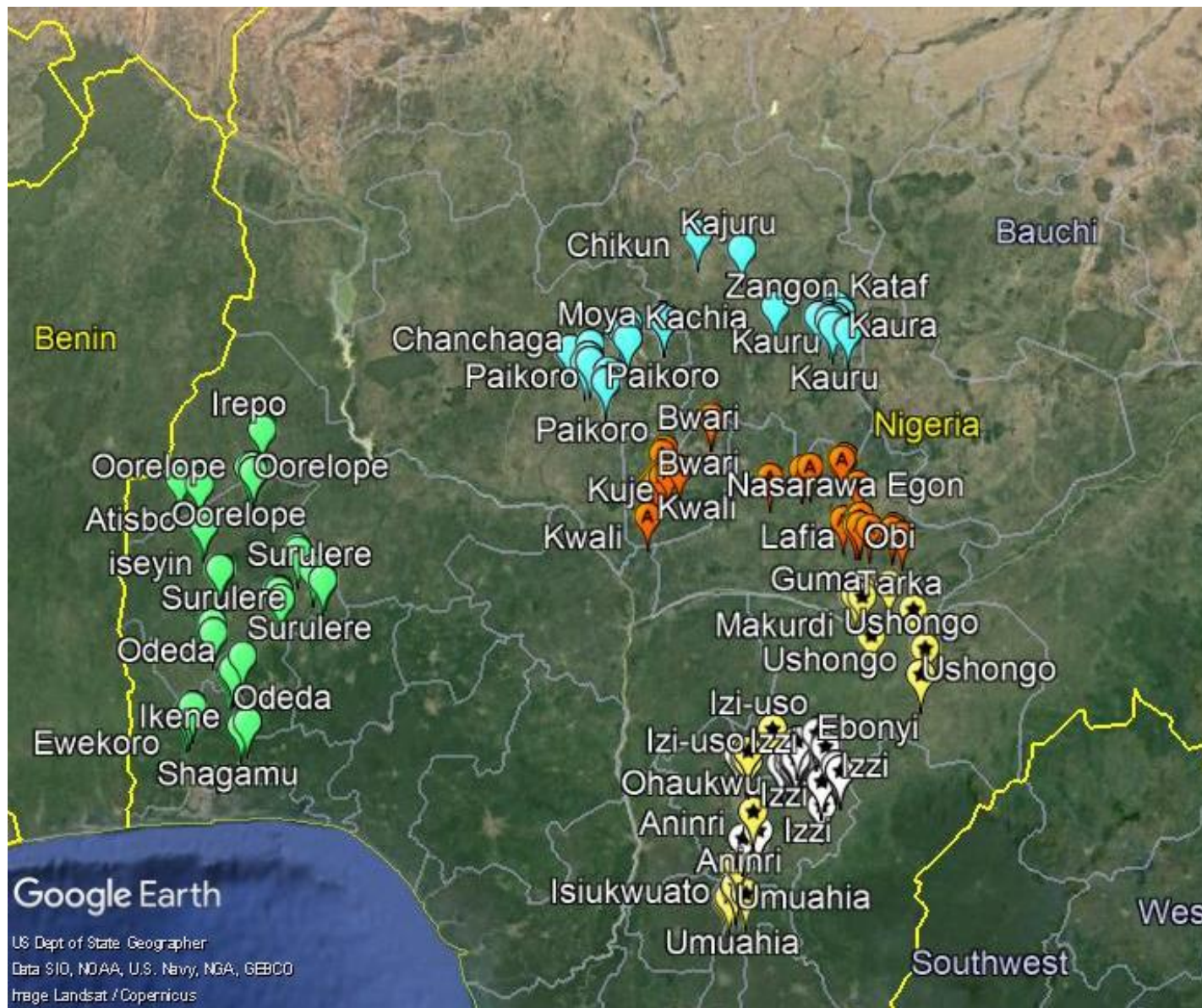
Seed Company	State	No. of demos	Gender		Planting period
			Female	Male	
Nwabudo	Abia	18	8	10	02-30/5/19
	Enugu	12	4	8	23-24/5/19
	Benue	10	4	6	31/5-3/6/19
PS Nutrac	Ogun	15	5	10	16-29/4/19
	Oyo	25	4	21	17-30/4/19
Strategic Seeds	Ebonyi	18	7	11	15-20/5/19
	Enugu	2	1	1	16-17/5/19
Biocrops	FCT	20	8	12	15-20/5/19
	Nasarawa	20	5	15	17-29/5/19
DaAllgreen	Kaduna	16	6	10	14-31/5/19
	Niger	25	11	14	22-24/5/19
	Total	181*	63	118	

* Only 179 were confirmed (Nwabudo established 39 not 40)

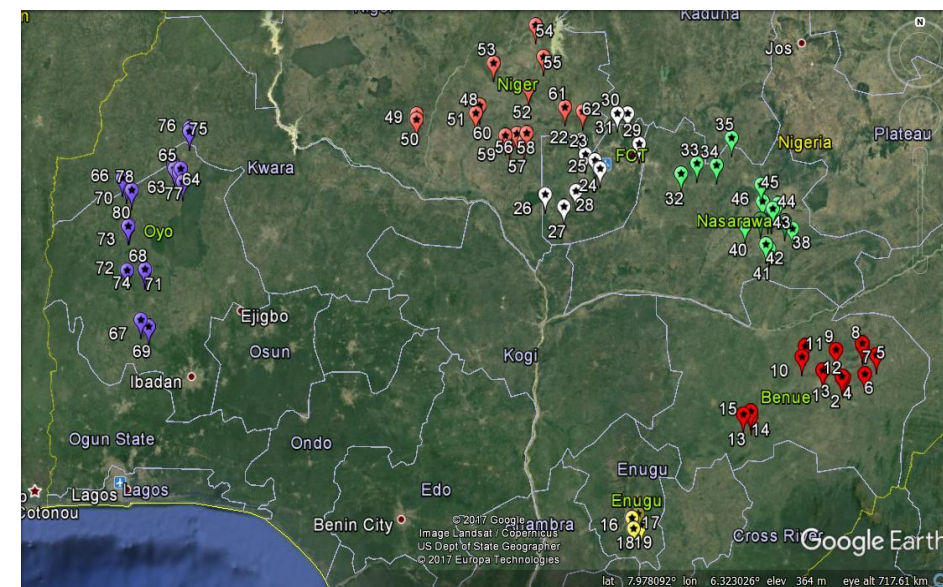
State	Number of Demo visited	Seed company in charge (No.)
Abia	17	Nwabudo (39)
Benue	10	
Enugu	12	
	02	Strategic Seed (19)
Ebonyi	17*	
Kaduna	15	DaAllgreen (40)
Niger	25	
Nasarawa	19*	Biocrops (39)
FCT	20	
Oyo	25	PS Nutrac (40)
Ogun	15	
Total	177	

- Plots were visited and GPS readings verified
- Data was collected on farmers' fields using a structured questionnaire

**Farmer did not facilitate visit of plot*



Validation trials in 2017



- Some observations that eventually affected yields:
- Intercropping: 37% of the demo plots (maize, cowpea, sweet potato, garden egg, cassava, cocoyam, groundnut, soybean, pepper, tomatoes, etc.)
- Staking: 29% had individual stakes, 33% pyramidal, 5% used trellis and 32 % not staked.
- Fertilizer application (NPK): PS Nutrac = 12.12.17; Strategic Seeds = 20.10.10; Nwabudo = 13.13.27, DaAllgreen and Biocrops = 15.15.15.
- About 48% of plots were sprayed with pre-emergence herbicide
- Land preparation: 74% on mounds, 25% on ridges, and 1% used both
- About 46% of farmers used land that had been cropped for 3 consecutive years (2016 - 2018) especially in Oyo, Kaduna, Nasarawa and Benue states and FCT

- Late arrival of planting materials
- Some farmers did not attend the GAP training but only relied on information gotten from other farmers
- Indiscriminate use of herbicide killing both weeds and yam plants
- Unequal sett sizes used (Weight of local variety was at the discretion of farmers and was always bigger)
- Local variety not treated in some plots

Observations During Monitoring of Demo Plots

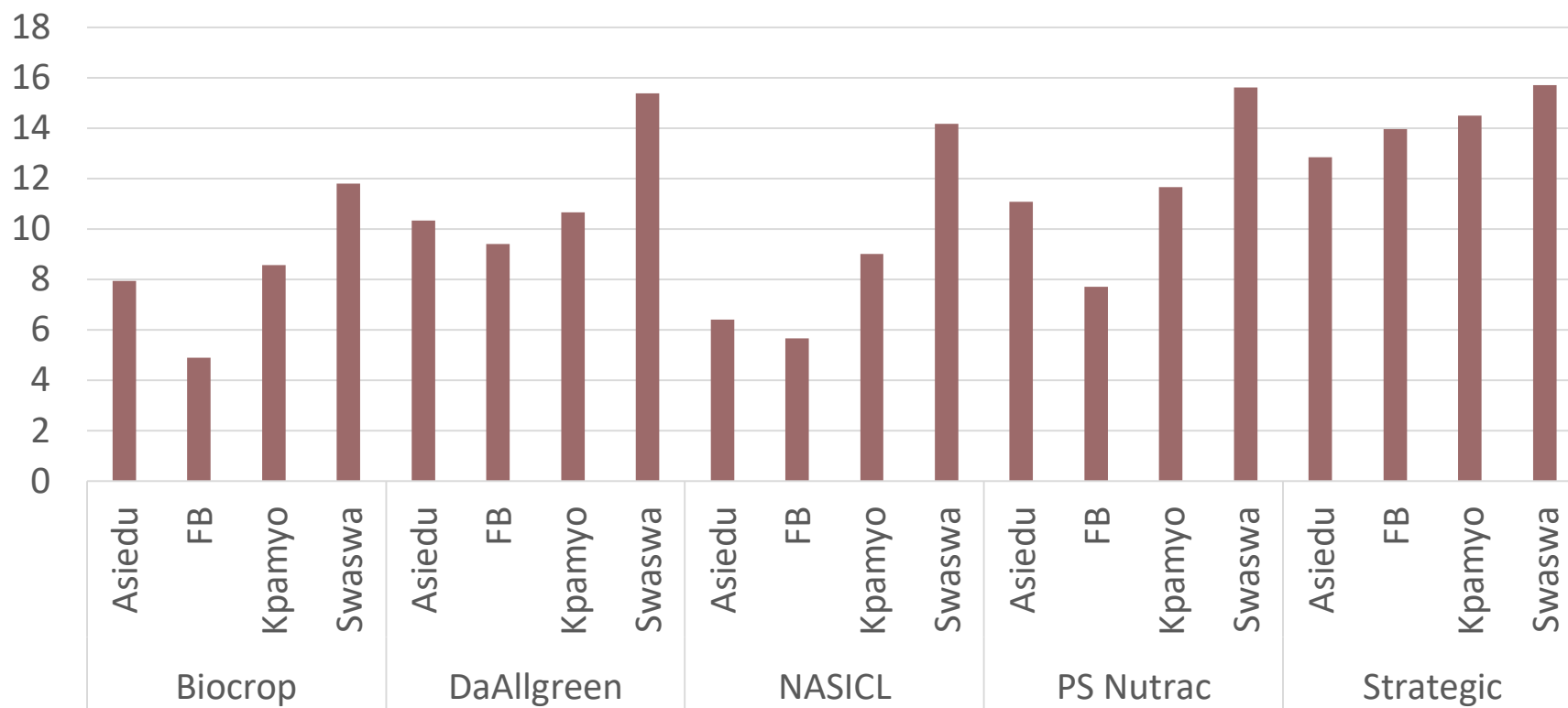
- Mix up of varieties with no clear demarcation (eventually no data could be collected)
- Planting on the same plot varied in space and time
- Some plots were in a poor condition (weedy, abandoned, and/or waterlogged)
- Seed companies' staff made up a considerable proportion of the out-growers
- Spacing recommendation not observed
- Rarity of visits communication between seed companies and farmers.
- General nonchalance in handling of the demos plots.

Variety	Mean (t/ha)	Minimum (t/ha)	Maximum (t/ha)	Std Dev
GAP Demos in 2019				
Swaswa	14.4	1.3	34.7	7.9
Kpamyo	10.5	1.6	28.9	5.9
Asiedu	9.6	1.1	34.3	6.4
Farmer Best	7.9	1.2	32.7	6.2
Validation trials in 2017				
Swaswa	19.1	12.3	34.6	3.27
Kpamyo	18.0	11.1	31.5	1.58
Asiedu	13.1	9.1	24.6	1.45
Farmer Best	12.1	7.3	22.7	2.03

Observations

- Wide variability in yield in 2019
- Maximum yields show the potential of varieties in both trials
- Yields depicted the level of management of plots

Mean tuber yields (t/ha) obtained by seed companies in 2019



- “Give us more planting materials because the yam varieties are very good”.
- “Seed yams are costly and scarce around here. When can we get enough quantity to buy?”
- “When I roasted some tubers on the farm and discovered that they were very tasty, I kept the tubers away from my children so that they don’t eat it all”.
- “Please always invite us for training because your trainings have increased our knowledge, in fact, if we cut sett sizes bigger like our local yam, it will perform better”.
- “Bring the planting materials early. The seed was weak by the time we got it. It looked like the seed had stayed too long inside the sack. The seed should come early like February because rain started in the month of March here”.

When will the seed of improved varieties be available in required quantities?

- Farmers expressed concern over the delay in the sale of seed of the improved varieties and have been sending their requests

Some seed requests for 2020 season

	Name	Seed Needs
1	Agvest Farms	5 ha
2	Prof. Cladius	1 ha
3	Islamic Organization, Iwo	10 ha
4	Tope Sonuga	10 ha
5	Emperor Farm, Okenne	20 ha
6	One Acre Fund (NGO)	10 ha
7	International Red Cross	For about 4000 displaced farmers

Source: Requests made to IITA

In 2018, partial demand from 36 states and FCT was 9.1 million seeds tubers



Flooded plot and harvested tubers, Abia



Very weedy field and its harvest, Abia



Crop destroyed by herbicide in FCT (about 12 weeks after planting)



Wrong plant spacing, up to 2.5 m between stands in Oyo State



Distribution of inputs in Ebonyi



Well maintained fields in Niger State (A) and Ebonyi State (B)





5 ha seed yam field of Biocrops with irrigation facilities, FCT, Nigeria



Seed and ware yam production fields of Fusua Foods, Ghana



Hydroponics system at DaAllgreen, Kaduna, Nigeria



Screenhouse with potted yam plants, Hikma Agro, Tamale, Ghana



AS facility IRIBOV Ghana. AS also in NRCRI, CRI, SARI and all seed companies



TIBs at NACGRAB, Ibadan, Nigeria. TIBs facilities also available in CRI, NRCRI, and to be set up at SARI

Primary Outcome 1: Established functional, scalable and sustainable public sector driven commercial early generation seed systems for improved yam varieties

1.2: Strengthened national regulatory bodies for coordination, effective seed yam quality control and certification to enable quality seed yam production and efficient seed yam supply chain in Nigeria and Ghana

Output 1.2.3: **Stakeholders' forum for coordination of seed production** established in Ghana and Nigeria (bringing together producers and marketers of all classes of seed, input suppliers, policy makers, etc.

Stakeholders' Meetings Organized in Nigeria and Ghana

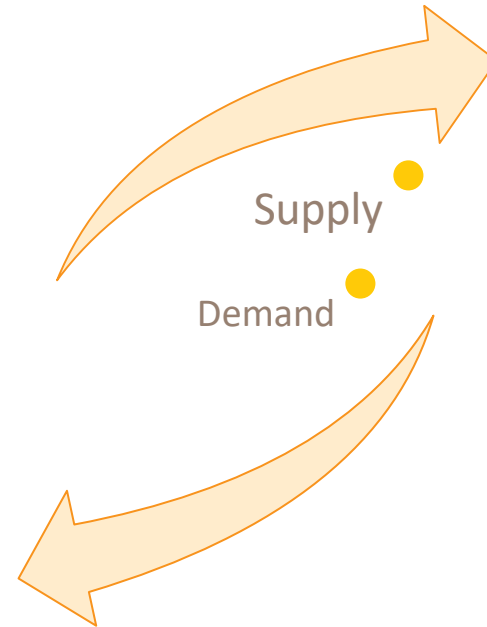


Meeting of stakeholders in Nigeria (89 participants)



Meeting of stakeholders in Ghana (41 participants)

- Seed yam producers
- Service providers
 - Seed quality regulators
 - Quarantine services
 - Policy makers
 - Communication experts
- Ware yam producers
- Input providers
- Transporters
- Marketers
- Exporters
- Processors



- ## Consumers
- Homes
 - Eateries
 - Hotels



Output 2.3.3: Gender Training on AYMT

INTERMEDIATE OUTCOME 2.3 Increased opportunities for women to earn income in commercial seed production and distribution

OUTPUT 2.3.3. Seed yam production **technical training developed and provided to women** to enhance capacity

Gender Training on AYMT



Seed company	Women trained (No.)	Male youths trained (No)	Total
Strategic Seeds	8	15	23
Nwabodu	15	6	21
PSNutrac	12	22	34
Biocrops	19	6	25
Da-Allgreen	19	23	42
Total	73	72	145

- Women and youths trained
- Seed companies identified and invited trainees
- Training focused on the AYMT
- Training materials were distributed to trainees

Research to Improve Availability, Accessibility and Affordability



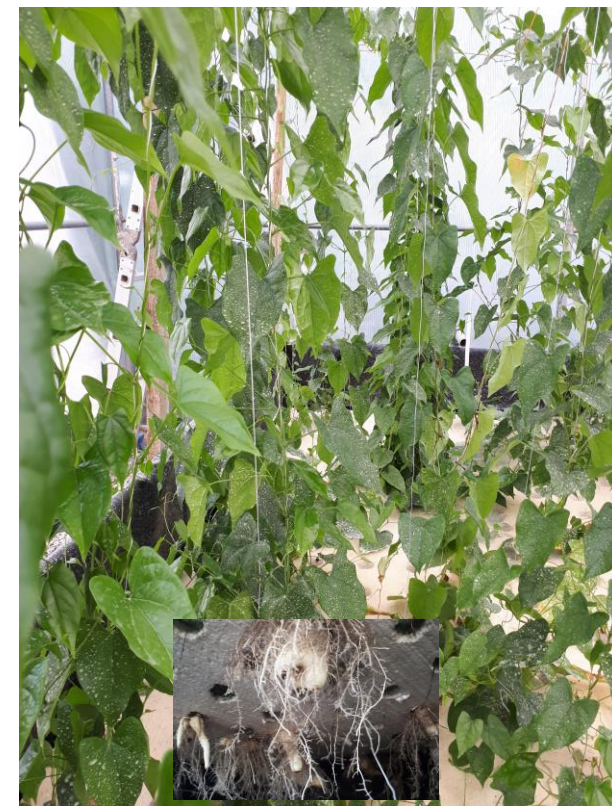
Laying the Foundation for Sustainability of the Formal Seed System

For sustainability, quality seed must be available, accessible and affordable.

Hence the need to:

- Develop systems for large scale production of certified seed
- Increase the available choices of varieties to meet diverse demands
- Reduce the unit cost of planting materials to encourage customers to return for purchase
- Keep production costs low for seed companies to remain in profitable business.

1. Production in Hydroponics Systems Using Different substrates



Sand (sandponics) (mean tuber weight 32 g)

Cocopeat (mean tuber weight 91 g)

Carbonized rice husk (mean tuber weight 12 g)

Floating hydroponics (healthy root system with tuber just initiated)

Plants of variety Kpamyo at 14 WAP of single-node vine cuttings in different substrates

Seed Production in Uncarbonized Rice Husk (UCRH)



Coarse UCRH

Crop duration: 5 months

Area: 1.03 m²

% Establishment: 22.5

Tuber No.: 18

Yield: 260 g

Powdery UCRH

Crop duration: 5 months

Area: 0.88 m²

% Establishment: 46.7

Tuber number: 28

Yield: 2.79 kg

Mean tuber weight: 99.5

Note: **Tuber of up to 402 g was produced**

2. Vertical seed yam production in nursery trays to optimize the use of space and with different substrates



Production in nursery trays with different substrates on a metal stand



Production in bamboo troughs on a stand



**Some visitors to YIIFSWA
screenhouse and field in
Abuja**





8 Weeks after planting (WAP)



12 WAP)



4 WAP



Harvest at 20 WAP

Parameter	Seed tuber size		
	0.01-2 g	>2-4 g	>4-6 g
Seed rate (Kg/ha)	100	300	500
Establishment (%)	92	95	96
Tuber No./ha	104,520	110,572	112,013
Range of tuber wt. (g)	6-428	8-704	8-890
Mean tuber weight (g)	76.9	90.6	120.5
Yield (t/ha)	7.2	8.8	11.8

3. Seed Production in Styrofoam Nursery Trays



Crop duration: 3-4 months
Area: 0.185 m²
Mean establishment: 86.7%
Tuber number: 75
Yield: 0.175 kg (9.48 t/ha)
Mean tuber weight: 2.37 g



- Demo plots were successfully conducted although with yields that were generally low.
- Yam value chain stakeholders met and were encouraged to form partnerships to facilitate growth.
- Women were targeted for training to become seed yam entrepreneurs
- There is great potential in producing and using clean minitubers for seed yam production.



Acknowledgements

Bill & Melinda Gates Foundation for funding

All partners of YIIFSWA II for their contributions to the project's achievements.

Thank You for listening

