



Accelerating the delivery of improved varieties to farmers through enhanced yam seed systems

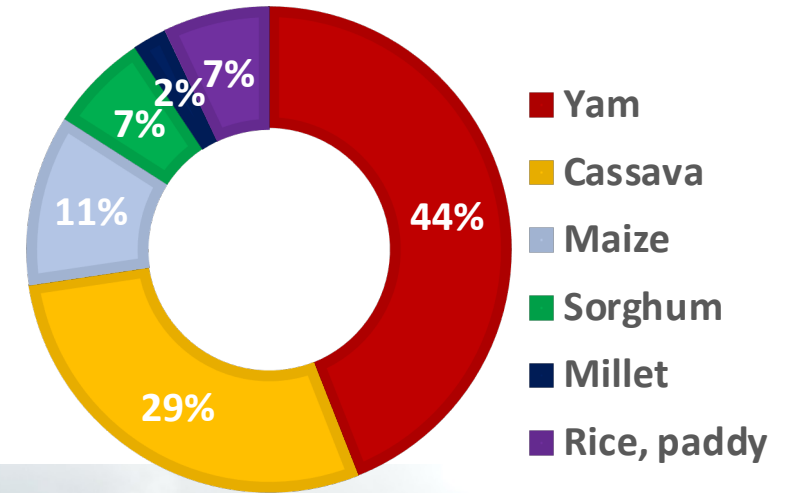
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Importance of yam

- Yam is an indigenous crop in West Africa
- The region produces more than 92% of the world crop
- Yam is an important cash and food security crop with great socio-economic value
- The tuber serves as both food and seed
- Productivity in traditional systems is declining partly due to an undeveloped seed system.



Background of research on yam seed systems

Identified challenges of traditional yam seed systems:

- Prone to limited supply and poor quality
- Seed constitutes about 1/3 of harvested tubers
- Seed is expensive (constitutes up to 40% of production cost)
- Extremely low rate of multiplication (1:3)
- Absence of dedicated seed yam producers and lack of information on seed agronomy
- Seed is obtained primarily by recycling of farmer preferred landraces
- Unavailability of improved released varieties with farmers



Seed bought from a local market

Traditional means of acquiring seed tubers



Seed yam is usually obtained from:

1. Small whole tubers (150 g to 500 g)
2. Ware size tubers (up to 1000 g)
 - Cut freshly into setts of 150 – 500 g at planting
 - Cut into setts and buried at milking, dug out during final harvest and planted in new fields
 - Whole tuber planted for ceremonial yam
3. Tubers of second harvest in milked crop
4. Local markets

The “Yam Improvement for Income and Food Security in West Africa (YIIFSWA)” project (2011-2022)

- **YIIFSWA-I: 2011-2016**

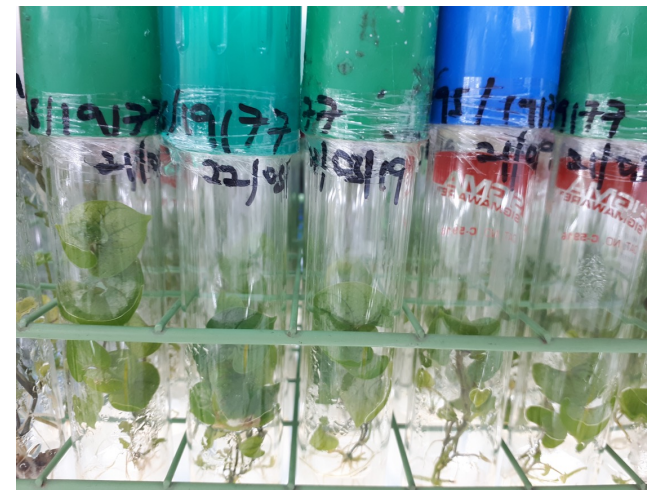
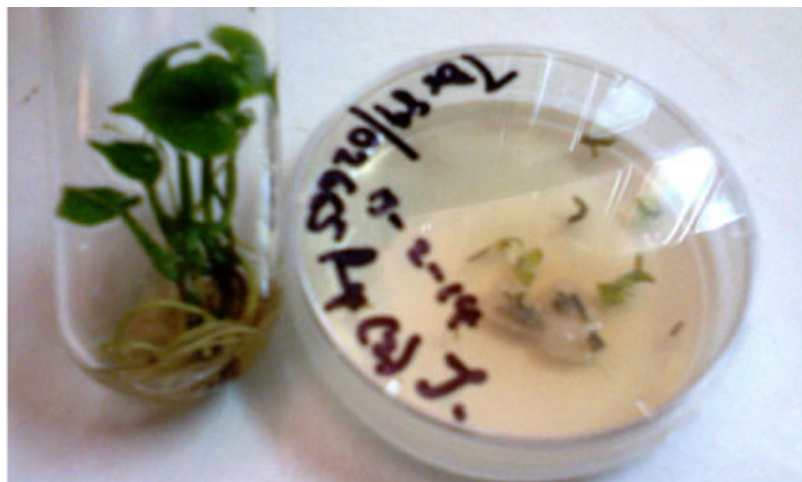
- Increase yam productivity for small-holder yam farmers in Ghana and Nigeria.
- Deliver key global good research products (on seed) to improve the productivity and livelihoods of yam farmers.

- **YIIFSWA-II: 2017-2022**

- Ensure the transfer of all advances made in YIIFSWA-I to NARIs and private seed companies for increased productivity and income generation for seed and ware yam farmers.

Broadly, the YIIFSWA project aimed at tackling the critical challenges of seed yam: **quality, availability, accessibility and affordability in Nigeria and Ghana.**

Cleaning of seed stocks and multiplication



- Virus elimination procedures developed (thermotherapy and meristemming)
- Cleaned stocks of planting materials multiplied and distributed to the NARS – three varieties promoted.

Development of high ratio propagation techniques



- 1. Temporary Immersion Bioreactor System (TIBs):** Plants are produced using a liquid medium in a sterile environment
- 2. Aeroponic system (AS):** Plants with much foliage produced in AS boxes with a mist of nutrient solution in the screenhouse
- 3. Hydroponics system (HS):** Production in containers using different substrates (cocopeat, rice husk, sand) and liquid nutrients

New techniques emphasize use of vine cuttings for propagation



Advantages of using vine cuttings

- More tubers are saved for food
- Reduction in the spread of nematodes and other tuber and soil borne pests and diseases
- Faster rate of multiplication (1:300 vs 1:3-5)
- Methods of production offer more flexible production cycles.
- **Additional value to the yam crop**

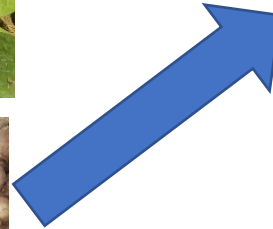
Minitubers from leaf-bud cuttings: screenhouse to the field



Leaf-bud cutting from mother plants in screenhouse



Yam minitubers harvested from leaf-bud cuttings in nursery trays (screenhouse)



Field production from minitubers planted at 100,000 stands/ha and harvested 5 MAP



Rooted leaf-bud cuttings transplanted to produce tubers



Rooted leaf-bud cuttings

Transplanted to the field

Maintained in the field

Seed and ware tubers of up to 6 kg after 6 months

High ratio propagation methods using vine cuttings for clean seed



Leaf-bud cutting (LBC)



Direct field planting of LBC under shade in the field



Established plants from LBC in the field (12 WAP)



Quality seed tubers harvested at 20 WAP

- Direct field planting of LBC gives the highest rate of multiplication
- Private seed companies in Nigeria (6) and Ghana (3) have been trained and are using various high ratio propagation methods for seed production
- YIIFSWA promoted three varieties; seed producers need more varieties.

Other outcomes of the YIIFSWA project

- Promotion of high-yielding improved and released yam varieties (3)
- Development of diagnostics tools for virus detection and elimination for quality control and certification
- Establishment of Quality Management Protocol (QMP) and standards for certification
- Business plans for breeder and foundation seed production (NARIs and private sector)
- Product promotion events: demonstrations, advocacy and awareness campaigns in social and mainstream media, and web platforms
- Strengthening of production capacity of NARIs, quality regulators, and private sector – training and provision of infrastructure (TIBS, AS, hydroponics, solar power, ICT tools)
- Multi-stakeholder forum for policy and advocacy (Yam forum) established



What planting material is recommended for commercial yam production?



Seed yam recommendation before YIIFSWA's research findings



Seed yam recommendations after research findings

The choice of planting material for foundation seed production by seed companies*

1. Whole minitubers of 1-10 g
2. Leaf-bud cuttings
3. Plantlets
4. Minisetts

The best planting material for ware yam production from research results

1. Whole minitubers of 30-50 g
2. Whole tubers > 50 g
3. Plantlets from rooted cuttings
4. Setts and minisetts

*Private seed companies with enhanced capacity for foundation seed production

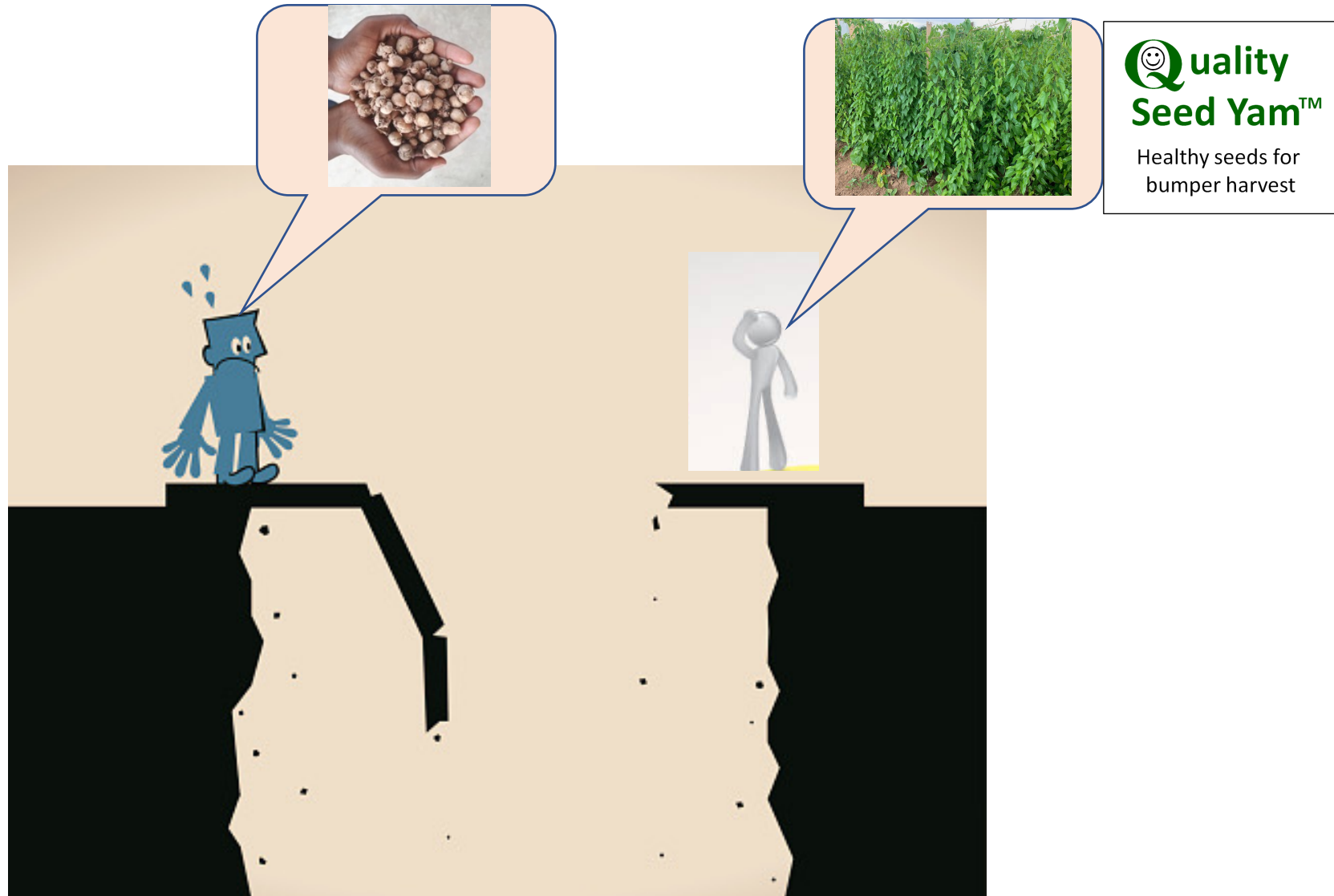
Nigeria

1. Da-Allgreen Seeds Ltd., Kaduna
2. BIOCROPS Biotechnology Ltd., Abuja, FCT
3. Nwabudo Agro Seeds and Inputs Ltd (NASICL), Umuahia, Abia State
4. Strategic Seeds Nigeria Ltd. (SSNL), Abakaliki, Ebonyi State
5. PS Nutraceuticals International Ltd. (PSN), Wasinmi, Ogun State
6. GoSeed, IITA, Ibadan, Oyo State
7. Umudike Seeds, NRCRI, Umudike, Abia State

Ghana

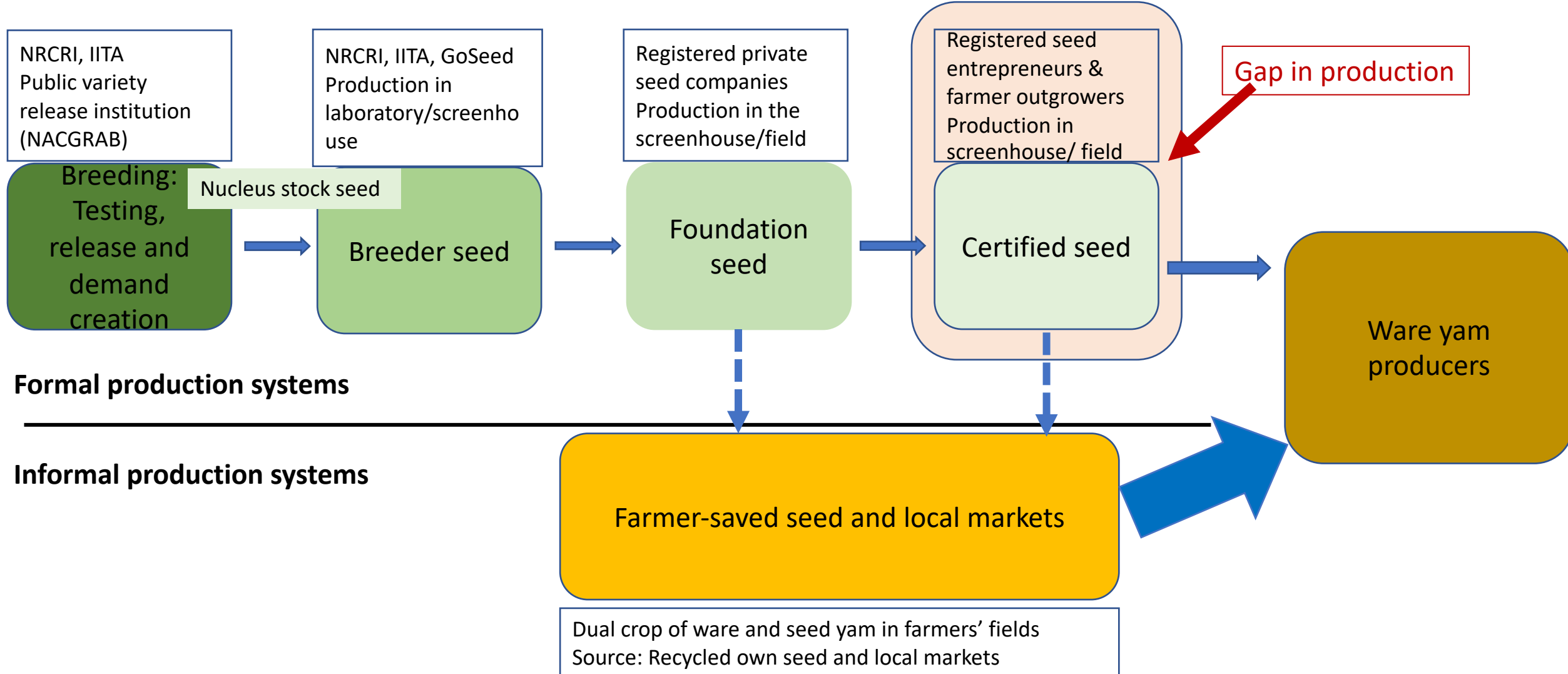
1. Fosuah Food Chain Ltd., Adaklu, Volta Region
2. Iribov Ghana Ltd., Sogakope, Volta Region
3. Hikma Farms Ltd., Tamale, Northern Region

What is the status of delivery of quality seed of improved yam varieties?



Established formal seed system to enhance the availability and use of released varieties

Quality management by public regulatory institution using ICT tools (seed tracker)



The way forward to address gaps in yam seed delivery

Technological

- Continue to scale and promote new technologies
- Develop good agronomic packages for high ratio technologies
- Establish strategies to reduce virus and nematode reinfection of seed
- Develop technologies for handling, packaging, transportation and storage of minitubers of <10 g
- Catalogue and promote new varieties

Marketing

- Establish a pool of seed entrepreneurs for certified seed
- Awareness creation on the potentials of quality seed
- Establish tools for demand estimation

Institutional

- Promote a centralized seed coordination
- Support policies to advance the formal seed system and improve on the informal system



Conclusion and recommendation

- Rapid multiplication methods for yam developed
- The formal seed yam sector established in Nigeria and Ghana
- Out scaling of the new technologies has started
- Sensitization of stakeholders to create awareness of new opportunities in the yam value chain.
- Policy to encourage the distribution of released varieties is necessary (e.g. to conclude the process of release only after X quantity of seed has been produced by seed companies).



Acknowledgements

Bill & Melinda Gates Foundation for funding the YIIFSWA project

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

Thanks for your attention

