



RESEARCH
PROGRAM ON
Roots, Tubers
and Bananas

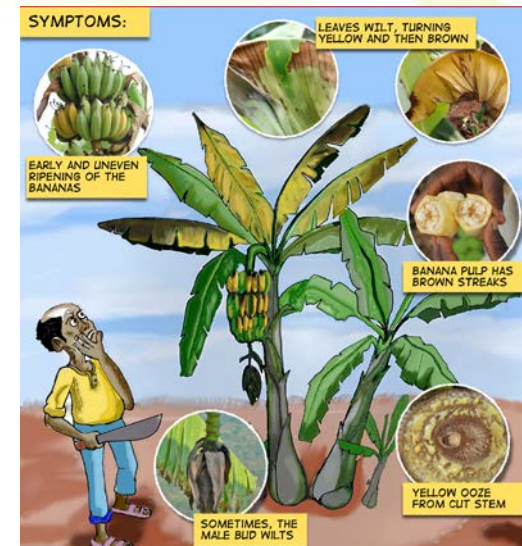
SCALING SWEETPOTATO TRIPLE S PLUS: gender responsive options for quality planting material, higher yields and extended shelf life for storage roots Ethiopia, Ghana

MARGARET McEWAN, CIP-SSA, RTB, on behalf of the team



Three Scaling Fund awards

- Broadening the scaling of BXW management in East and Central Africa (DRC, Rwanda, Uganda)
- Scaling the transformation of wet cassava peels into high quality animal feed ingredients (Nigeria)
- Scaling Triple S (root based seed technology) PLUS Ghana, Ethiopia.....
 - 81,000 reached with Triple S by 2018 - 2019 with 10% uptake; \$700,000



Clockwise: What is BXW?
Transformation of Wet Cassava
Peels; and Triple S basin with
sprouted roots

INTRODUCING THE “TRIPLE S PLUS” TEAM

Scaling partners: BoANRD, MEDA, RING, and potentially NGOs with large Ag/Nut programmes



Frezer Asfaw: CIP Ethiopia, MEL



Erna Abidin: CIP Ghana, Seed Systems & Crop Management



Sam Namanda: CIP Uganda, Regional Cross-country technical support



Mihiretu Cherinet: Scaling Champion CIP Ethiopia



Tom van Mourik: CIP Ghana, Participatory Research & Communication



Suleman Issahaq, Scaling Champion, CIP Ghana

Srini Rajendran: CIP SSA, Cost Benefit Analysis of Triple S PLUS & scaling process



Sarah Mayanja, Gender Specialist, CIP Uganda



Margaret McEwan: CIP SSA, Partnering & institutional arrangements for scaling

CHALLENGES

- **Women and resource poor** households lack timely access to quality sweetpotato planting material
- Acute in areas with **extended dry season** & unpredictable rainfall patterns
- **Decreasing land holding size:** imperative to intensify and increase productivity
- **Limited shelf-life** of storage roots: limited consumption period; inability to take advantage of peak market prices
- Unavailability of and **limited access to nutritious foods** in the dry season



Drying sweetpotato plants in mid January at Mirababaya, SNNPR, Ethiopia. Photo credit: M. Cherinet

VIABILITY

- **Farmer managed** seed practice:
 - low cost, inputs locally available
- **Adaptable** to different contexts (e.g. length of dry season) & varieties:
 - options for gender based preferences
 - reduces labour & water requirement for multiplication
 - reduces exposure to pests & diseases
- **Triple S:** 40-50 small-medium size roots can produce quality cuttings to plant 100 x 36 m² ~ 5.5 tons sweetpotato roots. 100g/day of OFSP provides RDA of provitamin A for a child under 5 years.

Root production from Triple S planting material:

- 91% gross margin for every US\$1 invested compared to 77% using the conventional approach.



Sweetpotato vines after 45 days in root bed, SNNPR, Ethiopia. Photo credit: M. Cherinet

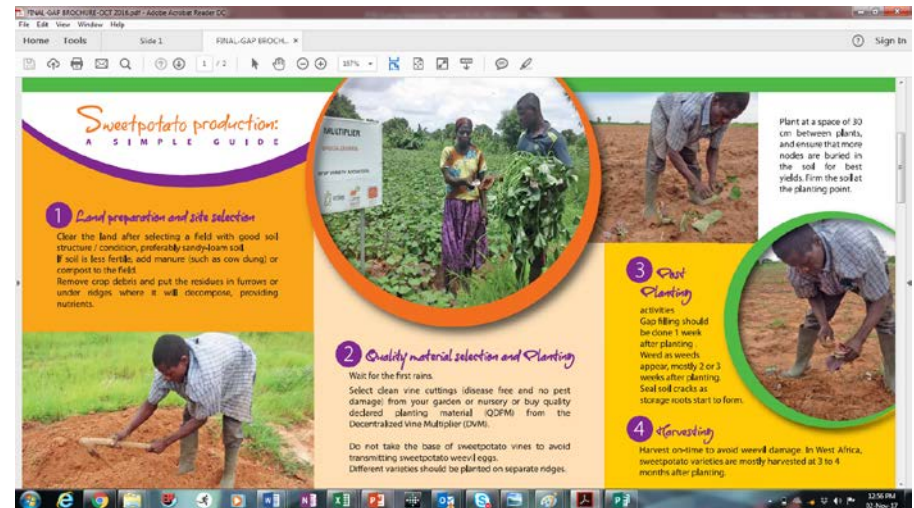
The “PLUS” TECHNOLOGIES

- **Agronomic practices:**

- improve quality of roots for sprouting & storage; and productivity and sorting/selection of roots

- **Gender responsive choices:**

- principle of sand storage used for sprouting &/or extending shelf life of storage roots
- stepped pits & sand boxes



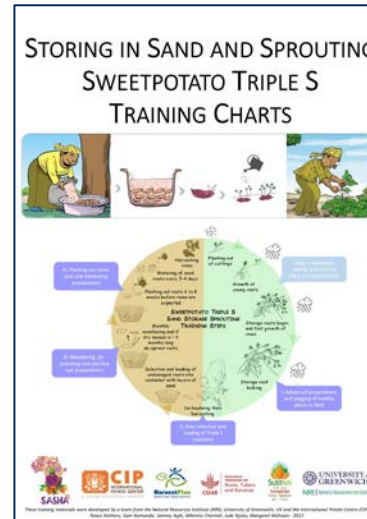
Training materials for GAPs (top);
Preparation of Stepped Pit (l) and Sand Box (r), Navrongo, Ghana. Photo credit: P. Abidin



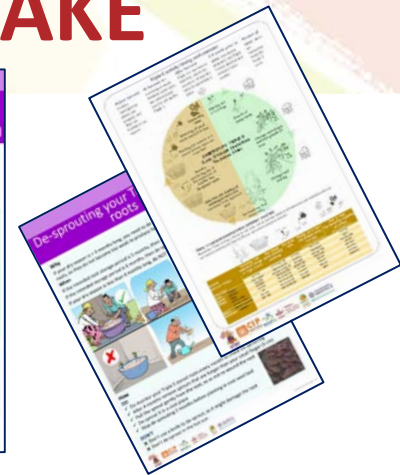
FROM KNOWLEDGE TO UPTAKE

Gender responsive communication materials & approach

- **Trainers' manual, flip charts and farmer handouts**
- Use and test **three promotion intensities** to disseminate the Triple S PLUS technology at scale
 - **Direct participatory adaptation and demonstration**
 - **Farmer training videos** (ZIZO, community video)
 - **Community radio at scale**



Materials credit: Stathers, Namanda et al., NRI, 2017



Participatory video production (r) and used for discussion with women (l). Senegal. Photo credit: T. v. Mourik

Triple S – resources - Guide for Trainers

Guide for Trainers
Sweetpotato Planting Material Conservation
Triple S method: **S**and, **S**torage, **S**prouting

1. Advanced preparations and sowing of healthy plants in field

2. Harvest selection and loading of Triple S container

3. Monitoring, de-sprouting and planting out preparations

4. Planting out roots, and vine harvesting preparations

SWEETPOTATO TRIPLE S SAND STORAGE SPROUTING TRAINING STEPS

Harvesting vines

Planting out of cuttings

Sprouting of young roots

Storage roots begin and fast growth of vines

Storage root bulking

De-hulling then harvesting

Selection and loading of undamaged roots into container with layers of sand

Monthly monitoring and if dry season in 4 months long deep-root roots

Planting out roots 6 to 8 weeks before vines are expected

Watering of seed roots every 3-4 days

Triple S assessment, sowing and training plants and preparations

- Designed around a framework of **4 training sessions** to fit the crop cycle
- Contains **outline plans** for each Triple S training sessions
- **Step-by-step** instructions on how to set-up a Triple S system
- Detailed discussion of **why, when and how each step is done**
- **Visual** illustrations of each stage
- Use together with the **Triple S training flip charts and farmer handouts**

Training Flipcharts

STORING IN SAND AND SPROUTING SWEETPOTATO TRIPLE S TRAINING CHARTS

What is Triple S?
Sand, Storage and Sprouting are the initial steps for producing sweetpotato planting materials in time for the start of the rains, using seed roots stored during the dry season.

What constraints does Triple S address?
Lack of sweetpotato planting materials at the start of the rains.

What does Triple S involve?

- Storing roots in dry sand
- Planting the sprouted roots out 6-8 weeks before the rains, and watering them
- Harvesting planting materials at the start of the rains

Logos: SASA, CIP, University of Greenwich, etc.

Sand, Storage, Sprouting Sweetpotato Triple S system

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Planning for Triple S

The sweetpotato crop cycle

Timing of Triple S activities

Activity	Start	End	Duration	Notes
Harvesting roots for storage	April	May	1 month	Use healthy, undamaged roots
Storing roots in dry sand	May	June	1 month	Use clean, dry sand
Sprouting roots in a basin	June	July	1 month	Use a basin with a 10cm layer of sand
Planting sprouted roots in a field	July	August	1 month	Plant in rows, 10cm apart
Watering and weeding	August	September	1 month	Water regularly, weed as needed
Harvesting roots for sale	September	October	1 month	Use a fork to lift roots

Logos: SASA, CIP, University of Greenwich, etc.

Planning for Triple S

Equipment needed

- Basin or similar container
- Newspaper
- Coarse, dry sand
- 50 undamaged/medium-small sized roots
- Fork
- Sticks for pegging healthy plants
- Watering can

Triple S calculations
How much planting material from how many roots

- 1 Triple S root planted out and watered for 6-8 weeks will generate 40 cuttings
- A Triple S basin holding ~90 roots planted out and watered for 6-8 weeks will generate ~2,000 cuttings (20 x 40 x 2,000)
- One month later the vines can be harvested again (second vine harvest) will generate ~2,000 cuttings (20 x 40 x 2,000)
- Three cuttings are planted per square metre, so 2,000 cuttings are sufficient to plant an area of ~650 m² (~0.15 of an acre). So 1 Triple S basin provides enough cuttings to plant at least 0.3 acre (0.15 x 2).

Logos: SASA, CIP, University of Greenwich, etc.

Using healthy roots for Triple S

Selecting healthy plants in the field from which to harvest roots for Triple S (Positive selection)

One month before harvest, walk through your field and peg the healthy sweetpotato plants.

Two weeks later, re-check the pegged plants to make sure they are still healthy. Only use roots from healthy plants as Triple S roots. This helps avoid weevil, virus and hairiness problems which reduce sprout vigour and vine yield.

De-hairing: At 3-5 days prior to harvesting, cut the foliage off your pegged plants leaving 10 cm of stem. This causes changes in the root which will protect it during storage, and will enable you to check if any stems have weevil tunnels in them.

Logos: SASA, CIP, University of Greenwich, etc.

Careful harvesting

Careful harvesting
Damaged roots will rot during storage. Harvest roots for Triple S carefully, use a fork hoe and work slowly. Place roots in shade, do not wash them. Transport the roots home carefully, do not overload, drop or sit on the sack.

Logos: SASA, CIP, University of Greenwich, etc.

Root selection

Select undamaged/healthy roots
Your Triple S roots will be stored for several months, so only store undamaged roots. Discard weevil damaged roots. Check carefully, as weevils lay eggs in tiny holes they make on the root, and the eggs hatch into larvae and can feed and breed in your Triple S roots. Discard broken or damaged roots. As they are more likely to rot during storage. Do not use roots from virus infected plants.

What size roots to store?
Small sweetpotato roots will dry out and shrivel during storage, while only a few large roots will fit in the basin. Choose small to medium sized undamaged roots, that are about as thick/wide as the handle of your hoe (2-5 cm diameter) for use in Triple S. Note in areas where the dry season is > 7 months, medium to large roots are preferred.

Logos: SASA, CIP, University of Greenwich, etc.

Preparing and loading your Triple S container

- Once you have selected your healthy, undamaged, small to medium-sized roots. Gather all your equipment. Plan where you will store your Triple S during the dry season, so that it can remain dry, and cool.
- Add a layer of cool, dry, coarse sand. You can sweep this sand from around your yard, but make sure it is cool before using it, and free from soil.
- Next add a layer of roots, make sure the roots do NOT touch each other.

Logos: SASA, CIP, University of Greenwich, etc.

Loading your Triple S container

- Then cover the roots with a layer of cool, dry, relatively coarse sand.
- Add another layer of roots, making sure they do not touch each other or the edge of the basin. Cover them with a layer of cool, dry, coarse sand.
- If there is space, add a third layer of roots.
- Always finish with a deep layer of sand (~10 cm thick). This will help prevent the roots from drying out during storage, and stop weevils or rats from finding and damaging them.
- Take care of your Triple S, ensure:
 - chickens cannot dig in the sand
 - it will not get rained on, or too hot
 - the family know about the Triple S, so that no one eats the roots, as they are the link to next year's food
 Check your Triple S regularly.

Logos: SASA, CIP, University of Greenwich, etc.

Monitoring your Triple S

De-sprouting your Triple S stored roots

Preparing the root bed, planting out and watering your Triple S roots

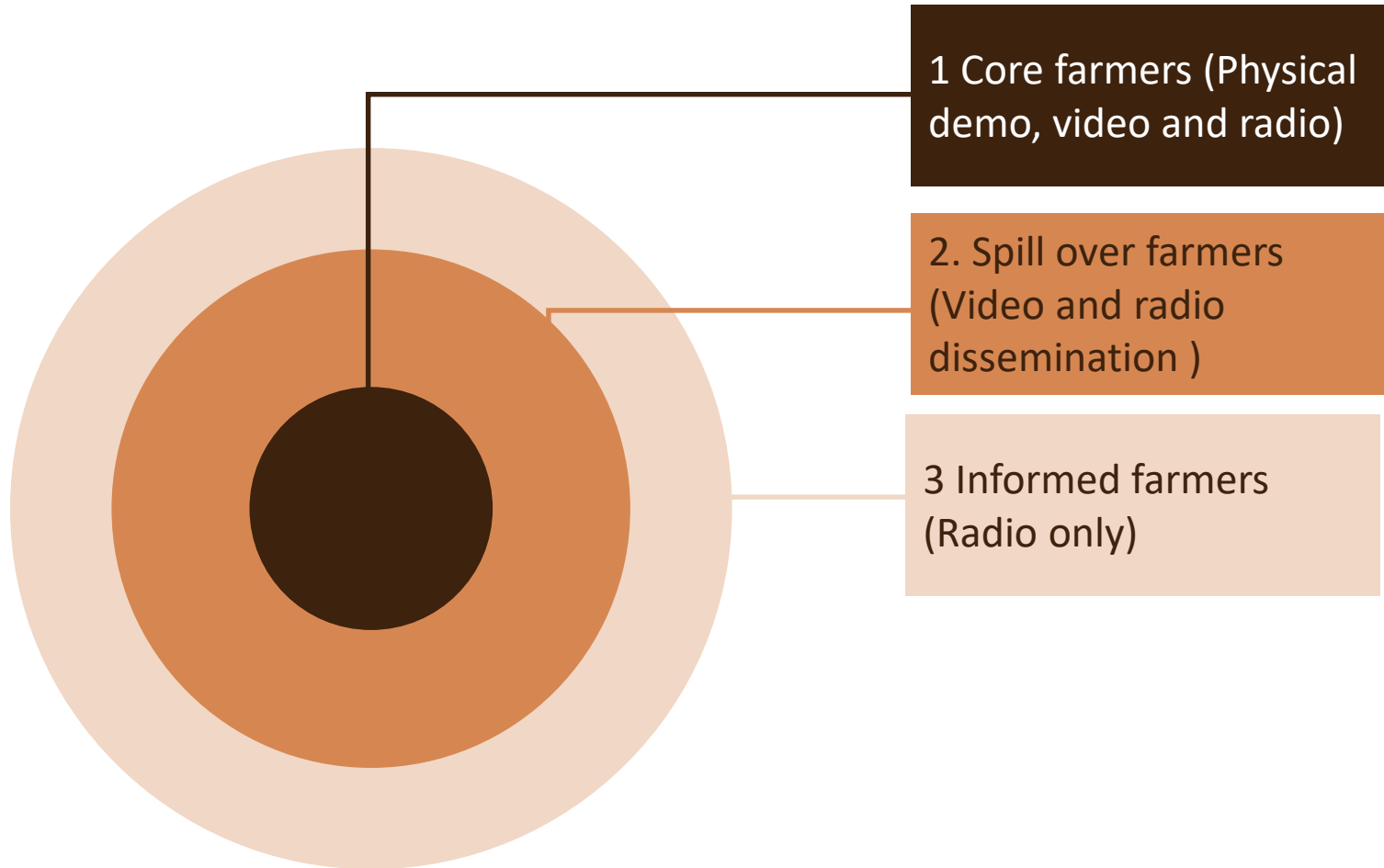
Vine production from your planted Triple S roots

Benefits of Triple S

Training other farmers

Logos: SASA, CIP, University of Greenwich, etc.

Graphic representation of levels of exposure

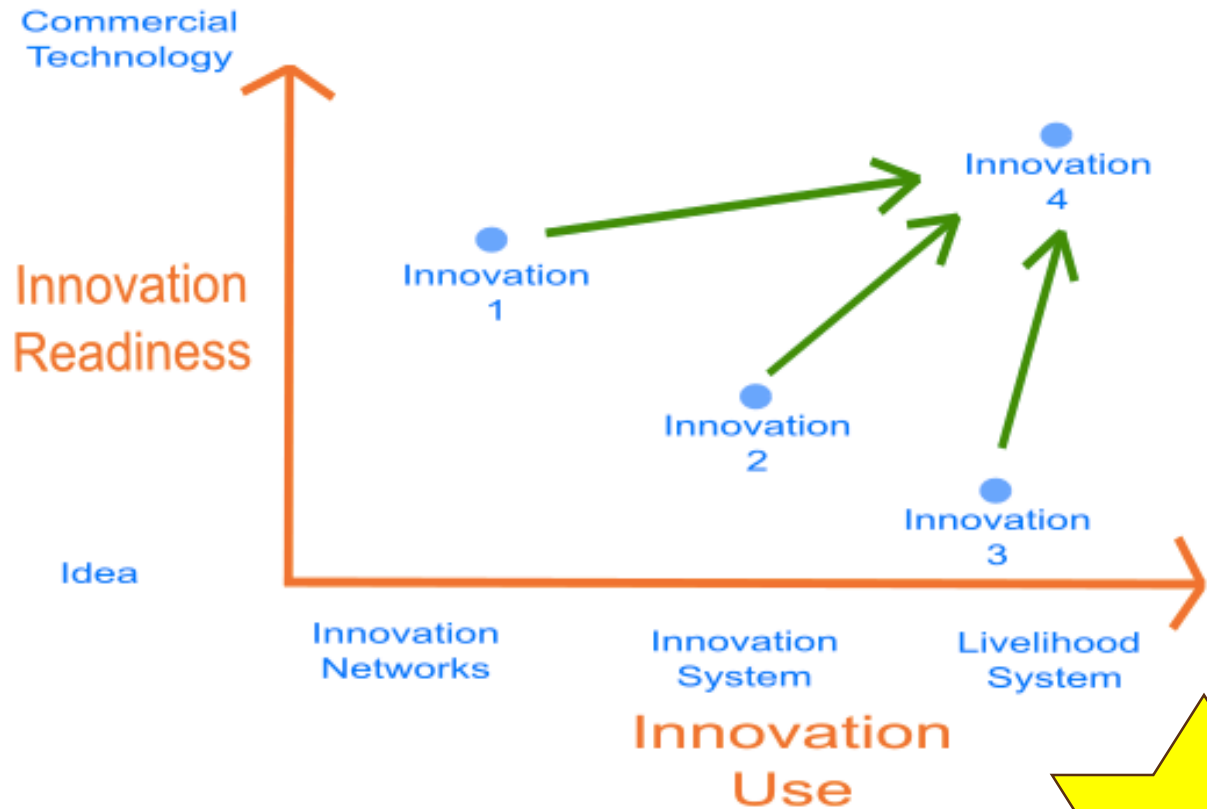


Scaling Readiness



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Scaling Readiness



FOR
WHO?

BY
WHO?

Identifying potential spillover countries & organizations

- **Sam Namanda** – “the father of Triple S” regional technical backstopping and support role
- **Triple S training resource set**
 - **Distribution** (English): Ethiopia, Uganda, Kenya, Tanzania, Mozambique, Nigeria, Ghana, Burkina Faso
 - **Translation:** Amharic, SNNPR languages; N. Ghana languages; Portuguese, French? Kiswahili?
- **Advocacy videos & video based extension**
- **Use Readiness for Scaling Tool** to assess additional components required to start scaling Triple S in additional countries and with new scaling partners



Farmer leader of Triple S FRG, SNNPR, Ethiopia. Photo credit: M.Chernet



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