Lessons learned from scaling the net tunnel technology

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What is scaling?

- **Scaling up**: increasing in terms of numbers, speed, size etc.
- **Scaling out**: expanding, such as geographically spreading the use of a particular technology.
- The aim for both is to achieve IMPACT at SCALE
- Should consider interactions between biophysical, social, economic and institutional factors
Is a technology ready for scaling?

- Technological innovation (battery strength/life)
- Infrastructural innovation (charging stations)
- Market innovation (promotions, incentives)
- Policy innovation (subsidies for clean vehicles)
- Value chain innovation (availability of spare parts)
- Mindset innovation (electric cars are ‘cool’)
- Educational innovation (training of new mechanics)
- Political innovation (‘manage’ fossil fuel lobby?)

Source: Marc Schut, RTB CC 5.4
Sweetpotato is highly affected by viruses under:
- High vector population
- Conducive weather for disease development (wet & hot conditions)
- Presence of virus inoculum in the environment

Source: Thomas-Sharma et al., 2017
Virus management strategies

- Host resistance
- Virus-cleaned seed
- On-farm management
Use of clean seed

Virus indexing & clean up

TC multiplication

Hardening

Marketable roots

Rapid multiplication

NT protection
Low cost net tunnels: Readiness for scaling

- Technology is being piloted in the ‘operational environment’
  - Farmer-managed with support from projects and government extension officers
- Over 810 net tunnels in use in 7 countries: Ethiopia, Kenya, Mozambique, Nigeria, Rwanda, Tanzania, and Uganda.
- Benefits include:
  - Reliable supply of clean planting material
  - Increase in root yields
  - Marketing
Significant increase in root yields

• In Nigeria, after two seasons, yields were still 100-200% higher in net tunnel sourced planting material than open field material.

• Significant yield increases in Tanzania even after 22 months.


Reliable supply of quality planting material….

- Enables farmer-multipliers to maintain a nuclear stock of clean vines which are longer and vigorous
- A symbol of quality seed in some locations
  - One net tunnel generates 1,750 to 1,980 three-node cuttings per harvest
Modifications on the initial design: 3 options to choose from depending on budget and preferences:

1. Flexible wooden sticks or bamboo with the end-tie method

**Advantages:**
- All materials are locally available
- Cheapest option
- Can be constructed on site

**Disadvantages:**
- Wood susceptible to termite attack and weather vagaries
- Least durable frame of the three options
- Permanently fixed – not movable once constructed
- Deforestation of young trees
- Sticks can break when bending
2. PVC pipes for frame with zipper or PVC clothing line closing method

**Advantages:**
- PVC pipe is easy to bend
- Cheaper than reinforcing rods
- Less wear and tear on the netting compared to wood
- Can be constructed with local labour
- Durable and not damaged by termites

**Disadvantages:**
- PVC is more expensive than wooden sticks and sometimes not easily available
- Iron pegs require hack saw to cut
- PVC pipes can lose shape over years under temperature fluctuations
3. Reinforcing bars or rod for frame with full-length zipper closing method

**Advantages:**
- Most durable of the three options
- Does not use binding wire which can damage the netting material
- Can be moved easily as a unit to different sites

**Disadvantages:**
- Iron rods are more expensive than PVC and wooden sticks
- Iron rods must be painted to avoid rusting
- Iron rods need to be welded prior to moving to the site
- Not user-friendly for irrigation with watering cans
### Estimated production costs & revenue

<table>
<thead>
<tr>
<th>Cost of construction &amp; starter material (USD)</th>
<th>Operational costs (5 months @USD15)</th>
<th>No. of 3-node cuttings/harvest</th>
<th>After 2 rounds of field multiplication</th>
<th>Revenue (@TZS.20/30-cm cutting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 - 130</td>
<td>75</td>
<td>1,750</td>
<td>31,500</td>
<td>TZS. 630,000/USD 286</td>
</tr>
</tbody>
</table>

- Total production cost over the initial 5 months = 80 + 75 = USD 155. Therefore, profit of 286 – 155 = USD 131/NT

- After 5 months the multiplier will only incur the USD 75 operational cost to produce 31,500/NT. Therefore, profit will be 243 – 75 = USD 211/NT
Key drivers and bottlenecks

**Drivers:**
- When farmers see yield decline of preferred varieties they seek sources of quality planting material.
- Net tunnels provide local sources of clean planting material; from VT material.
- Development and implementation of seed standards and inspection schemes in various countries.
- Strong root markets.
- Effectiveness in reducing virus infection in high virus pressure areas.
- Multipliers can combine quality vine production and root production.

**Bottlenecks:**
- Supply chain for insect-proof NTs not in place in some countries.
- Likelihood of re-infection in the open fields if not well-managed.
Scaling strategy

• Focus on high virus pressure areas, where farmers already buy planting material
• **Extension partners:** Identify enterprising farmers with potential for irrigation and enough land; train DVMs on business & technical skills
• **Agro-dealers:** Supply irrigation kits & insect-proof nets; act as root aggregators and brokers to link with traders, creating a pull effect on the seed system
• **NARIs:** Production of pre-basic seed & coordination of DVMs and buyers to match demand and supply
Cont’d…

- **District level platforms**: Strengthen communication and coordination among local stakeholders and provide the link to national level seed traders, and farmers apex associations.

- **Demo plots, field days, signboards, radio spots, and ICT apps e.g. SeedTracker**: To sensitize farmers on the benefits of using the NTs and where to obtain clean planting material.

- **Local authorities**: Engaged and champions identified to aid with promotion and awareness creation.

- **CIP**: Strengthen links between existing national platforms for RTB crops and districts stakeholder initiatives.
Launch of new brochure

- Captures on-farm experiences from seven countries
- Includes management recommendations
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