Lessons learned from scaling the net tunnel technology

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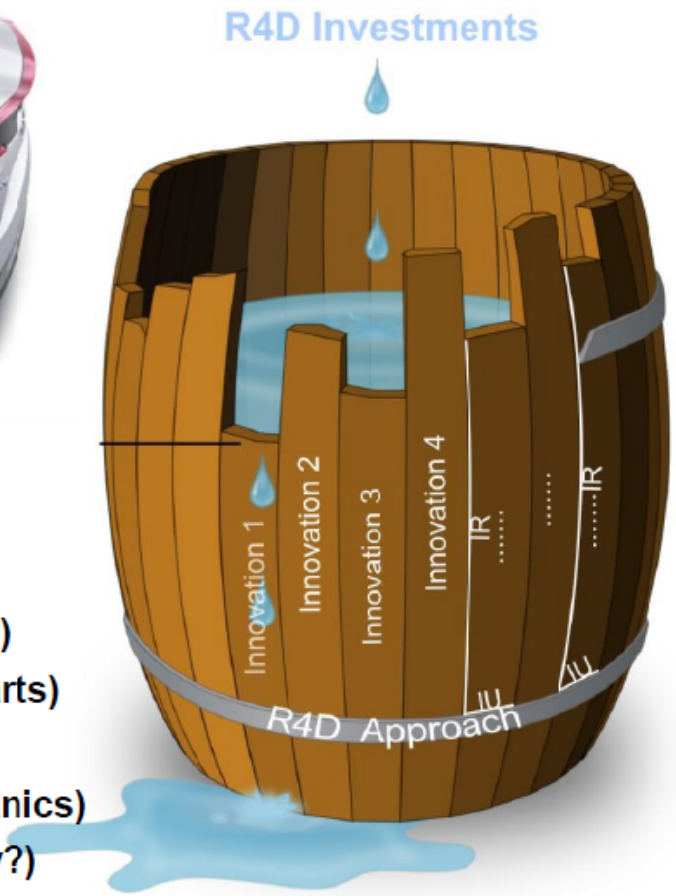
What is scaling?

- **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?

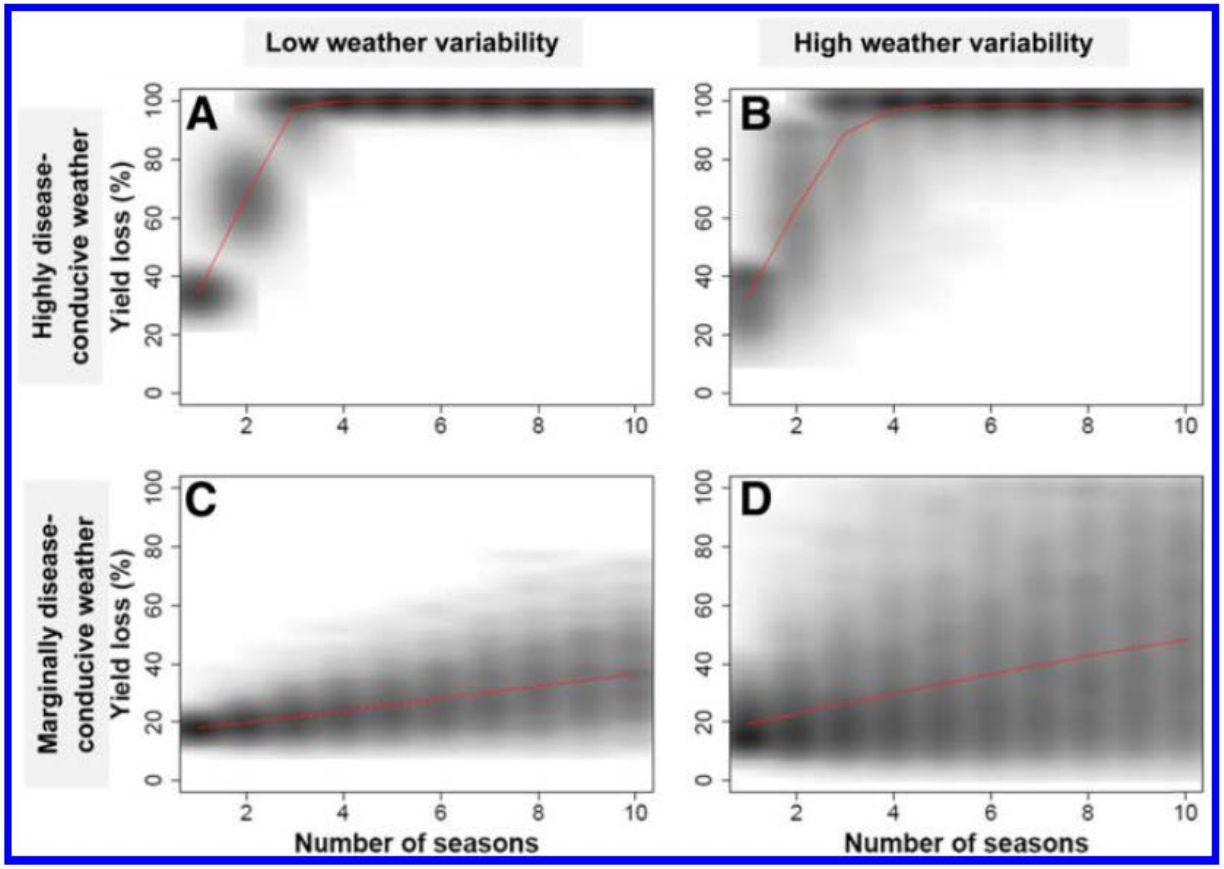
- Technological innovation (battery strength/ life)
- Infrastructural innovation (charging stations)
- Market innovation (promotions, incentives)
- Policy innovation (subsidies for clean vehicles)
- Value chain innovation (availability of spare parts)
- Mindset innovation (electric cars are 'cool')
-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



Source: Marc Schut, RTB CC 5.4

Virus challenge in sweetpotato

- 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

NT protection

Rapid multiplication

Marketable roots

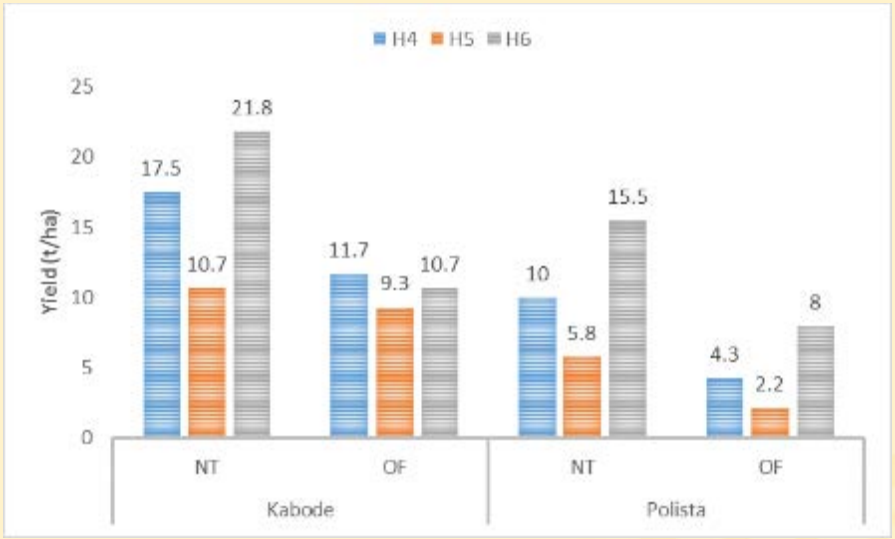
Low cost net tunnels: Readiness for scaling

- 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

a) Nigeria. Source: J. Njoku.



b) Tanzania. Source: K. Ogero.

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

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

- 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 provides 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

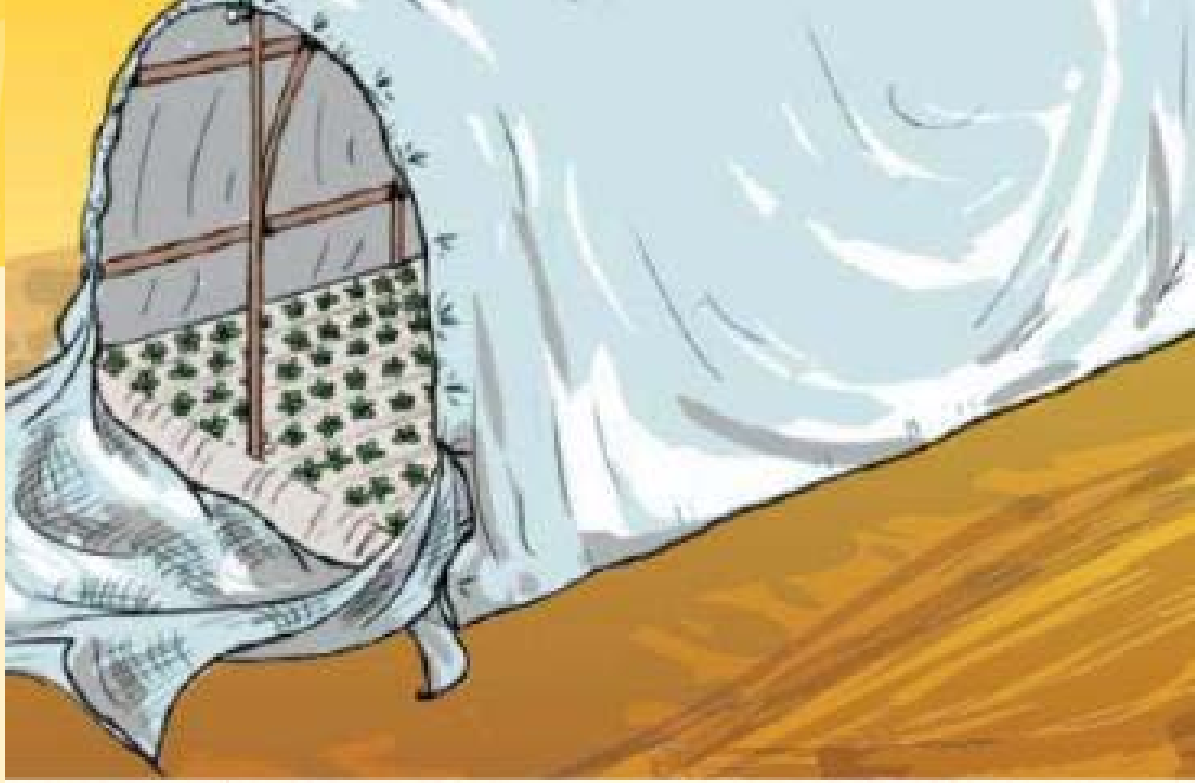
- Focus on high virus pressure areas, where farmers already buy planting material
- Extension partners: Identify enterprising farmers with potential for irrigation and enough land; train DVMs on business & technical skills
- Agro-dealers: Supply irrigation kits & insect-proof nets; act as root aggregators 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



Protecting Sweetpotato

Planting Material from

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