Quality Declared Seed for Potato and Sweetpotato: experiences from Ethiopia – from Practice to Policy

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Seed regulations: opening or closing the door?

- Global standards and protocols for VPCs to improve seed quality (FAO, 2010)
- What do we need to understand to ensure appropriate institutionalization at the national and local levels?
- Field pilots helped to identify & address:
  - Technical and procedural concerns
  - Drivers for seed regulatory functions
  - Stakeholder interests and perspectives
- Methods:
  - Implementation of field pilot & feedback
  - Documentation of process by stakeholders
  - Key documents & events
  - Write-shop for joint reflection
Outline

- Context & background
- Pilot of informal inspection scheme & results
- Feedback on implementation
- Convergence with policy process
- Validation of draft standards & submission
- Discussion
  - Contributory drivers
  - Stakeholder interactions
  - Next steps
Context

Pest & disease context
New seed production technologies
Uncontrolled spread of disease
Pest & disease context

- Seed (planting material) quality: genetic, physical, physiological, purity and health components
- VPCs: importance of seed health – seed borne disease
  - Climate change: increasing & new threats

Potato

- Bacterial wilt – seed and soil borne;
  - No resistant varieties; chemical control ineffective
  - Clean seed, rotation, and isolation distance and field management practices necessary
- Viruses, nematodes, late blight
Pest & disease context

• Sweetpotato
  – Sweetpotato virus diseases (complex SPVD): > 50% reduction in yield
  – Sweetpotato weevil
  – Sweetpotato butterfly
New seed production technologies

• Potato
  – Varieties for different end users
  – Tissue culture, aeroponics
    • disease free mini-tubers
  – Diffused Light Stores
    • Longer storage, improved quality, reduced losses of seed tubers

Multiplication rate in aeroponics is 50-60:1 compared to 6-10:1 in conventional systems. Credit. CIP-SSA
New seed production technologies

- **Sweetpotato**
  - Varieties
    - Orange-fleshed varieties – addressing nutrition concerns in new target groups
  - Virus indexed tissue culture, rapid multiplication techniques
  - Disease free material

TC plantlets in Melkasa TC Lab. Sweetpotato seed production plot, SNNPR. Credit: M.McEwan.
Re-engineering the seed systems

• Existing informal, market based farmer-to-farmer seed system (>95% informal)
  – Seed purchases: institutional market (seed aid) dominates, but some individual farmers buy

• Development of alternate system
  – Research, NGOs, farmer field schools, seed producer cooperatives, commercial multipliers
  – Capacity strengthening of seed producers

• **Potato**: production of small amounts of high quality mini-tubers by trained research, private sector, model farmers
  – Internal quality assurance managed by seed coop committees

• **Sweetpotato**: 1-2-3 decentralized multiplication with research centres, commercial multipliers, model farmers
Uncontrolled spread of diseases…

- **Potato**: seed & ware value chains identical
  - Key hubs: e.g. Shashamene
    - Ware potatoes “re-classified” as “seed”
  - No recognized labeling system for seed tubers
    - Customer trust at risk
- **Sweetpotato**: 2005-6 study
  - Found high prevalence of SPVD.
  - Varietal trials & seed distribution halted
- **Sweetpotato**: shortage of planting material after drought periods – “any vine was seed”
Uncontrolled spread of diseases…

- **Emergency distributions** of relief seed for potato & sweetpotato:
  - Institutional tender process benefits “traders” vs incipient producers of quality seed
  - Emergency distribution of poor seed led to crop failure, localized food insecurity & triggered greater political concern & awareness
Response: preparing the ground

- Formal certification:
  - impractical for small-scale decentralized & dispersed seed production characteristics of VPCs
  - logistical & cost factors

- Response: supply “head-points” of informal system with clean seed

- Introduce informal QDPM inspection scheme
  - Complement existing internal quality assurance CoopCom
  - Build awareness & capacity: seed production guidelines, standards, inspection protocol
The informal inspection scheme - potato

<table>
<thead>
<tr>
<th>Who</th>
<th>When</th>
<th>Action</th>
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<tbody>
<tr>
<td>FGCOM</td>
<td>6 Weeks after planting</td>
<td>First Field Inspection</td>
</tr>
<tr>
<td>FGCOM WERCOM</td>
<td>At flowering</td>
<td>Passed</td>
</tr>
<tr>
<td>FGCOM WERCOM</td>
<td>After harvest</td>
<td>Second Field Inspection</td>
</tr>
<tr>
<td>FGCOM WERCOM</td>
<td></td>
<td>Post-Harvest Inspection</td>
</tr>
<tr>
<td>FGCOM WERCOM</td>
<td></td>
<td>QDPM-Seed</td>
</tr>
</tbody>
</table>

- Failed → Ware Potato
- Passed
- Cond. approval → Improve
- Re-inspection
- Passed
- Failed
- Ordinary Seed

As per Ethiopian draft QDPM guidelines
The pilot

- Proposed & piloted second tier of inspection by *wereda*: WerCom
  - Research, extension experts (seed, plant protection) & seed coop. representatives
  - Labeling system:
    - Direct contact between buyer & seller possible
    - Seed becomes distinguishable & traceable
  - Decision tools: disease identification guide; field inspection tool; seed production guidelines; inspection protocol
  - Training & certificate “Recognized seed producer”
  - Authorized to market seed as QDPM for specified duration
The pilot: frequency of inspections

- **Potato**: 3 inspections
  - At flowering, 2 weeks before harvest, post-harvest inspection
- **Sweetpotato**: 2 inspections
  - 4 weeks after planting & 2 weeks before harvest
- To be successful – needed extensive demos & promotion of benefits of clean seed (e.g. 8t/ha vs 24t/ha for potato)

WerCom evaluating seed potato field, Geta Wereda. Credit: A.Aragaw
The pilot: field based observations

- Test set of parameters, with tolerance levels
- Review if realistic & attainable by trained seed producers

Table 1: Comparison of tolerance levels for sweetpotato QDPM field inspection – FAO and SNNPR Pilot

<table>
<thead>
<tr>
<th>Parameters</th>
<th>FAO</th>
<th>Pilot</th>
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</thead>
<tbody>
<tr>
<td>1 Rotation (minimum years)</td>
<td>4 y</td>
<td>3 y</td>
</tr>
<tr>
<td>2 Isolation distance (*with suitable barrier crop)</td>
<td>-</td>
<td>100m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5m*</td>
</tr>
<tr>
<td>3 Other varieties (off-type)</td>
<td>2%</td>
<td>2 %</td>
</tr>
<tr>
<td>4 Viruses (mottling, mosaic, leaf curl and stunting)</td>
<td>5%</td>
<td>5 %</td>
</tr>
<tr>
<td>5 Diseases (mainly stem blight caused by Alternaria sp.)</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>6 Sweetpotato butterfly (Acrea acerata)</td>
<td>-</td>
<td>0 %</td>
</tr>
<tr>
<td>7 Weevil (Cylas puncticollis)</td>
<td>0</td>
<td>0 %</td>
</tr>
</tbody>
</table>

FAO (2010); Ethiopian draft QDPM Guidelines
Pilot results 2011-2012: sweetpotato

- **Sweetpotato**: Oct. 2011
  - 4 commercial (~2 ha) supplying to FAO and INGOs
  - 27 plots: 90% acceptable (with additional 7% (2) conditional)

- **Sweetpotato**: Dec. 2012
  - 3 commercial multipliers
  - No seed multiplication plot met standard:
    - virus, alternaria, SP butterfly and vectors
    - “no better quality than informal system”

Sampling sweetpotato field for QDPM Pilot. Credit: A.Aragaw
Pilot results 2012: potato

• Potato: Aug.– Nov. 2012
  – pilot covered 3 regions: 14 cooperatives in 8 districts
• 135 seed potato fields inspected: 86% accepted
  – Rejected plots: BW, mixtures, severe defoliation, unsuitable sites
Challenges during pilot - sweetpotato

- No records for:
  - source of material, rotation history,
- Variable or unknown date of planting.
  - Age of material – 8 months (cf. 3-5 months)
  - Number of ratoons permitted?
- Recommendation for post harvest inspection for sweetpotato: possibility of “contamination”
- Institutionalization issues:
  - Who does inspections (wereda or regional BoA)
  - Who will pay:
    - quality seed has higher costs: production practices, storage, and inspection costs
Feedback on potato pilot - 2013

Interviews with *wereda* officials, WerCom & CoopCom members

**Technical issues:**

- Number & timing of inspections: add one at site selection
- Number of fields inspected at each Coop: time & resources required
- Insufficient land for rotation
- How to deal with rejected plots

Evaluation team discussing at Jeldu Agricultural Office. Credit: D. Gorfu
Stakeholder interactions – different interests

• Farmer ware crop producers
  – Discontent at impact of poor seed – increasing political voice

• Specialized seed producers (coop)
  – Concerned to get market for seed
  – Not able to participate in large institutional tenders for seed
  – Aware that stock seed was 3-4 years old – decided to order new mini-tubers from Solagrow (PLC)

• Commercial multipliers (PLC)
  – Lack of transparency on information about potential orders
  – Some commercial multipliers unhappy with prospect of informal QDS system: this threatened their current practice of buying “any seed” and selling it as “quality seed” to large institutional buyers
Stakeholder interactions – different interests

• **CoopCom: internal quality control**
  – Important to distinguish between ware and seed
  – Timing of inspections, & workload
  – Would rejected seed plots enter the system and tarnish their reputation & customer trust

• **WerCom**
  – Increase market opportunities for seed; more sustainable seed production
  – Work load, transport & incentives

• **Bureau of Agriculture regional input authority**
  – Concern at losing key role in the inspection process if delegated to wereda level & DAs

• **Seed Quality Laboratories**
  – Concern over shift to field inspections rather than lab based tests
Stakeholder interactions – different interests

• **Research & extension providers (regional)**
  – Population growth and smaller land holding size: recognition of importance of the 2 crops and contribution to food security
  – Pressure to increase supply of quality seed
  – Incorporate more site inspections & parameters

• **Regulatory body (Federal)**
  – Not possible to meet quality seed requirement through formal certification; QDS viable option to improve on farmer saved seed
  – Capacity of regional seed laboratories
  – Simplify & harmonize approach for implementation

• **EIAR & CIP**
  – Ensure improved quality of seed available to farmers through maintaining clean seed system
  – Act as ‘honest broker’ between institutional buyers & coops which could not enter tenders (CIP)
  – Convince “rogue” elements that they would stay in business if they adhered to QDS regulations
Stakeholder interactions – different interests

• **NGOs**
  – Recipients of funds to implement humanitarian programmes
  – Purchasers & distributors of seed
  – Training model farmers, coops as multipliers
    • Tension between humanitarian response and development objectives

• **FAO and donors**
  – FAO involved in estimates of seed requirements & channeled donor funds to large INGOs
  – FAO facilitated NGO/OFDA for purchase of QDPM materials
  – USAID started to stipulate that recipients of OFDA funding must purchase seed from recognized producers working with EIAR, RARIs, MoA, CIP
Convergence

Policy context
Pilot experience informs drafting of seed standards
• **Ag. Growth & Transformation Strategy (2010-15):** ambitious target to double crop production, required 5 x increase in quality seed:
  - Formal sector alone could not meet this demand
  - Seed proclamation (2000) did not provide policy conditions & incentives for seed industry
  - Agricultural Transformation Agency (ATA) role to address institutional bottlenecks

• **2013 Seed Proclamation**
  - Diversified seed distribution channels: state and private sector
  - Recognized QDS
  - Legal basis for decentralized regulatory authority to regional structures
  - Separated BoA functions of input & marketing from quality control & inspection
Convergence

• **2013 proclamation & recognition of QDS**
  – Pressure on MoA to prepare QDS standards & regulations, but had limited experience
  – Potato & sweetpotato stakeholders had example of a QDPM/QDS scheme but needed support for institutionalization to achieve coverage and sustainability

• **Formation of national taskforce (MoA, EIAR, CIP)**
  – Draft QDS standards & inspection manual
  – Regional validation workshops conducted for input into draft standards
  – Consolidation of comments into standards
  – ESA & MoA meeting to review standards
  – Presented to Standards Council for approval – May 2015
Table 2: Sweetpotato QDS Field Inspection standards - approved

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FAO</th>
<th>Pilot</th>
<th>Final 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>QDS 1</td>
</tr>
<tr>
<td>Minimum rotation (if history of weevil extend by season)</td>
<td>4 y</td>
<td>3 y</td>
<td>3 seas.</td>
</tr>
<tr>
<td>Minimum isolation (*barrier crop)</td>
<td>-</td>
<td>100m/5m*</td>
<td>10m/5m*</td>
</tr>
<tr>
<td>Other variety &amp; off-type</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Virus symptoms</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Alternaria</td>
<td>-</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>SP Weevil</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SP Butterfly</td>
<td>-</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
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Table 3: Potato QDS Field Inspection standards - approved

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<tr>
<td>Minimum rotation</td>
<td>4 y</td>
<td>3 y</td>
<td>3 seas.*</td>
</tr>
<tr>
<td>Minimum isolation</td>
<td>50m</td>
<td>50m</td>
<td>5 m</td>
</tr>
<tr>
<td>Incorrect variety</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Total virus (maximum %)</td>
<td>10%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Blackleg</td>
<td>2%</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Bacterial wilt</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Contentious technical issues

- **Minimum area for seed production: 2 ha**
  - Coop members can cluster individual holdings to meet criterion

- **Minimum rotation period**
  - Small individual landholdings a constraint; coops could rotate seed production among members?

- **Isolation distances: a challenge with small land holdings**

- **Tolerance levels:**
  - **Sweetpotato**
    - Weevil – zero tolerance. Common in SNNPR, so other regions did not want contaminated material
    - Addition of alternaria and sweetpotato butterfly
  - **Potato**
    - Total virus: lower tolerance set

- **How many classes of QDS are appropriate?**
Procedural – institutional questions

Feedback survey:

• Recommended should be part of regular activities of *wereda*: well developed chain of command exists

• Who should cover the costs?
  – costs should be covered by government in short term, but eventually seed producers should pay;

• Composition & full participation of WerCom
  – Other duties, transport, allowances, staff turnover

• On-going training essential

• Continued support for scheme until fully established and sustained
  – Wereda office needs to show commitment to scheme
Discussion: implications for other countries

- Pilot demonstrated a QDS scheme could be functional & adapted to local conditions

- Understanding potential drivers
  - Plant disease; emergency dissemination of relief seed
  - National policy shift allowed QDS
  - Technologies
    - Shift from seed availability to seed quality
    - Informal QDPM approach needed to be institutionalized to increase coverage and be sustainable
    - Institutional buyers drove commercialization of seed supply

- Identifying different stakeholder interests
  - Joint piloting and validation workshops:
    - Contentious issues aired & consensus reached
    - Built ownership – vs “top-down”
    - Sensitization and training – vs. “policing”
  - Championing and commitment from key players was critical
Next steps: awareness, training & roll out

- **Continuing capacity strengthening & awareness**
  - Field guides, assessment tools, cheaper & faster diagnostic kits

- **Risks**: specific seed potato production areas have established reputation; but danger that poor quality seed will be sold under “their brand”
  - The fate of existing Coops which don’t meet the standards: may undermine clean seed system
  - Wealthy farmers leaving Coops to become PLCs
  - “Corruption, bribing and mis-conduct may continue unless commitment from different law enforcement bodies”

- **Document challenges as scheme rolls-out for feedback, review & improvement of the scheme**
  - Strengthen evidence base for recommended tolerance levels & yield implications
  - Will buyers be willing to pay for differential seed quality?
Acknowledgements

- EIAR, MoA, BoA
- IFAD and CFC projects
- DONATA FARA, ASARECA
- BPBL (USAID)
- SASHA (BMGF)

Thursday 22\textsuperscript{nd} evening discussion on seed standards for R&Ts

Please join: Sweetpotato seed systems community of practice:
>100 members, SSA, USA, Europe, LAC:
[ sweetpotato-seed-system-aficionados-community-of-practice@googlegroups.com](mailto:sweetpotato-seed-system-aficionados-community-of-practice@googlegroups.com)

Visit: [www.sweetpotatoknowledge.org](http://www.sweetpotatoknowledge.org)
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