Priorities for Domestication of Native Fruits: Key Stakeholders and Attitudes

Simon Mng’omba and Festus Akinnifesi

1st National Workshop on Native Fruits

Matola, Mozambique

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PRESENTATION OUTLINE

• Importance of Native Fruits - Fruit Portfolio
• Status of Naïve Fruits in southern Africa
• Native Fruit Domestication Process
• Priority Setting Process
• Research to managing native fruits
• Changing farmers’ attitude
• Scaling up model for Native Fruits
• Conclusions
Importance of Native Fruits

Native fruits for
✓ Food and Nutrition security
  – low fruit consumption in SA (70 g/day vs 200 g/day)
  – available during the lean food period

✓ Income
✓ high in fibre good for digestion
✓ low production cost – perennial (High Value Crops)
### Tree Species

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<td>Ziziphus mauritiana</td>
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Status of native fruits in southern Africa

- All the harvest is from the wild
  - provided by nature & no need to cultivate them (**attitude**)
  - Food for the poor

- Limited **investment** for improvement

- Dwindling knowledge – limited pass on knowledge

- Limited research
  - retain massive size making planting & management difficult
  - not improved through selection/breeding

- Limited protection - a few in FR, home gardens, volunteer stands, farmlands etc.
Domestication

Tree domestication

✓ a human-induced evolution to bring species into wider cultivation through a *farmer-driven* and *market-led* process (Franzel et al. 2008)

Process:

• involves *identification, selection, propagation, management* and *adoption* of desirable fruit germplasm
Prioritizing Native Fruits

Priority setting - seeks to bring about agreement & consensus among different stakeholders.

- Part of **Domestication Research** - select, propagate & manage species with **high impact** (Simons & Leakey 2004).

- **Impact** – high income, nutrition or conserving biodiversity

- Data on quantities & values produced & consumed needed.

- **Participatory** - integrating views/expertise of many stakeholders: farmers, researchers, development practitioners, policy makers etc.
1. **Planning & team building** – workshops (many stakeholders)

2. **Define client groups** - user groups (beneficiaries)

3. **Preferred species assessment** - Desktop studies and field work (surveys)

4. **Product prioritization** – rank tree products & services

5. **Identifying key species** – based on commercial value, adoption, propagation, other benefits etc.

6. **Choice of species** - priority species reviewed and agreed upon
Native Fruit Domestication

• Select priority species: participatory (farmers, scientists, marketers, users/consumers etc.) – *several stakeholders needed*

• Encourage farmers continue on-farm conservation & sustainable exploitation alongside tree crops (*changing farmers’ attitudes*)

• Use vegetative propagation methods (grafting, budding, layering etc.) – capture desirable traits in wild tree populations, quality fruits & resolving long juvenile phase (*researchers/scientists needed*)

• Lobby for *investment* in Native fruit domestication/improvement

• Train *nursery operators* to ensure - access to superior stocks for multiplication & distribution (*scaling up and out*)
Screening plots and on-farm trials
• should be established for further selection/breeding

Phenology, physiology & propagation studies
• Research on native fruit phenology, physiology and profitable propagation options

Varietal selection
• fruit improvement: pulp taste, aroma and texture, fruit size and shape (main pomological attributes of fruit quality)
**Uapaca kirkiana** fruit thinning

- **In the wild** - small fruit size & high fruit load (up to 6000 fruits/tree)
- **On-farm land** - small fruit size and high fruit load

![Uapaca - wild](image1)

![Uapaca - orchard](image2)

<table>
<thead>
<tr>
<th>Fruit thinning spacing</th>
<th>Fruit size (cm)</th>
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<tr>
<td>5 cm</td>
<td>2.5</td>
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<td>10 cm</td>
<td>3</td>
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<td>15 cm</td>
<td>3.5</td>
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Native Fruits - New Crops for the Future

Strategy for Selecting Putative Cultivars

Identify putative cultivars using PRA

Clonal propagation (grafting)

Seedling rootstock

At nursery

Clonal orchards on-station and on-farm

Selected true-to-type/name elite cultivars (mother blocks)

Sub clones

Tissue culture for mass propagation

Seeds of known traits
Collected from wild Semi wild, ex circa trees and labelled

Named cultivars for pilot dissemination
## Domestication checklist

<table>
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<tr>
<th>Activity</th>
<th>Status</th>
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<tr>
<td><strong>Priority setting – farmers, marketers, consumers, researchers etc. (but priority changes)</strong></td>
<td>Yes</td>
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<tr>
<td>Germplasm collection – passport data, geo-reference, seed &amp; vegetative propagules</td>
<td>Yes</td>
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<td>Screening orchards/plots (genebanks)</td>
<td>Yes</td>
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<td>Genetic &amp; morphological characterization</td>
<td>Yes</td>
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<td>Tree improvement (rootstock selection)</td>
<td>Yes</td>
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<td>Field management protocol (spacing, fruit thinning)</td>
<td>Yes</td>
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<td>Vegetative propagation</td>
<td>Yes</td>
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<td>Cultivar development</td>
<td>Yes</td>
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<td>Dissemination and adoption</td>
<td>Yes</td>
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Participatory Selection of Superior *Uapaca kirkiana*
Example of selecting superior *Uapaca* phenotypes

Fruit mass of *Uapaca kirkiana* phenotypes in Malawi (Akinnifesi et al. 2008)
Changing farmers’ attitude - training (propagation, RRC)
Managing Native fruits (screening)

- Tree size and spacing: rootstock selection
- Fruit load and size: fruit thinning
- Dioecious trees: Uapaca & Marula
  - sex ratio
  - rejuvenation

Grafted trees
- dwarf
- precocity
- close spacing
Confusing farmers
- 10 x 10 m
- 8 x 8 m
- 5 x 5 m
Rootstock development

- Select resistant/tolerant rootstocks to biotic stress
- Select rootstock with graft compatibility & high yield
- Select cultivars with reduced tree size for easy management (controls scion vigor)
- Selecting promising cultivars with greater economic yield per unit area (*Enhanced productivity*)

Value addition of native fruit produce

- value added products from fresh produce for market diversification of native fruits (boost farmers’ expected revenue and encourage them to embark on domestication)
Scaling up model for Native Fruits

Resolving long juvenile phase and dioecy: (e.g. Uapaca & S. birrea)

- Supply two species with - short & long fruiting precocity
- Use grafted plants to reduce juvenile phase

Both species planted in 2004
Conclusions

Native fruits are important. So we need

- **Investments** to bring them into wider cultivation
- **Participation** of several stakeholders for superior cultivar selection
- **Change of mind set** (attitude) - provided by nature, but requires our attention
- **Better documentation & research** for cultivar development
- **Develop propagation & management protocols** (better yields)

Planting more native fruit trees on-farm is not good enough for food and nutrition security and increased income. We need better orchard management
Thank You!

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