Sorghum and Pearl Millet Seed Value Chains in Zambia: Opportunities and Challenges for Smallholder Farmers

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SORGHUM AND PEARL MILLET SEED VALUE CHAINS IN ZAMBIA: OPPORTUNITIES AND CHALLENGES FOR SMALLHOLDER FARMERS

Priscilla Hamukwala
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Introduction

Sorghum and pearl millet rank second and third, respectively, as important staple cereals after maize.

- There are new market developments in the beer industry requiring farmers to increase productivity and production.
- These markets can significantly affect access to improved seed, and thus increase decisions on utilization.
- Even though market developments indicate great potential for the two crops, their supply has remained erratic (Larson et al. 2006).
- There was need therefore to identify the constraining factors to steady supply of sorghum & millet grain through conducting a seed value chain.
- Little is known about the existing seed acquisition channels, extent of utilization, how they function and how well they are positioned to enhance small-scale farmers’ access to improved seed.
Objectives

- Determine farmer adoption of the improved seed, fertilizer use and yields for sorghum, maize, and millet crops since 1990.
- Identify key players, their functions, and value added at each stage of the chain.
- Identify factors that limit adoption of improved seed varieties.
- Determine strategies available to increase adoption and returns, and to reduce risk in the value chain.
Methodology

- Value chain analysis was used as a tool to reveal the pressure points that existed in a seed value chain.
- A seed value chain in this study refers to the entire sequence of actions necessary to create, sell, and deliver improved seed to farmers.
- Interview guides & structured questionnaires were used as well as secondary data.
- 130 farming households, 57 seed dealers, five seed companies, and two Research and Development institutions were surveyed.
- Location: Lusaka & Siavonga
Technology use over years (1990-2009) - Yield

- Yield levels for both sorghum and millet have been stagnant at about 0.5 tons per hectare for over 20 years.
- This doesn’t compare well with potential yields of more than 5 tons for some varieties.
- In the case of maize, average yields have never gone beyond 2.5 metric tons in the same period compared to 10 tons of potential yields.
- This an indicative of low productive gains of technologies & agronomic underperformance.
Results - Technology use over the years

Yield trends (1990-2008)

Year
Metric tons/Ha
Maize
Sorghum
Millet
Results - Technology use over the years

Fertilizer

- Decline in % area applied with fertilizer since 1990s
- Reduced from 49% in 1993 to 10% in 1998
- Average application rates per hectare are low (70 kg of fertilizer nutrients/ha as opposed to 400kg/ha of the soils requirements)
- The share of households using fertilizer fell from 31.4% in 1990/1991 season to 17.8% in 1998/1999
- Source: CSO - Post harvest survey
Results - Technology use over the years

Improved seed use

- The trend shows that percentage of household using hybrid seed has declined from 43 percent in 1990/91 season to 17.44% in 1998

- This has been attributed to withdraw of government subsidies
Seed Chain Actors & Functions (Maize)

- Seed Multiplication
  - Commercial farmers, Seed Co.s

- Seed production

- Quality assurance
  - SCCI

- Processing
  - Seed Co.s

- Distribution
  - Seed Co.s, traders, farmers, NGOs

- End users
  - Farmers

- Public research (ZARI, UNZA), Seed Co.s
Seed Chain Actors & Functions (Sorghum)

- Seed Production
  - Public research (ZARI, UNZA), Seed Co.s, Small scale farmers
- Seed Multiplication
  - Small scale farmers, Seed Co.s
- Quality Assurance
  - SCCI, Small-scale farmers
- Processing
  - Seed Co.s, Small-scale farmers
- Distribution
  - Seed Co.s, traders, farmers, NGOs
- End Users
  - Small scale - Farmers
Seed Chain Actors & Functions (Millet)

- **Seed Production**
  - Small-scale farmers, Seed Co.s

- **Seed Multiplication**
  - Small-scale farmers, Seed Co.s

- **Quality Assurance**
  - SCCI, Small-scale farmers

- **Processing**
  - Seed Co.s, Small-scale farmers

- **Distribution**
  - Small-scale, farmers, NGOs

- **End Users**
  - Small scale - Farmers

- Public research (ZARI, UNZA), Seed Co.s, Small scale farmers
<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Area Under Crop Production in (Ha)</td>
<td>128</td>
<td>0.25</td>
<td>10.5</td>
<td>2.42</td>
<td>1.81</td>
</tr>
<tr>
<td>Total Land Area Prepared By Animal draught power</td>
<td>129</td>
<td>0</td>
<td>10.5</td>
<td>1.30</td>
<td>1.91</td>
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<tr>
<td>Total Area Under Conventional Tillage</td>
<td>128</td>
<td>0</td>
<td>6.0</td>
<td>0.41</td>
<td>0.82</td>
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<tr>
<td>Total Area Under Conservation Tillage</td>
<td>129</td>
<td>0</td>
<td>5.25</td>
<td>0.55</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Area Prepared By Mechanical Tillage</td>
<td>129</td>
<td>0</td>
<td>1.5</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td>Valid N (List wise)</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Farmers’ Sources of Seed, Siavonga Region, Zambia, 2007/8 season

<table>
<thead>
<tr>
<th>Source of Seed</th>
<th>Maize (%)</th>
<th>Sorghum (%)</th>
<th>Millet (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own Production</td>
<td>55</td>
<td>60</td>
<td>95</td>
</tr>
<tr>
<td>Relief seed</td>
<td>25</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Other farmers</td>
<td>15</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Traders</td>
<td>3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>113</strong></td>
<td><strong>127</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Source: Survey data 2008
<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean No. of years a crop variety has been grown</td>
<td>124</td>
<td>16.02</td>
</tr>
<tr>
<td>Mean No. of years seed of a crop has been recycled</td>
<td>115</td>
<td>13.62</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>115</td>
<td></td>
</tr>
</tbody>
</table>
Factors Affecting competitiveness of the chain

- Support environment such as accessibility to support services such as credit, extension, products, markets
- Policies such as fertilizer policy, maize price support policy, diversification policy, comparative advantage policies
- Changes in consumer preferences
# Seed Dealers Types and Selected Characteristics, Siavonga Region, Zambia, 2008

Data source: Own survey data, 2008

<table>
<thead>
<tr>
<th>Type of Dealer</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer selling surplus seed</td>
<td>22</td>
<td>38.6</td>
</tr>
<tr>
<td>Seed Trader</td>
<td>5</td>
<td>8.8</td>
</tr>
<tr>
<td>Seed companies &amp; agents</td>
<td>6</td>
<td>10.5</td>
</tr>
<tr>
<td>NGOs &amp; Faith based organization</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Farmer seed producers</td>
<td>21</td>
<td>36.8</td>
</tr>
<tr>
<td><strong>Total=N</strong></td>
<td><strong>57</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place of Operation</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own stalls</td>
<td>8</td>
<td>14.0</td>
</tr>
<tr>
<td>Road side stand</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>Door to door operators</td>
<td>47</td>
<td>82.5</td>
</tr>
<tr>
<td><strong>Total=N</strong></td>
<td><strong>57</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources of Seed</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own Production</td>
<td>25</td>
<td>43.9</td>
</tr>
<tr>
<td>Other farmers</td>
<td>11</td>
<td>19.3</td>
</tr>
<tr>
<td>Seed Companies &amp; agents</td>
<td>9</td>
<td>15.8</td>
</tr>
<tr>
<td>Other seed dealers</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total N=</strong></td>
<td><strong>57</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of seed involved</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize Hybrid</td>
<td>N/a</td>
<td>35</td>
</tr>
<tr>
<td>Maize OPV</td>
<td>N/a</td>
<td>37</td>
</tr>
<tr>
<td>Sorghum</td>
<td>N/a</td>
<td>48</td>
</tr>
<tr>
<td>Millet</td>
<td>N/a</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>N/a</td>
<td>15</td>
</tr>
<tr>
<td><strong>Years of Operation: 8.32 years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value Chain Stage</td>
<td>Key Players</td>
<td>Roles</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Seed Production</td>
<td>ZARI, UNZA, SCCI, Private seed companies, farmers</td>
<td>Variety development Seed production</td>
</tr>
</tbody>
</table>
| Seed multiplication & Processing | -Seed Companies  
- Small scale farmers  
- NGOs | -Seed multiplication  
- Seed treatment  
- Packaging |                                                        |
| Trading & Transportation | -Seed Companies & Agents  
- Seed Dealers  
- Farmers | -transport  
- sell |                                                        |
| Seed Consumption       | - Government  
- NGOs  
- Commercial farmers  
- Small scale farmers |                                             | Small-scale farmers’ yield is 0.3 tons per hectare |
Challenged faced: Seed Producers

- Lack of stable markets
- Low profitability
- Lack of breeder seed
- Lack expert breeders to maintain variety purity
Challenged faced

Seed Dealers
- Lack of stable markets
- Low prices
- Delayed payments

Seed Users
- Non-availability of desired varieties
- Poor extension services
- Poor markets Access
- Poor credit facilities
Seed chains are made of seed producers, seed traders, and seed users
Most of them play multiple functions
Their core business is mainly hybrid maize seed production
Support environment affects the competitiveness of seed chain i.e., access to product markets, credit, extension services
Policy environment- fertilizer subsidy, maize price support, diversification policy, comparative advantage policies
Changes in consumer preferences
Farmers use largely farm saved seed
Low seed replacement rate (13 years of average)
Farmers lack desired varieties
Poor yields due to use obsolete technologies
Last public varieties released in 1999
Imperfect information in the value chains
Recommendations

- R & D institution to take into account of what attributes consumers of seed want
- Link farmers to market opportunities through outreach, institutional improvements and further research
- Need for an agribusiness package that includes a complimentary of inputs including financing