Magoye Ripper: An Evaluation of Benefits and Problems

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Outline

- Introduction
- Benefits & Problems of Magoye ripper:
  - Farmer perspective
- Profitability Analysis
  - Factors that affected Yield for Maize & Cotton
  - Income and cost estimations
  - Profitability results
- Implications/recommendations
Introduction

- Introduction of the ripping technology in Zambia (mid and late 1990s)
- On station and on farm trials were staged.
- Scaling up the ripping technology GART distributed about 2000 Magoye Rippers to CP, CBP, SP and EP
- On farm research to understand how farmers use Magoye Ripper

Area of the Study and Sample

- Study Locations:
  - Eastern Province: Chipata, Katete, Lundazi
  - Southern Province: Choma, Mazabuka, Monze, Namwala
- Population: All farmers who bought the ripper
- Sample:
  - Farmers stratified by zone, then randomly selected,
    - EP 84 farmers
    - SP 94 farmers
- Crops and fields
  - Crops: maize and cotton
  - Ripped fields
  - Ploughed fields
Definition of “Ripper Farmers”

- All farmers owned rippers
- “Ripper farmers” used ripper for minimum tillage land preparation, 2004/2005 season
  - Ripper farmers may have had both ripped and ploughed fields for each crop
- “Non ripper farmers” used traditional animal traction ploughing in land preparation, 2004/05
  - Non ripper farmers only had ploughed fields for each crop

Fields in survey by crop and tillage method in 2004/2005

<table>
<thead>
<tr>
<th>Tillage type</th>
<th>Eastern</th>
<th>Southern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize Ripped field</td>
<td>55</td>
<td>40</td>
</tr>
<tr>
<td>Maize Ploughed field</td>
<td>143</td>
<td>52</td>
</tr>
<tr>
<td>Cotton Ripped field</td>
<td>61</td>
<td>34</td>
</tr>
<tr>
<td>Cotton ploughed field</td>
<td>125</td>
<td>56</td>
</tr>
<tr>
<td>Total fields surveyed</td>
<td>384</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: FSRP/GART Magoye ripper survey 2005
### Cropping Year 2004/2005

- Poor rainfall – used district averages
- The survey was done only for 1 year
- Weed pressure:
  - => higher yield if weeds are managed well
  - => lower yield if weeds are not managed well
  - Number of weedings does not tell us if weeds are managed well

### Institutions involved in training farmers how & when to use ripper

- Major institutions involved in training farmers in Southern Province:
  - GART, Dunavant and MACO

- Major Institutions involved in training farmers in Eastern Province:
  - Clark Cotton, MACO and fellow farmers
What were the major benefits identified?

- Ripped lines harvested and conserved water (27%)
- Early land preparation (20%)
- Early planting (18%)
- Good seed emergence (13%)
- Observed higher yield (7%)

*By all farmers who had used the ripper at least once; farmers may have more than 1 response*

What were the major problems identified?

- Too many weeds (32%)
- Blunt tine (26%)
- Lack of spare parts (16%)
- Insufficient draught animals (12%)

*By all farmers who had used the ripper at least once; farmers may have more than 1 response*
Why did farmers not use the ripper in 2004/05?

- Lack of sufficient draught power
  - No animals
  - Immature animals
- Blunt tine
- Lack of spare parts
- Insufficient training

- Weeds were the major problem in ripped fields but did not prevent farmers from ripping

*By all non ripper farmers in 2004/2005*

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General Practices

- 11% of farmers used the ripper in other farmers fields as well as their own, but only 1% farmers indicated revenues from it
- About 9% of plots used hired animals for either ploughing or ripping (spread across both types)
- Only 13% of ripper farmers sharpened the tines prior to the season, at a cost of 5,000 – 10,000 kwacha
- Ripped fields were more likely to be on medium soils than ploughed fields
What are the mean area of fields?

- Maize ripped field: 1.08 ha
  (Maximum: 3.65  Minimum: 0.11)

- Maize ploughed field: 1.78 ha
  (Maximum: 8.0  Minimum: 0.20)

- Cotton ripped field: 1.24 ha
  (Maximum: 6.37  Minimum: 0.24)

- Cotton ploughed field: 1.94 ha
  (Maximum: 6.37  Minimum: 0.28)

Areas based on actual measurements

Planting dates:
Maize in Eastern Province

Graphs show frequency distribution: Green solid line to the left means that ripping farmers planted earlier.
Planting dates: Eastern Province

Graphs show frequency distribution: Green solid line to the left means that ripping farmers planted earlier.

Planting dates: Southern Province

Graphs show frequency distribution: Green solid line to the left means that ripping farmers planted earlier.
Profitability Analysis

- Key factors affecting yield
  - Plot size, fertilizer (nitrogen) or chemical packets (herbicides), soil texture, days late in planting
  - Values and quantities
    - Income
    - Costs
- Crop budgets were used to understand the financial benefits of the technology

Key factors affecting yield of maize

- Plot sizes
- Fertilizers (Nitrogen)
- Combination of fertilizer and use of ripper
- Coarse soils
- Planting days late
  - Higher rainfall strongly associated with early planting, so cannot measure effect separately
Maize Regression Highlights

- The ripper had positive impact on yield:
  - Combination of ripping and nitrogen application => higher yield
  - Indicates that ripper makes fertilizer more efficient
- Smaller plots => higher yields
- Nitrogen application => higher yields
- Planting days late => lower yield (18kg/ha maize loss)
  - Also related to lower rainfall
- Coarse soils => lower yields
- Namwala => higher yields

Net Income per hectare: Maize

Source: FSRP/GART Magoye ripper survey 2005
Maize Profitability Highlights

- Ripped fields had higher Net Profit than Ploughed fields in Eastern Province by more than half due to:
  - Ripper use which improved
    - Fertilizer uptake
    - Water retention by ripped lines
  - Planting days late w/low rainfall (farmer losses 18kg/ha of maize)
  - Small plots

- Ripped fields had relatively higher Net Profit than Ploughed fields in Southern Province due to:
  - Better uptake of fertilizer
  - Small plots

Key factors affecting cotton yield

- Plot size
- Chemical application
  - Farmers were using more chemicals per hectare
  - Lumpiness of packets
- Eastern Province
Cotton Regression Highlights

- Smaller plots => higher yields
- Higher chemical application => higher yields
- The ripper has no significant effect of tillage on yields
  - No direct effect
  - No interaction effect
- Eastern Province => higher yield

Net Income per hectare: Cotton

Source: FSRP/GART Magoye ripper survey 2005
Cotton Profitability Highlights

- Ripped fields had relatively higher yield than ploughed field in Eastern Province
  - Smaller plots
  - Higher chemical application

Key results

- Maize
  - The ripper => Higher yield because of
    - Efficient application of fertilizer
    - Water harvesting
  - Planting days late => Lower Yields

- Cotton
  - The Ripper did not find significant effect on the cotton yield, however,
  - Smaller plots => higher cotton yield
  - Higher chemical application => higher cotton yield

- Net Income from Ripped fields for both maize and cotton was higher than Net Income from ploughed fields
Implications

The results from the ripper study look promising:

- Ripper can mitigate the impact of the drought
  - Improved rainfall retention by furrows
  - Good seed emergence
  - Improved fertilizer uptake

- Enable the farmer do early land preparation
  - Spread demand for human & animal labour
  - Plant early

Implications/Recommendations

- More extension to farmers on how and when to use the technology is needed
- Need to evaluate the wearing down of the tine as that was a complaint from farmers
- Enhance public private partnership to ensure access to spare parts (tine, bolts, wings)
- Improve access to animals and services (distribution campaigns, etc.)
- Continue collaborative work with private sector in spreading the technology eg. Cargill Cotton, Continental, Dunavant
Source of information

- Food Security Research Project (FSRP)
  - Contact person: Stephen Kabwe
    - Email: skabwe@coppernet.zm
  - Website:
  - Google – Zambia Food Security Research Project

- Golden Valley Agricultural Research Trust (GART)
  - Contact person: David Samazaka
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- Conservation Farming Unit (CFU)
  - Contact person: Peter Aagaard
    - Email: cfu@zamnet.zm

Thank you