Evaluation of Farmer Use of the Magoye Ripper

Stephen Kabwe & Cynthia Donovan
Food Security Research Project, Zambia
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Outline

- Introduction: Review of earlier results
- Research methods: Regression and Profitability.
- Regression Modeling and Results
- Profitability
  - Income and cost estimations
  - Profitability results
- Implications/recommendations

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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

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Definition of "Ripper Farmers"

- All farmers owned rippers
- "Ripper farmers" used ripper for minimum tillage land preparation, 2004/2005 season
- "Non ripper farmers" used traditional animal traction ploughing in land preparation, 2004/05

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Distribution of the Sample

- Sample of 178 farmers who have all purchased rippers
  - 44% of 178 farmers were ripper farmers
  - 39% of ripper farmers were from Eastern Province
  - 48% of ripper farmers were from Southern Province

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Distribution of fields in 2004/2005

		Eastern	Southern
Tillage type	**Count**	**Row %**	**Row %**
Maize Ripped field	55	40	60
Maize Ploughed field	143	51.7	48.3
Cotton Ripped field	61	34.4	65.6
Cotton ploughed field	125	56	44
Total fields surveyed	384	48.7	51.3

Source: FSRP/GART Magoye ripper survey 2005

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What were the major problems identified? Farmers' responses

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

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

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Why did I not use the ripper in 2004/05? Farmer responses

- 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 force stop ripping

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By all non ripper farmers in 2004/2005

A farmer saying the ripper has no wings

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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
- 74% (ripped fields) were on medium soils (as opposed to coarse or fine soils), whereas 47% (ploughed fields) were on medium soils

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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)

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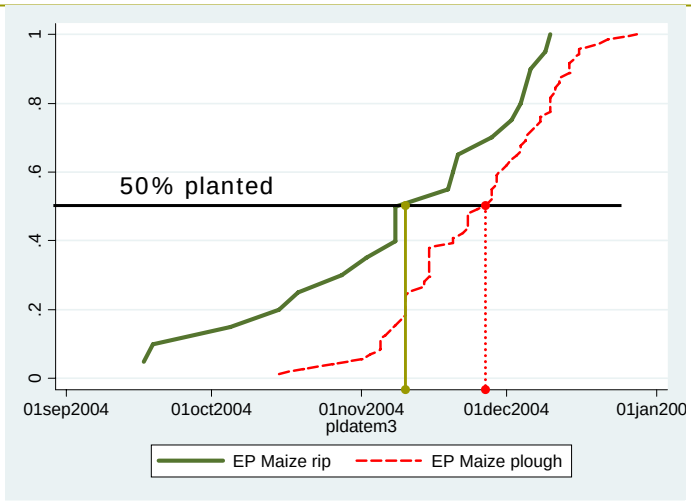
Areas based on actual measurements

Planting dates: Maize in Eastern Province



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

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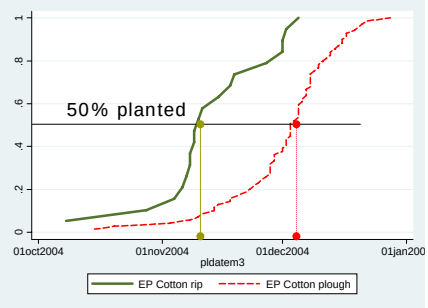
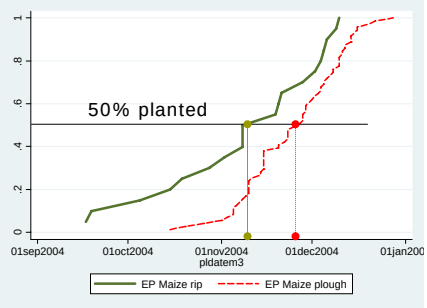
Planting dates: Eastern Province

Cotton



Maize



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

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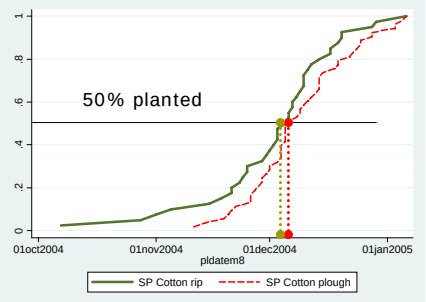
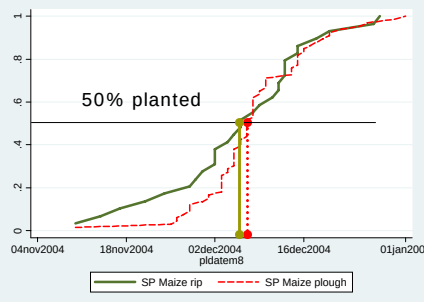
Planting dates: Southern Province

Cotton



Maize



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

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Procedures

- The regression analysis was used to understand the effect of various practices and factors on yield of maize and cotton
  - Yield = f (plot size, nitrogen, coarse soils etc)
- Crop budgets were used to understand the financial benefits of the technology

-weeding: difficulty in assessing due to lack of accounting for weed pressure

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Association of Tillage System on maize yield

Dependent variables	Coefficient	Robust Std error	Robust t-stat	t	Sig.
Plot Size	-128	58	-2.20	0.03	**
Nitrogen	10	2	4.33	0.00	***
Tillage	-140	217	-0.64	0.52	
Manure Use	113	216	0.52	0.60	
Hybrid	260	277	0.94	0.35	
Coarse soil type	-390	146	-2.67	0.01	***
Planting days late	-18	6	-3.04	0.00	***
Nitrogen X Tillage	9	4	2.29	0.02	***
Used the ripper at least 2 out of past 3 years	50	144	0.35	0.73	
Namwala District	1155	372	3.11	0.00	***
constant	1006	314	3.21	0.00	**

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Maize Regression Highlights

- Smaller plots => higher yields
- Nitrogen application => higher yields
- Combination of ripping and nitrogen application=>maize yield
- Coarse soils => lower yields
- Namwala => higher yields

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Association of Tillage System on cotton yield

Dependent variables	Coefficient	Robust Std error	Robust t-stat	t	Sig.
Plot Size	-93	19	-4.79	0.00	***
Chemical application	424	176	2.41	0.02	***
Chemical application squared	-150	57	-2.62	0.01	***
Tillage	-160	184	-0.87	0.39	
Coarse soil type	-69	61	-1.13	0.26	
Planting days late	-1	2	-0.49	0.62	
Chemical appl. X Tillage	244	169	1.44	0.15	
Used the ripper at least 2 out of past 3 years	84	67	1.26	0.21	
Eastern Province	125	73	1.72	0.09	*
constant	542	134	4.04	0.00	***

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Cotton Regression Highlights

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

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Profitability Results

- Net Income/ha = Gross Income/ha – Total Cost/ha

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Profitability: Income

- Gross Income = Yield * Output price
  - Yield was determined using Eastern Province observed average ripping yield as the base
  - Then adjusted the yield using regression coefficients
  - Output price for maize: average between FRA maize prices and AMIC prices (January to December 2005)
  - Output price for cotton: average price across Cargill, Continental and Dunavant

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Profitability: Costs

- Cost = f (input cost, labour cost and capital cost)
  - Input cost: seed, fertilizer, manure, chemical packets
  - Labour cost: average cost per ha for different farm activities
  - Capital cost: purchase cost of magoye ripper and mouldboard plough considering depreciation

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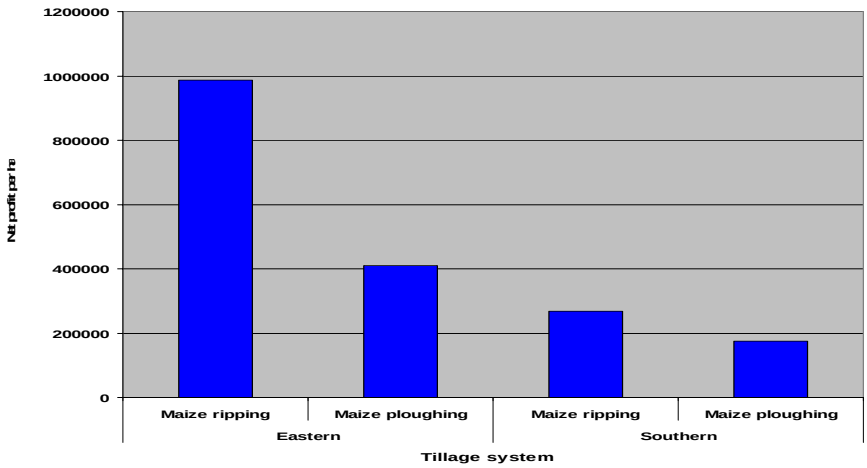
Net Income per hectare: Maize



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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
  - Fertilizer efficiency use
  - Water harvesting
  - Timely planting
  - Ease management
- Ripped fields had relatively higher Net Profit than Ploughed fields in Southern Province
  - Fertilizer efficiency use
  - Ease management (small plots)

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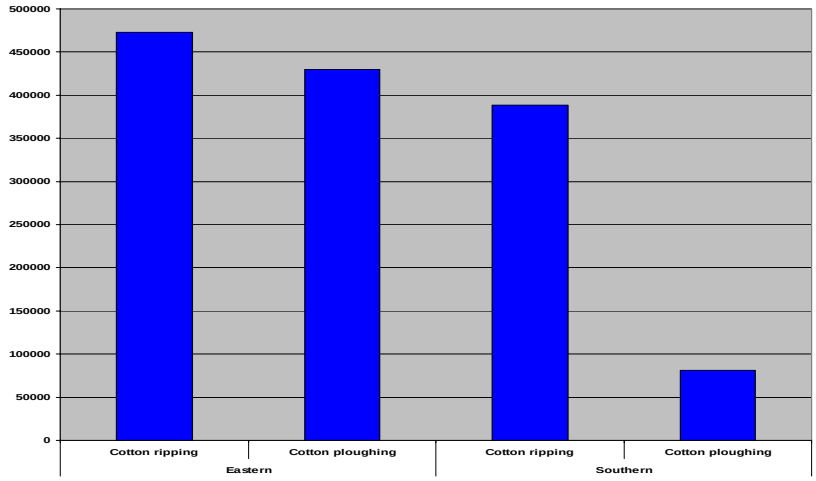
Net Income per hectare: Cotton



Source: FSRP/GART Magoye ripper survey 2005

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Cotton Profitability Highlights

- Ripped fields had relatively higher yield than ploughed field in Eastern Province
  - Ease management (smaller plots)
  - Higher chemical application

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Key results

- Efficient application of fertilizer and water harvesting are associated with the ripper
- Timely planting is associated with the ripper
- The Ripper did not have significant effect on the cotton yield, however,
  - Smaller plots are associated with higher cotton yield
  - Number of chemical packets is also associated with higher cotton yield
- Net Income from Ripped fields for both maize and cotton was higher than Net Income from ploughed fields

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Implications/Recommendations

- The results from the ripper study look promising however the following should be noted:
  - More extension to farmers on how and when to use the technology is needed
    - Time of land preparation and planting are critical when using this technology
  - Need to evaluate the strength of the tine in relation to the soil type
  - 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
  - The study is based on farmer observation (Not on-farm trials)

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Thank you

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