Maize expansion in Xieng Khouang province Laos

What prospects for conservation agriculture?

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Outline

• Context of the research
• Patterns of maize expansion
• Research questions
• Methods
• Results
  • Agrarian transition
  • Impacts on households economics
  • CA adoption patterns
  • CA diffusion
• Conclusions
Research Sites

- CA research and development project active between 2003 and 2008 in 4 districts
- Presentation concentrates on Kham basin and Nonghet to a lesser extent

Research Sites

- Network of experimentation and demonstration plots
- Establishment of CA farmer groups (17 villages in Xieng Khouang)
- Technical support to farmers and extension agencies

- Maize mono with residues management
- Associations food - fodder crops
- Rotations grass - legume crops
Maize boom

- Driven by strong market demand from neighboring countries

Maize boom

- Intensification -> hybrid maize
- Expansion -> mechanization - herbicides

Land cover changes in Xieng Khouang province (2002-2010)
Research questions

• Impacts of maize expansion on the household economy?
• Potential impacts of CA systems on the household economy?
• Can CA compete with more conventional forms of agricultural intensification?

Methods

• Households surveyed in 2003 were revisited in 2009,
• Trajectories of changes in household economy 2003-2003 (HH typologies),
• Scenario analyses using Olympe model: potential impacts of CA on HH economy.
Data collection

- **Exhaustive village census**:
  20 villages (5 in Kham basin) - household composition, land, labor, capital, farm equipment, etc.

- **Questionnaire surveys**:
  600 households in 20 villages - household livelihoods, farm economics, adoption of CA; 73 households surveyed by PRONAE in 2003 revisited in 2009

- **Focus groups**:
  Village histories, perceptions of the advantages and limits of CA, constraints for adoption and dissemination, etc.

Agrarian transition

- 2003 – Subsistence agriculture (paddy + upland rice)
Agrarian transition

- 2003 – Subsistence agriculture (paddy + upland rice)
- 2009 – Commercial agriculture (paddy + maize)
- Household typology: paddy/lowland - maize/uplands
  - All household increased income through maize
  - Maize expansion strategies differ according to upland area and capital available
    => better-off HH in 2003 took advantage of maize boom
- Income generated from maize is invested in paddy intensification - expansion
Household typology 2009

<table>
<thead>
<tr>
<th>TYPOLOGY CRITERIA</th>
<th>NO rice shortage 2003</th>
<th>Rice shortage 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Paddy</td>
<td>Paddy + upland rice</td>
</tr>
<tr>
<td>TYPES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A</td>
<td>1,52ha</td>
<td>0,45ha</td>
</tr>
<tr>
<td>1B</td>
<td>0</td>
<td>0,43ha</td>
</tr>
<tr>
<td>1C</td>
<td>2,49ha</td>
<td>2,07ha</td>
</tr>
<tr>
<td></td>
<td>86%</td>
<td>73%</td>
</tr>
<tr>
<td>Maize area</td>
<td>86%</td>
<td>73%</td>
</tr>
<tr>
<td>Cattle - buffaloes</td>
<td>10</td>
<td>3-4</td>
</tr>
<tr>
<td>Pigs</td>
<td>6</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Household types and CA adoption

[Graph showing household types and CA adoption]
CA diffusion: windows of opportunity


CA diffusion in Kham basin

- Tillage dominated upland systems
CA diffusion in Nonghet

- Swidden dominated upland systems – steep slopes

Percentage of HH engaged in CA
Main contraints to CA diffusion

- Traders provide easy tillage services to farmers: the practice spread rapidly in Kham basin and is now reaching more sloppy zones, e.g. in Nonghet.
- No experience and/or perception of environmental degradation linked to soil tillage in Kham basin

### Economics of maize cropping practices

<table>
<thead>
<tr>
<th></th>
<th>Swidden</th>
<th>Swidden + herbicide</th>
<th>Tillage</th>
<th>Tillage + herbicide</th>
<th>DMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (t/ha)</td>
<td>5.3</td>
<td>5</td>
<td>5</td>
<td>4.5</td>
<td>6</td>
</tr>
<tr>
<td>Labour (man.day/ha)</td>
<td>360</td>
<td>90</td>
<td>77</td>
<td>98</td>
<td>42</td>
</tr>
<tr>
<td>Cost (x 1000 kip/ha)</td>
<td>0</td>
<td>495</td>
<td>1 069</td>
<td>549</td>
<td>220</td>
</tr>
<tr>
<td>Return on labour (kip/day)</td>
<td>15 020</td>
<td>32 420</td>
<td>41 180</td>
<td>67 480</td>
<td>67 420</td>
</tr>
</tbody>
</table>
Simulation with Olympe model

- Land degradation compensated by fertilizer inputs after 7 years tillage

Conclusions

- Lessons
  - Maize expansion driven by mechanized tillage was not supportive to CA diffusion,
  - Positive effects of CA were masked by the general improvement in livelihoods,
  - Simulations can help raising awareness of stakeholders about potential environmental drawbacks of tillage systems,

- Recommendations
  - Windows of opportunity for CA,
  - Support extension activities to increase diffusion (e.g. PASS in Sayabouri)
  - Policy incentives and regulations (e.g. ban on mechanical tillage on steep slopes)