Economic and Impact Analysis of Conservation Agriculture Practices

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Outline of presentation

• Overview of CAPS economic issues
• Initial approach for economic and environmental impact analyses
Purpose of economic and impact analyses of conservation agriculture practices on SANREM

- Identify field- and farm-level production systems and sequencing of CAPS elements to maximize net benefits to smallholders, minimize risks, and maximize adoption.
- Assess broader economic and environmental impacts of CAPS
Potential CAPS Short-Term Benefits and Costs

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Time: land preparation (gender implications)</td>
<td>Time: weeding (gender implications)</td>
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<tr>
<td>Reduced drought risk (yields/food security)</td>
<td>Herbicides / Soil amendments</td>
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<td>Erosion control</td>
<td>Specialized equipment</td>
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<td>Livestock control</td>
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<td>Risk/uncertainty involving new, complex, integrated management systems</td>
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Potential CAPS Longer-Term Benefits and Costs (continued)

<table>
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<tr>
<th>Benefits</th>
<th>Costs</th>
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<tr>
<td>Time: land preparation (gender implications)</td>
<td>Specialized equipment</td>
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<td>Reduced drought risk (yields/food security)</td>
<td>New pests</td>
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<td>Erosion control</td>
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<tr>
<td>Time: Reduced weeding (gender implications)</td>
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<tr>
<td>Increased productivity (yields/income/food  security)</td>
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### Potential CAPS Longer-Term Benefits and Costs (continued)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Ecosystem Services</td>
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<tr>
<td>• Carbon sequestration</td>
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<td>• Reduced stream siltation/pollution</td>
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<td>• Recharged aquifers</td>
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<td>• Increased biodiversity</td>
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<tr>
<td>• Others</td>
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Economic Questions Include:

• What are the costs and benefits of CAPS in cropping systems/practices and related animal and forestry sub-systems?

• What are the “optimal” systems and is there an optimal sequencing of CAPS elements?

• What are the broader economic and environmental impacts of wide-scale CAPS adoption?

• What policy or other changes are required to bring about CAPS changes?
Approach

• Work with regional programs to identify farming systems and CAPS elements to be assessed
• Design farm-level optimization model for these systems.
• Collect data for model by region
• Validate model
Linear programming

- Model will maximize (a) net economic benefits to small holders and (b) environmental benefits of the farming systems (using multi-period models)
- Will explore implications of varying weights on the two goals and of changing policies
- Aggregation to market level will involve simple multiplication by number of farms and hectares affected (will ignore price effects)
Data needs from LTRAs

• Biophysical and socioeconomic characterization of main production systems in targeted regions (cropping, livestock, forestry subsystems)
Data needs (continued)

• For each CAPS field trial or intervention:
  – Changes in yields
  – Changes in input use (purchased or provided including family and other labor)
  – Changes in biophysical factors such as erosion, soil & water quality
Data needs (continued)

• Data should be collected periodically on:
  – Changes in quantities marketed/consumed by collaborating households
  – Changes in market conditions/prices
  – Changes in land use conditions
  – Changes in incomes of target group
Sequencing of regions

- All regions should begin collecting data as part of normal research process
- Region(s) modeled first will depend on LTR progress
- Tentatively, will begin with Latin America and West Africa
Assessing broader economic and environmental benefits

- As project progresses will assess adoption of CAPs and aggregate benefits
- In addition to economic assessment, we will explore benefits associated with ecosystem services
  - In the LP model
  - Placing monetary value on the services
Conclusion

• Impact assessment theme will work closely with LTRAs to help assess optimal farming systems and economic and environmental impacts of CAPS

• We appreciate the collaboration
Creating improved livelihoods ...

... through knowledge-based sustainable agriculture and natural resource management research

Office of International Research, Education, and Development, Virginia Tech