Country Paper
BANGLADESH
ON
Main Challenges and Constraints in using Machinery for Conservation Agriculture for smallholders in the region

Presented by
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BANGLADESH

Regional Workshop on the Role of Mechanization in Strengthening Smallholders’ Resilience through Conservation Agriculture in Asia and the Pacific
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Conservation agriculture (CA) aims to conserve, improve and make more efficient use of natural resources through integrated management of available soil, water and biological resources combined with external inputs.

It contributes to environmental conservation as well as to enhanced and sustained agricultural production.

(i) less soil disturbance, (ii) allow crop residue management and (iii) keep beneficial crop rotation.
Constrains of CA technology adoption

1. Policy planners are not much convince about these technology
2. Limited investments of local manufacturers to scale-up production linked with uncertain machinery demand
3. Manufacturing infrastructure and distribution channels of products are little developed
4. High price of machinery and low prices of agricultural produce discourage investments in agriculture, including machines and tools.
5. Financial organizations are not much friendly to farmers in terms of reducing rate of interest and installments.
6. Absentee farmer and small landholder limited access to new technology
7. Additional learning is still more compare to conventional system
8. Research–extension-farmers linkage are not well established about these CA technology transfer
9. Limited promotional activity and awareness build up program.
Main Challenges of CA technology

1. Changing mind set up of high officials in favor conservation agriculture technology
2. How to encourage private sector investment scaling up these technology
3. How to make available appropriate CA implements and tools at an affordable price to farmers.
4. Training to be conducted in different level of workers, considering the advantages of conservation agriculture.
5. Moreover, policy support is necessary for further acceleration of this technology among the users.
6. Availability of farmers’ friendly appropriate small machinery in the field. There are prototypes of machinery available with the research institutes.

7. Increasing the number of local machinery service providers in the farming community as the custom hiring business—which is very sustainable system for small holders.

8. Training of progressive farmers, extension workers, machinery operator, mechanic for dissemination of CA technology and mechanization.
Constraints and challenges to be foreseen

1. Making appropriate small CA machinery available in the farmers' field with affordable price.
2. Strategy to be taken for increasing number of local CA machinery service providers.
3. Arrange effective training to local machinery operator, mechanic, extension workers, and small progressive farmers.
Different tillage techniques

- Minimum tillage
- Strip tillage
- Bed planting
- Zero tillage
Minimum tillage by power tiller operated seeder

- Working as shallow tilling, fertilizing, seeding in line, seed covering at a time
- Residual soil moisture using for seeding
- Uniform depth of seeding
- Easy planting
- Seed saving 20%, cost saving 67%
- Wheat, maize, pulses, jute, rice, oilseeds can be sown successfully
Mungbean planting rice-wheat cropping system

Farmers can harvest it as bonus crop as crop duration minimum
Different seed sowing by the same seeder

- Plate need to change as per seed size
Rice direct seeding by seeder

- Dry direct seeding (DSR)
- Seed rate: 25 kg/ha
- 9-11 days early maturity
- Water saving avoiding puddling operation
  - Roundup herbicide used before 3 days of seeding
  - Herbicide sprayed after seeding at moist condition (after 6-24 hrs)
  - One hand weeding after 35 days
2. Strip till

Seeding, fertilizing and seed covering simultaneously - one operation

- Making a narrow strip and work through moderate level residue, 4-6 cm
- Fine till the strip
- Uniform depth of seed placement, 5-7 cm
- Un-till between the seeding line

- Seed & fertilizer unit separate
- Use as both strip till and minimum till
- Can handle maize and other small seeds efficiently

- Seed & fertilizer unit separate
3. Bed planting

Advantages

- Less seed
- Less water
- Less labor
- Less crop damage (rats, pests, diseases)
- Less production cost
- Higher yields
- Higher economic returns
- Facilitate crop diversification
- Increased agricultural sustainability
Efficient irrigation water application

- Minimize water loss
- Less labour involvement for irrigation

<table>
<thead>
<tr>
<th>Method of planting</th>
<th>Wheat cultivation</th>
<th>Maize cultivation</th>
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<tbody>
<tr>
<td></td>
<td>Irrig. Time/irri</td>
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<td>(hrs)/ha</td>
<td>Total Irrigation</td>
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<td>time (hrs)/ha</td>
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<td>Bed planting new bed method</td>
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<tr>
<td>Permanent bed</td>
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<td>Conv. method</td>
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<td>24.75</td>
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</table>

- Faster irrigation
- Water saving: 31%
Yield comparison of major crops under CA tillage systems

<table>
<thead>
<tr>
<th>Conservation agriculture system</th>
<th>2013-14 (t/ha)</th>
<th>2014-15 (t/ha)</th>
<th>2015-16 (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wheat</td>
<td>maize</td>
<td>Mung bean</td>
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<tr>
<td>Minimum tillage</td>
<td>4.7</td>
<td>9.5</td>
<td>1.3</td>
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<tr>
<td>Strip tillage</td>
<td>5.2</td>
<td>9.3</td>
<td>1.2</td>
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<tr>
<td>Zero till</td>
<td>4.4</td>
<td>8.8</td>
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<tr>
<td>Bed planting</td>
<td>5.2</td>
<td>9.7</td>
<td>1.0</td>
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<tr>
<td>Conventional system</td>
<td>3.5</td>
<td>9.0</td>
<td>0.7</td>
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</tbody>
</table>
Adaption of Minimum tillage Technologies Bangladesh
## Cost of planting in different CA over conventional methods

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>CA based Seeding</th>
<th>Cost of seeding (Tk./ha)</th>
<th>Cost saving (%)</th>
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<tbody>
<tr>
<td>1</td>
<td>Minimum tillage</td>
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<td>2</td>
<td>Strip tillage</td>
<td>2030.0</td>
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<td>Zero tillage</td>
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<td>4</td>
<td>Raised bed system</td>
<td>3394.0</td>
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<td>5</td>
<td>Conventional method</td>
<td>5895.0</td>
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Recommendations

➢ Program should be taken for development of skill and capability of the machinery researchers and local machinery manufacturers.
➢ Pilot projects to be undertaken in collaboration with the research institute, extension agencies and manufacturer for promoting CA technologies in the farmers’ field.
➢ Exchange of appropriate small machinery prototype among the region and organize traveling seminar, workshop with multi stakeholders showing the success cases of CA technology adoption and buildup confidence of the promoters, service provider’s and farmers.
Conclusion

❖ Conservation agriculture based technology is capable to sustain crop yield and save natural resources with climate resilient evidence.

❖ CA can sustain long run crop productivity and national food security.

❖ Promotional program should be considered for the greater interest of Sustainable Development Goals of the region.
Thank You Very Much..............

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