What Does System of Rice Intensification (SRI) Bring? Improved Yields or Increased Agronomic-Bandwidth?

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Research Background & Research Objective

- Green Revolution and its Pros n Cons
- Evolution of SRI as a knowledge and skill intensive innovation
- Contested by mainstream agriculture science establishments
- Spread in more than 50 countries and practised by as many as 5 million farmers
- Numerous studies on its adoption, dis-adoption and non-adoption

What do farmers do when sustainable intensification methods like SRI open up several newer options in rice cultivation practices?
Methodology: Location and Tools

40 villages in three contrasting rice farming systems of India
1. Mountain systems in the North Western Himalayas in Uttarakhand
2. Rainfed systems in the Eastern Coastal Plains and Hills in Odisha
3. Groundwater-based systems in the Deccan Plateau region in Telangana

Rice Seasons: 2011 to 2013
- Rapid Rural Appraisal Exercises
- Participant Observations
- Field Measurements
- Focus Group Discussions
- Semi-Structured Interviews

Concept: Rice Farming as a Socio-Technical System
## Characteristics of Studied Farming Systems

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Rice- Farming System</th>
<th>Mountain Systems in NW Himalayas (in Uttarakhand)</th>
<th>Rainfed systems in Eastern Coastal Plains and Hills (in Odisha)</th>
<th>Groundwater based systems in Deccan Plateau (in Telangana)</th>
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</thead>
<tbody>
<tr>
<td>Farming System</td>
<td>Mixed crop farming + livestock rearing &amp; forestry</td>
<td>Rainfed farming system + forestry</td>
<td>Rice based farming system supported by groundwater irrigation</td>
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<tr>
<td>Rice Growing Season</td>
<td>Kharif (May to October)</td>
<td>Kharif (June to December)</td>
<td>Kharif and Rabi (Groundwater irrigated)</td>
<td></td>
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<tr>
<td>Average Landholding Size</td>
<td>About one acre per household</td>
<td>Less than one hectare per household</td>
<td>About two hectare per household</td>
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<tr>
<td>Major form of Ag. Llabour</td>
<td>Mostly family and exchange labour</td>
<td>Family, exchange and hired labour</td>
<td>Mostly hired labour</td>
<td></td>
</tr>
<tr>
<td>Major source of irrigation</td>
<td>Irrig. canals fed by mountain springs and streams</td>
<td>Mainly rainfed + tanks &amp; bore wells for suppl. irrig. in coastal plain</td>
<td>Bore wells</td>
<td></td>
</tr>
<tr>
<td>Other crops grown during rice season</td>
<td>Millets and pulses</td>
<td>Millets, pulses, oilseeds in uplands &amp; only rice in coastal plains</td>
<td>Millets, cotton, pulses and oilseed</td>
<td></td>
</tr>
</tbody>
</table>
SRI Demands New Performative Skills

Raised Bed Nurseries (RBNs)

Properly Marked Fields

Water: Not Too Much nor Too Little

Precise Transplanting of Seedlings
Nursery Management

In Uttarakhand
- Under limited water availability and at higher elevations - older seedlings from conventional nurseries preferred

In Odisha
- Besides RBNs, also small nurseries in corners of wet puddled rice plots
- RBNs established when conventional nurseries delayed or damaged due to incessant rains or flooding

In Telengana
- Mostly RBNs due to assured water supply

RBNs alongside conventional seedling sources, helped farmers to:
(1) use and exchange inputs and seedlings between different rice systems
(2) manage risks such as delayed nursery establishment, vagaries of weather (delayed rain or flooding) or unforeseen seedling mortality due to insect infestation
Crop Establishment

In Uttarakhand
- Two different ways of transplanting evolved: line transplanting in rows only (where water availability was assured after marking) and line transplanting by eye estimation without the use of markers (where water supply was uncertain)

In Odisha
- Roller marker replaced by rope marker
- Rectangular and square patterns of planting were observed

In Telengana
- Irrigation, synchronisation of labour operations, and field conditions influenced marking

No. of seedlings/hill varied depending upon seedling age, variety (indigenous/ hybrid/HYV), seedling source (RBN/conventional), plot location (near/away from habitat) and even part of plot (border/middle) being transplanted

Reduction of planting density in the customary practices along with SRI plots
Water Management

In Uttarakhand
- Shift from traditional liberal flooding to shallow flooding, increasing water depth from transplanting to maturity stage in SRI plots

In Odisha
- SRI plot selection depended upon possibility of better drainage and availability of water at frequent intervals
- Reduced practice of retaining water in conventionally grown rice plots

In Telengana
- Limited hours of electricity limits AWD – encouraged maintaining thin film of water

Layout of canals, reliability of water supply, location of farms relative to habitats, and plot characteristics (size, shape, soil–moisture conditions, and biota) influenced application of SRI to particular plots
Weed Management

In Uttarakhand

- One way use of Mandva weeder along with supplementary hand weeding predominant in SRI plots

In Odisha

- Cono weeders replaced by Mandva weeder
- Women expressed reduced work load and better health conditions while using Mandva weeders

In Telengana

- No incentive for mechanical weeding for hired labour
- Mechanical weeding mostly limited to family labour

Farmers shifted to line transplanting discarding grid plantation as the latter required weeding on both sides. Also resulted in switching over to transplantation by using marked ropes as against mechanical markers.
Labour Management

In Uttarakhand
- Farmers preferred establishing and collectively raising multiple nurseries on a common plot
- Transplanting groups were transformed with young girls joining line and grid transplanting

In Odisha
- Transplanting group size reduced and managed mostly by family members and exchange labour relatively young

In Telengana
- Farmers having family labour do marking ahead of the transplanting labor group, while those externally dependent on labor for marking opted for transplanting with ropes operated by the transplanting labor

Transformation in gender division of labour was observed, more visible in weeding
Conclusions and Implications

- New technologies are often assumed to fit automatically into any farming system overlooking local complexities, uncertainties and constraints
- Agricultural interventions involve complex socio-technical adaptation processes
- Farmers try to integrate practices according to local context, leading to extension and diversification of the repertoire of methods
- Issues pertaining to labour use, water management, livelihoods and ecological services have to be integrated instead of focusing on farm productivity and individual households

Need to build upon farmers’ adaptive capacities to maximize exploitation of agro-ecological niches, minimize uncertainty in farm production and rationalize employment of available work force
THANK YOU!