Building Farmers for Adapting “Sustainable, Conservation Agriculture” Technique. ‘ZERO TILL’

CASE STUDY FROM INDIA
ROHA-DIST. RAIGAD-MAHARASHTRA.
WORK OF VIVEKANANDA RESEARCH & TRAINING INSTITUTE (VRTI, Non Profit NGO)
SPONSORED BY EXCEL INDUSTRIES LTD AS CSR PROJECT.
PRESIDENTED BY: RAJKUMAR KORDE.
AT BONN IN COP-23
08/11/2017
PREFACE:

India: 2nd largest producer of Rice. About 70% of this is produced by irrigation, needing large amounts of water.

The Study area, Roha Tehsil, is a Rainfed region. 3000 mm avg rainfall. Rice main crop with millets in kharip, pulses in rabi taken on reminiscent moisture in soil. Largely marginal farmers. Average land holding about One Hectare.

The ground strata mainly made of basalt. Compact, Amygdaloidal & Vesicular. Hilly contour, hillocks, undulation results in High Run Off of rainwater preventing Natural percolation/recharge. Depleting Ground water levels is Concern.

Once known as RICE BOWL, Rice cultivation becoming economically non viable. Costly labour, reducing yields, depleting water levels impacts pulses crop production and yield, REDUCING PRODUCTIVITY OF SOIL - Shadow on Agriculture Sustainability.
TRADITIONAL METHOD: Issues: Farmers’ Perspective

Lot of drudgery, Labour intensive, High dependency on monsoon, Rising labour cost, Low yields, Soil becoming infertile, loosing water holding capacity, decreasing Rabi, pulses, field.

Bio mass, cow dung burning for Nursery on a smaller plot

Nursery by broadcasting seeds, 60-70 kg/H

Tilling 6-7 days/H

Digging out seedlings

Transplantation, 10 labours for 3 days /H work in knee high submerged in muddy water
Traditional Method: Environment issues

- Bio mass, cow dung burning
- Tilling
- Transplanting

Burning of biomass/Tilling/ploughing exerts adverse impact on soil biota.

Loss of Top Fertile SOIL.

Flooding of rice fields till Harvesting time, creates anaerobic condition, generates Methane.

Requires Huge amount of water for irrigation.
“ZERO TILL” : Adaptation of new Conservation Agriculture Technique

**OBJECTIVE**

- Elimination / Reduction of METHANE Emission in paddy fields.
- Conservation of Soil and Soil Eco-System
- CARBON SEQUESTRATION
- Conservation of Water.
- DRUDGERY REDUCTION
- REDUCE COST OF CULTIVATION
- IMPROVE YIELD
- SUSTAINABLE AGRICULTURE
“ZERO TILL” : Adaptation of new Conservation Agriculture Technique
: Salient Features.

<table>
<thead>
<tr>
<th><strong>NO TILLAGE/NO PLOUGHING</strong></th>
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<tbody>
<tr>
<td>DIRECT SEEDING ON <strong>PERMANENT</strong> RAISED BEDS.</td>
</tr>
<tr>
<td>Preserve soil biota/ecosystem</td>
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<table>
<thead>
<tr>
<th><strong>NO PUDDLING / FLOODING</strong></th>
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<tr>
<td>Drain out water Maintain <strong>AEROBIC</strong> Condition-<strong>NO METHANE GENERATION</strong></td>
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<thead>
<tr>
<th><strong>CROP-ROTATION</strong></th>
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<tr>
<td>Enriching soil with minerals naturally</td>
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<tr>
<th><strong>MAINTAIN ROOTS OF CROPS IN THE SOIL.</strong></th>
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<td>Feed for Soil organisms.</td>
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<th><strong>USE OF WEEDICIDE ‘ GLYPHOSATE ‘ AFTER EACH CROP HARVESTED.</strong></th>
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<th><strong>WEED CONTROL BY USE OF SELECTIVE WEEDICIDES</strong></th>
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Technique “SRT” Evolved by Mr. Chandrashekhar Bhadsawale
at Saguna Baug, Neral, Dist. Raigad, Maharashtra.
ZERO TILL: STEPS: Activities-May-June

Preparing Raised beds.

Sowing 3/4 seeds/hole. 15-20 kg/h

All activities being done within the family.

Dibbling tool, Wt: 10 kg. 100*75*45 cm punches 20 holes at one stroke

Dibbling- 20 holes /stroke.
Important Activities in June-July

- Glyphosate spray to keep bunds clear of weeds
- Spraying pre-emergent weedicide after seeding & first shower ensuring the beds are wet
- Control crab using Glyricidia leaves to protect young seedlings
- Flooding to be avoided
- Young seedlings get washed away or get decayed.
- Gaps filled using surplus seedlings from the beds
COMPARISON OF GROWTH PATTERN

Traditional

- 30 Days
  - Ht 15-16”

- 60 Days
  - Ht 20-25”

ZERO TILL

- 30 Days
  - Ht 15-18”

- 60 Days
  - Ht 30-35”

- 60 Days
  - Ht 30-35”

Zero Till

- 45”- 50”

Tradit:

- 30”- 40”
Comparison: Stems, leaves, panicle.

**Traditional**
- Circumference of single shoot: 3 to 4 cm
- 56 day: Nos. 12-15
- Leaf width: 1 cm
- Traditional Panicle Age: 103 day, 09 cm

**SRT**
- Circumference of single shoot: 4 to 5 cm
- 56 day: Nos. 20-25
- Leaf width: 2 cm
- SRT Panicle Age: 103 day, 12 cm

**ZERO TILL**
Comparison: Root System

<table>
<thead>
<tr>
<th>Method</th>
<th>Length in Inches</th>
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<tr>
<td>Traditional</td>
<td>ϰ to ϳ</td>
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<tr>
<td>ZERO TILL</td>
<td>ϰϬ to ϭϮ</td>
</tr>
<tr>
<td>SRT</td>
<td>ϰϬ to ϭϮ</td>
</tr>
<tr>
<td>Traditional</td>
<td>4 to 7 &quot;</td>
</tr>
<tr>
<td>SRT</td>
<td>10 to 12&quot;</td>
</tr>
<tr>
<td>ZERO TILL</td>
<td>10 to 12&quot;</td>
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</tbody>
</table>

**Traditional:** 4 to 7"

**ZERO TILL:** 10 to 12"

**SRT:** 10 to 12"
Conservation of soil Biota, soil eco-system: Earthworm colonies found in SRT fields, never in traditional fields.
CONSERVATION OF SOIL: Prevention of Soil Erosion

Muddy water from Traditional rice field

Clear Water from SRT rice field
Pravin Mhatre: in farming since last 29 yrs, now taking 5th crop, Rice, using SRT, on the same raised Beds.
1st Crop: November 2015 Green chilly/ Chicken pea as an intercrop. irrigation, got 600 kg chilly & 70 kg chicken pea,
2nd Crop In 2016, kharip: RICE – Increased SRT area to 1.0 H. from 0.1 H. Output: 4.5 MT /H (SRT) paddy, 29% more than the traditional.
3rd Crop : Winter, Field Beans and Black eyed peas. 4th Crop : Vegetable and Ground nut with irrigation.

Sunil Sawant: Since last 15 years in active farming. Rearing buffalos for milk business.
Adopted ZERO TILL technique in 2016, in 0.4 H of rice field.
1st : Rice. Soft , spongy, moist beds encouraged him to go for 2nd crop, pulses.
2nd : Winter : Field beans, Cow pea;
3rd : vegetables, used bore well water for irrigation. Increased area to one Hectare.
4th Crop, rice, in succession on same Beds.
Shalini More: Farming since last 23 yrs, with her husband who also works part time. 3 Daughters to nurture. Holds 0.20 H of agri. land. Both also work on others’ farm as labour to earn their livelihood. Takes 2 Crops annually. Rice followed by Field beans and Cow pea.

• Adapted new technique in 2016. Now 3rd crop, RICE, on same Beds.

• She had found over the years, in traditional, the land is becoming more and more infertile, needing increased quantity of fertilizers, while in SRT requirement is less. Soil softened, formation of earth worm colonies, increased yield.

• Ease of ‘working’. She finds SRT WOMEN friendly, as all the drudgery activities are eliminated, and hence confident that she can now do farming on her own, alone.
Comparison of cultivation (input cost) for 1 Hectare SRT & Traditional

<table>
<thead>
<tr>
<th>sr no</th>
<th>Activity</th>
<th>Traditional method</th>
<th>'ZERO TILL’ SRT method</th>
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<tr>
<td></td>
<td>Details</td>
<td>Cost(INR)</td>
<td>Details</td>
</tr>
<tr>
<td>1</td>
<td>Nursery preparation</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bed making</td>
<td>No</td>
<td>Yes (Tractor)</td>
</tr>
<tr>
<td>3</td>
<td>Seed Qty .(40 Rs/kg )</td>
<td>100 kg</td>
<td>20 kg</td>
</tr>
<tr>
<td>4</td>
<td>Ploughing / Puddling</td>
<td>8 days</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Transplanting</td>
<td>30 man days</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Fertilizer Application</td>
<td>3 times, urea</td>
<td>1 times, DAP</td>
</tr>
<tr>
<td>7</td>
<td>Weeding</td>
<td>manually</td>
<td>Weedicides</td>
</tr>
<tr>
<td>8</td>
<td>Harvesting</td>
<td>75 man days</td>
<td>75 man days</td>
</tr>
<tr>
<td>9</td>
<td>Selective weedicide</td>
<td>0</td>
<td>2500</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>48500/-</td>
<td>31050/-</td>
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<tr>
<td></td>
<td>saving</td>
<td>36%</td>
<td>17450/-</td>
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BENEFITS AS PERCEIVED BY FARMERS

**NO FLOODING > NO SOIL EROSION.** In traditional paddy fields, gushing water erodes top loosened soil and carries away. In SRT, water flows through the furrows slowly. **FERTILE TOP SOIL GETS RETAINED.**

All the farmers found **COLONIES OF EARTHWORMS**, a welcome sign of sustained SOIL ECOSYSTEM HUMIFICATION PROCESS.

Found **Soil on the beds is SOFT. NO COMPACTION /HARDENING.** The beds were wet enough to sustain the pulses crop through out the cropping period. **NO CRACKS** in soil even at the end of summer. **Water retention capacity of soil has increased.**

**80% Reduction in seed consumption.** Growth of every part of plant much better than that of Traditional technique. Excellent weed control by use of selective and general weedicides. **20-25% rise in output.** Assured second crop-pulses on improved moisture content, Schedule of Tillage and transplantation depends on Monsoon and the labour availability at that time. SRT has not only eliminated the drudgery, waiting time, expenses but also the agony of farmers:

Conservation of Soil

Conservation of Soil Eco-system

Conservation of WATER

Economically viable, sustainable.

HAPPINESS.
“ZERO TILL” Technique “SRT” Evolved by Mr. Chandrashekar Bhadsawale at Saguna Baug, Neral, Dist. Raigad, Maharashtra.

Excel Industries Ltd, supported in promoting this Technique-ZERO TILL, in 10 rice producing districts of Maharashtra, under “Public-Private-Partnership” with State Government, through it’s NGO, Vivekananda Research & Training Institute (VRTX), In 2015.

VRTX, continued to Campaign for Adaptation by farmers of Roha, of this beneficial technique. No of farmers adapting has reached to 183 in 2017, from 55 in 2016 & 27 in 2015

The total area of cultivation has reached to 74 Hectare from 7.4 hectare.
WOMEN VERY HAPPY.
HAPPY FARMER.

THANKS

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