SUGARCANE RATOON MANAGEMENT

Sugarcane Ratoon

➢ Cultivation of additional crop(s) from the regrowth of stubbles of the previous main crop after its harvest, thereby avoiding replanting.

➢ 30-40% economical in operational cost saving along with seed material (Akhtar et al, 2003)
Sugarcane Ratoon Scenario in Punjab

- Single ratoon, only few growers have 2 ratoon
- Area contribution up to 50% (Malik and Gurmani, 2005).
- Productivity < 10 to 30% as compare to plant crop
- Ratoon yields contribute 40-50% to the total cane production in Pakistan (Qureshi and Afghan 2005.)

World Sugarcane Ratoon Trends

<table>
<thead>
<tr>
<th>Ratoon intensity</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Crop</td>
<td>China and Indonesia</td>
</tr>
<tr>
<td>1 ratoon crop</td>
<td>Pakistan and Fiji Islands</td>
</tr>
<tr>
<td>2 ratoon crops</td>
<td>India, U.S.A., Hawaii and Taiwan</td>
</tr>
<tr>
<td>2-3 ratoon crops</td>
<td>Australia, Brazil and Mexico</td>
</tr>
<tr>
<td>3-4 ratoon crops</td>
<td>Dominican Republic and Panama</td>
</tr>
<tr>
<td>4-6 ratoon crops</td>
<td>Barbados, Jamaica and Reunion</td>
</tr>
<tr>
<td>more than 6 ratoon crops</td>
<td>Mauritius and Zaire</td>
</tr>
</tbody>
</table>
Passage of Sugarcane in Pakistan

Acreage 1947-2013

Reference: PSMA Annual report 2013

Passage of Sugarcane in Pakistan

Annual Production 1947-2013

Reference: PSMA Annual report 2013
**Passage of Sugarcane in Pakistan**

**Average Yield (Ton/ha)**

1947-2013

![Graph showing sugarcane yield from 1947 to 2013](image)

**Reference** PSMA Annual report 2013

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**World Leading Sugarcane producing countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Area (ha)</th>
<th>Rank</th>
<th>Production (tons)</th>
<th>Rank</th>
<th>Yield (ton/ha)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>9705388</td>
<td>1</td>
<td>721077287</td>
<td>1</td>
<td>74.29</td>
<td>28</td>
</tr>
<tr>
<td>India</td>
<td>5090000</td>
<td>2</td>
<td>347870000</td>
<td>2</td>
<td>68.34</td>
<td>41</td>
</tr>
<tr>
<td>China</td>
<td>1802720</td>
<td>3</td>
<td>124038017</td>
<td>3</td>
<td>68.81</td>
<td>39</td>
</tr>
<tr>
<td>Thailand</td>
<td>1300000</td>
<td>4</td>
<td>96500000</td>
<td>4</td>
<td>74.23</td>
<td>29</td>
</tr>
<tr>
<td><strong>Pakistan</strong></td>
<td><strong>1046000</strong></td>
<td><strong>5</strong></td>
<td><strong>58397000</strong></td>
<td><strong>5</strong></td>
<td><strong>55.82</strong></td>
<td><strong>52</strong></td>
</tr>
<tr>
<td>Mexico</td>
<td>735127</td>
<td>6</td>
<td>50946483</td>
<td>6</td>
<td>69.31</td>
<td>36</td>
</tr>
<tr>
<td>Indonesia</td>
<td>456700</td>
<td>7</td>
<td>26341600</td>
<td>10</td>
<td>57.67</td>
<td>51</td>
</tr>
<tr>
<td>Philippines</td>
<td>433301</td>
<td>8</td>
<td>30000000</td>
<td>8</td>
<td>69.23</td>
<td>37</td>
</tr>
<tr>
<td>United States</td>
<td>370000</td>
<td>9</td>
<td>27900000</td>
<td>9</td>
<td>75.41</td>
<td>26</td>
</tr>
<tr>
<td>Cuba</td>
<td>361300</td>
<td>10</td>
<td>14400000</td>
<td>17</td>
<td>39.39</td>
<td>75</td>
</tr>
</tbody>
</table>

*Source: Food and Agriculture Organization of the United Nations. FAOSTAT 2012.*

**Objectives**

- Attainment of two to three healthy sugarcane ratoon crops, achievement of high yielding ratoon cane and prevent sudden yield decline
Constraints of sugarcane ratoon
- Poor establishment of plant crop.
- Reduced plant population due to less seed rate, gaps and poor sprouts.
- Poor physical condition of soil leading to compactness, loss in porosity, poor root development and poor microbial activities.
- Decline in nutritional status of soil due to exhaustive crop in nature
- Incidence of pest and diseases
- Improper harvesting time and techniques
- Stubble damage during harvesting and haulage of farm equipments
- Formation of toxic substances in the rhizosphere owing to poor weed management.
- Growing poor ratoonability varieties (Malik. K.B 2009)

Better Ratoon Management Technology
1. Awareness development among cane growers
   - Proper training of farmers
   - Farmers gathering
   - Group discussions
   - Field demonstration
   - Print media

2. Proper establishment of plant crop
   - Better land preparation
   - Cane seed quality
   - Recommended seed rate
   - Cultural operation

3. Harvesting techniques and stubble shaving
   - Harvest ratoon crop 2-3 cm below the soil surface for optimum tillering.
   - Yield of ratoon cane mainly depends on the number of tillers from the stubbles of the previous crop.
   - Timely stubble shaving or inter row cultivation. It increase millable cane by 16.6 % and yield by 14.42 % (Verma, 2002)

   - Disinfection of tools to avoid fungal disease
4. Trash Management

Adventages of trash burning-farmer's point of view

- Efficient water use
- Ease in cultural operation
- Destroy harmful insects habitats
- Heat effect stimulate plant system which enhance sprouting
- Weed seed destroy
- Cost saving

Adverse impacts of trash burning

- Not environment friendly
- Heat generate in field destroy beneficial microorganisms, insect and predator
- Stubble buds near surface are killed creating gaps in ratoon

Benefits of trash residue

- Less soil erosion
- Less weeds, so less herbicides
- Improved fertility and biological condition of the soil
- Lower fertilizer rates over long term
- Less fertilizer use in the long run
- Less water needed in irrigated crops as soil moisture is retained
- It save biological systems
- We may apply urea spray @ 5% accelerates trash rotting

5. Selection of varieties having good Ratoon ability
Variety is the single most important factor that influences ratoon ability

6. Causes of less plant population in ratoon crop
- Death of stubbles due to physical injury at harvest
- Some fungal diseases causes rotting of stubbles
- Nematodes and grubs attack the root
- Heavy machinery may induce compaction of soil that retard stubbles sprouting

Measures to maintain desired plant population
- A good ratoon crop should have not more than 15 % gaps of the total population.
- Gap filling should be done with healthy and disease free plants
- Benchmark for plant population is 60000/Acre depending upon varieties
- All boarders of plots should be densely sown at time of sugarcane sowing, which could be used afterward for recruiting material

7. Weed management
- Weed infestation is a major cause of low sugarcane yield (Hussain and Afghan, 2001; Baloch et al., 2002, and Malik and Gurmani, 2005).
- Weeds produce allelopathic effects which suppress crop growth
- Reduce yield more than 20-25% (Khan et al., 2004).
- If not controlled they may steal around 40% to the nutrition applied to crop (Yadava, 1981)
- Weeds have been reported to remove soil ‘N’ to the extent of 64 Kg ha⁻¹
- Use integrated weed management.

8. Irrigation
Sugarcane is a tropical plant and thrives best under conditions of adequate supplies of irrigation water.
- Sugarcane requires balanced/controlled irrigation
- Use Furrow irrigation
- Flooding should be discouraged

9. Balance crop nutrition/fertilization
Sugarcane ratoon crop require 25-30% more fertilizer than plant crop owing to:
- Depletion of nutrients by plant crop
- Decaying of old roots
- Sprouting of stubble buds

Fertilizer recommendation
- Apply Nutrients after soil analysis
- Potash (K) fertilizer must be used
- Macronutrients = S
- Micronutrients = Zn, B

10. Insect pest management
Insects
- Borers: Stem borer, root borer, top borer
- Sucking Pests: Sugarcane Pyrilla, White fly, Scale insect, Mealy bug
- Subterranean Pests: Termite, white grubs
- Defoliators: Army worms, leaf rollers, grass hopper, weevils
- Non Insect Pest: Mites, Nematodes, rats, squirrels, jackals and wild boar

Control:
Proper integrated pest management practices

11. Control Traffic
- Reduce unnecessary movement of heavy duty machinery in cane field
12. Adopt Minimum Tillage

Benefits

- Maintain soil structure
- Prevent soil compaction
- Save labor and fuel expenses
- Reduce cost of production

13. Frost management

- Selection of frost tolerant varieties
- Shallow, repeated irrigation
- Trash covering on buds

Experiments of Traditional sowing vs Latest production Techniques
- Conducted by Cane development cell of Fatima sugar mills limited with the collaboration of MSIRI since 2012

### Yield comparison of Traditional sowing vs Latest production Techniques

<table>
<thead>
<tr>
<th>Grower</th>
<th>Circle</th>
<th>Traditional sowing</th>
<th>Latest</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area (Acre)</td>
<td>Yield M/Acre</td>
<td>Net Profit</td>
</tr>
<tr>
<td>Malik Bashir Khar</td>
<td>Dibbi Shah</td>
<td>295</td>
<td>855</td>
<td>62,049</td>
</tr>
<tr>
<td>Mian Khuda Baksh daha</td>
<td>Head Bakaini</td>
<td>100</td>
<td>728</td>
<td>34,556</td>
</tr>
<tr>
<td>Mian Sultan Mehmood</td>
<td>Thatha</td>
<td>393</td>
<td>872</td>
<td>63,831</td>
</tr>
<tr>
<td>Muhammad Ashraf</td>
<td>Eason Wala</td>
<td>58</td>
<td>810</td>
<td>55,100</td>
</tr>
<tr>
<td>Muhammad Asif</td>
<td>Gurmani Sharqi</td>
<td>15</td>
<td>802</td>
<td>51,819</td>
</tr>
<tr>
<td>Muhammad Aslam</td>
<td>Gurmani Sharqi</td>
<td>22</td>
<td>912</td>
<td>70,737</td>
</tr>
<tr>
<td>Nasrullah Khan Tareen</td>
<td>Dibbi Shah</td>
<td>5</td>
<td>845</td>
<td>63,769</td>
</tr>
</tbody>
</table>

Plant Crop (2012)
Yield comparison of Traditional sowing vs Latest production Techniques

<table>
<thead>
<tr>
<th>Grower</th>
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<tr>
<td></td>
<td>Area (Acre)</td>
<td>Yield M/Acre</td>
<td>Net Profit</td>
<td>Area (Acre)</td>
</tr>
<tr>
<td>Malik Bashir Khar</td>
<td>455</td>
<td>760</td>
<td>73,638</td>
<td>30</td>
</tr>
<tr>
<td>Mian KhudaBaksh Daha</td>
<td>65</td>
<td>750</td>
<td>62,564</td>
<td>25</td>
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<tr>
<td>Mian Sultan Mehmood</td>
<td>409</td>
<td>910</td>
<td>94,495</td>
<td>7</td>
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<tr>
<td>Muhammad Ashraf</td>
<td>8</td>
<td>845</td>
<td>89,662</td>
<td>42</td>
</tr>
<tr>
<td>Muhammad Asif</td>
<td>9</td>
<td>860</td>
<td>92,940</td>
<td>14</td>
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<tr>
<td>Muhammad Aslam</td>
<td>24</td>
<td>986</td>
<td>109,069</td>
<td>6</td>
</tr>
<tr>
<td>Nasrullah Khan Tareen</td>
<td>11</td>
<td>810</td>
<td>76,921</td>
<td>5</td>
</tr>
</tbody>
</table>

1st Ratoon (2013)

Reference
Collaboration of Fatima Sugar Mills with MSIRI
Mauritius Sugar Industry Research Institute
MSIRI (Mauritius sugar industry research institute)
Land preparation & sowing
Raton management

Irrigation techniques/methods

Furrow/Surface irrigation
Drip irrigation

DRAGLINE/Movable sprinkler
CENTRAL PIVOT
Harvesting
TERRA Co-generation Plant
Special thanks

- Dr. SALEM SAUMTALLY  (Director MSIRI)
- Dr. Suman Seeruttun  (Research Manager MSIRI)
- Dr. Muhammad Goolam H BADALOO  (Research officer MSIRI)