

# CONSTRAINTS OF SUGARCANE RATOON AND BETTER MANAGEMENT TECHNOLOGY THEREOF

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## 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

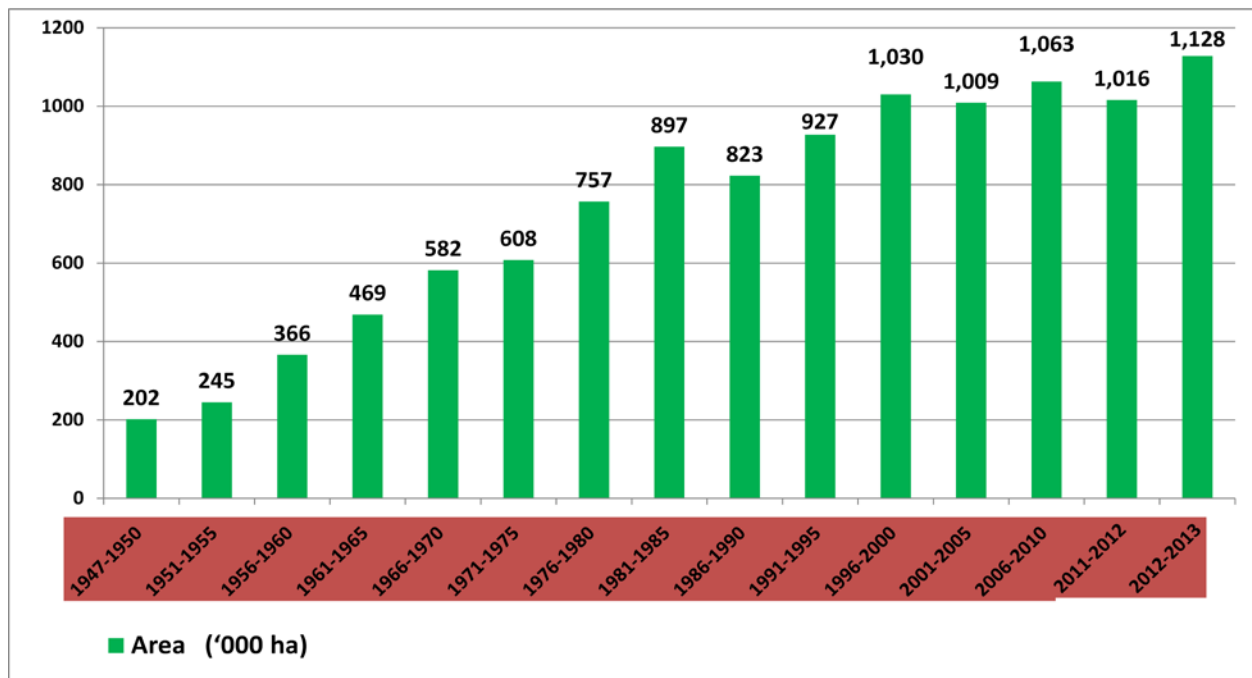
- Single ratoon, only few growers have 2 ratoon
- Area contribution upto 50 % (Malik and Gurmani,2005).
- Productivity < 10 to 30 % as compare to plant crop
- Ratoon yields contribute 40-50 % to the total cane production in Pakistan(Qureshi and Afghan 2005.)

## World Sugarcane Ratoon Trends

| Ratoon intensity         | Countries                        |
|--------------------------|----------------------------------|
| Plant Crop               | China and Indonesia              |
| 1 ratoon crop            | Pakistan and Fiji Islands        |
| 2 ratoon crops           | India, U.S.A., Hawaii and Taiwan |
| 2-3 ratoon crops         | Australia, Brazil and Mexico     |
| 3-4 ratoon crops         | Dominican Republic and Panama    |
| 4-6 ratoon crops         | Barbados, Jamaica and Reunion    |
| more than 6 ratoon crops | Mauritius and Zaire              |

# Passage of Sugarcane in Pakistan

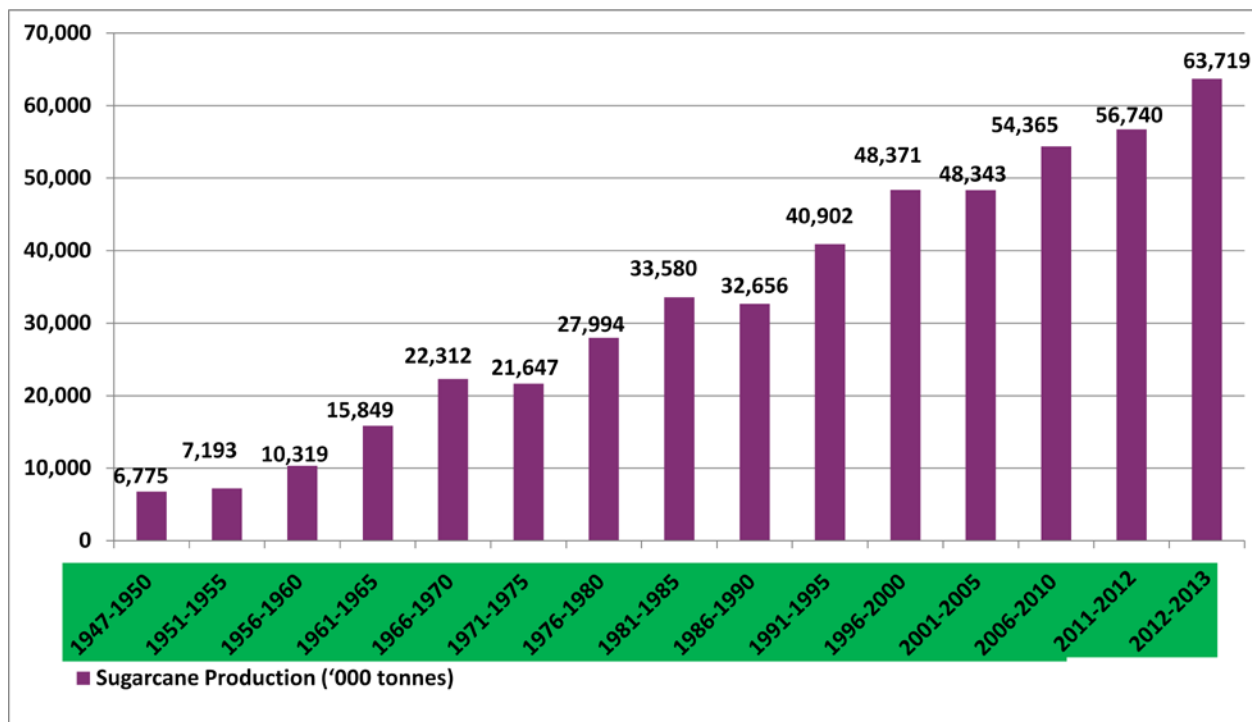
## Acreage 1947-2013



Reference PSMA Annual report 2013

# Passage of Sugarcane in Pakistan

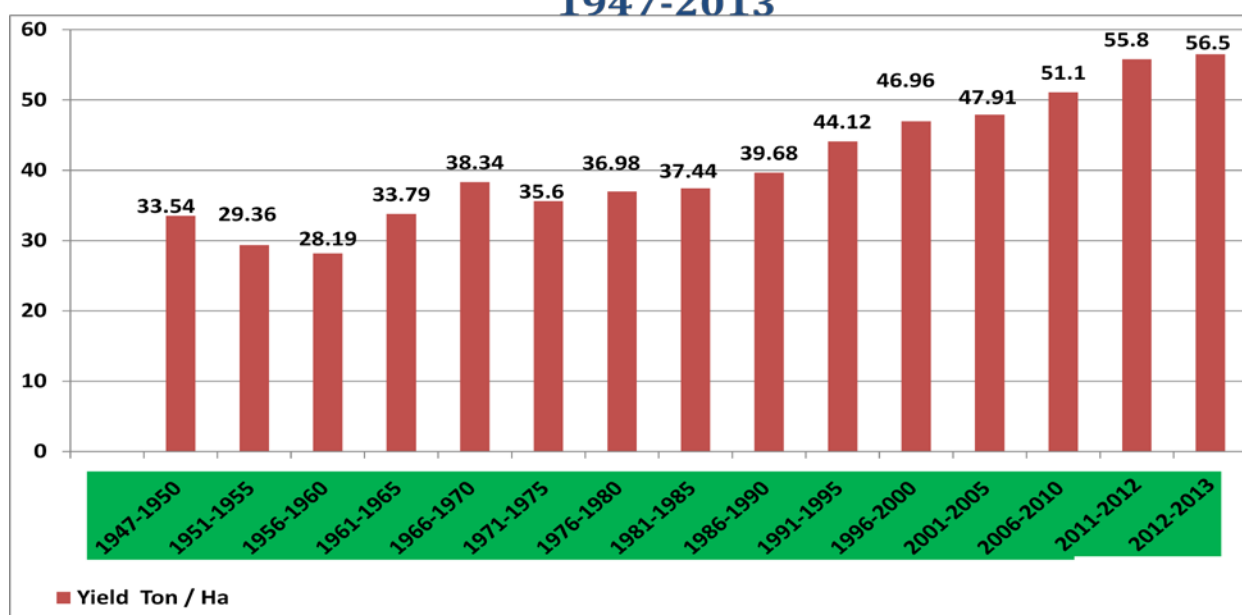
## Annual Production 1947-2013



Reference PSMA Annual report 2013

# Passage of Sugarcane in Pakistan

Average Yield (Ton/ha)  
1947-2013



**Reference** PSMA Annual report 2013

## World Leading Sugarcane producing countries

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

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

##### Advantages 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 borders 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<sup>-1</sup>
- 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**

| Grower                | Circle         | Traditional sowing |              |            | Latest      |              |            | Difference |
|-----------------------|----------------|--------------------|--------------|------------|-------------|--------------|------------|------------|
|                       |                | Area (Acre)        | Yield M/Acre | Net Profit | Area (Acre) | Yield M/Acre | Net Profit | (%)        |
| Malik Bashir Khar     | Dibbi Shah     | 295                | 855          | 62,049     | 30          | 943          | 69,201     | 12         |
| Mian Khuda Baksh daha | Head Bakaini   | 100                | 728          | 34,556     | 25          | 897          | 57,829     | 67         |
| Mian Sultan Mehmood   | Thatha         | 393                | 872          | 63,831     | 7           | 903          | 65,130     | 2          |
| Muhammad Ashraf       | Eason Wala     | 58                 | 810          | 55,100     | 42          | 865          | 60,923     | 11         |
| Muhammad Asif         | Gurmani Sharqi | 15                 | 802          | 51,819     | 14          | 844          | 55,999     | 8          |
| Muhammad Aslam        | Gurmani Sharqi | 22                 | 912          | 70,737     | 6           | 1,068        | 89,710     | 27         |
| Nasrullah Khan Tareen | Dibbi Shah     | 5                  | 845          | 63,769     | 5           | 975          | 72,185     | 13         |

**Plant Crop (2012)**

# Yield comparison of Traditional sowing vs Latest production Techniques

| Grower                | Circle         | Traditional sowing |              |            | Latest      |              |            | Difference |
|-----------------------|----------------|--------------------|--------------|------------|-------------|--------------|------------|------------|
|                       |                | Area (Acre)        | Yield M/Acre | Net Profit | Area (Acre) | Yield M/Acre | Net Profit | (%)        |
| Malik Bashir Khar     | Dibbi Shah     | 455                | 760          | 73,638     | 30          | 889          | 98,260     | 33         |
| Mian KhudaBaksh Daha  | Head Bakaini   | 65                 | 750          | 62,564     | 25          | 887          | 84,331     | 35         |
| Mian Sultan Mehmood   | Thatha         | 409                | 910          | 94,495     | 7           | 947          | 103,843    | 10         |
| Muhammad Ashraf       | Eason Wala     | 8                  | 845          | 89,662     | 42          | 897          | 103,216    | 15         |
| Muhammad Asif         | Gurmani Sharqi | 9                  | 860          | 92,940     | 14          | 1,003        | 116,332    | 25         |
| Muhammad Aslam        | Gurmani Sharqi | 24                 | 986          | 109,069    | 6           | 1,122        | 134,952    | 24         |
| Nasrullah Khan Tareen | Dibbi Shah     | 11                 | 810          | 76,921     | 5           | 880          | 89,059     | 16         |

**1<sup>st</sup>Ratoon (2013)**

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## **Special Thanks**

- Manzoor Hussain Malik  
(Senior vice president Agriculture, Shakarganj mills Ltd.)
- Dr. Shahid Afghan  
(Director General, Shakarganj sugar Research Institute Jhang)
- Ch. Muhammad Sadiq  
(Director development and planning, Tandalian wala Group of sugar mills)
- Karim Bux Malik  
(Ex. Director sugarcane research Institute, AARI, Fsd.)
- Mian Muhammad Yaseen Rizwan  
(GM-Cane, Shiekoo sugar Mills)
- Malik Basheer Ahmed  
(GM-Cane Chashma-I sugar Mills D.I. Khan)

**Collaboration of**  
**Fatima Sugar Mills**  
**with**  
**MSIRI**  
**Mauritius Sugar**  
**Industry Research**  
**Institute**

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# MSIRI (Mauritius sugar industry research institute)



Library



# Land preparation & sowing



## Raton management



## Irrigation techniques/methods

### Furrow/Surface irrigation



**Drip irrigation**



**DRAGLINE/Moveable 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)
-