

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

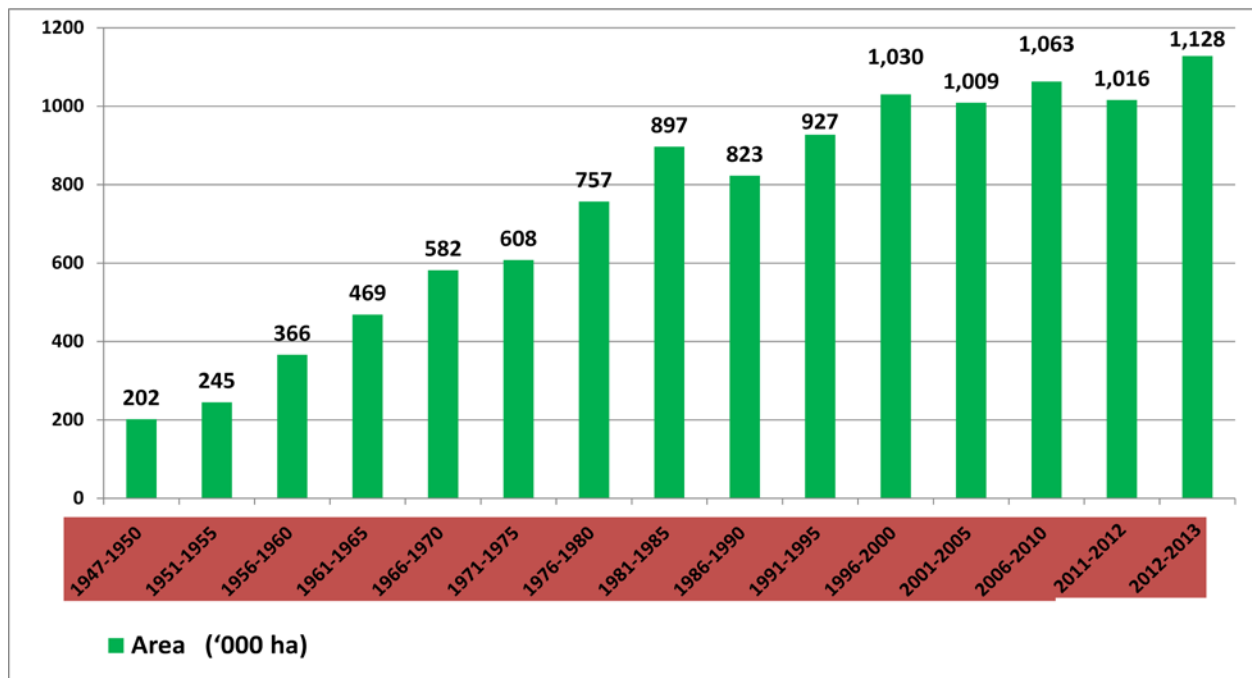
- Single ratoon, only few growers have 2 ratoon
- Area contribution upto 50 % (Malik and Gurmani,2005).
- Productivity < 10 to 30 % as compare to plant crop
- Ratoon yields contribute 40-50 % to the total cane production in Pakistan(Qureshi and Afghan 2005.)

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

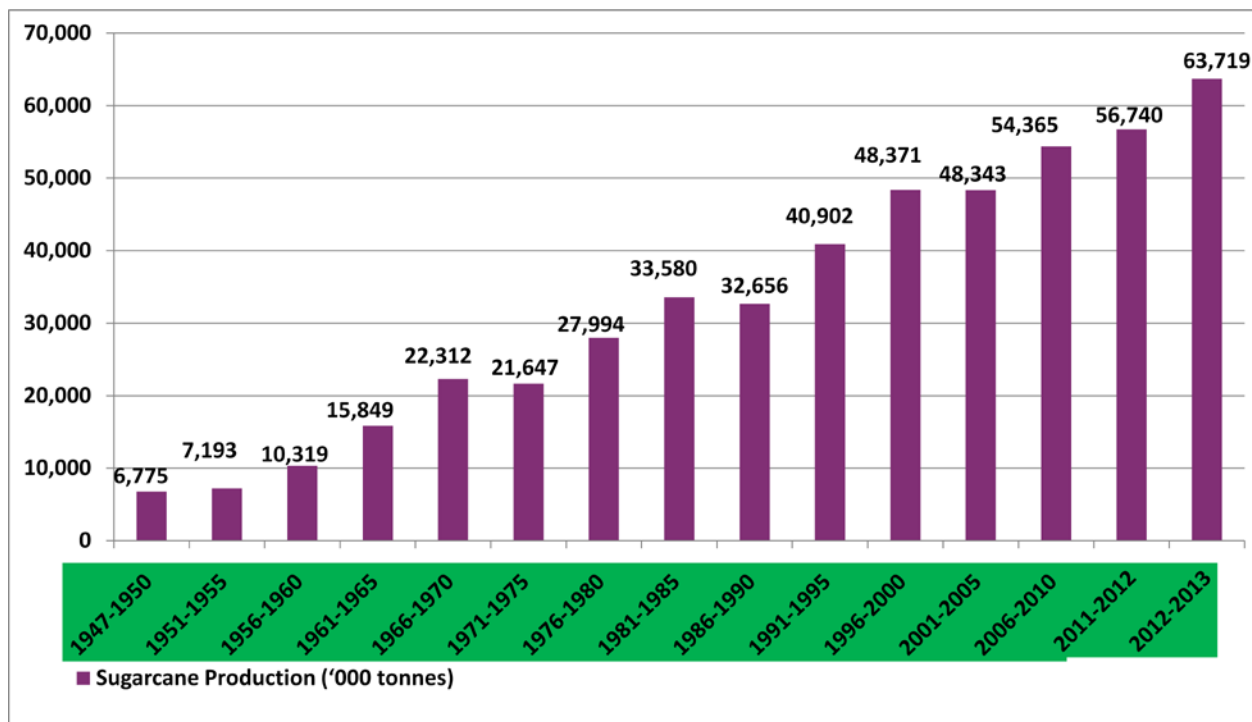
Acreage 1947-2013



Reference PSMA Annual report 2013

Passage of Sugarcane in Pakistan

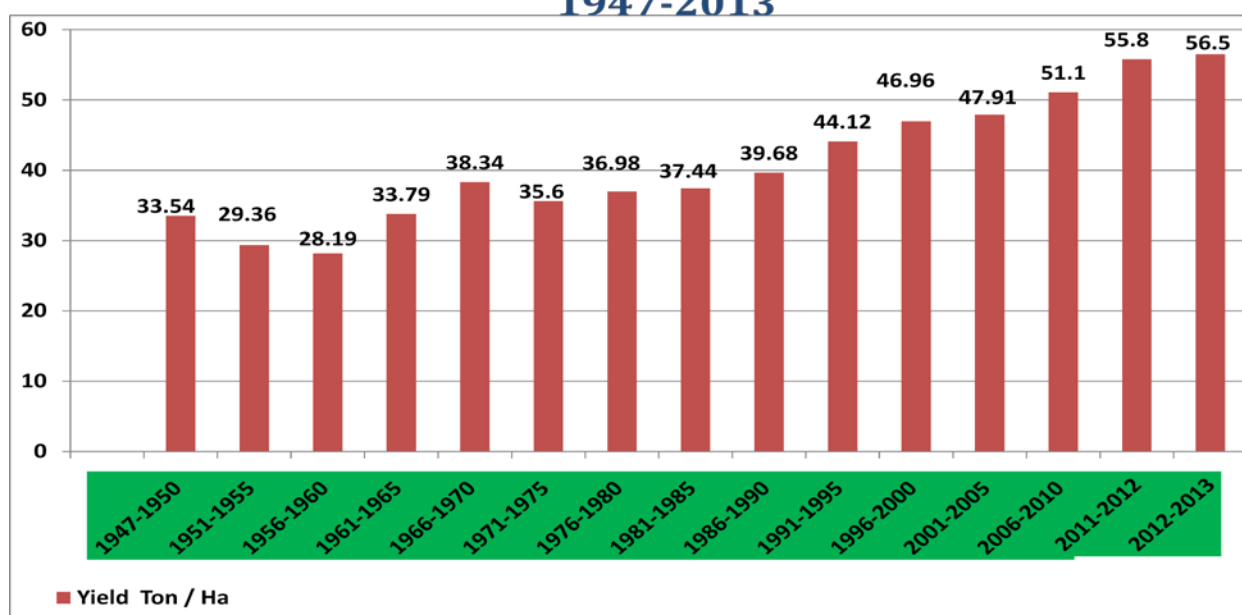
Annual Production 1947-2013



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
Pakistan	1046000	5	58397000	5	55.82	52
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⁻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

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

1stRatoon (2013)

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

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



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