

CHALLENGES IN INCREASING SUGAR RECOVERY IN PUNJAB

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Top 10 in cane sugar production Countries.

Rank	Name of country	Sugar (million tonnes)
1.	Brazil	37.50
2.	India	22.97
3.	China	12.05
4.	Thailand	9.79
5.	Mexico	6.58
6.	Pakistan	5.20
7.	Australia	4.22
8.	USA	3.27
9.	Guatemala	2.75
10	Indonesia	2.55

Source: ISO Sugar Year Book, 2014

Sugarcane in Pakistan

	Sugarcane area (000 ha)	Sugarcane production (M.T.)	Sugarcane yield (t ha ⁻¹)	Sugar recovery (%)
Punjab	683.91	39.74	63.0	9.85
Pakistan	1141	62.65	54.91	9.90

0.1% increase in sugar recovery produce sugar worth of Rs. 2.5 billion@ sugar price Rs. 50000 per tonne

Sources: Economic Survey of Pakistan 2014-15; Crop Reporting Service GOP, 2014-15

1) Crop duration

- In Punjab, the crop duration is less as compare to other sugarcane growing countries like Brazil, Mauritius, Australia and South Africa
- Even in Sindh the most of sugarcane crop is planted in September
- Crop does not enjoy the required growing period to achieve maturity
- It is a main reason for low sugar recovery in the province

Solutions

- Promotion of sugarcane plantation in September
- Use of resource efficient varieties
- Approval of site-specific varieties and development of production technology for different districts of Punjab using Digital Soil Mapping (DSM)

2) Planting of low sugar unapproved varieties

- Non adoption of approved sugarcane varieties having high recovery by the farmer is a major reason of low sugar tonnage per acre
- As the cane price is not linked with sugar recovery but payment on weight basis
- Un availability of approved varieties seed in the sugarcane growing areas

Solutions

- Ensure the availability of approved varieties seed in different sugarcane growing areas by establishing seed farms at mills
- Availability of seed at subsidized rates
- Premium on quality basis
- Timely payment to the farmers

List of presently cultivated varieties

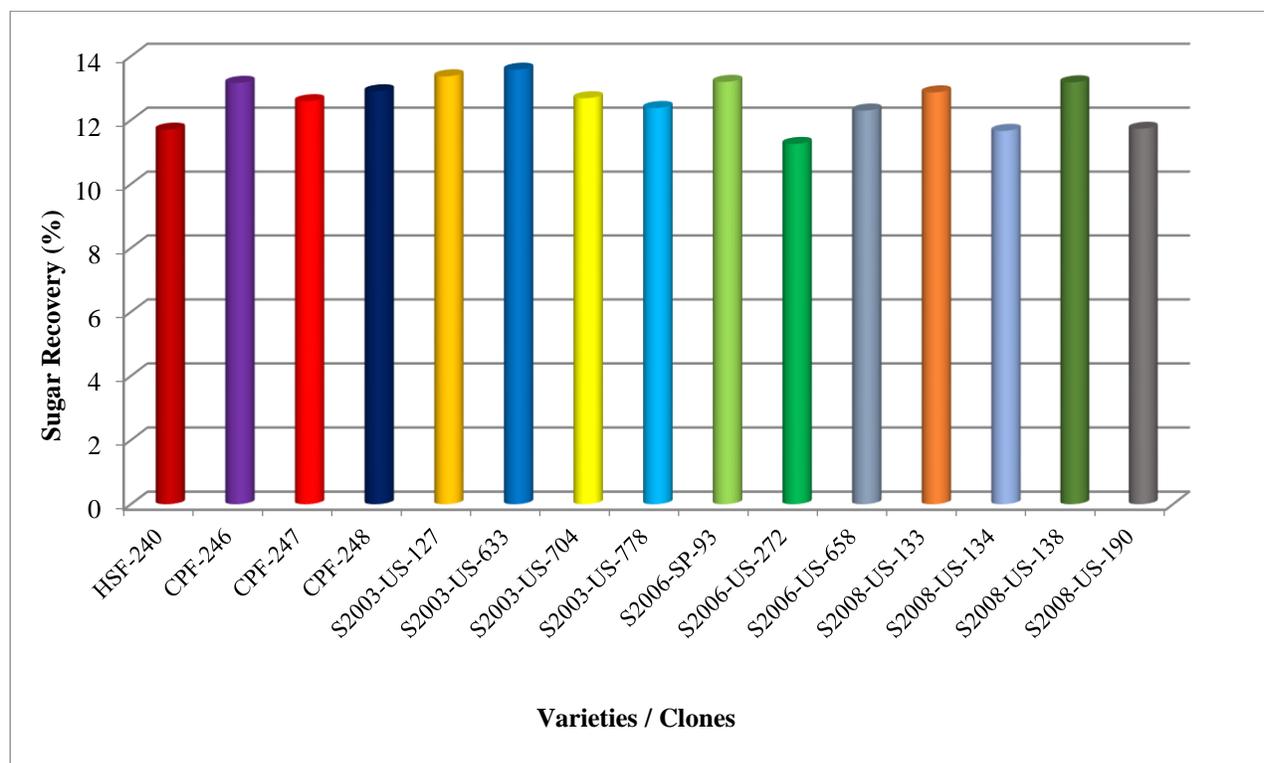
Sr. #.	Variety	Year of release	Average yield (t ha ⁻¹)	Yield potential (t ha ⁻¹)	S. recovery (%)
1.	CP 77-400	1996	90	120	11.90
2.	CoJ 84	2000	90	115	9.80
3.	SPF 213	2000	90	125	10.50
4.	CPF 237	2000	95	120	12.50
5.	SPF 234	2002	100	135	11.60
6.	HSF 240	2002	95	145	11.70
7.	HSF 242	2004	102	140	12.50
8.	SPF 245	2006	100	130	11.00

9.	CPF 243	2006	102	120	12.55
10.	CPF 246	2011	120	160	12.15
11.	CPF 247	2011	120	150	12.25
12.	CPF 248	2013	120	150	12.71

List of pipeline varieties

Sr. #	Name of clones	Av. Yield (t ha ⁻¹)	Yield potential (t ha ⁻¹)	Sugar Recovery (%)	Remarks
1.	S2003-US 127	106	125	12.60	Early
2.	S2003-US 633	105	130	13.50	Early
3.	S2003-US 704	107	135	12.80	Medium
4.	S2003-US 778	105	130	12.45	Medium
5.	S2005-US 54	107	135	12.60	Early
6.	S2006-US 272	107	135	12.60	Early
7.	S2006-US 658	106	160	12.40	Medium

Sugar Recovery Status of Varieties / Clones (Average: October to April)



3) **Late planting**

- Late planting of sugarcane particularly after wheat harvesting is becoming very popular in the province
- Crop could not enjoy the proper growth period

Solutions

- Promotion of timely plantation of sugarcane among farmers
- Government should provide the machinery on subsidized rates to the farmer for timely seed bed preparation and plantation

4) **Breeding Program**

- Lack of breeding facilities at provincial level
- Un availability of breeding material of desired characters
- Therefore, the variety evaluation program is completely dependent upon exotic breeding material

Solutions

- Consolidated variety selection program includes significantly expansion and strengthening of Sugarcane breeding and selection program
- Efforts should be made to establish a breeding station at provincial / country level
- High sugar recovery germplasm introduction from foreign countries
- Agro-meteorological studies for site specific variety development
- Extensive efforts for development of seed farms for newly approved varieties / promising lines at mills' level as desired by the Govt. & SR&DB

5) **Scarcity of irrigation water**

- Availability of Irrigation water is becoming a limiting factor day by day
- Un availability of irrigation water to the crop on critical growth stages is adversely effecting not only growth but also sugar recovery

Solutions

- Establishment of new water reservoirs
- Improvement in off farm and on farm water management programs including canal and water course lining etc.

- Adoption of sowing methods having high water use efficiency (WUE) e.g. 4 feet apart trench planting
- Adoption of modern irrigation practices at farmer level i.e. alternate skip irrigation, gated pipe system (for tube wells), drip irrigation etc.

6) Imbalance and improper use of fertilizer

- Late fertilizer application especially N fertilizers
- Not following the recommendation particularly by the small farmers due to time to time high fertilizer prices
- Imbalance fertilization, particularly K fertilizers are not used (30% more sugar recovery with K) (Ghaffaret *al.* 2013)
- Method of fertilizer application is not proper and most of it become unavailable to the crop

Solutions

- Soil analysis
- Use of recommended fertilizer application
- Supply of fertilizers / bio fertilizers to the farmers by the mills on subsidized rates
- Awareness seminars / workshops / farmer days focusing on method and time of fertilization

7) Disease and insect attack

- Disease attack is severely affecting sugarcane yield and sugar recovery e.g. whip smut in HSF 240
- Insect attack is becoming a serious threat for sugarcane since last few years particularly early shoot borer, pyrilla and whitefly etc.
- Leads to significant decrease in sugar recovery

Solutions

- Establishment of sugarcane nurseries to produce healthy seed
- Use of healthy seed after seed treatment
- Regular pest scouting and rouging of diseased plants
- Recommended use of granular insecticides
- Awareness among farming community about changing weather conditions and pest incidence

Losses due to sugarcane diseases

Disease	Losses (%)	
	Cane yield	Sugar recovery
Red rot	20-83	31-75
Whip smut	9-75	3-7
Pokkahboeng	17-84	7-10
Red stripe	15	-
Rust	40-50	-
Mosaic	8- 40	1-2
Leaf spot	16	1-3
Wilting	65	3-29

Source: Disease of sugarcane and sugar beet by V.P. Agnihotri (Rev. Edi. 1990, India)

Losses caused by sugarcane insects

Pest species	Extent of losses in terms of	
	% reduction in cane yield	% reduction in juice quality
Shoot borer	33	12 in sugar recovery
Top borer	30.0	46.6 in CCS%
Early shoot borer	31.8	20.4 in sucrose
Stem borer	56.6	39.02 in CCS%
Gurdaspur borer	15	74 in sugar and gur recovery
Pyrilla	28.1	50 in sugar recovery
Whitefly	65.3	7.7 in CCS%

Source: IPM system in Agriculture by Rajeev K. Upadhyayet. al. 1999, vol. 6, Cash crops. PP: 101-121, India

8) Drought / Frost attack

- The temperature extremes are widening day by day due to prevailing phenomenon of climate change
- Resulting in drought during grand growth period
- Severe frost attack and no proper precautionary measures by the farmer

Solutions

- Use of drought tolerant varieties
- Use of recommended crop production practices e.g. trench planting, deep ploughing etc.
- Use of efficient irrigation methods i.e. alternate skip and drip irrigation
- Application of light irrigation keeping in view the incidence of frost

9) Lodging

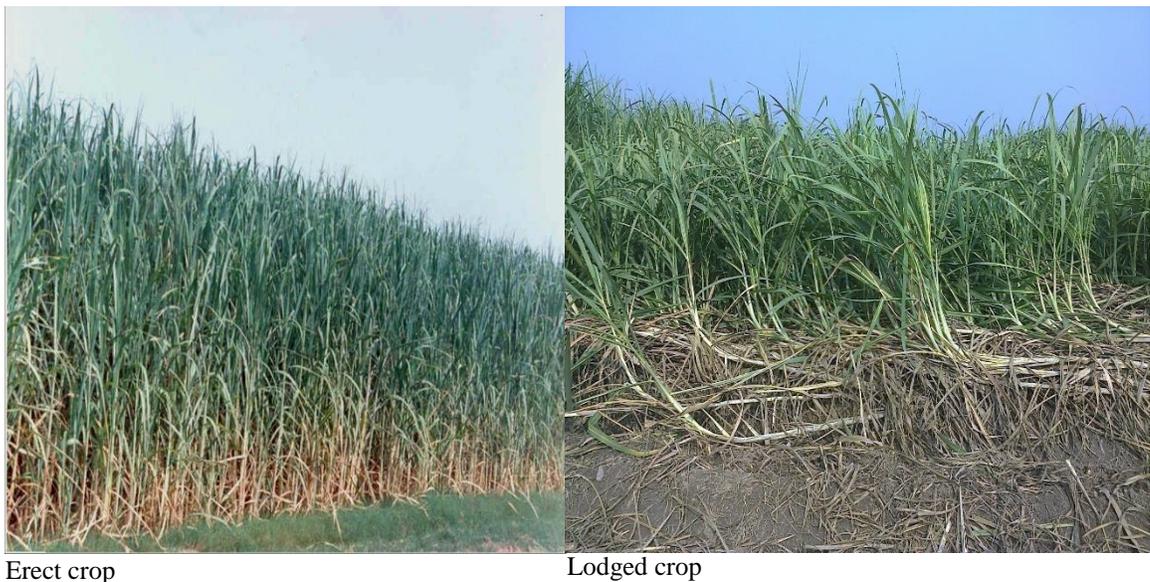
- Lodging is a serious disaster to sugar recovery in the province and it may decrease sugar yield upto 30%
- Poor crop management by the farmers including no earthing up
- Sole use of nitrogenous fertilizers

Solutions

- Planting of sugarcane in deep trenches
- Application of phosphorous and potash fertilizers along with urea at recommended rates
- Earthing up at proper crop growth stage
- Application of anti lodging agents

Lodging---serious disaster:

Up to 30% sugar yield loss due to lodging



10) Application of irrigation water before harvesting

- Common practice by the farmer for gaining higher weight of the crop at mill

- Adversely affect the sugar recovery

Solution

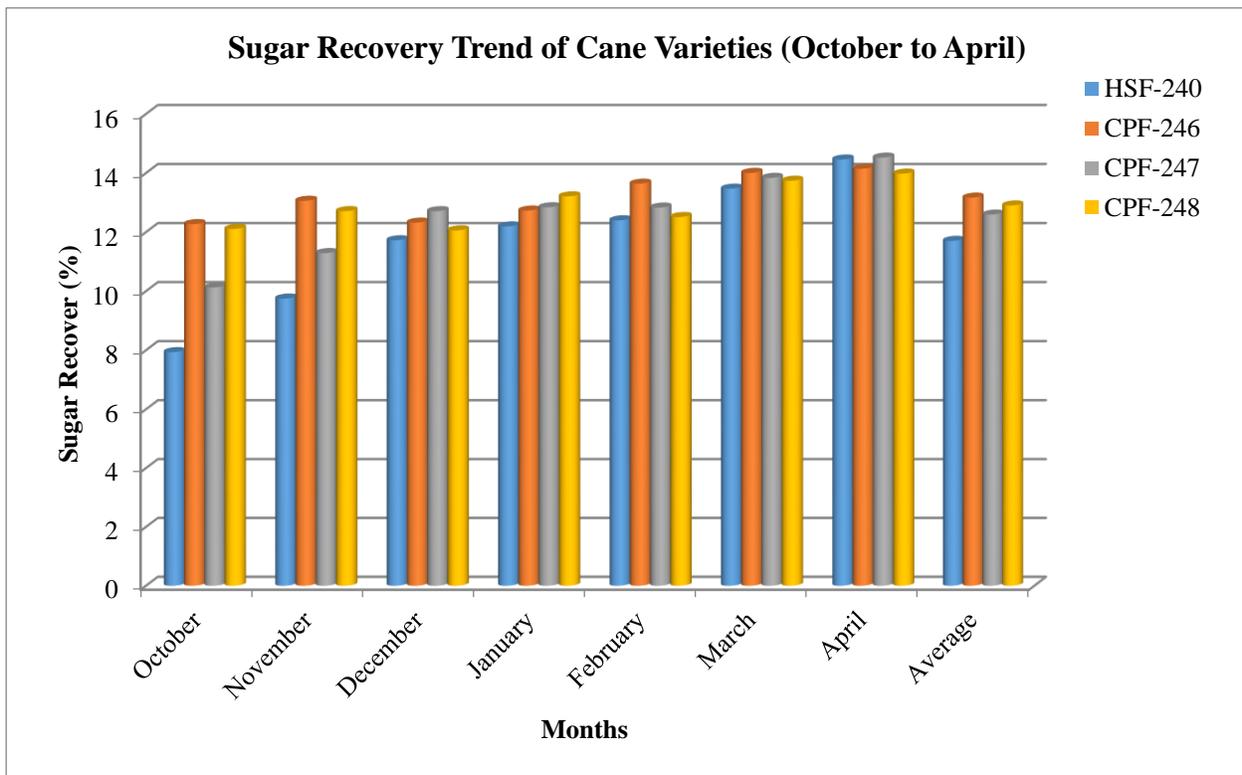
Stop irrigating crop about one month prior to harvesting

11) Non adoption of harvesting schedule of crop by farmers

Harvesting and Supply of cane to mills is not according to the maturity schedule of the varieties

Solutions

- Awareness about the proper harvesting schedule of sugarcane varieties
- Ratoon crop matures earlier and should be harvested first
- September plantation on second
- Then early maturing varieties following medium varieties
- At the end of crushing season, late maturing varieties should be harvested and supplied to the mill



12) Lag time between harvesting of the crop and milling

- Unplanned harvesting and supply of cane to the mills

- Cane remains in field for a significant time due to un-availability of transport or some other reasons
- Chemical process occurs and sucrose is converted into non recoverable sugars
- It is the major post harvest loss of cane

Solutions

- Supply of cane to mill as early as possible after harvesting of the crop
- Facilitation by mill to the farmers for transportation of crop from field to mills
- Topping must be discouraged

13) Poor ratoon crop management

- Ratoon crop occupies about 40% of total cropped area of sugarcane
- The ratoon crop matures earlier and yielded better sugar recovery than plant crop if managed properly
- Farmers take it as bonus crop and no proper crop management and protection measures are adopted

Solutions

- Awareness among the farmers about ratoon crop management through the mills cane staff
- Efficient crop production and protection measures
- Disk ratooning between rows
- Stubble shaving or harvesting with proper cutter
- Add 30% more N

14) Supply of un-cleaned cane to mill

- Cane supply at mill gate is not properly trashed
- For getting high sugar recovery the cane should be clean

Solutions

Proper de trashing of the cane and supply to mills

15) Inefficient processing

- No proper extraction of juice at mill level
- Leads to low recovery

Solution

Use of efficient juice extraction technology at mills

16) Poor development work by the mills

- Lack of quality cane development activities of sugar mills in the area
- It may be due to appointment of unqualified staff
- Development work is not included in priority areas

Solutions

- Provision of implements on subsidized rates or easy installments
- Varietal Development Program at mill level
- Establishment of model seed farm at mill level
- Production of organic fertilizer from filter cake
- Supply of recommended cane varieties to farmers by mills
- Proper pests scouting and control measures
- Seed and fertilizer loaning to farmers by mills
- Appointment of Agri. Graduate in sugar mill for development work
- Capacity building of mill staff
- Awareness seminars/farmer's days for farmers