PRODUCTION TECHNOLOGY FOR HIGH SUGARCANE YIELD

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Identified Problems

- Sugarcane production
- High tax placed on sugar production
- Poor infrastructure provision; such as roads in areas around sugarcane farms
- High production cost
- Can not compete in the international market

List of Stakeholders

- Sugarcane farmers
- Farmers association
- Pakistan Sugar Mills Association
- Sugar-producing industries
- Ministry of agriculture
- Ministry of finance
- Ministry of trade and industry
- Activists
- Donors
- Consumers

Current Scenario

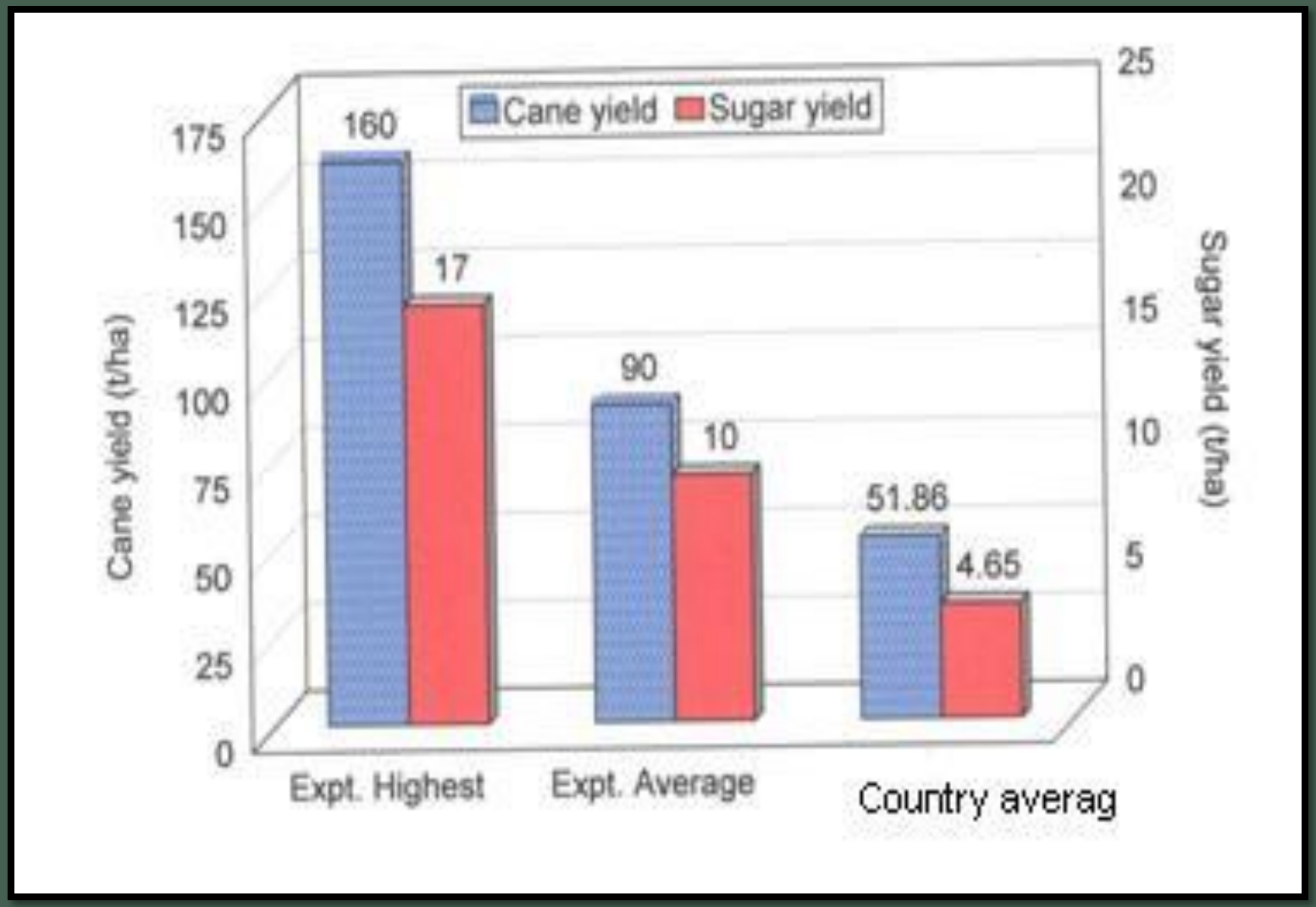
Farmers have decreased the total area under cane production due to water shortage, late payments, increased input costs, diseases, and rodent attacks.

Cane yield, sugar recovery, and sugar yield in the main sugarcane growing countries of the world

Country	Cane yield (t/ha)	Recovery (%)	Sugar yield (t/ha)
Australia	100.4	13.8	13.85
Egypt	110.8	11.5	12.74
Brazil	68.4	14.5	9.91
U.S.A.	80.2	11.7	9.38
Colombia	80.5	11.5	9.26
Mexico	79.5	11.6	9.22
India	66.9	9.9	6.62
Pakistan	50.3	9.2	4.63
World Avg.	64.4	10.6	6.82

Source: FAO Production Yearbook

Cane and Sugar Yield Gap in Experimental and Farmers' Field



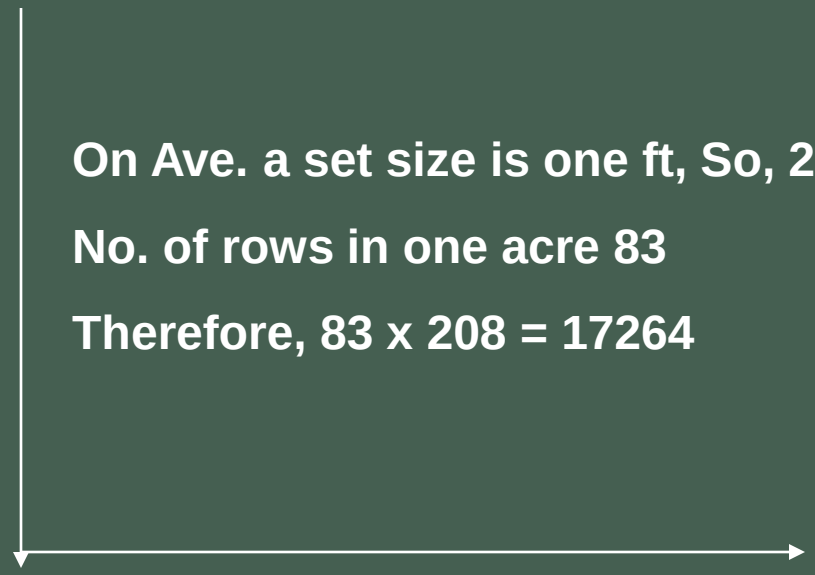
CAUSES OF LOW SUGAR RECOVERY

- Sowing of low sugar varieties
- Payment on a weight basis
- Supply of staled and un-cleaned cane
- **Plant Population**
- Application of water before harvesting
- Un-scheduled supply of cane to the mills.
- **Supply of cane to the mills is not according to the maturity schedule**
- Poor development work by the mills
- Appointment of unqualified staff
- Late planting
- Diseased and insect-infected cane
- Late application of fertilizer

Recommendation for plant population = 40,000 double budded sets/ha

One acre number of sets required 32300

What is happing in the field



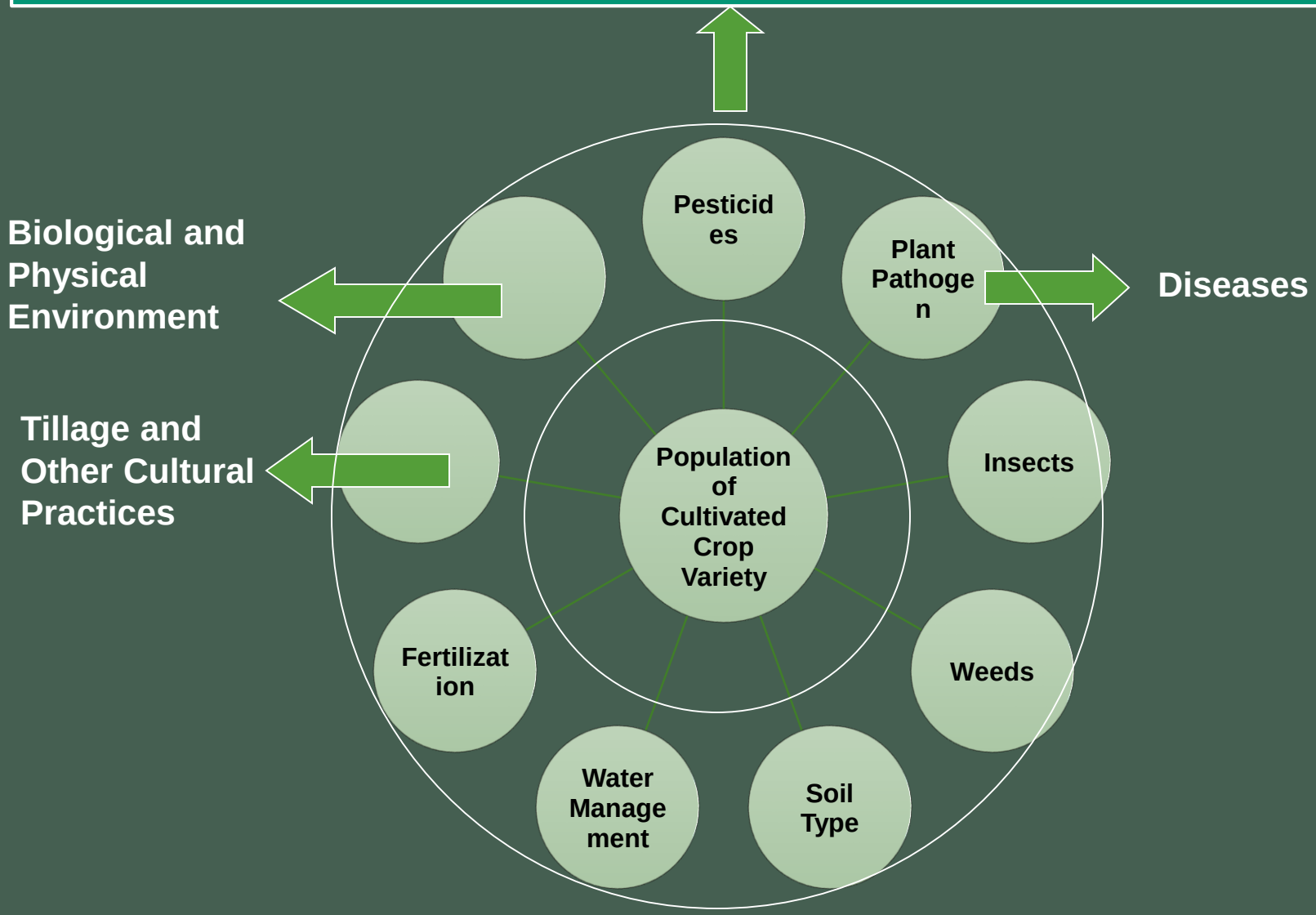
On Ave. a set size is one ft, So, 208 sets per row were planted

No. of rows in one acre 83

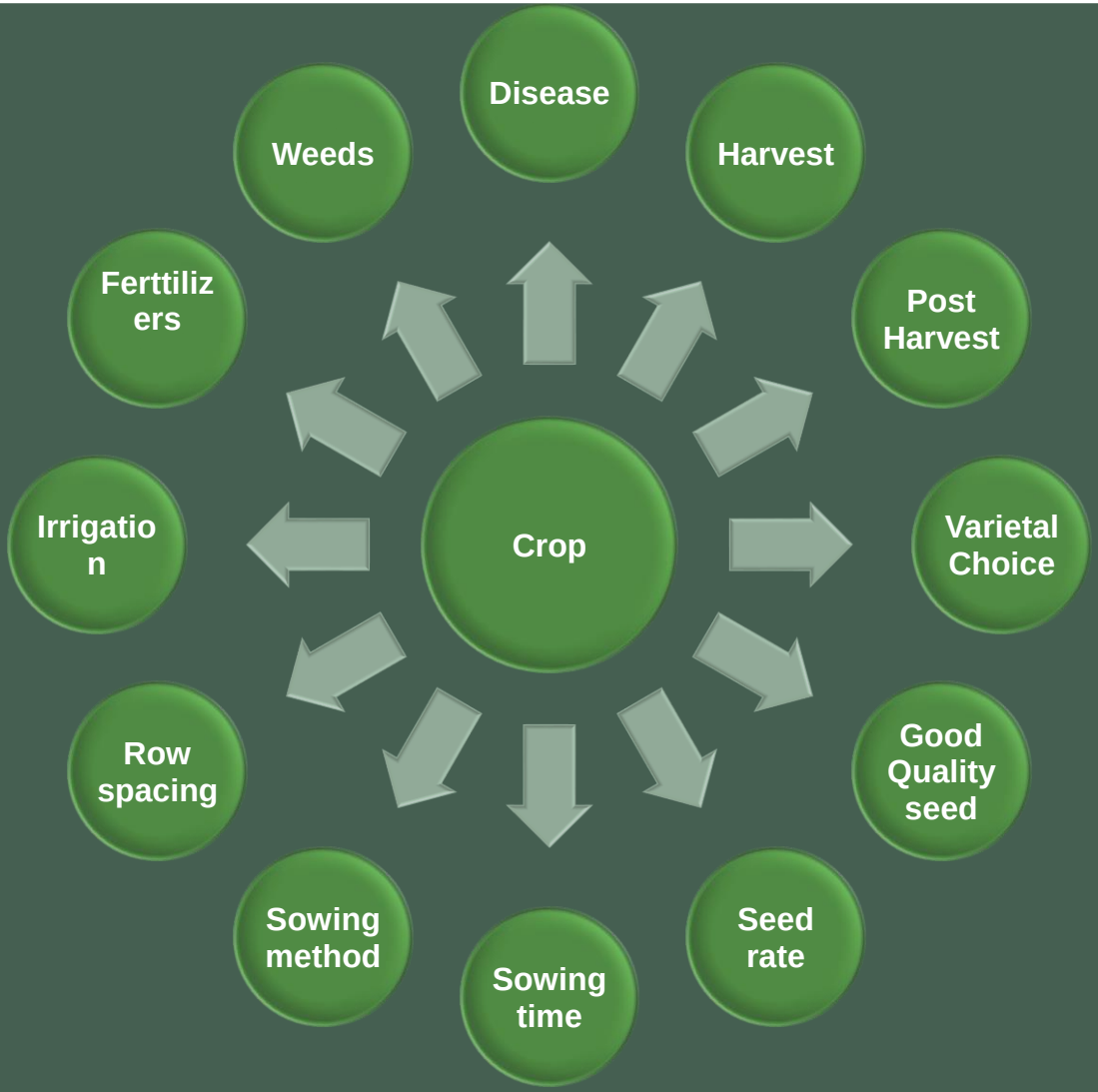
Therefore, 83 x 208 = 17264

This means that we have only 50% population

Crop Production



Crop Management

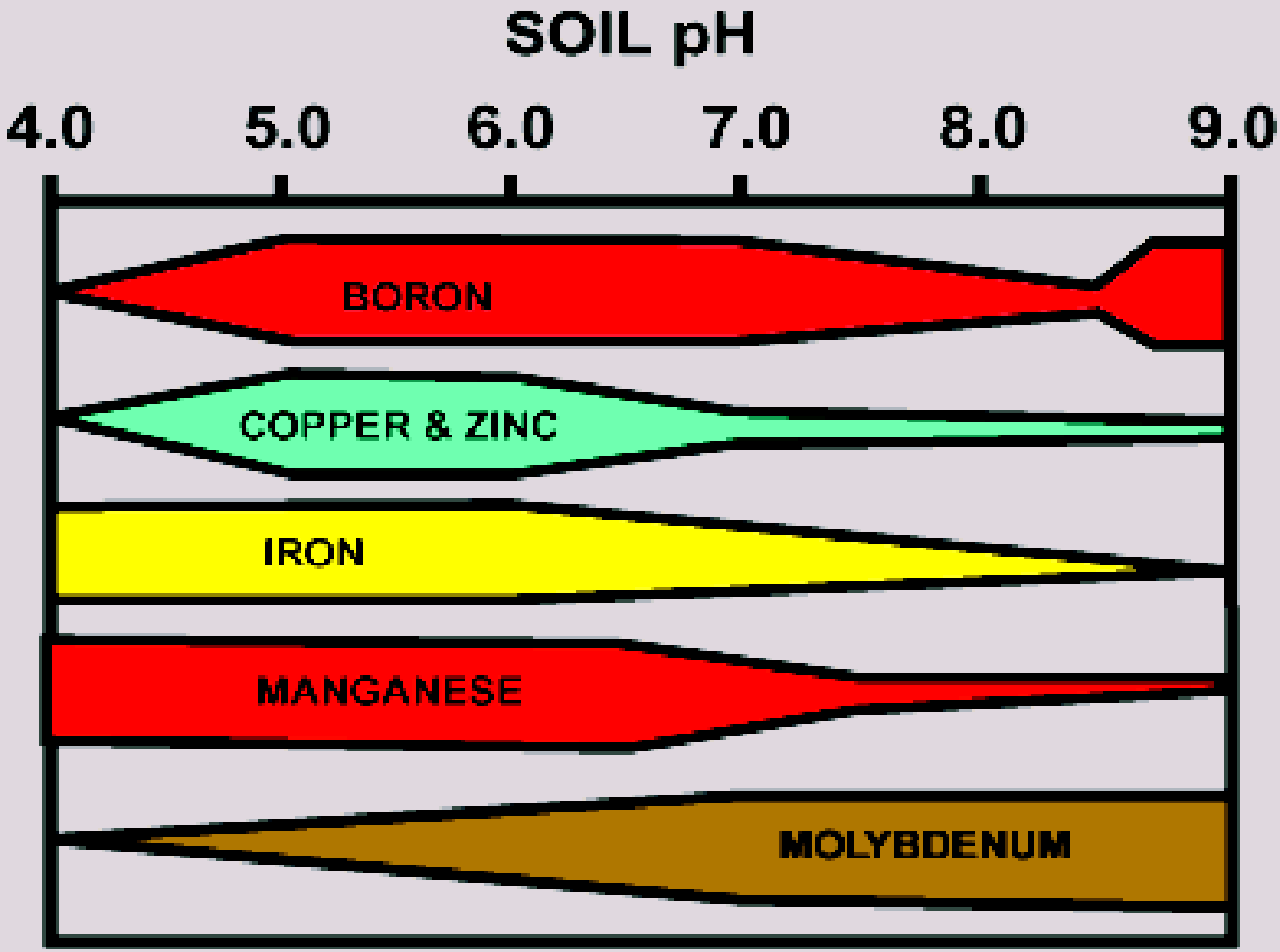


Fertilizer Application

- Based on soil test, soil reaction/pH
- Concept of balanced fertilizer use
- Previous cropping history
- Organic amendments previously applied
- Application at critical stages of crop growth
- Use of suitable fertilizer application methods
- Fertilizer application be followed by irrigation
- Integrated plant nutrient management

Factors Affecting Fertilizer Efficiency

- Poor Seedbed Preparation: 10-25%
- Delay in Sowing: 20-40%
- Inappropriate Crop Variety: 20-40%
- Inadequate Plant Population: 10-25%
- Inadequate Irrigation: 10-20%
- Weed Infestation: 15-50%
- Insect Attack: 5-50%
- Imbalanced/Improper Fertilizer Application: 20-50%



Alkaline pH reduces micronutrient availability, except Mo.

Fertilizer Recommendations

Crop	Soil Texture	Fertilizer dose (N-P-K) kg/ha
Wheat	Loam	120-90-50
Rice	Clay	120-80-0
Cotton	Clay loam	150-80-50
Sugarcane	Clay loam	200-120-150
For Calcarious soils with alkaline pH, use Ammonium sulphate, MAP, SOP		
For Calcareous soils with normal pH, use DAP, Urea, SOP		

Irrigation Management

- Source: Canal or underground water
- Suitability based on the laboratory analysis
- Irrigation at critical stages of crop growth
- Amount and method of application affect the efficiency
- Determine amounts based on water retention characteristics of soil: an area of extensive research in soil physics

Irrigation Water Standards

Class	Quality	Electrical conductivity (EC) dS/m	Total dissolved solids (TDS) ppm	Sodium adsorption ratio (SAR)	Residual Sodium Carbonate (RSC) m equ/lit
1st	Suitable	< 1.5	< 1000	< 7.5	< 2
2nd	Marginal	1.5-2.7	1000-1800	7.5-15	2-4
3rd	Unsuitable	> 2.7	> 1800	> 15	> 4

Advanced Irrigation Practices

- Soil water retention characteristics vary among different textural classes
- Save water by applying amount that is needed to refill the soil up to field capacity
- Monitoring changes in soil water is critical
- Experience of developed nations can be used
- Sensor technologies coupled with computer controlled irrigation offer great prospect

Environment

- Biological and physical environment
- Soil microorganisms can modify/improve BE
- Organic amendments improve activity of soil microbes as they are rich in organic carbon
- Earth worms make fine tunnels in soil: improve root penetration and aeration
- Effective microorganism technology
- Bio fertilizers to improve soil conditions

Tillage Practices

- Decide based on previous cropping history, soil texture, locality, and requirement of the crop
- Understand the role of tillage
- Consider deep plowing every 3-5 years based on prevailing crop rotations
- Conservation tillage vs. conventional tillage
- Use wisdom, science, and local experience
- Consider cost-effectiveness

Remedy

- Genotypes respond differently across a range of environments i.e., the relative performance of varieties depends on the environment
- Genotype by environment interactions are common for most quantitative traits of economic importance
- Advanced breeding materials must be evaluated in multiple locations for more than three years (one plant and two ratoon crops)
- Sugar yield = Cane yield x sugar recovery%

Sustainable Sugar Production

- To grow early maturing, high cane and sugar yielding varieties.
- Initiate a quality payment system
- Adoption of new production technology
- Apply alternate skip furrow irrigation
- Recovery schedule should be followed
- Fresh cane should be supplied to the sugar mills
- Supply of clean cane to the sugar mills
- Stoppage of water 20-30 days before the supply of cane to the mills
- To avoid late application of fertilizer
- Development work should be undertaken by the sugar mills
- Avoid late planting
- Recruitment of qualified cane staff by sugar mills
- Pre-sowing contract with the farmers

Cont..

- **Socio Economics**
  - Mostly small growers do not adopt innovations and lack the resources to apply new technology due to which their yields are very low.
  - Big farmers respond to new innovations and have resources for their applications hence their yields are very high.
- **Solutions**
  - Provision of credit facilities to the small farmers.
  - Strengthening of linkage of Extension staff with the growers.
  - Availability of seed of approved varieties
  - High cost of inputs like seed, fertilizer, insecticide, diesel, equipment, and irrigation water should be rationalized.

Cont..

- **Marketing**
  - Role of middleman
  - Late payments by Sugar Mills to the cane growers
  - Less weighing of cane by Sugar Mills
  - High cost of production
  - Wait due to long queues
- **Policies**
  - Commencement of development activities by sugar mills.
  - Introduction of support price policy on quality payment.
  - Elimination of middleman
- **Milling**
  - Crushing of stalled cane.
  - Poor procurement system.
  - Non-adoption of harvesting schedule.
  - Recruitment of un-qualified staff.
  - Un-consistent policies.

Goal oriented efforts

Integrated efforts of all units can solve the problem

Thanks for your attention!