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**Course name :**

**Crop Production Technology-II  
(ASAG 2204)**

**Course credit :**

**(2-1-0)**

**Lecture 12**

**Topic: Sugarcane**



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# SUGARCANE

*Saccharum officinarum*

- ✓ Genus : Saccharum is derived from the Sanskrit word “sarkara - white sugar”.
- ✓ It is an important crop in the Indian sub-continent.
- ✓ Sugar industry is **second largest agro-based** industry next only to textiles.
- ✓ Sugarcane crop contributes more than **62% of world sugar production.**
- ✓ Globally **60 %** of white crystal sugar comes from **sugarcane** and **40 %** comes from **sugarbeet.**
- ✓ India is one of the major producers of sugarcane and sugar in the world.



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- S-cane provides **cheapest form of energy** giving food [sucrose].
- In addition to sugar, **38 value added products** are obtained.
- Juice is used for making of white sugar, brown sugar (khandasari) and jaggery (gur).
- Is a source as bio-fuel, fibre, fertilizer etc. by products viz, bagasse (power of sugar mills) and molasses [main raw material for alcohol].

### **1.1 ORIGIN :**

- *S. officinarum* is Indo Myanmar china border and New Guinea.



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## 1.2 Area & Production

- Brazil has the largest sugarcane area.
- Cuba, China, Pakistan, Mexico, S. Africa, Australia, Indonesia, are cane growing countries.
- Today, India ranks second in the world, after Brazil, in terms of area (4.1 m.ha) and sugarcane production.
- Among the states, Uttar Pradesh occupies half of the total area followed by Maharashtra.
- In terms of productivity, Tamil Nadu leads followed by Karnataka and Andhra Pradesh.
- Bihar, A.P, TN , Karnataka, Gujarat and Punjab are the other cane growing states.



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➤ Sugarcane in India is grown in two distinct agro-climatic regions-the **Tropical** (largely comprising Maharashtra, Karnataka, Gujarat and Tamil Nadu) and the **Sub-tropical** (Uttar Pradesh, Punjab, Haryana and Bihar).

➤ **There are 3 cultivated species of sugarcane**

➤ *Saccharum officinarum*

➤ *S.barberi,*

➤ *S.Sinense*

**Two wild species**

➤ *Saccharum spontaneum*

➤ *Saccharum robustum.*



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## 1.3 CLASSIFICATION :

### 1.3.1 *Saccharum officinarum* :

- These are **thick and juicy canes** good for chewing purpose also.
- These contains **high sugar content, low fibre** .
- **Resistant to smut but are susceptible to red rot.**
- Cultivation **limited to tropical areas.**

### 1.3.2 *Saccharum sinense*:

- Indigenous to **north eastern India.**
- They have long and thin stalks, broad leaves, low to medium sucrose content and early matured.

Long internodes are present.

### 1.3.3 *Saccharum barberi* :

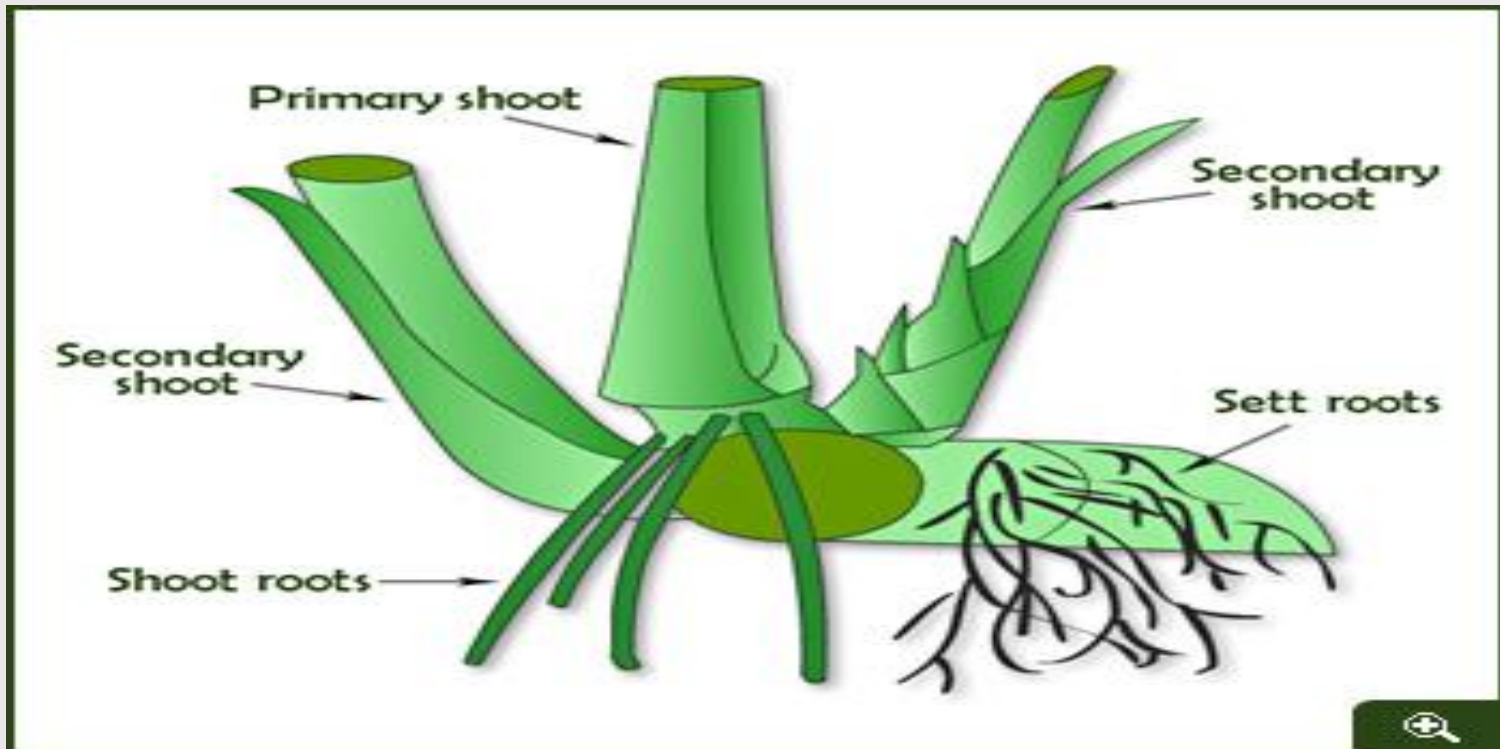
- Indigenous to **north eastern India.**
- It is characterised by short and thin stalks, narrow leaves, low to medium sucrose content and early maturity.



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## 1.4 ROOT SYSTEM :

- Fibrous root system is present.
- 2 types of roots, namely sett roots and shoot roots.
- **Sett roots – temporary**
- **Shoot roots - permanent**





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## 1.4.1 STALK:

- Roughly cylindrical and is composed of many distinct nodes and internodes.
- Above portion of plant which bears leaves and flowers. A small portion of the stalk is below ground which is called **rootstock**.
- At each node there is a bud , sometimes known as an **eye** appearing on opposite sides of the cane.
- Below the bud there is a raised portion called as leaf scar- attachment between leaf sheath and stalk.
- Above each node, 2 or 3 translucent dot like structures known as root primordia appear. Root primordia will give rise to sett roots. The inflorescence of sugarcane generally called **arrow**.
- Sugarcane flower at the age of 10-12 months.





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## 1.5 CLIMATE :

- Sugarcane is tropical plant.
- It will grow in tropics and sub tropics.
- A growing season which is long and warm with adequate rainfall or irrigation, long hours of bright sunshine and higher relative humidity which permits rapid growth to build up adequate yield.
- **Ripening season** of around 2-3 months duration having **warm days, clear skies, cool nights and relatively a dry weather without rainfall and higher difference in day (maximum) and night (minimum) temperatures for build up of sugar are required.**



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- Warm summer growing season with adequate rainfall is an ideal climate for sugarcane production.
- Temp.  $> 50^{\circ}\text{C}$  = arrests its growth.  
 $< 20^{\circ}\text{C}$  = slows its growth.
- Low temp. reduces tillering.
- Optimum temp. =  $26-36^{\circ}\text{C}$ .

Ideal climate for cultivation of sugarcane in our country such as **maharashtra, parts of karnataka, A.P.**

Sugar synthesis -  $30^{\circ}\text{C}$

Tillering –  $30-35^{\circ}\text{C}$

Root growth –  $36^{\circ}\text{C}$  (soil)

Shoot growth -  $36^{\circ}\text{C}$  (soil)

Short day lengths **decreases number of tillers / plant.**

Long day lengths **produces more dry matter.**



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➤ **Rainfall : In India, grown in areas ranging from 600 to 3000 mm, rains at active growth period ,encourages rapid cane growth, cane elongation whereas rains at ripening period, leads to poor juice quality.**

➤ **Sunshine : S'cane is sun loving plant. Higher sunshine hours, favours higher cane yield, sugar recovery.**

## **1.6 SOIL :**

- Suitable from **sandy loam to clay loam.**
- Comes well under **drained loamy soils.**
- Grown on light soils under proper irrigation.
- Heavy soils under proper drainage.
- Saline , alkaline and acidic , soils are not suitable.



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## **1.7 Varieties**

**1.7.1 Late maturing varieties (12 -13 months):** Co 7219, Co7706, Co8011, CoR8001.

**1.7.2 Mid-late maturing varieties (11-12 months)**  
: *CoA7602, CoT8201, Co7805, Co8021, 85R186, 86A146, 87A 397, 83V15, 83V288.*

**1.7.3 Early maturing varieties (9 -10 months) :**  
Co6907, Co7505, 90A 272, 81A99, 82A123,  
83A145, 81V48, 85A261, 86V96, 84A125,  
91V83, 93V297, 83R23, 87A298.

**1.7.4 Under rain fed conditions for planting in February:** Co6907, 81A99, 85A261, 81V48, 83R23, CoT820, CoA7602, 87A298, Co7210.



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**1.7.5 For Planting in May - June:** Co6907, Co8013, 84A125, 85A261, 81A99, 87A298, 81V48, 91V83, 93V297.

**1.7.6 For water logged (swamp) conditions:** Co697, 84A125, CoR8001, 83V288, 83V15, 81V48, 91V83, 87A298, 85A261, 87A261, 87A397, 89V74.

**1.7.7 For Moisture Stress conditions:** Co6907, CoT8201, CoA7602, Co7219, 84A125, 85A261, 83V15, 81A99, 83R23, 89V74, 83V288, Co7508.

**1.7.8 For redrot affected areas:** Co7508, CoA7602, Co8014, CoR8001, 85A261, 87A298, 90A272, Co6907, 86V96, 83R23, 91V83, 88R58, 92A126, Co7219, 86V96, Co7805, Co7706, 83V15, 89V74, 87A397.

**1.7.9 Smut disease tolerant varieties:** Co8013, Co8014, 81A261, 84A125, 81A48, 83V15, 83V288, 83V96, 89V74, 93V297, 90A272, Co7805, 86A146, 87A397.

**1.7.10 For jaggery preparation:** Co7706

**1.7.11 For Saline / Alkaline Soils :** 81V48, 81A99, CoT8201, 93A145



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## **1.8 CROPPING SYSTEMS :**

### **NORTH INDIA**

**Maize – potato-sugarcane**

**maize- sugarcane –wheat**

**Rice – sugarcane – wheat**

**Cotton- sugarcane – ratoon**

### **SOUTH INDIA**

**Rice- sugarcane- ratoon-wheat**

**Cotton – sugarcane – ratoon – wheat**

**Cotton – sugarcane - chickpea**

**Sugarcane – ratoon- kharif paddy- winter rice**

## **1.9 INTERCROPPING :**

### **Autumn**

Sugarcane + potato

Sugarcane + wheat

Sugarcane + lahi ( rapseed)

Sugarcane + lentil

### **Spring**

Sugarcane + greengram / blackgram



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## 1.10 Field preparation

- Field is ploughed 2-4 times with iron plough and pulverization to break the clods.
- Surface soils are dug to a depth of 20 cm to facilitate drainage and deep root system. Tractor ploughing is a common practice.
- Sugarcane needs deep tillage, shallow ploughing with local plough limits the development of root system resulting in lodging of cane plants.
- Sugarcane is mostly grown on alluvium loam soils , one deep ploughing with soil turning plough followed by two cross harrowings . (NI)
- Planking should be done to make the field smooth and clod free.



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## **1.11 PLANTING SEASON**

- **Optimum time for Sugarcane planting is December to end of March month ending.**
- **For coastal districts it is January- Middle of March, for Rayalseema it is January to February middle, in Telangana for Eksali crop during December to January middle,**
- **For Adsali crop it is August – September middle is the optimum time of planting.**

## **1.12 Duration of Sugar cane crop varies 10-18 months**

- **Kamsali crop : < 10 months**
- **Eksali crop : 10-12 months**
- **Adsali crop : 12-18 months**





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## 1.13 Seed rate

### 1.13.1 Seed selection:

- Healthy seed material, free from pests and diseases like red rot, wilt, smut, ratoon stunting should be selected.
- **Top 1/3 to 1/2 portion** of a cane being comparatively immature has buds of high viability and is best for sowing.
- Bottom portion of cane is rich in sugar and takes a long time in germination ; this should be used in jaggery making.
- Ratoon crop is not suitable for seed purpose.



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## 1.14 Seed preparation and treatment :

- Before planting, the dry leaves of the cane stalks are removed by hand in order to avoid any possible damage to buds.
- Thereafter cane is cut into **3 budded setts** usually 30-45 cm long.
- About **35000-40000 setts** are needed to plant 1 ha which can be obtained from about **75-80** quintals of cane.



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## 1.15 Setts treatment :

- Setts should be soaked in water if it is drawn from stale and dried canes.
- As a preventive measure against termites and shoot borers setts should be treated with chlorpyrifos, Heptachlor, @ 1.0 kg/ha.
- Sett rotting : Agallol or Aretan ( 0.5 %)
- Grassy shoot : Erythromycin
- Leaf scald: Streptomycin (100 ppm)
- Leaf spot : carbendazim ( 0.1%), COC (0.2%)
- Hot air treatment of setts @54 °C – redrot, ratoon stunt, grassy shoot.



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## 1.16 Spacing

Mostly planted by opening a furrow with ridges .

Row to row spacing varies from 60-90 cms

**Adsali Planting** : 120 cm row spacing is followed

**Early varieties** : 80cm

**Mid late varieties** : 90 cm