

## Sugarcane (*Saccharum officinarum*) $2n = 80$

**Origin:** India

The word sugarcane is derived from Sanskrit word 'sharkara' meaning sugar. It includes 3 cultivated species like *S. officinarum*, *S. barberi*, and *S. sinense*.

Wild species

*S. spontaneum*,

*S. robustum*.

**Cultivated species:**

*S. officinarum* ( $2n = 80$ )

*S. sinense* ( $2n = 118$ )

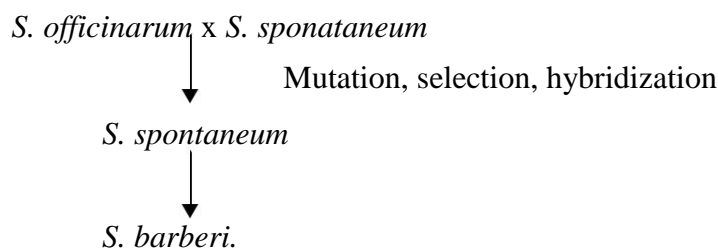
*S. barberi* ( $2n = 82 - 12$ )

*S. officinarum* is also known as noble cane. The term noble was given by Dutch scientists in Java to tall, handsome, large barked and colourful canes of this species. The canes of this species have thick stem, soft rind, low fibre, high sugar content, high cane yield, and resistance to smut.

1. *S. robustum*  $\longrightarrow$  *S. officinarum* (New Guinea)  
*S. barberi* and *S. sinense* (North)
2. *S. officinarum* X *S. spontaneum*  $\longrightarrow$  India).

**Origin of cultivated species:**

The wild progenitor for *S. officinarum* is *S. robustum*



**Distribution :** India, Brazil, Cuba, China, USA, Mexico, France, Germany and Australia. In India, Uttar Pradesh, Maharashtra, Haryana, Andhra Pradesh, Tamilnadu, Karnataka, Bihar and Punjab. India stands first in sugar and sugarcane production in world.

**B reeding objectives:-**

High cane yield / height of stem, thickness, tillering capacity, no of villable canes / plant and weight of individual cane.

Moderate high sucrose content

### Early to full season maturity

- a) Red rot
- b) Smut
- c) Wilt
- d) Mosaic
- e) Ratoon – stunting disease
- f) Grassy – shoot

### Resistance / tolerance to insect pests

- a) Shoot borer
- b) Cane borer
- c) Pyrilla
- d) Mealy bugs
- e) White flies
- f) Termites
- g) White grub

### Tolerance to abiotic stresses

- a) Drought
- b) Salinity
- c) Flooding
- d) High temperature

### Wider adaptability

### Resistance to diseases



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### **Breeding procedures:**

#### **1. Hybridization:** 3 basic types of crosses are made

**Biparental crosses:-** These are the crosses resulting from 2 known parental clones. This is easily achieved by bringing together the two parents in an isolated area or under lanterns

**Area crosses:** In this system several male sterile female clones are pollinated by one male parent in an isolated area.

**Melting pot crosses:** Melting pot crosses or polycrosses are made by bringing together arrows of large number of superior / potential parental cultivars in an isolated area. Natural cross pollination is allowed. This procedure allows the evaluation of breeding behaviour of a large number of clones at a minimum expense.

#### **Breeding for resistance to diseases:-**

**Red rot:-** It is a major problem in sub-tropical countries. The major sugarcane varieties which are found to be resistant to this disease are

Co 1148, 1336, 6304, Co 5659, CoS 698 etc.

**Smut:** Serious disease in many sugarcane growing countries resistant commercial varieties in India are

Co 449, 527, 853, 1148, 1336.

#### **3. Mutation Breeding:**

According to Heinz x-ray - Irradiation to induce mutations in sugarcane were carried out in 1927. Many mutation breeding programmed with x – rays and gamma – rays were started during early sixties in India.

Mutation breeding in sugarcane aims at creating economic mutants for higher cane yield, non – flowering and resistance to various diseases such as redrot, smut, downy mildew and to various insect borers.

Gamma-rays as well as chemical mutagens such as EMS are applied mostly on buds.

**Abiotic stress tolerance / reistance:-**

Common abiotic stresses for sugarcane as in other crops are drought, flooding, salinity, high temperature freezing temperature

According to Zobel, they are following 3 basis steps for breeding stress resistance cultivars.

Identifying and characterizing crop traits that are needed for resistance against a particular stress

Identifying and characterizing the genotypes that are capable of filling the needs are determined under step I above.

Manipulating genes to produce an adapted variety that has the required characteristics and fills other specific needs.

**Biotechnology:**

Regeneration of sugarcane plant from callus has been possible.

**Breeding centres:-**

Sugarcane breeding institute, Coimbatore

Indian Institute of Sugarcane Research, Lucknow

State sugarcane research stations, such as shahjahanpur (UP), Seorali, (Deoria) (UP), Pusa (Bihar), Padegaon (Maharashtra) and Anakapalli (AP).

Drought	:	Co 285, Co 740, Co 997, Co 1148
Frost	:	Co 1148, N Co 310
Salinity	:	Co 453, Co 62125
Lodging	:	Co 6304, Co 7117, CoS 7918
Water logging	:	Co 1157, Co 975, Co 785, Bo 91, Bo 104, Bo 106, Bo 109
Top borer	:	Co J 67, Co 1158
Inter nodal borer	:	Co C 671, Co 975
Red rot	:	Co 7627, Co J 64, CoR 8001.