

## Package of practices for sugarcane crop for Southern Zone Normal areas and seasons : Plant Crop

1. Varieties
  - a. Early maturing Co 6907, 85 A261, 84 A 125, Co 8014, 83 A 30, 87 A 298, 99 V 30, 86 V 96, 91 V 83, 2000 V 59, 2003 V 46, 93 A 145, 97 A 85, 2001 A 63, 2000 A 213 and 83 R 23.
  - b. Mid-late maturing Co T 8201, Co A 7602, Co 7805, 83 V 15, 86 A 146, 88 A 162, 96 A 3, 97 R 129, 2002 V 48, 2000A225, 98A163 and 99 A 5
  - c. Late maturing Co 8011, Co 7219, Co 7706, 87 A 380 and Co R 8001.
  - d. Moisture stress Co T 8201, Co 6907, 87 A 298, 97 A 85, 99V30, Co 7219, Co A 7602 and 83 R 23.
  - e. Swamp conditions 84 A 125, 87 A 298, 86 V 96, 97 V 118, Co 6907, Co T 8201, Co 7219, 85 A 261, 2000 V 59, 2003V46, 83 V 15, Co 7706, Co A 7602 and Co R 8001.
  - f. Saline – Alkaline soils Co T 8201, 97 A 85, 93 A 145, 99V30S and Co 7219.
2. Soils / Areas Alluvial and red soils of rice deltas. Well-drained loamy soils.
3. Land preparation Soils to be worked to fine filth to a depth of 20-25 cm. Open trenches of 30 cm width, 20 cm depth and 50 cm ridges have to be formed by manual labour or iron plough or ridgamar.
4. Seed rate 40,000 three budded setts per hectare.
5. Seed treatment Hot water treatment of seed material at 52° C for 30 minutes or treatment with aerated steam for smut and grassy shoot disease followed by dipping of setts in Carbendazim (0.05%) and Malathion (0.1%) to eliminate pineapple disease and scale insect.
- Short crop Primary seed nurseries of six to seven months age can be raised from treated seed material in the months of December-January. Secondary seed material should be planted in July-August months utilizing seed from primary seed nurseries. Commercial plantings can be done utilizing seed from secondary nurseries.
6. Spacing 80 cm between rows for early varieties and 90 cm for mid-late varieties.
7. Planting with cut off dates
 

Early varieties	December – January
Mid varieties	February
Late varieties	March
8. Manures and fertilizers including bio-fertilizers, micro nutrients etc;
 

Farm yard manure @ 25 tonnes per hectare or press mud cake @ 12 tonnes per hectare in the last ploughing. 224 kg nitrogen (pocket application) has to be applied in two equal split doses at 45 and 90 days after planting.

Phosphorous @ 100 kg P<sub>2</sub>O<sub>5</sub> and Potassium @ 120 kg K<sub>2</sub>O per hectare as basal application. Zinc sulphate (2 gm/lt) and Ferrous sulphate (10-20 gm/lt) as foliar spray at 45-60 days after planting where zinc and iron deficiencies are observed.

9. Inter cultivation and other management practices, if any:

Weed management:

Application of Atrazine @ 5 kg/ha in 1125 lts of water to be sprayed on the third or fourth days after planting, depending on soil moisture. At 20 and 60 days of planting spraying of 2,4-D (4 ½ kg) + Gramoxone (2.5 lts) in 1125 lts/ha is recommended.

Inter culture:

Earthing up at about four months after planting, propping the crop by trash twist, twice or thrice, depending on crop growth.

10. Irrigation

Once in six days during summer and once in 15-21 days from November to harvest. During grand growth period, irrigation is to be provided when dry spell exceeds 15 days. If only one irrigation is possible during formative phase, it has to be given at 30 days after planting and trash mulching has to be done three days after planting @ 3 t/ha.

11. Harvesting

Crop has to be harvested at peak maturity depending upon variety, date of planting and juice quality.

12. Post harvest technology

Sugarcane harvested in a field should be free from root material, soil etc., The immature top portion should be cut to the first visible top internode. Such dressed cane should be crushed within 24 hours either in a sugar factory or jaggery crusher to avoid loss in the weight of cane and recovery of end product.

Powdery and bucket shaped forms of jaggery were found to be better for storage and handling. Jaggery kept in painted earthen pots and gur drying cum storage bins was not subjected to any spoilage for longer period. Jaggery powder kept either in polythene bag or polythene bottles can be stored for periods longer than an year without any loss in quality or quantity.

## **Normal areas and seasons: Ratoon crop**

1. Varieties

The same varieties indicated for plant crop are suitable for ratoon crop

2. Soils/Areas

Alluvial, red and well drained loamy soils

3. Stubble shaving and interculture

Plant crop has to be harvested to the ground level or just below ground level. Stubble shaving has to be done with spades without disturbing the stools. The interspaces have to be ploughed to 12 to 15 cm depth to break the crust and improve aeration for better ratooning.

4. Trash mulching

Trash mulching @ 3 t/ha at 3<sup>rd</sup>-5<sup>th</sup> days after planting ensures conservation of soil moisture and suppression of early shoot borer and weed growth.

5. Manures and fertilizers including bio fertilizers, micro nutrients etc.,  
336 kg N/ha has to be applied in two split doses at ratooning and 45 days later.  $P_2O_5$  @ 100 kg / ha and  $K_2O$  @ 120 kg / ha are to be applied at the time of ratooning. If deficiency of iron is noticed Ferrous sulphate (2%) is to be sprayed on foliage immediately.
6. Gap filling:  
Gap filling has to be done with seedlings raised in polythene bags or in nursery from single budded setts within two weeks after ratooning.
7. Weed management:  
Weeding and hoeing at 1<sup>st</sup>, 4<sup>th</sup> and 7<sup>th</sup> weeks after ratooning or spraying Atrazine @ 2.0 kg / acre immediately after ratooning followed by one hand weeding at 45 days after ratooning or metribuzin @ 600 g/acre in 450 lit. of water within three days after ratooning followed by one hand weeding at 45 days after ratooning.
8. Harvesting:  
Ratooning crop matures earlier than plant crop. Therefore crop has to be harvested earlier than plant crop at peak maturity.

### **SALINE / ALKALINE SOIL CONDITIONS**

1. Varieties 93 A 145, 97 A 85, Co T 8201, 99V30 and Co 7219.
2. Soils / Areas Saline / Alkaline soils
3. Land preparation Deep ploughing is not advisable but other aspects are similar to plant crop.
4. Seed rate 45,000 three budded setts per hectare. Seed material should be selected from matured crop.
5. Planting / Sowing/ with cut off dates  
Early planting December – January
6. Manures and fertilizers including bio fertilizers, micronutrients etc;  
Gypsum has to be applied @ 2-5 t/ha depending upon  $P^H$  ranging from 8.5 – 9.2. Farm yard manure @ 25 t/ha or press mud cake @ 12 t/ha and Zinc sulphate @ 50 kg / ha are to be applied in the last ploughing.  $P_2O_5$  @ 100 kg / ha and  $K_2O$  @ 120 kg / ha for early planted crop and 50 kg / ha  $K_2O$  for late planted crop at the time of formation of ridges and furrows. For early planting, Nitrogen @ 168 kg/ha in two splits at 60 and 120 days after planting should be applied.
7. Inter cultivation and other management practices if any:
  - i. Provision of drainage and leaching with good quality water.
  - ii. Earthing up at 4 months after planting and trash twist propping 2-3 times depending upon the growth of the crop.
  - iii. Trash mulching @ 3 t/ha three days after planting.
8. Irrigation  
For early planted crop – once in six days during summer and once in 15-21 days from November to harvest. During rainy season if dry spells prevails one to two irrigations may be provided. Late planted crop is usually rainfed.
9. Harvesting  
Crop has to be harvested at peak maturity depending upon variety, date of planting and juice quality.

## PESTS AND DISEASES OF SUGARCANE AND THEIR MANAGEMENT

### INSECT PESTS:

#### **Early shoot borer**

- Planting of setts in deep furrows.
- Application of Phorate 10 G granules @ 15 kg/ha at the time of planting.
- Trash mulching @ 3 t/ha at 3 days after planting in plant crop and immediately after stubble shaving in ratoon crop.
- Irrigation at frequent intervals during summer.
- Spraying Endosulfan 0.07% or Chlorpyrifos 0.05% at 4, 6 and 9 weeks after planting in 450, 675 and 900 lts of water, respectively.
- Early ratooning in the months of November and December coupled with closer irrigations in the formative phase of the crop.
- Use of synthetic pheromones in water traps @ 5 /acre commencing from 35 days after ratooning.
- Field release of egg parasitoid, *Trichogramma chilonis* @ 50,000/ha at 30 days after ratooning and subsequent releases should be made at fortnightly intervals for four times.

#### **Internode borer**

- Control of early shoot borer in early stages of the crop growth.
- Detrashing of the crop with a view to destroying the larvae and pupae attached with the leaf sheaths.
- Removal of water shoots at eighth/ ninth months.
- Avoid high dose of nitrogen
- Draining off water in low-lying areas.
- Use of synthetic pheromones in water traps @ 5 /acre commencing from the internode formation stage of the crop.
- Field release of egg parasitoid, *Trichogramma chilonis* @ 50,000/ha at fortnightly intervals from 120 days after planting until a month before harvest.
- Spray endosulfan @ 0.07% twice at 15 days interval during June-July months.

#### **Scale insect**

- Dipping three budded setts in Malathion 0.1% or Dimethoate 0.05% for 15 minutes before planting.
- Detrashing the cane in the first weeks of July, August and September months followed by spraying with dimethoate 0.05% or malathion 0.15%.
- Dimethoate is preferred for spraying during heavy rains.
- Plant crop once met with heavy infestation should not be ratooned.

#### **Mealy bug:**

- The plant crop infested with mealy bugs should not be ratooned.
- Known alternative host plants (certain grasses like *Cymbopogon*) near sugarcane fields may be destroyed.
- Avoid over dosage of nitrogenous fertilisers.
- Repeated ratooning may be avoided in areas prone to mealy bug.

- Detrashing in grown-up crop is advocated followed by thorough spraying with dimethoate @ 1.7 ml/lit or malathion @ 3ml/lit. by using foot sprayer with long lance.

#### **6. White fly:**

Providing of adequate drainage facilities

Heavy rainfall washes out the pest.

Application of 'N' fertilisers at recommended dose at stipulated time.

Ratooning is to be avoided in low lying areas prone for water logging.

Spraying with endosulfan 0.07% or malathion 0.1% or chlorpyrifos 0.05% using foot sprayer with long lance.

#### **7. Termites:**

- Systematic digging of termite mounds and destruction of queens. Application of lindane dust @ 200g/ mound followed by proper leveling.
- Application of Lindane 1.2% Dust in the furrows @ 25 kg/ha.
- On standing crop, spray chlorpyrifos 20 EC @ 5ml/lit. on internodes.

#### **8. Cane fly:**

- ➔ Removal of lower leaves
- ➔ Judicious use of Nitrogenous fertilisers.
- ➔ Prevention of lodging.
- ➔ Spray endosulfan @ 2ml/lit or malathion @ 2 ml/lit with foot sprayer
- ➔ Release of *Epiricania melanoleuca* 4000-5000 cocoons/ha and 4-5 lakhs eggs per hectare.

#### **9. Mites:**

- Removal and destruction of infested leaves
- Removal and destruction of grasses on the bunds.
- Spray the sugarcane crop and grasses with wettable sulphur @ 3g/lit at 15 days interval starting from the appearance of the pest.
- Adoption of balanced nutrition.
- Frequent irrigations in the pre-monsoon period reduce *O. indicus* infestation.

#### **10. Woolly aphid:**

- ❖ Harvesting of affected matured crop on priority basis.
- ❖ Avoidance of transportation of infested leaves.
- ❖ Avoidance of ratooning, if the plant crop is heavily infested with woolly aphid.
- ❖ Adoption of paired/wider row planting.
- ❖ Removal and burning of affected leaves.
- ❖ Wrapping and propping of canes.
- ❖ Judicious use of nitrogenous fertilisers and irrigation water.
- ❖ Providing proper drainage.
- ❖ Collection and release of predators like *Chrysoperla carnea* @ 5000-7500 eggs/ha ; Syrphid fly, Brown lace wing, *Micromus timidus* ( Ord.Neuroptera) and *Dipha aphidivora* (Ord. Lepidoptera) in infested patches.
- ❖ Monitoring of the pest through yellow traps.

- ❖ Thorough spraying with malathion 50 EC @ 2ml/lt. or endosulfan 35 EC @ 2ml/lt or monocrotophos @ 1.6 ml/lt. or dimethoate 30 EC @ 1.7ml/lt or chlorpyriphos 20EC @ 2.5 ml/lt. or methyl demeton @ 2ml/lt. or Acephate @ 1g/lt.

### **11. Root grub**

- Damage due to root grub appears to be severe in light soils.
- Application of phorate 10 G granules @ 15 kg/ha to soil at planting reduces the damage.
- In standing crop, flooding of fields for 2-3 days is effective in reducing the severity.

### **DISEASES:**

#### **1. Smut**

- Systematic eradication of smutted clumps.
- Avoidance of second ratoon if incidence is severe.
- Treating three budded setts in hot water at 52<sup>o</sup> C for 30 minutes or aerated steam at 51<sup>o</sup> C for two hours followed by dipping setts in Carbendazim and raise special seed nurseries.
- Selecting seed material from disease free areas atleast 40 mt away from affected fields. Sett treatment with propiconazole (1 ml/lt) for 15 minutes before planting in susceptible varieties
- Spray propiconazole (0.5 ml/lt) twice, one at 35 days after ratooning and 30 days later if infection persists.

#### **2. Red rot**

- Selection of healthy seed material from disease free localities.
- Systematic eradication of affected clumps.
- Uproot and destroy un-germinated setts of plant crop and un-sprouted clumps of ratoon crop.
- Affected plant crop should not be ratooned.
- Proper drainage should be maintained to avoid stagnation.
- After harvesting affected plots, all stubbles and debris should be burnt and further cane planting should not be taken up to four months.
- Diseased canes are to be harvested as early as possible and crop residues should be burnt.
- Keep the crop erect without lodging by propping with bamboos or trash twist propping.
- Growing resistant varieties like Co 7706, Co A 7602, Co 8021, Co T 8201, Co R 8001, 85 A 261, 83 A 30, 87 A 298, 86 V 96, 83 V 15, 83 R 23, 90 A 272 and Co 7219.

#### **3. Grassy shoot disease**

- Uproot and destroy affected clumps.
- Severely affected plots should not be ratooned.
- Select seed material from disease free plots.
- Treat setts in hot water at 52<sup>o</sup> C for 30 minutes or aerated steam at 50<sup>o</sup> C for one hour and raise special seed nursery.
- Spray Malathion (2 ml/ lt) or Dimethoate (2 ml/lt) to check vector population.

#### **4. Pineapple disease:**

- The disease can be avoided by dipping the setts in 0.05 percent solution of carbendazim (150 g of Carbendazim in 300 litres of water for 40,000 three budded setts sufficient to plant in one hectare).
- Fungicidal sett drip treatment is essential for heat treated setts

**5. Wilt:**

- Frequent irrigations during summer
- Avoid water logging
- Use of disease free seed material
- Effective control of diseases and pests
- Application of recommended dose of nitrogen

**6. Leaf scald:**

- Grow healthy short crop seed material for planting
- Sterilize harvesting knives with 5 % formaldehyde or on direct flame
- Hot water treatment at 52°c for 30 minutes then treats the setts with carbendazim (0.05 %) for 15 minutes to avoid pineapple.

**7. Top rot:**

- Two sprays of mancozeb (3 g/lt) at 2-3 weeks interval.

**8. Ring spot:**

- Spray either carbendazim (0.1 5) or mancozeb (0.3 %) or copper oxychloride (0.04 %) twice or thrice at three weeks interval starting from the first appearance of disease.

**9. Rust:** Spray tridemorph 1 ml / lt. or Mancozeb 3 g/ lt. bi-weekly intervals.