



Crop Management Practices

An Agricultural Extension Initiative of **INDORAMA**

Sugarcane



Sugarcane



Introduction

Nigeria produces approximately **1 million metric tonnes of Sugarcane per year**. Sugarcane, is a strongly growing grass, highly adaptable to a wide range of tropical and subtropical climates, soils and cultural conditions and is propagated in over 100 countries. There can be little doubt that as a source of food, renewable energy and supplier of income to millions of people occupying more than 20 million hectares of land, Sugarcane must rank amongst the top agricultural Crops in the world. Sugarcane is the most important Sugar crop of the world. About 70% world Sugar is produced from Sugarcane. Considering the high importance of Sugar in modern life, Sugarcane is given an important place as Wheat and Paddy. Besides, other products like Vinegar, Molasses and Wine are also produced from Sugarcane.

Sugarcane is a renewable, natural agricultural resource because it provides Sugar, besides Biofuel, Fibre, Fertilizer and myriad of by-products/co-products with ecological sustainability. Cultivated Sugarcane might have originated in Oceania, most probably in New-Guinea.

Climate Requirement

Sugarcane is considered as essentially a tropical plant. It is a long duration Crop and thus it encounters all the seasons viz: rainy, winter and summer during its life cycle. The "ideal" climate for production of maximum Sugar from Sugarcane is characterized as a long, warm growing season with a high incidence of solar radiation and adequate moisture (rainfall) - the plant uses from 148 to 300g of water to produce 1.0g of dry substance.

Warm and humid climate is favorable for its growth. A temperature range of 30 to 40C with annual rainfall ranging between 70cm to 150 cm is the best for its successful cultivation. Long duration of sunlight (summer) helps in producing thicker and short Sugarcane. Warm long days produce plants with more tillers, juice and high sucrose contents.

Soil

Sugarcane does not require any specific type of soil as it can be successfully raised on diverse soil types ranging from sandy soils to clay-loams & heavy clays. Sugarcane crop can be grown on

a wide range of soils. The main characteristics of the soils suitable for sugarcane cultivation are that it must possess high contents of organic matter and is well drained. Therefore, heavy clay soil with proper drainage or light soil with irrigation facilities are also favorable for this Crop.

Land Preparation

Sugarcane crop requires well prepared soil to ensure sufficient moisture retention, well leveled soil for easy irrigations and intercultural operation, soil with good tilth to facilitate earthing up and well drained soil to save the Crop from waterlogging in case of heavy rains.

To prepare the field for Sugarcane a number of ploughings are given with a country plough, clods are broken, and stubbles are removed. This is followed by deep-ploughing with tractor or mould-board- plough and planking. Finally, 2 or 3 harrowings are given to bring the seed-bed into fine tilth. After sowing, ridges are made to divide the field into convenient size beds for irrigation and drainage.

Selection of Stem Cuttings

Sugarcane crop is propagated by stem-cutting. The upper-half portion of the plant bears buds of high viability and are best for raising new Crop. Cane sets of two or three nodes, bearing 3 or 4 vegetative buds are made from the healthy, free from insect pests and diseases, top portions of the plants after hand peeling. About 35,000 sets are required for one hectare.

When selecting cultivars for yield it is important to appreciate the impact of the three main components of yield (population, stalk mass and cane quality) on management and performance.

Sett Treatment

Cane-seed-setts are wet and sugary, therefore, while in soil, before sprouting into new plant, these are mostly damaged by insects (termites) and fungus. To avoid these losses, the sets, before planting, are dipped into 0.5% Agallol (3%) or 0.25% Aretan or Tafasan (6%) for 2-3 hours.

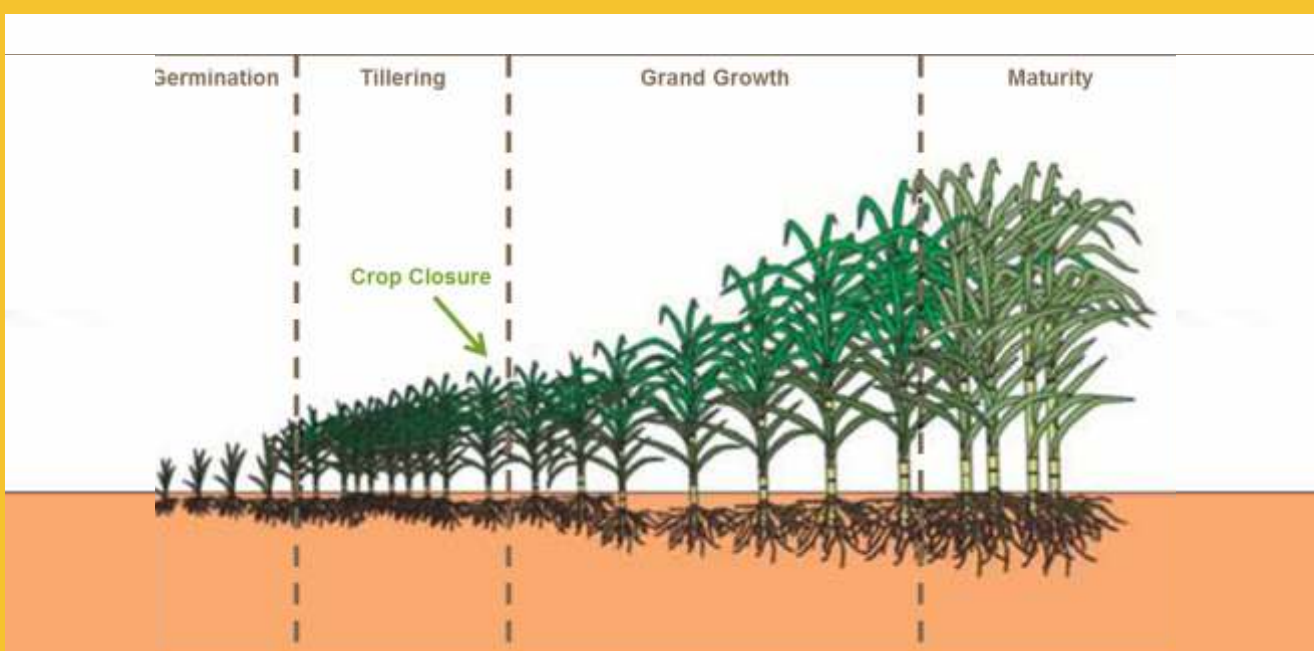
Method of Sowing Sugarcane

Crop is sown by various methods e.g. Flat Planting, Furrow planting and Trench method, depending upon the field conditions.

After care

After sowing, the Sugarcane field requires some immediate care like hoeing and protection from insects and farm animals. The fields are irrigated within a few days after sowing to get required soil conditions for hoeing. Hoeing assists in the emergence of sprouts and increases the plant population in the field.

The new emerging shoots are tender and palatable for animals to eat. Therefore, a number of insects and farm animals are attracted towards it and they require due protection measures..



Measures to Obtain Higher Germination

1. Using quality Setts as seed material obtained from a short seed crop devoid of any primary infection
2. Using preferably two eye bud Setts instead of three bud Setts as seed material
3. Careful preparation of Setts without damaging the buds or setts
4. Planting freshly prepared and treated Setts
5. Giving adequate and frequent irrigation during germination phase
6. Seed treatment with fungicides and pesticides

Summary of good management practices for cultivar selection:

1. Select cultivar on the basis of proven performance (sugar, fiber or ethanol), which are suited to the specific soil, climate, harvesting, management and milling conditions.
2. Soil-sample land to be used before final land preparation and planting, and obtain Fertilizer recommendations from an approved laboratory. It must be able to give recommendations for Sugarcane.
3. Ensure that Fertilizer application for the Crop cycle is based on soil and leaf analysis.
4. Plant when rains are reliable for rainfed cane and conserve moisture. Plant only after irrigation has been installed for irrigated cane.
5. There must be regular monitoring and control of weeds, pests and diseases.

Manures and Fertilizers

Farmyard manure is added one month before planting at the rate of 10-12 tonnes of well decomposed manure, to improve the soil texture and water holding capacity. Chemical Fertilizers are applied based on the recommendation of the soil test. For general purpose **200-300 kg Nitrogen (440 to 660 Kg/Ha Indorama Granular Urea)**, 80 kg Phosphorus, 80 kg Potash and 80 kg Calcium per hectare are applied. Half dose of Nitrogen and full dose of other Fertilizers are placed in furrows below or on the side of Cane-setts, at the time of sowing as a basal dose. The rest of the Nitrogen is applied in two split doses as top dressing during plant growth period. The application of Fertilizer at the early stage of plant growth is advantageous, and increases the sucrose contents in the juice.

Nitrogen deficiency:

It affects older leaves first. It causes light green to yellow leaves from base upward often with necrosis on leaf tip and edges. It also causes stunted growth with short internodes and slender stalks. It reduces tillering and result in low yields and low sucrose content.

Functions of Nitrogen and impact on Cane quality:

Nitrogen (N) is essential for photosynthesis and Sugar production and is taken up by the roots from the soil solution mainly as the Ammonium cation or Nitrate anion.

Approximately 80 to 85 % of the total N is sequestered into Proteins via the Amino acid link, which in turn are the building blocks of enzymes that govern the rate, timing, direction and extent of metabolic reaction pathways.

N is important to meristematic activity and in this way stimulates vegetative growth and tillering. Sugarcane is able to reabsorb more N than necessary for its vegetative growth by storing N. Emphasis on correct and timely placement of N Fertilizer is a key management factor as Sugarcane is notoriously inefficient in recovering applied N (6-45%).

Urea is probably the most commonly used N carrier in many Sugar industries because of high N concentration which translates into low transport and application costs. The Urea granules are coated, and are therefore less prone to volatilization.

Weed Management

In Sugarcane, weeds have been estimated to cause 12 to 72 % reduction in cane yield depending upon the severity of infestation. Sugarcane is a perennial crop and remains 3-4 years in the same field. Therefore, all types of weeds, seasonal, annual and perennial grow in the field. These compete for nutrients, space, light and create a favourable environment for disease and insect development.

Weeds of the Sugarcane can be classified into two groups i.e. one with broad leaves or Dicotyledonous and second as narrow leaved grassy or Monocotyledonous. Spraying with 2-40 @ 1 kg in 800 litres of water after a month of sowing destroys all broad leaved weeds. The second group of grassy weeds, are really a most problematic, since Sugarcane crop belongs to the grassy group of monocotyledonous.

Hand hoeing is the best method to control these weeds. Sometimes, particularly when the field is sown, spraying with 2 kg of Dilapon or Paraquat in 500 litres of water is done before the sprouting of the Sugarcane crop appears. This kills all grasses that stand in the field at that stage. Sometimes spraying is done with 2 kg Atrazine or Simazine in 500 litre water after the sprouting of the Sugarcane crop to check the weed's growth and spread. This is done with utmost care that a minimum dose of weedicide (sub-lethal), falls on the Sugarcane crop and optimum dose (lethal doze) falls on the weeds.

Diseases

Fungus, Bacteria and Virus cause diseases to Sugarcane crop. These are transmitted from one plant to another and one field to another field either by original seed sett or causal organism already in the soil or spores are carried by blowing wind.

Red rot disease is caused by a Fungus *Colletotrichum falcatum*: Red rot disease appears in July. Leaves start loosing colour and withering. The stalk becomes dry, wrinkled, hollow and alcoholic smell is emitted. To control the disease, if a very few plants are affected, uproot and burn these plants, otherwise discard the whole field and do not grow this Crop in the same field for at least three years. Fresh sowing should be done with seed-setts from resistant variety, dipping these in 0.25% solution of Agallol or Aretan for 2-3 minutes.

Pest Management

Sugarcane crop is attacked by a large number of insect pests, at various stages of its growth. Important ones are described here.

- 1. Top borer:** Larva is potent to make bores in midribs, top of shoots and can move through them, thus causes much damage to the growing points, and makes dead-heart in the stalk. Spraying with 1.5 litres Endosulfan 35 EC or Nuvacron 40 EC in 1000 litres of water gives reasonable control.
- 2. Pyrilla:** The insect pyrilla lives on the dorsal surface of the leaves and sucks the cell sap and leaves become yellowish white. To control it, Dusting with 10% BHC at the rate of 25 kg hectare or spraying with Malathion 50 EC or Endosulfan 35 EC at the rate of 1.25litres/hectare in 1000 litres of water.
- 3. Root borer:** The female lays eggs and larva develops and falls to the ground, thereby making hole into the root tissues. It makes a dead-heart ill the roots and leaves and plant dry up. To control this insect, Spraying with 20 EC BHC, 5 litres in 500 litres of water, over the seed-setts, at the time of sowing will not only control the root-borer but also shoot -borer and termites. Standing crop is given a spraying with 1.5 litres of Endosulfan 35 EC or Nuvacron 40 EC in 600 litres of water when eggs and moths are visible in the field.



Ratooning

Sugarcane is a perennial crop i.e. it does not require fresh planting year after year. The Crop of the second year and the subsequent years is called ratoon. Based upon practical experience, the growers can decide to keep the ratoon for 2-3 years. The main problem in keeping the ratoon is the accumulation of insect pests and diseases which deteriorate yield and quality of the juice.

An inter-culture with hoe or plough is given for incorporating the recommended doses of fertilizers and manures. Gap-filling is done. A light irrigation is applied to enhance sprouting. A ratoon crop matures earlier than fresh planted crop.

Harvesting and Yield

Sugarcane is a cash crop and after harvesting it is used in making sugar. Therefore, harvesting at the right stage of maturity is an important consideration. Experienced growers judge the maturity by process of withering leaves or by taste of the cane juice.

Harvesting is done with the help of sickle. Stalks are cut at ground level, leaves are stripped off and green top is cut. The canes are tied in bundle, and carried to the factory for Sugar or gum making. The average yield of cane 'is 500 q/ha, but under scientific management it may yield about 800 quintals/hectare. Ratoon crop gives lower yields than fresh crops.

