



- Beverages
- Timber plants
- Fibre plants
- Latex/rubber plants
- Paper

#### Improvement methods

For quality yield especially in crops

- Pure line selection; - breeding
- Improved method of cultivation
- Selection and use of quality seeds
- Use of adequate amount and type of chemical fertilizers, compost, manure etc.
- Selection of crops for a particular locality
- Introduction of high yielding and disease – resistant varieties
- Intensive and extensive cultivation
- Introduction of early maturing crop
- Proper irrigation

#### SUGAR PLANTS

Cane sugar as sucrose (culture 01) (a combination of glucose and fructose during photosynthesis) is the main commercial sugar, used universally as a secretives. It is one of the best sources of energy available to man. An acre of sugar cane plant, from where cane sugar is sourced, yields more calories of energy than any other field crop covering the same area.

There are two main sources of supply of sugar in the world. These include (1) sugar cane in the tropics (*Saccharum officinarum-poaceae*) and Marple (*Acer saccharum*) mostly in U.S. A.

To a lesser extent sugar is sourced from sugar-beet (*Beta vulgaris* – *chenopodaceae*). Sugar is also obtained from some sugar palm including the edible date palm (*Phoenix dactylifera*) etc.

Sugarcane: The sugar cane plant is a tall, red-like plant 25-4m in height or more. The plant thrives in Nigeria in wet guinea savannah and rain belt of Nigeria. Large acreage are also planted successfully under irrigation in the dryer Guinea savannah. The Niger state is one of the largest producer of all the states in Nigeria most especially for commercial purposes.

The plant takes 12-20 months to mature. It is propagated through stem cutting and the root stuck continues to grow as soon as the cutting are planted. Nearly 70% of the national yield of sugarcane is used for the manufacture of white sugar. The remaining percentage goes into the making of unrefined sugar, sugar syrup and for chewing by man known world producers of sugarcane include India, Java, Hawaii and Brazil, Cuba, Egypt. Proper irrigation and the use of fertilizers are important factors in the cultivation of sugar cane. The plant is susceptible to many diseases, particularly 'red rot' caused *Collectotrichum* sp

#### (1) Juice Extraction

Milling of short lengths to squeeze out juice

Straining to remove bagaste

Boiling of extracted (acidic) juice in boiling house (5.1-5.7 ph)

#### (2) Clarification

Addition of lime (and phosphoric acid sometimes) to range ph to 7.0

Pumping of juice through high velocity heater precipitation

Removal of impurities in clarifiers

Bright yellow clarified juice + sediment (press mud)  
For fertilizer production

(3) Concentration

Clarified juice pumped into multiple effect evaporator

Concentrated into clear pale yellow syrup

Boiling of concentrate in single effect vacuum pan for further concentration in batches to give semi solid massecuite

(4) Crystallization

Not massecuite fed into high speed centrifuge

Separation of massecuite into molasses and sugar crystals (brown sugar) under high centrifugal force

Molasses drained off  
and collected

brown sugar  
(sugar coated with  
film of molasses)

used in  
confectioneries

spraying with water under centrifugation to  
remove brown coating to have white sugar

(5) Refining

White sugar heated

Melting and mixing with lime ph increase to 10

Saturation of melted sugar with CO<sub>2</sub> reduction of ph to 7

Heating and passing through charcoal filter (continuous rotary pressure filter)

Repeat process as with brown sugar i.e. spraying with water under centrifugation

White sugar crystal dried in a rotary drier

By products utilization

(1) Bagasse (crushed stalks of sugar cane)

- As fuel
- For manufacture of wrapping paper and cardboard

(2) Press mud (sediment got after clarification process)

- Used as manure on a limited scale
- Wax obtained from press mud is used for shoe polish

(3) Molasses (one of the products crystallization process)

- Manufacture of alcohol
- Cattle feed
- Manure
- Fertilizer
- Carrying of tobacco

## SPICES AND CONDIMENTS

### Spices:

- Certain aromatic and plant products
- Used for seasoning and flavouring food and various vegetable preserves
- Used extensively in cookery and confectionery, beverages and medicine
- These including red pepper, *Capiscum sp (chilli) annum/frutesance*, ginger, *zyngiber officinale*, *syzygium aromaticum (clove)*, pepper (*Piper nigrum*) *occinum gratissum*, *xylophia aetlopica*, Efinrin (*Piper guineense*)
- Garlic (*Allium sativun*), onion (*Allium cepa*, Aidan (*Tetrapleura tetraptera*)

### Condiments

A substance such as salt, pepper that is used to give flavor to food or that is eaten with food. They came mostly seasonal products described form other materials.

### Red Pepper or Chilli:

This is the red pod-like fruit (berry) of *Capiscum annum* – family *solanaceae*. Chill is native to tropical America and West Indies and was introduced to other parts of the world including Africa and Asia. The plant is a herb or under shrub, extensively cultivated in all tropical countries.

Chillies are stomachic, pungent and stimulating and carmmative. In small doses they enhance secretion of saliva and gastric juices and also induce peristaltic movement. The active ingredient responsible for its pungency is capsinin contained in the fruit wall. Chillies are used all over the world as a condiment in raw ripe or dried form. They are also used for flavouring salads, soup, sauces, etc. The dosed fruit is ground into fine powder and sold as Cayenne pepper. Extracts from chillies have many pharmaceutical uses.

Clove (*Syzysium aromaticum*) (family Myrtaceae). The familiar clone used in the kitchen are the dried flavor buds of clone plant. These is an evergreen tree 15-30ft tall nature to Zanziba and the Phillipines. They are cultivated have in the Northern part of Nigeria. They also thrive well in other parts of the tropics such as Sumatra, Jamaica, Brazil where they are also cultivated. Cloves are very aromatic and are widely used in curries, pepper soup and medicine. Clove oil is extracted from the unripe fruit and leaves and used for medicinal purpose especially for tooth ache and some toilet products. Clove oil is unnecessarily used as a cleaning agent in histological works.

Ginger:

This is the Rhizome of *Zingiber officinale* (family Zingiberaceae). The plant is a small erect, perennial herb. It is indigenous to tropical Asia and cultivated in other tropical areas. It produces a single, leafy stem covered with the leaf sheaths of the lanceolate – oblong to linear leaves. The plant reaches a height of 3-4 feet, the leaves growing to 6-12 wider long. It is usually used to lend fragrance and progency to some food preparations. An essential oil contained in it is responsible for the aroma. An Oleoregin (Gingerin) gives it its pungent taste. It is used medicinally as stomacharic, carmnatine appetizer stimulant and as digestive.

Garlic (*Allium sativum*) (family liliaceae). This is a strong smelling whitish bulb, the smell being due to the preference of a sulphur-containing, volatile oil in all parts of the plant. The plant is a small perennial herbs cultivated all over the world including Asia, Africa and Kenya. Garlic is used as condiments particularly in fish and meat preparations where they also serve as tendernizer. They are also used in various fruit and vegetable preserves. It has some important medicinal properties. It is an effective remedy for high blood pressure, rheumatic and muscular pains. It is digestive and curative and removes pain in

the bone. It heals intestinal and stomach ulcer. It is regarded as nature's best antiseptic for the goat, it is a good tonic for the lungs.

#### *Monodora myristica* (Annonaceae)

This is a high forest *Monodora* extensively from Sierra Leone to Cameroon. Tree up to 90ft high and 6-7ft in girth. The seeds are used as a fragrant and known as African nutmeg.

#### *Xylocarpus aethiopicus*

The plant is in rain forest species and widely distributed. The tree is 60ft high and 2ft in girth with a clean straight bole. The fruits (Oct.-Mar.) are about a dozen narrow carpels, 2-3 inches long and 0.25m thick. Stalkless as a common stalk up to 2m high reach at first and eventually blackish containing 4-9 seeds.

The fruits are sometimes used as condiment for spicing food by the natives in Nigeria.