Gur (Jaggery) Making (Theory)

Gur is a natural sweetener rich in minerals like calcium, iron, phosphorus etc. The best quality *gur* and *shakkar* (powdered jaggery) are obtained from CoPb 92, Co 118, CoJ 64 and CoJ 88. Making of *gur* and *shakkar* from sugarcane involves juice extraction, clarification, boiling and concentration, cooling and moulding.

- Use an efficient cane-crusher for extracting juice.
- For clarifying the juice, add *Sukhlai* emulsion. *Sukhlai* is a shrub which grows in the Shivalik Hills. For preparing emulsion, soak the dry bark of *Sukhlai* in a bucket of water for 24 hours. Then rub the bark to obtain a thick mucilaginous fluid. Add about one litre of this fluid to 100 litres of cane juice, when the scum begins to rise in the pan.
- Towards the end of boiling process, heating is regulated to avoid charring.
- The concentrated juice is transferred to the cooling pan when its temperature reaches the striking point (114-116 ºC) for *gur* making and (120-122 ºC) for *shakkar* making.
- *Gur* is then moulded into desired shapes and sizes using moulding frames.
- For *shakkar*, at the time of solidification the material is made into powder manually using wooden scrappers. Powder is dried to 10.5-11.5 % moisture content, sieved and packed in polythene bags.

……

Practical: JUICE QUALITY ANALYSIS OF SUGARCANE

Criteria for the best quality of sugarcane juice:

- Should have accumulated peak sucrose content in juice.
- Should have low level of non sugars
- Should have high purity
- Should have optimum fibre content

- Should have negligible amount of unwanted materials (trash, binding materials, dead and dry canes, mud particles, water shoots, etc.)
- Should have higher quantity of juice
- There should not be pith in the cane

There are five quality indexes/parameters of sugarcane juice:

- Brix
- Purity
- Polarization
- sucrose content
- reducing sugar

- **Juice Brix:** Juice Brix refers to the total solids content present in the juice expressed in percentage. Brix includes sugars as well as non-sugars. Brix can be measured in the field itself in the standing cane crop using a Hand Refractometer or Hand Refractometer Brix or HR Brix. In the field, collect composite juice samples from several canes. Then place a drop of the composite juice sample in the Hand Refractometer and measure the Brix reading. The HR Brix meter has graduations from 0 to 32 per cent. The HR Brix readings can be separately taken from both top and bottom. A narrow range indicates ripeness of the cane, while a wide difference indicates that the cane is yet too ripe. While, if the bottom portion of the cane has lower Brix value than the top, it means that the cane is over-ripened and reversion of sugar is taking place.

- **Juice Sucrose or Pol Per Cent**: The juice sucrose per cent is the actual cane sugar present in the juice. It is determined by using a polarimeter, hence sucrose per cent is also referred to as pol per cent. For all practical purposes pol % and sucrose % are synonyms. Now a days an instrument called sucrolyser is also available for determining sucrose % in juice.

- **Purity Coefficient**: It refers to the percentage of sucrose present in the total solids content in the juice. A higher purity indicates the presence of higher sucrose content out of the total solids present in juice. The purity percentage along with sucrose percent aids in determining maturity time.

  $$\text{Purity Percentage} = (\text{Sucrose \%}/\text{HR Brix})100$$

  A cane crop is considered fit for harvesting if it has attained a minimum of 16% sucrose and 85% purity.

- **Reducing Sugars:** The reducing sugars refer to the percentage of other sugars (fructose and glucose) in the juice. A lower reducing sugars value indicates that much of the sugars have been converted into sucrose.
- **Commercial Cane Sugar:** The commercial cane sugar (CCS) refers to the total recoverable sugar percent in the cane. This could be calculated by the following formula**:**

  CCS (tons/ha) = [Yield (tons/ha) x Sugar Recovery (%)] /100

  Sugar Recovery (%) = [S - 0.4 (B - S)] x 0.73

  Where, S= Sucrose % in juice

  and B= Corrected Brix (%)