ARTIFICIALLY RIPENING FRUITS: SAFE METHODS

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Cultivation of fruits like banana, papaya, mango, avocado, etc. has continually increased during the past decade due to, among other reasons, very high demand for these fruits. Thus, large quantities of fruits harvested at different stages of maturity are transported long distances to places of high market demand. Commercial scale production has created an organized marketing network throughout the country. Simultaneously, programmed ripening was also started to meet the demand in required quantities.

Long time taken to ripen, uneven ripening, poor quality ripened fruits and very high susceptibility to post-harvest diseases associated with natural ripening are some problems experienced during natural ripening of fruits of different maturity stages. Therefore, traders have resort to ripe fruits artificially.

When a fruit is mature, it produces a volatile gas called ethylene, which initiate the ripening process. This gas is called ripening hormone. Once ethylene is produced and accumulated at threshold level (1 - 2 ppm), ethylene production is further stimulated at very high rate. This process is known as autocatalitic ethylene production. Ripening process cannot be stopped, once a fruit reaches its autocatalitic ethylene production stage.

TRADITIONAL METHODS

Smoking has long been used to induce ripening process of bananas, mangoes and avocados. Sending smoking into bananas placed in a soil pit was the traditional method widely adopted for banana ripening. Scientific research proves that ethylene and acetylene present in the smoke trigger ripening process. Acetylene also induces ripening but at higher concentrations compared to ethylene.

Use of green leaves of cinnamon, *billing*, *kappetiya* and gliricidia are also popular among small-scale traders for inducing ripening process. Fruit ripening takes place due to ethylene produced by the green leaves. Better results can be obtained by using wilted leaves because wilted leaves produce more ethylene than fresh leaves. Limited availability of green leaves and extra labour involved in the process are the reasons for the poor adoption of this technology. Ethylene supply from a biological source like green leaves provides the best method for artificial ripening.

ETHYLENE GAS

In developed countries, ethylene gas is exclusively used for fruit ripening. By exposing fruits to ethylene, in specially constructed chambers together with maintaining optimum temperature during ripening period, better quality ripened fruits are obtained. Compressed ethylene gas or ethylene generators are used in those ripening chambers. Ethylene gas, however, is not produced in Sri Lanka and therefore, imported ethylene gas cannot practically be used due to excessive cost. As an alternative, acetylene gas generated from calcium carbide is widely used in many developing countries.

CALCIUM CARBIDE

Calcium carbide is a by-product of kilns. Therefore, possibility of containing impurities in it is a risk. It has been found out that calcium carbide can contain chemical contaminants such as arsenic and phosphorous hydrides. These chemicals are carcinogenic and toxic to human beings. Since calcium carbide is not the product of kilns, the quantity of these contaminants present in it is not known. There may be none or trace amounts of these contaminants depending on the source of calcium carbide.

Calcium carbide is a crystal, which absorbs moisture readily from the air and releases acetylene leaving calcium oxide as a powder. The chemical contaminants present in the calcium carbide remain in the powder form calcium oxide, after the release of acetylene gas. Therefore, chemical contaminants, if any, can be avoided by the safe use of calcium carbide for artificial fruit ripening. However,

calcium carbide has an unpleasant odour, which is absorbed to the ripening fruits. Use of higher doses therefore, results in poor flavoured fruits.

Research studies were conducted in the department of agriculture to find out the optimum rate of carbide and method of application without possible contamination. The results indicate that 01 g of calcium carbide per kilo of fruits is the optimum dose to induce ripening while imparting minimum unpleasant odour.

Exposing fruits only for 24 hours using optimum dose of calcium carbide will induce ripening process. No unpleasant odour will be present in ripened fruits in this method. It is essential to wrap the calcium carbide in a piece of newspaper to prevent the deposit of calcium oxide powder on the fruit surface. In this way chemical contamination can be completely avoided. After twenty-four hours treatment, carefully remove the calcium oxide powder and bury in soil.

Calcium carbide can be kept in a plastic container with perforated lid in large scale commercial ripening. It is also possible to send only the acetylene gas into the ripening chamber, keeping the carbide completely outside. In these methods chemical contamination is completely prevented.

ETHRAL

Research carried out to test locally available ethral as an alternative for calcium carbide, show that 01 ml ethral diluted in a litre of water generate ethylene gas when a base is added to the solution. Ethylene generated by this method can therefore, be safely used to induce ripening process in fruits. However, do not dip fruits in ethral solution or spray ethral solution to the fruits.

For commercial ripening, a ripening chamber must be used and adding a base (sodium or potassium hydroxide) to the solution must be done immediately before closing the door of the chamber. For a 50 cu. m. (approximately 600 cu. ft.) ripening chamber, 5 ml ethral in one litre water is sufficient to induce ripening process

when 5 g of sodium hydroxide is added. Exposing the fruits to ethylene gas for 24 hours is sufficient. Ripening process will complete in 03 days.

USE MATURE FRUITS

Any method of artificial ripening must be carried out only for mature fruits. If immature fruits are ripened artificially, the quality of those fruits will be extremely poor. Fruits must be harvested at the correct stage of maturity and programmed ripening can be practiced to provide better quality fruits.

Misusing of artificial ripening methods to ripe immature fruits and making their peel yellow must be completely avoided.