

## A Way-Out from Artificial Ripening of Climacteric Fruits

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Fruits are loved by everyone as they are good for health because they are enriched with carbs, vitamins and other nutrients which are essential for growth and development. However, these health benefits of fruits are tormented by human selfishness. Potentially harmful compounds which can be Carcinogens (agents which convert normal human cells into cancer cells) are being sprayed on these fruits after harvesting by some unscrupulous fruit vendors to hasten the process of ripening in order to make more profit in less time and thereby exposing general public to risk associated with these artificially ripened fruits like banana, papaya, mangoes, apples etc.

**Chemistry of Ripening-** is a course of action in fruits that makes them edible and more delicious. All fruits have modes of ripening, different from one another. Fruits ripen when a change in composition occurs i.e.; conversion of starch into sugar. Usually, fruits produce Ethylene gas- a plant hormone which ripens fruits in a natural way but this takes little more time so in order to save this time fruits are plucked raw and transported to fruit mandis then to retail outlets who actually are responsible for using banned chemical named as 'Calcium Carbide' which is in fact used for welding purposes. Industrial grade calcium carbide is being used for many years in particularly mango ripening.  $\text{CaC}_2$  is cheap. One kg of this chemical costs Rs 25-30 which can ripen 10 tons of fruits. It takes 10 - 15 days for mangoes to ripen naturally and 8 days by using  $\text{CaC}_2$ .

**Clause 2.3.5 of the Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011**, prohibits sale of fruits which have been artificially ripened by use of acetylene gas commonly known as 'Carbide Gas'.

**Treatment-** Approximately 20gms of  $\text{CaC}_2$  is used for 4-6 dozen mangoes and that too is used on the exterior of fruit. This chemical only oxidizes the chlorophyll pigment and converts green color into yellow. For fruit vendors, the point is to speed up ripening so that they can make some fast cash. This chemical is harmful and mere washing with water sometimes can't eliminate residues which get absorbed into the pulp. Sometimes, fruits are kept in hay-lined wooden boxes called crates. These crates are stacked on shelves and wood fire is lit below them. The smoke releases ethylene and acetylene gas which induce ripening. Using  $\text{CaC}_2$  is less cumbersome. All that a trader does is to wrap a small quantity of  $\text{CaC}_2$  in paper packet and keep it near box of mangoes/bananas. This box is kept in closed space for 1 - 2 days and due to moisture content present in fruits, heat and acetylene gas is generated which starts ripening process.

**Reaction Involved-**  $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 \uparrow + \text{Ca}(\text{OH})_2$

$\text{CaC}_2$  releases acetylene gas which isn't a natural plant hormone like ethylene. Besides it,  $\text{CaC}_2$  contains trace amounts of heavy metals like arsenic and phosphorus hydride which can cause vomiting, diarrhea, mood disturbances, burning sensation of chest, mental confusion, memory loss, cerebral edema and seizures.

Fruits ripened with  $\text{CaC}_2$  are excessively soft, less tasty and have shorter shelf life.

**Innovation-** In a bid to help vegetables and fruits vendors, Ministry of Food Processing Industries (MOFPI) with Indian Agricultural Research Institute (IARI) has designed a mobile vending solar cart (Rehri) with aim to reduce wastage of fruits and vegetables by keeping them fresh for up to 5 days. Modern technology preserves these eatables by controlling environment around them same like in CA-store

where Oxygen level is reduced to 2 - 3% by infusing Nitrogen gas, Carbon dioxide level is increased up to 5% and Relative humidity is also scaled up to 90 - 95% to keep the fruit in resting state and decrease spoilage by retarding the ripening process. Solar cart is capable of reducing temperature of storage chamber by 5 - 6°C and increasing RH by 15 - 30%.

**Detection and Advice-** Artificially ripened fruits like mangoes can be easily detected from the lot as they will have uniform yellow color and they will look glazing with hard texture and will develop black patches on the surface over time. After you have bought fruits of your choice, place them in a bucket or body of water. If it sinks to the bottom that means it's naturally mature and ripe. However, if it floats that means it has been harvested prematurely and shouldn't be consumed just yet. Wash fruits thoroughly under potable running water to wash off chemicals and pesticide residues if any.

**Solution-** As an alternative to this problem, govt. in collaboration with Dept. of horticulture needs to construct large number of Ethylene Chambers near fruit markets and ensure that fruits are ripened as per legal methods. Private players can come to rescue with investment in building up these facilities and also CA-stores at individual level which will increase the avenues for skilled and technical unemployed youth to get adjusted and enrolled there. The Agro marketing dept. should encourage vendors to use natural ways of ripening. Increasing the infrastructure will automatically increase competition in the market among business houses and eventually people will get improved and safe product to consume. One shouldn't look at the cost factor when it comes to health and safety.

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