FSSAI permits FBOs to use ethephon for artificial ripening of fruits

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Shraddha Joshi, Mumbai

FSSAI has clarified that food business operators (FBOs) can use ethephon as a source of ethylene gas for artificial ripening of fruits. In addition to this, the country’s apex food regulator has also issued a detailed guidance note for traders on artificial ripening of fruits.

Lately, it had come to FSSAI’s notice that stakeholders were not abiding by the provision to use ethylene gas. Several issues have been raised relating to the modalities of using ethylene gas to ripen fruits.

The regulator has been actively considering an alternate to calcium carbide use for ripening process. Traders, in order to avoid spoilage during transportation, harvest raw fruits and ripen them before sale.

Further, FSSAI received several representation on whether ethephon can be used to ripen fruits. After taking due consideration, FSSAI clarified ethephon in powder form could be used, provided that it is packed in sachets, and these sachets do not come in direct contact with the fruit.

**Guidance note on artificial ripening**

After issuing guidance notes on spices, eggs and formalin in fish, the regulator has now come up with a guidance note on artificial ripening to create awareness among all the concerned stakeholders related to the different aspects of artificial ripening of fruits. It includes standard operating procedures (SOPs) detailing all facets using ethylene gas and its reliable source.

The guidance note provided the consumers some key takeaway points to keep in mind for ethylene gas. Ethylene, being a hormone produced naturally within the fruits to stimulate the ripening process, does not pose any health hazard to consumers.

It can be used for ripening at a concentration up to 100 parts per million (ppm) (100ul/L). The use of carbide gas or acetylene gas is not permitted for artificial ripening under the Food Safety and Standards Regulations, 2011, due to the potential health hazards. The source of ethylene gas should not come in direct contact with fruits.

Besides, the note issued by the FSSAI provided SOP details like the requirement for the ethylene ripening system and the chamber should be an air-tight room with a temperature and humidity regulation system, suggested handling conditions for stacking of fruits and air...
circulation. Fruits should not occupy more than 75 per cent of the volume of the chamber during the treatment.

Requirement of exposure time and ripening temperature for different fruits

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Ethylene exposure time (hours)</th>
<th>Ripening temperature (degree Celsius)</th>
<th>Relative humidity (RH)%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana</td>
<td>24-48</td>
<td>15–18</td>
<td>90-95</td>
</tr>
<tr>
<td>Mango</td>
<td>24-48</td>
<td>20-22</td>
<td>90-95</td>
</tr>
<tr>
<td>Papaya</td>
<td>24-48</td>
<td>20–25</td>
<td>90-95</td>
</tr>
<tr>
<td>Pear</td>
<td>24-48</td>
<td>18–22</td>
<td>90-95</td>
</tr>
<tr>
<td>Tomato</td>
<td>24-48</td>
<td>18-20</td>
<td>90-95</td>
</tr>
</tbody>
</table>

As per the provisions of the Food Safety and Standards Act, 2006, artificial ripening by acetylene gas (known as carbide) is prohibited under the Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011, as it contains traces of arsenic and phosphorus, which is harmful for humans, and thus, banned in India.

It is pertinent to mention here that considering the issue of the rampant use of banned calcium carbide and the non-availability of alternative ripening agent, FSSAI, via a notification in 2016, permitted the use of ethylene gas for ripening of fruits. It permitted the use of ethylene gas at 100ppm (100ul/L) depending upon the crop, variety and maturity for artificial ripening of fruits.

As per the regulator, the guidance note also cautioned traders, as ethylene gas was highly inflammable. Concentrations above 27,000ppm are explosive, hence smoking is prohibited around the premises. Consumers should avoid fruits with black blotches on the skin, as there are chances that these fruits are being ripened by acetylene gas.

As for the food safety officials, they are directed to monitored the illegal use of calcium carbide in mandis and markets and check the labels at source for the composition, the name of the manufacturer, the instructions for use, etc.

Taking a positive note, Prerna Gupta, assistant professor, food technology and nutrition, Lovely Professional University, said, “Ethephon is being used as a source for artificial ripening in plants. Earlier its use was limited to various cereal products, mainly wheat, tobacco, coffee, cotton and rice.”

“In the United States, it is currently registered for use on apples, barley, blackberries, bromeliads, cantaloupes, grapes, guava, nuts, tobacco, cotton, rye, sugarcane, wheat, walnuts, pineapples cucumbers, cherries, tomatoes, etc.,” she added.

“Ethephon is a good substitute for calcium carbide which is banned by FSSAI. In India, most of the small-scale vendors use calcium carbide and should be encouraged to use ethephon/ethrel for ripening of fruits, because these small vendors do not have access to commercial ripening facilities like ethylene-based ripening chambers owned by big traders/companies. Thorough
care has to be taken to select a proper stage of fruit for artificial ripening process,” Gupta said.

She added, “I believe that as we are shifting towards organic farming and look for more of organic products, in that case organic buyers might not like this idea of adding any external hormones to what they eat.”

“Being a pesticide (GUP), its use in the ripening of plants should be checked, and a limit for its use on plants should be maintained. Moreover, certain perishable plant products should be allowed to grow by natural ripening process,” Gupta said.

Sharing his opinion, Khalid Parwez, expert, Food Safety Knowledge Assimilation Network (FSKAN), a body under FSSAI, said, “The direction and guidance note will be helpful for farmers, traders and consumers.”

“The farmer should harvest the fruits at its optimum maturity. Traders should use the prescribed limit of ethylene for ripening, and consumers should buy from the authentic seller in the market,” he added.

Parwez said, “Further, I would like to bring a notice to FSSAI about smart packaging, where the access ethylene can be absorbed before it reaches to consumers.”

“Activated carbon-based scavengers with various metal catalysts can also effectively remove ethylene,” he added.

“They have been used to scavenge ethylene from produce warehouses or are incorporated into sachets for inclusion into produce pack, and embedded into paper bags or corrugated board boxes for produce storage,” Parwez said.

“The activated earth-type minerals, like clays, pumice, zeolites, coral, ceramics and even Japanese Oya stone, can be embedded or blended into polyethylene film bags, which are then used to package as well as excess ethylene scavenging,” he added.