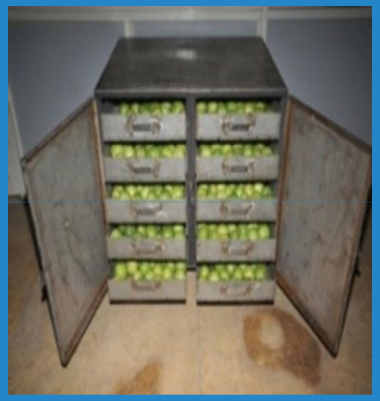
CIAE/APPD/IB/2025/41

Technologies for Processing and Value Addition of Tomato



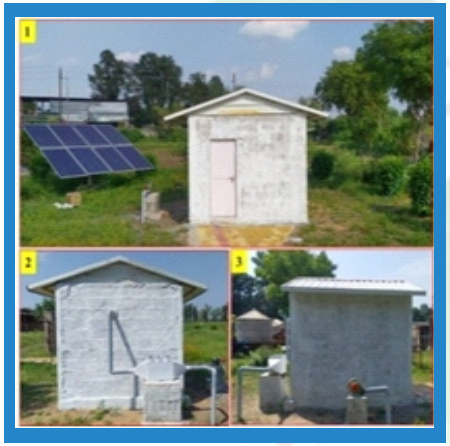



S. Mangaraj | M. K. Tripathi
Adinath Kate | Dilip A. Pawar

Agro-Produce Processing Division
ICAR-Central Institute of Agricultural Engineering
NabiBagh, Berasia Road, Bhopal – 462 038

Earth Air Heat Exchanger cum Evaporative Cooling (EAHE-EC) based storage structure

The Earth Air Heat Exchanger cum Evaporative Cooling (EAHE-EC) system offers a low cost and energy-efficient solution for storing fresh produce, particularly for farmers and entrepreneurs. This system maintained lower temperatures (20.6–22.6 °C) and higher relative humidity (82.6–89.4%). Tomatoes can be stored in this system for up to 21 days. The handling capacity, cost and energy required for this system is 1 tonne, 1.75 lakhs and 250 W, respectively.



Pilot scale MA Storage Structure

This system utilizes the principle of MA packaging. A polymeric film (LDPE+LLDPE 60µ) has been used as the inside lining material of structure made from perforated SS sheet which act as a regulator for the transport of gases and water vapour. The structure is suitable for handling, storage and transportation of tomato and similar perishable produce. Total weight of the developed unit is 150 kg, capacity 100 kg/batch and cost Rs. 25000/-. The tomato stored in this system fetches 21 days of shelf life at ambient temperature and 35 days at 10°C.

Micro-perforation based MA Packaging

For retail-size Modified Atmosphere (MA) packaging, the optimal perforation area for tomatoes is 0.0019%,for 60 µm LDPE and LLDPE films to achieve the desired gas composition for prolonged storage. Tomatoes can be packed in these optimized perforated MA packages up to 28 days at 25 °C and 45 days at 10 °C.This approach helps slow respiration, reduce spoilage, and extend shelf life while preserving freshness, firmness, and sensory quality of tomatoes during storage and distribution.

Tomato ketchup

Tomato ketchup is produced from ripe, high-quality tomatoes processed into a smooth, flavorful, and shelf-stable product. The process Involves the series of operations like washing, blanching, peeling, pulping, grinding/crushing, sieving, cooking, preservatives and spice addition, final cooking, bottling and cooling are performed for preparation of tomato puree. The pulp is cooked with sugar or jaggery, until it reaches consistency of 26-28° Brix. Developed per 100 g ketchup contains 0.9 g of protein, 28.6 g of total carbohydrates, 0.4 g of dietary fiber, 1.6 of Acidity, 3.3 of pH and 4.08 Pa. S of viscosity.

Tomato puree

Tomato puree is made from ripe, fresh tomatoes processed into a smooth, thick product. Cleaned and sorted tomatoes are blanched to loosen skins and inactivate enzymes, then pulped to remove seeds and skins. The pulp is concentrated by cooking; however, no spices are added for puree preparation. The mixture is cooked for up to 30 minutes and stirred continuously until the TSS reaches 80 °Brix. Recommended preservatives are then added before bottling, sealing, and cooling, ensuring quality for culinary uses. Prepared 100 g puree contains 1.4 g of proteins, 15.6 g of carbohydrates, 1.4 g of dietary fibers, 1.1 g of acidity, 3.8 of pH and 0.23 Pa.S of viscosity.

Tomato powder

Tomato powder is produced by dehydrating ripe tomatoes to obtain a fine, shelf-stable product. Fresh, sorted tomatoes are washed, blanched, and sliced into 6 mm thickness. These slices are dried in a hot air dryer at 60 °C for 72 hours until fully dehydrated. The dried slices are then ground using a hammer mill or grinder to achieve a fine powder, which is sieved for uniformity. No additional spices are added. The dehydrated tomato powder is packed in airtight, moisture-proof containers retain color, flavor, and nutrients.Per 100 gram of powder contains 302 Kcal of energy, 10.2 g of protein, 0.44 g of total fat, 74 g of carbohydrates, 12 g of dietary fiber and 47 g of sugars.

Tomato based coagulant

A coagulant mixture is generally made from tofu whey and ripe tomatoes for use in tofu preparation and other plant-based products. The process starts with tofu production from soy milk, which is filtered, cooked, coagulated, and pressed to remove excess water. Ripe tomatoes are washed, hydrolysed through heat treatment, and mixed with fermented tofu whey in a 2:1 ratio. The mixture is ground into a slurry, adjusted to a pH of 3.0–3.5, heat-dried in a tray dryer, and milled into a fine powder. This product serves as a natural ingredient for innovative coagulation methods, enabling nutrient fortification and offering a plant-based coagulant that results in healthier tofu and paneer.