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REAPING FRUITFUL GAINS IN BANANA PROCESSING

Banana processing is indeed very delicate and unique. And one of the companies in India that boasts of a banana processing plant is Jain Irrigation. Venturing into this arena itself speaks volumes about the company. Strong R&D, sound knowledge of processing etc are the cornerstones of its success.

■ Prasenjit Chakraborty

A visit to Jain Irrigation's banana processing plant at Jalgaon that produces natural banana puree and concentrate is worth. The plant is located at Jain valley on Shiroli Road, which is 5 km away from Jalgaon city. The entire process right from receiving banana to the making of final product is unique. The first step starts with receiving bananas at the plant premises, which arrive in trucks. It is important to mention here that the fruits (bananas) are unloaded only when these meet all specifications.



The plant employs production processes capable of producing fruit purees for baby food application. The processes

are fully automated and have fail-step process. It means if there is any deviation in the process parameters, the production cycle stops and the product is put to drain.

Ashok Jain
Vice Chairman

Ripening process

Bananas received are mature but unripe. After unloading, fruits are palletised and then each pallet goes to the ripening chamber. Each pallet is individually tagged to ensure traceability of the product to the source and ensure record of the complete processing cycle. There are seven ripening chambers for banana, each of them having capacity of 150 mt. There are number of steps involved in ripening process. The first step is to evaporate ethylene gas for 24 hours in the chamber. "We convert liquid ethylene into gaseous form by heating and then the gas is circulated in the ripening chamber," says Pravin R Rane, Production In-charge, Jain Irrigation Systems Ltd.

After evaporation of ethylene gas, temperature and humidity are maintained in the chamber for next six days. The temperature in the chamber remains between 18° C and 22° C. In between whatever CO₂ is generated is exhausted outside the chamber. If CO₂ is not exhausted out, then it will be difficult to maintain temperature inside the chamber and the ripening process will not be uniform. "We have to run the plant for all the seven days. And to get

the fruit available for processing, we have to ensure the cycle of ripening process. We have seven ripening chambers, which fulfil the cycle," says Rane.

Banana processing

It takes seven days to complete ripening process and once over, processing of banana starts. In the first step of processing, fruits are washed with chlorine water so that surfaces of the fruits are free from micro-organisms. After chlorination, fruits go for inspection, and in this process, rotten, unripe and damaged fruits are identified and separated. Only good quality fruits are sent for processing. Before going for the second stage of processing, fruits are again washed in soft water to get rid of chlorine. After this, hardcore processing starts. There are two tiers of conveyors in the plant. Fruits that are washed in soft water are placed in bottom conveyor where a number of women workers are engaged in peeling off bananas. After peeling, bananas automatically come on to the top conveyor and subsequently go to the mashing pump where mashing of bananas are done. Immediately after mashing, pasturisation is done. "Here mashed banana is heated at 90° C to

deactivate the enzymes present in the mashed banana and also reduce the microbial load," says Rane.

Once pasteurisation is completed, pulp is sent to pulper to separate out seeds present in the pulp. Once seeds are separated out, pulp is sent to finisher. There are two options available once pulp comes out of finisher. "If we want to make single strength puree it goes directly to steriliser. For making concentrate, pulp is directly sent to evaporator where water is evaporated from the pulp and becomes concentrate," adds Rane.

De-aeration process

The concentrate puree has to undergo de-aeration process to get rid of dissolved air present in it. Removal of dissolved air is essential to maintain product quality over its entire shelf-life, says Rane. Then the product is sterilised at the sterilisation centre where it is rapidly heated above 130° C followed by steps such as holding and rapid cooling. Cooling is done to below 25° C. This short time high temperature heating process ensures that the product is free of bacteria and other pathogens without losing any sensory or nutritional properties of the product.

The cooled product is then packed in to pre-sterilised bags through a sterile filling system. Maintaining process



Banana peeling



Banana inspection

and package integrity ensures shelf-life of 18 months for the product without any preservatives. Filling is done in 220 litre bag in drums and then packaging & palletisation of drums follow. After drum palletisation, product is kept for quarantine for seven days. From the total production, 50 per cent goes to export and rest is consumed locally. It exports to Middle East, Europe, the US, etc. Prominent clients for Jain Irrigation include Coca Cola, Nestle, Hindustan Unilever, etc.

Manufacturing standards

The plant is compliant to most stringent global quality standards and are certified under British Retail Consortium (BRC), ISO 14001, OHSAS (Occupation Health and Safety) 18001. The products are also *Kosher* and *Halal* certified and the plant is US FDA audited. "The plant employs production processes capable of producing fruit purees for baby food application. The processes are fully automated and have fail-step process. It means if there is any deviation in the process parameters, the production cycle stops and the product is put to drain," says Ashok Jain, Vice Chairman, Jain Irrigation Systems Ltd.

The plant has sophisticated machines from Europe, the US, etc. As far as research and development is concerned, Jain's Food Division has many breakthroughs to its credit and some of these have now become industry standards. "The most important

innovation has been development of Evaporative Cooling Ripening Chambers as a substitute for high-cost Refrigerated Ripening Chambers and the traditional way of ripening using hay," claims Jain.

Manpower training

Every person who joins the organisation has to undergo training. "We provide training to our workers on every aspect, and safety is our prime concern. Even contract workers have to undergo training procedure," says Rane. Any person entering the plant has to undergo sanitisation process. Currently, 120 workers are working in the banana processing plant.

Tissue culture

Jain Irrigation is involved in end-to-end work in the banana supply chain starting from providing high-quality, disease-free planting material to farmers, followed by irrigation systems and agronomy guidance and then buy back the surplus produce to add value and sell in export and domestic markets. Jain Irrigation has pioneered tissue culture banana, which has revolutionised banana cultivation in the country. "Our annual capacity is 100 million banana plants. We have facilities in multiple locations for primary & secondary hardening, and we have introduced a unique concept of supplying to the farmers secondary hardened and virus-free plants to reduce risk of mortality of the plants at farms," concludes Jain. ■

Photo: Nachiket Gujar

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