Pollution study of cool fruit processing process

Yongli Zhang¹, Xin Chen²*, Bei Liu³ and Qian Wang⁴

¹School of Chemical and Environmental Engineering, Hanshan Normal University, Chaozhou 521041, China
²School of Environment and Chemical Engineering, Foshan University, Foshan 528000, China
³Foshan Environmental Protection Investment Co. LTD, Foshan 528000, China
⁴Foshan Shuiye Group Co. LTD, Foshan 528000, China

*Corresponding author e-mail: xinchen@fosu.edu.cn

Abstract. As one of the traditional foods in China, cold fruit is also the origin of fruit and melon food processing. The main sources of material pollution are raw material pollution, auxiliary material pollution and food additive pollution. The pollution of processing flow, the pollution of processing environment and the pollution of transportation and storage environment constitute the pollution of processing and transportation. Waste water is an important part of pollution in cold fruit processing.

1. Introduction
Cool fruit is one of China's traditional foods, but also the origin of fruit food processing, which is still a tourist as well as leisure food and local specialties. And they are loved by consumers.

Cool fruit, also known as glazed fruits or preserved fruits, which refers to a variety of fresh vegetables and fruits as raw materials. They are made by adding little or no excipients and food additives through salting, sugar marinating and drying [1].

During the production process, the cold fruit loses a small amount of vitamin C. But fiber content, minerals and some amino acids retain most of the original nutrients. The main forms also keep the general shape of the original fruit, and some products also have the function of dietary therapy, which belongs to the products with rich nutrition and health. The Classification of preserved fruits is shown in Table 1.
Table 1. Classification of preserved fruits

| Variety category | Flavor | Represents the product |
|------------------|--------|------------------------|
| Sugar-stained honey | Added flesh and sugar cooked together, the finished product is basically soaked in a strong sugar liquid, the flesh is tight, high sugar content | Honey red fruit, honey sea otter, sugar laurel, sugar rose, Sugar green plums |
| Return to the sand | After the raw materials are boiled with sugar, the surface will be dry and white icing will be added, presenting opacity. After the sugar staining process, the bitterness is removed and the moderate sour and sweet taste and crisp and delicious taste are retained. | Sugared lotus seed, sugared lotus root slice, Candy orange pie and melon chips |
| Fruits | After the raw material is cooked with sugar stains, the surface is dry and white icing is attached, showing opacity, and the sugar staining process removes the bitterness and retains a moderately sweet and crisp taste | Sugar lotus, sugar flakes, Sugar orange cake and melon strips. |
| Cool fruit | Is a variety of fresh fruit as the main raw materials of licorice products, its appearance shape basically maintain the original fruit sample, the appearance is more dry, some products have a frosted shape on the surface, the entrance acid slightly salty, fine products after a sweet taste of raw fruit, the taste is tight and chewy. | Hawthorn slices, apples, Apricots, pears, fruit peels. |
| Talk class | With some fresh fruit as the material, it is marinated first, and a suitable amount of food additives are added to the dry finished product. The acid is sweet, has a sweet but not greasy taste, soft toughness has chewy. | Words Mei, Words Li, Nine-system chenpi, licorice. |
| Fruit cakes | The fresh flesh is cooked into a paste, then concentrated and dried by the machine, poured into the mold, you can make the finished product. Sweet and sweet, bright color, fragrant and flexible soft. | Sourding cake, hawthorn cake, Hawthorn strips, gordan skins. |

2. Material pollution analysis

2.1. Contamination analysis of main raw materials
In the planting process, Fruit farmers lack relevant concepts of pesticide and fertilizer or do not strictly abide by the national standards for the use of pesticide and fertilizer. Unreasonable use of pesticides and fertilizer even exceeds the standard, which easily leads to pesticide residues in fruits. The surface of freshly picked fruit can contain a lot of impurities and bacteria if not handled promptly, which can damage the main raw materials and easily lead to deterioration [2].

2.2. Analysis of auxiliary material pollution
When raw materials are processed into semi-finished products, the addition of white sugar which has been stored for a long time and is hygroscopic results in the increase of the total number of bacteria, especially yeast.
Salt added when raw materials are processed into semi-finished products, due to storage time is too long, low purity, low salt concentration, temperature, air and other factors, Wang Xiuru in the overview of food microorganisms mentioned that if salt cannot completely penetrate into the fruit tissue, will not reduce the moisture activity of food and effectively control the activity and fermentation of
microorganisms, will cause the rapid reproduction and growth of corrupt bacteria, resulting in fruit corruption and quality [3].

2.3. Contamination analysis of food additives
Food additives commonly used in cool fruits are preservatives, sweeteners, colorants, anti-knot agents, emulsions and thickeners.

Preservatives commonly used in cool fruits are benzoic acid and its sodium salts, sorbic acid and its sodium salts, sulfur and so on. Benzoic acid is controversial in the international community because of reports of cumulative poisoning. Although it is still permitted to be added to the use of various countries, but the scope of application in food is getting smaller and smaller, such as it in Japan's imported food category has strict control measures, and even some imported food is expressly prohibited to use, and benzoic acid production in Japan has stopped [4]. However, because of the low price of benzoic acid, in China is still often used as a preservative in cool fruit fruit, the use of sorbic acid as a preservative of cool fruit fruit, if the fruit is contaminated by microorganisms, sorbic acid will become a nutritional substitute of microorganisms, not only cannot inhibit microbial reproduction, reaction will accelerate product corruption.

In order to ensure that the product in the production process to ensure that its shape, color, taste to meet the perfect requirements, enterprises will usually use colorants and sweeteners and other additives, but if in the process of cool fruit processing is not added according to the standard or only by personal experience to add, so that the product additive content exceeds the standard, affect product quality and safety, will bring great harm to human health.

In addition, with the rapid development of the food industry and the rapid upgrading of chemical technology level, the market appears more and more variety of additives, its proportional structure is more complex than ever before, divided into food and industrial use of two uses, the cost-effective difference between the two is greater, in order to reduce production costs, some enterprises knowingly malicious use of industrial use additives into food, resulting in the inherent toxic and harmful ingredients left in fruit raw materials, which will inevitably bring potential food safety risks [5].

3. Pollution analysis of processing and transport

3.1. Contamination of the process
Screening. Cool fruit in the production process before the screening of fresh fruit, this step enterprises will often neglect the existence of pollution, screening machines and utensils of hygiene problems will affect the quality of cool fruit;

Rinsing. Rinsing is to further clean raw materials and remove mud, branches and other impurities. However, the number of rinses is less or more often after rinsing still use dirty water, will make the physical pollution still exist with the raw material inside [6].

Pickled and sugar stained. In the process of marinating, microbial contamination of products often occur, if the amount of added salt is less than 15%, nitrates in food can be reduced by microorganisms into nitrites, if people eat pickled products containing nitrites, will cause poisoning phenomenon;

Mix. In the processing process, if there is no timely and serious cleaning and disinfection of the equipment used in mixing, the work equipment used in the processing of cool fruit will be an important factor causing cross-contamination of food.

Dried. Products need to be placed in an open-air tanning field for drying, because the fragrance of the finished product will attract a large number of fly mosquitoes, fly mosquitoes will stay on the surface of the finished product, attached to it pathogens will soon contaminate the finished product, through the spread of a variety of pathogenic microorganisms and then harm humans [7].

Packaging. There are two main aspects of packaging pollution, namely packaging equipment and packaging materials. Packaging equipment such as pipeline platforms and sealing machines, such as long-term use, no regular cleaning and disinfection, resulting in microbial growth and thus affect product
quality; The safety and hygiene of packaging materials directly affect the safety and hygiene of products [8].

The production process is not completely separated, the whole production process of the enterprise is more chaotic, and there is no clear demarcation. There is no functional division of contaminated and clean areas, and some even have multiple process opportunities in the same location.

3.2. Pollution analysis of the processing environment
Some of the production personnel of cool fruit processing enterprises are of mixed quality, low quality of their own hygiene, before production does not trim nails, no disinfection, do not wear gloves, headgears and so on to carry out work.

Some cool fruit processing enterprises have poor equipment, poor sanitation conditions inside the processing workshop, no changing rooms, disinfection rooms, disinfection facilities, etc., the quality of hygiene is difficult to be effectively controlled.

3.3. Analysis of environmental pollution in transport and storage
The whole circulation of food from raw material processing to consumption is complex and changeable, it will be biological and chemical infested, by the circulation process, such as light, oxygen, moisture, temperature, microorganisms and other environmental factors. Food is a product of the most vulnerable to environmental factors, so the transport and storage environment if the above-mentioned environmental factors will cause quality problems.

4. Waste water pollution from the processing of cool fruit
The cool fruit wastewater mainly comes from the three production processes of cleaning, salting and dipping sugar, including cleaning wastewater, pickling discharge, desalination wastewater and sugar immersion liquid produced by the cool fruit processing process. Cleaning is the first step in the processing of cool fruit, it produces cleaning wastewater mainly accounted for about one-third of the amount of wastewater, pH is high, suspension index is high; biochemical oxygen demand (BOD), NH3-N indicators are out of the normal range, desalination wastewater salt content is slightly lower than pickled discharge liquid, suspension, salt content, chemical oxygen demand COD, biochemical oxygen demand BOD, NH3-N All the indicators are gradually reduced with the increase of the number of desalinated wastewater, LuoYuchi [9] in the analysis of the characteristics of water pollution in the cool fruit industry, the sugar-soaked liquid has high organic matter, high salt, high nitrogen phosphorus, high acid and other characteristics, so it can be seen that cool fruit wastewater has high salt, high organic matter and water quality fluctuations of the characteristic conclusion.

5. Conclusion
The material pollution of cool fruit processing consists of three parts: main raw material pollution, auxiliary material pollution and food additive pollution, processing and transportation pollution, including three parts: pollution of processing process, pollution of processing environment and pollution of transportation and storage environment, waste of cool fruit processing process, also constitutes an important part of pollution.

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