EXTRACTING VALUE ADDED COMPOUNDS FROM CITRUS RECYCLING WATER

Khumora Abdashimova
Gulistan State University, 3rd stage student
Ilmiy rahbar: t.f.d.dots: ***Sattarov Karim Qarshievich***
Oktamova Charos
Gulistan State University, 2rd stage student

Abstract: Demand for food products, History of citrus fruits, Processing of citrus fruits, Creation of environmentally friendly technologies, Advantages of citrus canning industry

Key words: Flavonoids, alkalis, acids, ethanol, pectin, carotene, sugar, vitamins C, V, R

Citrus plants are evergreen plants, cultivated fruit trees belonging to the citrus family of the rutabaga family. Orange, tangerine, grapefruit, lemon, bergamot, citron, shaddock, bigaria and about 30 other types. It is spread from North China to Australia, from the shores of the Mediterranean Sea to Europe. In Uzbekistan, it is grown in the scientific research institute of horticulture, viticulture and winemaking, Kibray district of Tashkent region and other greenhouse farms. Citrus fruits are shrubs or low trees, all organs have a fragrant essential oil. For example, lemons and oranges contain 60 mg % vitamin C, 600-700 mg % vitamin R. They contain pectin, carotene, sugar, vitamins C, V, R. Fruits are eaten fresh, preserves, jam, sukat are made. Essential oil is extracted from leaves and stems. Citrus plants are propagated by grafting and cuttings.

The growth of the world's population leads to an increase in the demand for food production, which leads to the generation of large amounts of food processing waste. At the same time, it is possible to prevent environmental damage caused by groundwater pollution as a result of food processing waste entering the landfill. Unlike processing waste from other industries, food processing waste usually contains compounds that may be beneficial to human health. Considering human health and environmental safety, the development of new methods for the recovery of commercially important biomolecules from food processing wastes is a priority. In recent years, considerable economic attention has been paid to the technologies for extracting biologically active molecules from food processing waste.

The production of 1 ton of purified segments used for canning results in the processing of approximately 3.6 tons of high chemical oxygen demand water as wastewater. However, this processing water contains beneficial phytochemical

compounds, including high amounts of pectin, oligosaccharides, and flavonoids, as a result of the dissolution of the segment membrane. Thus, improper treatment of recycled water not only causes serious environmental problems, but also leads to the loss of large amounts of valuable food compounds. Currently, the main processing methods used to treat citrus canning process water do not allow for the recovery of any beneficial compounds. For example, flocculants such as polyaluminum chloride have been used to remove pectin1, but the flocculant does not allow recovery of pectin from the mixture and creates a secondary contamination stream. Microbial biodegradation methods have also been investigated for pectin degradation2. However, only a limited reduction in chemical oxygen demand was achieved and no compound was recovered. Thus, the citrus canning industry needs to create a system to not only recover high-value compounds, but also implement green production. The challenge of recovery is to consider technology and economics. Direct recovery of mixtures is as costly as using ethanol, so mixing and concentrating water is important. We have successfully created a pilot water reuse system to conserve water in citrus canning and have achieved a reduction in the amount of water required for processing.

For complete recovery of compounds, the quality of recycled water was studied first. Sequential food-grade acidic and alkaline (NaOH) cooking processes dissolved the membrane of whole citrus segments and released insoluble fibers, pectin and flavonoids, which resulted in high chemical oxygen demand values in both types of processing water. Most of the flavonoids were removed during acidification and less remained in the alkaline process. However, alkaline treatment destroys the membrane tissue more easily and produces more pectin in alkaline water.

Pectin is usually isolated by ethanol precipitation for use as a food additive. To reduce ethanol consumption, the concentrated mixed water was precipitated with ethanol at an optimized concentration. Primary pectin contains a large amount of compounds, mainly flavonoids and salts. Thus, another wash with ethanol improves pectin quality and exchanges water within pectin to prevent pectin shrinkage during vacuum drying. The dried pectin was further powdered for better water solubility.

The demand for environmental protection and efficient use of resources continues to grow, and enterprises are constantly encouraged to use new technologies to reduce pollution. The citrus canning industry has become one of the main sectors of wastewater discharge. After a systematic analysis of the quality, the recycling water produced during the removal of membrane segments showed great potential for the recovery of high-value compounds**.**

Conclusion

A cost-effective approach to water reclamation identified in this study minimized wastewater generation and facilitated cleaner production at a mandarin orange cannery. The results show that a recycling process that allows water to be reused can be

implemented in the food processing industry. If it does not affect food safety. This approach to water resources management is beneficial for the coordinated and sustainable development of the economy, society, resources and environment.

References:

1. Pavon-Silva, T., Pacheco-Salazar, V., Sanchez-Meza, J.C., Roa-Morales, G., Colin-Cruz, A., 2009. Physicochemical and biological combined treatment applied to a food industry wastewater for reuse. J. Environ. Sci. Heal A 44, 108-115
2. Tanabe, H., Kobayashi, Y., Akamatsu, I., 1986. Pretreatment of pectic wastewater from orange canning by soft-rot Erwinia corotovora. J. Ferment. Technol. 64, 265-268
3. Kalapathy, U., Proctor, A., 2001. Effect of acid extraction and alcohol precipitation conditions on the yield and purity of soy hull pectin. Food Chem. 73, 393-396
4. Chen, J.L., Cheng, H., Wu, D., Linhardt, R.J., Zhi, Z.J., Yan, L.F., Chen, S.G., Ye, X.Q., 2017. Green recovery of pectic polysaccharides from citrus canning processing water. J. Clean. Prod. 144, 459-469