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The Application Domains and Integration of Watermelon and Pumpkin Products into Production

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Annotation: Melon products, in particular, are obtained by separating the primary and secondary pulp of pumpkin fruits, cleaning them, treating them with ascorbic acid (freezing), drying them using sublimation and convective methods, and grinding them into powder using a grinding machine. The secondary pulp of the product, which has a color property, is used in the garment and textile industry to dye various clothes, fabrics, and yarn products, reducing the cost of finished products by about 1-1.5 times.

Keywords: primary and secondary mass, peel, freezing, powder, organoleptic.

INTRODUCTION

It is well-established that, in contemporary practice, vegetable crops are subject to various processing methods due to their substantial nutritional value, both within the daily dietary regimen of the population and in industrial production sectors. However, the secondary raw materials generated during the processing and preservation stages are frequently discarded, as the technology for their comprehensive processing remains underdeveloped. This technological challenge is evident in the findings of both domestic and international scholars, whose research outputs are cited in Chapter 1 of this dissertation and in the corresponding list of references.

The outcomes of the authors' investigations reveal that the complex processing of vegetable crops (specifically watermelon and pumpkin) has been achieved through innovative technological methods, which include the separation of the primary mass and secondary peel,

followed by pressing to yield juices, concentrates, and dried product samples.

Analysis and Methodology. These product variants have found broad applicability across diverse industries, including the food, pharmaceutical, medical, livestock, and agricultural sectors. Furthermore, these products have been successfully integrated into production processes at enterprises such as "NAMMTI INNOVATION PRO SUB TECH" LLC, "SUNNY LAND PRODUCTS" LLC, and "FRUITS DRIED INNO TECH" LLC. Consequently, technical specifications, regulatory frameworks, and technological recommendations have been formulated. It is advised that the product samples derived from the complex processing of watermelon and pumpkin be applied within the following industrial sectors:

Food Industry:

The primary and secondary mass of watermelon and pumpkin, obtained by pressing, is used to produce juice, concentrates, and organic powders (which contain aromatic and biologically active substances for flavor and color enhancement). These powder products are incorporated into confectionery, enhancing flour products with high organoleptic properties. Through the addition of powders into bakery products such as bread and pastries, as well as confections (sweets, cakes, baklava, marmalade, purees, chips), the technological recipes for their production are optimized, leading to the creation of affordable innovative products in the industrial sector.

The secondary mass generated during the pressing of watermelon and pumpkin peels is dried using sublimation and convective methods, resulting in powder products. The technology for producing high-quality concentrates, juices, and ready-to-eat or semi-prepared food products from these powders has been developed.

For the pharmaceutical and medical sectors:

The primary and secondary masses of watermelon and pumpkin, subjected to convective and sublimation freeze-drying, are processed into liquid, thick, concentrated, powder (powdered), and granulated forms with high natural vitamin content and nutritional value. These medicinal and therapeutic products, based on innovative technology, have been developed for use in the pharmaceutical and medical industries. The medicinal and therapeutic product samples created for the pharmaceutical and medical sectors are depicted in Figure 1 and have been introduced into production.

Figure 1. Assortment of medicinal and therapeutic product samples for the pharmaceutical and medical sectors.

The dried product samples of pumpkin and watermelon, including their primary and secondary peels and seeds, presented in Figure 1, were analyzed for chemical properties at the Biorganic Chemistry Institute using high-synthesis laboratory equipment. These samples have been recommended for inclusion in consumption and pharmaceutical product ranges.

The technology and assortment for preparing organic powder and granule product samples, which are used for the prevention and treatment of various parasitic and worm diseases, are

developed by reprocessing and drying pumpkin seeds. These products, which are affordable in price, provide a natural solution. Figure 2 below presents the product samples obtained from pumpkin fruit and seeds as a result of innovative scientific research.

2nd image: Samples of products obtained as a result of innovative scientific research on pumpkin fruit and seeds.

In the product assortment presented in Image 2 above, concentrated juices obtained by pressing the main mass of pumpkin treated with ascorbic acid, as well as secondary pulp and peel mass generated during the pressing process, are developed using convective and sublimation drying methods to produce organic powders. A technology for the preparation of high-concentration medicinal juices has been developed.

DISCUSSION AND RESULTS

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The primary and secondary products obtained from pumpkin seed processing (oil, powder) can be utilized in food products (both finished and semi-finished), various sweets, and edible oil. The powder obtained by pressing or drying the seeds can also be consumed as a seasoning.

The juice derived from pressing the secondary peel of watermelon is used to create natural medicinal and dietary beverages. The technology for processing the peel to obtain raw materials and juice samples is shown in Image 5.1.3 below.

3rd image: Samples of raw materials and juice obtained from pressing the secondary peel of watermelon.

In the above, Image 5.1.3 shows the successful production of medicinal and dietary beverage juice samples obtained from pressing the secondary peel of watermelon.

For the livestock industry:

- The product samples obtained by processing and drying the primary and secondary masses for the livestock sector, which have large fractions, and the waste products damaged by heat agents, are shown in Image 3 below. These samples are mixed-feed products with high nutritional value for animals.

4th image: Samples of primary mixed-feed products obtained during the convective drying process.

- The product samples obtained by drying the primary and secondary masses of watermelon and pumpkin, without treatment with ascorbic acid, are exposed to high temperatures of 90-110°C, resulting in products unsuitable for consumption (due to burning or darkening). These samples are sent to the livestock sector.
- A technology and a principal schematic for preparing mixed-feed and granulated products through convective and sublimation drying of the pulp mass obtained by pressing watermelon and pumpkin fruit seeds and secondary peel have been developed.

Conclusion

The raw materials obtained by pressing and cutting the primary, secondary masses, and seeds of watermelon and pumpkin, which are not recommended for consumption in the food and livestock industries due to unfavorable fraction characteristics, are used as rapidly and easily synthesized organic fertilizers for soils with low fertility and ball rating. This process improves the productivity of land areas.

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