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SUBLIMATION DRYING OF PLUMS AND PRECAUTIONS USED DURING THE DRYING PROCESS

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ABSTRACT

This article provides information from the literature about the processes and precautions for sublimation drying of plum varieties. Based on this, the country can achieve a number of positive achievements in the field of agriculture along with the development of export of dry products. Including, it is very convenient to load and unload and store dry goods, while dry goods are an invaluable quality product for various expeditions and passengers.

KEYWORDS

Plums, plum varieties, harvesting, sorting, freezing, sublimation drying, dry product, precautions.

Introduction

Fruit drying is one of the oldest and most common methods, the essence of which is to concentrate dry matter and dehydrate the product. Dried fruits are a high-calorie product rich in carbohydrates and concentrated in terms of their chemical composition. In particular, the value of dried fruits is very high and they are distinguished primarily by the abundance of sugar, organic acids, mineral salts and other substances in them.

In the process of drying fruits, the weight of the product is significantly reduced, but the dry products are well stored and have the characteristic of preserving the vitamins contained in them. Fruit drying has a number of important advantages compared to other types of processing, namely: dried fruits are more transportable than other products, the packaging process is relatively simple, and the production process does not require complex equipment and facilities.

Plum varieties "Samarkand black plum", "Berton", "Arton", "Osennyaya", "Wengerka fioletovaya", "Ispolinskaya", "Kora olu", "Anna shpot" and "Kirke" are very good. Production technology consists of cutting, transportation, storage, sorting, inspection, washing, splitting, freezing, sublimation drying, packing and storage. Plums are sorted according to their size, ripeness and quality. Crushed, rotten, diseased and insect-damaged fruits are separated.

Table 1. Biochemical composition of fruits of plum varieties suitable for drying

Plum varieties	Years	Dry matter, %	Sugare, %	Vitamin C, mg %
Ispolinskaya (control)	2021	16,6±0,4	20,2±0,4	7,5±0,2
	2022	17,1±0,5	18,3±0,3	6,9±0,1
	2023	17,3±0,3	18,9±0,5	6,8±0,3
Kara olu	2021	15,9±0,3	18,2±0,3	6,8±0,1
	2022	16,3±0,4	17,1±0,5	7,3±0,2
	2023	15,7±0,5	16,7±0,2	6,5±0,3
Yarxi	2021	18,8±0,5	23,5±0,3	7,7±0,3
	2022	18,3±0,4	22,1±0,5	7,2±0,2
	2023	17,9±0,3	19,1±0,5	7,4±0,1
Vengerka fioletovaya	2021	15,5±0,2	16,9±0,3	6,1±0,3
	2022	16,2±0,4	16,6±0,5	5,9±0,1
	2023	17,1±0,3	17,1±0,4	7,4±0,2

Kara olu, Ispolinskaya, Yarkhi, Vengerka fioletovaya varieties regionalized in Uzbekistan were selected for the experiments. Ispolinskaya variety was selected for control. Fruits characteristic of these varieties were analyzed for three years (2021-2023).

The highest indicator of dry matter content was observed in the Yarkhi variety and made up 18,3 %, while the lowest indicator was shown in the Vengerka fioletovaya variety and made up 16,2 %. It was 17,1 % in the Ispolinskaya variety selected from the control quality.

When drying plum fruits, the sugar content is an important indicator. The composition and high organoleptic indicators of the dried plum variety depend on the amount of sugar in the plum fruits as raw material.

During the experiments, the amount of sugar in the Kara olu variety selected as a control was 15,9 % in 2021, 16,3 % in 2022, and 15,7 % in 2023, while the three-year average sugar content was 17,3 %. The highest result according to this indicator was recorded in the Yarkhi variety. That is, 23,5 % in 2021, 22,1 % in 2022, 19,1 % in 2023, and the three-year average was 21,6 %.

The lowest level of sugar content was observed in the Vengerskaya fioletovaya variety, the three-year average of which was 16,3 %. In the Ispolinskaya variety, 19,1 %, the three-year average was recorded.

Taking into account the late ripening of plum varieties (August-September), it is advisable to dry plums mainly by sublimation method. According to some literature, it is not recommended to dry plums after September 10-15, because the fruits do not dry until the autumn rains. However, this condition does not affect the sublimation drying method. The reason is that the raw material is freeze-dried in the sublimation drying method.

Workers should be provided with special gowns, hats, shoes and gloves. Eating and smoking are prohibited at the workplace. Before eating, you should take off your work clothes, wash your hands and face thoroughly, and rinse your mouth.

Table 2. Effect of plum drying methods on the biochemical composition of the finished dry product (2021-2023)

Varieties	Drying method	Water, %	Carbohydrate, %	Organic acid, mg%	Protein, %
Ispolinskaya (control)	I (in the sun)	15,75	68,3	1,58	3,57
	II (convective)	16,80	73,5	1,47	3,68
	III (sublimation)	3, 15	78,8	2,10	4,31
Kara olu	I (in the sun)	15,00	65,0	1,50	3,40
	II (konvektiv)	16,00	70,0	1,40	3,50
	III (sublimation)	3,00	75,0	2,00	4,10
Yarxi	I (in the sun)	15,15	65,7	1,52	3,43
	II (convective)	16,16	70,7	1,41	3,54
	III (sublimation)	3,03	75,8	2,02	4,14
Vengerka fioletovaya	I (in the sun)	14,70	63,7	1,47	3,33
	II (convective)	15,68	68,6	1,37	3,43
	III (sublimation)	2,94	73,5	1,96	4,02

As can be seen from the above table, the biochemical composition of the finished dry product changes slightly when we dry 4 types of plum varieties in 3 different ways. It is known that the percentages of water, carbohydrates, organic acids and protein in the Ispolinskaya variety of the tested plum are relatively higher than those of the Qora olu, Vengerka fioletovaya and Yarkhi varieties.

Drying dried plums in a frozen state under vacuum, the moisture in them turns into vapor in the form of ice, bypassing the liquid state, this process is called sublimation. Freeze-drying of products is mainly carried out at low temperature and high vacuum. The study and testing of freeze-drying regimes is carried out in an experimental device with a productivity of 3-5 kg of raw materials per cycle.

The installation consists of a drying chamber (sublimator), a freezing chamber, a refrigerator, a vacuum pump and equipment. There are 3 cameras in the sublimator. The chamber is closed by a door with a viewing window made of thermal glass. Bolts with a rubber seal and compression nuts ensure a tight closure of the chamber. The sublimator housing consists of front and rear frames and a steel housing coated with silicone varnish for corrosion protection. The phenomenon of sublimation or sublimation is when the moisture in the solid phase - ice bypasses the liquid and turns into gas - steam. The difference of this method from traditional drying methods is that it consists in freezing the materials containing moisture, because during the drying process the moisture turns from the frozen state into steam.

So, freeze-dried plums differ sharply from plums dried by other methods: they retain their color, taste, initial size, easily absorb moisture after recovery, and volatile components remain largely unchanged. In this way, dried fruits can be stored for a long time in rooms with unregulated temperature.
When drying plum varieties intended for drying, it is necessary to use the drying technology as well as precautions during the drying process. The purpose of this is to obtain high-quality dry products and to supply the obtained dry products for the consumption of the population throughout the year. It is advisable to take precautions when taking dried plums.

References:

1. Shoumarov X.B., Islamov S.Ya. Qishloq xo‘jaligi mahsulotlarini saqlash va birlamchi qayta ishlash texnologiyasi. – Toshkent, 2011.
2. R.J.Jo‘raev, M.M.Adilov “Qishloq xo‘jalik mahsulotlarini saqlash va qayta ishlash texnologisi”. Toshkent, 1999.)
3. Ostonaqulov T.E., Narzieva X. va B.G‘ulomov “Mevachilik asoslari” Toshkent, 2011.
4. Islamov Soxib Yaxshibekovich, Ermakova Jamilaxon Muxammadovna “Texnologicheskaya xarakteristika suxix produktov iz sushennix sortov abrikosa” Eurasian journal of akademik research, UIF = 8.1 | SJIF = 5.685, ISSN: 2181-2020, Volume 2 Issue 13, December 2022.
5. Ermakova Jamilaxon Muxammadovna “Olxo`rini quritish usullari va quritilgan olxo`rini saqlash” Impact Factor 2022, SJIF: 4.833, Multidisciplinary scientific online journal, ISSN: 2181-2330, Ijodkor o`qituvchi jurnali, 5 iyun / 2022 yil / 19-son.
6. Umidov SH.E., Tashmanov R.K. “Achieving efficiency by reducing natural decline in apple storage” ACADEMIC RESEARCH IN MODERN SCIENCE, International scientific-online conference, Published November 4, 2023 | Version v1, https://doi.org/ 10.5281/zenodo.10071395.