JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS

VOLUME 5, ISSUE 03
MONTHLY JOURNALS

ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

UDK: 615.322

DETERMINATION OF DRY PRODUCT YIELD IN THE NATURAL DRYING PROCESS OF LEEKS

Solayeva Umida Shonazar qizi
PhD student at Tashkent State Agrarian University
u_solayeva@tdau.uz

Annatotsiya

Ushbu tadqiqotda porey piyozi (Allium porrum L.) nav va duragaylaridan olingan namunalarning turli tabiiy quritish usullarida quritilganda quruq mahsulot chiqimi va sifat ko‘rsatkichlariga ta’siri o‘rganildi. Tajribalar uch xil sharoitda olib borildi: ochiq oftobda quritish, quyosh panelli quritkichda quritish hamda maxsus qora mato yordamida sun’iy soya sharoitida quritish. Quritish davomiyligi, qurish tezligi va mahsulot rangidagi o‘zgarishlar o‘zaro taqqoslab baholandi. Olingan natijalar shuni ko‘rsatdiki, quritish usullari orasidagi farqlar sezilarli darajada katta emas, biroq quyosh panelli quritish usuli nisbatan yuqori samaradorlikni ta’minladi. Soxta piyozbosh qismida eng yuqori quruq mahsulot chiqimi “Linkolin F1” duragayida quyosh panelli quritishda 17.0 %, soyada 16.8 % va oftobda 15.7 % ni tashkil etdi. “Kolambus” navida mos ravishda 16.8 %, 16.5 % va 15.5 % natijalar qayd etildi. “Sizokril” va “Vesta” navlarida esa natijalar o‘zaro yaqin bo‘ldi. Barg qismida eng yuqori natijalar asosan soyada quritish sharoitida kuzatildi: “Linkolin F1” duragayida 14.0 %, “Kolambus” navida 13.8 % va “Sizokril” navida 13.7 % quruq mahsulot chiqimi aniqlandi, eng past ko‘rsatkichlar esa ochiq oftobda qayd etildi. Quritish davomiyligi usullarga qarab farq qildi: soyada 8–11 soat, quyosh panelli quritkichda 9–12 soat, ochiq oftobda esa 15–18 soat davom etdi. Tadqiqot natijalariga ko‘ra, quyosh panelli hamda soyada quritish usullari an’anaviy oftobda quritishga nisbatan samaraliroq ekanligi aniqlandi.

Kalit so’zlar

porey piyozi, tabiiy quritish, oftobda quritish, soyada quritish, namlik miqdori, quruq mahsulot chiqimi

Аннотация

В данном исследовании изучено влияние различных способов естественной сушки на выход сухого продукта и качественные показатели образцов, полученных из сортов и гибридов лука-порея (Allium porrum L.). Эксперименты проводились в трёх условиях: сушка на открытом солнце, сушка в солнечной сушилке и сушка в искусственной тени, созданной с помощью специальной чёрной ткани. Были сравнительно оценены продолжительность сушки, скорость высушивания и изменения цвета продукта. Результаты показали, что различия между методами сушки не являются значительными, однако сушка в солнечной сушилке продемонстрировала более высокую эффективность. В ложностеблевой части наибольший выход сухого продукта был получен у гибрида «Linkolin F1»: 17,0% при сушке в солнечной сушилке, 16,8% в тени и 15,7% на открытом солнце. У сорта «Kolambus» соответствующие показатели составили 16,8%, 16,5% и 15,5%. У сортов «Sizokril» и «Vesta» результаты были близкими. В листовой части

наилучшие результаты в основном наблюдались при сушке в тени: 14,0% у гибрида «Linkolin F1», 13,8% у сорта «Kolambus» и 13,7% у сорта «Sizokril», тогда как наименьшие значения были зафиксированы при сушке на открытом солнце. Продолжительность сушки варьировала в зависимости от метода: 8–11 часов в тени, 9–12 часов в солнечной сушилке и 15–18 часов на открытом солнце. Полученные результаты показывают, что сушка в солнечной сушилке и в тени является более эффективной по сравнению с традиционной сушкой на открытом солнце.

Ключевые слова

лук-порей, естественная сушка, солнечная сушка, сушка в тени, влажность, выход сухого продукта

Annotation

This study investigates the effect of different natural drying methods on the dry matter yield and quality indicators of samples obtained from varieties and hybrids of leek (Allium porrum L.). The experiments were carried out under three conditions: open sun drying, drying in a solar panel dryer, and drying under artificial shade created using a special black fabric. Drying duration, drying rate, and changes in product color were comparatively evaluated. The results showed that the differences between the drying methods were not significantly large; however, the solar panel drying method demonstrated relatively higher efficiency. In the pseudo-stem part, the highest dry matter yield was observed in the “Linkolin F1” hybrid: 17.0% in solar drying, 16.8% in shade, and 15.7% in open sun. For the “Kolambus” variety, the corresponding values were 16.8%, 16.5%, and 15.5%. The “Sizokril” and “Vesta” varieties showed similar results. In the leaf part, the best results were mainly observed under shade drying conditions: 14.0% in “Linkolin F1”, 13.8% in “Kolambus”, and 13.7% in “Sizokril”, while the lowest values were recorded under open sun drying. Drying duration varied depending on the method: 8–11 hours in shade, 9–12 hours in the solar dryer, and 15–18 hours in open sun. The results indicate that solar panel and shade drying methods are more efficient compared to traditional open sun drying.

Keywords

leek, natural drying, sun drying, shade drying, moisture content, dry matter yield

Introduction. One of the most optimal methods for long-term storage of vegetable products in agriculture is to dry them in various ways. During the drying process, excess water in the product evaporates, resulting in a decrease in the moisture content of the product and a slowdown in microbiological degradation processes. Therefore, the shelf life of dried products is much longer than that of fresh products.

Since leeks have a high water content, they have a short shelf life when fresh. Drying this vegetable increases its shelf life, facilitates transportation, and allows for year-round consumption. Porey onions contain a number of nutrients that are beneficial to the human body, including vitamin C, B vitamins, potassium, calcium, and phosphorus.

The main types of natural drying of leeks include drying in the open sun and in the shade. In the open sun, the raw material is dried directly under the sun. This method is considered one of the least cost-effective. However, there are some disadvantages to this method, and in adverse

weather there is a high risk of contamination of the product, dust coating or damage by insects. Also, when dried in the open sun, the product's color fades, and the vitamins, enzymes, and nutritional value decrease.

In the natural drying method in the shade, the product is dried without exposure to direct sunlight. This method preserves the color of the dried product better than when dried in the open air, and the natural appearance and quality of the product are higher. In some cases, the drying time can also be reduced.

During the experiments, varieties and hybrids of leek were also dried naturally in a solar panel dryer. This drying equipment differs from other drying equipment in its energy efficiency and environmental friendliness. No additional fuel or electricity is required during the drying process, as the equipment operates on solar energy. The drying time in the drying equipment was slightly shorter than in the open air. This is because exposure to sunlight creates a greenhouse effect inside the drying chamber, resulting in faster evaporation of moisture from the raw material. In addition, in this drying method, the product is dried, protected from external environmental factors, dust, pests and insects.

The purpose of the study is to select varieties suitable for drying porey onions and develop drying technology.

Research objectives:

To study the agronomic characteristics of leek and select suitable varieties for drying;

To determine the factors affecting the quality of dried leeks during drying and to analyze the quality indicators of the dried product;

The following varieties of onions were selected as the objects of the study: Sizokril, Vesta, Columbus, and Linkolin F_1.

The subject of the study is the determination of the output and drying time of the dried product, when the varieties and hybrids of porey onions are dried in an oftob, shade and drying equipment.

The methods of the study were determined by the net weight of dried vegetables, the shape and size of the particles, the volume of grinding, defects in appearance, the ratio of components, organoleptic indicators and methods for determining drying according to the interstate standard Gost 13340.1-77. General technical specifications for dried vegetables were taken from GOST 32065-2013, and physicochemical, special organoleptic and correlation-regression analysis and methods of statistical-mathematical planning of experiments were used.

Experimental results: In the experiments, selected varieties and hybrids of leek were dried using various natural drying methods. The experiments were conducted in three different variants. In the first option, the samples of leek were dried naturally in the open sun, that is, in the open sun. In the second option, the samples were dried in a solar-powered drying equipment, with the top of the equipment covered with a light-transmitting polymer film. In the third option, a part of the drying equipment was covered with a special black cloth, creating artificial shade,

and the drying process was carried out. Using these methods, the drying time, the rate of product build-up, and changes in the color of the dried product were studied in a comparative manner.

During the research, selected varieties and hybrids of leek were initially subjected to a selection process. During the selection process, samples damaged by pests, mechanically damaged, and not meeting the required quality level were discarded. Foreign impurities, including dried leaves, twigs, and other impurities, were also removed from the raw material.

The selected raw materials were weighed and their initial mass was determined. Then the samples were washed twice under running water. During the washing process, dust, soil, and other mechanical impurities on the surface of the onion were completely removed. After washing, the samples were spread on wire mesh screens to remove excess water from the product surface and dried in natural conditions until the water droplets had completely drained.

In the next step, the samples of leek were subjected to the cutting process. In this process, the raw material was divided into two parts, namely the false bulb part and the leaf part. The false onion part was noted separately weighed mass, the Leaf part was also pulled separately in the same order. The false onion part was cut into rings 3-5 mm thick, and the Leaf part was ground into a rectangular shape 4-5 mm thick.

The cut samples were placed evenly on special drying racks and placed in the open sun, drying equipment, and shade according to the appropriate drying options (Table 1).

Determine the yield and drying time of dried leek onions when dried in the sun, in the shade, and in a drying machine (2024-2026).

№	Varieties and hybrids of leek	In the sun (30-35 °C)						In the shade (40-70 °C)						Solar panel dryer (40-70 °C)					
		Raw materials, kg	False onion-head, kg	Leaf part, kg	Dry product output,%		Drying time, hours	Raw materials, kg	Fake onion-head, kg	Leaf part, kg	Dry product output, %		Drying time, hours	Raw materials, kg	Fake onion-head, kg	Leaf part, kg	Dry product output,%		Drying time, hours
					Dried false onion head, %	Dried leaf part, %					Dried false onion head, %	Dried leaf part, %					Dried false onion head, %	Dried leaf part, %	
1	Sizocryl	5	1.7	2.8	15.3	13.5	18-24	5	1.8	2.6	16.7	13.7	10-18	5	1.7	2.8	16.8	13.5	11-20
2	Vesta	5	1.5	3.0	15.1	13.3	15-20	5	1.7	2.8	16.3	13.6	11-16	5	1.9	2.6	16.7	13.7	12-18
3	Columbus	5	1.8	2.7	15.5	13.2	17-21	5	1.6	2.5	16.5	13.8	12-17	5	1.6	2.7	16.8	13.5	10-16
4	Linkolin F1	5	2	2.6	15.7	13.4	16-20	5	1.8	2.9	16.8	14.0	8-15	5	2	2.5	17.0	13.9	9-15

The top of the raw material placed in the drying equipment was covered with a light-transmitting polymer film and the drying equipment was started. For drying the raw material in the shade, part of the drying equipment was covered with a special black cloth, creating artificial shade conditions. During the drying process, the air temperature, moisture content of the raw material, and the drying duration were regularly monitored and recorded (Figure 1).

Figure 1. Placing leek raw materials in a solar panel drying unit.

No significant differences were observed between the results of experiments on natural drying of leeks, but certain differences were found in the duration of drying and the yield of dry product. It was observed that the drying time was longer when the raw materials were dried in the open sun, while the drying time was relatively shorter when dried in a solar panel dryer. The long drying time in the open sun was caused by the variability of solar radiation, unstable air temperature, and adverse weather conditions.

The faster drying of the raw materials in the solar panel dryer was due to the fact that the upper part of the device was covered with a film. While the film protects against adverse weather conditions, it creates a greenhouse effect under it, creating a high temperature. In addition, improved air circulation inside the dryer also accelerated the drying process.

When part of the drying equipment was covered with a special black cloth, the drying time of the raw material was shorter than in the other two methods. This is explained by the fact that the black cloth absorbs part of the visible and infrared rays coming from the sun, that is, the process of heat absorption occurs. The absorbed heat leads to an increase in the temperature inside the drying equipment, and as a result, the moisture in the raw material evaporates faster. At the same time, the black cloth also helps to preserve the natural color of the raw material.

When samples from leek varieties and hybrids were dried using three different drying methods, the dry product yield indicators were close to each other. When the false onion head was dried in the open sun, the highest dry product yield was 15.7% in the hybrid variety “Linkolin F1”, 15.5% in the variety “Columbus”, 15.3% in the variety “Sizokril” and 15.1% in the variety “Vesta”. When drying the leaf part, the highest dry product yield was 13.5% in the “Sizokril” variety, 13.4% in the “Linkolin F1” hybrid variety, 13.3% in the “Vesta” variety, and 13.2% in the “Columbus” variety.

When dried in a solar panel dryer under a black cloth, the highest dry product yield from the false onion head part was 16.8% in the “Linkolin F1” hybrid variety, 16.7% in the “Sizokril” variety, 16.5% in the “Columbus” variety, and 16.3% in the “Vesta” variety. When drying the leaf part in the shade, the dry product yield was 14.0% in the “Linkolin F1” hybrid variety, 13.8% in the “Columbus” variety, 13.7% in the “Sizokril” variety, and 13.6% in the “Vesta” variety.

When dried in a solar panel dryer, the highest dry product yield from the false onion head was 17.0% in the hybrid variety “Linkolin F1”, 16.8% in the varieties “Sizokril” and “Columbus”, and 16.7% in the variety “Vesta”. The highest result when drying the leaf part was 13.9% in the hybrid variety “Linkolin F1”, the average results were 13.7% in the variety “Vesta”, and 13.5% in the varieties “Sizokril” and “Columbus”.

According to the results of the experiment, it was found that the false onion head of leeks dries longer than the leaf part. This is because the false onion head consists of densely packed cell layers, and the cell tissues in it are denser and thicker than the leaf part. Also, due to the high content of cell sap and dissolved substances in it, moisture evaporates more slowly.

The shortest drying time was observed when drying in the shade. In particular, it was 15 hours for the hybrid variety “Lincoln F1”, 16 hours for the variety “Vesta”, 17 hours for the variety “Columbus” and 18 hours for the variety “Sizokril”. The average drying time was recorded when drying in a solar panel dryer, and the longest drying time was observed when drying in the open sun.

Conclusion. During the experiment, the internal temperature of the drying equipment was monitored regularly, along with the external temperature, during the drying process. A thermometer was used for this. The temperature was measured every two hours during the drying process and the results were recorded in a field notebook. The cutting thickness of the raw material and the number of turns were also studied as factors affecting the drying duration.

REFERENCES

1. Голенко Д.В. Подбор сортимента лука порея (Allium porrum) для весеннего сбора урожая в условиях беларуси овощеводство. Сборник научных трудов. Минск.- 2015.- С. 62-64.
2. Porey piyozi yetishtirish / Ilmiy nashr / “Agrobank” ATB.-Toshkent: “Tasvir” nashriyot uyi.- 2021.- B. 12-14.
3. Sullieva S., et.al. Varieties and hybrids of leek (Allium porrum) in the conditions of Uzbekistan. BIO Web of Conferences.- 2024.- №93, -P.- 1-4.
4. S.B. Sasongko et al. Effects of drying temperature and relative humidity on the quality of dried onion slice.- 2020.- 1p.
5. T.C. Millî eğitim bakanliği bahçecilik pirasa yetiştiriciliği.- 2013.-S.- 23-26.
6. Xakimov Sh.Sh, Usmonov M.S. Porey piyozining oziq-ovqat va shifobaxshlik xususiyatlari, nav na’munalari va yetishtirish agrotexnologiyasi / ilmiy maqola / 3rd - International Conference on Research in Humanities, Applied Sciences and Education Hosted from Berlin, Germany.- 2022.-B.- 1-2.
7. U.Sh.Solayeva, B.Sh.Nortojiyev. Porey piyoz bo‘laklariga natriy glutamat bilan ishlov berib quritishda mahsulot sifat ko‘rsatkichlariga uning ta’siri. O‘ZBEKISTON AGRAR FANI XABARNOMASI. № 4/2 (22) 2025 Ilmiy-amaliy jurnal. B.-52-54.
8. Xakimov R.X., Xakimova M.B. Impact of packaging materials on the preservation of beijing cabbage GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ) ISSN (E): 2347-6915 Vol. 12, Issue 6 June (2024)

9. Хакимов Р.Х., Шарипов С.Я., Хакимова М.Б., Пекин карамини замонавий совуткичли омборларда сақлаш технологияси Progress Annals: Journal of Progressive Research Volume 2, Issue 6, June 2024 ISSN (E): 2810-6466 Website: https://academiaone.org/index.php/