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РОЗДІЛ 1

**АКТУАЛЬНІ ПИТАННЯ ЗБЕРІГАННЯ  
ТА ТЕХНОЛОГІЇ ПЕРЕРОБКИ ЗЕРНА,  
ОВОЧІВ ТА ФРУКТІВ**

струють стійку тенденцію до зростання, тому дуже перспективним є використання твердого біопалива для опалення приватних будинків. У цьому випадку використання в якості палива паливних брикетів та гранул підвищує ефективність системи опалення навіть у порівнянні з вугіллям і дровами [2].

Виробництво твердого біопалива – це хороший спосіб збільшити рентабельність виробництв, оскільки для нього використовуються саме відходи. Джерела такої сировини дозволяють виробляти в Україні до 30 млн. тонн твердого біопалива на рік [2].

Отже, спельта є цінною зерною культурою для органічного споживання, яка користується попитом як за кордоном, так і в Україні. Вона ціниться вище, ніж звичайна м'яка пшениця, і вирощування її є рентабельним. Спельта має зайняти своє місце серед зернових культур в Україні.

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### Література

1. Что такое полба? [Електронний ресурс] – Режим доступу: <https://www.youtube.com/watch?v=pg8FkpWQOhg>.
2. Тверде біопаливо в Україні: перспективи [Електронний ресурс] – Режим доступу: <http://moemisto.lviv.ua/article/tverde-biopalivo-v-ukraini-perspektivi>.

## IMPROVEMENT TECHNOLOGY POSTHARVEST DRYING OF GRANE MILLET

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An important task of the grain-processing industry of Ukraine is to provide the population with quality and available cereal products. In our country, this valuable cereal culture as millet has received little attention and this at a time when it is characterized by high resistance to drought, with the gradual climate change over the last decade. Millet, unlike, for example, from buckwheat, provides a fairly stable yields, regardless of weather conditions.

Especially the value of this crop is determined almost waste-free use of its products in various industries. Today, when proper nutrition becomes more and more popular, grains along with vegetables is the main component of a balanced diet. Millet is an important source of magnesium, increases the effectiveness of insulin in the body and helps to avoid the development of diabetes, the dissemination of which is already comparable with the epidemic. Millet is a great alternative to wheat in the presence of intolerance to gluten, flour from millet can be used in expanding the range of gluten-free products.

In the structure of world production of the grain of millet ranks sixth after maize, rice, wheat, barley and sorghum. Over the last years in Ukraine the acreage of millet began to rise after a substantial reduction. Last year in the Odessa region was sown to millet 13705,33 hectares, in the whole of Ukraine was sown millet – 96 thousand hectares (in 2015 – 92 thousand hectares).

For any technology of cultivation of agricultural crops it is important to use locally adapted varieties. The appearance of modern varieties of millet relevant is the technology improving their post-harvest handling, use of modern methods of drying and storage that will preserve the value of millet, its integrity and reduce power consumption when it is processed.

For grain drying, for several decades, domestic manufacturers used a reliable and easy dryers DSP-32OT. It was a time when saving energy was not important, because the cost of energy was low.

The present dictates to the manufacturers of other conditions, when energy saving is one of the main conditions for obtaining cost-effective raw materials. You need to stay on the market long-term partners, it is necessary each time to reduce the energy consumption of drying grain, to ensure the productivity, adaptability and versatility of operation of grain dryers. Therefore, after thorough monitoring of the market, we offer grain drying equipment it was proposed modular dryers. However, the lack of theoretical developments in technology and modes of drying of grain millet in new dryers in the Ukraine and in the CIS countries is not sufficiently studied and substantiated, and causes the relevance and practical importance to the development of this field of study.

The aim of our work is scientific substantiation and improvement of technology of drying of grain of modern varieties of millet, which will guarantee grain drying with minimal energy consumption without deterioration in its quality and its further storage.

To achieve this goal it is necessary to solve the following tasks:

- to analyze market condition of grain production in Ukraine and ways to use millet in technology of food products and composite industries;
- explore the basic physical, thermal and technological properties of grain of millet as an object of drying, depending on humidity and temperature of the grain;
- to determine the granulometric composition of the grain mass of millet and its impurities;
- to study structural and mechanical properties of millet grains and their changes during heating, drying and cooling grain;
- the kinetics of drying of grain of millet;
- identify the biochemical properties of millet grains and their changes during drying and storage, and mathematical modeling to establish the possibility of predicting the grain quality of the millet in storage;
- to improve the technology of post-harvest handling and storage of grain of millet;
- to determine the economic and social efficiency of post-harvest handling and storage of grain millet and to develop recommendations for its use in the industry.

An important part of the process of post-harvest processing of millet also is drying its cleaning. Fresh seeds contain a lot of impurities and their negative effects on the process of grain storage, because most of them have considerably higher water absorption, vitality, and respiration intensity than the main crop. Only with careful cleaning grain, and compliance with all technological requirements in the process of post-harvest handling, you can get quality products from millet, for example, cereals, flakes for quick cooking.

Most often, the grain is injured while using traditional sieves using scrapers or brushes, the smallest grain damaged during use aspirators.

To identify the necessary working bodies and to determine the optimal hole sizes of sieves to separate the mixture into fractions, it is necessary to analyze the variability of the sizes of main crop grain sizes and impurities, is separated. Determination of the variability of the size of millet was carried out sieve analysis. Calibration was performed by sieving through a system of successive sieves with round holes with a diameter of: 4,5; 4,0; 3,4; 3,0; 2,5; 2,4; 2,0; 1,1; 1,0 mm and slotted: 2,2x20; 2,1x20; 2,0x20; 1,9x20; 1, ones 8x20; 1,7x20; 1,6x20; 1,4x20; 1,2x20; 1,0x20 mm. After sifting, stair fractions remaining on each of sieves, manually dismantled in such a way that each stair fraction was divided into two parts: one from the grain of the main crop (millet), or from impurities. At the end of the screening was determined the mass of each stair faction, plowing millet and impurities. Based on these data was constructed a correlation table in which seeds of millet and a mixture of the impurities separated into size classes and plotted graphs of the distribution of basic grains, weed and grain

impurities. Based on the sieve analysis found that the bulk of the grain of millet has a sufficient quality factor and the filled structure is characterized by large grains obtained pass sieve with a hole diameter of 2.0 mm. the Results of sieve analysis show that the greatest passage of millet – 87,27 % obtained with sieves with a diameter of 2.0 mm. When bringing the quality of millet on the basis of contamination to cereal conditions it is recommended to use sieves with apertures of 1,7x20...2,0x20 mm, which allow you to clean it from much of the weed and grain impurities.

Today, the priority is to determine the efficacy of in post-harvest processing of millet sieves Fadeeva which was patented in two types of sieves: sieves with hexagonal holes – hexagonal sieve (Patent No. 38580 from 12.01.2009.), and screens embossed with rectangular holes (Patent No. 37527 dated 25.11.2008). Their main advantages in comparison with stamped sieves, is that they have rectangular openings, this helps to reduce injury to the grain by avoiding contact of grains with sharp edges of the holes of the sieves and the use of balls made of food grade rubber instead of scrapers.

Summing up the above, we can conclude that even in a complex political, economic and environmental conditions in our state is still an important supplier of grain crops on the world market.

In our country, unfortunately, not many businesses are keeping pace with the times. A large portion of the granaries is the Soviet legacy, which requires a major overhaul and refurbishment to meet modern requirements and to compete with global grain exporters. And before us now the task is to make existing technologies more modern and efficient through innovation and close cooperation of researchers from the manufacture.

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## **HULLESS BARLEY MULTIFUNCTIONAL FOOD GRAIN**

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Barley has always been not only the raw material for brewing, and also valuable food crop. Barley uses for producing different grouts, instant cooking products, flour, composite flour, cereal flakes. Main barley producing countries are EU countries, Canada, Turkey, Russia, Ukraine, Australia, Argentina and the USA. But today, conventional barley, by all indications inferior to hulless barley (*Hordeum vulgare* L. var. *nudum* Hook. f.) which contains more proteins, lipids and vitamin E, less sugar and cellulose. In addition, hulless barley contains  $\beta$ -glucans which contribute significant reduction of cholesterol in human blood plasma and prevention of cancer and prevention against cardiovascular disease, diabetes.

An important indicator of the quality of the brewing malt is an indicator of falling number, which is not included in DSTU 3767-98. For malting barley production seeds should be viable. Pre-sprouted seeds has a reduced ability to germination during the malting process which reduces the quality of beer. Half of this barley is not suitable for the production of beer after storage [1]. A slight germination of seeds cannot be detected by visual inspection, it is can be measured by the amylase activity [1]. To avoid purchase of pre-germinated barley need to conduct a Falling Number test [1]. For the high quality barley indicator of Falling Number should be more than 250. For the German Standards indicator of Falling Number should be not less than 150 [2]. Indicator of Falling Number of hulless barley may be useful to assess its suitability in a bread baking industry.

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