**ОДЕСЬКА НАЦІОНАЛЬНА АКАДЕМІЯ
ХАРЧОВИХ ТЕХНОЛОГІЙ**

ЗБІРНИК
НАУКОВИХ ПРАЦЬ
МОЛОДИХ УЧЕНИХ, АСПІРАНТІВ ТА СТУДЕНТІВ

**ОДЕСА
2016**

ББК 36.81 + 36.82
УДК 663 / 664

Одеська національна академія харчових технологій
Збірник наукових праць молодих учених, аспірантів та студентів
Міністерство освіти і науки України. – Одеса: 2016. – 408 с.

Збірник опубліковано за рішенням вченої ради від 01.07.2016 р., протокол № 12
За достовірність інформації відповідає автор публікації

ISBN 966-571-063-х

РОЗДІЛ 1

АКТУАЛЬНІ ПИТАННЯ ЗБЕРІГАННЯ ТА ТЕХНОЛОГІЇ ПЕРЕРОБКИ ЗЕРНА, ОВОЧІВ ТА ФРУКТІВ

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NEW KINDS OF WHEAT WITH INCREASED BIOLOGICAL VALUE

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Products of grain processing and bread products all over the world are traditional foodstuff and constitute a significant part of the food ration for people. One of the main grain crops, which are cultivated by the people, along with corn and rice, is wheat. The volume of wheat production make about 700 million t., it is about 30 % of world grain production.

Wheat is member to the cereals family. Cereals form inflorescences, which have difficult spike including individual spikelet. Inside each ear of wheat is the fruit (seed) called «wheat kernel». With good nitrogen nutrition in the ear is usually 35-40 seeds, which are coated with hulls. Wheat kernel of majority of plants, which are belong to the cereals family (more than 6000 species) fall to the ground with hulls, because they are firmly related to the surface of the seed. This occurs in oats, barley, some wild grains and hulled wheat. Hulls, remaining with wheat kernel, serve a protective function, as well as contribute to a better spread of seeds, because of increasing windage ability.

The genus of wheat contains about 30 species, that are well distinguishable by morphological and biological characteristics and the prevalence of a culture. Wheat depending on the number of chromosomes couples, are: di-, tetra-, hexa- and oktaploid. Most species of wheat are cultural, but wild-growing species also meet. Practically all cultural species of wheat are naked, which don't have hulls during trashing. However, there are also hulled species, their culm is very brittle, easily broke during threshing, therefore, ear is also easily separated from the culm, so grains, which are strong fitted by films, are great difficulty separated from them.

Mankind cultivates only two species of all wheat today (under 99 %) such as: durum (tetraploid) and common wheat, are also divided in the grain market. May be noted that in Ukraine «тверда пшениця» in World wheat classification is «durum» wheat and ukrainian «м'яка пшениця» in World named «hard» wheat. Because of the fact that in Ukraine, until now, only been grown bread wheat, while in the USA, Canada, France, Australia are grown soft wheat of biscuit or pastry application.

So, if we consider chronology of wheat cultivation, we can see that for 9 thousand years humanity has moved from the hulled wheat to the naked (hulless) wheat. Because of the fact that the hulless wheat have better technological processability: have a higher bulk density, i.e. so have more cheaper cost of their transportation and storage; no need to install the processing equipment for their threshing or dehulling; less energy cost of processing them.

However, despite of above, in the open press often appears more details of using polba (emmer) and spelt in food. What is the reason?

Emmer and spelt were an important staple in parts of Europe from the Bronze Age to medieval times; it now survives as a relict crop in Central Europe and northern Spain. To the cultural types of hulled wheat include einkorn (Triticum monococcum), emmer (Triticum dicoccoides), Macha wheat (Triticum macha), Timopheev's wheat (Triticum timofeevi) and T. spelt, among which the most prevalence has Triticum dicoccoides and Triticum spelt. Emmer is a tetraploid wheat, which means it has four sets of chromosomes, spelt – a hexaploid wheat (has six sets of chromosomes). Spelt is sometimes considered a subspecies of the closely related species common wheat (Triticum aestivum), in which case its botanical name is considered to be Triticum aestivum subsp. spelta. Both wheats have found a new market as a health food.

The most important wheat substance is gluten, which represents generally proteins with some substances of non-protein character (starch, mineral substances). Gluten proteins possess higher ability to absorb water and swell, forming hydrated elastic, flexible and cohesive jelly. The most part of the wheat proteins is gluten proteins – gliadines (alcohol-soluble) and glutenins (alkali-soluble). Glutenins, as a high-polymer proteins, are more high-molecular and form the basis of the molecular grid (frame of dough), which provides firmness and flexability of dough.

Wheat varieties with high-baking quality differ from the low-quality varieties, especially, by the high content of glutenins, and therefore they have a low ratio of gliadin / glutenin (Gli/Glu). For example, the ratio of Gli / Glu in high quality wheat is 1.6-1.8, in medium quality – 2.2-2.4, in low quality – 2.7-2.8. Therefore the primitive species of wild wheat, bypassed selection, spelt and emmer have Gli/Glu ratio 5.7-6.5. Due to this fact hulled wheats have more digestible (digested) protein.

Celiac disease (gluten-sensitive enteropathy) is an autoimmune disease and is accompanied by damage mucosa of the small intestine. The cause of celiac disease is intolerance cereal proteins, primarily alpha-gliadin. This is due to deficiency of special enzyme in human body so that there is an incomplete splitting the gluten proteins and injuring of Intestinal villi by toxic products of metabolism. Eventually, significantly disrupted the process of absorption of carbohydrates and fats in the small intestine because of this disease. The α-fraction of emmer is represented by α6-component. This makes this species more perspective for using in dietary food, as exactly this component restricts using cereals by celiac disease people. In 1991 in "The International association of food allergy of the USA" was conducted clinical trials which proved that, in half of cases, spelt gluten doesn't cause an allergy in people, who are sensitive to this component in grain.

Compared to common wheat hulled wheats contains in 1.2-1.3 times more content of minerals and some vitamins (vitamin A).

Another kind of wheat, which has high biological value, is black wheat. This wheat was obtained in Odessa Plant Breeding and Genetics Institute, crossing ordinary hexaploid wheat (as Kuyalnik, Selyanka) and wild black wheat Dong10 Chinese origin. This variety of wheat has a low baking quality but has an increased level of protein, vitamins and micro- macronutrients. It contains 7-8 mg/kg vitamin C, almost three times more vitamin E group, twice times more the amount of zinc and iron. This immediately brings this kind of wheat to a new quality level.

The main foodstuff produced from wheat grain are:

— flour and flour mixes;

— grain and flakes;

— muesli and grain breakfasts.

Flour is a product obtained as a result of grinding cereal grains, other cereals and certain products of their processing. In the products range of flour mills wheat patent flour ranked first and widely used in the production of bread and bakery products. Being a product of daily nutrition, wheat patent flour characterized by a relatively low biological value, especially of micronutrients which content is insufficient in the traditional bread products.

Groats is food product represents whole or grinding kernel, fully or partially freed from hulls, aleurone layer and embryo. Groats and groat products take about 20...30 % of the total consumption of grain products.

Flakes is a product obtained as a result of flattening of groat or whole grain. Flakes – are product of healthy and nutritious food.

It should be noted that the main trend of using wheat is a bakery, so breeders are constantly breeding and selecting varieties with high baking properties, while processors are using them not only for the flour production, but also for the production of groats and breakfast cereals.

To sum up, the above-considered species of wheat are new nonconventional raw materials for Ukraine. And, as a result, for their advance on the market to the aim of creation the healthy products is necessary to carry out the complex of actions including next:

— studying of technological properties of different species of wheat with the increased biological value and development of the "sparing" structure and the modes of postharvest processing of grain (drying and cleaning);

— development of technology of trashing (dehulling) for preparation of hulled wheat for processing and development of technologies of obtaining wholemeal wheat flour, groats, flakes and muesli;

– studying of a chemical composition of processing wheat grain products with the increased biological value.

According to conducted analysis can be noted that existing in Ukraine range of cereal products requires expansion which should be carried out in the direction of improving the nutritional value. The solution to this problem is possible through using of new hulled wheat and special breeding varieties with a high content of important substances for the human body.

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РОЗДІЛ 2 – ХІМІЧНІ, ФІЗИЧНІ ТА МАТЕМАТИЧНІ МЕТОДИ ДОСЛІДЖЕННЯ ПРОЦЕСІВ ТА АПАРАТІВ

Наукове видання

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Підписано до друку 2016 р. Формат 60×84/8. Папір офсетний.
Ум. друк. арк. 47,4. Тираж 30 прим. Замовлення