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SUB-SECTION 11. Technologies of food products

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SOME FEATURES OF CHEMICAL COMPOSITION OF UKRAINIAN NAKED OATS VARIETY «SALOMON»

Keywords: naked oats, groat production, chemical composition, protein content, lipids, starches, β-glucans.

INTRODUCTION

Groats food processing sector refers to socially important branches of agriculture complex. State and development of the groats industry of state is one of the determinants of the welfare, working capacity and the health of its population.

Traditionally, at groats plants being processed include seven cereal crops: rice, millet, buckwheat, oats, barley, corn, wheat and also one legume crop □ peas. A small proportion constitute groats food products obtained by processing of sorghum, lentils, chickpeas and other.

Wide demands from consumers have rice, buckwheat and oat groats and derivates from its groats products. Flakes and instant groats products have become increasingly prolific in recent decades among groats products. The interest of consumers in this type of groats and groats products is primarily connected to their ability to be quickly prepared and good food and flavoring properties compared with traditional groats.

The nutritional value of grain intended for food production is defined by the chemical composition which is characterized by containing proteins, starches, lipids, fiber, minerals and β-glucans.

Due to their balanced amino acid composition, the presence of mucous substances unique vitamin content, most of groats can be attributed to the products of dietary and restorative nutrition.

Processing of these crops involves complex energy-intensive operation in technological process. Most types of groats and groats products have low yield and relatively lower nutritional value compared to the unprocessed grain. During dehulling and pearling operations significant part of protein, vitamins, minerals, β-glucans and dietary fiber which are concentrated in outer layers are also removed [1;2].

Over the centuries, oats (Avena sativa L.) has been an important fodder and food crops. In the XX century it began to gain importance for agricultural production and processing industries.

The global industry uses oats for producing a wide range of food products besides traditional cereal flakes, flour, different groats and instant cooking products it is additionally

used in the manufacturing of beer, oat milk, ice cream, bread, cookies, baby food products and other high nutritive products for human [3;4;5].

Imperfection and complexity of processing traditional varieties of oats into food products was a result of the emergence of new, more promising for food and processing industry naked variety of oats (Avena nuda).

The advantage of naked forms of oats is almost total absence of hard floral hulls, which are firmly related to the surface of the grain (20...40 % in hulled oats forms) which greatly improve their technological properties. Naked oats grain has thin and papery hulls which are practically completely separated in the process of harvesting and thrashing of the grain [6;7].

The researches conducted by scientists from of the advanced countries have established that naked forms of oats have relatively high content of protein, fat, starch and relatively lower mineral content and fiber compared to traditional forms of oats which determines advantage of nutritional value of naked oats and more nutritional value of its food products.

First Ukrainian naked variety of oats was grown at Nosivska Selection-Experimental Station of Chernihiv Institute of Agricultural Production of UAAS. In 2010 year were registered cultivar of naked oats «Skarb Ukrainy».

«State register of plant varieties suitable for dissemination in Ukraine» contains cultivars of naked oats: «Salomon», «Samuel», «Skarb Ukrainy».

In modern conditions the appearance of new naked varieties of oats Ukrainian growing determines its chemical indicators for determining the feasibility of their use for the production of high quality food products.

MATERIAL AND METHODS

Samples of naked oats cultivar «Salomon» were cultivated and harvested in Kirovograd region, Ukraine in 2013.

Protein content of naked oats grain was determined according to the method GOST 10846-91, fat content was determined according to the according to the method GOST 29033-91, starch content of the samples was determined according to the method GOST 10845-98, ash content of naked oats grain was determined according to the method GOST 10847-74.

RESULTS AND DISCUSSION

For anatomical parts of the grain nutrients are unevenly distributed. Coats contain much cellulose and pentozanes. The aleurone layer has high concentration of protein, cellulose, ash, endosperm – starch and protein. The germ contains proteins, lipids and vitamins.

The results of research chemical composition of naked oats variety «Salomon» are presented in Table 1.

Table 1.

Some indicators of chemical composition of naked oats «Salomon»

Cultivation year	Protein, %	Starch, %	Lipid, %	Fiber, %	Ash, %
2011	14,6	59,8	6,5	3,4	2,4
2012	15,3	60,3	5,9	3,7	2,2
2013	15,0	58,5	6,3	3,5	2,1

Important parts of the chemical composition of the grain are proteins. Proteins cannot be synthesized independently and get into the human body only with food products. The average protein content in traditional varieties of oats may reach 10...11 %. In traditional oats groats and flakes this indicator in average reaches 12,3 % [8]. There is relatively high protein content in traditional oats products due to the fact that in the process of their production hulls which contain substances mainly difficult to assimilate are removed from the grain and not counted in determining protein content. The average protein content in studied samples of naked oats variety «Salomon» depend on cultivation year was in the range 14,6...15,3 %.

The total carbohydrate content in traditional oats is in the range 60...80 %. Predominant substance of carbohydrate complex is starch, which in average may reach 53,7 % in unprocessing oats grain and 58,2...60,1 % in oats groats and flakes [8;9]. The average starch content in studied samples of naked oats is in the range 58,5...60,3 %.

In oats grain presence soluble no starch polysaccharide β-glucan. It is physiologically important dietary component of the oats grain. The vast majority of β-glucans of oats was found in the peripheral parts of the grain, oats bran contents 4,17 % β-glucans, in the food products of oats processing its content is in the range 2,9...4,3 % [8;9]. The average β-glucan content in studied samples of naked oats was in the range 7,36...7,59 %.

Fiber is contained mainly in the membranes of grain and in the cell walls of the aleurone layer and represents a macromolecular carbohydrate which determines the mechanical strength and elasticity of plant cells. Fiber content depends on the varietal characteristics and growing conditions. Traditional forms of oats average contain 10...15 % of fiber [8;9]. The average fiber content in studied samples of naked oats was in the range 3,4...3,7 %.

Important value in human nutrition is contained in lipids. Oats grains are characterized by a high content of lipids. The majority of lipids in oats grain are located in the germ and endosperm. The average content of lipids in oat grain ranges from 7 to 9 % which is much higher compared to other crops: maize up to 5,8 %, millet – 5,5 %; sorghum – 5,3 %, barley – 4,6 %; wheat – 3,8 % [10]. The average lipids content in studied samples of naked oats was in the range 5,9...6,5 %.

Minerals are an important component of grains; they influence the biochemical and physiological processes in the human body. Minerals make up a small part of the weight of grains, mainly located in the upper layers of the grain. Oats grain is contained most extreme importance to human micro- and macroelements: potassium, magnesium, calcium, silicon, phosphorus, sodium, chromium, manganese, aluminum, cobalt, copper, fluoride, molybdenum, sulfur, boron, iodine, nickel, selenium, tin, titanium, zirconium, strontium content of which essentially depends on agro climatic growing conditions. The average total of minerals content in studied samples of naked oats was in the range 2,1...2,4 %.

CONCLUSIONS

Analysis of the obtained data showed that variety of naked oats «Salomon» has a well balanced chemical composition compared to the averages values for traditional oat cultivars and food products of their processing. Obtained data allow considering the potential for production products with the standard quality of the existing range, or products with high biological and nutritional value from naked oats.

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