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TECHNOLOGICAL CHARACTERISTICS OF NAKED OATS VARIETY «SALOMON» GROWN IN UKRAINE

Abstract. The features of the studied naked variety of oats cultivar «Salomon» is the high values of parameters volume weight (680...695 g/l) and content of hull grain (5...7 %) relative of these average parameters for conventional forms oats. Almost total absence of hard floral hulls on surface of naked types of oats and relevance some of indicators of technological properties of test samples to requirements for conventional forms simplify the technological process of manufacturing oats food products.

Keywords: naked oats, technological properties, quality factors.

INTRODUCTION

In the recent years, scientists-breeders have obtained new high-efficiency crops, which are characterized by high nutritional value. Among them a special place belongs to naked forms of oats (*Avena nuda*) [1; 2]. «State register of plant varieties suitable for dissemination in Ukraine» contains two food cultivars of naked oats: «Salomon», «Samuel» and one fodder cultivar «Skarb Ukrainy».

The problem of using naked varieties of oats in the national groat industry is located in the initial stage. The majority of researches were held by Ukrainian scientists-breeders to determine the growing conditions, some technological properties and chemical composition of the grain [3; 4].

An important factor to determining the optimal mode of preparation and processing stages of naked oats in cereal products is determining their technological properties. Technological properties of grain are a set of signs and indicators that determine the behavior of the grain during its processing to cereal products, yield and quality of these end products. Technological properties of grain include organoleptic and physical indicators. Organoleptic indicators of the grain characterize its freshness and suitability for processing and include color, smell, and taste. Physical indicators of grain include grain's shape, its geometric characteristics, weight of 1000 grains, volume weight, grain size characterization, uniformity, glassiness. According to these parameters the optimum modes of grain cleaning and processing machines are determined [5].

MATERIAL AND METHODS

The promising and the most common cultivar of naked oats grown in our country were selected for the researches. Samples of naked oats cultivar «Salomon» were cultivated and harvested in Kirovograd region, Ukraine in 2011...2013 years.

Grain linear dimensions (length, width, thickness) were determined by direct measurement by a digital caliper reading to 0.01 mm. To determine the size of the grain one-

Table 1.

Grain size characterization of naked oats variety «Salomon»

Cultivation year	Set of sieves, pass \ overtail, %				
	— 2,2×20	2,2×20 2,1×20	2,1×20 2,0×20	2,0×20 1,8×20	1,8×20 —
2011	5,9	55,6	24,1	10,6	3,8
2012	6,2	56,3	21,0	12,2	4,3
2013	5,7	53,4	25,1	11,3	4,5

hundred naked oats grains were selected at random and their three principal linear dimensions were measured.

Sizing, fractionation and uniformity of naked oats grain were determined by sieving on slotted sieves (1,2×20; 1,4×20; 1,5×20; 1,6×20; 1,7×20; 1,8×20; 2,1×20, 2,2×20) mm. Samples (250 g) were sieved sequentially on slotted sieves. After sieving, grain labeled as wide, medium and thin. All sizing, fractioning and uniformity procedures were repeated three times.

Thousand kernel weight was determined according to the method GOST 10842-89 (ISO 520:2010). From weighed sample of naked oat (25...30 g) all dockage, shrunken and broken kernels, and other foreign material were removed, after this 1,000 kernels were counted and weighed.

Volume weight (mass per hectolitre) was determined according to the method DSTU 4234-2003 (ISO 7971-2:1995). Volume weight is the measure of grain density determined by weighing a known volume of grain. Special 1 liter volume cylinder is filled with naked oats grain, then the grain from the cylinder is poured into the approved box and weighed on electronic scales.

Foreign matter content is determined according to the method GOST 30483-97. Foreign matter content is determined by sieving tested samples (100 g) of naked oat on slotted sieves.

RESULTS AND DISCUSSION

Important factor defining and affecting the dehulling and pearling processes is geometrical characteristics of the grain and its particle size characterization. Larger grain contains more percentage of endosperm and respectively will give a higher yield of end food products. A better efficiency of dehulling and pearling processes will have a batch of larger grain sizes. Uniformity can be considered high if it is more than 80 %, low at 50...60 %. The results of research grain size characterization of naked oats cultivar «Salomon» are presented in Table 1.

The analysis of the data showed that samples of naked oats variety «Salomon», are of sufficiently high uniformity in thickness. Nearly 80 % of total naked oats grain is located to pass sieve 2,2×20 and overtail of sieve 2,0×20 mm. Content of the fine grain obtained from pass of sieve 1,8×20 for the samples were 3,8, 4,3 and 4,5 %, respectively. High uniformity of naked oats allows to determine the optimal modes of grain cleaning and processing equipment and make dividing into factions before processing effective.

Shape of the grain effects significantly affected on the processes of preparing grain, especially on its cleaning stages. Naked oats has symmetrical long-cylindrical, round-shaped kernel with crease on ventral side.

Table 2.

Geometrical characteristics of naked oats variety «Salomon»

Cultivation year	Length l, mm	Width a, mm	Thickness b, mm
2011	5,7...8,1	1,6...3,4	1,2...2,7
2012	5,9...8,6	1,9...3,7	1,3...3,1
2013	6,0...8,4	1,7...3,3	1,4...2,9

The results of research of geometrical characteristics of naked oats are presented in Table 2.

It was discovered that regardless of the year and growing conditions the largest linear grain dimension of naked oats was length (5,7...8,6) mm, the smallest □ thickness (1,2...3,1) mm.

Hoodness is important indicator that defines the structure and holding of the technological process. The content of hulls characterize technological value of grain in groat industry determining the yield of end food products. The presence of hulls on the surface of grain complicates technological process increasing the energy expenses. For the conventional varieties of oat hoodness indicator ranges in 20...40 %.

For the naked varieties of oats hoodness indicator is not characteristic, but in grain mixes hulled and unthreshed grain are always present which enables to consider this indicator to determine technological effectiveness of naked varieties of oat. For these crops the important technological indicator is the content of hulled grain in its grain mixes. The content of hulled grain in the studied samples of naked oat is ranged in 5...7 %.

Thousand kernel weight characterize grain size and uniformity. Thousand kernel weight is also a useful index for potential yield of end products. For the studied variety of naked oats this indicator was located in the range from 23 to 26 g for harvests 2011...2013 years.

By the indicator of thousand kernel weight studied samples of naked variety of oats were within values which are inherent to hulled forms of that crop (20...32 g for hulled oats) which suggests a possible high efficiency of its use in the groat industry.

An important indicator of the physical properties of the grain is an indicator of grain volume weight. For conventional food oats under the existing regulations volume weight should be at least 460 g/l. Volume weights of studied samples of naked oats depending on the year of cultivation ranged 680...695 g/l.

The presence of various impurities in the grain mass depends on growing conditions and its harvesting and is crucial for determining the optimal modes of cleaning equipment. For testing samples of naked varieties of oats and barley the content of non-edible and edible foreign matter are determined. Content of non-edible foreign matter in grain mass of studied samples of naked oats depends on the year of cultivation ranged 1,3...1,7 %, edible foreign matter □ 2,1...2,4 %.

CONCLUSIONS

The advantages of studied naked variety of oats are the high values of indicator volume weight and low values of indicator content of hull grain compared to traditional varieties. The absence of hard floral hulls and velevance of some indicators to the existing requirements for traditional oats significantly simplifies its processing to food products. Grain

size characteristics and uniformity depending on the year of cultivation changed, which indicates the necessity of fractioning of grain mass before its processing. Fractioning of the grain has to be sieved on slotted sieves.

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