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Increasing the Quality of Durum Wheat Grain on the Basis of Isolation from it Cerips with a "Black Germ"

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ANNOTATION

In recent years, there has been a tendency for a sharp deterioration in the quality of durum wheat grains supplied to flour mills. The decrease in the quality of grain is associated with a high content in hard wheat of soft white grain (up to 8-10%) and caryopses with the "black germ" disease (up to 5-8%). The presence of these components in batches of durum wheat reduces their classiness and technological potential, expressed by the yield and quality of pasta grits. For this, fractionation of durum wheat grain was carried out on a pneumosorting table and a concentrator. For each fraction obtained, the nature, weight of 1000 grains, the content of white grain wheat, grains with a "black germ", the quantity and quality of gluten were determined. As a result of the experiment on the pneumosorting table, it is possible to isolate from the grain of the 4th class 6.5% of the grain of the 5th class with a content of 16.98% of the grains with a "black germ", as well as 35.1% of the grain of the 3rd class with the content gluten 23.68% and 8.82-11.12% grains with a "black germ". On the concentrator, it is possible to isolate from grain of the 4th class 2.9% of grain of the 5th class with a content of 27.7% of grains with a "black germ" and 10.8% of grain of the 3rd class with a gluten content of 23.96% and 5 .6% of grains with "black germ".

Introduction

Durum wheat flour is a valuable raw material for the production of many functional foods: pasta, confectionery, bakery and other products. In recent years, there has been a tendency for a sharp deterioration in the quality of durum wheat grains supplied to flour mills. The decrease in the quality of grain is associated with a high content in hard wheat of soft white grain (up to 8-10%) and caryopses with the "black germ" disease (up to 5-8%). The presence of these components in batches of durum wheat reduces their classiness and technological potential, expressed by the yield and quality of pasta grits [1-3]. The main cause of the disease of grain durum wheat "black germ" is the defeat of its fungi Helminthosporium (Helminthosporium) and Alternaria (Alternaria). Unlike Helminthosporium, the specific extensibility of the gluten of the Alternaria grain is weaker than that of the normal grain. So, if the specific extensibility of gluten in normal grain is 0.27 cm/min, then in alternari grain it is 0.43 cm/min. Accordingly, the proteolytic activity of such a grain is higher compared to normal. This difference ranged from 10 to 48 milligrams of dry matter nitrogen and, obviously, depends on the phase in which the grain was damaged by the fungus. Helminthosporium grain is characterized by high acidity and acid number of fat. This difference is from 0.5 to 1.2 degrees and in terms of the acid number of fat up to 9.7 mg. CON. The ash content of grain with a "black germ" exceeds the ash content of normal grain. In Helminthosporium grain, the difference is in the range from 0.04 to 0.20%, and in Alternaria from 0.01 to 0.1% [3-6]. When processing grain with a "black germ", the bulk of dark inclusions is represented by dark shells of the affected grain. The discoloration of durum wheat as a result of fungal attack especially affects the appearance of pasta [5].

Materials and Methods

To increase the potential of grain batches on the basis of technological modeling, fractionation of durum wheat was carried out using a vibro-pneumatic method on a laboratory pneumatic sorting table and a concentrator.

To study the variations and relationships of the physical, technological and biochemical properties of grain, the following indicators of the quality of durum wheat grain were analyzed: nature, weight of 1000 grains, the content of weed and grain impurities, the content of white wheat, grains with a "black germ", the quantity and quality of gluten (Tables 1-4).

Table 1: The content of components in the grain of durum wheat,%.

Content of Components in Durum Wheat Grain, %						
Name of Grain Fractions	Exit, %	Durum wheat, %	White Grain wheat, %	Grains with "Black Germ", %	Weed Impurity, %	Grain Admixture, %
Faction 1	6,5	72,32	3,74	16,98	5,02	1,94
Faction 2	13,3	78,85	6,26	11,12	1,66	2,1
Faction 3	21,8	80,44	8,96	8,82	0,24	1,54
Faction 4	42,4	86,8	6,73	5,54	0,24	0,72
Faction 5	16,0	86,77	7,7	4,84	-	0,68
weighted average	100	83,41	7,1	7,63	0,7	1,16

Table 2: Physical and technological properties of durum wheat grain.

Name of Grain Fractions	Exit, %	Nature, g/l	Weight of 1000 Grains, gr.	Gluten, %	IDK, c.u.	Ash content, %
Faction 1	6.5	687	27.6	22.08	53	2.29
Faction 2	13.3	785	29.2	23.68	55	1.99
Faction 3	21.8	794	34.7	23.68	60	1.81
Faction 4	42.4	816	40	22	58	1.81
Faction 5	16	825	36.83	22.32	60	1.89
weighted average	100	_	36.24	22.8	56	1.88

Table 3: The content of components in various grain fractions of durum wheat, %.

Name of Fractions	Exit, %	Durum Wheat, %	White Grain Wheat, %	Grains with "Black Germ", %	Weed Impurity, %	Grain Admixture, %
Fraction 1 (sh.)	2.9	62.66	3.6	27.7	3.5	2.5
Faction 2	6.3	74.1	5.1	15.4	1.9	3.5
Faction 3	7.9	80.2	6.5	9.3	1.5	2.5
Faction 4	10.8	83.9	8	5.6	1	1.6
Faction 5	14.1	85.6	6.5	5.6	0.5	1.8
Faction 6	13	86.8	7	4.7	0.24	1.3
Faction 7	20.2	88.5	7.1	3.5	0.1	0.8
Faction 8	24.9	91.8	4.4	2.9	0.2	0.8
weighted average	100	86	6.2	5.9	0.6	1.4

Table 4: Physical and technological properties of various grain fractions of durum wheat.

Name of Fractions	Exit, %	Nature, g/l	Weight of 1000 grains, gr.	Gluten, %	IDK, unit etc.	Ash content, %	Dry gluten content, %
Fraction 1 (sh.)	2.9	675	23	23.6	70	2.36	9.64
Faction 2	6.3	740	27.7	22.52	59	2.02	9.24
Faction 3	7.9	756	30.7	21.96	49	1.88	8.96
Faction 4	10.8	784	34.5	23.96	63	1.97	9.16
Faction 5	14.1	802	35.6	22.24	66	1.85	9.12

Faction 6	13	808	37.1	22.08	66	1.8	9.08
Faction 7	20.2	815	39.5	21.88	56	1.86	9.12
Faction 8	24.9	818	37.6	21.56	63	1.76	8.88
weighted average	100	-	35.1	22.22	61	1.87	-

Results and Discussion of Results

In the first series of experiments, the fractionation of durum wheat containing grains with a black germ was carried out on a laboratory pneumatic sorting table without preliminary cleaning of the grain. As can be seen from (Table 1) and (Table 2), it is possible to isolate fraction 1 from the original grain of the 4th class in the amount of 6.5%, which belongs to the 5th class in terms of nature GOST 9353-90. In this fraction, the content of grains with a "black germ" was 16.98%. In addition, it was distinguished by a high ash content - 2.29% (see (Table 1) and (Table 2). In the second series of experiments, the fractionation of durum wheat grains containing grains with a black germ was carried out on a laboratory concentrator. The initial grain of durum wheat was successively cleaned on an air-sieve separator AOZ, a sieve separator ZLS, a pneumatic separator UPS-1 and on a triere-puppet separator with a cell diameter of 5 mm. The cleaned grain was divided on the concentrator into 8 fractions, including the runoff. As a result of fractionation, it was possible to isolate from the original grain of the 4th class 2.9% of the grain of the 5th class with the content of caryopses with a "black germ" up to 27.7% and ash content of 2.36% (Table 3) and (Table 4). Analyzing the results of fractionation of durum wheat by the vibropneumatic method on a pneumosorting table and a concentrator, it can be concluded that it is expedient to fractionate and separate grain of the 5th class from the original batch of the 4th class with a high content of grains with a "black germ" and high ash content. This is confirmed by further studies, during which laboratory grinding of durum wheat was carried out. According to the results of grinding, an increase in the yield of pasta grits was found to be 2.36% in relation to the original grain and by 6% in relation to the grain from which fraction 1 was extracted.

Conclusion

The results obtained indicate the possibility of effective fractionation of durum wheat with a "black germ" on a pneumosorting table and a concentrator and subsequent processing into flour. When fractionated on a pneumosorting table, it is possible to isolate from the original grain of the 4th class 6.5% of the grain of the 5th class and 35.1% of the grain of the 3rd class with a gluten content of 23.68%. On the concentrator from the original grain of the 4th class, it is possible to isolate 2.9% of the grain of the 5th class and 10.8% of the grain of the 3rd class with a gluten content of 23.96%. The durum wheat fractions obtained by vibropneumatic fractionation can be used to produce pasta flour, which is a valuable raw material in the production of many functional food products.

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