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Effect Of Inter-Drop Clearance on Output Amaranth Flakes

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ANNOTATION

Currently, amaranth grain and its processing products are widely used in the Russian Federation as vegetable raw materials for the food, oil extraction and pharmaceutical industries. Amaranth grain has a valuable chemical composition, incl. high content of the most important essential amino acid - lysine, high nutritional and biological value and is a promising raw material for use in various sectors of the food and processing industry. A technology for obtaining amaranth flakes from amaranth grain has been developed. The optimal parameters of hydrothermal treatment by the method of cold conditioning of amaranth grain in the production of flakes were determined, which amounted to moistening the original amaranth grain to a moisture content of 12-13% and annealing for 2-3 hours. The optimal value of the roll gap is set equal to 0.1 mm, at which the output of amaranth flakes can be up to 88.9% in one pass through the roll machine.

Introduction

Currently, amaranth grain and its processing products are widely used in the Russian Federation as vegetable raw materials for the food, oil extraction and pharmaceutical industries. Amaranth grain has a valuable chemical composition, incl. high content of the most important essential amino acid - lysine, high nutritional and biological value and is a promising raw material for use in various branches of the food and processing industry [1,2]. Over the past 20-30 years, unfavorable changes have occurred in the nutritional structure of the population of the Russian Federation, as a result of which the consumption of complete proteins of animal origin has decreased by 25%, the total caloric content of the diet - by 15%, the consumption of animal fats - by 70% and proteins of plant origin - by 30% [1]. At the same time, a new source of raw materials for the food industry has appeared on the world market - amaranth grain and its processing products, which have a valuable chemical composition, high nutritional and biological value, containing a wide range of physiologically functional nutrients, which determines the prospects for their use in food technology. productions [1].

Amaranth grain processing products contain essential amino acids, insoluble dietary fiber, PP vitamins, minerals balanced in the content of Ca and P macronutrients. Analysis of various literary sources shows the advisability of using amaranth processed products as an enriching additive in various food products [1-14, 15-23]. I would especially like to note that amaranth meal contains a unique substance - squalene, which is a strong (effective) antioxidant [5]. Recently, amaranth grain and its processing products have found wide application in the domestic market as a new vegetable source of raw materials for the food, oil extraction and pharmaceutical industries. Amaranth grain has a valuable chemical composition, incl. high content of the most important essential amino acid - lysine, high nutritional and biological value and is a promising raw material for use in various sectors of the food and processing industry [1-2]. Amaranth surpasses many traditional cereals in terms of protein, amino acids, vitamins, macro- and microelements, biologically active substances and fat content, incl. wheat and rye [3]. Table 1 shows a comparative characteristic of the content of the main components in the grain of amaranth and

wheat. The purpose of our research is to determine the effect of the roll gap on the output of amaranth flakes.

Objects and Methods of Research

As an object of research, we used amaranth grain of the "Voronezh" variety. The processing of amaranth grain into various products was carried out on MLP-4 laboratory grinding mills with smooth microrough rollers. The main mechanical and kinematic indicators of the MLP-4 mill with smooth microrough rollers are as follows: productivity - up to 100 kg / h, speed of the fast-rotating roller 4.5 m / s, differential 1.75.

Result and Discussion

At the first stage, studies were carried out to determine the optimal roll gap to obtain the maximum yield of amaranth flakes in one pass from the original amaranth grain that underwent hydrothermal treatment (HTT) with heating for 1.5 hours. Cold conditioning was used as a TRP as the most common method. To obtain amaranth flakes, the original samples of amaranth grain were flattened in a laboratory mill MLP-4 with smooth microrough rollers with various inter-roller gaps. The data obtained are presented in Table 2 and Figure 1. At the second stage, studies were carried out to determine the effect of the time of heating on the yield of amaranth flakes. For this, the original amaranth grain was moistened to 12.2% and heated for 2.0, 3.0, 4.0, 5.0 and 6.0 hours, respectively. The obtained results of the influence of the time of heating on the yield of amaranth flakes are presented in Table 3 and Figure 2. Studies carried out at the Department of Grain, Bakery and Confectionery Technologies of the FSBEI VO "MGUPP" showed that with an optimal roll gap of 0.1 mm, the yield of amaranth flakes can be up to 88.9% per pass through a roll machine with smooth, micro-rough rollers.

Table 1: Chemical composition of amaranth grain and wheat.

Культура	Белок, %	Жиры, %	Углеводы, %	Клетчатка, %	Зола, %	Вода, %
Амарант	17,6	7,4	54,2	6,2	2,6	12
Пшеница	12,3	1,7	68,4	2,0	1,6	14

Table 2: Influence of the roll gap on the output amaranth flakes.

Масса исходного зерна амаранта, г	Зазор, мм	Сход с сита 850 мкм, %	Сход с сита 475 мкм, %	Сход с сита 132 мкм, %	Проход сита 132 мкм, %
500	0,4	81,0	5,0	8,0	1,0
500	0,3	82,0	6,0	6,0	1,0
500	0,2	84,0	8,0	6,0	2,0
500	0,15	87,0	9,0	4,5	2,5
500	0,1	88,0	7,0	2,0	3,0

Table 3: Influence of the heating time on the yield of amaranth flakes.

Масса исходного зерна амаранта, г	Время отволаж., ч	Сход с сита 850 мкм, %	Сход с сита 475 мкм, %	Сход с сита 132 мкм, %	Проход сита 132 мкм, %
500	2,0	88,9	6,8	3,3	1,0
500	3,0	88,9	5,7	4,4	1,0
500	4,0	86,7	5,7	5,6	2,0
500	5,0	86,7	5,7	5,1	2,5
500	6,0	86,0	6,0	4,0	3,0

Figure 1: Appearance of amaranth flakes, depending on the size roller gap (a - gap = 0.3 mm, b - gap = 0.2 mm, c - gap = 0.15 mm, d - gap = 0.10 mm).

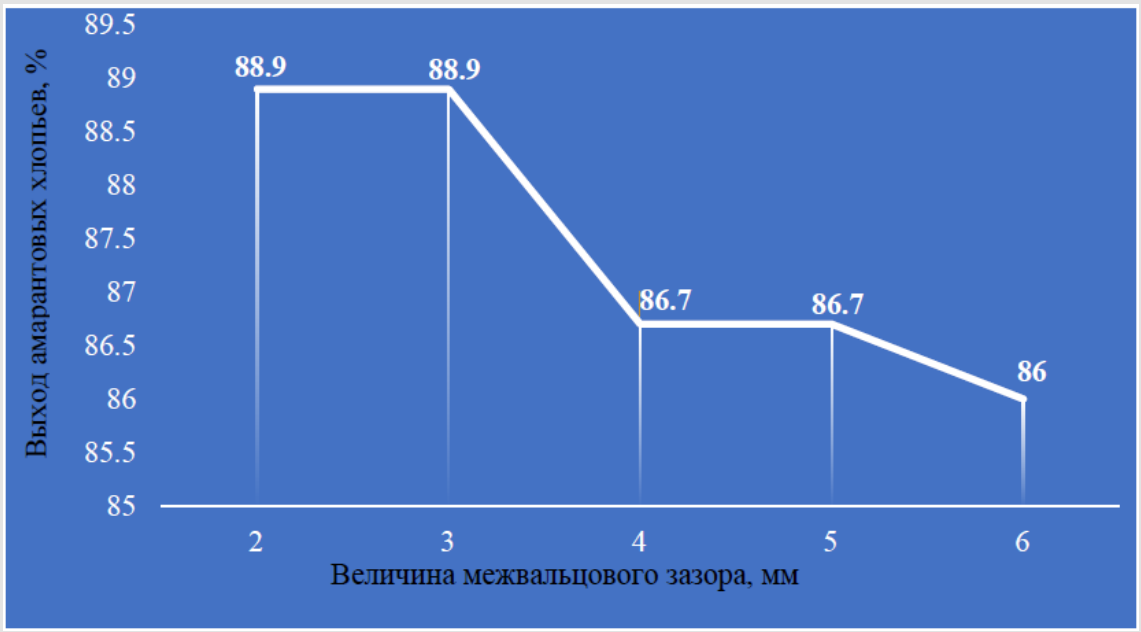

Figure 2: Dependence of the yield of amaranth flakes on the time of heating.

Conclusion

A technology for obtaining amaranth flakes from amaranth grain has been developed. The optimal parameters of hydrothermal treatment by the method of cold conditioning of amaranth grain in the production of flakes were determined, which amounted to moistening the original amaranth grain to a moisture content of 12-13% and annealing for 2-3 hours. The optimal value of the roll gap is set equal to 0.1 mm, at which the output of amaranth flakes can be up to 88.9% in one pass through the roll machine.

Conflict of Interest

The authors declare that there is no conflict of interest.

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