

Пищевая и перерабатывающая промышленность замыкает производственную цепочку АПК, поэтому важно как можно полнее сохранить и эффективнее перерабатывать сельхозпродукцию, превратив ее в конечные продукты высокого качества и потребительского спроса, что возможно осуществить только на основе комплексного инновационного подхода. Для решения этой задачи необходимо усилить роль государства в регулировании экономических процессов, разработке и освоении научно-технических направлений и внедрения инноваций.

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AMARANTH PRODUCTS: NEW OPPORTUNITIES FOR NUTRITIONAL VALUE OF WHOLESOME FOOD

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The main goal of modern agriculture is to provide food market with cheap raw materials of high quality for food goods, medicines and energy needs. At the present stage of development, plant raw materials are the source of a significant amount of food, medicines and virtually all biologically active substances. Such attention is a consequence of the deterioration of the environment. There is an increase in cases of alienation of synthetic drugs and antibiotics by human organism, the occurrence of negative phenomena when using artificial improvers in the diet.

The strategic direction for solving these problems is the development of crop and fodder production as well as food industry. The first stage of this development belongs to applying new crops, which have a variety of uses and considerable adaptive and productively potential. Amaranth is one of such crop [1]. Amaranth has become very popular among Ukrainian agricultural producers in recent years. Its cultivation is growing every year and in 2019 amaranth acreage has increased 6 times, compared to the previous year and is more than 4 thousand hectares. The main regions where plants are cultivated include Dnipropetrovsk, Kyiv, Kharkiv, Poltava region. Amaranth easily adapts to climatic conditions of temperate climate in which Ukraine is located, which makes it possible to grow it in both steppe and forest-steppe zones with low and sufficient humidity, in areas with sandy or clay soils [2].

Considering the possible directions for the use of amaranth products, promising in this regard is food industry, for which the development of functional foods based on natural raw materials is an urgent task. Amaranth products enriched by high content of biologically active substances, include oil, porridge, flour [3]. Amaranth seeds are primarily distinguished by a high protein content about 12-18%, which in some cases is up to 23%. The protein biological quality is very high and exceeds the proteins of wheat, corn, soybeans [4]. In addition, amaranth seeds are rich in minerals such as iron, calcium, and potassium, contain a high amount of vitamins B₂, E, B₁, D, bile acids, steroids and phytosteroids, as well as unique squalene.

A by-product of amaranth oil production is amaranth oil meal or amaranth flour, the use of which for food production is rather limited because of lack of technological solutions, for example, for the production of flour confectionery [5]. Since biscuits are very popular food products and mainly refined wheat flour depleted of biologically active substances is used for its production, research aimed to the use of amaranth products, namely amaranth flour, is promising and relevant to the industry. This will increase the bioconversion of amaranth seeds, which is still mainly used for the production for animal feed.

Wheat flour of the premium grade TM "Dnepromlin", amaranth flour of the TM "Shvedov", corn starch, margarine, powdered sugar, invert syrup, mélange, powdered vanilla, ammonium, carbon dioxide, salt, water were used to make the experimental samples. The ratio of the amount of amaranth flour to wheat flour varied from 1: 1 to 1: 7 in the formulation of cracker-type, sugar and butter biscuits. These types of biscuits differ from others in terms of high carbohydrate and vegetable fats content, relatively low nutritional value, so they need to be improved.

The organoleptic profiles of the products are shown in Fig. 1. It is established that the use of amaranth flour in the amount of more than 15% by weight of wheat flour is impractical for cracker-type biscuits, because both the structure of product and the water absorption capacity deteriorated (Fig. 2). Amaranth flour has a significant positive impact on the quality of sugar and butter biscuits.

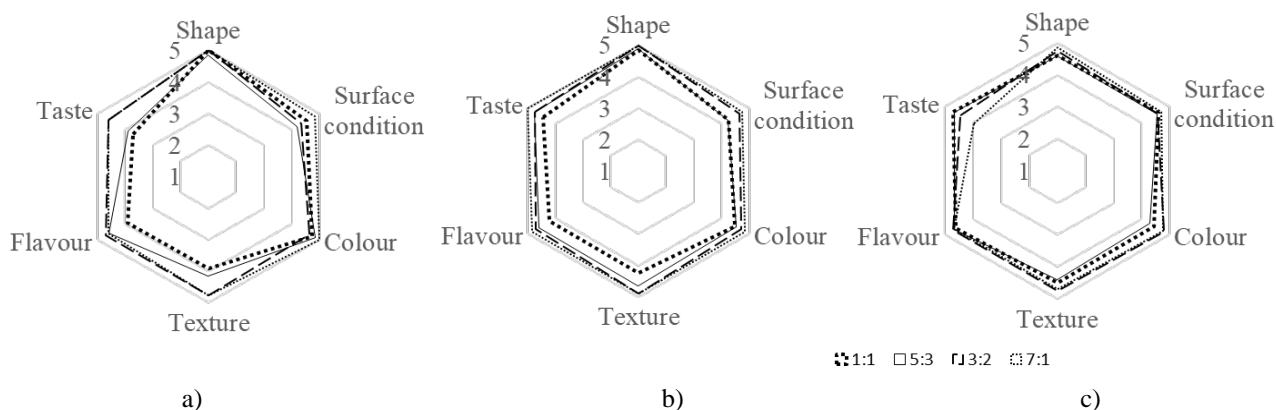


Figure 1 – Influence of amaranth flour on organoleptic profiles of biscuits: a) – cracker-type; b) – sugar; c) – butter

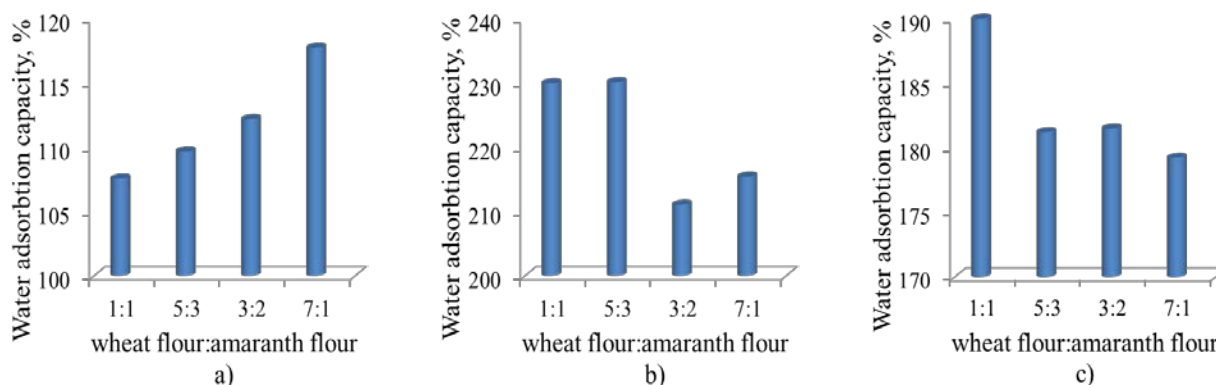


Figure 2 – Water adsorption capacity of biscuits with amaranth flour: a) – cracker-type; b) – sugar; c) – butter

Thus, when applying amaranth flour over 35% in butter biscuits, it has a positive effect on the organoleptic and physical characteristics, which is especially reflected in improving the taste and smell of the product. For sugar biscuits, the optimal concentration of amaranth flour is 20–30%, which adds a pleasant taste and flavor, developing porosity. Taking everything into account, the use of amaranth flour for biscuits is promising to improve the organoleptic characteristics, texture and enrich the product with biologically active compounds, increasing bioconversion of vegetable raw materials along the food chain.

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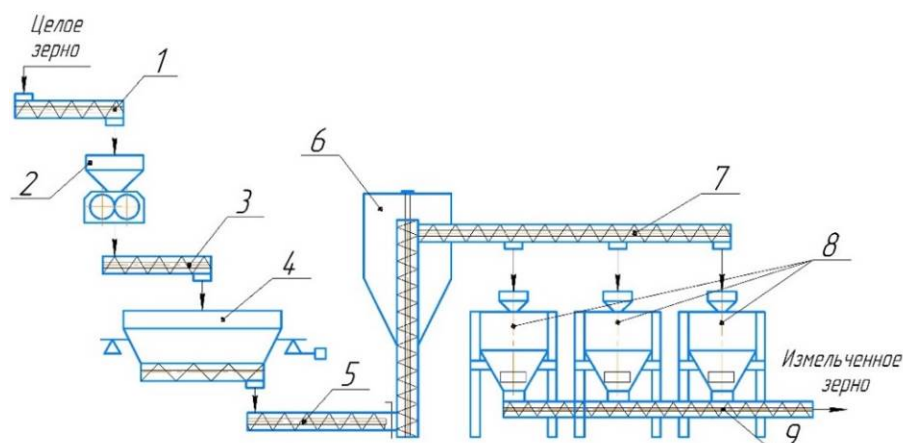
ПРОИЗВОДСТВЕННАЯ ПРОВЕРКА И ЭКОНОМИЧЕСКАЯ ОЦЕНКА СПОСОБА ДВУХСТАДИЙНОГО ИЗМЕЛЬЧЕНИЯ ЗЕРНА

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Для оценки фактического экономического эффекта от использования способа двухстадийного измельчения зерна, в котором процесс измельчения зерна проходит за две ступени, где на первой ступени осуществляют деформацию зерна сжатием и сдвигом до величины, исключающей компрессионное сжатие с последующим разрушением зерна ударом на второй ступени, была проведена его производственная проверка на базе Минского районного унитарного предприятия «Агрокомбинат «Ждановичи».

Для снижения энергоемкости процесса на стадии измельчения зерна, а также для улучшения показателей измельчения нами предложено реализовать в данном комбикормовом цеху метод двухстадийного измельчения зерна. В качестве первой ступени процесса предложено использовать вальцовый измельчитель, второй ступени – модуль из трех молотковых измельчителей.

Технологическая схема предложенной комбинированной технологии двухстадийного измельчения зерна представлена на рисунке 1.



1 – конвейер подающий зерно; 2 – вальцовый измельчитель ДВ-3; 3 – конвейер разгрузки вальцового измельчителя ДВ-3; 4 – бункер весовой; 5 – конвейер разгрузки бункера весовой; 8 – молотковые дробилки ДЗВ-5; 9 – конвейер разгрузки молотковых дробилок ДЗВ-5

Рисунок 1 – Технологическая схема двухстадийного измельчения зерна, внедренная в МРУП «Агрокомбинат «Ждановичи»

Перед проведением производственной проверки оборудования для двухстадийного измельчения зерна было проведено снятие функциональных показателей работы модуля одностадийного молоткового измельчения в соответствии с требованиями ТКП 273-2010 и ТКП 148-2008 [1, 2]. Полученные данные приведены в таблице 1.