European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 3 No. 3, March 2022
ISSN: 2660-5643

TECHNOLOGY OF STARCH SEPARATION FROM DIFFERENT VARIETIES

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Article history:

Received: January 11th 2022
Accepted: February 11th 2022
Published: March 30th 2022

Abstract:

In recent years, not only around the world, but also in Uzbekistan, a large number of studies have been devoted to the isolation of starch from plant raw materials, which shows how quickly the demand for starch is growing all over the world. In addition to the traditional use of starch, for example, in the paper and cardboard industry, in recent years, a number of new directions for the effective use of starch and products from it have been expanding.

Keywords: Rice, Rice Husk, Starch, Sieves Of Different Sizes

Rice production in our country developed rapidly, especially after the republic gained independence. According to the Decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev dated July 29, 2019 No. PQ-4406 "On additional measures for the deep processing of agricultural products and the further development of the food industry", it is additionally planned to create ample opportunities for deep processing of grain rich in carbohydrates [1]. In this regard, studies have been carried out on the technology of extracting starch from various rice varieties rich in starch.

Rice is one of the oldest food crops on the Earth. It is a staple food in many parts of the world (China, India, Japan, Pakistan, Indonesia), especially in the tropics.

Rice (Oryza) is one of the oldest perennial cereals, which belong to the Poaceae family. About 20 varieties of rice grow in tropical and subtropical regions such as Southern and Eastern Asia, Africa, the Americas, and Australia. The annual rice (Oryza sativa) is grown in the tropics, subtropics and temperate regions. It has been cultivated in Southeast Asia for 7,000 years. Rice dates back to the 3rd-2nd centuries BC in India, China, and Central Asia, the 8th-8th centuries in Europe, and the 15th-16th centuries in America.

In West Africa, the African rice (rice without husks) is also grown. The wild variety of rice (*O. punctata*) and short-tailed rice are used as food.

In 2004, the average yield of rice in the world was 39.7 centner/ha, and in Uzbekistan it was sown on 60 thousand hectares, with an average yield of 46.5 centner/ha and a gross harvest of 279 thousand tons [2].

Rice has a pleasant taste, is of high quality and is absorbed in the human body several times faster than other cereals, so it is often used as a diet food. The digestibility of rice is the highest - 95.9%, and the calorie content is 3594, which is slightly lower than the calorie content of wheat (3610). Boiled rice water has long been known as a medicine. Riceis rarely ground into flour. Rice flour is gluten-free, that is why it isn't baked as bread. In the Caucasus and Central Asia, rice is used to make pilafwhich is a popular national dish, pudding is made in Europe and curry in the southeast Asia. The product obtained during the bleaching of rice is used as a raw material in the preparation of alcohol, vodka, beer and starch. Bran is a nutritious feed for livestock, especially for pigs. It contains 10-13.7% of protein, up to 14% of fat, many phosphorus compounds, of which phosphorus-organic substances necessary for feeding young cattle are phytin, lecithin and others. High-quality edible and technical fat (up to 10% fat content) is obtained from bran [3].

The fruit of the rice is a grain, wrapped in a flower petal, and does not grow together with it. The grain itself varies in shape from round to cylindrical, the surface is always edged, the color is silver - white, yellow, reddish-brown, purple. The endosperm of the grain is usually transparent or opaque. The opaque endosperm of the translucent grain is located in the center. The weight of 1000 grains in the shell is 26-40 g.

The grain is 5-10.5 mm long and 2.5-4 mm wide. The aleurone layer is made up of a series of tissues. Rice is a shell grain, the flower bark is 13-30% (usually 17-23%), the bark is 4-5%, the aleurone layer is 12-14%, the apex is 2-3%, the endosperm is 65-67 %. The chemical composition of rice depends on the navigator, the growing area, the conditions and the degree of maturity. The average rice grain contains 14% moisture, 7.3% protein, 55.2% starch, 2% fat, 9% fiber, 3.1% sugar and 4.6% minerals. In peeled rice, the fiber content decreases to 1.1-1.3%, the

ash content to 1.5-1.6%, and the starch and protein content increases. The main part of rice proteins consists of the protein in the group of glutelinsorizen and a small amount of proteins in the group of albumin, globulin and prolamins.

Rice bran contains 48-57% of starch. Starch is more common in rice bran than other grains.

Starch is a natural polysaccharide and has the following properties:

- annual renewal and unlimited supply of raw materials;
- easy variability by chemical, physical, microbiological or combined methods, as well as easy transition to new practical value content;
- the ability to form all the changes of low-molecular compounds in chemistry with starch;
- the ability to form new binding materials on the basis of starch or in combination with synthetic polymers;
- non-toxic and easy to work with starch.

Starch ($C_6H_{10}O_5$) is a polysaccharide, a form of cellulose ($C_6H_{10}O_5$), the industrial source of which is corn, wheat, barley, rice, potatoes and tapioca. Starch is a reserve carbohydrate in the form of starch granules in most plants, a mixture of polysaccharides that give a glucose when fully hydrolyzed and have a general formula. Starch is a white powder consisting of starch granules [3, 4]. The structure and size of the grains are specific to each starch-containing plant, which can be used to determine the origin of starch under a microscope.

The chemical composition of starch granules is not uniform: 96.1-97.6% of the dry matter is polysaccharides amylose and amylopectin.

In the laboratory, rice varieties "Alanga", "Avangard" and "Nukus" were selected and experiments were carried out in the laboratory of the Institute of Microbiology to obtain starch from rice husks.

As reported in the literature, starch extraction from rice is complicated due to the rigid structure of the protein substances that form strong bonds with the starch granules.

To separate the starch from the rice, it is necessary to break down the solid shell consisting of starch and proteins. Therefore, heat treatment or chemical treatment is required to separate the starch from the rice grains.

Our research consisted of 3 experiments. We separated the starch in two different ways. In the first method, mechanically ground rice grains were treated with hot water at 30-100°C. In the second method, the above mechanically prepared rice flour was soaked in a 0.5% solution of NaOH at room temperature. 100 ml of solution was used for 10 g of starch, the process lasted from 1 to 10 h, and the system was stirred vigorously until a mother solution was formed.

In the production of starch from rice, the separation of starch in solvents is the basis of this process. In our first experiments, in order to study the process by which grains dissolve starch in solvents, that is, water, we first studied the dependence of its fineness on the release of starch. For this purpose, the separation of starch from the raw rice husk was first considered. Drowned in distilled water under normal conditions. In this case, almost no starch separation was observed for up to 3 days, which indicates a long-term separation under normal conditions under the influence of protein in the grain.

Table

Dependence of the degree of fineness of the raw material on the release of starch

Rice varieties / sieve sizes	Release of starch, %			
	0,5 mm	1 mm	2 mm	3 mm
Alanga	70,0	73,0	66,0	62,0
Avangard	72,0	74,0	67,3	63,
Nukus	73,0	75,0	68,2	64,3

The results of the experiment showed that the yield of starch increased with increasing fineness, but in 0.5 mm samples the residual particles of starch mixed with the solution in solution made it difficult to separate and its purification had a negative effect on the yield of starch.

During the experiment, the dissolved starch was separated from the insoluble particles by a filter. It was then centrifuged. The sediment was separated and dried. In the same way, rice husks were crushed to different sizes to study the separation of starch from them. Sieves of 3 mm, 2 mm, 1 mm and 0.5 mm were used for this purpose.

Thus, according to the results of our initial experiments, up to 74% of starch is extracted from Alanga grains, up to 75% from Avangard grains, and up to 76.0% from Nukus grains from raw materials obtained from 1 mm sieves.

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