

## **Improvement of Buckwheat Malt Technology**

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**Annotation.** *This work was dedicated to the study of the effect of malting temperature on the chemical composition of buckwheat malt. It was found that steeping and malting buckwheat set the optimum mode soaking 4 extracts of buckwheat under water and 6 hours of air pauses steeping water temperature 16°S within 24-32 hours. Malting also held at different temperatures: 14, 16 and 18°C. The optimum temperature was 16°S duration germination 24 - 32 hours. At this temperature, malting and humidity 44% maximum capacity amyolytic malt was after the first day and was 320ed.*

**Keywords:** *buckwheat, malt, germination, moisture content, temperature, amyolytic ability.*

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### **I. Introduction**

Buckwheat - an annual plant of buckwheat family. The birthplace of buckwheat is the North India. As a cultivated plant, buckwheat is processed more than 5000 years. It has spread throughout the world from the India's ancient and Middle Ages. Buckwheat - a traditional crop that is grown in Central and Eastern Europe and Asia. Major countries, producers of buckwheat are China - about 42% of the total production in the world, Russia - just over 34%, Ukraine - about 10% [1]. It is also grown in Poland, Brazil, USA, France, Japan and other countries. The fruit of buckwheat is called - grain, and which is used for sowing - seeds, shelled fruit - core, shell fruit - husks. Grain size, color, fruit shell is varietal characteristics. Thus, the grain sizes depending on the variety, can vary widely: length - from 4.0 to 6.0 mm, width - from 3.0 to 4.5 mm. Accordingly 1000 grain weight varies - from 12 m to 35 m. Seeds composed of two cotyledons, which after germination appear above ground, embryonic root and endosperm. Consistency embryo is more than vitreous than endosperm. The form is divided into: buckwheat winged, with curved edges, and wingless with convex faces. Winged buckwheat is more precocious, with red seeds. Seeds wingless buckwheat has a brown color. There are also intermediate forms of flaps or with slightly convex faces [2].

Traditionally, buckwheat is the raw material for the production of buckwheat and flour. It is the most valuable food in the world. Annual consumption of buckwheat per capita in Ukraine is about 7 kg. It is characterized by high nutritional, taste and dietary properties and is one of the first places among cereal crops. Buckwheat flour is used in different countries for making pancakes, bread, pastry and pasta [3,4]. Today, buckwheat - is an important cereal crop, a favorite food of many nations. It has great dietary value, and it is included in the diet in various diseases of the gastrointestinal tract [5]. Recently, many countries use buckwheat as a new type of raw material for production of malt and beer. For nutritional value and yield is higher than corn and wheat, and also it is more resistance to the adverse climatic conditions than barley. In different countries conduct research work, leading search capabilities to effective use of buckwheat in the production of malt brewing and baking industries. Buckwheat as raw materials can be used as refined and crude from shells. P Rothe, recent studies have shown that crude buckwheat suited best for germinating of malt through its more gradual swelling and as a result, improve the quality of the malt. In this malt declined losses in germinating of malt and improved filtration capacity [1, 2].

### **Analysis of published data and problem definition**

Food, nutritional properties of buckwheat properties, due to its unique chemical composition. Buckwheat contains of proteins 9,5-14,1%, 1,8-3,1% fat, starch 80,5-84,1%, 1,2-2,2% fat, sugars, organic acids, mineral salts vitamins. The high biological value due to its proteins. Buckwheat proteins are easily digested by the human body, they are more valuable in comparison to proteins on cereals and by the nutritional value are not inferior to protein legumes. Buckwheat is exceeding the fat groats superior to all other cultures, except millet. It is rich in essential fatty acids that are not synthesized in the human body and must come from food. Fat buckwheat different resistance to oxidation. This makes buckwheat and processed products capable of long-term storage. And it contains fat-like substance - phospholipids, particularly lecithin.

Main buckwheat nutrients - carbohydrates. They are starch, dietary fiber and sugars [6, 7]. Carbohydrates in buckwheat are mainly sucrose, which is located in the embryo and aleurone layer and polysaccharides, starch, and cellulose non-starch polysaccharides. Carbohydrate composition of buckwheat is represented mainly starch. The content of starch in the grain may reach in some varieties to 70%, higher than in a number of crops. The ratio of amylose and amylopectin is 25 and 75% respectively. Starch grains of buckwheat in size considerably smaller than in barley, but slightly higher than in rice [8].

Buckwheat contains vitamins E, B<sub>1</sub>, B<sub>2</sub>, PP, B<sub>6</sub>, folic acid, and organic acids: citric, malic, oxalic acid, and minerals such as iron, phosphorus, copper, potassium, manganese [9]. The feature fractional composition of proteins in buckwheat protein than other cereals are almost complete absence prolaminiv and vice versa presence of albumin and globulin [7]. On this basis, gluten-free buckwheat belongs to the culture and recommended for use in diets for celiac disease (gluten intolerance). This autoimmune disease that according to the World Association of Gastroenterology affects about 1% of the population. According to the latest officially registered in Ukraine 200 tys people celiac disease, but in reality this figure is 2-3 times higher. [10] Celiac disease is characterized by a complete intolerance of gluten - the protein gluten, which contains mainly prolaminova hlyutelinova and protein fractions. For many years, celiac disease was considered a fairly rare disease. However, the development and introduction of new diagnostic techniques allowed to find out that this pathology is more often than expected. The review PG Malkov et al [11] discussed the current understanding of the diagnosis, pathogenesis and treatment of this disease. For the most effective treatment alyutenova strict diet (gluten-free products are considered, which contain less than 1 mg of gluten per 100 g), which must follow for life. These patients forbidden to eat and beer, as well as share gluten containing proteins in barley is about 80%. Thus, the range of foods in this category of people is very limited, which can not but affect the quality of life. Thus, the involvement of buckwheat as raw material for the production of buckwheat malt and beer based on gluten-free diet will increase for patients with celiac disease. In world practice, there are already work on the use of buckwheat not malting use as raw materials and buckwheat malt in brewing and baking industries. These developments include foreign researchers beer production technology using 100% buckwheat pour or malt from it with the additional introduction of enzymes in the low amylase activity materials.

### The purpose and objectives of research

The aim of research was to choose the optimum temperature for germinating of malt buckwheat and determine its amylase activity.

According to the goal settled the following tasks:

- explore the physical, chemical and physiological parameters of a variety of buckwheat grains (protein and starch, energy and ability to germination, water permeability);
- germinating of malt determine optimum conditions (temperature constipation water soaking mode) for svizhoprosloho buckwheat malt with high amylase activity;
- explore the organoleptic and physico-chemical properties of buckwheat malt;
- improve technology of buckwheat malt.

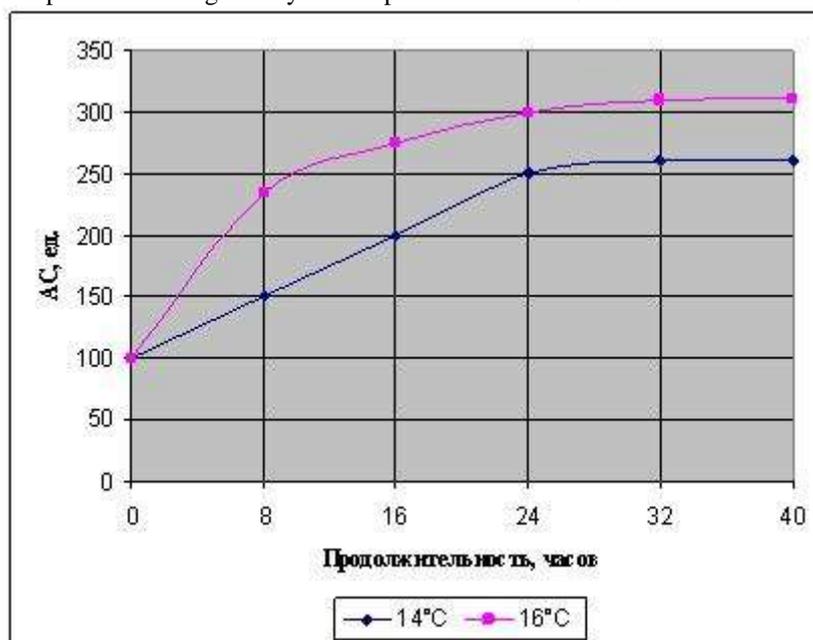
Sprouting was carried out in an experimental laboratory facility at the Department of Biotechnology of fermentation and winemaking National University of Food Technologies at different temperatures - 14, 16 and 18 ° C. Buckwheat malt obtained by using pre-selected mode soaking namely, air-water soaking method - 4:00 buckwheat kept under water, air break 6:00. Temperature control germinating grains systematically carried out at 2 hours at different depths layer malt. In terms of dissolution endosp Ermou mode 4-6 and temperature 16 ° C were optimal because when grinding the endosperm buckwheat has a floury consistency. Higher temperatures germination is not used because it is known that at a temperature of 18 ° C and above [3] in grain sharply activated processes of growth and development, increasing the level of oxidative process in which results in reduction of reserve substances that negatively affects the extract of malt. Also at higher temperatures is outside the intensive development of microorganisms that on the one hand inhibits the physiological processes in the grain, and the other leads to the loss of dry matter that goes to microorganisms. resulting in the quality of state of the malt decreases. Visually, the degree of germination of buckwheat can be judged by the length of shoots (Figure 1). This visual criteria can be used to determine the completion germinating of malt buckwheat.



22 hours 24 hours 26 hours 29 hours 31 hours  
**Figure 1.** Changing the length of the stem buckwheat during germinating

In developing effective technology germinating of malt need to find conditions that would allow for a short duration to get high quality malt with high amylase activity.

So germinating of malt investigated the effect of temperature on amylase activity during germination of buckwheat. The data presented in Fig. 2 only for temperature 14 and 16 ° C.



**Fig. 2** Changes Aa duration of germinating of malt

Since at these temperatures is optimal duration of germination of buckwheat. buckwheat was carried out at 44% humidity and a temperature of 14 and 16 ° C.

At different temperatures was similar in nature increase amylase activity. However, the temperature effect on achieving maximum enzyme activity, at 16 ° C upper limit was observed already after 26 hours, and at 14 ° C - 32 only.

Thus, the highest level of amylase activity was observed in buckwheat at a temperature of 16 ° C with 44% humidity.

Conclusions:

- Optimal conditions for germinating of malt buckwheat are:
  - humidity - 44%;
  - temperature – 16C;
  - duration - 24-32 hours, depending on the variety of buckwheat.
- The highest level of amylase activity was observed in buckwheat at 16C 24 hour of germination.

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