CREATION OF OPTIMUM CONDITIONS FOR PROPAGATION OF SACCHAROMYCES CEREVISIAE YEAST

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Annotation. Saccharomyces cerevisiae is of great importance as a biotechnological object, various sources of nutrients are currently used to grow yeast cultures. It is known that crop waste can be recycled or used for various purposes. In the article, molasses is used for the industrial production of Saccharomyces cerevisiae.

Key words: Sacchoromyces cerevisiae, strain, colony, nutrient medium, sugar beet, sorghum beet, celery root, sweet potato nodules.

Introduction. Among biological objects, the most studied organisms in the field of biotechnology are Saccharomyces fungi, and these yeasts occupy a leading position in industry. The interest in these organisms is mainly related to their metabolism, there are two ways of energy exchange in yeasts, anaerobic-glycolysis and oxidative energy exchange can be carried out individually, and these processes can happen together, yeast fungi are widely used in the beer, wine, and bread industries. In order to create high-performance feed technologies, it is necessary to know well the technologies of cultivation of yeasts and their metabolism and physiology [1,4,6,7.8].

Nutrients in the roots of crops belonging to the root group are collected and used for food and technology. This group includes one, two and perennial crops. Among them, sugar beet and hashaki beet are two-year plants, whose homeland is the Mediterranean Sea. All irrigated land areas were used by peoples as a vegetable plant before our era, i.e. 2000-1500 years ago. In general, the sugar beet planting area on the earth is about 8 million has reached a hectare. At the beginning of the 20th century, the cultivation of this root-fruit sugar beet was 1.5 million. made up only one hectare. Sugar production in 1900-1960 was 41% from sugar beet, and 59% from sugar cane [9,12].

Sugar beets from root crops are used in the sugar industry, and molasses, an intermediate product produced in the sugar industry, is used in foreign countries for the cultivation of Saccharomyces cerevisiae and obtaining pure different strains. These strains are widely used in the development of various products in the food industry. But in many countries, it is urgent to research various other cheap and effective sources of nutrients for the cultivation of Saccharomyces cerevisiae fungal strains. From this point of view, it is advisable to grow Saccharomyces cerevisiae in nutrients rich in proteins, carbohydrates and mineral elements, prepared on the basis of the chemical composition of various root-fruit and nodule plants and their combination.

Currently, dry yeasts are used as seeding material in production practice, they are produced in France, Canada, USA. Also, in several Russian institutes, strains of Saccharomyces cerevisiae yeast collections are stored, which have valuable production properties needed in the yeast industry. Using these strains allows the production of an expanded variety of yeast juice assortments. At the same time, pure lines of these yeast cultures are important in production practice, and they are obtained in laboratory conditions based on high-performance technologies [2,3,510,11].

Purpose of work. According to the above considerations, the purpose of the work is to study the biochemical composition of some root crops and nodular crops in order to create conditions for the cultivation of pure cultures of Sacchoromyces cerevisiae and to determine the effect of effective nutrient media on the growth of the fungus based on their combination, consists of learning.

Conduct research. Saccharomyces cerevisiae and its LV-7, LK, LV-3 strains, potato tubers from agricultural crops, red and sorghum beets, carrots, celery, and sweet potato roots were used as research objects.

Experiments aimed at isolating, growing and selecting selective types of yeasts from the primary bread-producing regions identified in our research were carried out in the laboratory of the Department of Genetics and Biotechnology of the Faculty of Biology of Samarkand State University and to check the chemical composition of bread products prepared using the isolated yeasts. focused experiments were conducted in the laboratory of “Samarkand Golden Apple Group” LLC.

Nutrient environments play an important role in research based on biotechnological and microbiological processes. The correct selection of food media is one of the important factors that ensure the effective results of research. A sheep nutrient medium was used for the isolation and cultivation of locally prepared yeasts:
1. Saburo nutrient medium: glucose - 40; peptone- 10; if- 20; distilled water- 1000 ml.
2. Glucose-ammonium nutrient medium: glucose-20; $(NH_4)_2SO_4$ - 5; KH_2PO_4 - 0,85; K_2HPO_4- 0,85; $MgSO_4*7H_2O$- 0,5; NaCl- 0,1; $CaCl_2$ * $4H_2O$ - 0,4; distilled water- 1000 ml.

Sterilization methods are used in research to prevent the development of foreign microorganisms on the external and internal surfaces of the research object. The expediency of which methods of sterilization to use depends primarily on the physico-chemical properties of the object being studied and its susceptibility to sterilization. One of the most convenient methods of sterilizing food media is sterilization in an autoclave. This method is based on decontamination by heating the object with water vapor and high pressure.

The obtained results were analyzed statistically in the EXCEL-10 program. In statistical analysis indicators (M) - arithmetic mean value, (σ) - root mean square

limitation, (m) - error of arithmetic value, (t) - according to Student's criterion (P) - reliability index level was determined.

Results. Experiments aimed at isolating pure cultures of locally prepared yeasts in the regions where basic bread products are made were conducted in the laboratory of the Faculty of Biology of Samarkand State University. In the experiments, samples were used from regions of Kattakorgan district where bread products are prepared locally. Carbohydrate-protein organic nutrient mediums (beetroot-beets) were used for the cultivation of yeasts and the separation of their pure cultures. In the selection of selective yeasts, attention was paid to qualitative characteristics such as the rate of colony formation, the size of the formed colonies. In the first part of our research, we selected the composition of the organic medium used for the cultivation of yeasts, which was considered optimal according to the carbohydrate-protein content. It is known that the ability of yeast to raise dough depends mainly on the activity of the fructofuranidase enzyme. According to the literature review, yeast strains LV-7, LK and LV-3 have higher biomass yield compared to other currently known strains, and the most important of the factors affecting yeast productivity is the nutrient environment. Carbohydrates, minerals, vitamins and trace elements are of particular importance. Accordingly, when choosing a nutrient medium, we selected types of agricultural crops rich in carbohydrates, proteins, mineral elements and microelements.

One of the greatest needs of the baking industry is the development of highly active strains of yeast for yeast industries. Such strains differ from the strains used in yeast factories by their high productivity, used in the dough fermentation industry, by the presence of enzymes of the maltase system, i.e. α-glucosidase and permease. Highly active yeasts differ mainly in maltase activity, as a result of which the fermentation time is shortened, in such strains, the rising power is higher than in high-yielding strains, this process takes place with the participation of the β-fructofuranosidase enzyme.

Table 1

Indicators of industrial baking yeast

Strain	Biomass output, %	Lifting power, minute, power	Maltase activity, min	Trehalose content, % relative to dry mass
LV-7	95-100	38-43	150-180	15-17
LK	95-100	40-43	150-180	15-17
LV-3	95-97	35-43	140-160	12-14
L-80	90-92	35-37	45-50	8-10
L-127	85-90	32-35	35-40	8-10
L-129	80-85	30-32	30-35	8-10
L-144	85-90	32-34	35-45	10-12
L-153	85-90	35-40	40-45	13-15
L-80U	80-85	25-32	30-35	8-9

As can be seen from the table, the yeast strains LV-7, LK and LV-3 are the most productive strains, the maltase enzyme activity is low, the fermentation duration is therefore low, but the biomass yield is have high productivity (Table 1). The quality indicators of yeast are affected by the following factors: source quality, cultivation conditions, concentration of carbohydrates and mineral substances in nutrients, the amount of microelements and vitamins, temperature, intensity of aeration and environmental pH.

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Accordingly, when choosing a nutrient medium, we selected types of agricultural crops rich in carbohydrates, proteins, mineral elements and microelements. Based on the obtained results, potato nodule, carrot root, celery root and leaf, sweet potato nodule and beet root as a source of mono and oligosaccharides, celery root and partial leaf as a source of sucrose, carrot root and celery as a source of vitamins. rhizome and leaf, sweet potato tuber and hashaki root can be used as a protein source. As a source of gray elements, various mineral substances and microelements, potato peel, celery leaf and root fruit can serve. Taking these characteristics into account, nutrient mediums were prepared separately and in different proportions in the nutrient mediums prepared for each agricultural crop, and LV-7, LK and LV-3 strains of highly productive yeast were grown and studied. In the conducted experiments, the temperature was up to 25 0C, the intensity of aeration, and the pH indicator of the environment were controlled. The obtained results are shown in Table 2.

Table 2

Growth rate of Saccharomyces cerevisiae strains

Food environment	**Strains**	**Duration of time**	
		30 minutes	**60 minutes**
Potatoes	LV-7 LK LV-3	++ + ++	+++ ++ +++

Carrot	LV-7 LK LV-3	+ + +	+ ++ +
Celery root	LV-7 LK LV-3	+ ++ +	+ ++ ++
Batat	LV-7 LK LV-3	++ ++ ++	+++ +++ +++
Hashaki beets	LV-7 LK LV-3	+ ++ +	+++ +++ +++

Taking into account the optimal environmental conditions for the growth of yeasts, these agricultural crops are: sweet potato nodule + celery leaf, beet root + celery leaf and celery root + sweet potato and celery root + celery beet, and sweet potato nodule + beet root + celery an organic nutrient medium was prepared in a mixed proportion of leaves 100 gr. against the product. The growth rate of Sacchamyces cerevisiae strain LV-7 and LV-3 in potato nodule mass was higher, and the growth rate of LK strains was lower. In the organic medium, the growth rate of the strains during 30 minutes, the growth rate of the fungus Saccharomyces cerevisiae was lower, at 60 minutes, the growth rate of the strains in the organic medium of carrot was lower (LV-7, LK, LV-3) strains are as follows has been.

Based on the obtained results, potato nodule, carrot root, celery root and leaf are used as a source of mono- and oligosaccharides for growing yeasts, sweet potato tuber and beetroot can be used as a source of sucrose, celery root and partially leaf, as a source of vitamins, carrot tuber, celery root and leaf, sweet potato tuber and haska root as a source of protein. As a source of ashes elements, various mineral substances and microelements, potato peel, celery leaf and root fruit can serve. Taking these characteristics into account, nutrient mediums were prepared separately and in different proportions in the nutrient mediums prepared for each agricultural crop, and LV-7, LK and LV-3 strains of highly productive yeast were grown and studied. In the conducted experiments, the temperature was up to 25 0C, the intensity of aeration, and the pH indicator of the environment were controlled. The obtained results are shown in Table 3.

Table 3

Growth rate of Saccharomyces cerevisiae strains

Mixed organic nutrient medium	**Strain**	**30 min.**	**60 min.**	**90 min.**	**120 min.**
Sweet potato knot + celery leaf	LV-7 LK LV-3	+ + +	+++ +++ ++	+++ +++ ++	++ ++ ++

Hashaki beet root + celery leaf	LV-7 LK LV-3	+ + +	++ ++ ++	++ ++ ++	++ ++ ++
Celery root + sweet potato	LV-7 LK LV-3	++ ++ ++	++ ++ ++	+++ +++ ++	++ ++ ++
Celery root + beetroot	LV-7 LK LV-3	+ + +	++ ++ ++	+++ +++ ++	++ ++ ++
Sweet potato knot + beet root + celery leaf	LV-7 LK LV-3	+ + +	++ ++ ++	++++ +++ +++	++ ++ ++

The growth rate of LV-7, LK, LV-3 strains was in the organic mixture of celery root is relatively low, and the growth rate of all three fungal strains LV-7, LK, LV-3 in the organic medium prepared from sweet potato tuber and beet root is high. Taking into account the chemical properties of the nodules and roots of agricultural crops, we tried to grow LV-7, LK, LV-3 strains in the organic medium prepared on the basis of the combination of these crops. The growth rate of LV-7, LK, LV-3 fungal strains in the feed organic mixture made from sweet potato tuber and celery leaf was high in the interval of 30-90 minutes, and the growth rate decreased slightly by 120 minutes. The growth rate of LV-7, LK, LV-3 strains in the organic mixture prepared on the basis of the combination of celery leaves in the beet roots did not change in the time interval of 30, 60, 90 minutes. Fungi strain LV-7 had a high growth rate for 90 minutes in an organic medium prepared on the basis of sweet potato nodule in celery root. The growth rate of LK strains was similar to that of LV-7 strains. The growth rate of LV-3 strains was average. The rate of budding and reproduction in the colonies was average. In celery root, in organic mixture prepared from beet root, LV-7 was high at 90 minutes, growth rate decreased after 120 minutes, growth characteristics of LK strains were similar to LV-7. The growth rate of LV-3 strains in this organic mixture was average. In the 90-minute time period, the growth and germination of LV-7 strains was high in the organic mixture prepared from celery leaf mixture in sweet potato nodule, and the growth rate of LK and LV-3 fungal strains was lower than that of LV-7.

Summary. In conclusion, depending on the composition of the organic environment, Saccharomyces cerevisiae strains have different effects, i.e., the strains reproduce differently in the composition of organic media, the LV-7 strains grow effectively when there are proteins, vitamins A, C, B1, B2, PP in the organic media, the LV-3, LK strains the sish rate will be lower and other factors can be investigated.

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