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SELECTION OF ACTIVE YEAST STRAINS FOR FERMENTED BEVERAGES FROM PLANT MATERIALS

Abstract. Various fruits and vegetables were used as sources of yeast cultures, which were grown in the Turkestan region, for the fermentation of beverages based on juice. For selection of the yeast cells we used the most acceptable methods such as washing with sterile water and scraping with a sterile scalpel. The sources of yeast cultures used washes from the surface of juice-bearing berries growing in the Turkestan region, as well as fresh juices obtained under sterile conditions, including pomegranate juice, cherry, red cherry, red grapes, watermelon juice, table beet juice, sugar sargo juice. From the 180 isolated yeast species, the majorities are *Saccharomyces* - 159, and 71 pure cultures were isolated. Subsequent study of the morphological features of cells, physiological and biochemical properties, research of antagonistic activity, resistance to antibiotics allowed for further selection of strains. The most active and corresponding by technological parameters were selected: *Saccharomyces cerevisiae* Al-06 (from grapes), *Saccharomyces cerevisiae* Gl-8 (from sargo juice) and *Saccharomyces cerevisiae* -Az-12 (from pomegranate juice). Thus, performed analyzes showed the possibility of using plant materials not only as freshly squeezed juice of pomegranate, cherry, grapes, watermelon juice, sugar sargo juice, but also as sources of active yeast.

Key words: yeast, Saccharomyces cerevisiae, pomegranate, fruit, berries, fermented juice.

Introduction. Analysis of the health status of the population in Kazakhstan shows that many residents of the country have health problems to some extent, which depend on many factors, including their living conditions. At the same time, one of the major factors is the negative impact of the environment on the health of the population. High level of pollution of the environment is a stressful environment for the human body [1]. In this connection, there is an urgent need for the creation of products capable of restoring and strengthening the body. Fruits and vegetables play an important role in nutrition, and the products of their processing, including fermented beverages, occupy an exceptional place.

Under the action of yeast, a number of irreversible metabolic processes occur, leading to significant changes in both biochemical composition and organoleptic characteristics. Skillfully selected yeast strains lead to the transformation of sugars, to their reduction and with the simultaneous enrichment of juices with yeast metabolites, including vitamins, organic acids, alcohols, etc. giving a peculiar, unique taste and aroma to the finished product [1-4].

Since yeasts are natural inhabitants of nature, they can be isolated from water, soil, and plant substrates. Fruits containing various organic acids, sugars and other sources of nutrition for yeast are predominantly populated with yeast. Yeast strains associated with fruit surfaces are capable of converting a wide range of sugars into alcohol, and they can also tolerate a high concentration of alcohol. Although yeasts of different genera Kloeckera, Hansensiaspora, Candida, Pichia are involved in the transformation of sugars into acids and alcohols, but in most cases Saccharomyces species dominate the final fermentation stage than any other yeast [2, 5-8].

There are indications in different areas of research and in every industry regarding the details of proper sampling for microbiological analysis. Depending on the research, choose one or another method of sampling, which allows either to only detect or detect and quantify the yeast organisms in the analyzed substrate [9-11].

Materials and methods. Turkestan region, located in the southern part of the country, since time immemorial is considered a region with a rich variety of flora and fauna [12]. To extract the yeast cells, we used the most acceptable methods, including washing with sterile water and scraping with a sterile scalpel. The sources of yeast cultures used washes from the surface of juice-bearing berries growing in the Turkestan region, as well as fresh juices obtained under sterile conditions, including pomegranate juice, cherry, red cherry, red grapes, watermelon juice, table beet juice, sugar sargo juice [5, 13]. The presence of yeast in them can be set directly under the microscope or after concentrating on centrifuges at a frequency of 2000 rpm for 15–20 minutes. Samples of liquids were taken in sterile vessels.

The general principle of sowing is that the sample is transformed into a state where it can be serially diluted to make it seeding directly onto Petri dishes [14].

Wort agar was used as nutrient media; Sabur agar (glucose-peptone media), mycelium formation was investigated on corn-glucose agar medium. These media are used to fully account for and isolate most types of yeast. The most widely used full-fledged medium for growing yeast is also malt wort. It consists of glucose, fructose, sucrose, maltose, maltotriose and maltotetraose, as well as a small amount of pentoses - arabinose, xylose and ribose. Nitrogen components make up 6-7% dry matter (DM), among them ammonium nitrogen is 2.18-2.44 mg per 100 ml. In the wort there are amino acids, all the main B vitamins and minerals, the content of which depends on the water used. The wort is obtained from breweries not hopped, after filtration. It is diluted with tap water to a concentration of 6-8% of DM [15-19].

Wort agar can be made from dry malt extract. 20 g of the powder is dissolved in 400 ml of hot distilled water containing 12 g of agar, and sterilized at 121 °C for 15 minutes. After sowing, the plates are incubated 24 hours in the usual position so that the agar adsorbs the liquid, and then the Petri dishes are inverted to avoid dropping condensate from the lid to the surface.

Sowing yeast on dense media from the suspension being studied is made with a pipette, with 0.5 ml or one drop of the measured volume in each dish. Always take at least three dishes for each dilution in order to obtain the average number of colonies on one dish. Crops are produced either from suspension with a pipette or loop according to the “draining stroke” principle. A drop of the test suspension containing yeast cells is applied to the surface of the agarized solidified medium in a Petri dish. After that, a sterile glass spatula evenly distribute the drop to the surface. With the same spatula, you can still sow 2-3 dishes in case the first one is very dense growth of colonies [3, 9].

When cultivating yeast, like most living organisms, maintaining a certain temperature is of great importance. At the same time, the overwhelming majority of yeast species belong to the group of mesophilic microorganisms with temperature limits of growth ranging from 2–5 to 30–37 °C and optimum at 26–28 °C. True yeast thermophiles are not known among the yeast, for growth of which temperatures are higher 50–60 °C [5, 7].

The process of isolating a pure culture ends with the transfer from a separate, grown in isolation colony into a test tube. The isolated cultures were examined for cell homogeneity under a microscope, as well as the uniformity of the colonies on the plate during subsequent sieving [10].

Thus, the requirements that must be fulfilled in the work on determining the type of yeast are as follows: before determining each culture should be carefully checked for purity by microscopy and sieving on dense nutrient media; from each source culture, they prepare a so-called control culture by transferring it into a test tube with wort agar and retain its entire work period by definition . When describing morphological traits, standard media and cultivation methods are used, since these traits can vary significantly depending on the medium composition and growing conditions.

Results and discussion. Microorganisms isolated from various plant substrates were mostly separate budding cells, and yeasts were also found, forming pseudomycelium and individual species with a true well-formed mycelium. Among the studied representatives of the yeast were typical representatives of Oosporidium, also met Rhodoturola, capable of forming primitive pseudomycelium, colonies have a pronounced rather bright red or orange color; individual grown colonies in many respects belonged to Candida cells, of which round, slightly elongated, colonies formed on agar are most often cream-colored with a wrinkled surface.

The results of the selection of pure cultures of *Saccharomyces* yeast are presented in table 1.

Table 1 – The results of the selection of pure cultures of yeast *Saccharomyces*

Research raw materials	The number of analyzed colonies on the dishes			Isolated pure cultures
	total	estimated yeast	giving spores	
Pomegranate juice	31	24	16	16
Cherry juice	18	15	15	9
Red grape juice	65	33	24	24
Watermelon juice	11	8	8	5
Beetroot juice	12	8	7	6
Sugar sargo juice	43	32	21	11

Of the 180 different types of isolated yeast, most belong to Saccharomyces 159 and only 21 cultures to Dipodascaceae, 71 pure cultures were isolated.

Since the main goal of this work was the development of a fermented beverage, the selected cultures of microorganisms selectively selected yeast capable of transforming sugars into biologically active substances that are useful for the body. Among the selected cultures, preference was given to representatives of the culture class of *Saccharomycets*, the family of *Saccharomycetaceae.* The sizes of the studied single cultures varied in width on average from 4.5 to 9 μm and in length up to 10 μm. Form predominantly rounded, oval, elongated.

The most acceptable cultures were selected in accordance with their relatively fast ability to ferment fruit juices, where the leading factor was high organoleptic characteristics, natural fruit smell, without the appearance of turbidity or large sediment and a pleasant slightly sour taste (table 2).

The most promising were Saccharomyces cerevisiae strains isolated from grapes, sugar sargo juice and pomegranate juice, which were obtained by multiple passages of individual yeast colonies on solid nutrient media. A further study of the morphological features of the cells, physiological and biochemical

Table 2 – Chemical indicators and tasting evaluation of mixed fruit juices, fermented in experienced yeast

Fruit juice	Kind of Yeast	Volume fraction of ethyl alcohol, %	Mass concentration of sugars, g/dm^3	Mass concentration of titratable acids, g/dm^3	Mass concentration of volatile acids, g/dm^3	Tasting evaluation
Watermelon juice	*Saccharomyces cerevisiae* Al-06	1,5	4,2	5,01	0,45	6
	Saccharomyces cerevisiae Gl-8	2,3	3,1	5,64	0,51	7
	Saccharomyces cerevisiae Az-12	1,6	3,9	5,21	0,54	8
Pomegranate juice	*Saccharomyces cerevisiae* Al-06	2,6	5,8	6,93	0,72	8
	Saccharomyces cerevisiae Gl-8	3,7	4.1	7,82	0,75	8
	Saccharomyces cerevisiae–Az-12	2,8	5,3	6,15	0,78	9
Mixed juice (watermelon-pomegranate)	*Saccharomyces cerevisiae* Al-06	2,3	4,9	5,92	0,55	8
	Saccharomyces cerevisiae Gl-8	3,1	2,7	8,43	0,59	9
	Saccharomyces cerevisiae–Az-12	1,8	4,5	5,15	0,64	10

properties, clarification of the antagonistic activity, resistance to antibiotics made it possible for further selection. As a result, the strains identified as the following strains of the yeast *Saccharomyces cerevisiae* Al-06 (from grapes), *Saccharomyces cerevisiae* Gl-8 (from sugar sargo juice) and *Saccharomyces cerevisiae* Az-12 (from pomegranate juice), belong to the *Saccharomycecececeae* family species Saccharomyces, subspecies cerevisiae according to the "Determinant of Burgi".

Biological species of the genus Saccharomyces are a good model for studying the fundamental biological processes: speciation and adaptability of organisms to the environment. Currently, the genus *Saccharomyces* is clearly defined and includes, in addition to *S. cerevisiae,* the species *S. arboricolus, S. bayanus, S. cariocanus, S. kudriavzevii, S. mikatae* and *S. Paradoxus* [5]. The cultural gene pool of *Saccharomycetes* yeast is represented by *S. cerevisiae* and *S. bayanus* species.

Yeast culture *Saccharomyces cerevisiae* Al-06 (from grapes) grows in 1.5% milk at a temperature of 30 ° C, fermentation of milk does not occur, gas (CO_2) is formed during the fermentation of juices. When they growth in a solid medium, form beige colonies in a round shape 1.5-2.0 mm in diameter. Growth on a stroke is moderate, continuous. The culture has a characteristic smell of yeast. The strain does not form pigments diffusing into the medium (figure 1).

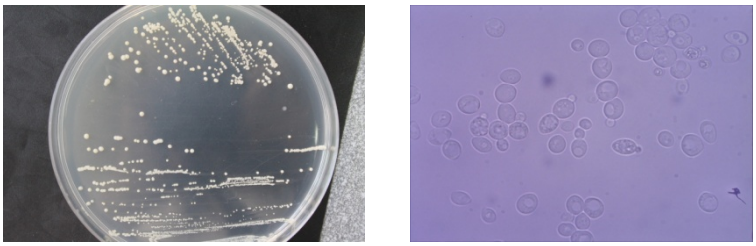

Figure 1 – Culture of the yeast Saccharomyces cerevisiae Al-06 (from grapes)

The average cell size is 6.5×7.2 μm. The shape of the cells is oval and rounded. Reproduces by budding.

On aqueous agar containing sodium acetate cells form asci with spherical spores with smooth shells, 1 to 4 in cell. Colonies are large, smooth, and convex, with smooth edges on the malt wort agar.

Physiological and biochemical properties. Many simple compounds, such as glucose, fructose, galactose, sucrose, glycerin, can be used as a carbon source. As a result of the fermentation of sugars, CO_2 and ethanol are formed.

Features of growth: Temperature optimum is 26 ± 1 °C. Cells grow in the range of 4 to 40 °C. The optimum pH of the medium is 4.5-5.5. Keeps viability in the pH range from 2.0 to 10. It grows when the content of bile in the medium is up to 2.5%.

The cultural and morphological properties of *Saccharomyces cerevisiae* Gl-8 yeast strain (from sugar sargo juice) are the following: On the surface of a solid agar medium, round convex, light cream-colored opaque colonies with a smooth edge, 3-3.5 mm in size, smooth surface, glitters, the consistency is soft, buttery (figure 2).

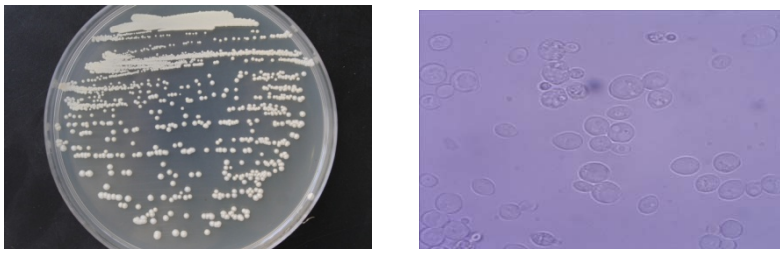

Figure 2 – Yeast culture of *Saccharomyces cerevisiae* Gl-8 (from sugar sargo juice)

The average cell size is 5.0×8.7 μm. The shape of the cells is oval and rounded. Reproduces by budding. On agar medium containing sodium acetate, the cells form aski with spores of spherical shape with smooth shells, 1-4 askies in cell.

Physiological and biochemical properties. Ferments: glucose, sucrose, maltose, galactose, 1/3 raffinose. Does not ferment: lactose and simple dextrins.

Features of growth: Temperature optimum is 26 ± 1 °C. Cells grow in the range of 4 to 40 °C. The optimum pH of the medium is 3.5-5.5. Keeps viability in the pH range from 2.0 to 10. It grows when the content of bile in the medium is up to 2.5%.

Cultural and morphological properties of *Saccharomyces cerevisiae* Az-12 (from pomegranate juice): on the malt wort-agar colonies are small, smooth, convex, with plain edges (figure 3). The average cell size is 5.0 × 6.4 microns. The shape of the cells is mostly rounded. Reproduces by budding. The yeast does not form a yeast spore.

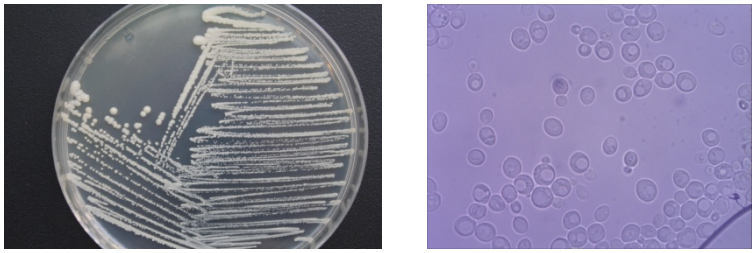

Figure 3 – Culture of Saccharomyces cerevisiae Az-12 yeast (from pomegranate juice)

Physiological and biochemical properties. Ferments: glucose, fructose, sucrose, maltose, maltotriose, does not use galactose, consumes pentose in a small amount - arabinose, xylose and ribose, can use many simple glycerol compounds as a carbon source, as a result of fermentation of sugars it forms CO_2 and ethyl alcohol.

Features of growth: The temperature optimum is 37 ± 1 °C. Cells grow in the range of 5 to 45 °C. The optimum pH of the medium is 3.5-5.5. Keeps viability in the pH range from 1.2 to 10. It grows when the content of bile in the medium is up to 3.0%.

In relation to oxygen, all of the studied strains are optional.

Antibiotic resistance: *Saccharomyces cerevisiae* Al-06 strains are resistant to gentamicin, cefazolin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, ciprofloxacin, cefuroxime, amphotericin. Show moderate antagonistic properties in relation to *E. coli*.

The strain *Saccharomyces cerevisiae* Gl-8 is resistant to gentamicin, oxacillin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, ciprofloxacin, metronidazole, ketonazole, amphotericin. It shows pronounced antagonistic properties in relation to *E. coli* и *Staphylococcus aureus*.

Saccharomyces cerevisiae Az-12 is resistant to gentamicin, oxacillin, cefazolin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, cefotaxime, ciprofloxacin, cefuroxime, metronidazole, ketonazole, amphotericin. They show pronounced antagonistic properties with respect to Escherichia coli, Pseudomonas aeruginosa and *Staphylococcus aureus.*

Thus, performed analyzes show the possibility of using plant materials not only as freshly squeezed juice of pomegranate, cherry, grapes, watermelon juice, sugar sargo juice, but also as sources of active yeast. Of the yeast isolated from plant substrates, the most acceptable from a technological point of view, as well as those with pronounced antagonistic abilities in relation pathogens are *Saccharomyces cerevisiae* Az- 12 и *Saccharomyces cerevisiae* Gl-8

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Conclusion. As a result of the selecting work, *Saccharomyces cerevisiae* strains isolated from grapes, sugar sargo juice and pomegranate juice were chosen and obtained by multiple passages of individual yeast colonies on solid nutrient media and identified as *Saccharomyces cerevisiae* Al-06, *Saccharomyces cerevisiae* Gl-8 и *Saccharomyces cerevisiae* Az-12.

The most promising were Saccharomyces cerevisiae Gul-8 and *Saccharomyces cerevisiae* Az-12 with the ability to ferment fruit juices relatively quickly, and the leading factor was high product quality: organoleptic characteristics, natural fruit odor, no turbidity, and a pleasant slightly sweet, slightly sour taste.

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ӨСІМДІКТІК ШИКІЗАТТАН ДАЙЫНДАЛҒАН ФЕРМЕНТИРЛЕНГЕН СУСЫНДАРҒА АРНАЛҒАН БЕЛСЕНДІ АШЫТҚЫ ШТАММДАРЫНЫҢ СЕЛЕКЦИЯСЫ

Аннотация. Шырындар негізінде жасалған сусындардың ферментациясы үшін, ашытқы культураларының негізгі көзі ретінде, Түркістан облысында өсірілген әртүрлі жемістер мен жидектер пайдаланылды. Ашытқы жасушаларын алу үшін ең қолайлы әдістер қолданылды: стерильді сумен алынған жуынды және стерильді скальпельмен алынған үлгі. Ашытқы культураларының негізгі көзі ретінде, Түркістан облысында өсірілетін, шырыны бар жидектердің бетінен, сонымен қатар, стерильді жағдайларда алынған балғын шырындардың, олардың қатарында анар, шие, қызыл шие, қызыл жүзім, қарбыз, асхана қызылшасы, қант жүгері шырындары, жуындылары қолданылады. Бөлініп алынған ашытқылардың 180 түрінің 159-ы *Saccharomyces,* олардың 71-і таза культура түрінде алынды. Жасушалардың морфологиялық ерекшеліктері, физиологиялық және биохимиялық қасиеттері, олардың антагонистік белсенділігінің айқындалуы, антибиотиктерге тұрақтылығын зерттеу жаңа штаммдардың селекциялануына мүмкіндік береді. Белсенділігі жоғары және технологиялық параметрлерге сәйкес түрлер ретінде мына ашытқылар таңдалды: *Saccharomyces cerevisiae* Al-06 (жүзімнен алынған), *Saccharomyces cerevisiae* Gl-8 (қант жүгерісі шырынынан) және *Saccharomyces cerevisiae* – Az-12 (анар шынынынан). Өткізілген зерттеулер өсімдік шикізатының анар, шие, жүзім, қарбыз, қант жүгерісі шырындары түрінде ғана емес, сонымен қатар белсенді ашытқылардың көзі бола алатындығын көрсетті.

Түйін сөздер: ашытқылар, *Saccharomyces cerevisiae*, анар, жемістер, жидектер, ферментирленген шырындар.

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СЕЛЕКЦИЯ АКТИВНЫХ ШТАММОВ ДРОЖЖЕЙ ДЛЯ ФЕРМЕНТАТИРОВАННЫХ НАПИТКОВ ИЗ РАСТИТЕЛЬНОГО СЫРЬЯ

Аннотация. Для ферментатации напитков на основе сока, в качестве источников дрожжевых культур использовали различные фрукты и овощи, произрастающие в Туркестанской области. Для извлечения дрожжевых клеток нами использовались наиболее приемлемые методы, в том числе смыв стерильной водой и соскоб стерильным скальпелем. В качестве источников дрожжевых культур использовали смывы с поверхности сокосодержащих ягод, произрастающих в Туркестанской области, а также свежих соков, полученных в стерильных условиях, в том числе сок граната, вишни, черешни, красного винограда, арбузный сок, сок столовой свеклы, сок сахарного сарго. Из 180 выделенных видов дрожжей большинство относятся *Saccharomyces* – 159, чистых культур выделено 71. Последующее изучение морфологических особенностей клеток, физиологических и биохимических свойств, прояснения антагонистической активности, устойчивости к антибиотикам дали возможность для дальнейшей селекции штаммов. Наиболее высокоактивные и соответствующие по технологическим параметрам были отобраны: *Saccharomyces cerevisiae* Al-06 (из винограда), *Saccharomyces cerevisiae* Gl-8 (из сока сахарного сарго) и *Saccharomyces cerevisiae* – Az-12 (из гранатового сока). Таким образом, проведенные анализы показали возможность использования растительного сырья не только в качестве свеже выжатых соков граната, вишни, винограда, арбузного сока, сока сахарного сарго, но и в качестве источников активных дрожжей.

Ключевые слова: дрожжи, *Saccharomyces cerevisiae*, гранат, фрукты, ягоды, ферментированный сок.

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REFERENCES

[1] Abilkaiyr N.A. Population health as a major of quality of life // National Academy of sciences of the Republic of Kazakhstan. Series of biological and medical. 2019. Vol. 2, N 332, P. 20-27. https://doi.org/10.32014/2019.2519-1629.16

[2] Babieva I.P., Chernov I.Yu. (2004) Biology of Yeast. M.: Partnership of scientific publications KMK. P. 18-35.

[3] Zyuzina O.V., Shunyaeva O.B., Muratova E.I., Ivanov O.O. (2006) Theoretical foundations of food biotechnology: laboratory works. Tambov: Tamb. state tech. Un-one. 48 p.

[4] Smart K.A., Chambers K.M. (1999) Use of Methylene Violet Staining Procedures to Determine Yeast Viability // Journal-American society of brewing chemists. 231 p.

[5] Tonge G.M., Jarman T.R. (1981) Opportunities for biotechnology in the food industry. FIE Conference, London.

[6] Egorova T.A. (2003) Fundamentals of Biotechnology. M.: Publishing Center "Academy". 208 p.

[7] Rudenko E.Yu. (2007) Prospective yeast strains for fruit and berry winemaking in the Samara region // Winemaking and viticulture. N 3. P. 24-25.

[8] Abramov Sh.A., Daudova T.I. (2005) Pinot gris and sugar cubes in unique conditions of Sarykum // Wine-making and viticulture. N 6. P. 18-19.

[9] MacLean R.C., Gudelj I. (2006) Yeast // Nature. 441: 498-501.

[10] Izgu F., Altinbay D., Sertkaya A. (2005) // Biosci. Biotechnol. Biochem. 69, 2200. doi:10.1271/bbb.69.2200

[11] Slavikova E., Vadkertiova R., Vranova D. // J Basic Microbiol. 2007. 47, 344-350.

[12] Abdimutalip N., Ibragimova E., Ibragimova D. Conservation and restoration of biodiversity of flora and fauna on the territory of the Turkestan region // National Academy of sciences of the Republic of Kazakhstan. Series of biological and medical. 2018. Vol. 1, N 325. P. 79-83.

[13] Manas Ranjan Swain, Marimuthu Anandharaj, Ramesh Chandra Ray, Rizwana Parveen Rani. (2014) Fermented Fruits and Vegetables of Asia: A Potential Source of Probiotics, Biotechnology Research International, ID 250424:19. http://dx.doi.org/10.1155/2014/250424

[14] Goddard M.R. Quantifying the complexities of Saccharomyces cerevisiae's ecosystem engineering via fermentation // Ecology. 2008. 89:2077-82.

[15] Chambers P.J., Pretorius I.S. Fermenting knowledge: the history of winemaking, science and yeast research // EMBO Rep. 2010; 11:914-20.

[16] Saparbekova A.A., Kantureyev G.O., Aytkulova R.E. (2013) Production of natural fermented beverages // IX International Scientific and Practical Conference Prague. P. 93-97.

[17] Saparbekova A.A., Valliulina S.A., Tazhimetova K.T. (2015) Fruits of vegetable raw materials of the South Kazakhstan region and prospects for their use for fermented beverages // Proceedings of the international scientific-practical conference "Domestic science in the era of changes: the postulates of the past and the theory of new time". No. 2(7). Yekaterinburg. P. 132-133.

[18] Noriko Komatsuzaki, Rina Okumura, Mika Sakurai, Yukihide Ueki, Jun Shima (2016). Characteristics of Saccharomyces cerevisiae isolated from fruits and humus: Their suitability for bread making, Progress in Biological Sciences. Vol. 6, N 1. P. 55-63.

[19] Chambers P.J., Pretorius I.S. (2010) Fermenting knowledge: the history of winemaking, science and yeast research // EMBO Rep. 11: 914-920.

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