JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125VOL 7, ISSUE 15, 2020

THE USE OF FRUCTIC SYRUP IN THE EXPANSION OF THE RANGE OF BABY FOOD

Sh.Sadikova[1], K.Dodaev[2]

[1]Namangan engineering and technology institute, Namangan, Republic of Uzbekistan

E-mail: shaira_sadikova90@mail.ru,

[2]Tashkent chemical-tecnological institute, Tashkent, Republic of Uzbekistan,

Dodoev@rambler.ru

Received: 16 March 2020 Revised and Accepted: 17 June 2020

Abstract

Studies on the current state of baby food in Uzbekistan, on measures to improve the quality and safety of baby food are presented. One of the ways to achieve the goal was the use of natural glucose-fructose-sucrose, glucose-fructose, fructose, glucose syrups of various plants, in this work - stalks of sorghum. The results of agro-technical conditions for the preparation of raw materials, studies of the physicochemical properties of squeezed juice and obtained by further processing of the syrup are presented.

Keywords: Sorghum, dietary properties, baby food, stem, juice, nutritional values, peel, pulp, syrup, fructose, glucose, extract.

1. Actuality.

In the framework of the state "Concept of the development of the food industry until 2025", new approaches to the theory of balanced nutrition of children appeared [1].

The priority tasks of increasing the competitiveness of food products, creating conditions for ensuring food security of the country, as well as import substitution in relation to socially important food products and increasing export potential is the introduction of innovations based on a large-scale technological upgrade of production using advanced scientific and technical developments [2,3].

Unfortunately, in the country there is no mass production of natural syrups, dietary fiber, alcohol, starch, the source of which is sugar sorghum.

As a result of the study of sugar sorghum, we revealed that it is a unique strategic raw material resource, from which, with deep processing, you can get a wide range of products that are in the modern world, therefore it can be attributed to an effective and promising agricultural crop [4,5].

Sugar sorghum is a resource that in crop production will allow to fulfill the above tasks, give the country new products of healthy baby food, high-value feeds, ensure high employment of the population, and use the employment of the population.

The aim of the research is to study the nutritional value and dietary properties of infant nutrition using sorghum stem extract.

As noted in the reports discussed at WHO meetings published in 2010, advertisements for foods containing high levels of fat, sugar, and salt shape children's eating habits. These data confirm significant violations of the principles of rational nutrition in children of preschool and primary school age, which leads to the development of diseases such as diabetes, obesity and metabolic disorders [6,7].

Currently, the need for local infant products is not satisfied. At the same time, the provision of infant nutrition in the Republic is of great social importance in connection with the need to improve children's health. Thus, the tasks of both improving the technology for obtaining individual infant nutrition products and the reasonable expansion of the range of non-traditional recipes aimed at covering the shortage of irreplaceable components in infant nutrition become relevant.

One of the ways to expand the range of products is the production and use of syrups, including as a sugar substitute: glucose-fructose-sucrose, glucose-fructose, fructose, glucose. Optimal is the use of syrups from a technological and economic point of view. A worthy example is sugar sorghum syrup, the studies of which are given in this paper. The advantage of using this syrup in the production of infant nutrition is due to its chemical composition, studied functional and technological properties, the presence of proven agricultural cultivation techniques, a wide range of plants [8,9,10,11].

Dr. Douglas Shar from the USA notes that sugar sorghum syrup has a light aroma and is useful in almost all recipes that use sugar or glucose syrups. Unlike treacle and honey, with a characteristic strong aroma that inhibits other floral aromas, sorghum syrup sweetens the product and helps to reveal the aroma of the inherent product used in the recipe [12].

ISSN- 2394-5125VOL 7, ISSUE 15, 2020

The main advantages of the mixture of sorghum syrup (sucrose-glucose-fructose):

- quickly and easily digested by the organism;
- restores strength and releases the necessary energy;
- easy to pass by the kidneys;
- promotes an increase in glycogen in the liver and muscles (the main supply of carbohydrates in the body of each person).

According to the spectrum of sugars, sorghum syrup is similar to invert sugar (sugar split into monosugars, invert) and even to natural honey, it is not sugared due to the presence of fructose [13,14-20].

2. Objects and research methods

In the course of this work, we used modern methods of physicochemical analysis.

The researches were conducted on the basis of regulatory documents and the developed methodology. When performing the work, the methods given in International normative standarts and local standarts were used.

The objects of study were 3 varieties and a hybrid of sugar sorghum: "Karabash" and "Uzbekistan 18". On April 14, 2019, at one of the plots, we sowed the seeds of sugar sorghum of the varieties "Karabash" and "Uzbekistan 18". When growing seeds, we found that the growth and development of sugar sorghum depends not only on the growing season, but also on growing conditions, such as type of soil, seed placement depth, and germination energy.

"Karabash": plant height 250-300 cm, leaves 10-11, ripening 100-120 days. The panicle is brown, oval, upright, 21-26 cm long. The grain is light brown in color, partially membranous, weighing 1000 pieces 22-24 g. The yield of green mass is 51.47 t/ha, dry matter - 17.14 t/ha.

"Uzbekistan 18": plant height 310-350 cm, leaves 16-17, matures in 140-145 days. The panicle is white, oval, upright, 24-25 cm long. The grain is white, partially membranous (up to 30%), weight 1000 pieces 28 g, yield when threshing 75%. Grain productivity - 6.85 t/ha, green mass - up to 100.0 t/ha, dry matter - 27.73 t/ha.



3. Results and its discussion

In our studies, the growth and development of varieties of sugar sorghum "Karabash" and "Uzbekistan 18" proceeded approximately the same way, as the sowing was carried out on the same day.

Phenological observations of the growth and development of sugar sorghum varieties "Karabash" and "Uzbekistan 18" are presented on average in table. 1.

№	Varieties	Development phases and dates							
		Sowing	Full shoots	Stooling	Mowing	Bloom	Milk ripeness	Full ripeness	Vegeta-tion period
I	Karabash	14.04	26.04	16.05	4.06	5.07	11.07	26.08	103
II	Uzbekistan 18	14.04	27.04	19.05	17.06	23.07	13.08	5.09	144

TABLE 1. Phenological observations of the growth and development of sugar sorghum during the growing season at 100 thousand pcs. seed/1 ha

The data given in table 1. show that the growing season on average corresponds to the biological characteristics of the variety. The vegetation period by varieties with sifting of 100 thousand units/ha was: “Karabash” - 103 days, and “Uzbekistan 18” - 144 days.

The duration of interphase periods of the development of sugar sorghum plants was studied at a sowing rate of 100 thousand units/ha. Analyzing the interphase period on average for the “sowing-seedling” period, “Karabash” - 12 days for sifting of 100 thousand units/ha, “Uzbekistan 18” - 13 days for 100 thousand units/ha.

ISSN- 2394-5125VOL 7, ISSUE 15, 2020

1) "Shoots - stooling" - for all sowing rates, the number of days was: "Karabash" - 20 days, "Uzbekistan 18" - 22 days. "Uzbekistan 18" had a longer period, "shoots-stooling" in comparison with the variety "Karabash" for 2 days.

2) "Stooling - mowing" - a long period compared with "shoots - stooling" for varieties amounted to: "Karabash" - 20 days, "Uzbekistan 18" - 29 days. So, "stooling - mowing" at a sowing rate of 100 thousand units/ha, the grade "Uzbekistan 18" is extended by 9 days compared to the variety "Karabash".

3) The interfacial period "mowing - bloom" the number of days by variety was: "Karabash" - 36 days at 100 thousand units/ha, "Uzbekistan 18" - 30 days at 100 thousand units/ha.

4) The interfacial periods "bloom - milk ripeness" and "milk –wax ripeness" - the number of days by variety was: "Karabash" - 21 days at 100 thousand units / ha, "Uzbekistan 18" - 54 days at 100 thousand units/ha.

Thus, as our studies showed, the total number of days of the interphase period by variety was: "Karabash" at 100 thousand units/ha — 103 days, "Uzbekistan 18" at 100 with thousand units/ha — 144 days. Duration of interphase periods of development of sugar sorghum varieties "Karabash" and "Uzbekistan 18" are presented in table. 2.

№	Experience Options	Development phases and dates of their onset, days							
		Sowing rate, thousand units ha/(C)	Sowing - shoots	Shoots - stooling	stooling - mowing	Mowing – bloom	Bloom – milk ripeness	Milk-wax ripeness	total quantity days of interfacial periods
I	Karabash	100	12	20	20	30	6	15	103
II	Uzbekistan 18	100	13	22	29	26	31	23	144

TABLE 2. Duration of interphase periods of sugar sorghum plant development

To obtain sugar syrup, stem samples were taken in the phase of milk-wax ripeness. Stem samples were taken manually, the selected samples were weighed on a laboratory electric balance, manually peeling the peel from the pulp.

Sorghum sugar syrup, i.e. a thick extract was obtained by extraction with hot distilled water at a temperature of 72-78° C in a digester, followed by concentration of the liquid extract in a vacuum drying complex and evaporation of the concentrated extract in a water bath. The solids in the thick extract (syrup) were determined using a refractometer, and the carbohydrate composition was determined using a sugar meter. The results of the studies are shown in table.3.

The physicochemical properties of the obtained sugar syrup (extract) from the sorghum variety Karabash and Uzbekistan 18 are studied. The results are presented in table. 4.

№	Varieties	The mass of the peel, g	The pulp of the mass, g	Solid in extract,%	Carbohydrates in extract,%	The yield of extract, g
1	Karabash	818	1059	36,74	28	740
2	Uzbekistan 18	805	1104	28,18	24	740

TABLE 3. Indicators of syrup from various varieties of sorghum

№	Indicators	Result
1	Appearance	Honey-forming liquid without precipitation
2	Smell	Specifically, without smell
3	Taste	Specifically, sweet
4	Color	Light-brown
5	Transparency	The same concentration, no precipitation
6	Solubility	Soluble in hot water
7	Mass fraction of solids, % no less	70-75
8	pH of 1% aqueous solution of the finished product	6,0-6,5
9	Mass fraction of ash,% no more	1,0-1,5

ISSN- 2394-5125VOL 7, ISSUE 15, 2020

10	Oxymethylfurfural	Is absent

TABLE 4. The main physical and chemical properties of concentrated sugar syrup of sorghum varieties "Karabash" and "Uzbekistan 18".

4. Conclusions.

As a result of the research:

- the technological properties of stalks of sugar sorghum of local zoned varieties grown in Uzbekistan were studied, on the basis of which a method for producing new sugar syrup was developed, the technical and economic indicators of the production of sugar syrup from sorghum were studied;
- the chemical composition and organoleptic characteristics of sugar syrup from the sorghum varieties "Karabash" and "Uzbekistan 18" were investigated;
- sugar syrup from sugar sorghum of the varieties "Karabash" and "Uzbekistan 18" can replace beet sugar in the composition of fruit purees, sweet baby and diet preserves intended for baby food, which will enrich the product with sugars (mainly fructose), vitamins, biologically active substances necessary for children.

5. References

[1] Decree of the president of the republic of Uzbekistan on “Concept of the development of the food industry until 2025”.

[2] Golubeva L.V., Pozhidaeva E.A. Functijnal and technological properties of sorghum syrup and its use in ice cream technology // Food processing: Techniques and technology, 2019 – T. 49 №3. – P. 431-437

[3] Chexomova E.A., Bessonova O.V. Research of the assortment and quality of baby fruit puree of various manufacturers in Omsk // Modern high technology/ - 2014. - №5-1. – P. 104-107

[4] Sadykova Sh.A., Maksumova D.K., Dodaev K.O. Application of sweet sorghum stalks in the production of products for baby nutrition // Storage and processing of farm products. - 2014. №7 – 41-42 c.

[5] Sodikova Sh.A. Application of sugar sorghum in manufacture children foods. // Universum: Technicals sciences: electronic scientific journal. - 2019. № 6(63). P. 74-75.

[6] Nutrition of a healthy and sick child: a manual for doctors / Edited by V.A.Tutelyanova, I.Ya.Konya, B.C.Kaganova. – M. – 2010. – P. 324

[7] Sverdlichenko A.V. Improvement of technology and development of recipes for mashed canned food based on Jerusalem artichoke for baby food // diss. cand. technical science – Krasnodar (in Russian), 2018. – P. 11, 28, 29, 30.

[8] Regassa T.H. Sweet sorghum as a bioenergy crop: Literature review / T.H.Regassa, C.S.Wortmann // Biomass and Bioenergy. – 2014. – Vol. 64. - P.348-355.

[9] Ratnavathi C.V. Sorghum syrup and other by products / C.V.Ratnavathi, U.D.Chavan // Sorghum biochemistry: An industrial perspective / C.V.Ratnavathi, J.V.Patil, U.D.Chavan. – Elsevier. 2016. – P. 253-310.

[10] Sapronova E.A., Ermolaeva G.A., Shaburova L.N. Caramel mass based on sweet sorghum syrup. Food Industry. 2012. - №4. P. 58-59

[11] Efremova E.N., Petrov N.Yu. Sugar sorghum processing technology. Proceedings of Nizhnevolzhskiy agrouniversity complex: science and higher vocational education. - 2012. – T. 28. №4. – P. 66-69.

[12] Erbulakova M.T. Biotechnological basis for the production of bread using products of processing of sugar grades of sorghum // Abstract of diss. PhD. – The republic of Kazakhstan, Almata, 2015. – P. 23.

[13] Caroline LiboreiroPaivaa, Warlley Pinheiro Evangelistaa, Valeria Aparecida Vieira Queirozb, Maria Beatriz Abreu Gloria, Bioactive amines in sorghum: Method optimisation and influence of line, tannin and hydric stress. Food Chemistry, 2014.

[14] LimanLiua, Thomas J. Heraldb, DonghaiWanga, Jeff D. Wilsonb, Scott R. Beanb, Fadi M. Aramounic Journal of Cereal Science, Characterization of sorghum grain and evaluation of sorghum flour in a Chinese egg noodle system, 2011.

[15] Safarov, J. E, Sultanova, Sh. A., Dadaev, G. T. Development of helio of a drying equipment based on theoretical researches of heat energy accumulation. Energetika. Proc. CIS Higher Educ. Inst. and Power Eng. Assoc., 2020, vol. 63, No 2. pp.174-192. https://doi.org/10.21122/1029-7448-2020-63-2-174-192

[16] Safarov, J. E., Sultanova, Sh. A., Dadayev, G. T., Samandarov, D. I. Method for drying fruits of rose hips. International Journal of Innovative Technology and Exploring Engineering. vol. 9, Issue-1, 2019. pp.3765-3768. DOI: 10.35940/ijitee.A4716.119119

[17] Safarov, J. E., Sultanova Sh.A., Dadayev G.T., Jumayev B.M. Solar water heating convective dryer for drying medical herbs. International Journal of Psychosocial Rehabilitation. Volume 24, Issue 8. 2020. P.1946-1955. DOI: 10.37200/IJPR/V24I8/PR280214

[18] Safarov J.E., Sultanova Sh.A., Aït-Kaddour A., Samandarov D.I., Jumayev B.M. Optimal option drying silkworm cocoons with preserving qualitative indicators. International Journal of Advanced Science and Technology. Volume 29, №9s. 2020. pp.2099-2104.

[19] Safarov, J. E., Sultanova Sh.A., Dadayev G.T., Jumayev B.M. Research of the temperature field profiles of

ISSN- 2394-5125VOL 7, ISSUE 15, 2020

the drying process of plant raw materials using a solar-water heating drying equipment. International Journal of Psychosocial Rehabilitation. Volume 24, Issue 8. 2020. P.1969-1977. DOI: 10.37200/IJPR/V24I8/PR280217

[20] Safarov J.E., Sultanova Sh.A., Samandarov D.I., Jumayev B.M., Zulpanov Sh.U. Analysis of drying equipment for drying products. International Journal of Advanced Science and Technology. Volume 29, №9s. 2020. pp.2105-2109.