BRIEF COMMUNICATIONS

DYNAMICS OF THE ACCUMULATION OF SUGARS IN SWEET SORGHUM

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Sorghum belongs to the genus *Sorghum* Moench and exhibits a very wide diversity of species and varieties [1-2].

In order to choose the time of harvesting sweet sorghum and to optimize the yield of sugar for further technological processing, we have studied the dynamics of accumulation of sugar and the change in the weight of the pith of sweet sorghum of the Sakharnoe-40 variety from the beginning of the appearance of shoots until harvesting.

Sample of the stems were selected from the 25th day after the appearance of shoots, in the incipient tillering phase. Analysis was carried out every 10 days. The dry matter in the juice was determined refractometrically, and the monosaccharides by Bertrand's method [3].

As can be seen from Table 1, with the growth of the plant the proportion of rind in the stem decreased and at full ripeness it amounted to 13.1%. The proportion of pith at the end ripening was 86.9%. Beginning from the period of milky ripeness and up to the end of ripening the proportion by weight of dry matter in the juice stabilized, while the content of mono- and disaccharides rose continuously. In the period of milky ripeness the juice had pH 3.2 and titratable acidity of 4.7 g/liter (calculated as tartaric acid). After full ripeness of the sorghum, the juice of the stems had pH 5.4 and the titratable acidity had fallen to 2.4 g/liter.

Analyses were made of the sugar-containing components (glucose, fructose, sucrose) in samples of fresh stems as the plant ripened. The glucose content was determined by difference between the total monosaccharides and fructose, and the sucrose content by difference between the second and first determinations multiplied by the factor 0.95. The results of the analyses are given in Table 2.

TABLE 1. Change in the Weight of Parts of the Stems and Accumulation of Sugars in the Dynamics of the Growth of Sweet Sorghum, Variety Sakharnoe-40

Days after the appearance of shoots	Phase of flowering	Weight, %		Concentration in the juice	
		rind	pith	dry matter	di- and mono-saccharides
25	Tillering	91.0	9.0	27.0	3.2
35		80.3	19.7	26.0	3.4
45		72.0	28.0	22.0	5.8
55		60.5	39.5	22.0	7.4
65		54.0	46.0	21.0	8.4
75		49.5	50.0	20.5	10.3
85	Flowering	41.0	59.0	20.0	11.4
95		37.0	63.0	20.0	14.7
105	Milky	30.0	70.0	19.8	15.2
115	ripeness	22.0	78.0	19.5	16.4
125	Technological	15.0	85.0	19.2	16.9
135	ripeness	14.6	85.6	19.0	17.6
145		13.1	86.9	19.0	17.6

TABLE 2. Levels of Sugar-Containing Components in the Stems of Sweet Sorghum Sakharnoe-40

Sugars	Level (%) in the phase of					
	tillering		flowering		milky ripeness	technol. ripeness
Monosugars (glucose + fructose)	4.86	4.89	4.97	4.91	4.91	3.22
Sucrose	4.97	5.24	3.80	5.70	6.93	12.81
Fructose	–	0.97	3.22	3.23	3.33	2.07
Glucose	–	3.42	2.55	2.28	2.18	2.05
Total sugars in the juice	9.83	14.52	14.54	16.02	17.35	20.93
	14.50	15.90	16.89	20.62	20.52	23.33

As the sorghum ripened, the yield of free monosaccharides fell from 4.8% in the tillering phase to 3.2% in the phase of technological ripeness and, at the same time the accumulation of 12.8% of sugars was observed. The sugar content of the juice ranged from 14.5 to 23.33%. The analyses showed that for the production of an edible concentrated glucose-fructose syrup it is desirable to process the stems of the plant in the period of full technological ripeness.

REFERENCES

1. P. M. Shorin, The Technology of the Cultivation and Use of Sweet Sorghum [in Russian], Rossel'khozizdat, Moscow (1986).
2. Kh. R. Muminov, The Biological Characteristics and Agromechanics of Sorghum under the Conditions of the Water Shortage and Salinized Soils of Uzbekistan [in Russian], Fan, Tashkent (1982).
3. I. S. Lur'e, Handbook on Technical Control in the Food Industry [in Russian], Moscow (1978).