

AREAS OF PROCESSING SUGAR CORN HYBRIDS OF FOREIGN AND MOLDOVAN SELECTION

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Abstract: Corn (*Zea mays* L.) is a multi-purpose high-output cereal. Sugar corn beans are used in making preserves when immature, before sugar is converted into starch. Thirteen hybrids of sugar corn, that are cultivated in Moldova, were studied. They were grown on the testing fields in Bacioi, Chisinau, belonging to the National Commission charged with the study of plants in year 2010-2011. The research has revealed the hybrids that are best suited for canning.

At present 28,6 % of sugar corn is used to process on the food purpose in the world.

The area seeded with sugar corn constitutes 1,027 million ha (between 2001-2005) in the world. The main producing countries are USA, Hungary, Canada, France, Japan [1-4]. The Republic of Moldova is a favorable region to cultivate the corn. To produce the canned corn it is necessary to cultivate the sugar corn of certain sorts. The production of canned sugar corn comprised 3492 tons in 2005, 4837 ton – in 2006.

During the last years, in the Republic of Moldova the sugar corn hybrids of local and import selection are intensively developed.

Research purpose: To determine the use of new and perspective sugar corn hybrids to produce the canned and congealed food.

RESEARCH METHODS AND MEANS

The sugar corn hybrids of local and import selection harvested in the milky ripeness have been tested:

Hibrizii de porumbul zaharat în stare proaspătă:

- Sheba F₁ (martor, Olanda);
- Porumbeni 198 F₁ (Moldova);
- Signet F₁ (Olanda);
- Nectar 1 F₁ (Moldova);
- Nectar 2 F₁ (Moldova);
- Trophy F₁ (Olanda)
- Porumbeni 196 F₁ (Moldova);
- Porumbeni 280 F₁ (martor, Moldova);
- Chall F₁ (Moldova);
- Nectar 3 F₁ (Moldova);
- Porumbeni 343 F₁ (Moldova);
- Harvest Gold F₁ (Olanda);
- Nectar 4 F₁ (Moldova) .

Sugar corn was cultivated on the land plots of State Commission of sorts testing of the Republic of Moldova in the village of Bacioi, city of Chisinau, in 2010, in conformity

with „Method indications for the chemical – technological testing of fruit, vegetables, berries sorts destined for the industrial processing”.[5]

The traditional methods of preserving and namely preserving by the sterilization and congelation were used for the technological tests.

The use of the sugar corn hybrids was established based on the results of the physical – chemical, technological and organoleptic research. The products samples have been produced in accordance with the technological instructions on the canned and congealed sugar corn production.

Kernel were cut using the MTBP-500 industrial machine.

RESEARCH METHODS

The research of the biometric parameters of the sugar corn has been carried out in accordance with the method of measuring, gravimetry and chemical method. The following has been established:

- average mass;
- length and maximal diameter of the ear;
- percentage of coating leaves and output of kernels per one ear;
- mass fraction of:
 - the dry substances (according to the refractometer and by drying);
 - titrable acids (recalculated in the malic acid);
 - glucose;
 - fructose;
 - saccharose;
 - starch,

RESULTS AND DISCUSSIONS

Based on the results of the research of the organoleptic and technical characteristics of fresh sugar corn analyzed in year 2010. One of the topical problems in sugar corn cultivating technology consists in the moment of the cobs harvest, which has to occur in the milk stage. The basic method utilized in practice is the spreading of the contents of kernels during the milk stage. This method is subjective and does not always bear veritable results. Other methods do exist, e.g. chemical, however they can be quite time-consuming. Thus, we tried to determine the moment of harvest using the volume of amidone, which forms from other carbohydrates when sugar corn ripens. Mass fractions of amidone reported in the total volume of carbohydrates, as per variety and hybrid, can be divided into 3 groups, characterised by the differing quality of fresh and boiled kernels depending on the juiciness and the presence of tones of amidone taste:

Sheba F₁, Porumbeni 198 F₁, Signet F₁ – 11,0% - 12,9% – Milk stage kernels, juicy, fragrant, soft.

Trophy F₁, Porumbeni 196 F₁, Porumbeni 280 F₁, Chall F₁, Nectar 3 F₁ – 28,0 - 43,2% – Kernels in the stage of technical maturity (milk stage), juicy, sweet; Except nr. 14 – with a tone of amidone (reported volume makes up 36,8% of the all the carbohydrates), nr. 15 – not mellow, nor sweet, makes up 28,9%.

Porumbeni 343 F₁, Harvest Gold F₁, Nectar 4 F₁ – 76,0- 76,7% – kernels with a distinct amidone taste, can be used in technical processing.

Researched samples of sugar corn (fig. 6) are in accordance with the requirements for sugar corn used in industrial processing: cylindrical or small conical cobs, uniform in

length and diameter, 16 cm long, with long tooth-like kernels that have a thin peel; a pronounced sweet taste. Kernel substance is characteristic of corn in the milk stage of ripening. Corn cob grain yields are within the norm of 50,5-61,6%.

Table 1 shows the results of the physico-chemical analysis of fresh sugar corn. Overall volume of carbohydrates, expressed in inverted sugar, depending on the hybrid makes up from 1,71 to 9,70%, amount of pH between 6,10 6,60, amidone volume is 1,35-6,20%.

Table 1. Physico-chemical indicators of sugar corn, tested in year 2010

Nr.	Sample code	Fracția masică, %						
		Dry substance	Amidone	Glucose	Fructose	Sucrose	Reduced carbohydrates	Amount total invert sugar recalculated
1	Nr. 10 Sheba F ₁	25,8	1,54	-	-	-	0,72	5,56
2	Nr. 11 Porumbeni 198 F ₁	35,7	1,88	-	-	-	1,06	8,47
3	Nr. 12 Signet F ₁	22,0	2,04	-	-	-	1,06	9,70
4	Nr. 14 Nectar 1 F ₁	30,0	2,12	-	-	-	1,42	3,86
5	Nr. 15 Nectar 2 F ₁	28,5	1,98	0,38	1,02	4,34	1,22	4,22
6	Nr. 16 Trophy F ₁	23,4	1,94	0,11	0,64	2,83	1,34	4,02
7	Nr. 17 Porumbeni 196 F ₁	26,1	2,14	-	-	-	1,50	4,30
8	Nr. 19 Porumbeni 280 F ₁	17,5	1,35	-	-	-	1,20	2,78
9	Nr. 20 Chall F ₁	21,1	2,56	2,18	1,02	1,88	1,10	2,95
10	Nr. 21 Nectar 3 F ₁	23,7	2,40	-	-	-	1,44	4,63
11	Nr. 22 Porumbeni 343 F ₁	32,2	6,20	-	-	-	1,32	1,72
12	Nr. 23 Harvest Gold F ₁	33,2	4,26	-	-	-	1,30	1,71
13	Nr. 25 Nectar 4 F ₁	32,2	6,10	-	-	-	1,33	1,74

Data presented graphically in fig.1 using a coordinate system: x – volume of dry substances, y – amount of amidone, which depending on the breed (hybrid), makes up 1,35-

2,04% of sugar corn in the milk stage. In samples with more than 4% amidone, from an organoleptic point of view, there is a pronounced taste of amidone.

As corn goes through further ripening stages, the amount of amidone grows, influencing the taste (enhancing its taste in corn).

Results obtained are for a single year, so this topic necessitates further research and statistic data processing.

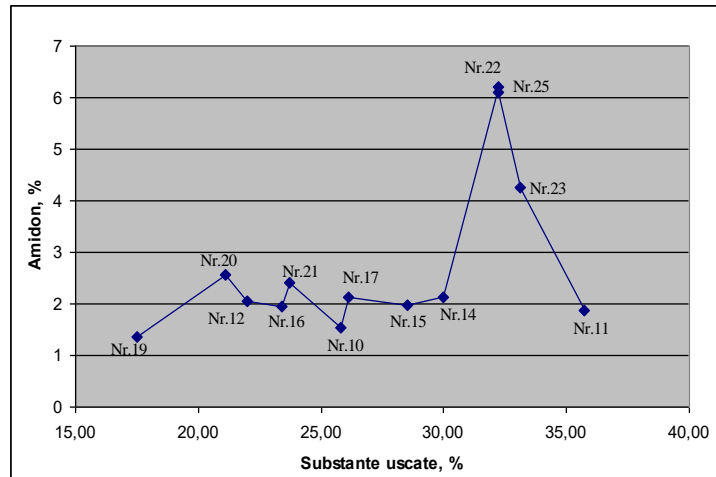


Fig. 1. Amidone and dry substances Ratio of in sugar corn.

Physico-chemical indicators of sugar corn produces are presented in table 6.

The presence of a fine and thin peel is a very important sign of taste quality of the sugar corn kernel. Determining this sign by organoleptic method is very subjective, this is confirmed by the divergence of reports given by tasters and mentioned above. And instruments are required for an objective determination of the kernel's pericarp consistence. One of the causes of the limited spread of sugar corn plantations and the need to import corn kernels by canneries consists in the absence of the seed breed selected in the republic. This fact greatly increases the cost of cultivating and processing for alimentary purposes.

Bearing in mind that the Nectar 4 F₁ breed of sugar corn is of moldavian selection, which determines its production in the republic, representatives of the „Fabrica de conserve din Coșnița” company have been proposed to produce an experimental batch of canned corn using this sugar corn hybrid in the next year's season. And the final conclusion to utilising sugar corn hybrids, depending on their taste and nutritious qualities, will be determined by the results of cultivation and processing that consider the indicators of agricultural establishment, productivity, attacks by pests and the specifics of cultivating sugar corn. (va fi luată în dependență de rezultatele cultivării și prelucrării luând în considerație indicii agrogospodărești, Icii M)

Technological testing of sugar corn has given the next few ways of utilising hybrids:

Nectar 1 F₁, Nectar 3 F₁, Nectar 4 F₁, Porumbeni 198 F₁, Porumbeni 196 F₁, Porumbeni 280 F₁, Porumbeni 343 F₁, Sheba F₁, Signet F₁, Trophy F₁, Harvest Gold F₁ – for

production of canned sugar corn; Trophy F₁, Harvest Gold F₁, Porumbeni 343 F₁, Nectar 4 F₁—for production of frozen sugar corn.

Above mentioned hybrids are included in the Plants Breed Register of the Republic of Moldova for year 2012. (Registrul soiurilor de Plante al Republicii Moldova pentru anul 2012.)

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