New Genotypes of Sweetleaf (*Stevia rebaudiana* Bertoni) Acclimatized and Bred at Buzau

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Abstract

In Romania, during the 1980s, this species was studied in addition to other sweetener plants, such as Jerusalem artichoke, sweet sorghum, sweet iris, etc. After 1996, the researches were restarted intensively at Vegetable Research and Development Station Buzau by the Breeding and Biodiversity Conservation Laboratory. A valuable germplasm collection has been made for this species and the new genotypes will be proposed for approval.

Keywords: breeding, distinct, genotype, germplasm, sweetener

Introduction

S. rebaudiana Bertoni has been known for many centuries by indigenous tribes of South America, who called it “kaa-hee” (sweet herb). South American Indians used stevia both as a sweetener and as a medicinal plant. Stevioside is the major sweetener present in leaves (Carneiro *et al.*, 1997). Folk medicine of Paraguayan indigenous tribes recommends it particularly as a substance strengthening the heart, the circulatory system and regulating blood pressure (Marcinek *et al.*, 2016). *Stevia rebaudiana* is often used by the food industry due to its steviol glycoside content, which is a suitable calorie-free sweetener (Carrera-Lanestosa *et al.*, 2017). In 1990, Ovidio Rebaudi was the first chemist to study the chemical characteristics of the substances extracted. Its name was later changed to the current one, and it was recommended not only for food production, but also for the medicinal effects that were attributed to it (Yadav *et al.*, 2011).

Aims: Obtaining genotypes with distinct phenotypic expression, adapted to the pedoclimatic conditions of our country and their expansion as crop vegetable.

Materials and Methods

Research began with the creation of a rich germplasm collection followed by its evaluation and the valuable genotypes were intensively bred resulting two genotypes with distinct phenotypic features. The selection method used was repeated individual selection, with particular attention being paid to genotypes that demonstrated increased resistance at low temperatures. To highlight this feature, the experience was set up in two culture environments, both greenhouse and field. Sowing has been made on March 10, and the plants sprouted on April 5 in both experimental variants. Their planting took place on May 15th. The flowering in the greenhouse took place on August 15 and in field much later, on September

Table 1. Main features of new obtained genotypes - mean values for both greenhouse and field

1	Culture system	Greenhouse		Field		G1		G2	
2	Cultivated genotype	G1	G2	G1	G2	S %	X	S %	X
3	Plant height (cm)	180	150	72	55	54	126	47,5	102,5
4	Bush diameter (cm)	68	82	32	43	18	50	19,5	62,5
5	Main shoots no. (pieces)	20	22	24	26	2	22	2	24
6	Secondary shoots no. (pieces)	156	224	72	144	42	114	40	184
7	Main shoots length (cm)	120	80	48	34	36	84	23	57
8	Secondary shoots length (cm)	56	42	12	7	22	34	17,5	24,5
9	Stem thickness at the base (mm)	9.2	9.6	9.8	11.2	0,3	9,5	0,8	10,4
10	Stem length (cm)	5	3	4	3	0,5	4,5	0	3
11	Main shoots thickness (mm)	5.1	5.3	4.4	4.8	0,35	4,75	0,25	5,05
12	Secondary shoots thickness (mm)	1.4	1.8	1.9	2.3	0,25	1,65	0,25	2,05
13	Main shoots weight (g)	65	62	33	32	16	49	15	47
14	Secondary shoots weight (g)	5.2	4.8	20.8	27	7,8	13	11,1	15,9
15	Plant weight (g)	1300	1364	792	832	254	1046	266	1098
16	Internodes distance (cm)	3.5	3.3	2.2	1.6	0,65	2,85	0,85	2,45
17	Leaf weight (g)	732	812	414	462	159	573	175	637
18	Leaf length (cm)	9.6	7.5	5.1	3.8	2,25	7,35	1,85	5,65
19	Leaf width (cm)	2.2	4.2	1.7	2.1	0,25	1,95	1,05	3,15
20	Petiole length (mm)	8	5	5	4	1,5	6,5	0,5	4,5

x-average; s-standard deviation

5. The seed production in greenhouse conditions took place much earlier compared to field, on September 10, opposed to the field plants that yielded after October 10. The planting scheme was 70 cm between rows and 30 cm between plants per row in the field and for greenhouse the crop was set up in tapes, at 70 cm between rows, 40 cm between plants per row and 1.2 m between tapes.

Results and discussion

The two genotypes have distinct phenotypic characteristics and exhibit high resistance to low temperatures. G1 (genotype 1) shows lanceolate leaves, pubescent stems and erect habit and G2 (genotype 2) shows smaller leaves, slightly ovoid, and the plant has thin branches and globular habit. The foliage is smoother and darker (Tab. 1).

In both greenhouse and field conditions, G1 recorded higher values in terms of plant height compared to G2 and in terms of plant weight, production of shoots and leaves, both in the field and in protected spaces, G2 was superior. It should be noted that yield can be doubled and even tripled if the young seedlings are harvested periodically. In protected areas the harvesting can be done 3-4 times on the vegetation cycle and 2-3 times in the field. Of all the analysed features, there was a significant decrease of the values in the field compared to greenhouse. Regarding the difference between genotypes, it is insignificant for most of

the studied characters, the main distinction element being the leaf shape.

Conclusion

The researches have been completed so far with obtaining two genotypes with distinct phenotypic expressivity that can be cultivated in our country, in protected areas and field. At the same time, a valuable germplasm collection has been made for this species and a database that can assist in future breeding works. The new genotypes will be proposed for approval and can be successfully cultivated as a perennial and as an annual plant, in colder areas, with protection over winter.

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