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Preliminary results of stevia plant (*Stevia rebaudiana*)

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Abstract

The study was conducted at the experimental plots of the Agricultural Technology Transfer Center(ATTC) Fushe - Kruja, from 2013 to 2014. The objectives of this study were, recognition with bio morphology of the growth and development of Stevios plant under conditions of our country. The study design consists of 30 plant pots planted with the STEVIAS. Indicators studied, were: time of planting, the beginning of growth, plant growth height in cm, number of brothers, number of branches in the main branch, the average number of leaves, total number of leaves. Planting was carried out on 20 February 2013, followed by the onset of growth on 3/25/2013 to 3/04/2014, ripening and harvest in September 5-10 October. At the end of the production these results were taken according to the study indicators. The height of the plant was carried 71.53 ± 11.08cm, depending on feeding conditions and illumination which according to requirements of this plant is one of the most dominant factors. The average number of brothers per branch is to 10.6 ± 2.4, which shows a high potential for stevia plant production. The average number of leaves per branch is 48.13 ± 9.26, and with a total leaves of 517. 03 ± 176.25, which are quantitative harvestable indicators of plant. Weight of plant was conducted at 49.46 ± 4.987gr.

Keyword; time of planting, the beginning of growth, height growth, number of brothers, number of branches

1. Introduction

Stevia rebaudiana (Bert.) Bertoni (Family-Asteraceae) is one of 154 members of the genus Stevia and one of only two species that produce sweet steviol glycosides. It has been used to sweeten tea for centuries dating back to the Guarani Indians of South America

Studies showed that the Stevia could replace some or all of the sugar (sucrose) in recipes without drastically affecting the visual acceptability or physical characteristics of the food product. Further studies on the safety of Stevia are recommended to determine its potential usefulness as a sugar substitute.

Stevia is a semi-humid subtropical plant that can be grown easily like any other vegetable crop. Researchers are actively involved in the cultivation and study of various parameters like mean height, weight of leaves, growth per day, total biomass yield and stevioside content in the plant.

The objectives of the study were: Cultivation of Stevia plant, recognition of growth phases and bio morphology of this plant under the conditions of Albania

2. Materials and methods

The study design consisted of 30 plant plots planted with the Stevia at experimental base of Centre for Agricultural Technology Transfer. Indicators studied, were: time of planting, initial growth, plant growth height in cm, number of brothers, number of branches in the main branch, average number of leaves, total number of leaves, periods of earliest to latest flowering, ripening, picking and seed treatment, Planting was carried out on 20 February 2013, followed by the initial growth from 25/3/2013 to 3/04/2014, ripening and harvest from 5 September to 10 October. Seed picking and the finishing evaluation were carried out. The data were analyzed by ANOVA

3. Results and discussion

Stevia prefers fertile soil of high sand percentage and drained. Use of high quantities of manure is the best way of improving heavy and mudy soil. Organic remains, leaves, hay, etc. serve for improving soil structure and quality as well as supplying with nutritious matter. Fertilization is carryed out after ploughing or before planting.

"Green" fertilization is carried out a year before planting stevia. Rye or leguminous plants are preferred to "green" fertilization due to improve heavy soil quality.

Stevia is grown in acid soils of pH 4-5, but it doesn't bloom in soil of high pH (7.5). Salty soils are not appropriate to Stevia plant. (Shock, 1982).Stevia is successfully cultivated in beds with large quantity of sand. The beds should be over land to eleminate stagnant water and reduce soil flattening. The beds should be 3-4 m wide and 6-10 cm high. Firstly, for building a bed, the picketing is made and afterwards bed shape is constructohet. These beds should be permanent.

Stevia rebaudiana is not planted by seeds due to various questions and difficulties linked with poor growth of plant. So, sprout plants that will be planted are obtained by separating daughter plant with root from mother plant. This way of additing is the main priority. Sprout plants are put on pan before transporting. The transportation must be rapid and good weather. Sprout plant transfer to plots must be done as soon as possible in order to ensure optimal technical conditions of planting.

The distance between sprout plants has to be 10-12 cm from one another and the distance between rows has to be 60 cm. Planting is carried out after preparing soil. Firstly, plants put in bucket of water filled at the level of first leafand stay here up to the moment of planting. Sprout plant is planted putting into a small hole filled with water and after it is covered by soil . During the planting if the weather is hot and sunny, the sprout plant is filled with soil around in order to reduce the loss of moisture. Low temperatures during the night interupt plant growth.

Row covering for earlier plantings in cool summer areas will allow a more rapid growth of plants and it will aso protect sprout plants from frost.

Earlier planting depends on the conditions of environment, during the months February and March in beddings for seedling to be planted in plots in April.The growth began from 25 March to 3 April. Height of plant growth ranged from 45 cm to 97 cm. It depends on the condition of feeding and enlighting, which are very important factors. Leaves are sessile, 3-4 cm long, elongate-lanceolate or spatulate shape with blunt-tipped lamina, serrate margin from the middle to the tip and entire below. Leaf color is dark orange. The upper surface of the leaf is slightly glandular pubescent. The stem is weak-pubescent at bottom and woody. The rhizome has slightly branching roots. Flowers are composite surrounded by an involucres of epicalyx. The capitula are in loose, irregular, sympodial cymes. The flowers are light purple, pentamerous. The fruit is a five-ribbed spindle-shaped achene [7, 4, 5,]. Number of brothers per plant ranged from 7 to 14, which shows a high producing potential of Stevia plant. Average number of leaves for each branch ranged from 24 to 58. otal number of leaves for each plant ranged from 210 to 960.

Figure 1. Stevia rebaudiana

Figure 2. Ex situ in vivo cultivation

Figure 3. Dried leaves of Stevia rebaundiana

Blooming period was from 1 August to 15 September (45 days). It due to the flower is firstly appeared at the top of plant and after in first, second, third order branches, etc. Maturity of leaves and highest percentage of Steviocide content was carried out from 21 to 29 September.Harvisting and bounding in parts as well as further drying is carried out from 5 to 10 October. Weight of plant mass ranges from 41 to 59 g.

Plant harvesting for seeds' production was carried out on 15 September, which coincides to botanic plant maturity

Table 1. Experimental data

No of plots	Planting time	Initial growth	Plant height	No.of brothers	No.av.leaves/ branch	Total no. Of leaves	Blooming time	begining	finishing	Maturity september	harvesting	Weight(g)	Seed obtained
1	20-Feb-13	25.3.2013 Till 3.4.2014	60	10	44	440	0	1-Aug-13	15-Sep-13	22	5-10 October	41	Harvesting 15 October
2	0	0	56	12	30	360	0	0	0	21	0	42	0
3	0	0	45	9	28	252	0	0	0	25	0	45	0
4	0	0	60	8	44	352	0	0	0	26	0	39	0
5	0	0	55	7	30	210	0	0	0	23	0	45	0
6	0	0	57	13	30	391	0	0	0	24	0	46	0
7	0	0	75	11	50	550	0	0	0	21	0	47	0
8	0	0	73	14	48	672	0	0	0	26	0	43	0
9	0	0	71	9	46	414	0	0	0	27	0	48	0
10	0	0	69	8	44	352	0	0	0	28	0	49	0
11	0	0	64	9	42	378	0	0	0	22	0	50	0
12	0	0	68	10	42	420	0	0	0	24	0	55	0
13	0	0	72	7	52	364	0	0	0	26	0	54	0
14	0	0	76	11	52	572	0	0	0	25	0	52	0
15	0	0	77	13	54	702	0	0	0	25	0	51	0
16	0	0	79	12	56	672	0	0	0	24	0	46	0
17	0	0	81	14	56	784	0	0	0	29	0	48	0
18	0	0	78	14	52	728	0	0	0	28	0	47	0
19	0	0	82	12	58	696	0	0	0	25	0	45	0
20	0	0	84	9	58	552	0	0	0	27	0	49	0
21	0	0	97	8	62	496	0	0	0	29	0	50	0
22	0	0	88	15	64	960	0	0	0	20	0	51	0
23	0	0	73	14	56	784	0	0	0	21	0	56	0
24	0	0	59	12	48	576	0	0	0	22	0	54	0
25	0	0	64	10	46	460	0	0	0	26	0	55	0
26	0	0	74	9	48	432	0	0	0	25	0	53	0
27	0	0	79	7	50	350	0	0	0	28	0	55	0
28	0	0	77	8	52	416	0	0	0	29	0	55	0
29	0	0	77	12	54	648	0	0	0	24	0	54	0
30	0	0	76	11	48	528	0	0	0	23	0	59	0

Bio morphology indicators obtained : The height of the plant was 71.53 ± 11.08cm, depending on feeding conditions and illumination which according to requirements of this plant is one of the most dominant factors. The average number of brothers per branch was 10.6 ± 2.4, which shows a high potential for stevia plant production. The average number of leaves per branch was 48.13 ± 9.26 and with a total number of leaves of 517. 03 ± 176.25, which are quantitative harvestable indicators of plant. Weight of plant mass was 49.46 ± 4.987gr. Biomorphology indicators achieved are approximate to those reported by different reserarcher

4. Conclusions

Stevia planted for the first time in our country showed good performance under conditions of our country. It is multiplied by seeds and roots without having any questions of failure in the multiplying cycle. The cultivation under experimental conditions gives good results.

Stevia may be planted on the whole country, especially, in coastal lowland, light soils and in water presence, ensuring a hydric regime (relative moisture 75-80 %).

Economic profitability of this plant could serve as an income source for farmers, as the stevia is an plant which is processed by food and pharmaceutical industries and it is highly demanded by the market.

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