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Stability of characters, forming foliar mass productivity of elite population of the new stevia variety Stela

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SUMMARY

The first Bulgarian stevia variety, created in Agricultural Institute – Shumen, is a consolidated populations and the vegetative propagation is its basic way of reproduction for the conditions of Bulgaria. The original genotype is maintained *in vitro*. After micro-propagation and rooting, elite seedlings are obtained, adapted to field conditions. The produced rhizomes are stored during winter and in the next 3 to 5 seasons are harvested for reproduction by elite seedlings cutters. The stability of elite population after selection of characters, forming the productivity of dry foliar mass has been studied in the present research. For the 3-years rhizomes, together with the increase of the total productivity is increased also the variation of the height and number of the stems, the relative weight, the weight and dry matter content of the foliar mass. With the increase of the rhizomes' mass and the intensive shooting the meristem activity and the potential for somaclonal variation is increased. The increased variation among

5

- the older rhizomes imposes invigorated selection and limiting the period of their use for reproduction of elite seedlings.

Key words: stevia, foliar mass, productivity, seedlings, cutters, reproduction

INTRODUCTION

- The interest in the natural
- sweeteners, obtained from the South
- America plant stevia (*Stevia rebaudiana* B.) increases in the last years. Many countries carry their own researches aiming cultivation of the plant and creation of technologies of growing in specific soil-climatic conditions.

- The stevia is a short day plant, requiring certain light regime and temperature sums for its development. In the moderate climate zone, including Bulgaria, stevia is grown like an annual plant with a perennial use of the rhizomes.

- Researches are necessary for *in vitro* and *in vivo* production of seedlings and reproduction by seeds for their practical use and for accelerated multiplication and realization of elite seedlings (Bojimirov and Slavova, 2011; Kikindonov and Enchev, 2012).

- The stevia plant has been object of
- researches in the former Sugar Beet
- Institute – now a Plant Growing
Department of Agricultural Institute - Shumen, since 1980. It is introduced into an *in vitro* culture, methods for vegetative propagation of cuttings and preservation of the rhizomes are designed. The available gene pool of stevia in our country is studied (Kikindonov, 2013; Uchkunova et al., 2012). Genotypes with potential yield of over 300 kg/da dry leaves mass, more then 16% total sweet substances content in the dry leaves are bred (Uchkunov and Uchkunova, 2012). It has been made characteristics of the yield's structure, co-relations are traced in regards to selection of the most

B.). (*Stevia rebaudiana*

(Bojimirov and Slavova, 2011; Kikindonov and Enchev, 2012).

((Kikindonov, 2013; Uchkunova et al., 2012).

300kg/da

16% (Uchkunov and Uchkunova, 2012).

3 5

50 cm

1 da

6666

10-12 °

30 cm

cm;

g;

g;

%.

0,935.

2016

g; 1

0,667

seedlings are obtained adapted to field conditions. The selected rhizomes are conserved during winter and in the next 3-5 seasons are harvested for reproduction by cuttings of elite seedlings.

The planting out is manually done at the beginning of May when the soil temperature surpasses 10-12 °C, at 50 cm inter-row distance and 30 cm in-row distance. In this way in 1 da are ensured 6666 plants. Each plant is manually harvested, and individually studied.

During vegetation – in the period from the planting on the field to the harvest biometrical measurements are carried out: number of main stems, number of branches, height of the main stems in cm, weight of the overground part of a plant in g, weight of the green leaves mass of one plant in g, weight of the dry leaves mass from a single plant in g, output – the ratio between the dry leaves mass and the total weight in %. In our previous researches are established high degrees of co-relation of the studied traits with the dry mass as final product – from 0.667 to 0.935.

The analysis of the development of plants from one, two and three year old selected rhizomes is made in 2016.

RESULTS AND DISCUSSION

155

399 mm,

mm,

269

2459 °

The mean vegetation continuance of stevia for the test period is 155 days, from the planting on the field to the harvest. For this period the mean year rainfalls' sum is 399 mm, with a norm of 269 mm, and the temperature sum is 2459 °C.

Each year from the adapted to field conditions plants, obtained after micropropagation and rooting of the original variety genotype elites are selected by phenotype for preservation of the rhizomes. On the following year elite seedling material is produced by cuttings from the developed plants. In this way an

100-120 elite population of the variety is maintained with yearly selection of 15-20 elites from 100-120 plants of the total population. The period of use of the elite rhizomes varies and is limited by the level of the clonal variation and the accumulation of phytopathogens. The simultaneous assessment of the variation of the traits forming the productivity in 2016 of one, two and three years old rhizomes of selected elites gives possibility to determine the optimal period of use and the effect of the selection for the maintenance of the variety.

2016

16

1

The results of the assessment of 16 selected plants from one year old rhizomes on Table 1 show low levels of variation and stability of the elite population after the *in vitro* micro-propagation and rooting, adaptation and preservation of the developed rhizomes.

1. , 2016 .
Table 1. Assessment of elite plants of stevia, elite population of one year old rhizomes, 2016

	Height	Stems	Total weight	Dry matter	Part of leaves	Dry leaves yield	Randeman
	cm	./number	g	%	%	g	%
1	80	47	460	22,8	57,8	61,0	13,3
2	65	16	510	23,1	55,5	66,0	12,9
3	64	12	625	25,4	61,2	90,0	14,4
4	65	17	520	23,3	62,1	74,0	14,2
5	85	67	710	25,0	55,2	96,0	13,5
6	70	26	950	26,4	63,1	151,0	15,9
7	75	29	830	27,2	57,0	123,0	14,8
8	68	51	830	24,5	58,7	114,0	13,7
9	80	14	540	25,5	56,5	74,0	13,7
10	65	34	490	23,5	57,4	67,0	13,7
11	59	27	500	23,4	58,2	69,0	13,8
12	65	42	610	15,9	64,0	97,0	15,9
13	80	21	880	25,5	55,0	119,0	13,5
14	65	61	1260	22,7	56,8	157,0	12,5
15	60	19	865	28,0	55,6	129,0	14,9
16	78	39	1030	25,6	56,0	143,0	13,9
Mean	70,3	32,6	725,6	24,2	57,3	101,9	14,0
CV%	19,3	6,54	10,4	5,33	7,33	8,64	3,22
P	2,90	3,60	3,10	3,54	3,02	4,02	1,04

CV% 19,3%
10,4%.

The highest variation is registered for the plants height – with a variation coefficient 19.3%, and the total weight – with CV% up to 10.4%. The yield dry leaves and the output as resultant economical qualities of the productivity vary in narrow borders and confirm the high effectiveness of the use of *in vitro* methods for the original genotype's maintenance.

The results of the individual analyses of 21 elites, selected from 100 one year rhizomes in the previous year are given on Table 2.

2.

, 2016 .

Table 2. Assessment of elite plants of stevia, elite population, two year old selected rhizomes, 2016

	Height	Stems	Total weight	Dry matter	Part of leaves	Dry leaves yield	Randoman
	cm	./number	g	%	%	g	%
1	60	26	620	24,6	56,5	85,0	13,7
2	55	65	660	18,4	62,4	102,0	15,5
3	64	38	795	23,9	57,8	106,0	13,3
4	60	5	800	23,3	60,4	113,0	14,1
5	75	22	950	24,0	56,2	122,0	12,8
6	75	51	870	25,4	59,0	124,0	14,3
7	65	89	820	26,2	59,4	117,0	14,3
8	75	44	655	24,4	58,9	94,0	14,4
9	75	28	850	23,2	60,5	116,0	13,6
10	88	71	1140	24,6	55,7	157,0	13,8
11	70	17	690	24,8	57,3	87,0	12,6
12	65	20	1120	24,5	55,6	142,0	12,7
13	70	57	1070	24,7	60,7	153,0	14,3
14	70	55	920	18,6	60,2	123,0	13,4
15	65	27	740	24,0	55,4	96,0	13,0
16	70	29	870	27,7	56,6	127,0	14,6
17	60	42	1190	23,5	58,3	158,0	13,3
18	80	42	1090	24,2	58,5	146,0	13,4
19	80	9	1100	28,3	55,2	180,0	16,4
20	70	35	1320	23,6	61,0	179,0	13,6
21	78	14	1090	25,1	57,0	194,0	17,8
mean	70,0	37,4	921,9	24,1	58,6	129,6	14,0
CV%	18,7	7,51	11,1	7,45	10,3	9,55	4,44
P	3,40	4,40	4,12	4,22	6,00	5,33	2,42

It makes impression the persistence of the variation parameters of the traits and the productive qualities with the increase of the average values of the number of stems, the total weight, and the weight of leaves. The increased mass of the two year old rhizomes increases the indices for productivity with persistence of the parameters for height, dry matter content, part of leaves and output. These data are indicative for the maintenance of consolidated by genotype elite population after one-time selection with coefficient 4,75.

On the third year, after selection of 15 elites from two year old rhizomes from the previous year is registered significant increase of the variability: height – CV% - 26%, number of stems – 21.6%, total weight – 26.5% (Table 3).

3.

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Table 3. Assessment of elite plants of stevia, elite population of selected three year old rhizomes, 2016

	Height	Stems	Total weight	Dry matter	Part of leaves	Dry leaves yield	Randeman
	cm	/number	g	%	%	g	%
1	74	35	710	24,4	61,3	102	14,4
2	55	34	475	18,9	62,2	57	12,0
3	80	30	670	23,4	61,2	96	14,3
4	80	47	730	24,6	62,0	107	14,7
5	70	59	750	25,7	60,0	115	15,3
6	55	14	390	22,0	62,8	53	13,6
7	66	63	540	24,2	59,5	79	14,6
8	71	24	390	22,0	59,0	52	13,3
9	50	24	640	25,1	66,5	107	16,7
10	80	34	950	24,6	56,5	129	13,6
11	60	10	650	20,8	60,3	96	14,8
12	70	55	890	24,7	61,7	134	15,1
13	75	25	980	24,6	59,8	138	14,1
14	75	25	1160	25,1	57,4	164	14,1
15	85	37	990	25,9	56,1	142	14,3
mean	69,7	34,4	727,7	23,7	61,6	104,7	14,3
CV%	26,3	21,6	26,5	7,56	12,4	16,6	5,61
P	4,20	5,71	6,15	7,22	8,00	9,33	3,02

16.6%.

129,6 g

CV% -

104 g

- As a result of that the variation of the dry leaves yield is increased – CV% - 16.6%. The decrease of the average values of height, number of stems and especially of the total weight brings to decrease of the productivity – from 129.6 g for the two year old to 104 g for the three year old rhizomes. The persistence of the quality parameters for dry matter content and the part of leaves reflect on the stability of the output index.

- With the increase of the mass of the three year old rhizomes and the more intensive shooting the mitotic activity and the potential for clonal variation of the traits height and number of stems accelerates. The dry matter content and the part of leaves are more dependent on the external conditions. The accumulation of phytopathogens in the older rhizomes is a strong factor for suppression of the growth and the decrease of the productivity.

CONCLUSIONS

- The morphological traits height, number of stems, total weight, dry matter content and part of leaves, as well as the dry leaves yield and the output as resultant economical qualities for the productivity, vary in narrow borders and confirm the high effectiveness of the use of *in vitro* methods for the maintenance of the original genotype.

- The increased mass of the two year old rhizomes increases the productivity indices with persistence of plants' height, dry matter content, part of leaves and output. These data are indicative for the maintenance of genotypically consolidated elite population after one-time selection.

- With the increase of the mass of the three year old rhizomes and the more intensive shooting the mitotic activity and the potential for clonal variation of the

- traits height and number of stems accelerates. The increased variation in the older rhizomes and the accumulation of phytopathogens forces strengthening of the selection and limiting the period of their use for reproduction of elite seedlings.

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Euglenophyta (3) Chlorophyta (8)

species), and Chlorophyta (8 species). By saprobiological analysis, it was found that the quality of water was changing along the river. At the upperstream of the river belonged to the second class. At downstream (locality 2 and 3) of the river water quality was getting worse and it belonged to the third class.

Key words: algae, river, Stanishorka, Gjilan.

INTRODUCTION

The algae have been an interesting group for investigation because of their very primitive nature and a world-wide distribution, which is due to their capability to exist under most varied environmental conditions.

Pollution of surface water has become one of the most important environmental problems. Two types of large and long-lasting pollution threats can be recognized at the global level: on the one hand, organic pollution leading to high organic content in aquatic ecosystems and, in the long term, to eutrophication.

It is a well-known fact that polluted water can reduce water quality thus restricting use of water bodies for many purposes (Sen, 2013).

Eutrophication in rivers is defined as an increase in primary production (algal and plant biomass) due to an elevated nutrient input. High levels of eutrophication lead to negative consequences for the river itself and reservoirs in particular (Wetzel, 1983).

Study area

Gjilan city is situated on the south-eastern part of Republic of Kosovo. Geographical coordinates of city of Gjilani, in degrees minutes seconds Latitude: 42 28' 08" N , Longitude: 21 27' 48" E. The

(Sen, 2013).

(Wetzel, 1983).

: 42 28' 08" N ,

: 21 27'

48" E.

508 m

elevation of the city is 508 m above sea level. Two small rivers flow through the city of Gjilan, while the River Stanishorka is the left branch of the Morava River, which runs on the outskirts on the territory of the city.



Stanishorka River



Position of Gjilan City in Kosovo

MATERIAL AND METHODS

3

The samples were collected from 3 sampling sites, along the river Stanishorka (Gjilan, Kosovo), during the spring seasons 2015. Water samples were collected in 500 ml glass bottles, 10 cm beneath the water surface, using standard methods (Hindak, 1978). Conductivity, pH, salts, TDS (Total Dissolved Salts), were measured on site using portable instruments (HACH). Epilithon was brushed from the stones using a toothbrush. Epiphyton was sampled from the substrate and placed in the plastic bottles.

The diatoms were examined using a Leica microscope.

Diatoms cleaning

Cleaning of diatoms' frustules and the preparation of slides and their determination was done according to Krammer and Lange-Bertalot (1986; 1988; 1991a; 1991b).

Diatoms' identification was done according to the keys: *Bacillariophyta*: Krammer and Lange-Bertalot (1986; 1988;

(),
2015.
500 ml, 10 cm
(Hindak, 1978).
, pH, , TDS (
)
(HACH).
Leica.
Krammer Lange-Bertalot (1986; 1988; 1991a; 1991b).
: *Bacillariophyta*: Krammer Lange-Bertalot

(1986, 1988, 1991a, 1991b).
 Komárek, 1988.
 Eutlenophyta
 Ettl (1983); Fott (1971).

1991a; 1991b).
 Identification of Cyanophyta was done according to the key: Anagnostidis and Komárek, 1988
 Identification of Chlorophyta and Eutlenophyta was done according to the key: Ettl (1983); Fott (1971).

RESULTS AND DISCUSSION

1.
 39 , 4
 : *Bacillariophyta* (21
 53.87%), *Chlorophyta* 8
 (20.52%), *Cyanophyta* 7
 (17.95%) *Euglenophyta* 3 (7.65%).
Bacillariophyta
 17 , *Cyanophyta* 6
 , *Euglenophyta* 2 *Chlorophyta*
 3 .
 :
 15 ,
 20 ,
 24 .
 -
 -
 21 .
 -
 (11)
 .
Bacillariophyta
Navicula lanceolata *Synedra ulna*
 .
Amphora, *Cocconeis*, *Cymbella*, *Diatoma*
 ,
Chlorophyta ,
Closterium
Cladophora
Stigeoclonium
 .
Cyanophyta 7
 6 .
Oscillatoria 2 ,
 .
Euglenophyta
 3 , 2 .

The results of our investigation are presented in Table 1. Determined species (39 species) belongs to 4 divisions: Bacillariophyta (21 species or 53,87 %), followed by Chlorophyta with 8 species (20.52 %), Cyanophyta with 7 species (17.95) % and Euglenophyta with 3 species (7.69 %).

The division Bacillariophyta contain 17 genus, while Cyanophyta contain 6 genus, Euglenophyta 2 genus and Chlorophyta 3 genus.

The number of species per locality is different: in first locality determined 15 species, in second determined 20, while at third locality is determined 24 species. As seen second and third locality has more number of algal species than second locality. Bioindicator species determined 21 species. Where the betamesosaprob bioindicators species is dominated (with 11 species), compared with other bioindicators.

Within Bacillariophyta only two species *Navicula lanceolata* and *Synedra ulna* are determined at three localities.

Some genus such as *Amphora*, *Cocconeis*, *Cymbella*, *Diatoma* are represent with 2 species, while other genus are represent with 1 species.

Chlorophyta is represented by three genres, dominated genus is *Closterium* by four species. Second genus is *Cladophora* with 3 species. While third genus is *Stigeoclonium* with one species.

Division *Cyanophyta* represented by 7 species, distributed in 6 genres. Only genus *Oscillatoria* is represented by 2 species, while other genus represented with one species.

Division *Euglenophyta* represented by 3 species, distributed in 2 genres.

2015

Table 1. Determined algae in waters of river Stanishorka (Gjilan, Kosovo) during spring season 2015

		Level of saprobity	/Localities		
			1	2	3
	/Division Cyanophyta				
1	Anabaena inaequalis (Born. et Fla.)		+		
2	Chroococcus cochaerens (Naeg.)			+	
3	Nostoc linckia (Born et Flah.)				+
4	Oscillatoria .formosa (Bory)		+	+	
5	Oscillatoria mirabilis (Böcher)				+
6	Phormidium ambigum (Gom.)			+	+
7	Spirulina platensis (Nordst.)Geitl.		+		+
	Number of bioindicators species	3			
7	Cyanophyta		3	3	4
	Total number of species Cyanophyta and number of species per locality				
21 species	/Division BACILLARIOPHYTA				
1	Achnantes hungarica (Gunow)	o		+	+
2	Amphora lybica (Ehrenberg)		+	+	
3	Amphora normani (Rabenhorst)	o			+
4	Cocconeis pediculus (Ehrenberg)	-		+	+
5	Cocconeis placentula (Ehrenberg)			+	
6	Cyclotella ocellata (Pantoseck)				+
7	Cymatopleura solea (Brebisson)W.Smith	-		+	+
8	Cymbella affinis (Kützing)	-	+		
9	C.naviculiformis (Auerswald)Cleve		+	+	
10	Diatoma monoliforme Kützing				+
11	D.vulgaris (Bory)			+	
12	Epithemia adnata (Kützing)				+
13	Fragilaria ulna (Nitzh.)Lange-Bertalot		+		+
14	Gomphonema parvaulum (Grunow)		+		
15	Gyrosigma acuminatum (Kützing)			+	
16	Meridion circulare (Agardh)		+	+	
17	Navicula lanceolata (Agardh)Ehrenberg		+	+	+
18	Nitzschia palea (Kützing) W.Smith		+		+
19	Pinnularia microstauron (Ehren.)Cleve			+	
20	Synedra ulna (Nitzsch)Ehrenberg.		+	+	+
21	Surirella angusta Kützing)				+
	Number of bioindicators species	13			
21 species	Bacillariophyta		9	12	12
	Total number of species Bacillariophyta and number of species per locality				
3 /species	/Division EUGLENOPHYTA				
1	Euglena viridis (Ehrenbeg)	-			+
2	E.terricola (Dang.)Lemm		+	+	+
3	Trachelomonas.affinis Lemm.				+

	Number of bioindicators species	1			
3	Euglenophyta		1	1	3
/species	Total number of species Euglenophyta and number of species per locality				
8	/Division CHLOROPHYTA				
/species					
1	Cladophora fracta(Roth) Kütz			+	
2	C.fracta var. lacustris (Roth) Kütz				+
3	C glomerata (L) (Kütz)		+		+
4	Closterium attenuatum Ehreb.		+	+	
5	C venus Ehreb.				+
6	C.gracilis (Breb.)			+	+
7	C. praelongum Nitzsch			+	
8	Stigeoclonium tenue Kützing				+
	Number of bioindicators species	4			
8	Chlorophyta		2	4	5
/species	Total number of species Chlorophyta and number of species per locality				
39	/Total number of species of algae and bioindicators species during spring season per locality	21	15	20	24
/species					

CONCLUSIONS

(2015)	39
	Bacillariophyta	21
	21	-
	11	-

During the study period (spring season 2015) we identified 39 species of algae.

Dominated the Bacillariophyta by 21 species, compared with other divisions.

Determined 21 bioindicators species, dominated beta mesosaprob bioindicators species by 11 species.

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2015

1, 2, 3*
1, 2, 3
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Algological analysis of river Krena (Gjakova, Kosovo) during spring season 2015

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SUMMARY

2015
(,).
43
: Bacillariophyta (28),
Cyanophyta (6), Euglenophyta (3
) Chlorophyta (6).

During spring season 2015 were done algological investigations of the river Krena (Gjakova, Kosovo). Algological samples were taken at three localities at this river. In the algae community are found 43 taxa from four division: Bacillariophyta (28), Cyanophyta (6 species), Euglenophyta (3 species) and Chlorophyta (6). By saprobiological analysis, it was found that the quality of water was changing along the river. At the upper and middle part of river the water belonged to the second class. At downstream of the river water quality was getting worse and it belonged to the third class.

Key words: algae, river, Krena, Gjakova

INTRODUCTION

Freshwater phytoplankton can be extremely diverse in terms of taxonomy, morphology and ecology (Presscott, 1954). They can respond to a wide range of pollutants; making them useful in providing early warning signals of deteriorating conditions and the potential causes of such conditions (Lacuna et al., 2012).

The determining factors for the structure of phytoplankton communities in lakes include the interplay between the effect of chemical, physical and biological parameters (Basualto et al., 2006).

Study area

Gjakova city is located in the south-western part of Republic of Kosova. The city is also situated at the entrance to the Erenik Valley, where the River Krena flows from the north to the Erenik mountain stream. After a few kilometers, it flows into the river Drini i Bardhë. The municipality of Gjakova covers an area of 521 km², including the town of Gjakova and 84 villages. Geographical coordinates of city of Gjakova: Latitude 42 22' 49" N, Longitude 20 25' 51" E. Krena River represents the beauty and freshness of the city, but unfortunately this river is polluted by dumping of solid waste and sewage from households. Krena River has a poor water quality. This is argued by different environmental indicators such as: concentration of huge number of inhabitants in a small territory; around 18,000 inhabitants live in a territory of 30 ha. Due to many human activities it's generated a huge amount of wastes which are accumulated in an inappropriate location. All these indicators and many other prove a statement regarding water quality that we have mentioned above. Poor water quality associated with unsustainable management actions could lead towards some environmental hazards. However, Gjakova region is supplied with waters from Hydro-system "Radoniq" with a

(Presscott, 1954).

(Lacuna et al., 2012).

(Basualto et al.,

2006)

521 km²,
84
: 42 22' 49" N,
20 25' 51" E.

; 18.000
30 ha.

000 700 l/s, 200

capacity of 700 l/s covering around 200,000 inhabitants including also a population which is in direct contact with polluted waters of Krena River.



Krena River

Position of Gjakova City in Kosovo

3 -
 (,),
 2015.
 500 ml,
 10 cm
 (Hindak, 1978).
 , pH, , TDS
 ()
 (HACH).
 .
 .
 Leica.
 ,
 -
 Krammer Lange-Bertalot (1986; 1988;
 1991a; 1991b).
 :
Bacillariophyta: Kramer Lange-Bertalot

MATERIAL AND METHODS

The samples were collected from 3 sampling sites, along the river Krena, during the spring seasons 2015. Water samples were collected in 500 ml glass bottles, 10 cm beneath the water surface, using standard methods (Hindak, 1978).

Conductivity, pH, salts, TDS (Total Dissolved Salts), were measured on site using portable instruments (HACH). Epilithon was brushed from the stones using a toothbrush. Epiphyton was sampled from the substrate and placed in the plastic bottles.

The algae were examined using a Leica microscope.

Diatoms cleaning

Cleaning of diatoms' frustules and the preparation of slides and their determination was done according to Krammer and Lange-Bertalot (1986; 1988; 1991a; 1991b).

Diatoms' identification was done according to the keys: *Bacillariophyta*: Kramer and Lange-Bertalot (1986; 1988;

(1986; 1988; 1991a; 1991b).
 Komárek (1988).
 Ettl (1960).

1991a; 1991b).
 Identification of Cyanophyta was done according to the key: Anagnostidis and Komárek (1988).
 Identification of Chlorophyta and Euglenophyta was done according to the key: Ettl (1960).

1. 43 ,
 4 :
 Bacillariophyta (28 65.11%),
 Chlorophyta 6
 (13.95%), Cyanophyta 6 (13.95%)
 Euglenophyta 3 (6.98%).
 Bacillariophyta -
 20 , Cyanophyta
 5 , Euglenophyta Chlorophyta
 5 . -
 :
 20
 , 21 , -
 27 . -
 , -
 Bacillariophyta
 Navicula 4 ,
 Diatoma 3 ,
 1 2 .
 Chlorophyta
 Closterium
 Cladophora
 2 .
 Stigeoclonium .
 Cyanophyta 6
 , 5 .
 Oscillatoria 2 ,
 .
 Euglenophyta -
 3 , 2 .

RESULTS AND DISCUSSION

The results of algal determination are presented in Table 1. Determined species (43 species) belong to 4 divisions: Bacillariophyta (28 species or 65.11 %), followed by Chlorophyta with 6 species or 13.95 %, and Cyanophyta with 6 species or 13.95 %, and Euglenophyta with 3 species or 6.98 %.

The division Bacillariophyta contains 20 genres, followed by Cyanophyta with 5 genres, Euglenophyta and Chlorophyta by 5 genres.

The number of species per locality is different: in first locality determined 20 species, in second determined 21, while at third locality is determined 27 species. As seen the third locality has more number of algal species than first and second locality, so third locality is more diversity.

Within Bacillariophyta only genus Navicula contain 4 species, genus Diatoma contain 3 species, while other genus contain 1 or 2 species.

Chlorophyta is represented by 3 genres, dominated genus is Closterium by three species. Second genus is Cladophora with 2 species. While third genus is Stigeoclonium with one species.

Division Cyanophyta represented by 6 species, distributed in 5 genres. Only genus Oscillatoria is represented by 2 species, while other genus represented with one species.

Division Euglenophyta represented by 3 species, distributed in 2 genres.

1.

(,)

2015

Table 1. Determined algae in waters of river Krena (Gjakova, Kosovo) during spring season 2015

		Level of saprobity	/Localities		
			1	2	3
	/Divison Cyanophyta				
1	Anabaena inaequalis (Born. et Fla.)		+		
2	Nostoc linckia (Born et Flah.)				+
3	Oscillatoria .formosa (Bory)		+	+	
4	Oscillatoria mirabilis (Böcher)				+
5	Phormidium molle (Kützing)	-		+	
6	Spirulina platensis (Nordst.)Geitl.		+		+
	Number of bioindicators species	4			
	Cyanophyta	6	3	2	3
	Total number of species Cyanophyta and number of species per locality				
28	/species				
	/Division BACILLARIOPHYTA				
1	Achnantes hungarica (Gunow)	o		+	+
2	Amphora lybica (Ehrenberg)		+		
3	Amphora normani (Rabenhorst)	o			+
4	Cocconeis pediculus (Ehrenberg)	-	+		+
5	Cocconeis placentula (Ehrenberg)			+	
6	Centronella reichelti (Voigt)		+		
7	Cyclotella ocellata (Pantoseck)		+		+
8	Cymatopleura solea (Brebisson)W.Smith	-		+	+
9	Cymbella affinis (Kützing)	-	+		
10	C.naviculiformis(Auerswald)Cleve		+	+	+
11	Diatoma ehrenbergi Kützing				+
12	D.monoliforme (Kützing)			+	+
13	D.vulgaris (Bory)		+	+	
14	Epithemia adnata (Kützing)			+	+
15	Fragilaria ulna (Nitzh.)Lange-Bertalot			+	
16	Gomphonema parvaulum (Grunow)				+
17	Gyrosigma acuminatum (Kützing)			+	
18	Melosira varians (Agardh)		+	+	+
19	Meridion circulare (Agardh)		+	+	
20	Navicula lanceolata (Agardh)Ehrenberg		+	+	+
21	Navicula radiosa (Kützing)	-		+	+
22	Navicula tripunctata(O.F.Müller)Bory				+
23	Nitzschia dissipata (Kützing)Grunow	-			+
24	N.palea (Kützing) W.Smith			+	
25	Pinnularia microstauron (Ehren.)Cleve		+		+
26	Rhoicosphenia abbreviata (Kützing)Grun		+	+	
27	Surirella angusta Kützing)				+
28	Synedra ulna (Nitzsch)Ehrenberg.		+	+	+
	Number of bioindicators species	16			
28	/species				
	Bacillariophyta		13	16	18
	Total number of species Bacillariophyta and number of species per locality				

3	/species	/Division EUGLENOPHYTA			
1		<i>Euglena viridis</i> (Ehrenbeg)	-		+
2		<i>Euglena terricola</i> (Dang.)Lemm		+	+
3		<i>Phacus hispidulus</i> Lemm.		+	+
			1		
		Number of bioindicators species			
3	/species	Euglenophyta		2	0
		Total number of species Euglenophyta and number of species per locality			3
6	/species	/Division CHLOROPHYTA			
1		<i>Cladophora fracta</i> (Roth) Kütz			+
2		<i>C. glomerata</i> (L) (Kütz)			+
3		<i>Closterium archerianum</i> Cleve			+
4		<i>C attenuatum</i> Ehreb.			+
5		<i>C.striolatum</i> Ehreb		+	+
6		<i>Stigeoclonium tenue</i> Kützing		+	+
			3		
		Number of bioindicators species			
6	/species	Chlorophyta		2	3
		Total number of species Chlorophyta and number of species per locality			3
43	/species			20	21
		Total number of bioindicators species of algae and species during spring season per locality			27

CONCLUSIONS

(2015)	43
	Bacillariophyta	28
	24	-
		-
	12	.

During the study period (spring season 2015) we identified 43 species of algae.

The Bacillariophyta dominated by 28 species, compared with other divisions.

There were determined 24 bioindicators species, dominated beta mesosaprob bioindicators species by 12 species.

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