RESEARCH ON THE CULTIVAR'S INFLUENCE ON PLANT HEIGHT AND LEAF CHARACTERISTICS OF THE SWISS CHARD CULTURE

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Abstract

Swiss chard is cultivated for leaves and petioles. Although it has been consumed only for the leaves replacing the spinach. Nowadays, the swiss chard with new varieties with petioles and well-developed leaves begins to be demanded on the market more and more. Researches on the behavior of several swiss chard varieties have highlighted cultivars with protruding petioles and swiss chard plants exceeding 50 cm. Also, among the varieties studied, two petioles were found which exceeded 50% of the total weight of the leaf.

Key words: swiss chard, petiole, cultivar

INTRODUCTION

The development of vegetable science has led to an increase in the range of vegetables, the current consumer claims diversity, wanting to consume vegetables that traditionally do not grow in our country. Swiss chard is one of the less cultivated vegetables in our country, although it has good conditions for development, a culture that begins to take root in us. In support of increased consumption of swiss chard, nutritionists and dietitians recommend eating swiss chard because of its low calorie content but rich in vitamins, minerals and active principles.

The chemical composition and the nutritional qualities of different types of Beta vulgaris subspecia cicla were investigated, in order to discover the biological activities of the plant with regard to its anti-cancer, anti-diabetic and antioxidant properties (Ninfali et al., 2007; Ninfali and Angelino , 2013, Pyochem and Yanardag, 2010, Gil et al., 1998, Bozokalfa et al., 2011, Tomas-Callejas et al., 2011, Pokluda and Kuben, 2002;

Significant concentrations of nutrients were recorded in different samples of swiss chard. Field experiments were performed on swiss chard crops, analyzing the morphological characteristics of the plant, and also examining the leaves and petioles of 12 varieties of swiss chard. The values of the nutritional parameters (always obtained from leaves and petioles) of the varieties studied were as follows: vitamin C - 307 and 72mg / kg, K - 4198 and 4848mg, Na - 2101 and 966mg, Ca - 481 and 310mg and Mg - 361 and 113mg / kg of fresh matter (Pokluda and Kuben, 2002).

Another study on the swiss chard's mineral composition involved swiss chard seeds of 54 different plant genetic appearances, representative of all of the Turkish genetic resources of this plant. Assessing germoplasm diversity in the context of nutritional concentration is very useful for future plant cultivation programs due to improved mineral concentrations in swiss chard varieties and because of the plant's contribution to reducing nutritional deficiencies in human nutrition. Significant differences have been observed between additions and also high nutrient content.

Concentrations of the measured parameters (taking into account the dry plant weight) varied between the following limits: P 5.99 - 2.38g / kg, K 49.40 - 28.60g / kg, 4.74-2.66g / kg, Mg 9.43-3.33g / kg , Na 5.72 - 2.40 g / kg, Fe 159.65 - 77.22 mg / kg, Cu 16.96 - 7.60 mg / kg, Zn 65.52 - 22.31 mg / kg, Mn 33.89 - 12.57mg / kg, and Ammonia 44.3 - 28.81g / kg. Concentrations of NO3 and NO2 were 496.55 - 262.48mg / kg and 0.047-0.044mg / kg respectively, calculated on the weight of the fresh plant. Two of the accessions examined are recommended to be gene sources due to their high level of K, Ca, and Zn (Bozokalfa et al., 2011).

In Turkey, in folk medicine, swiss chard is used as an antidiabetic agent. One of the studies on hypoglycaemic properties (Yanardag and Colak, 1998) shows that a 2-8g dose of one kilogram of aqueous extract of dried swiss chard leaves resulted in the fall of glucose in the blood of rabbits with alloxan-induced diabetes , but the methanol extract from the same plant did not do the same.

MATERIALS AND METHOD

The purpose of the research is to determine the behaviour of swiss chard cultivars in summertime crops cultivated in field in the north-west of the country. Research on swiss chard has been aimed at determining the growth and development of swiss chard plants, namely plant height, petiole length and petiole yield.

In order to achieve the objectives proposed in 2016 in Săcuieni, located in north-west of Romania on a loamy-sandy soil, a monofactorial experience was placed on a pedological horizon of aluvisol.

The biological material consisted of 7 swiss chard varieties, namely:CARDE BLANCHE AMPUIS, BRIGHT YELLOW,LISCIA VERDE DA TAGLIO, CHARLOTTE, VERTE A CARDE BLANCHE 3, LUCULLUS,COULEURS RAINBOW.

The experimental culture was placed in a parcel with 7 variants in 3 repetitions, arranged according to the subdivision blocks. Each variant had a number of 15 plants.

The statistical processing of the experimental data was done by variance analysis.

RESULTS AND DISCUSSIONS

Before the establishment of the crop, the land was cleansed from the plant debris from the previous crop (garden peas), after which a summer plowing and shredding of the land was made. Sowing took place on 17.08.2016, 60 cm between rows and 35 cm between plants in a row. Further, the crop maintenance work was done according to the swiss chard culture technology.

The summertime crop of the swiss chard is done in order to obtain a harvest of leaves and petioles not only in the year of culture but also in the spring of the following year, provided winter is mild.

The first aspect researched in this experience was the height of the swiss chard plants. Table 1 shows the data on the height of swiss chard plants in the seven varieties studied. The witness was the average of experience.

Table 1

The influence of the cultivar on the height of the plants of swiss chard-summertime crop, Săcuieni, 2016

Nr. crt.	Variety	Height (cm)	Height (%)	± d	Signification
1	CARDE BLANCHE AMPUIS	38.54	87.05	-5.37	0
2	BRIGHT YELLOW	41.02	93.06	-3.15	-
3	LISCIA VERDE DA TAGLIO	52.09	117.66	+7.82	XX
4	CHARLOTTE	43.71	98.73	-0.56	-
5	VERTE A CARDE BLANCHE 3	47.38	107.02	+3.11	-
6	LUCULLUS	46.38	104.76	+2.11	-
7	COULEURS RAINBOW	41.69	94.17	-2.58	-
	Media	44.27	100.00	0.00	-

LSD5%=5,31 LSD1%=6,40 LSD 0,1%=8,89

Analyzing the height of the swiss chard plants at the 7 cultivars, there is a fairly large uniformity to the experimental media, with a few exceptions. Thus the highest plants were reported in the Liscia Verde da Taglio variety, 52.09 cm, 17.66 cm more than the average of the experience. The difference from the control was statistically significantly positive. If Liscia Verde da Taglio variety had the tallest plants, the Ampuis variety was the smallest.

The average height of the three rehearsals was 38.54 cm, with 5.37 cm less than the control.The difference was statistically significantly negative. Varieties with lower heights than average were Bryght Yellow (41.02cm), Charlotte (43.71cm), Couleurs Rambow (41.29cm). In these varieties the differences from the control were small and failed to pass the threshold P = 5% not statistically assured.

The next parameter analyzed was the length of petioles. This is important because in most cases the swiss chard is valued as a link. Smaller petioles are less important than larger ones. The data on this aspect are presented in Table 2.

Table 2

The influence of the cultivar on the length of the swiss chard in summertime crop, Săcuieni, 2016

Nr. crt.	Variety	Absolute lenght (cm)	Relative lenght (%)	± d	Signification
1	CARDE BLANCHE AMPUIS	14.28	78.54	-3.90	000
2	BRIGHT YELLOW	15.29	84.10	-2.89	00
3	LISCIA VERDE DA TAGLIO	23.05	126.78	+4.87	XXX
4	CHARLOTTE	17.08	93.94	-1.10	-
5	VERTE A CARDE BLANCHE 3	21.06	118.81	+2.88	XX
6	LUCULLUS	17.64	97.02	-0.54	-
7	COULEURS RAINBOW	19.03	104.67	+0.85	-
	Media	18.18	100.00	0.00	-

LSD5%=2,18 LSD1%=2,61 LSD 0,1%=3,72

If the height of the plant was found to be somewhat uniform, in the case of petiole length the diversity is higher. Thus the longest petioles were recorded in the Liscia Verde da Taglio variety, 23.5 cm. The difference from the control was statistically significantly positive. And the petioles of the Verte variety of Carde Blanche were larger (21.06cm). Compared to the average, they were 2,88 cm longer. The difference from this was statistically significantly distinctly positive.

Among the varieties studied, the Ampuis variety had the smallest petioles. Their average length was 14.28 cm, with 3.90 cm less than the petioles of the witness. The difference was statistically significantly negative. The yellow petioles of the Bright Yelow variety were smaller than the 2,89cm witness. The difference was statistically significantly negative.

Other swiss chard varieties had smaller or larger petioles than the control, but the differences were small, not exceeding P = 5%, not statistically assured.

As has been shown, the swiss chard is generally valorised in links, the form of whole leaf (petiole and limb). Some consumers prefer the leaves to be richer in petioles and others in the limb.

To determine which are the varieties of larger quantities of petioles and vice versa, one kg of leaf was taken from which the petioles and the limb were weighed separately. Data on this aspect are shown in Table 3.

Table 3

Limb and petiole content of swiss chard leaves of a kilo of leaves, Săcuieni, 2016

Nr. crt.	Variety	Quantity of leaves(g)	Quantity of petioles(g)	Quantity of limb(g)
1	CARDE BLANCHE AMPUIS	1000	570	430
2	BRIGHT YELLOW	1000	470	530
3	LISCIA VERDE DA TAGLIO	1000	530	470
4	CHARLOTTE	1000	375	625
5	VERTE A CARDE BLANCHE 3	1000	420	580
6	LUCULLUS	1000	400	600
7	COULEURS RAINBOW	1000	470	530

The variety with the largest amount of petioles is Ampuis, with petioles representing more than half (570g) of the total leaf. Another variety that petioles exceed 500g of a pound of leaf is Liscia Verde da Taglio (530g). The smallest amount of petioles and concomitantly the largest amount of tongue is Charlotte. This represents 62.5% of the total leaf. For the rest of the varieties the limb exceeds 50% of the total leaf.

CONCLUSIONS

The researches in Săcuieni regarding the behavior of some cultivated cultivars of swiss chard in the field showed several conclusions and recommendations, namely:

1. The varieties chosen have almost equal height increases, so that the experimental plot looks rather uniform.

2. The Liscia Verde da Taglio variety had the most representative increases, the plant average exceeded by 50 cm.

3. The smallest plants were those of the Ampuis variety (38.54cm), which was found with the highest amount of petioles in the total leaves (57%).

4. With the longest petioles (23.05 cm) Liscia Verde da Taglio variety exceeded the average of the experience by 26.78%, the appearance of the links of this variety having the most attractive aspect.

5. The Charlotte variety has not been highlighted in terms of plant height and petiole length, the measurements being close to the average of the experience. However, it actually detached the largest amount of limb from the total leaf (62.5%).

6. Due to the different colors of the leaves, it is recommended to use the varieties in bindings.

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