

# Nutritional Traits of Two Romanian Celery Varieties. Note 1: Conventional Field Culture

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Received 6 Octobre 2022; received and revised form 25 Octobre 2022; accepted 8 November 2022; Available online 30 December 2022

## Abstract

Celery is an annual or biannual plant that bears well-developed leaves, being intended for both consumption and processing in various industrial sectors. The present experiment was carried out in order to quantify the nutritional properties characterized by the gross chemical composition of two local varieties of celery, Dacia and Victoria. The experiments were carried out in the experimental field of a private vegetable farm located in Cluj County, and the biological material consisting of celery roots, Victoria and Dacia varieties, comes from SCDL Buzău. The average weight of the roots of *Apium graveolens* L. the Dacia variety is equal to 373 g, and that of the Victoria variety to 276 g. In the Dacia variety, a dry matter content equal to 20.60% was determined, which corresponds to a content of water of 79.40%, and in the Victoria variety a slightly lower dry matter content was determined than that reported for the Dacia variety, equal to 20.51%, which corresponds to a water content equal to 79.54%. For both varieties, the largest proportion of the nutrient content is occupied by non-nitrogenous extractives and crude ash content. The differences between the nutrient contents tested in the fresh substance are in favor of the Dacia variety, but they are statistically insignificant at the 5% significance level, and the differences between the contents in most of the nutritional components expressed in the dry substance, except for non-nitrogenous extractive substances, are in favor of the Victoria variety.

**Keywords:** dry matter, fat, protein, nitrogen free matter

## 1. Introduction

Celery is an erect herbaceous annual or biennial plant that can reach a height of 60-90 cm, with obvious branches bearing well-developed leaves on long expanded petioles. Stems are branched, angular or fistulate and conspicuously jointed. The leaves are large, pinnate-lobed, deeply divided into three segments, divided once or twice and toothed at the apex. The leaves are ovate at the suborbicular level, trilobed, with a length of 2-4.5 cm. The flowers are small, white in color and the inflorescence is a compound umbelliferous type. The callus is toothed, has five ovate petioles, with an inflected tip. The fruit is a

schizocarp with two mericarps, suborbicular to ellipsoid in shape, 1-2 mm in diameter, aromatic and with a slightly bitter taste.

The seed (mericarp) results from splitting the schizocarp (fruit) and is ribbed and much smaller than carrot seeds [3, 4, 5]. In cytogenetic studies, Choudhary and Kaul (1986) observed that celery is diploid with chromosome number equal to  $2n = 22$  [1]. Flowers, although potentially self-fertilizing, are normally pollinated for cross-pollination by insects [5]. The present experiment was carried out in order to quantify the nutritional properties characterized by the gross chemical composition (protein, fat, cellulose, ash, non-nitrogenous extractive substances) of celery

roots belonging to two native varieties Dacia and Victoria.

## 2. Material and Method

Celery is an erect herbaceous annual or biennial plant that can reach a height of 60-90 cm, with obvious branches bearing well-developed leaves on long expanded petioles. Stems are branched, angular or fistulate and conspicuously jointed. The leaves are large, pinnate-lobed, deeply divided into three segments, divided once or twice and toothed at the apex.

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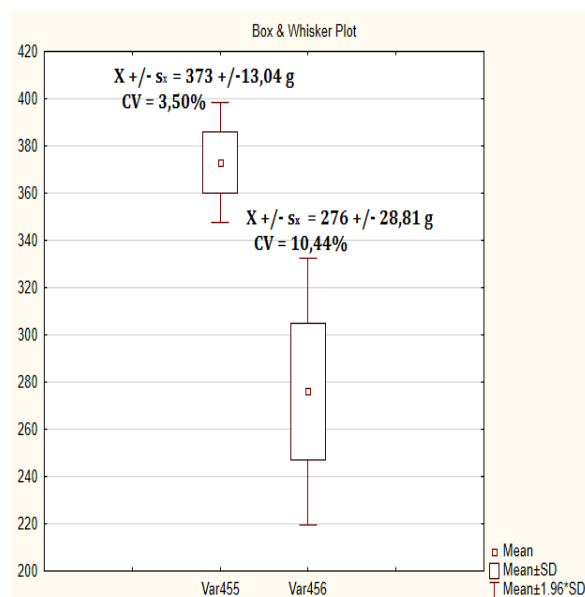
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## 3. Results and Discussions

The average weight of the roots of *Apium graveolens* L. variety Dacia cultivated in field conditions is equal to 373 g, and that of the variety Victoria also cultivated in field conditions, is equal to 276 g (Fig. 1.1).

The difference between them, equal to 97 g, is statistically ensured at the 0.1% significance level. According to the Box-Plot diagram and the standard deviation values, the degree of dispersion of the individual values from the mean is greater for the Victoria variety compared to the Dacia celery variety. However, according to the values of the coefficients of variation, the values can be considered homogeneous, and the

averages representative for the experimental device (Fig. 1).



Var 455 – Dacia variety; Var 456 – Victoria variety; X – mean (g); sx – standard deviation (g); CV – coefficient of variation (%).

**Figure 1. Box-Plot diagram of the weights of Dacia and Victoria celery varieties cultivated in field conditions**

Regarding the varieties of *Apium graveolens* L. Dacia and Victoria, grown in field conditions, the determination of the gross nutrient content refers to both the fresh substance and the dry substance, given the fact that the dry material represents the matrix on which the supplement will be made nutritional which is the final objective of the present study. In the *Apium graveolens* L. Dacia variety, a dry substance content equal to 20.60% was determined, which corresponds to a water content of 79.40%.

Regarding the nutrient content, the largest proportion of is occupied by non-nitrogenous extractive substances (10.56%) and the content in crude ash (5.98%).

Crude protein (1.74%) and crude fat (0.26%) are the least represented nutritional components in celery root, Dacia variety. According to the dispersion parameters and variability values there is a normal distribution of the individual values and the means are representative.

According to the asymmetry values, with the exception of ash and water content, for dry matter and the other nutritional components, the individual values are higher than the average value (Table 1).

**Table 1.** The crude nutritional composition of Dacia celery variety (% of fresh matter), cultivated in field conditions

No. crt.	Issue	Water	DM	CP	CF	CC	CA	NFM
1	No. of samples	30	30	30	30	30	30	30
2	Mean	79.40 <sup>ns</sup>	20.60 <sup>ns</sup>	1.74 <sup>ns</sup>	0.26 <sup>ns</sup>	2.06 <sup>ns</sup>	5.98 <sup>ns</sup>	10.56 <sup>ns</sup>
3	Standard deviation	0.41	0.41	0.15	0.04	0.13	0.28	0.26
4	Minimum	79.13	19.98	1.50	0.21	1.90	5.20	10.40
5	Maximum	80.02	21.07	1.90	0.30	2.20	6.14	11.00
6	Kurtosis	2.95	0.43	-1.12	-0.29	0.17	-0.48	-0.54
7	Skewness	-0.43	2.95	1.46	2.51	2.41	1.08	1.49
8	Coefficient of variation	0.52	1.99	8.72	15.28	6.51	4.68	2.46

CP - crude protein; CF - crude fat; CC - crude cellulose; CA. - crude ash; NFM - nitrogen free matter; Kurtosis - vaulting; Skewness - asimetry.

In the *Apium graveolens* L. Victoria variety grown in field conditions, after the statistical processing of the raw data, it is found that it has a content in dry matter slightly lower than that reported for the Dacia variety, equal to 20.51%, which corresponds to a water content equal to 79.54%. And in this case, the largest proportion of the nutrient content is occupied by the non-

nitrogenous extractive substances (10.96%) and the crude ash content (5.48%). Crude protein (1.32%) and crude fat (0.34%) are the least represented nutritional components in celery root, variety Victoria. In accordance with the data provided by the asymmetry calculation, for raw ash, individual values below the average prevail, while (Table 2).

**Table 2.** The crude nutritional composition of Victoria celery variety (% of fresh matter), cultivated in field conditions

No. crt.	Issue	Water	DM	CP	CF	CC	CA	NFM
1	No. of samples	30	30	30	30	30	30	30
2	Mean	79.49 <sup>ns</sup>	20.51 <sup>ns</sup>	1.32 <sup>ns</sup>	0.3 <sup>ns</sup>	2.41 <sup>ns</sup>	5.48 <sup>ns</sup>	10.96 <sup>ns</sup>
3	Standard deviation	0.48	0.48	0.08	0.02	0.19	0.15	0.44
4	Minimum	79.00	19.70	1.70	0.26	2.00	5.20	9.50
5	Maximum	80.30	21.00	1.90	0.40	2.50	6.20	10.60
6	Kurtosis	2.97	-1.45	-0.51	-0.76	0.02	0.55	-0.77
7	Skewness	1.45	2.97	0.61	2.48	-0.59	0.87	0.58
8	Coefficient of variation	0.61	2.36	6.06	5.88	7.89	2.73	4.01

CP - crude protein; CF - crude fat; CC - crude cellulose; CA. - crude ash; NFM - nitrogen free matter; Kurtosis - vaulting; Skewness - asimetry; ns -  $p > 0.05\%$ .

The differences between the contents of dry matter, crude protein and crude ash are in favor of the Dacia variety, but are statistically insignificant at the 5% significance level. For the other nutritional components, higher values are noted, but still statistically insignificant at the 5% significance threshold, for the Victoria variety (Table 1 and Table 2).

In the *Apium graveolens* L. Dacia variety, the nutritional content, expressed from the dry substance, is characterized by the following average values: 8.53% crude protein, 1.25%

crude fat, 10.09% crude cellulose, 27.35% crude ash and 52.77% non-nitrogen extractives. According to the dispersion parameters and variability values there is a normal distribution of the individual values and the means are representative.

The calculation of the asymmetry highlights the fact that for all the nutritional components analyzed, the individual values are lower than the average value (Table 3). The study of the Victoria variety of the species *Apium graveolens* L., shows that, according to the results

of the present experiment, the nutritional content, expressed as percentages of dry substance, is characterized by the following average values: 8.88% crude protein, 1.40% fat crude, 11.11% crude cellulose, 29.18% crude ash

and 49.43% non-nitrogen extractives. According to the dispersion parameters and variability values there is a normal distribution of the individual values and the means are representative.

**Table 3.** The crude nutritional composition of Dacia celery variety (% of dry matter), cultivated in field conditions

No. crt.	Issue	CP	CF	CC	CA	NFM
1	No. of samples	30	30	30	30	30
2	Mean	8.53 <sup>ns</sup>	1.25 <sup>ns</sup>	10.09 <sup>ns</sup>	27.35*	52.77*
3	Standard deviation	0.74	0.18	0.47	1.09	1.47
4	Minimum	7.51	1.04	9.45	25.72	50.96
5	Maximum	9.45	1.44	10.58	28.37	54.40
6	Kurtosis	0.30	2.79	1.31	0.01	2.25
7	Skewness	-0.32	-0.27	-0.29	-0.76	-0.07
8	Coefficient of variation	8.67	14.39	4.70	4.00	2.79

CP – crude protein; CF – crude fat; CC – crude cellulose; CA. – crude ash; NFM – nitrogen free matter; Kurtosis – vaulting; Skewness – asimetry; ns –  $p > 0.05\%$ ; \* –  $p < 0.05\%$ .

The calculation of the asymmetry of the asymmetry highlights the fact that, similar to the situation recorded in the Dacia variety of *Apium graveolens* L., for all the nutritional components analyzed, the individual values are lower than the average value (Table 4).

The differences between the dry matter contents highlighted for most of the nutritional components, except for the nitrogen free matter,

in contrast to the results obtained under the conditions of using the fresh matter of the celery varieties, are in favor of the Victoria variety. If in terms of crude protein, crude fat and crude cellulose contents, the differences are not statistically assured at the 5% significance threshold, for crude ash and nitrogen free matter, the differences are statistically assured at the 5% significance threshold (Table 3 and Table 4).

**Table 4.** The crude nutritional composition of Victoria celery variety (% of dry matter), cultivated in field conditions

No. crt.	Issue	CP	CF	CC	CA	NFM
1	No. of samples	30	30	30	30	30
2	Mean	8.88 <sup>ns</sup>	1.40 <sup>ns</sup>	11.11 <sup>ns</sup>	29.18*	49.43*
3	Standard deviation	0.51	0.11	0.81	1.06	1.16
4	Minimum	8.26	1.26	10.15	28.02	48.13
5	Maximum	9.64	1.52	12.15	30.46	50.48
6	Kurtosis	0.97	1.72	1.60	2.55	3.21
7	Skewness	-0.65	-0.20	-0.07	-0.39	-0.55
8	Coefficient of variation	5.74	7.53	7.32	3.64	2.34

CP – crude protein; CF – crude fat; CC – crude cellulose; CA. – crude ash; NFM – nitrogen free matter; Kurtosis – vaulting; Skewness – asimetry; ns –  $p > 0.05\%$ ; \* –  $p < 0.05\%$ .

#### 4. Conclusions

The average weight of the roots of *Apium graveolens* L. the Dacia variety cultivated in field conditions is equal to 373 g, and that of the Victoria variety also cultivated in field conditions is equal to 276 g. In the Dacia variety, a substance content was determined dry equal to 20.60%, which corresponds to a water content of 79.40%. Regarding the nutrient content, the largest proportion of is occupied by non-nitrogenous

extractive substances (10.56%) and the content in crude ash (5.98%). The nutritional content, expressed from the dry matter, is characterized by the following average values: 8.53% crude protein, 1.25% crude fat, 10.09% crude cellulose, 27.35% crude ash and 52.77% non-nitrogenous extractives. In the Victoria variety, a slightly lower dry substance content was determined than that reported for the Dacia variety, equal to 20.51%, which corresponds to a water content equal to 79.54%. And in this case, the largest proportion of

the nutrient content is occupied by the non-nitrogenous extractive substances (10.96%) and the crude ash content (5.48%). The same nutritional content expressed as percentage of dry matter is characterized by the following average values: 8.88% crude protein, 1.40% crude fat, 11.11% crude cellulose, 29.18% crude ash and 49.43% extractives non-nitrogenous.

The differences between the nutrient contents are in favor of the Dacia variety, but they are statistically insignificant at the 5% significance level. The differences between the contents of most nutritional components expressed in dry matter, except for non-nitrogenous extractives, are in favor of the Victoria variety.

For crude protein, crude fat and crude cellulose, the differences are not statistically assured at the 5% significance threshold, for crude ash and non-nitrogenous extractives, the differences are statistically assured at the 5% significance threshold.

**Acknowledgements.** This article is funded by the Ministry of Research, Innovation and Digitalization through Operational Program for Competitiveness 2014 – 2020, Axe 1 - Research, technological development, and innovation (RDI) in support of economic competitiveness and business development, Action 1.2.3. Section G - Partnerships for Knowledge Transfer, Contract no. 3/AXE 1/1.2.3.G/30.05.2018, ID: P\_40\_377, COD MySMIS <119675>. Title of the project: "Obtaining a supplement-type food product, on the natural substrate of *Apium graveolens* L. nutritionally optimized by enrichment with selenium and vitamins, for the purpose of improving the quality of life".

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