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Original Article

Study Concerning the Influence of Selenium Supplements on Crude Chemical Composition of *Allium sativum* L., de Cenad Variety

ODAGIU Antonia, Ioan Gh. OROIAN*, Laura PAULETTE, Daniela BORDEA, Cristian IEDERAN, Cristian MĂLINAŞ

University of Agricultural Sciences and Veterinary Medicine Cluj - Napoca, Mănăştur St., No. 3 - 5, 400372 Cluj-Napoca, Romania

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Abstract

The nutraceutical quality of garlic is a valuable attribute largely appreciated. The Allium sativum L. combined with selenium supplements will lead to synergic effects, that will improve its preventive and curative action. The aim of this paper was to determine the crude chemical composition of *Allium sativum* L. variety de Cenad currently cultivated in Romania, with and without selenium supplements. The chemical analysis was performed in the Laboratory of the Environmental Engineering and Protection from the same university. The crude chemical composition was determined according to Weende pattern. Basic statistics was implemented using Statistica v 7.0, Windows version [4]. The selenium supplementation of the *Allium sativum* L., de Cenad variety determined an increase of nutritional value emphasised by enhanced crude protein and crude content.

Keywords: nutraceutic, protein, ash, Weende pattern, nutritional value

1. Introduction

The positive effects of *Allium sativum* L. on human health is well known since history, but our days an increased interest in using this vegetable as food supplement/nutraceutical food was recorded. Besides its nutritional traits meant to supply positive effects on human organism, negative action of garlic was not reported.

The positive influence of garlic on human health is due to its antioxidant profile, with major role on lipid metabolism, and specific products of lipids oxidation.

Another important trait of garlic components ion is on plasmatic antioxidant enzymes represented by glutathione – S – transferase, superoxide – dismutase and catalase.

The selenium supplements combined to garlic will lead to synergic effects, that will improve the preventive and curative action of each one of these components [1, 2].

In this respect, as first step in producing such an efficient food supplement based on garlic, we consider the identification of suitable varieties that could represent raw material in fabrication of such nutraceutics.

The aim of this paper was to determine the crude chemical composition of *Allium sativum* L.

* Corresponding author.
Tel.: 0040264596384; Fax: 0040263593792
e-mail: neluoroian@gmail.com

variety de Cenad currently cultivated in Romania, with and without selenium supplements.

2. Material and Method

The substrate submitted to chemical analysis consists of *Allium sativum* L., de Cenad variety bulbils, without selenium supplements (control), and with selenium supplements in amount of 33 ppm (experimental). The culture was conducted in field conditions, at Jucu experimental farm of the University of Agricultural Sciences and Veterinary Medicine of Cluj - Napoca. The chemical analysis was performed in the Laboratory of the Environmental Engineering and Protection from the same university. The crude chemical composition was determined according to Weende pattern (fig. 1).

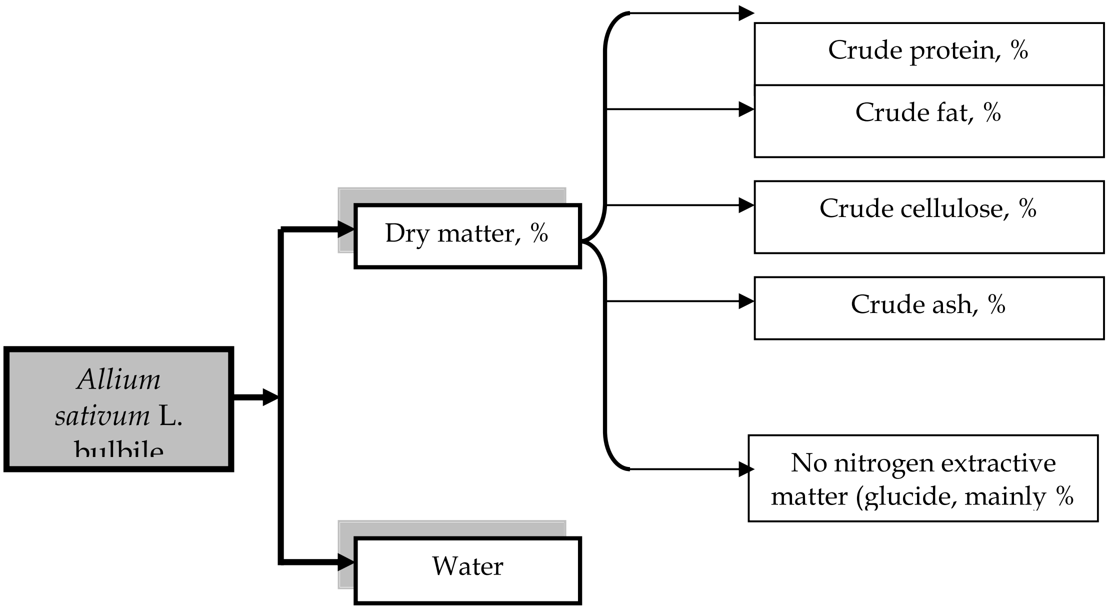


Figure 1. The Weende pattern of crude chemical composition determination of *Allium sativum* L. Cenad variety

Dry matter was determined gravimetrically, and water by difference [3]. The crude protein was quantified using the Kjeldahl method with Kjeldahl equipment, crude fat with Velp extractor, crude cellulose with FiberTech equipment, crude ash using a Nabertherm type furnace and non nitrogen extractive matter by difference [3]. The results are expressed as share of fresh material. Basic statistics was implemented (average, standard error of average, standard deviation, variance, coefficient of variation, median, interval of confidence ± 95%, minimum, maximum, Kurtosis, Skewness) using Statistica v 7.0, Windows version [4]. The Boxplot graphic representation was used for emphasizing the chemical crude composition in control and experimental material.

3. Results and Discussions

The results of the chemical crude analysis emphasizes a bigger dry matter content in experimental variety (table 3), which received 33 ppm selenium supplements (37.40%), compared to control (table 1), which received no selenium supplements (35.00%).

The distributions of determined crude chemical composition values (%) of the control *Allium sativum* L. bulbils, were symmetrical, within confidence interval ± 95%, while Skewness and Kurtosis values, also demonstrate the normal distributions (table 2).

Bigger crude protein, 6.94%, and crude ash share, 2.20% was recorded in experimental variety that received 33 ppm selenium supplements (table 3), compared to control, where 6.24% crude protein, and 1.30% crude ash shares were determined (table 1).

The selenium supplements, also determined an increase of ash (2.000% compared to 1.104% in control), and cellulose content (0.898% compared to 1.000% in control), and decrease of fat (tables 1 and 3).

Table 1. The averages, coefficients of variation, and basic statistic parameters of crude chemical composition of *Allium sativum* L., de Cenad variety, bulbils cultivated in field conditions without Se supplements , (%)

Issue	n	Median	$\overline{X}$	±	$s_{\overline{X}}$	s	s^2	V%
DM	120	35.000	35.000	±	0.204	2.236	5.000	6.389
Water	120	65.000	65.400	±	0.238	2.608	6.800	3.988
CP	120	6.200	6.240	±	0.015	0.167	0.028	2.676
CC	120	1.000	1.040	±	0.010	0.114	0.013	10.962
CF	120	1.200	1.220	±	0.008	0.084	0.007	6.885
CA	120	1.300	1.300	±	0.014	0.158	0.025	12.154
SEN	120	25.300	25.200	±	0.167	1.829	3.345	7.258

DM – dry matter; CP – crude protein; CC – crude cellulose; CF – crude fat; CA – crude ash; SEN – non nitrogen extractive matter.

Table 2. The parameters of dispersion of crude chemical composition of *Allium sativum* L., de Cenad variety, bulbiles cultivated in field conditions without Se supplements , (%)

Issue	n	Confidence interval -95%	Confidence interval +95%	Minimum	Maximum	Skewness	Kurtosis
DM	120	32.224	37.776	32.000	38.000	0.001	0.200
Water	120	62.162	68.638	62.000	68.000	-0.164	1.812
CP	120	6.032	6.448	6.100	6.500	1.089	0.536
CC	120	0.898	1.182	0.900	1.200	0.405	0.178
CF	120	1.116	1.324	1.100	1.300	-0.512	0.612
CA	120	1.104	1.496	1.100	1.500	0.000	1.200
SEN	120	22.929	27.471	22.600	27.600	-0.247	0.853

DM – dry matter; CP – crude protein; CC – crude cellulose; CF – crude fat; CA – crude ash; SEN – non nitrogen extractive matter.

Table 3. The averages, coefficients of variation, and basic statistic parameters of crude chemical composition of *Allium sativum* L., de Cenad variety, bulbils cultivated in field conditions with 33 ppm Se supplements, (%)

Issue	n	Median	$\overline{X}$	±	$s_{\overline{X}}$	s	s^2	V%
DM	120	37.000	37.400	±	0.585	1.140	1.300	3.049
Water	120	63.000	62.600	±	0.585	1.140	1.300	1.821
CP	120	6.900	6.940	±	0.118	0.230	0.053	3.317
CC	120	1.000	1.020	±	0.076	0.148	0.022	14.542
CF	120	1.100	1.080	±	0.084	0.164	0.027	15.215
CA	120	2.000	2.020	±	0.067	0.130	0.017	6.455
SEN	120	26.700	26.340	±	0.665	1.297	1.683	4.925

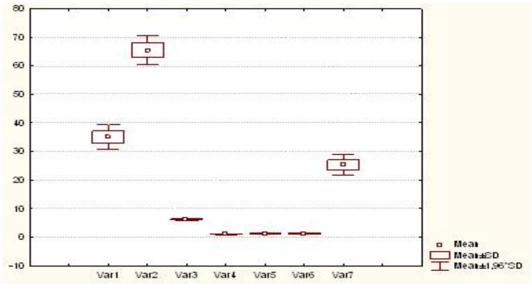
DM – dry matter; CP – crude protein; CC – crude cellulose; CF – crude fat; CA – crude ash; SEN – non nitrogen extractive matter.

Table 4. The parameters of dispersion of crude chemical composition of *Allium sativum* L., de Cenad variety, bulbiles cultivated in field conditions without Se supplements , (%)

Issue	n	Confidence interval -95%	Confidence interval +95%	Minimum	Maximum	Skewness	Kurtosis
DM	120	35.984	38.816	36.000	39.000	0.405	2.000
Water	120	61.184	64.016	61.000	64.000	-0.405	2.000
CP	120	6.654	7.226	6.600	7.200	-0.606	2.000
CC	120	0.836	1.204	0.800	1.200	-0.552	2.000
CF	120	0.876	1.284	0.800	1.200	-1.736	2.000
CA	120	1.858	2.182	1.900	2.200	0.541	2.000
SEN	120	24.729	27.951	24.400	27.900	-0.658	2.000

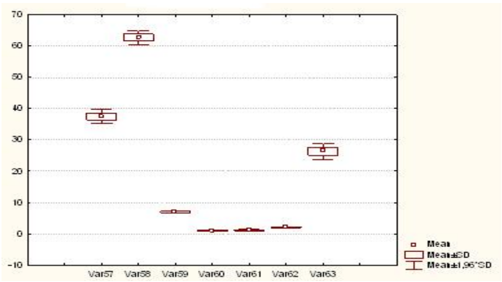
DM – dry matter; CP – crude protein; CC – crude cellulose; CF – crude fat; CA – crude ash; SEN – non nitrogen extractive matter.

In experimental groups, that received 33 ppm Se supplements, there were also recorded normal distributions of the crude chemical composition values (%) within confidence interval ± 95%, and correspondent Skewness and Kurtosis values (table 3). The analyse of the structure of the crude chemical composition (%) of both experimental resulted crude material (bulbils that were not supplemented in Se and bulbils supplemented with 33 ppm Se), shows that biggest share was occupied by water, and within dry matter content, protein crude chemical composition was dominant (figs. 3 and 4).



Var 1 –DM (%); Var 2 – Water (%); Var 3 – CP (%); Var 4 – CC (%); Var 5 – CF; Var 6 – CA; Var 7 – SEN

Figure 2. The structure of the crude chemical composition (%) of the *Allium sativum* L. de Cenad variety bulbils, not supplemented with Se



Var 57 –DM (%); Var 58 – Water (%); Var 59 – CP (%); Var 60 – CC (%); Var 61 – CF; Var 62 – CA; Var 63 – SEN

Figure 3. The structure of the crude chemical composition (%) of the *Allium sativum* L. de Cenad variety bulbils, supplemented with 33 ppm Se

4.Conclusions

The selenium supplementation of the *Allium sativum* L., de Cenad variety determined an increase of dry matter, and main nutritional components, crude protein and crude ash, and decrease of moisture and crude fat.

Symmetrical, normal distributions, within confidence interval ± 95% were obtained for the crude chemical composition of both experimental variants (without selenium and with 33 ppm selenium supplements), emphasizing the adequacy of the applied basic statistic model.

Variability, Skewness, and Kurtosis values emphasize that the chemical crude composition of the determined in *Allium sativum* L., de Cenad variety, bulbils is representative

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