ANALYTICAL TESTINGS OF THE CONTENT OF NITRATES DETERMINED AT PARSLEY DEPENDING ON THE LEVEL OF THE NITROGEN FERTILIZATION

Ana Leahu*, Georgiana Gabriela Codină*, Silvia Mironeasa*

* Ştefan cel Mare University of Suceava, Faculty of Food Engineering, 13 Universitaţii St., 720229, Suceava, Romania, e-mail:analeahu@usv.ro

Abstract: *The quality of the crop can be appreciated on the one hand by its high content in organic and mineral compounds necessary for the human and animal nutrition and by the presence in the vegetarian products of other compounds with unfavorable characteristics for the health of humans and animals. Among such compounds may be enumerated as well nitrites and nitrates which in some vegetarian products can be accumulated in large enough quantities such that it can become dangerous for humans and animals from a sanogenetic perspective.*

The level of nitrates from plant varies depending on the species, the breed, the organ of the plant, the nitrates content from the soil, the degree of illumination of the plants and some other factors. It can be accepted that the vegetables from the leafy category contain more nitrates than the ones from which the fruits are consumed. It is certain that the presence of too many nitrates in the soil is one of the most important reasons that causes the excessive accumulation of NO_3^- *in the leafs of nitrophilous plants.*

This paper aims to draw attention on some possibilities and means of reducing the content of nitrates from parsley plants whose products are meant for consuming in a fresh state using agro-chemical measurements which can be extended in the production process favoring the attainment of high and appropriate in terms of quality crops, thus eliminating the opposite trends between the consumer and the producer.

Keywords: *vegetables, content of nitrates and nitrite, influences as luminosity.*

Introduction

The supplies in ground's nutritional elements are limited, therefore maintaining and increasing ground's fertility by applying fertilizers are essential pre-requisites in order to obtain great crops, constant as period of time and quality.

Chemical fertilizers with azoth can substantially heighten the leguminous plants' crop, firstly the leafy and root ones, which in most cases are *nitrofile*, having the tendency of the accumulation of excessive quantities of nitrates, dangerous sanogenetically when the production process is not correctly directed [Rusu M. and his co-workers, 2005].

The nitrates represent the main source of azotes for plants. Before being attract in metabolism, the NO_3^- ions suffer a decreasing process, which takes place in two stages, on the first stage the NO_3^- passing to NO_2^-, on the second stage placing the reduction of NO_2^- to NH_3 [Escobar-Gutiérrez and his co-workers, 2002]. In general, it is accepted the idea that in the reduction mechanism are involved two enzymes: nitratreductaza, which activates on the first stage of reduction and nitritreductaza, which activates on the second stage of reduction. There is a tight connection between clorofilian assimilation and the reduction of the nitrates within green cells. At some species (tomatoes), 80-90% of nitrates are reduced in green leaves, in roots the reduction process being almost absent; at some species the reduction activity of the nitrates manifest also in roots.

However, practically, bigger dozes of azoth comparative to the specific consume level of plants are used for avoiding the eventual decreases of the crop level towards the maximum that can be offered by the sort or the hybrid.

At the root crop we can see very great variations according to the species. At the radish these are between 900-4500 mg/kg, but LMA is of 600 mg/kg, while at the carrot LMA is of 200-300 mg/kg [McCall and his co-workers, 1998].

In the leguminous case variations can be seen, between 6-126 mg/kg at the pea and to 400-950 mg/kg at beans (Lacatuş V., 1997). The research theme proposes the testing of some methods of decreasing the accumulation level of nitrates in the vegetal mass of leguminous plants conceived for human consume by applying corrective fertilizers on plants.

Materials and Method

For decreasing the accumulation level of the nitrates in the vegetal mass of the leguminous plants there were used test-plants: parsley (*Petroselinum crispum*). As experimental diagrams there were used polifactorial experiences with two studied parameters made according to the method of the subdivided house plots. The harvest of the plants was effectuated at the time of commercial maturity that means after 110 days for parsley. There were extracted from the crop leaf exhibits and roots from the parsley, as well from the radish. The ground utilized: cambic cernoziomoid with the following characteristics: pH-5.3; SB-6.87 me/100g.

At the plants' testing's extracted at the time of the crop the following determinations were effectuated:

- the nitric acid was determined by the colorimetrical method, from fresh material; by extraction in acetic acid solution 2%, and the dosing of the extract was made with fenoldisulfonic acid in alkalescent medium.

A Factor: The fertilization level

There were used two methods of fertilization:

a1) with little dozes of mineral fertilizers (0.50g N + 0.50 P_2O_5 + O.50 g K_2 O for the pot of vegetation with 7 kg dry ground);

b2) with great doses of mineral fertilizers (2.0 g N + 1.O g P_2O_5 + 1.0 g K_2 O for the pot of vegetation).

There used as fertilizers the ammonium nitrate with 33.5% N, the concentrated super phosphate with P_2O_5 42% and the potassium sulfate with 54% K_2 O. The ground acidity was rectified applying at the vegetation pot 14 g limestone with 80% neutralizing power (PNA), calculated for rectifying the hydrolytic acidity of the cambic cernoziomoid used in experimentalism.

B Factor: Complex foliates fertilizers soluble in water

There were variants like these to follow:

b1) the splashing of the plants with water (control – F0);

b2) the splashing of the plants with solution 1.5% of ICF-ICPA – code 6282, universal eradicator (F);

b3) the splashing of the plants with solution 2.5% of ICF-ICPA – code R-5 (FI) which contains macro-, micro-elements and urea;

b4) the splashing of the plants with solution 2.5% of ICF-ICPA – code RN9 (F2) which contains macro-, micro-elements and lignosulfonates.

Table 1. The production of leaves and roots of parsley, under the influence of the chemical fertilizers applied to the ground and of the plants' splashing with foliar fertilizers

Variant	Treatments	Foliar treatments	Roots				Leaves			
			weight	%	Dif.(g)	Diff.[1]	weight	%	Dif(g)	Diff.[1]
a_1b_1-1	$N_{0,5}$ $P_{0,5}$ $K_{0,5}$	water	18.0	100.0	0.0	blank	46.7	100.0	0.0	blank
a_1b_2-2		ICF 6282	19.7	109.6	1.7	*	54.3	116.2	7.6	*
a_1b_3-3		ICF RN 5	19.4	107.8	1.4		48.4	103.6	1.7	
a_1b_4-4		ICF RN 9	19.9	110.7	1.9	*	51.6	110.6	4.9	
a_2b_1-5	$N_{2,0}$ $P_{1,0}$ $K_{1,0}$	water	14.4	100.0	0.0	blank	45.4	100.0	0.0	blank
a_2b_2-6		ICF 6282	14.7	102.1	0.3		47.2	104.0	1.8	
a_2b_3-7		ICF RN 5	16.0	111.1	1.6	*	54.9	120.9	9.5	*
a_2b_4-8		ICF RN 9	18.2	126.4	3.8	**	52.4	115.4	7.0	*

[1]Difference significance

Results and discussions:

Results acquired for parsley

The foliar treatments' effect over crops' level for parsley is positive for the roots and for the leaves as well.

The crop of roots heightened significantly in the case of two eradicators from of the three tested on the agro-content 1 of fertilizing, a major increasing being observed also in the case of the crop of leaves (variants 2 and 4 towards variant 1 splashed with water).

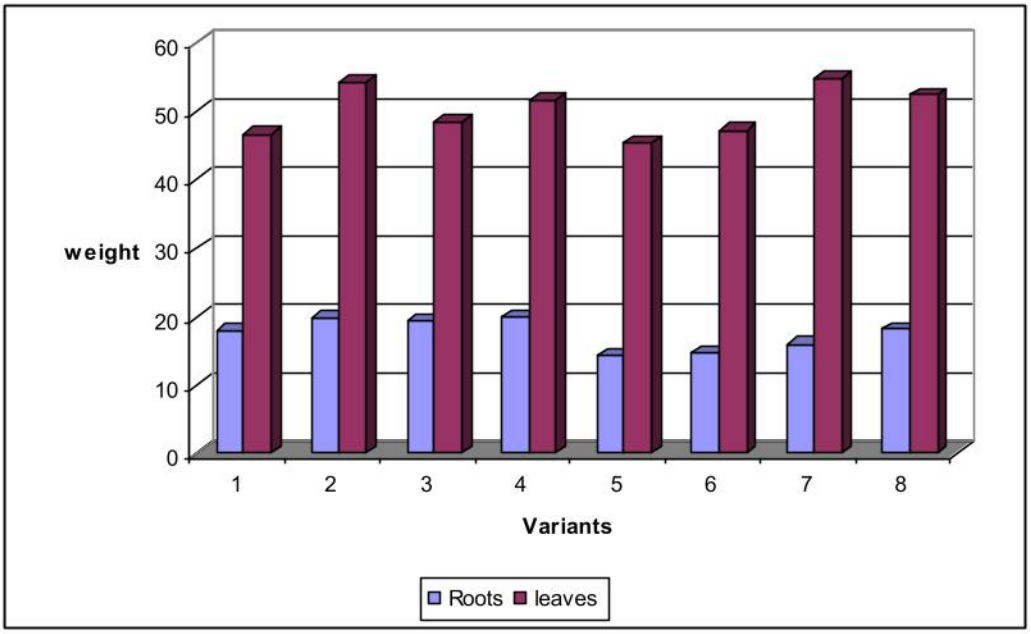

Figure 1. The effect of the fertilizing agro-content and of the splashing with complex foliant fertilizers over the level of the parsley roots' crops

At the agro-content 2 of fertilizing it can be seen approximately the same variations under the influence of the splashes with foliar eradicators, that means the crop of roots and leaves has developed significantly in a distinct way or just significantly at the variant 8, where the splashing with the eradicator RN9 was applied by comparison with variant 5, where the splashing was effectuated with water.

The studied factors influenced differently the accumulation process of the nitrates in parsley. From the registered dates in table 2 are ascertained:

The agro-content of fertilizing influenced substantially the nitrates content from leaves and roots. In consequence, at variant 1 to which applied a little doze of fertilizers at ground and splashes with foliar fertilizers were not effectuated, the nitrates content was of 97 ppm $N\text{-}NO_3$ and that of the leaves of 98 ppm $N\text{-}NO_3$ while at variant 5 to which it was used a great doze of azoth fertilizers, without foliar fertilizers, the level of the nitrates content grew up at 386 ppm $N\text{-}NO_3$, and that of the roots at 288 ppm $N\text{-}NO_3$.

Table 2. 21The content of nitric azoth accumulated in the parsley roots and leaves

Variants	Treatments	Roots				Leaves			
		$N\text{-}NO_3$ ppm	%	Diff.ppm	Diff.[1]	$N\text{-}NO_3$ ppm	%	Diff.(g)	Diff.[1]
a_1b_1-1	apa	97	100.0	0.0	blank	198	100.0	0.0	blank
a_1b_2-2	ICF 6282	63	65.0	-64	0	80	40.6	-118	00
a_1b_3-3	ICF RN 5	90	92.8	-7		56	28.6	-142	000
a_1b_4-4	ICF RN 9	76	78.7	-21		50	25.3	-148	000
a_2b_1-5	apa	288	100.0	0.0	blank	386	100.0	0.0	blank
a_2b_2-6	ICF 6282	208	72.2	-80	00	172	44.6	-214	000
a_2b_3-7	ICF RN 5	198	68.8	-90	00	149	38.6	-237	000
a_2b_4-8	ICF RN 9	128	44.4	-160	000	161	41.7	-225	000

[1]Difference significance

This shows that chemical fertilizers with azoth applied to the ground (ammonium nitrate in the present case) carries out an essential role in increasing the plants' nitrates content.

Thus, the nitrates content from the leaves doubled under the influence of a great ammonium doze applied to the ground, and that of the roots tripled. This demonstrates that when the nitrates content from the ground is raised up, the transfer of the NO_3 ions absorbed in the air part of the plant is maintained by a biological mechanism that comes under the possibility of the NO_3 ions' conversion to NH_4 and their incorporation in organic compounds. A high ground content of nitrates constitutes a motive in increasing the content of nitrates from the air part of the plant, but the same motive can favor the accumulation of nitrates in the root, fact that presents importance for the parsley meant to the production both of leaves and of roots, employable in the alimentary diet's preparation.

The regulation of the nitrates from the leaves and roots can be done, therefore, by using dozes of fertilizers applicable to ground that do not outrun 150 kg N/ha, applied fractionized in two rounds.

The splashes with complex foliar fertilizers activated in the sense of stopping the excessive accumulation of nitrates in parsley plants. Thus, at variants 1-4 with poor fertilizing agro-content the subject of nitrates from roots and leaves was diminished in the case of the three utilized sorts of foliar eradicators ICPA type, the most significant diminution, excelling in the case of variants 3 and 4, where were used eradicators that contain macro- and micro-elements. In the case of variants 5-8 (fig. 2) from ground with high agro-content of fertilizing, the foliar splashes with complex fertilizers conducted to a lessening of the nitrates content from the leaves and roots, especially the one from the leaves, all the decreases being very significant, so that in leaves remains a nitrates content inferior to the one from variant 1 considered as a general control.

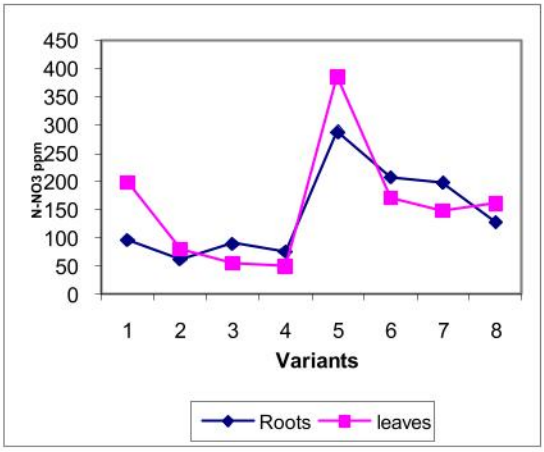

Figure 2. Variations content of nitrates from the parsley roots and leaves in accordance with the treatments through foliar splashes and with the ground fertilizing

Conclusions

The excessive dozes of azoth fertilizers applied to the ground decrease the level of the parsley roots and leaves crop.

The splashes with foliar eradicators ICP type grow up the parsley leaves and roots crop both on the low fertilized agro-content and on the high fertilized one. The eradicator with the best effect was the one nominated as ICF-RN9, recommended for foliar splashes at the cultures effectuated in greenhouses and solariums in the cold season.

The ground's fertilizing with mineral fertilizers which contain azoth favor the accumulation of some excessive amounts in the vegetative air and underground organs of the leguminous plants, while the splashes with foliar eradicators ICP type made to intensify the azoth metabolism process contributes to the declining of this content.

The fact that the splashing with complex foliar fertilizers diminish substantially the nitrates content from the parsley leaves and roots, even in the case of a mineral azoth fully fertilized agro-content, it explains through these eradicators content of molybdenum ions, which break through the epidermis into the foliar tissue, interfering in the biochemical synthesis and activation processes of the nitratreductaza enzyme present on the first stage of metabolism of the nitrate ions at NH_4, followed by the ammonium including processes into organic compounds. As well, the orthophosphate and magnesium ions from the foliar eradicators contribute to the forming of the organic compounds involved in the stocking and utilization of the solar energy stored up in different organs of the plants, and the auxiliary substances of the thiamin and procaine type are in manner to intensify the activity of the metabolic processes in plants. The glycoprotein substances of vegetal origin are directly implied in this process.

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