EVALUATION OF THE POLLUTION DEGREE BY NITRATES AND NITRITES IN SOME ORGANIC VEGETABLE CROPS FROM IASI COUNTY

EVALUAREA GRADULUI DE POLUARE CU NITRAŢI ŞI NITRIŢI LA UNELE CULTURI LEGUMICOLE ECOLOGICE DIN JUDEŢUL IAŞI

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Abstract: *The present study has proposed to establish the extent to which some vegetable crops are contaminated by nitrates and nitrites. Research has been conducted in 2008-2009, in two vegetable farms in the area of Târgu Frumos, operated in the conventional system, and in the experimental field of UASVM Iasi, operated as organic one. The results revealed that in the two types of land (organic and conventional), the degree of pollution is not significant. In conventional crops, the nitrate content ranged between 5579.47mg/kg and 213.66mg/kg; in the organic crops, it had a range between 573.93mg/kg and 19.33mg/kg. Nitrites were generally undetectable quantities*

Key words: pollution, vegetable crops, nitrates and nitrites.

Rezumat: *Studiul de faţă şi-a propus să stabilească măsura în care unele culturi legumicole prezintă contaminări cu nitraţi şi nitriţi. Cercetările au fost realizate în perioada 2008-2009, în două ferme legumicole din localitatea Târgu Frumos, exploatate în sistem convenţional, şi în câmpul experimental al USAMV Iaşi, exploatate în sistem ecologic. Rezultatele au scos în evidenţă faptul că în cele două tipuri de terenuri (ecologic şi convenţional), gradul de poluare nu este semnificativ. În culturile convenţionale, conţinutul de nitraţi a variat între 5579.47mg/kg şi 213.66mg/kg, iar în culturile ecologice, acesta a avut valori cuprinse între 573.93mg/kg şi 19.33mg/kg. Nitriţii au fost în general, în cantităţi nedetectabile.*

Cuvinte cheie:poluare, culturile legumicole, nitraţi şi nitriţi

INTRODUCTION

Excess of fertilization on agriculture leads to soil disturbance and accumulation in soil and groundwater of minerals that affect humans and animals and kill bacteria binding atmospheric nitrogen (Stoian L., 2005).

Pollution by nitrates and nitrites of soil and vegetables crop, is a risk factor for agriculture. Nitrates accumulate in agricultural production grown on land where their quantity is increased. Pollution sources are fertilizers, soil minerals and organic rich in nitrogen.

Danger presents itself not nitrates (NO3), but nitrites (NO2) derived from them, and salts of nitric acid, the digestive tract of man and animals.

The main purpose of the present study is to outline and determine to what extent are polluted by nitrates and nitrites in vegetable crops of the two gravins systems, ecological and conventional.

MATERIAL AND METHOD

The research was organized in "V, Adamachi" organic farm from University of Agricultural Sciences and Veterinary Medicine Iasi (UASVM Iasi) and two farms in Tg. Frumos, which applies to conventional agriculture in 2008-2009. Soil pollution assessment was conducted based on analysis of soil and vegetable products.

Sampling of soil and plants to completion for this study were made compared to the two types of land in conventional and organic system during 2008-2009.

Establishment of vegetable crops was carried out as recommended literature (Stoian, 2005; Stan şi Munteanu, 2001, Stan şi colab. 2003).

In organic farm of the UASVM Iaşi, study was conducted in six vegetable species: tomato, cucumber, eggplant, pepper, cabbage and onion (polytunnels and field crops) and the conventional system Tg. Frumos (Maxim and Vavilov) to the following crops: tomato, cucumber, pepper, cauliflower, pepper and celery.

Analyses were performed in the Environmental Chemistry Laboratory of the Institute of Public Health Science, by colorimetric method, according to standards.

RESULTS AND DISCUSSIONS

Preliminary results obtained from vegetable crops on nitrate and nitrite content in the samples analyzed (soil, plants) are presented in tables 1 and 2. These data allow us to see that some of the values that express the content is much lower than the maximum limits (MRL) specified in the literature (Cumpătă Simona-Diana, Beceanu Dumitru, 2006).

a. Results from organic vegetable farm "Adamachi V.".

Nitrate content in soil samples analyzed ranged from a messenger to another, thus: polytunnels maximum occurred in (S2-P2-Cross) grown tomatoes, where the nitrate content was 573.93 mg / kg body weight.

Table 1

Nitrates content in soil samples collected from organic farm (mg / kg)

Code sample	Place harvesting	Sampling location	Nitrates (MgNO3/kg dry soil)
S72	soil / tomatoes, sun S2_P2 Eco	turns / 0-20 cm	573.93
S73	soil / cucumber, sun S2, P1-Eco	turns / 0-20 cm	19.33
S74	soil / plants - peppers, sun S3, P3-Eco	turns / 0-20 cm	65.93
S75	cabbage field, P5-Eco	turns / 0-20 cm	214.02
S76	tomato + pepper, field P6	turns / 0-20 cm	266.03
S77	onion field P4-Eco	turns / 0-20 cm	256.37

The soil in the polytunnels Eco P1-S2-grown cucumbers, there was a minimum of nitrate which was 19.33 mg / kg and in soil from the polytunnels S3-P3-Eco grown pepper and eggplant, it was 65.33 mg / kg. Nitrate content in soil from the field on different plots cultivated with vegetables ranged between 214.02 mg / kg (cabbage) and 266.03 mg / kg (onion).

Analyzing the content of nitrates in plant products in eco-farm „V. Adamachi" Iaşi that in all samples analyzed for nitrate and nitrite content was undetectable (table 2).

Table 2

Nitrate content in products samples collected from V Adamachi Iaşi organic farms (mg / kg)

Code sample	Place harvest	Harvesting date	Plant samples	Sampling location	$NaNO_2$ [mg/kg]	KNO_3 [mg/kg]
V46	farm Adamachi	23.07.2009	tomatoes	polytunnels	nd	nd
V47	farm Adamachi	23.07.2009	cucumber	polytunnels	nd	nd
V48	farm Adamachi	23.07.2009	eggplant	polytunnels	nd	nd
V49	farm Adamachi	23.07.2009	cabbage	polytunnels	nd	nd
V50	farm Adamachi	23.07.2009	tomatoes	field	nd	nd
V51	farm Adamachi	23.07.2009	onion	field	nd	nd

* nd= not detectable

b. Results form familial association Tg. Frumos

Measurements of nitrate content in soil samples collected from polytunnels in Tg. Frumos, familiar from the two associations (Maxim and Vavilov), are presented in table 3 (Munteanu N., 2009). Nitrate content varied from one soil to another and from one association to another family. In general, the nitrate content in these soils was higher than in organic farms. Thus, Maxim association, higher than maximum level of 4500 mg/kg nitrate content in soil samples grown tomatoes (variety Veneţia) was 5579.47 mg/kg (per row/0-20 cm) and 5471.61 mg/kg (between row/0-20 cm) .

Nitrate accumulation in plants is explained by an absorption in excess of usage, with the assistance of the following factors: genetic order (different varieties), the order climate (light intensity and temperature), agronomic order (type and amount of nitrogen fertilizers used balance between different components of fertilization (Clemansa Tofan, 2001).

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Table 3

Nitrate content in soil samples collected from Tg. Frumos, farms before conversion (mg / kg)

Code sample	Place harvesting	Sampling location	Nitrates mgNO3/kg dry soil
0	1	2	3
S28	ground solar/tomato variety Venetia	turns / 0-20 cm	5579.47
S29	ground solar / tomato variety Venetia	fixed row / 0-20cm	5471.61
S30	ground solar / tomato variety soi Izmir	turns / 0-20 cm	5400.52
S31	ground solar / tomato variety Izmir	fixed row / 0-20 cm	356.65
S32	ground solar / tomato variety Balett	turns / 0-20 cm	1269.07
S33	ground solar / tomato variety Balett	fixed row / 0-20 cm	398.43
S34	ground solar / cucumber	turns / 0-20 cm	780.44
S35	ground solar / cucumber	fixed row / 0-20 cm	250.66
S36	ground solar / pepper	turns / 0-20 cm	1720.50
S37	ground solar / pepper	fixed row / 0-20 cm	236.94
S38	ground / field cucumber Merengue	turns / 0-20 cm	213.66
S39	ground / field cucumber Merengue	fixed row / 0-20 cm	254.40
S40	ground / field cauliflower Fremont	turns / 0-20 cm	722.45
S41	ground / field cauliflower Fremont	fixed row / 0-20 cm	232.78
S42	ground / field celery	turns / 0-20 cm	1037.95
S43	ground / field celery	fixed row / 0-20 cm	412.82
S44	ground / field pepper Romatica	turns / 0-20 cm	854.42
S45	ground / field pepper Romatica	fixed row / 0-20 cm	2667.1
S46	ground / field pepper Bianca	turns / 0-20 cm	902.33
S47	ground / field pepper Bianca	fixed row / 0-20 cm	3203.48
S48	ground / field pepper Whitny	turns / 0-20 cm	1028.15
S49	ground / field pepper Whitny	fixed row / 0-20 cm	2073.15
S50	ground / field pepper Vedrana	turns / 0-20 cm	1009.44
S51	ground / field pepper Vedrana	fixed row / 0-20 cm	1382.17
S52	ground / field pepper Fidelio	turns / 0-20 cm	1728.59
S53	ground / field pepper Fidelio	fixed row / 0-20 cm	1513.95
S54	ground / field cucumbers Amurg	turns / 0-20 cm	789.05
S55	ground / field cucumbers Amurg	fixed row / 0-20 cm	1655.4
S56	ground / field tomatoes Ballet	turns / 0-20 cm	1184.77
S57	ground / field tomatoes Ballet	fixed row / 0-20 cm	1689.94

Table 4 show the nitrate content of vegetable samples collected from farms before conversion Tg.Frumos familiar from the two associations in the study.

Table 4

Nitrate content in plant samples collected from farms before conversion (mg/kg)

Code sampe	Place harvest	Harvesting date	Plant samples	$NaNO_2$ [mg/kg]	KNO_3 [mg/kg]
0	1	2	3	4	5
V11	Tg. Frumos	9.07.2009	tomato variety Venetia,	nd	nd
V12	Tg. Frumos	9.07.2009	tomato variety Izmir	nd	nd
V13	Tg. Frumos	9.07.2009	tomato variety Balett	nd	nd
V14	Tg. Frumos	9.07.2009	cucumber / solar	nd	4.41
V15	Tg. Frumos	9.07.2009	pepper / solar	nd	nd
V16	Tg. Frumos	9.07.2009	pepper - leaf	nd	40.81
V17	Tg. Frumos	9.07.2009	cucumber Merengue + Mandi	nd	13.48
V18	Tg. Frumos	9.07.2009	cauliflower - leaf, field Fremont	nd	nd
V19	Tg. Frumos	9.07.2009	celery - leaves, field	nd	72.33
V20	Tg. Frumos	9.07.2009	pepper Romatica	nd	nd
V21	Tg. Frumos	9.07.2009	pepper Romatica - Leaves	nd	115.66
V22	Tg. Frumos	9.07.2009	pepper Bianca	nd	nd
V23	Tg. Frumos	9.07.2009	- sweet Bianca - leaves	nd	146.5
V24	Tg. Frumos	9.07.2009	pepper Whitny	nd	nd
V25	Tg. Frumos	9.07.2009	Whitny peppers - leaves	nd	58.6
V26	Tg. Frumos	9.07.2009	pepper Vedrana	nd	nd
V27	Tg. Frumos	9.07.2009	Vedrana peppers - leaves	nd	43.95
V28	Tg. Frumos	9.07.2009	pepper Fidelio	nd	nd
V29	Tg. Frumos	9.07.2009	Fidelio peppers - leaves	nd	190.45
V30	Tg. Frumos	9.07.2009	cucumber Amurg	nd	nd
V31	Tg. Frumos	9.07.2009	cucumber Amurg leaves	nd	43.95
V32	Tg. Frumos	9.07.2009	tomatoes Ballet	nd	nd
V33	Tg. Frumos	9.07.2009	tomatoes Ballet - leaves	nd	13.2

In all samples analyzed for nitrite content was undetectable. Nitrate content in vegetable samples analyzed from these farms was within acceptable limits. Plant samples at these variations were observed between nitrate content of leaf samples of such plant nitrate content in the product.

CONCLUSIONS

1. Most soil samples and plant products do not have pollution by nitrates and nitrites.

2. Nitrate content in organic farm ranged 573.93mg/kg at USAMV and 19.33mg/kg, falling within acceptable limits for organic production.

3. At Tg. Frumos, have been determined the highest concentrations of nitrates in the soil, up to about 5579.47 mg/100 g, in terms of production and intensivization big those numbers are not harmful to vegetable crops and is a potential risk factor.

4. Nitrate content of vegetable products has been zero or negligible values (unknown) environmental operating conditions, and vegetable crops under the conventional system this content reaches up to about 190.45 mg/kg dry soil, placing is within acceptable limits.

5. Nitrite contents were generally undetectable quantities.

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