THE SEASONAL EVOLUTION OF THE NITRATES IN SOIL AND PLANT, AT *CAPSICUM ANNUUM* L. CONV.GROSSUM, IN THE CONDITIONS OF VEGETATION'S VESSELS EXPERIENCES

EVOLUȚIA SEZONIERĂ A NITRAȚILOR ÎN SOL ŞI PLANTĂ, LA *CAPSICUM ANNUUM CONV.GROSSUM,* ÎN CONDIȚIILE UNOR EXPERIENȚE ÎN VASE DE VEGETAȚIE

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Abstract. *The nitrogen represents one of the most disputed element concerning the presence and the effect, in plants environment and chemical composition. Accumulation in active soil stratum of the radicular system over the normal limits can create the induction of some luxury consumption phenomena and even toxicity at crop plants and level fruits. In this context a serious control of nitrates must be done in both two environments, soil-plant, keeping an equilibrium which can insure the normality and to avoid toxicity and pollution phenomenon.*

Rezumat. *Experiența demarată în cadrul disciplinei de Agrochimie a UŞAMV Iaşi în sistemul semicontrolat al vaselor de vegetație, face parte dintr-un studiu amplu, în care urmărim evoluția unor factori biologici, de producție şi agrochimici asupra culturii de ardei gras.*

Lucrarea de față face referiri asupra evoluției nitraților din sol, dar şi din plantă, atunci când se aplică fertilizarea chimică radiculară, precum şi cea combinată (radiculară şi foliară).

Evoluția nitraților din sol depinde de tipul de sol, sortimentul de îngrăşământ chimic folosit precum şi de condițiile climatice din timpul perioadei de vegetație. Prezența nitraților în plantă este influențată în mod direct de concentrația acestora din sol, însă aceasta beneficiază şi de aportul asigurat de îngrăşămintele foliare.

The experience in the context of Agrochemistry discipline at UŞAMV Iaşi in one semi-controlled system of vegetation' vessels is included in a high research in which we follow the evolution of biological and agrochemical factors of production towards pepper crops.

The present study makes references towards the evolution of the nitrates in soil and in plant when the chemical radicular fertilization is applied as well as the combined one (foliar and radicular).

Evolution of nitrates from soil depends upon the soil type, the used fertilizer and the climatic conditions during the vegetation period. The presence of nitrates in plants is directed influenced by their concentration in soil, but they benefit of contribution assured by the foliar fertilizer.

MATERIAL AND METHOD

The experiment had been realised the vegetation house of agrochemical discipline belonging to the University of Agricultural Science and Veterinary Medicine "Ion Ionescu de la Brad Iaşi. At the basic fertilization it was used the complex 15-15-15, but for the phasial fertilization, foliar fertilizer F_{221}, Fertcomplex, Green Kristalon and Biostar, at pepper crops.

The purpose of this study was to follow the evolution of nitrate content in soil at the beginning and at the end of vegetation and the impact of simple and combinated fertilization toward the nitrate accumulation in vegetative device as the index of a normal assurance statement of this element in citiric consumption fenophase .

The experiment organised in vegetation vessels in 2006 is three-factorial arranged after the randomised blocks method.

A Factor (foliar fertilization, mineral unfertilized):

a1 - F_{221}

a2 - Fertcomplex

a3 – Kristalon verde

a4 - Biostar

B factor (foliar fertilization, mineral unfertilized – complex 15-15-15):

b1 - F221 + $N_{80}P_{80}K_{80}$

b2 - Fertcomplex+ $N_{80}P_{80}K_{80}$

b3 - Kristalon verde + $N_{80}P_{80}K_{80}$

b4 – Biostar + $N_{80}P_{80}K_{80}$

C factor (hibrid)

c1 – Gypsy

c2 – Albatros

c3 – Belladonna

c4 – Shy Beauty

Table 1

The composition and characteristics of used foliar fertilizer

Foliar fertiliz	**CSA %**	**pH**	**N g/l**	**P g/l**	**K g/l**	**B g/l**	**S g/l**	**Mn g/l**	**Mg g/l**	**Zn g/l**	**Cu g/l**	**Fe g/l**	**Mo g/l**
F221	16	6,5-7	70	70	48	0,2	9	0,2	0,5	0,1	0,05	0,2	-
Fert.	16	6.5	80	80	75	0,3	0,4	0,4	0,04	0,04	0,1	0,3	0,03
Kris.	16	6,6	180	180	180	0,025	-	0,04	-	0,025	0,01	0,07	0,004
ecol. fertiliz	**pH**	**Nt %**	**Nor g %**	**witness %**		**Polizahar., polipept, prot.**					**Vitamins**		
Bios	5,8	2	2	12		13,5					B1, B6, PP		

For the organic foliar fertelizer the concentrations of 0,2-0,3 % (Biostar) and 0,5-1 % were used for the chemical ones and the doses are of 2-3 l/ha . For the organic foliar fertilizer and 7-8 l/ha for the chemical ones.

The basic fertilization was made on 23 of may 2006, one week before planting.

Foliar fertilization was made in three periods: first fertilization before, at 4 july 2006; the second in the immediate period at 12 july 2006; and the last during the blossoming, at 18 july 2006 .

During the period of vegetation tests from soil were taken (at the beggening and the end of vegetation) and tests of vegetative device – leafstalk (the beginning of blossoming which were prepared and supposed to analyse. The nitrates dosing method was the spectophotocolorimetrical method.

RESULTS AND DISCUSSIONS

Fertilization influenced soil feritilization statement and the degree of pepper plants supply through determining a favorable nitrates evolution in both two medium

Table 2

The evolution of nitrogen on the depth of 0-20 cm

Variants/ Hibrids	C1		C2		C3		C4	
	* $N\text{-}NO_3$ ppm	** $N\text{-}NO_3$ ppm	* $N\text{-}NO_3$ ppm	** $N\text{-}NO_3$ ppm	* $N\text{-}NO_3$ ppm	** $N\text{-}NO_3$ ppm	* $N\text{-}NO_3$ ppm	** $N\text{-}NO_3$ ppm
Unfert.	4,5	1,5	4,5	1,8	4,5	1,3	4,5	1,6
a1	4,3	1,4	4,2	1,6	3,9	1,3	4,3	1,4
a2	4,2	1,2	4,2	1,4	3,8	1,1	4,1	1,5
a3	4,4	1,3	4,1	1,1	4,0	0,9	4,1	1,3
a4	4,3	1,1	4,2	1,0	3,9	0,8	4,0	1,5
b1	12,0	7,1	11,5	6,2	11,6	5,8	11,4	6,0
b2	11,9	6,8	12,3	7,5	11,9	4,9	12,3	6,9
b3	12,1	6,5	11,9	6,4	10,7	3,5	11,9	5,5
b4	14,1	8,1	12,1	7,1	10,9	4,4	11,2	6,8

* $N\text{-}NO_3$ ppm = the beginning of vegetation ** $N\text{-}NO_3$ ppm = the tehnological maturity

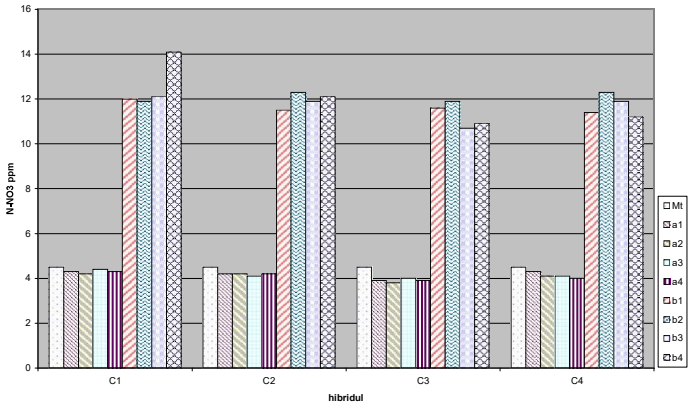

Fig. 1 – Soil nitrate content at the beginning of vegetation

Analisying the evolution of the nitrogen in soil (tab.2) we remark that in all variants of fertilization this situates in medium to large , at the beginning of vegetation period and goes lower step by step at the end of vegetation because of the specific plants consumption on one way and levigation and denitrification phenomena which take place during a vegetation season.

From this point of view, variants C_1b_4, C_2b_2, C_3b_2 and C_4b_2 followed maximal values at the nitrates insurance statement, at the beginning of vegetation period, including in normal insurance class for this determination period and having values between 11,9 and 12,3 ppm. It has been found out for the same variants at the end of vegetation period, – soil nitrate content goes lower with a half , through values under 10 ppm .

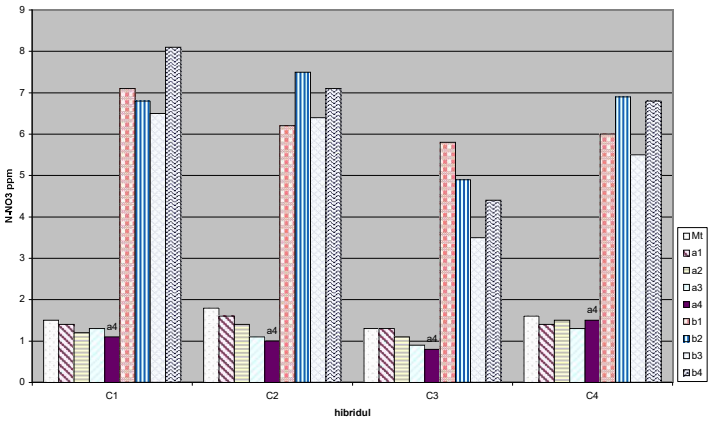

Fig. 2 — Soil nitrate content at the end of vegetation

In foliar fertilized variants, soil nitrate content is low at the beginning of vegetation an goes on lower proportionaly, at the end of vegetation through minimal values, in form of marks (1,1ppm N-NO_3 - var C_1a_4 , C_3a_2 and 0,8 ppm N- NO_3 var C_3a_4 basic and suplimentar fertilization).

The administration of fertilizer as well as a foliar and combinated solutions (basic and suplimentar fertilization) drives to improvement of nitrates plants enssurance statement towards the unfertilized witness.(tab 3).

Table 3

Evolution of nitrogen in pepper leafstalk

Variants/ Hibrids	C1		C2		C3		C4	
	N-NO_3 ppm	%	* N-NO_3 ppm	%	* N-NO_3 ppm	%	* N-NO_3 ppm	%
Unfert.	2500	100	2600	100	2800	100	2650	100
a1	4400	176	4900	188,5	4800	171,4	4700	177,4
a2	4500	180	4700	180,8	4800	171,4	4750	179,3
a3	5050	202	5200	200	5550	198,2	5150	194,3
a4	3700	148	3850	148,1	3900	139,3	3900	147,2
b1	5800	232	6100	234,6	6000	214,3	5950	224,5
b2	5700	228	5900	226,9	6200	221,4	6100	230,2
b3	6200	248	6700	257,7	6700	239,3	6600	249,1
b4	5250	210	5500	211,5	5400	192,9	5350	201,9

The determination of nitrates insurance statement through the analyse of foliar diagnosis, reprezents an analysing test of evolution in soil fertilization, shows the efficiency of the foliar fertilizers appliance, in completing the basic ones.

Nitrates content in leafstalk gets to maximal values in C_2b_3 and C_3b_3 variant of 6700 ppm N-NO_3 and a little lower at C_4b_3 (6600 ppm) and C_1b_3 variants (6200 ppm), which marks a normal nitrates insurance statement of the vegetativ device for the fenophase before blossoming.

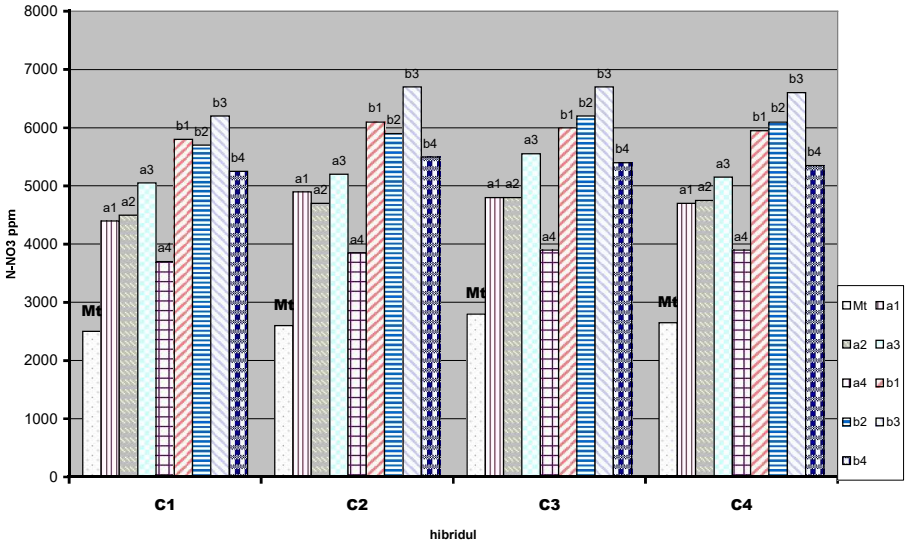

Fig. 3 – Nitrates content in pepper plants

In simple fertilized variants using only foliar products, it remarks an important growing comparing with unfertilized witness, observing that only Kristalon foliar (a_3) can attract an improvement of nitrates plants enssurance statement between normal limits (over 5000 ppm N - NO_3) , the rest of variants , keeping nitrates under optimal values .

CONCLUSIONS

1. Basic fertilization (at soil) assured through complementary with that of foliar protection, represents an viable solution for the manifestation of a normal nitrate fertilization statement in soil.

2. At the beginning of vegetation , the soil nitrates enssurance was situated between normal limits (10 and over 10 ppm N-NO_3) and unpolluted fertilized at variants combined and goes lower step by step during the vegetation , because of plants consumption and because processes which take place in soil (elutriation , denitrification) , under the influence of different agroecopedological factors.

3. The most reprezentative variants under the fertlization aspects impact over the evolution of the nitrates in soil are those which assure NPK agroground completing with Fertcomplex foliar (12,3 ppm N-NO_3).

4. The obtained results through foliar diagnosis at the leaf stalk, in fertilized variants combinated, show a positive relation establish between soil-plant-fertilizer, respectivly nitrates evolution in nourishing medium translocation, metabolism and their presence in plants as the effect of a complete fertilization .

5. The researches and studies, even made over one year period show a surefact , fertilization with solid and liquid products at soil on the foliation device , in minimal quantities, assure normal level of nitrates in soil, unpolluted and without riskc of toxicity for plants.

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