THE ECO-PEDOLOGICAL DIAGNOSIS MATRIX OF SOIL TROPHICITY IN A VEGETABLE SYSTEM UNDER ECOLOGICAL CONVERSION II. DIAGNOZE OF EFFECTIVE TROPHICITY

MATRICEA DIAGNOZEI ECOPEDOLOGICE A TROFICITĂŢII RESURSELOR DE SOL DINTR-UN SISTEM LEGUMICOL ÎN CONVERSIE ECOLOGICĂ II. DIAGNOZA TROFICITĂŢII EFECTIVE

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Abstract. *The vegetable areas from the part of NE Romania are adapted to re-conversion toward the ecological system of producting of the new vegetables under crop. Consequently, the soil quality in these areas is analyzed by the eco-pedological diagnosis of effective troficity. In case of the protected crops, the matriceal indicator of eco-pedological diagnosis shows us a suitable effective trophicity (over 65 points). In case of unprotected crops from Târgu Frumos, this indicator shows us a medium effective trophicity (over 45 points), because of negative anthropogenic impact in conventional system. On the other hand, in case of the ecological system from UASMV Iaşi, the soil has a very good effective trophicity (over 80 points) in the protected system and suitable effective trophicity (over 65 points) on field crops.*

Key words: ecological specific, ecological diagnosis, conventional vegetables, organic vegetables

Rezumat. *Calitatea resurselor de sol, din areale legumicole ale NE României, pretabile la reconversie spre sistemul ecologic de producere a legumelor proaspete cultivate în câmp şi cultură protejată este analizată prin diagnoza eco-pedologică a troficităţii efective. Indicatorul matriceal al diagnozei eco-pedologice indică o troficitate efectivă bună (peste 60 puncte), pentru culturile protejate, şi medie (peste 45 puncte) pentru culturile din câmp, la Tg. Frumos, datorită impactului antropic negativ în sistemul convenţional. În sistem ecologic, la USAMV Iaşi, solul are o troficitate efectivă foarte bună (peste 80 puncte) în sistemul protejat şi bună (peste 65 puncte) la legume în câmp.*

Cuvinte cheie: specific ecologic, diagnoza ecologică, legumicultură convenţională, legumicultură ecologică.

INTRODUCTION

Agrarian Policy of European Union, jointly agreed between the Department of Agriculture and Sustainable Development, Department of Environment, General

Directorate Joint Research Centre and the European Environment Agency, stipulate the improving of agricultural environment in the EU states, the monitoring of quality over 35 agro-ecological indicators with direct impact on vegetation, soil and water (Gobin *et al.*, 2001; Zdruli *et al.*, 2002; Marmo, 2006; Montanarella, 2006).

Within national development and environmental strategies, especially in recent years, more countries have taken into consideration, the solving of complex problems related to damage of environmental quality by anthropogenic impact, by use of intensive technologies.

MATERIAL AND METHOD

The value of Eco-Pedological Diagnose of Efective Trophicity of Soil Resources (EPDETSR-points) is obtained by sum of the score of each of 10 quality analyzed indicators:

$$\text{EPDT} = \sum_{1}^{10}(Tx + AP + Con + BSI + pH + SOM + BS + Nt + P_{AL} + K_{AL})$$

The 10 main pedo-ecological factors and determinants that compose this formula being above-mentioned.

With a view to comparing of the resulted values we gave an assessment scale, with 5 levels. On their basis we gave the qualificatives (very good, good, medium, satisfactory and low):

- less than 20 points – low effective trophicity, oligo-trophic soil; qualificative: low;
- 21-40 points – than medium effective trophicity, oligo-mezotrophic soil; qualificative: satisfactory;
- 41-60 points – medium effective trophicity, mezotrophic soil; qualificative: medium;
- 61-80 points – good effective trophicity, eutrophic soil; qualificative: good;
- 81-100 points – very good effective trophicity, mega-trophic soil; qualificative: very good.

RESULTS AND DISCUSSIONS

On the basis of eco-pedological analyses we pointed out the analysis and assessment of effective trophicity, with the matrix of eco-pedological diagnosis of the soil, in case of vegetable systems in various stages of evolution to organic system, within representative and traditional vegetable lands from NE Romania (tables 1 and 2).

The analysis of Eco-Pedological Diagnosis of Efective Trophicity of Soil Resources (EPDETSR) as synthetic indicator of the correlation and interaction of ecological factors (climatical and pedological) of the biotopes point out the effects of the uncontrolled and negative anthropogenic impact in case of conventional system from Târgu Frumos.

Table 1

The matrix of eco-pedological diagnosis ecopedologice of effective trophicity of the soil, under conventional system

Indicators	Grades	Târgu Frumos – A.F. Maxim						Târgu Frumos – A.F. Vavilov		
		solarium				field		solarium		
		tomatoes	cucumbers	cucumbers small solarium	hot pepper	cauliflower	celery	tomatoes	mild pepper	cucumbers
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Soil texture	value	37	35	35	33	39	39	33	35	36
	class	IV	IV	IV	IV	IV	IV	IV	IV	IV
	score	6	6	6	6	6	6	6	6	6
Consistency of moist soil	value	hard	hard	hard	hard	Very hard	very hard	friable	hard	hard
	class	IV	IV	IV	IV	III	III	V	IV	IV
	score	6	6	6	6	4	4	8	6	6
Soil reaction (pH_{H2O})	value	6.7	6.6	7.1	6.7	6.4	6.4	6.7	6.9	6.6
	class	V	V	VI	V	IV	IV	V	VI	V
	score	8	8	10	8	6	6	8	10	8
Base saturation (%)	value	84	88	90	86	76	78	90	88	87
	class	V	V	V	V	IV	IV	V	V	V
	score	8	8	8	8	6	6	8	8	8
Soil organic matter content (%)	value	3.3	2.5	2.8	3.2	2.5	2.4	3.4	3.0	3.1
	class	IV	III	III	IV	III	III	IV	III	IV
	score	6	4	4	6	4	4	6	4	6
Total nitrogen content (%)	value	0.16	0.17	0.15	0.18	0.14	0.13	0.15	0.16	0.16
	class	IV	IV	IV	IV	III	III	IV	IV	IV
	score	6	6	6	6	4	4	6	6	6
Available phosphorus content-ppm	value	22	24	23	18	16	18	17	18	17
	class	IV	IV	IV	III	III	III	III	III	III
	score	6	6	6	4	4	4	4	4	4
Exchangeable	value	171	152	167	158	130	125	143	152	138

	1	2	3	4	5	6	7	8	9	10
potassium (ppm)	class	IV	IV	IV	IV	III	III	IV	IV	IV
	score	6	6	6	6	4	4	6	6	6
Air porosity (%)	value	20	19	17	15	11	10	18	15	17
	class	IV	IV	IV	III	III	III	IV	III	IV
	score	6	6	6	4	4	4	6	4	6
Biological Synthetic Indicator -%	value	22	27	22	18	17	15	24	21	21
	class	IV	IV	IV	III	III	III	IV	IV	IV
	score	6	6	6	4	4	4	6	6	6
Genetic type of soil		hortic antrhosol				haplic chernozem		hortic anthrosol		
EPDETSR-points	points	64	62	64	58	46	46	64	60	62
	estimate	good	good	good	medium	medium	medium	good	medium	good

Table2

The matrix of eco-pedological diagnosis ecopedologice of effective trophicity of the soil, under organic system

Indicators	Grades	Didactical and Experimental Station – UAVM IAŞI						
		solarium				field		
		mild pepper	eggplants	tomatoes	cucumbers	tomatoes	mild pepper	eggplants
0	1	2	3	4	5	6	7	8
Soil texture	value	34.6	33.9	35.1	34.3	37.5	39.3	38.1
	class	IV	IV	IV	IV	IV	IV	IV
	score	6	6	6	6	6	6	6
Consistency of moist soil	value	friable	friable	friable	friable	hard	hard	hard
	class	V	V	V	V	IV	IV	IV
	score	8	8	8	8	6	6	6
Soil reaction (pH_{H2O})	value	6.4	6.6	6.8	6.9	7.3	7.2	6.7
	class	IV	V	V	VI	V	VI	V
	score	6	8	8	10	8	10	8

0	1	2	3	4	5	6	7	8
Base saturation (%)	value	91	91	92	90	86	85	87
	class	VI	VI	VI	V	V	V	V
	score	10	10	10	8	8	8	8
Soil organic matter content (%)	value	3.74	3.65	3.71	3.62	3.21	3.15	3.26
	class	V	V	V	V	IV	IV	IV
	score	8	8	8	8	6	6	6
Total nitrogen content (%)	value	0.24	0.29	0.23	0.25	0.18	0.17	0.18
	class	VI	V	VI	VI	V	V	V
	score	10	10	10	10	8	8	8
Available phosphorus content (ppm)	value	72	53	71	48	27	30	33
	class	VI	V	VI	V	IV	IV	IV
	score	10	8	10	8	6	6	6
Exchangeable potassium (ppm)	value	193	241	203	232	165	158	143
	class	V	VI	V	VI	IV	V	IV
	score	8	10	8	10	6	8	6
Air porosity (%)	value	21	22	18	19	15	14	15
	class	V	V	IV	IV	III	III	III
	score	8	8	6	6	4	4	4
Biological Synthetic Indicator (%)	value	37	37	36	34	29	27	28
	class	V	V	V	V	IV	IV	IV
	score	8	8	8	8	6	6	6
Genetic type of soil		hortic anthrosol				haplic chernozem		
EPDETSR-points	points	82	84	82	82	64	68	64
	estimate	very good	very good	very good	very good	good	good	good

Also, this diagnosis shows us that the trophic background of studied soils is high, but it's not turning to good account, both, nutrition and physiological processes of plant development and soil biological activity being limited and stressful, especially in case of field crops, in the summer season, excessive droughty. This is the reason for the conventional system of representative and traditional area from Târgu Frumos was taken for research, for its re-conversion to vegetable organic system.

There are evident the higher values in case of Didactical and Experimental Station-UAVM Iaşi (table 2) with organic vegetable system which indicate a high trophicity, much closer to what can ensure the potential of natural soil resourcess. In this way, it highlights the efficiency of organic system, comparatively with conventional system, thus reducing the limitative and stressfull effects which acting, both, on soil quality and plant and vegetable production under environmental protection and sustainable development in NE Romania.

CONCLUSIONS

1. The qualitative values of EPDETSR within studied vegetable ecosystems greatly differ, depending on the stage of re-conversion to organic vegetable and protected system or field, on the one hand, and ecological specific of studied areas, on the other hand.

2. In case of ecological vegetable stationaries they pointed out high values that indicate a high trophicity, much closer to what can ensure the potency of the soil natural resources.

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