THE ECO-PEDOLOGICAL DIAGNOSIS MATRIX OF SOIL TROPHICITY IN A VEGETABLE SYSTEM UNDER ECOLOGICAL CONVERSION I. PEDO-BIO-ENZYMATIC GENERAL INDICATORS

MATRICEA DIAGNOZEI ECOPEDOLOGICE A TROFICITĂŢII RESURSELOR DE SOL DINTR-UN SISTEM LEGUMICOL ÎN CONVERSIE ECOLOGICĂ I. INDICATORI GENERALI PEDO-BIO ENZIMATICI

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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 pedo-biological and pedo-enzymatic indicators . Biological indicators of soil fertility pointed out high level for ecological system, comparatively with the conventional. On the interval, the biological potential decreases more than 30%, comparatively with the series of plants. The values decrease more than 25% comparatively with the protected crops.*

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

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 matricea de specific ecologic, indicatorii pedo-biologici şi pedo-enzimatici. Indicatorii biologici de fertilitate au valori ridicate pentru sistemul ecologic comparativ cu cel convenţional. Pe intervalul dintre rândul de plante, potenţialul biologic scade cu peste 30% faţă de terenul de pe rândul de plante din solar. La culturile de câmp, valorile scad cu peste 25% faţă de culturile protejate.*

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

INTRODUCTION

Within the ecosystem, between biotope and biocenosis they achieve reversible and permanent changes of substances, energy and information which determine the stability or instability of natural and anthropogenic ecosystems (Bireescu *et al.*, 2008).

Ecological interpretation of the soil defines, from the quantitative and qualitative point of view, two important and realistic characteristics of its: trofic potential and ecological specific where the soil can manifest completely or restricting, seasonal and local (Chiriţă, 1974; Doran *et al.*, 1994; Bireescu *et al.*, 2009).

MATERIAL AND METHOD

The main characteristics of quality of the biotope were analysed within ecological context, zonal and regional, by the study of the main physical, chemical and biological properties of soil samples collected from plastic tunnels and field on the lines of plants and interval between lines.

We performed the study of soil trophicity, from the quantitative and qualitative point of view, for reconversion to organic vegetable production characteristics of the biotope was performed by observations and determinations of some physico-mechanical, chemical and biological properties of soil resources both, from plastic tunnels and field (colour, structure, soil reaction, electroconductivity) and laboratory.

We consider that the file of soil quality assessment must contain the most important 10 pedo-ecological factors and determinants: soil texture-Tx; edaphic volume-Ve and soil consistency-Con; Biological Sinthetic Indicator-BSI, total nitrogen content-Nt, available phosphorus content-P_{AL} and exchangeable potassium content-K_{AL}; three eco-pedo-chemical determinants (soil reaction-pH_{H2O}, soil organic matter content-SOM and base saturation-BS). These soil properties were included into the six ecological size classes, noted with scores from 0 to 10 points. Effective trophicity of the soil is the resultant of the action and interrelations of physico-mechanical, chemical and biological properties, at the same time considered indicators of soil fertility and quality.

RESULTS AND DISCUSSIONS

The ecological analysis for Târgu Frumos stationary, where it practiced conventional vegetable production, and for Didactic and Experimental Stationary-UAVM Iaşi where it practiced organic vegetable production, pointed out the followings:

- In the class of low ecological size are included: low level of summer precipitations, low level of summer relative humidity, with stressful and limitative effect, together with soil acidity and air porositty, correlated with fine soil texture, having a stressful and negative role, both, on the lines of plants and especially on interval between lines.
- In the class of excessive ecological size is included the hard and very hard soil consistency in the summer season, especially on the interval between lines of plants. The soil humidity is an ecological factor that determine the soil consistency in the moist and dry condition, having a special role in the functioning of soil and plants to optimum capacity, especially under the climate changes (Feiziene et al., 2008).
- In the class of very low ecological favorability for the vegetable crop field are included the hard and very hard soil consistency and air porosity, low level of precipitations and relative humidity in the summer season, excessive droughty;

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**					
		solarium				**field**	
		tomatoes	cucumbers	cucumbers small solarium	hot pepper	cauli flower	celery
0	1	2	3	4	5	6	7
Soil texture	value	37	35	35	33	39	39
	class	IV	IV	IV	IV	IV	IV
	score	6	6	6	6	6	6
Consistency of moist soil	value	hard	hard	hard	hard	very hard	very hard
	class	IV	IV	IV	IV	III	III
	score	6	6	6	6	4	4
Soil reaction (pH_{H2O})	value	6.7	6.6	7.1	6.7	6.4	6.4
	class	V	V	VI	V	IV	IV
	score	8	8	10	8	6	6
Base saturation (%)	value	84	88	90	86	76	78
	class	V	V	V	V	IV	IV
	score	8	8	8	8	6	6
Soil organic matter content (%)	value	3.3	2.5	2.8	3.2	2.5	2.4
	class	IV	III	III	IV	III	III
	score	6	4	4	6	4	4
Total nitrogen content (%)	value	0.16	0.17	0.15	0.18	0.14	0.13
	class	IV	IV	IV	IV	III	III
	score	6	6	6	6	4	4
Available phosphorus content-ppm	value	22	24	23	18	16	18
	class	IV	IV	IV	III	III	III
	score	6	6	6	4	4	4
Exchangeable potassium (ppm)	value	171	152	167	158	130	125
	class	IV	IV	IV	IV	III	III
	score	6	6	6	6	4	4
Air porosity (%)	value	20	19	17	15	11	10
	class	IV	IV	IV	III	III	III
	score	6	6	6	4	4	4
Biological Synthetic Indicator -%	value	22	27	22	18	17	15
	class	IV	IV	IV	III	III	III
	score	6	6	6	4	4	4
Genetic type of soil		hortic antrhosol				haplic chernozem	
(EPDETSR-points)	points	64	62	64	58	46	46
	estimate	good	good	good	medium	medium	medium

Table 2

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

Indicators	Grades	Didactical and Experimental Station – UAVM IAŞI						
		plastic tunnels				field		
		mild pepper	egg plants	toma toes	cucum bers	toma toes	mild pepper	egg plants
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
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

- The most representative ecological factors and determinants are included into the middle ecological size classes (III-rd and IV-th) and middle and high ecological favorability classes for Tg.Frumos stationary with conventional system. In case of Didactical and Experimental Station-UASVM Iaşi, with organic system, the most representative ecological factors and determinants are included into the midde and high ecological size classes (III-rd IV-th and V-th) and middle and high ecological favorability classes.
- In the class of high ecological size, with positive ecological effects, are included the annual average temperature and two eco-pedological factors of space and time (edaphically volume of the soil and bioactive length period) for Tg.Frumos stationary with conventional system, plus synthetic indicator of potential trophicity of the soil for Didactical and Experimental Station-UASVM Iaşi, with organic system;
- In the class of low ecological favorability are included the growth pedo-ecological factors (available phosphorus, exchangeable potassium, soil organic matter content) and the low level of soil biological activity for Tg.Frumos stationary with conventional system, plus low level of synthetical indicators of potential and effective trophicity, stressed by excessive drought of July 2009, in case of Didactical and Experimental Station-UASVM Iaşi, with organic system;
- In the class of high ecological favorability are included the annual average precipitations, winds, low level of soil acidity and soil reaction for Tg.Frumos stationary with conventional system, plus soil organic matter content, base saturation, soil biological activity and nutrient content in the case of samples collected in June 2009, from Didactical and Experimental Station-UASVM Iaşi, with organic system;
- In the class of very high ecological favorability are included annual average temperature, edaphically volume of the soil and bioactive length period for Tg.Frumos stationary with conventional system, plus soil reaction, in case of Didactical and Experimental Station-UASVM Iaşi, with organic system.

CONCLUSIONS

1. According to ecological specificity files, the most ecological factors and determinants are included into medium ecological size classes and medium and high ecological favorability classes for vegetable crops.

2. There is a distinction between the values obtained on the lines of plants and interval between lines. Thus, on the interval, the values of air porosity and summer consistency of the soil are decreased with 50% becoming risk factors, limiting and stressful, for extension and nutrition of lateral roots. The background of qualities is not turning to good account under compaction and lack of moisture, on the interval between lines. On the lines of plants it focuses on a limited space overall activity of roots and useful microflora lateral root development being restricted mainly to conventional stationaries.

3. Under the field conditions it pointed out the stressful effect of summer drought in July 2009, corroborated with the low relative humidity of air in the summer season.

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