THE ASSESSMENT ON THE FERTILITY POTENTIAL OF VEGETABLES CULTIVATED SOIL FROM TÂRGU FRUMOS MICROREGION

EVALUAREA POTENȚIALULUI DE FERTILITATE A TERENURILOR CU VOCAȚIE LEGUMICOLĂ DIN MICROZONA TÂRGU FRUMOS

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Abstract. *The research was carried out in the vegetable ecosystem of Târgu Frumos microregion in 2010 - 2011. The assessment of the fertility potential of vegetable cultivated soil from Târgu Frumos microregion was evaluated using synthetic biological indicators of soil fertility as expressed through: potential indicator of enzyme activity (IPAE%), potential indicator of vital activity (IPAV%) and synthetic biological indicator (ISB%) (Ştefanic et al 1994). In this study were analyzed two vegetable microfarms from Târgu Frumos such as A.F. Maxim and A.F. Vavilov. The results reveal a high fertility potential of analyzed soil from Târgu Frumos, which provides a high suitability regarding sustainability of the vegetable crops and also stabilize the production process.*
Key words: fertility potential, potential indicator of enzyme activity (IPAE%), potential indicator of vital activity (IPAV%) and synthetic biological indicator (ISB%).

Rezumat. *Cercetările au fost desfăşurate în cadrul ecosistemului legumicol al microzonei Târgu Frumos în 2010 - 2011. Evaluarea potențialului de fertilitate a terenurilor cu vocație legumicolă din microzona Târgu Frumos s-a realizat cu ajutorul indicatorilor biologici sintetici de fertilitate şi calitate ai solului exprimați prin: indicatorul potențialului activității enzimatice (IPAE%), indicatorul potențialului activității vitale (IPAV%) şi indicatorul sintetic biologic (ISB%) (Ştefanic şi colab 1994). În cadrul acestui studiu au fost analizate două microferme legumicole din microzona Târgu Frumos, A.F. Maxim respectiv A.F. Vavilov. Rezultatele demonstrează un potențial ridicat de fertilitate a terenurilor din microzona Târgu Frumos, ceea ce asigură o mare pretabilitate privind sustenabilitatea culturilor legumicole vizând totodată posibilitatea stabilizării procesului de producție.*
Cuvinte cheie: potențial de fertilitate, indicatorul potențialului activității enzimatice (IPAE%), indicatorul potențialului activității vitale (IPAV%), indicatorul sintetic biologic (ISB%).

INTRODUCTION

Târgu Frumos microregion is one of the most important areas of vegetables crops from Moldova. From tens or even hundreds of years, the populations of

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Târgu Frumos have practice the vegetable growing and the products are delivered to markets and retail stores in major cities (Munteanu, 2009).

Soil fertility is the main attribute of the fundamental life processes and pedogenesis of the soil, through which provides the structure and functionality of natural biocenoses (Stefanic et al. 2006, Bireescu Geanina 2001). Highlighting the action and intensity of inputs on quality indicators of fertility and soil resources, is performed using synthetic indicators like PIVA, PIEA and SBI proposed by Stefanic et al (1994).

In these circumstances the question apear to ensuring increased values of fertility and biological properties and mitigation under the stress of the risk factors determined by conventional vegetable growing system in which risk factors have a significant role in limiting and stressful.

In our country, soil respiration testing was possible in 1988 when Stefanic made an original respirometer, able to replace the oxygen consumed automatically in the process of soil respiration and capture CO_2 released (Stefanic, 1999). Soil respiration is a parameter that assesses the soil microflora activity and is representing a measure of the intensity with which it engages soil processes involving soil microflora (Stefanic, 1999).

MATERIAL AND METHOD

The research was carried out in 2010 - 2011 in the vegetable ecosystem of Târgu Frumos microarea for two microfarms, AF Maxim and A.F. Vavilov, in order to evaluate the fertility potential of land in this area.

The study of the main characteristics of soil fertility was possible with a series of indicators of soil fertility such as:

- Potential indicator of vital activity (PIVA), expressed as semisum of respiratory activity of soil and cellulose decomposition activity (PIVA% = (A + At) / 2);
- Potential indicator of enzyme activity (PIEA), expressed as semisum of sucrase and urease activity in soil (PIEA% = (Z + U) / 2);
- Synthetic biological indicator - (SBI%), expressed as semisum of the above mentioned two indicators (BI = (PIVA% + PIEA%) / 2).

Calculation methodology for PIVA% and PIEA% is based on the equal importance of each determination, considering each determination that the expression of one aspect of soil life event.

Samples for laboratory testing were collected using a sampling drill from the depth 0-20 cm by taking systematic agrochemicals samples applied in Romania at two different times, 18.03.2010 and 20.07.2010 from among the plants and the interval between rows of plants.

The test results for indicators were statistically processed by multiple test method of Duncan (Snedecor, 1965).

RESULTS AND DISCUSSIONS

Potential Indicator of Vital Activity - PIVA%

In Table 1 can be seen the results on synthetic indicators of fertility of soil resources: PIVA; PIEA and SBI.

At A.F. Maxim (18/03/2010) stationary, the values of potential indicator of vital activity (breathing and cellulose) from vegetables crops in solar plants vary slightly among the 16.88% to 20.08%.

At A.F. Vavilov (18.03.2010) stationary, the values of vital potential from the plants cultivated in greenhouse are average among comparable to those of A.F. Maxim 13.45 to 15.64% respectively.

At A.F. Maxim (20/07/2010), the values that indicates the synthetic indicator of potential cellulolytic vital breath from the samples that was taken from the greenhouse varying slightly from 20.07 to 22.27%.

At the samples from the interval between rows of plants the values halved.

At A.F.Vavilov (20/07/2010) stationary, the values are comparable to the A.F. Maxim, 20.93 to 22, 30%.

At the samples from the interval between rows of plants the values halved.

Potential indicator of enzyme activity - PIEA%

Stationary Târgu Frumos – A.F.Maxim (18/03/2010), the depth of 0-20 cm, the values for the enzymathic potential varying slightly from 7.11 to 8.45%.

Stationary Târgu Frumos – A.F. Vavilov (18/03/2010), the 0 -20 cm depth, the values for the enzymathic potential are submedii of greenhouse crops are comparable to those of A.F. Maxim, but somewhat smaller 6.25 to 6.71%.

Stationary Târgu Frumos – A.F. Maxim (20/07/2010), the depth of 0-20 cm, the values of synthetic indicator of potential enzyme for the sample taken between the rows in greenhouse, varying slightly from 10.26 to 11.41 %

At the samples from the interval between rows of plants the values halved. Stationary Târgu Frumos – A.F. Vavilov (20/07/2010), the 0 -20 cm depth, the values are comparable to those of A.F. Maximum, 11.26 -11.91% respectively.

At the samples from the interval between rows of plants the values halved.

Synthetic Biological Indicator - SBI%

Stationary Târgu Frumos - A.F. Maxim (18.03.2010), the 0 -20 cm depth, the values of biological potential from the vegetables cultivated in greenhouses are varying slightly from 11.99 to 14.26%.

Stationary Târgu Frumos - A.F. Vavilov (18.03.2010), the 0 -20 cm depth, the values of potential biological are smaller comparable to those of A.F. Maxim 9.85 to 11.02% respective.

Stationary Târgu Frumos - A.F. Max (20.07.2010), the 0 -20 cm depth, the values of biological potential of greenhouse crop between the rows of the plants, varying slightly from 15.16 to 16.59%.

At the samples from the interval between rows of plants the values halved.

Table 1

The Potential of Vital and enzymatic study of vegetable from Târgu Frumos 2010

Stationary	Culture	Specification	POTENȚIAL BIOTIC			POTENȚIAL ENZIMATIC					
			soil breathing (mg CO_2)	Celulozolise (%celulose)	PIVA %	Catalasis (cmc O_2)	Sucrose (mg gl)	Ureasis (mg NH_4)	Total Fosfatasis (mg P)	PIEA %	SBI %
Tg.Frumos A.F.Maxim 0-20cm 18.03. 10	Onion	Small tunnel lake ,row	21,15	22,45	18,27	225	524	5	3,1	8,16	13,22
	Letuce	Small tunnel lake ,row	23,41	24,56	20,08	234	568	4	3,8	8,45	14,26
	Orach+Letuce	Tunnel hill, row	20,74	21,63	17,73	207	453	6	2,7	7,49	12,61
Tg.Frumos A.F.Vavilov 0-20cm 18.03. 10	Vegetables	Tunnel lake, row	17,71	16,43	13,45	187	364	4	2,6	6,25	9,85
	Cucumbers	Tunnel lake, row	18,32	19,06	15,64	193	376	3	3,2	6,40	11,02
	Peppers	Tunnel edge, row	17,27	18,54	15,03	201	384	5	2,5	6,71	10,87
Tg.Frumos AFMaxim 0-20cm 20.07.10	Tomato *Granadero F1*	Row	25,86	26,31	21,77	317	756	6	4,2	11,41	16,59
		Interval	14,71	15,44	12,62	152	273	3	2,1	4,87	8,75
	Tomato *Caliope F1*	Row	24,31	25,21	21,01	336	684	5	3,7	10,84	15,93
		Interval	13,17	14,36	11,57	125	315	2	1,8	5,63	8,60
	Peppers *Maradona*	Row	23,42	24,53	20,07	351	568	4	4,6	10,26	15,16
		Interval	11,31	12,65	10,09	172	276	2	2,3	5,03	7,56
Tg.Frumos A.F.Vavilov 0-20cm 20.07.10	Tomato *Belle F1*	Row	26,14	27,18	22,30	312	754	7	4,4	11,55	16,93
		Interval	14,05	13,24	12,32	165	471	4	3,0	6,84	9,58
	Cucumbers *Merengue*	Row	24,81	25,33	20,93	322	788	9	3,7	11,91	16,42
		Interval	17,03	18,27	14,81	161	442	4	1,8	6,29	10,55

Stationary Târgu Frumos - A.F. Vavilov (20.07.2010), the 0 -20 cm depth, the values are the average of the biological potential of solar crop plants among comparable to those of AF Maxim repectiv 16.42 to 16.93%.

At the samples from the interval between rows of plants the values halved.

The environmental conditions in greenhouses and in the open field in 2010, is considered an atypical climatic year for the investigated area, with a rainy summer and not dry out as multi-media shows, correlated with the type of operation (conventional) and position among the plants (drip irrigation) or range of rows (irrigated and sunk by anthropogenic impact and technology) influence, cautions, limited, or promote the resumption and multiplication of soil biological activity in the qualitative transformation of organic waste.

Biological and synthetic fertility indicator as pedobiologic SBI, show high values in the two stationary studied plants row regardless of culture.

The values decreased significantly in the interval between rows of plants and can reach over 50% due to soil compaction in terms of fertile soils because of the high clay content, consistency summer regime and poor aeration.

Synthetic indicators of fertility values and quality PIVA% and PIEA% are influenced by environmental conditions and the microclimate of a technological nature.

Biological activity is much lower range especially because poor physical and mechanical properties (medium-fine texture soil, low aeration porosity and consistency summer hard soil) and anthropogenic impact by subsidence phenomenon and especially the impact of stressful and limiting the risk factors of conventional technology system on life in soil.

CONCLUSIONS

1. In conventional technology system in the two analyzed stationary the vital indicators of fertility and quality synthetic, PIVA% SBI% and PIEA% are influenced by environmental conditions and the microclimate of a technological nature, emphasizing the positive mitigate the effects of stressful and limiting risk factors;

2. The biological activity is much lower range especially because poor physical and mechanical properties (medium-fine texture soil, low aeration porosity and consistency summer hard soil) and anthropogenic impact by subsidence phenomenon and especially from the impact of stressful and limiting the risk factors of conventional technology system on life in the soil;

3. The biotic potential physiological activity illustrate the totality of soil microbiota (microflora, edaphic mezofauna) which is involved in biochemical transformation of organic matter, humus and mineral soil material.

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