ORGANO-MINERAL FERTILIZER USE IN AGRICULTURE SUSTAINABLE

FERTILIZANŢI ORGANO-MINERALI CU UTILIZARE ÎN AGRICULTURA DURABILĂ

CIOROIANU T., SÎRBU Carmen,
DUMITRAŞCU Monica, ŞTEFĂNESCU S.
[1]National Research - Development Institute for Soil Science, Agrochemistry and Environment Protection, Bucharest, Romania

Abstract. *Carried out research aimed to test agrochemically and realize some organo-mineral fertilizers with humic substances, fulvic and microelements that can be used both in organic and conventional agriculture. Fertilizers can be applied both extraradicular and through irrigation (watering or drip). Testing and evaluation of these fertilizers has been carried out comparatively with witnesses represented by certificated fertilizers. Present paperwork shows the results of agrochemically tests carried out in the House of vegetation on a tomato culture using new variants of organo-mineral fertilizers with possibilities to be used both in conventional and ecological agriculture.*

Key words: fertilizer, humic acids, fulvic acids, organo-mineral, foliar

Rezumat. *Cercetarile efectuate au urmarit realizarea si testarea agrochimica a unor fertilizanti organo-minerali cu substante humice, fulvice si microelemente utilizabili atat in agricultura clasica cat si cea ecologica. Fertilizantii se pot aplica atat extraradicular cat si prin irigare sau udare cu picatura. Testarea si evaluarea acestor fertilizanti s-a facut comparativ cu martori reprezentati de ingrasaminte certificate. Lucrarea prezentate rezultatele testarii agrochimice efectuate in Casa de vegetatie pe cultura de tomate utilizand noi variante compozitionale de fertilizanti organo-minerali cu posibilitati de utilizare atat in agricultura clasica cat si ecologica.*

Cuvinte cheie: fertilizant, acid humic, acizi fulvici, organo-meineral, foliar

INTRODUCTION

Globally there is a remarkable series of solutions containing fertilized Humic substances, fulvice, proteic substances in single component or structures with macro and micronutrients, used as fertilizers both in high culture and in the intensive from greenhouses and solariums (T. Cioroianu si col., 2009, Manuel Mata Brenuy, 2006, Oleg Andreevich Gladkov, 2007).

It is well known that the use of compounds that belong to class of humic and fulvic substances due to chelate properties from such elements as iron, copper, zinc, calcium, magnesium and manganese that ensures a more easily absorption both by plant and animal organisms. It also mentions their use in combination with NP or NPK structures to increase agricultural production by

increasing nutrient absorption and photosynthesis processes (Carmen Sirbu et al. 2008, 2009).

Within the testing laboratory and quality control of fertilizers in the INCDPAPM - ICPA - Bucharest experiments have been conducted leading to many variants of processes and formulas of fertilizers with possible uses in agriculture classical system, but also organic, the fertilizer-applied agrochemical extraradicular being tested in the House of vegetation and solar (Carmen Sirbu et al., 2009).

The principles that were applied to define the technological processes for obtaining these fertilizers were specific to organic agriculture standards also classic according to EC Regulation 834/2007 regarding organic production and labeling of organic products, Regulation (EC) 889/2008 laying rules for implementing Regulation (EC) no. 834/2007 on organic production and labeling of organic products and Regulation (EC) 2003/2003 on chemical fertilizers.

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MATERIAL AND METHOD

Using some extracts of natural substances from vegetal origin, represented by salts of humice and fulvice acids into a complex matrix with chelates macro and microelements , leads to stabile fertilizers from physical and chemical point of view. Fertilizers can be applied both extraradicular and drop wetting.

There were obtained from laboratory phase three variants of extraradicular fertilizers with organic substances composition with simulating role, obtained by extraction and separation and fulvice and humic acids from coal mass. Experimental fertilizers have been tested experimentally, by extraradicular application in the House of vegetation on tomato culture.

Experiments performed to obtain fertilizers extraradicular targeted:

-to define the structure and composition of fertilizer materials setting;
-to set the laboratory experimental schemes and operating parameters;
-to establish control on the phase of the process and final;
-to check technologies at the laboratory stage;
-to create samples for physico-chemical characterization and realize agrochemical testing.

Extraradicular fertilizers experimentally obtained to realize the agrochemical testing were:

- NPK type with salts from fulvice acids and chelates microelements, variant „OMI 1";
- NPK type with salts from humic acids and chelates microelements – variant „OMI 2"
- NK-type with salts from humic and fulvice and microelements – variant „OMI 3"

Experimental fertilizers were tested comparatively with unfertilized witness (M0), two foliar fertilized and certified „ECO" (ECO 1 and ECO 2) and a traditional extraradicular fertilizer „Fert 111".

Agrochemical experiments were carried out in the House of Vegetation from I.N.C.D.P.A.P.M. – ICPA Bucharest, using Mitscherlich pots with 20 kg soil.

Testing were carried out on a cultures created on unfertilized agrofond, and also on fertilized agrofond with complex fertilizer type 15.15.15, in doses of 50 mg for each nutrient / kg soil.

Agrochemical experiments were realised on tomato culture, type Dacia – Pontica, on a vermic chernozem soil There were created fourteen variants (seven on agrofond without fertilization and seven on an agrofond with fertilization), with three repetitions of three plants.

Experimental fertilizers were applied as 0.5% concentration solution in quantities of 30 ml / pot, in number of three treatments at intervals of 10 to 15 days.

At the end of the vegetation were performed assessments of the parameters of production and analysis of the value of nutrients in the fruit samples.

RESULTS AND DISCUSSIONS

In case of experiments carried out on tomato culture, Dacia Pontica type, cultivated in vegetation pots, when the end of vegetation there were made physical and chemical analyses from fruits, after the assessments of production parameters, from the average sample of the three repetitions.

The agrochemical activity results of the fertilizers on tomato culture, in House of Vegetation, are presented in table 1 - 2 and figure 1 - 3.

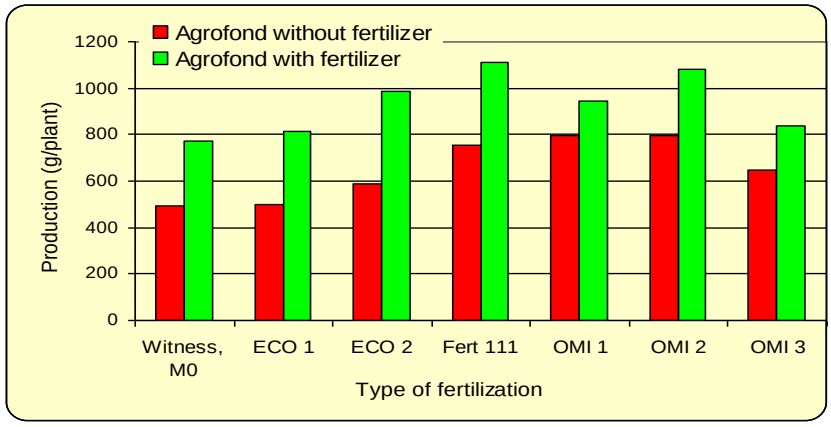

Fig. 1. The evolution of production depending on extraradicular fertilization applied to tomatoes, variety Dacia - Pontica (without fertilization and with basic fertilization)

The growth of production for experimental variants cultivated on unfertilized agrofond were 100.7 – 119.3% (ECO witnesses) until 161.5 – 161.7 (fertilizers OMI 1 and OMI 2) compared to extraradicular unfertilized witness (M0) and increased gradually in the following order: M0, ECO 1, ECO 2, OMI 4, Fert 111, OMI 1 and OMI 2.

In the case of carried out experiments on basic fertilized agrofond, growth of productions compared to M0 witness were bigger with 5 to 28% (in case of ECO witness) and till 40 – 43.8 % (fertilizer OMI 2, respectively Fert 111) with a evolution in the following order: M0, ECO 1, OMI 4, OMI 1, ECO 2, OMI 2 and classic fertilizer Fert 111.

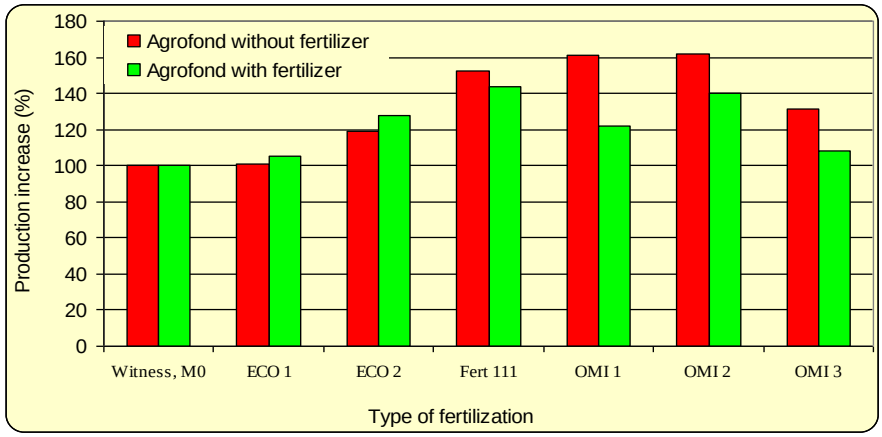

Fig. 2. The evolution of production over the M0 witness according to the extraradicular fertilization, applied on tomatoes, variety Dacia - Pontica (without basic fertilization and with basic fertilization)

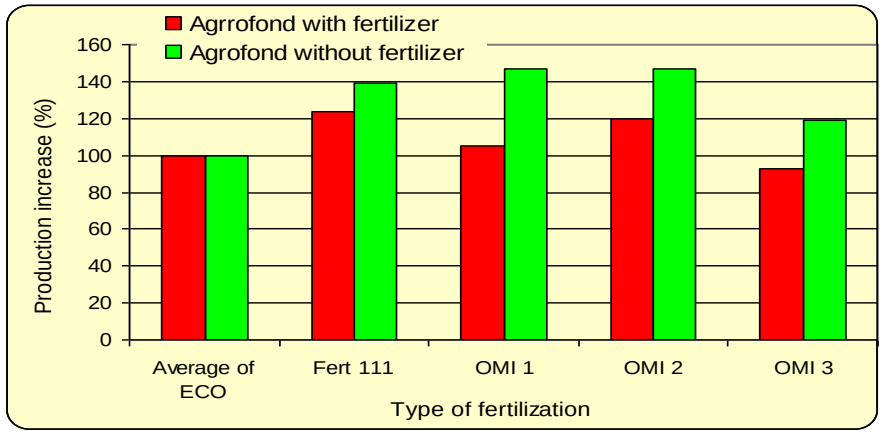

Fig. 3 - Distribution of production increase over the average of witness ECO depending on extraradicular fertilization applied an tomato variety Dacia - Pontica (without basic fertilization and with basic fertilization)

Statistical data analyses obtained after the agrochemical experiments carried out on and agrofond without basic fertilization indicated the obtaining of a different significant production in case of experimental fertilizers OMI 1 and OMI 2 both compared to the variant without foliar fertilization (M0) and with the product certified „ECO 1" and average yields obtained (table 1).

In case of carried out tests on a basic fertilized agrofond the statistical analyses data indicated a significant production in case of experimental fertilizers Fert 111 and OMI 2, both against the variant without foliar fertilization (M0) and against the fertilizer certified "ECO 1". Compared to the traditional fertilizer Fert 111 obtained productions were insignificant (table 2).

Table 1

The evolution of tomato production by foliar treatment applied, basic unfertilized agrofond

Fertilizer type	Product plant / plot g	Difference compared to MO, g	Signif.	Difference compared to ECO 1, g	Signif.	Difference compared to ECO 2, g	Signif.	Difference compared to Fert 111, g	Signif.
		MO		ECO 1		ECO 2		Fert 111	
M0	493,3	0,0	-	-3,3	ns	-95,0	ns	-260,0	o
ECO 1	496,7	3,3	ns	0,0	-	-91,7	ns	-256,7	o
ECO 2	588,3	95,0	ns	91,7	ns	0,0	-	-165,0	ns
F 111	753,3	260,0	*	256,7	**	165,0	ns	0,0	-
OMI 1	796,7	303,3	**	300,0	**	208,3	*	43,3	ns
OMI 2	798,7	305,3	**	302,0	***	210,3	*	45,3	ns
OMI 3	646,7	153,3	ns	150,0	*	58,3	ns	-106,7	ns

DL 5% 201,44 DL 1% 287,38 DL 0.1% 410,28

Table 2

The evolution of tomato fruit production by foliar treatment applied, basic fertilized agrofond

Fertilizer type	Product plant / plot	Difference compared to control, g	Signif.	Difference compared to control, g	Signif.	Difference compared to control, g	Signif.	Difference compared to control, g	Signif.
	g	MO		ECO 1		ECO 2		F 111	
M0	771,7	0,0	-	-40,0	ns	-216,0	ns	-338,3	o
ECO 1	811,7	40,0	ns	0,0	-	-176,0	ns	-298,3	o
ECO 2	987,7	216,0	ns	176,0	ns	0,0	-	-122,3	ns
F 111	1110,0	338,3	*	298,3	*	122,3	ns	0,0	-
OMI 1	943,3	171,7	ns	131,7	ns	-44,3	ns	-166,7	ns
OMI 2	1080,0	308,3	*	268,3	*	92,3	ns	-30,0	ns
OMI 3	835,0	63,3	ns	23,3	ns	-152,7	ns	-275,0	o

DL 5% 268,78 DL 1% 383,45 DL 0.1% 547,43

CONCLUSIONS

1. Were experimentally obtained and characterized physico-chemical 3 fertilizers to be applied to extraradicular fertilization. These fertilizers are distinguished by a complex composition by associating a type matrix NPK or NK, with micronutrients Fe, Cu, Zn, Mn and Mg of humic and fulvic acids, natural substances chelated and biostimulator role.

2. With agrofond a basic fertilization in the House of Vegetation on tomato, Dacia Pontica variety, it has been remarked a ascending evolution of the productions gains compared to M0 witness, in the following order: 5.2% for ECO 1, 8.2% for OMI 3, 22.2% for OMI 1 and 28% for OMI 3, respectively 40% for OMI 2 and 43.8% in the case of traditional fertilizer Fert 111, production differences being significant for Fert 111 and OMI 2.

3. Regardless the agrofond the higher production were obtained through the extraradicular application of experimental fertilizers OMI 1 and OMI 2 containing humic and fulvic compounds as well in the case of the fertilizer Fert 111.

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