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EXPERIMENTAL RESEARCH ON THE APPLICATION OF NEW FOLIAR FERTILIZERS ON LETTUCE CROP IN SOLAR

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Abstract

Among the unconventional means of action on the internal environment of plants, to reduce the entropy dissipation of nutrients on the soil profile and to increase the degrees of productive use of nutrients in harvest, the newly created foliar products are part of research topics for their introduction in the Romanian agriculture [1, 6, 9, 10, 11].

Research was conducted in 2010, in the University of Agronomic Science and Veterinary and Medicine of Iasi, experimental field of the SDE V. Adamachi (horticultural farm Adamachi and Ezăreni ranch) and was aimed at:

- *increasing the productive potential of soil under conditions of environmental protection;*
- *establishing of unpolluting fertilization technologies;*
- *testing new Romanian and foreign fertilizers.*

For this purpose, experiments were tested on lettuce, Silvia cultivar, in the solarium, and seven liquid products of foliar application were tested.

INTRODUCTION

The results of the research in field, solarium and greenhouses with foliar fertilizers determined their recommendation and implementation in the agricultural and horticultural practice, globally. This encouraged progressive production of foliar fertilizers in many countries, both for their local use and export [12, 11, 5, 13, 9, 6, 1, 3, 4].

Newly created foliar products, tested for their introduction in Romanian agriculture are unconventional and non-polluting means of action on the internal environment of plants, to reduce the entropy dissipation of nutrients on the soil profile and to increase the degrees of productive use of nutrients in harvest [3, 4, 5, 11].

Foliar fertilizers are preferred by many countries [12, 13] as it was found that they had special advantages such as:

- provide enrichment plants with nutrients, micronutrients, minerals and vitamins that improve plant health, helping to increase production;
- are 100% water soluble and easy to apply;
- stimulate the production of microbial biomass, by increasing the fertility of the soil;
- prevent the development of pathogens in plants;
- stimulate plant health;
- determine the production of compounds that stimulate the natural defense mechanisms of plants.

MATERIAL AND METHODS

Research was conducted in 2010, in the University of Agronomic Science and Veterinary Medicine of Iasi, experimental field of the SDE V. Adamachi (horticultural farm Adamachi and Ezăreni ranch) and was aimed at:

- increasing the productive potential of soil under conditions of environmental protection;
- establishing of unpolluting fertilization technologies;
- testing new Romanian and foreign fertilizers.

For this purpose, experiments were tested on lettuce, Silvia cultivar, in the solarium, and seven liquid products of foliar application were tested.

V.1	Control, sprinkled with water
V.2	F111 Hum - 1%
V.3	F111 Hum - 3%
V.4	F311 Hum - 1%
V.5	F311 Hum - 3%
V.6	Humat de potasiu - 1%
V.7	Accele-GRO-M - 0.1%
V.8	Accele-GRO-M - 0.3%

RESULTS AND DISCUSSION

The soil on which the experiments were located was a hortic antrosol from the SDE UASVM Iasi, with a potential for high fertility. The main physical and chemical qualities of soil are presented in table 1, both in unfertilized control variant, but sprinkled with water, and also for highly productive variants, foliar fertilized.
Figure 1 shows the influence of fertilization with fertilizers tested.
Foliar fertilization increased the total assimilatory pigments (39.34%-Accel-GRO-M-0.1% and 43.30% - F 311-1%) and the content of each pigment (Table 2).
It appears that by foliar fertilization are obtained significant increases (36.23% - potassium humate-1% and 40.77% - F311 Hum -1%) (Figure 1, Table 3).

Fig. 1. Influence of fertilization on lettuce, in solar (Silvia cultivar)

CONCLUSIONS

1. Foliar fertilization is a complementary measure, unconventional and ecological fertilization can improve the mineral nutrition and plant tissues which can created, of course, a nutritional balance that makes the plants to withstand stress conditions and also to ensure satisfactory yields.
2. It appears that the foliar fertilizers applied have stimulated plants to additional consumption of mobilized nutrients from the reserve soil, increasing root absorption capacity.
3. The foliar fertilizers used to lettuce, Silvia cultivar, during vegetation plants, provide significant production increases statistically compared with control unfertilized. It appears that by foliar fertilization are obtained significant increases (36.23% - potassium humate-1% and 40.77% - F311 Hum-1%).
4. In particular the following products were highlighted, foliar applied, which realized the significant production increases and energy balance: F 311 Hum-3% (40.77%), (31.34%); and F111 Hum-3% (39.05%), (29.79%), respectively.
5. Fertilizers tested by foliar fertilization increased the total content in assimilatory pigments (39.34% - Accel-GRO-M - 0.1% and 43.50% - F 311 Hum-3%) and content of each pigment in part.

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Table 1

Main physical and chemical characteristics of soil

Ecopedotop	Specification	Clay under 0.002 mm	Text. cls.	Porosity of aeration	EC, mS/cm	pH in H_2O	Humus, %	Nt, %	P_{AL}, ppm	K_{AL}, ppm	SB, me	T, me	V, %
SDE USAMV Iaşi 20.07.10 *Hortic Antrosol Solars (0-20 cm)*	Lettuce, row of plants	35.1	TT	25	0.386	6.73	3.754	0.256	88	254	27.7	30.4	93
	Lettuce, interspace of plants	35.8	TT	13	0.441	6.88	3.775	0.275	95	267	29.8	32.5	95

Table 2

Efficiency of foliar fertilization on lettuce photosynthesis in solar, non-irrigated (Silvia cultivar)

Variants	a Clorophyll				b Clorophyll				Carotene				Total pigments (mg/g s.pr)			
	mg/g	*dif*	*%*	*Sem*	*mg/g*	*Dif*	*%*	*Sm*	*mg/g*	*Dif*	*%*	*Sm*	*mg/g*	*Dif*	*%*	*Sm*
Control, sprinkled with water	0.2051	-	100	-	0.1743	-	100	-	0.1406	-	100	-	0.5200	-	100	-
F111 Hum -1%	0.2897	0.0846	141.26	xxx	0.2503	0.0760	143.66	xxx	0.2008	0.0602	142.83	xxx	0.7408	0.2208	142.46	xxx
F111 Hum - 3%	0.2943	0.0892	143.51	xxx	0.2541	0.0798	145.83	xxx	0.2033	0.0627	144.66	xxx	0.7517	0.2317	144.55	xxx
F311 Hum - 1%	0.2920	0.0869	142.38	xxx	0.2514	0.0771	144.25	xxx	0.2018	0.0612	143.59	xxx	0.7452	0.2252	143.30	xxx
F311 Hum - 3%	0.2957	0.0906	144.19	xxx	0.2560	0.0817	146.91	xxx	0.2049	0.0643	145.78	xxx	0.7566	0.2366	145.50	xxx
Humat de potasiu - 1%	0.2887	0.0836	140.78	xxx	0.2486	0.0743	142.67	xxx	0.1987	0.0581	141.35	xxx	0.7360	0.2160	141.53	xxx
Accele-GRO-M - 0.1%	0.2845	0.0794	138.73	xxx	0.2446	0.0703	140.35	xxx	0.1955	0.0549	139.07	xxx	0.7246	0.2046	139.34	xxx
Accele-GRO-M - 0.3%	0.2883	0.0832	140.57	xxx	0.2483	0.0740	142.48	xxx	0.1986	0.0580	141.28	xxx	0.7352	0.2152	141.38	xxx

DL5%-0.0217 mg/g s.pr *DL5%-0.0271 mg/g s.pr.* *DL5%-0.0214 mg/g s.pr* *DL5%-0.0861 mg/g s.pr.*
DL 1%-0.0386 mg/g s.pr *DL 1%-0.0315 mg/g s.pr* *DL 1%-0.0337 mg/g s.pr* *DL 1%-0.1358 mg/g s.pr*
DL 0.1%-0.0514 mg/g s.pr *DL 0.1%-0.0578 mg/g s.pr* *DL 0.1%-0.0426 mg/g s.pr* *DL 0.1%-0.1784 mg /g.s.pr*

Table 3

Energy and productive efficiency on lettuce fertilization in solar, non-irrigated (Silvia cultivar)

Variants	Average prod. (kg/ha)	Productiv efficiency (kg/ha)			Energy efficiency (Mcal/ha)					
		Dif.	*%*	*Smn.*	*Output*	*Input*	*Balance*	*Dif.*	*%*	*Smn.*
Control, sprinkled with water	8028	-	100	-	1204	301	903	-	100	-
F111 Hum – 1%	11016	2988	137.22	xxx	1652	496	1156	253	128.02	xxx
F111 Hum – 3%	11163	3135	139.05	xxx	1674	502	1172	269	129.79	xxx
F311 Hum – 1%	11120	3092	138.52	xxx	1668	500	1168	265	129.35	xxx
F311 Hum – 3%	11301	3273	140.77	xxx	1695	508	1186	283	131.34	xxx
Humat de potasiu – 1%	10936	2908	136.23	xxx	1640	492	1148	245	127.13	xxx
Accele-GRO-M – 0,1%	10939	2911	136.26	xxx	1641	492	1149	246	127.24	xxx
Accele-GRO-M – 0,3%	11083	3055	138.05	xxx	1662	499	1163	260	128.79	xxx

DL 5%-1372 kg/ha
DL 1%-1903 kg/ha
DL 0.1%-2516 kg/ha

DL 5%-105 Mcal/ha
DL 1%-156 Mcal/ha
DL 0.1%-214 Mcal/ha