

THE FOLIAR FERTILIZATION, UNCONVENTIONAL AND NONPOLLUTANT MANNER OF INCREASING THE PRODUCTION OF GRAPES IN THE DURABLE VITICULTURE

FERTILIZAREA FOLIARĂ - MIJLOC NECONVENȚIONAL ȘI NEPOLUANT DE CREȘTERE A PRODUCȚIEI DE STRUGURI ÎN AGRICULTURA DURABILĂ

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Abstract. *The paper presents the experimental results of a testing on a variety of Romanian and import foliar fertilizers, in the Ampelographic Collection of the University of Agricultural Sciences and Veterinary Medicine Iasi, on the Chasselas dore variety. The use of these products determines the increase of the contents of leaves in the assimilatory pigments, both on the total of pigments and on each pigment separately; the grape productions increased, the statistically ensured growths were comprised between 20.63 and 30.71; the resulting energetic indicators advance the factorial ones allocated and the quality of production of grapes is positively influenced, mainly through the increase of the total content of sugars. Among the products tested we noticed: Basfoliar active, Folplex 41, Folifert 997, Folifert K and Vinafert 2.*

Rezumat. *Lucrarea prezinta rezultatele experimentale ale testarii unui sortiment de fertilizanti foliari romanesti si de import, in Colectia Ampelografica a Universitatii de Stiinte Agricole si de Medicina Veterinara Iasi, pe soiul Chasselas dore. Utilizarea acestor produse determina cresterea continutului frunzelor in pigmenti asimilatori, atat pe total pigmenti, cat si pe fiecare pigment in parte; productiile de struguri au crescut, sporurile asigurate statistic, au fost cuprinse intre 20,63 si 30,71; indicatorii energetici rezultativi îi devanseaza pe cei factoriali alocatiș calitatea productiei de struguri este influentata pozitiv, in principal prin cresterea continutului total în zaharuri. Dintre produsele testate s-au remarcat: Basfoliar activ, Folplex 411, Folifert 997, Folifert K si Vinafert 2.*

The supplementary fertilization through foliar manner, during the vegetation period, with complex nutritive solutions, is recorded in the durable agriculture as an important measure to improve the nutrition of plants (Dorneanu and the collaborators 2003, Bireescu and collaborators, 2005)

The permeation of nutritive elements and organic substances in the leaves takes place under the form of ions and molecules, in the course of diffusion through the cuticle pores and the interspaces among the cellulose of the epidermis and the subjacent layers that represent the free layer of leaves (Borlan and collaborators 1995, Franke 1967).

The ions absorbed in the leaves are rapidly metabolized in physiologically active organic compounds, being integrated in the general metabolic process and having a stimulating role in the biosynthesis of amino acids, of assimilatory pigments, with positive effects in the growth and development of plants (Neuman and Collaborators 1981, Parker and collaborators 1980, Dorneanu and collaborators 2003)

MATERIAL AND METHOD

During the period 2004-2006 at SDE Iasi , V Adamachi farm, 16 foliar compounds were tested for the grape vine. We worked with Chasselas dore variety, grafted on the Kober 5BB stock. The plantation was founded in 1985 on a Cambic black earth with medium fertility potential, the plantation distances were of 2.2/1.2 m, the logs were driven in the shape of semi-high bilateral cord, with the cutting in fruit studs of 2-3 buds.

The experiment was of monofactorial type, in randomized blocks. The experimental variants were compared with a blank assay spluttered with water; the foliar products were applied in three stages using 10 l/ha (1.000 l solution/ha); the first treatment was applied after the blossom, and the next at intervals of two weeks.

After the second and third treatment, we determined the content of foliar pigments, and the full maturity of grapes, their production and quality.

RESULTS AND DISCUSSIONS

The foliar fertilization registered a significant influence on the photosynthetic efficiency of utilization, productivity and quality of the grape production.

The productive and energetic efficiency is remarked through production increases, statistically ensured, comprised between 20% (iron chelate 0.2%) and 30% (Folplex 411-1%; active Basfoliar 0.5%). The foliar fertilizers used stimulate the energetic efficiency of the solar energy transformation into biochemical energy, specific to the plat; thus the production of energy and the energetic balance, as resulting indicators, advances the allocated factorial ones. The net energetic increase is amplified, compared to the blank assay, with relative values comprised between 11.52 % and 20.66% (table 1).

The nutrients applied through foliar manner are metabolized in specific organic compounds, which have a biostimulative effect in the synthesis of assimilatory pigments (table 2), as a result the total content increases in the assimilatory pigments, compared to the unfertilized blank assay, with relative values comprised between 31.15% and 39.53%. Also, the content of each assimilatory pigment increases; in the case of "a" chlorophyll, the content increases from 1.1031 mg/g fresh substance, in the blank assay, up to 1.5443 mg/g fresh substance in the variant fertilized with Folplex 111-1%, and in the case of "b" chlorophyll, the content increases from 0.8636 mg/g fresh substance, in the blank assay, to 1.1756 mg/g fresh substance, in the variety fertilized with Folifert 997-1%.

The biostimulating role of foliar fertilizers was observed also regarding the productivity and quality indicators (table 3); the average weight of a cluster increased in relative values with 20.3-47.9%, and in absolute values with 28-30 g compared to the unfertilized blank assay.

Tabel 1

Productival and energetical efficiency of some foliar fertilizers on vine, Chasselas doré variety

Variants	Yield (kg/ha)	Productival efficiency (kg/ha)			Energetical efficiency (Mcal/ha)					
		dif.	%	semin.	OUTPUT	INPUT	bilant	dif.	%	semin.
Control	8584	-	100	-	8584	3004	5580	-	100	-
Folplex 411-1%	11127	2543	129,63	xxx	11127	4450	6677	1097	119,66	xxx
Folplex 111-1%	10593	2009	123,41	xxx	10593	4237	6356	776	113,91	xxx
Microfert fer-0,3%	10401	1817	121,17	xxx	10401	4160	6241	661	111,85	xxx
Fortifert 411-1%	11029	2445	128,48	xxx	11029	4412	6617	1037	118,58	xxx
Fortifert 141-1%	10545	1961	122,84	xxx	10545	4218	6327	747	113,39	xxx
Folifert 997-1%	10913	2329	127,13	xxx	10913	4365	6548	968	117,35	xxx
Folifert Ca-0,8%	10696	2112	124,61	xxx	10696	4278	6418	838	115,02	xxx
Folifert K-0,4%	10866	2282	126,58	xxx	10866	4346	6520	940	116,84	xxx
Basfoliar activ-0,5%	11221	2637	130,71	xxx	11221	4488	6733	1153	120,66	xxx
30/30/30 + KH-0,5%	10355	1771	120,63	xxx	10355	4142	6213	633	111,34	xxx
60/30/30 + KH-0,5%	10634	2050	123,88	xxx	10634	4254	6380	800	114,35	xxx
Vinafert 1-0,5%	10672	2088	124,32	xxx	10672	4269	6403	823	114,75	xxx
Vinafert 2-0,5%	10796	2212	125,77	xxx	10796	4318	6478	898	116,09	xxx
Chelat de fier-0,2%	10371	1787	120,81	xxx	10371	4148	6223	643	111,52	xxx
Plantfert 1/12/11-1%	10518	1934	122,53	xxx	10518	4207	6311	731	113,10	xxx

DL 5% - 867 kg/ha
DL 1% - 1451 kg/ha
DL 0,1% - 1623 kg/ha

DL 5% - 268 Mcal/ha
DL 1% - 317 Mcal/ha
DL 0,1% - 581 Mcal/ha

Tabel 2

The influence of foliar fertilization on vine photosynthesis, Chasselas doré variety

Variants	chloro phyll “a”	chloro phyll “b”	Caroten	T o t a l p i g m e n t s			
				mg/g s. pr.	dif.	%	semn .
Control	1,1031	0,8636	0,5456	2,5123	-	100	-
Folplex 411-1%	1,5443	1,1700	0,7911	3,5054	0,9931	139,53	xxx
Folplex 111-1%	1,4781	1,1459	0,7395	3,3635	0,8512	133,88	xxx
Microfert fer-0,3%	1,4752	1,1457	0,7358	3,3567	0,8444	133,61	xxx
Fortifert 411-1%	1,5371	1,1686	0,7831	3,4888	0,9765	138,87	xxx
Fortifert 141-1%	1,4623	1,1643	0,7456	3,3722	0,8599	134,23	xxx
Folifert 997-1%	1,4798	1,1756	0,7593	3,4147	0,9024	135,92	xxx
Folifert Ca-0,8%	1,4687	1,1693	0,7488	3,3868	0,8745	134,81	xxx
Folifert K-0,4%	1,4858	1,1516	0,7587	3,3961	0,8838	135,18	xxx
Basfoliar activ- 0,5%	1,5421	1,1660	0,7883	3,4964	0,9841	139,17	xxx
30/30/30+KH- 0,5%	1,4341	1,1563	0,7336	3,3240	0,8117	132,31	xxx
60/30/30+KH- 0,5%	1,4788	1,1592	0,7481	3,3861	0,8738	134,78	xxx
Vinafert 1-0,5%	1,4826	1,1518	0,7574	3,3918	0,8795	135,01	xxx
Vinafert 2-0,5%	1,4895	1,1675	0,7652	3,4222	0,9099	136,22	xxx
Chelat de fier-0,2%	1,4123	1,1510	0,7316	3,2949	0,7826	131,15	xxx
Plantfert 1/12/11- 1%	1,4774	1,1430	0,7476	3,3680	0,8557	134,06	xxx

DL 5% - 0,3671 mg/g s. pr.

DL 1% - 0,5423 mg/g s. pr.

DL 0,1% - 0,7516 mg/g s. pr.

Under the climatic conditions specific to the experimental years, with deficit regarding the humidity, but abundant regarding temperature, the quality of grapes, expressed through the content of sugars and acidity, varies slightly, compared to the blank assay, according to the chemical composition of the foliar products used.

CONCLUSIONS

The foliar fertilization, as an unconventional means of fertilization, according to the experimental results, can substitute the basic, radicular fertilization, in a proportion of 10-12%.

The foliar fertilizers used are ecological, through the growth of crops much bigger quantities of nutrients are exported, compared to those applied through foliar fertilization.

Tabel 3

The influence of foliar fertilization on productivity and yield quality, Chasselas doré variety

Variants	The medium weight of grapes (g)				Dry substance (%)		Water (%)		Total sugar (g/l)				Total acidity (g/l)
	g	dif.	%	semn.	leaves	grapes	leaves	grapes	g/l	dif.	%	semn.	
Control	167	-	100	-	21,17	14,35	68,31	81,82	167,5	-	100	-	4,63
Folplex 411-1%	247	80	147,9	xxx	33,21	15,73	70,13	85,16	173,4	5,9	103,5	xxx	4,38
Folplex 111-1%	198	31	118,6	xxx	22,97	14,16	67,95	82,34	168,7	1,2	100,7	x	4,61
Microfert fer-0,3%	195	28	116,8	xxx	20,63	13,84	67,36	79,51	169,8	2,3	101,5	x	4,60
Fortifert 411-1%	248	81	148,5	xxx	34,57	17,14	71,36	84,65	173,6	6,1	103,6	xxx	4,31
Fortifert 141-1%	196	29	117,4	xxx	22,81	14,03	64,53	81,07	172,3	4,8	102,9	xx	4,57
Folifert 997-1%	239	72	143,1	xxx	35,32	17,54	72,45	85,36	171,5	4,0	102,4	xx	4,59
Folifert Ca-0,8%	224	57	134,1	xxx	29,16	15,68	73,16	84,58	173,5	6,0	103,6	xxx	4,51
Folifert K-0,4%	237	70	141,9	xxx	27,83	15,34	70,83	83,17	171,6	4,1	102,4	xx	4,58
Basfoliar activ-0,5%	245	78	146,7	xxx	36,02	17,76	73,51	85,93	170,8	3,3	101,9	xx	4,29
30/30/30+KH-0,5%	197	30	117,9	xxx	23,51	14,11	63,36	86,38	168,9	1,4	100,8	x	4,37
60/30/30+KH-0,5%	199	32	119,2	xxx	24,87	14,56	64,81	83,11	173,1	5,6	103,3	xxx	4,48
Vinafert 1-0,5%	201	34	120,3	xxx	25,18	15,01	66,37	82,43	172,3	4,8	102,9	xx	4,51
Vinafert 2-0,5%	198	31	118,6	xxx	27,33	15,16	68,56	83,64	171,8	4,3	102,6	xx	4,55
Chelat de fier-0,2%	201	34	120,3	xxx	22,41	13,41	64,08	85,16	168,7	1,2	100,7	x	4,59
Plantfert 1/12/11-1%	195	28	116,8	xxx	21,86	14,09	66,17	79,57	169,7	2,2	101,3	x	4,53

DL 5% - 13 grams
DL 1% - 17 grams
DL 0,1% - 25 grams

DL 5% - 0,8 g/l
DL 1% - 3,1 g/l
DL 0,1% - 4,9 g/l

The foliar fertilizers stimulate the energetic efficiency, the resulting indicators advance the allotted factorial ones, through the significant increase of grape production and its quality.

The foliar fertilizers stimulate the photosynthetic efficiency, the efficiency of the total content of assimilatory pigments, and of each apart.

All the foliar experimented fertilizers have proved to have a positive influence on the grape vine, among these being emphasized Basfoliar active-0.5%, Folplex 411-1%, Fortifert 411-1%, Folifert K-0.4% etc.

REFERENCES

1. Birescu Geanina, Birescu L., Dorneanu Emilia, Gavriluță I., Breahă Iuliana, Dana Daniela, 2005- *Cercetări privind efectul unor fertilizanți foliari noi asupra productivității și calității culturilor în condițiile conservării mediului*. Lucrările Simpozionului Internațional CIEC „Managementul nutrienților pentru îmbunătățirea calității culturilor și conservarea mediului”, Editura Agris, Craiova, pag. 291-298.
2. Borlan Z., Sin Gh., Tănase Gh., Bandu G., Birescu L., Caramete C., Dorneanu A., Gavriluță I., 1995- *Îngrășăminte simple și complexe. Tehnologii de utilizare și eficiență agronomică*. Editura Ceres.
3. Dorneanu A., Borlan Z., Popa O., Dumitru M., Dorneanu Emilia, Cioroiu T., Daniela Dana, 2003- *Îngrășămintele foliare, mijloc important de fertilizare suplimentară în timpul vegetației plantelor. Raportul optim între fertilizarea de bază și fertilizarea foliară*. Lucrările Simpozionului Internațional CIEC „Diversificarea sortimentului de îngrășăminte și îmbunătățirea calității acestora în raport cu derivatele agriculturii durabile. Editura Agris, Bacău, pag. 127-136.
4. Franke W., 1967- *Mechanism of foliar penetration of solutions*. Rev. Plant Physiology, nr. 18 pag. 281-300.