

**SOME ASPECTS CONCERNING THE INFECTED PLANTS
FREQUENCIES WITH SEVERE VIRUSES, AS FOLLOW OF THE
INTERACTION BETWEEN DIFFERENT CULTIVATION
MEASURES, AT THE POTATO FOR SEEDS**

**CONSIDERENTE PRIVIND FRECVENȘA PLANTELOR INFECTATE CU
VIROZE GRAVE, CA URMARE A INTERACȚIUNII DINTRE DIFERITE
MĂSURI CULTURALE LA CARTOFUL PENTRU SĂMÂNȚĂ**

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***Abstract:** The effected determinations in the years 2005-2007 emphasized that the infested shrub frequency with serious viruses (Y, PLRV) was bigger at the cultivar Desirée in comparison with cultivar Santé. Therewith, the obtained results emphasized that in the Suceava conditions the importance of the early planting and of the vegetation interruption at the warning, increased significant at one time with unrolling of the multiplication process from the biologic category „super elite- bases” at the category „certified A”.*

***Rezumat:** Determinările efectuate în anii 2005-2007 au scos în evidență că rata creșterii frecvenței tufelor infectate cu virusuri grave (Y, PLRV) a fost mai mare la soiul Desirée comparativ cu Santé. Totodată a rezultat că în condițiile Sucevei importanța plantării timpurii și a întreruperii vegetației la avertizare, a sporit semnificativ odată cu derularea procesului de multiplicare de la categoria biologică „bază-superelită” la categoria „certificată A”.*

Key words: seed potatoes, viruses, technological measures

INTRODUCTION

In Europe, among the 20 identified viruses at the potato only 6-8 viruses shows a special economic importance. In conditions of our country the biggest importance shows Y Virus and Leaf roll of potato, which produced the serious decays at potato and therefore the increased reduction of the infected plants yield (Cojocaru N., 1995).

The yields lost vary between 5-80%, depending by infection degree with viruses, viruses types, environmental conditions and by applied crop technology.

It could not destroy the viruses with conventional fighting method. The only one possibility for diminishing of the yields lost is the utilization of planting material which is free of viruses. It is known that the main factor in the realization of the high yield with a good quality is utilization of the planting material of high quality from biological, phytosanitary and physical point of view (Draica C. și Caciuc C., 1998).

The cultivar like the biologic source is the most important factor in obtaining of the high yields. Because of the specific traits, each cultivar is capable to fight against viruses in a different manner function by used crop technology or because of the aphides. The early planting it is considered a preventive measure against viruses infection because the plants are vigorous in the moment of aphides attack and in this case the access of the insects at the shrub is difficult.

The early interruption of the vegetation at the potato for seed, diminish the risk of settlement of the potato crops by the population of aphides which are in a numeric increasing and stop the viruses migration from the epigee part of the plants to the tubers (Gontariu I.,1998).

MATERIAL AND RESEARCH METHOD

All the works of the experiment, during years 2005-2007, were made. At the beginning of the experiments we used the cultivars Santè and Desirèe from the biologic category pre bases (clones D), and at the end of the experiments, after three years, we obtained the biologic category "certified, class A". In the field, the experiment was placed in the filed for producing of planting material (ARDS of Suceava), in four replications. We taken into consideration the following factors:

- **A Factor** - cultivar:

a1 - cultivar Santè

a2 - cultivar Desirèe

- **B Factor** – planting time:

b1 - early planting

b2 - after 30 days

- **C Factor** – vegetation interruption:

c1 - at warning

c2 - after 20 days

The potato planting was accomplished with planting machine for experimental fields. The distances between tubers was 21 cm and between rows, 70 cm. The experiments was placed on the common chemozem.

Fertilization of the potato plots with N:P:K, 100:100:100 kg s.a /ha, in a balanced rapport, was accomplished, in a proper manner so that the viruses infection symptoms could not be masked.

For destruction of the aphides it used the insecticides Mospilan 60 g/ha, Calypso 80ml/ha, Actara 0,06 kg/ha(2 tr.), the spell between two treatments was 12 days. In order to destroy of the potato herbage the first treatment was made mechanically, at warning – after 70 days from the plant sprouting, using Diquat (Reglone forte) 5 l /ha, and second treatment was made after 90 days from the plant sprouting. During vegetation period all works for producing of planting material were accomplished.

The notation of the grave viruses in three stages were accomplished. First notation, when the height plant was on 35-40 cm, the following notations twice weeks were accomplished. For a better emphasize of the infestation level of the shrubs with grave viroses, during vegetation period, the "sick" shrubs did not eliminate.

RESULTS AND DISSCUSIONS

Between those two extremes represented by cultivar Santè (Super elite category) and cultivar Desirèe („certified A" category), the frequency of the infested shrubs with grave viroses grown on 8,1-13,3 times (table 1).

The data from table 3 emphasize that the relatively reduced infestations at both cultivars were registered, but it is necessary to mention that the cultivar Desirèe, must to have a superior level of the biological category in comparison with biological category of the cultivar Santè.

Table 1

The frequency of the infested shrubs with grave viruses

Planting time	The vegetation interruption	Biological category /year		
		basis	basis	
		SE class	E class	Certified A
		(2005)	(2006)	(2007)

The cultivar Santé

Early	At warning	0,30	0,41	1,58
	After 20 days from the warning	0,50	0,90	1,73
After 30 days	At warning	0,40	0,67	2,66
	After 20 days from the warning	0,54	0,90	3,40

The cultivar Desirée

Early	At warning	0,74	2,10	4,00
	After 20 days from the warning	0,80	2,97	4,08
After 30 days	At warning	0,75	3,03	4,77
	After 20 days from the warning	0,86	3,45	5,46
	DI 5%	0,12	0,21	0,19
	DL 1%	0,19	0,30	0,29
	DL 0,1%	0,27	0,39	0,38

Table 2.

The dependence variations of the shrubs infection frequency with grave viroses function by the association types of the „biological” components with technological measures types

Frequencies class	Cultivar		The planted biological category			Planted		The vegetation interruption	
	Santè	Desirée	pre basis	super elite	elite	early	after 30 days	at warning	after 20 days
0,30-0,55%	*			*		*		*	
	*		*			*	*	*	*
0,56-0,80%	*			*			*	*	*
		*	*			*	*	*	*
0,81-1,05%	*			*		*	*		*
		*	*				*		*
1,56-1,80%	*				*	*		*	*
2,06-2,30%		*		*		*		*	
2,56-2,80%	*				*		*	*	
2,81-3,05%		*		*		*	*	*	*
3,31-3,55%	*				*		*		*
		*		*			*		*
3,81-4,05%		*			*	*		*	*
4,56-4,80%		*			*		*	*	
5,31-5,55%		*			*		*		*

At the cultivar Desirée in comparison with cultivar Santé were registered the significant growing of the infestations frequency with grave viroses indifferently by graduations of the technological measures (planting time, the vegetation interruption

stage). The most important differences between that two cultivars in the third year of the multiplication of the planting material were registered. This phenomenon in the year 2007, was happened, when at the end of the vegetation period the biological category „certified A” was obtained (table 3).

Table 3

Differentiations of two cultivars from infested shrubs frequency point of view with grave viruses

Planting time	Vegetation interruption	Biological category (year)	Santè % (mt)	Desirèe		
				%	dif.	signif
Early	At warning	SE basis (2005)	0,30	0,74	0,44	**
		E basis (2006)	0,41	2,10	1,69	***
		Certif. A (2007)	1,58	4,00	2,42	***
	After 20 days from warning	SE basis (2005)	0,50	0,80	0,30	*
		E basis (2006)	0,90	2,97	2,07	***
		Certif. A (2007)	1,73	4,08	2,35	***
After 30 days	At warning	SE basis (2005)	0,40	0,75	0,35	**
		E basis (2006)	0,67	3,03	2,36	***
		Certif. A (2007)	2,66	4,77	2,11	***
	After 20 days from warning	SE basis (2005)	0,54	0,86	0,32	*
		E basis (2006)	0,90	3,45	2,55	***
		Certif. A (2007)	3,40	5,46	2,06	***
	DI 5%				0,23	
	DL 1%				0,32	
	DL 0,1%				0,42	

Table 4

The variation of the infested shrubs frequency with grave viroses at three biological categories

Planting time	Vegetation interruption	Cultivar	Biological category (year)			Diferences significance					
			Basis SE class (2005)	Basis E class (2006)	Certified A (2007)	E-SE		A-SE		A-E	
Early	At warning	Santè	0,30	0,41	1,58	0,11		1,28	***	1,17	***
		Desirèe	0,74	2,10	4,00	1,36	***	3,26	***	1,90	***
	After 20 days from warning	Santè	0,50	0,90	1,73	0,40	**	1,23	***	0,83	***
		Desirèe	0,80	2,97	4,08	2,17	***	3,28	***	1,11	***
After 30 days	At warning	Santè	0,40	0,67	2,66	0,27		2,26	***	1,99	***
		Desirèe	0,75	3,03	4,77	2,28	***	4,02	***	1,74	***
	After 20 days from warning	Santè	0,54	0,90	3,40	0,36	*	2,86	***	2,50	***
		Desirèe	0,86	3,45	5,46	2,59	***	4,60	***	2,01	***
	DI 5%				0,27		0,23		0,36		
	DL 1%				0,36		0,32		0,47		
	DL 0,1%				0,47		0,42		0,60		

Form the data of the table 5 results that the infested plants frequency with grave viroses grown in the second multiplication year in comparison with first year (super elite basis category) with 1,19 percents, and at the certified A category, from the precedent year, in the third multiplication year, the infested plants frequency with grave

viroses grown with 1,66, percents in comparison with elite basis category from the precedent year. Thus, the growing of the infestation frequency with grave viroses on 2,85% in the third multiplication year is due of the viroses induction with 40% in the first year and with 60% in the second multiplication year, becoming visible, in the third multiplication year. If we analyze the above data, with help of the multiplication coefficient of the virosed plants frequency, the data below presented, proves that two cultivars closely values, were registered, such as:

	cultivar Santè	cultivar Desirèe	the average of cultivars
- at the E category in comparison with SE category	1,7	3,6	3,0
- at the certified A category in comparison with E category	3,2	1,6	2,0
- at the certified A category in comparison with SE category	5,4	6,0	5,7

Thus in the third multiplication year of the planting material, a growing *Leaf roll of potato*, on 5,4-6,0 times, was registered. Some inadvertences in the evolution of the multiplication coefficients of the grave viroses frequency is due of the differences of the references values. Thus the apparent sensibility of the cultivar Santè in the “certified A” stage, illustrated through a multiplication coefficient on two times bigger (3,3) then cultivar Desirèe (1,6), is due of the fact that the frequency of the infested shrubs with grave viroses grown at the cultivar Santè, from 0,725% (“elite” stage) to 2,34% at the biological category “certified A”. But at cultivar Desirèe the frequency of the infested shrubs with grave viroses grown from 2,89% to 4,54%. Referring to the delayed planting effects upon viroses infestation, it emphasized that these effects were insignificants when, for planting we used the tubers originated from clone D (pre basis). The negative influence of the delayed planting with one month, even is indirectly, it emphasized, constantly and significant in the biological category “certified A”, that mean, for planting, we used tubers from the “elite” category (Table 5).

Table 5

The dependence of the infested shrubs frequency with grave viruses by planting time

Vegetation interruption	Biological category (year)	Cultivar	Planting time			
			early	after 30 days		
			%(st.)	%	dif.	sign.
At warning	SE basis (2005)	Santè	0,30	0,40	0,13	
	E basis (2006)		0,41	0,67	0,26	*
	Certif. A (2007)		1,58	2,66	1,08	***
	SE basis (2005)	Desirèe	0,74	0,75	0,01	
	E basis (2006)		2,10	3,03	0,93	***
	Certif. A (2007)		4,00	4,77	0,77	***
After 20 days from warning	SE basis (2005)	Santè	0,50	0,54	0,04	
	E basis (2006)		0,90	0,90	0,00	
	Certif. A (2007)		1,73	3,40	1,67	***
	SE basis (2005)	Desirèe	0,80	0,86	0,06	
	E basis (2006)		2,97	3,45	0,48	**
	Certif. A (2007)		4,08	5,46	1,38	***
DI 5%					0,20	
DL 1%					0,43	
DL 0,1%					0,57	

Also, at the „elite” category, the indirectly induction of the delayed planting (one month), only at the cultivar Desirèe, was observed (tab.5). Concerning the influence

of the vegetation interruption, the observations effected during three years noted that, generally the delaying of the vegetation interruption with three weeks from warning, was associated with growing of the shrubs viroses degree, especially when the planting was accomplished later too (tab.6).

Table 6

Influence of the vegetation interruption upon the infested shrubs frequency with grave viroses

Planting time	Cultivar	Biological category (year)	Vegetation interruption after 20 days from warning			
			%(st.)	%	dif.	signif.
Early	Santè	SE basis	0,30	0,50	0,20	*
		E basis	0,41	0,90	0,49	***
		Certified A	1,58	1,73	0,15	*
	Desirèe	SE basis	0,74	0,80	0,06	
		E basis	2,10	2,97	0,87	***
		Certificată A	4,00	4,08	0,08	
After 30 days	Santè	SE basis	0,40	0,54	0,14	
		E basis	0,67	0,90	0,23	**
		Certified A	2,66	3,40	0,74	***
	Desirèe	SE basis	0,75	0,86	0,11	
		E basis	3,03	3,45	0,42	***
		Certified A	4,77	5,46	0,69	***
		DI 5%			0,14	
		1%			0,22	
		0,1%			0,30	

CONCLUSIONS

Taking into consideration the amplification time of the infestations with grave viroses, is it possible, during one year, the multiplication of the planting material, without the „viroses purification”, but, at establishment of the potato crop, it is necessary to use tubers which belong SE basis category.

The main roles in the diminishing of the viroses infestation have the early planting and the vegetation interruption at warning becoming so significant as the multiplication is made for many times

The importance of the technological measures is significant if we used the cultivars with small tolerance at the grave viroses.

REFERENCES

1. Cojocaru N., 1995 – *Principalele virusuri ale cartofului, pagube și simptome*. Cartoful în România vol. 5, numărul 2-3, aprilie-septembrie.
2. Draica C., Caciuc C., 1998 – *Cultura cartofului în România, situație actuală și de perspectivă*. Cartoful în România, vol. 8, nr. 3.
3. Gontariu I., 1998 – *Date privind dependența frecvenței virozelor grave și ușoare ale cartofului de unele măsuri tehnologice*. Lucrari științifice, vol.41, seria agronomie.