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**ORIGINAL ARTICLE**

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**A NEW MICROZONE FOR SEED POTATO PRODUCTION IN ROMANIA - HUEDIN AREA - IN CLUJ COUNTY****O NOUĂ MICROZONĂ PENTRU PRODUCEREA CARTOFULUI DE SĂMÂNȚĂ ÎN ROMÂNIA - MICROZONA HUEDIN - DIN JUDEȚUL CLUJ****MORAR G.\*, VÂTCĂ S., OLTEAN I., OLTEAN M.I.****REZUMAT**

În climatul temperat continental infecția virotică a cartofului este condiționată de sursele de infecție virotică și de vectorii virozelor. În microzona Huedin, situată intramontan în județul Cluj, cu un climat umed și răcoros (600 m altitudine; 7,2°C media anuală a temperaturii, 18°C temperatura medie a lunii celei mai calde a anului – iulie, 604,4 mm precipitații anuale) și izolată în spațiu în mod natural s-au testat 4 tipuri de soiuri de cartof sensibile sau rezistente la principalele virusuri ale cartofului: PVY și PLRV. Rezultatele cercetării au demonstrat că se poate obține o producție de sămânță de aceeași calitate cu cea produsă în zonele tradiționale de producere a cartofului de sămânță, dacă se respectă elementele specifice din tehnologia cartofului de sămânță: izolare în spațiu, eliminare timpurie și repetată a plantelor infectate cu viroze, combaterea sistematică a bolilor și dăunătorilor în special a afidelor, întreruperea vegetației la zborul maxim al afidelor.

**CUVINTE CHEIE: cartof de sămânță, microzonă, afide, viroze****ABSTRACT**

In the continental temperate climatic area virotical infection of potato was conditioned by the sources of virotical infection and by then viroses vectors. In Huedin micro area, situated intermountain in Cluj County at 600 m altitude, which humid and cool climate and isolated in space in natural way. Were tested 4 types of potato varieties sensitive or resistant at the main viruses of potato: PVY and PLRV. The results of researches was demonstrated that potato seed production can be obtained in the same quality with those produced into the seed traditional areals, when specific elements of classical technology are respected, as they are: in field isolation, early picking up and elimination of any virused plant, systematically control diseases and predators invasion mainly aphids, vegetation interruption at maxim fly of aphids.

**KEY WORDS: seed potato, microareal, aphids, viruses**

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## DETAILED ABSTRACT

From geographical point of view, the Cluj County has all the relief forms, from the Apuseni mountainous areas to the Transylvanian plain, which create large ecological conditions for the potato cultivation, Huedin is one of Cluj micro zone remarkable for its geographical location and the humid and cool climate. The annual temperature average is 7.2<sup>0</sup>C, the average temperature of warmly month of the year (July) is 18<sup>0</sup>C and the rainfall sum is 604.4 mm.

This research focused on testing the possibility of biological category Base Class Elite production within Huedin micro zone and verifying the production biological quality by comparison with seed tubers obtained within the traditional seed potato areals.

According complete specific technology applied for the Base biological category, four types of potato varieties were tested to main significant potato viruses: the potato leaf roll virus (PLRV) and the potato virus Y (PVY). Each variety was planted with tubers in Base Class Super Elite biological category, on a half hectare surface; alongside a catching aphids plot was established to study the evolution of viruses vectors flight. The four potato varieties were:

- resistant to the potato virus Y (PVY) - Ostara
- sensitive to the potato virus Y (PVY) – Procura
- resistant to the potato leaf roll virus Y (PLRV) – Super
- sensitive to the potato leaf roll virus Y (PLRV) – Desiree

The biological value was tested as the percentage of infected plants with significant viruses and as the production capacity of the resulted biological category (Certified as class A), when compared with the same biological category from the recognized in special potato seed zone.

The biological value of the planting material obtained within the micro zone in Huedin fits within the accepted hints for the biological category certified as Class A, both as significant viruses infection and as insignificant viruses, for all experimented types of varieties, (Tabs 1 and 2) (Felicia Mitroi, 1992). Comparing with the same biological category coming from other seed potato zone, the viruses infection is practically equal, some small differences being favorable for infection percentage value determined on plants from the Huedin areal.

In Huedin seed potato micro zone it is possible to obtain Elita potato seed with un percent of virotic infections between legal limits if is concerning serious viruses at very sensible types of potato.

Biological value and production capacity of Elita biological category seed potato produced in Huedin closed micro zone was practically equal in comparison with the same category biological produced in traditionally seed potato zone.

## INTRODUCTION

From geographical point of view, the Cluj County has all the relief forms, from the Apuseni mountainous areas to the Transylvanian plain, which create large ecological conditions for the potato cultivation, Huedin is one of Cluj micro zone remarkable for its geographical location and the humid and cool climate.

Studying the climatic elements which describe the favorability of the special areas for the potato seed production (Man and colab, 1969) we noticed that in the Huedin micro zone the requested climatic values are registered.

A detailed analyze of the Huedin areal, including its pedological and geomorphic study, we claim this areal to offer all the necessary conditions for the potato seed production according to the applied methodology used in the traditionally seed potato zone (Morar G., 1994), By this, the possibility for the Cluj County to develop a new areal zone to produce locally the potato seed tubers in the Elite Base Class biological category, is opened.

This research focused on testing the possibility of biological category Base Class Elite production within Huedin micro zone and verifying the production biological quality by comparison with seed tubers obtained within the traditional seed potato areals.

## MATERIAL AND METHODS

The research was carried out in 1998-1999. According complete specific technology applied for the Base biological category, four types of potato varieties were tested to main significant potato viruses: the potato leaf roll virus (PLRV) and the potato virus Y (PVY). Each variety was planted with tubers in Base Class Super Elite biological category, on a half hectare surface; alongside a catching aphids plot was established to study the evolution of viruses vectors flight. The evaluation of the virus infection was observed visual through leaves symptoms examination. The experimented four potato varieties were:

- resistant to the potato virus Y (PVY) - Ostará
- sensitive to the potato virus Y (PVY) – Procura
- resistant to the potato leaf roll virus Y (PLRV) – Super
- sensitive to the potato leaf roll virus Y (PLRV) – Desiree

The experimental field for the production of Elite within the Huedin area was conducted according the methodology described within the recognized special potato seed areas. The next activities were strictly respected:

- the field of potato seed was isolated by other potato cultures;
- ensuring a planting density of 65,000 plants/ha;
- keeping the culture out of weed, diseases and predators invasion;
- early picking up and elimination of any virused plants;
- every 12 days a treatment for viruses carrying aphids elimination was applied;
- mechanical and chemical plant vegetation was interruption when 10 days following the maximum flights of aphids was completed

When harvesting the Base class Elite biological category, a hundred tubers (100 tubers) of each potato variety were kept with the regard of the next year repetition, to compare with the Elite material produced within the traditional seed potato zone.

The biological value was tested as the percentage of infected plants with significant viruses and as the production capacity of the resulted biological category (Certified as class A), when compared with the same biological category from the recognized in special potato seed zone.

## RESULTS AND DISCUSSION

In Huedin micro zone, during the years of Base class Elite biological category production, by rigorously respecting the measures of viruses infection prevention within and around the experiment, an in late evolution and a low frequency of aphids flights was registered (Figure 1 and 2). The maximum frequency of aphids flight was situated in the first year, in the third decade of June, and in the second year, in the first decade of July. In both years of the experiment a low number of aphids were counted, especially a slow evolution of *Myzus persicae* species was registered. The first catching of this species were determined in the second decade of June and, with a single registration exception, starting with the first year, the number of *Myzus persicae* individuals was no higher than 10 aphids / yellow pot. These values are remarkable as they are comparable with mean values registered within the traditional seed potato zone in Harman and Suceava (Man and al., 1969).

Figure 1: Aphids flights frequency in 1998

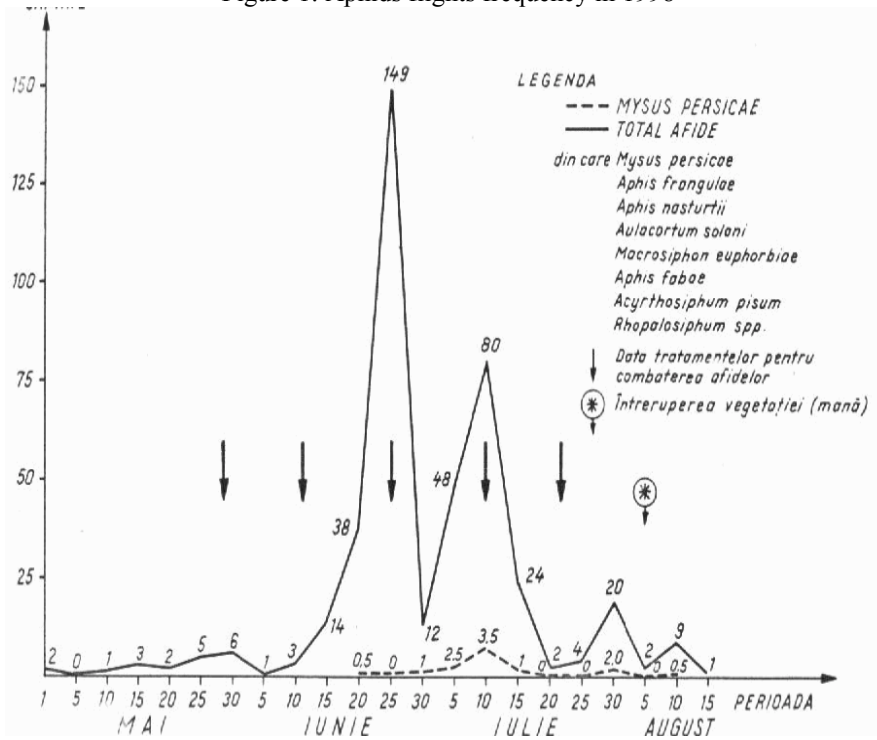
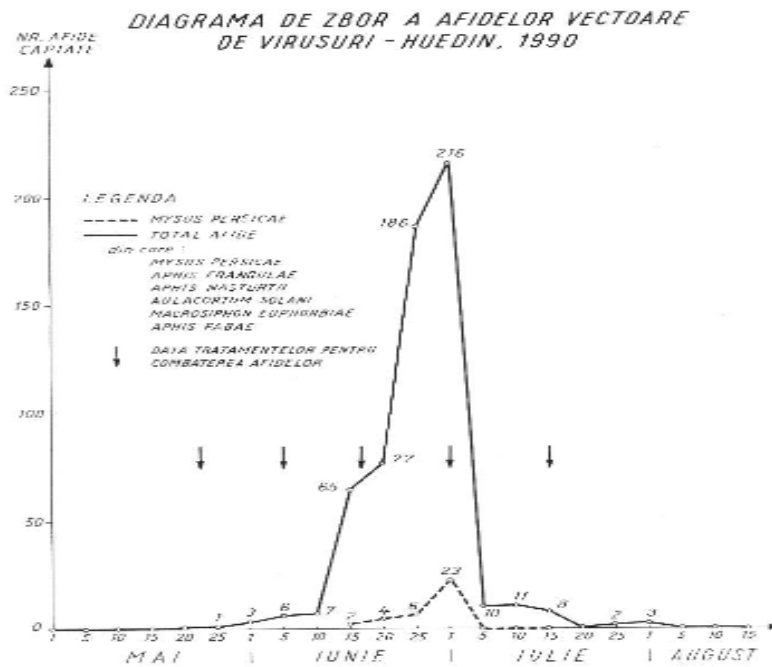


Figure 2: Aphids flights frequency in 1999



The biological value of the planting material obtained within the micro zone in Huedin fits within the accepted hints for the biological category certified as Class A, both as significant viruses infection and as insignificant viruses, for all experimented types of varieties, (Tables 1 and 2) (Felicia Mitroi, 1992). Comparing with the same biological category coming from other seed potato zone, the viruses infection is practically equal, some small differences being favorable for infection percentage value determined on plants from the Huedin areal.

The planting material produced within the micro zone of Huedin had the same biological value when compared with the planting material from the favorable recognized special seed potato zone of Elite biological category. The production capacity of potato seed tubers from the closed Huedin zone was nearly of seed material from the others seed potato zone, in both years of experiment. The total production, the production of potato seed tubers, separately on size fraction and as addition of both size calibrations, varies for the same variety according to vegetative and tuberisation growth (Tables 3 and 4). In the first year of research, (exception Procura varieties of which production increase was due to other factors), the registered productions were slowly lower for the material within the Huedin zone, presenting values of 90-97% of the production capacity within the specially seed potato zone. In the second year, all experimental variants planted with seed tubers coming from Huedin registered increased production, of 101-105%. As result, we consider the production potential of potato seed tubers from all areas as balanced, both as size fractions and as total production.

Table 1: Viroses infection percent (%) for potato seed Class A, First Year

Varieties	Huedin micro zone					Traditional seed potato zone				
	VRFC (PLRV)	VYC (PVY)	Mosaic	Total viroses serious	light	VRFC (PLRV)	VYC (PVY)	Mosaic	Total viroses serious	light
OSTARA	0,24	0,24	2,20	0,48	2,20	0,74	0,49	2,21	1,23	2,21
PROCURA	0,24	0,98	0,98	1,22	0,98	0,49	1,22	2,21	1,71	2,21
SUPER	0,49	0,24	2,70	0,73	2,70	0,49	0,49	1,22	0,98	1,22
DESIREE	0,74	0,24	2,20	0,98	2,20	0,74	0,74	1,96	1,48	1,96

\* Certification methodologies admits at biological category C class A:

- 1% serious viroses + 3% light viroses at I-III<sup>d</sup> degeneration class (Varieties: Ostara, Super and Desiree),

- 1,5 % serious viruses + 4% light viroses at IV<sup>th</sup> degeneration class (Procura Varieties)

Table 2: Viroses infection percent (%) for potato seed Class A, Second Year

Varieties	Huedin micro zone					Traditional seed potato zone				
	VRFC (PLRV)	VYC (PVY)	Mosaic	Total viroses serious	light	VRFC (PLRV)	VYC (PVY)	Mosaic	Total viroses grave	light
OSTARA	0,73	0,24	2,69	0,97	2,69	0,00	0,98	1,96	0,98	1,96
PROCURA	0,24	1,22	2,21	1,46	2,21	0,49	0,98	2,94	1,47	2,94
SUPER	0,49	0,24	1,22	0,73	1,22	0,24	0,24	0,73	0,48	0,73
DESIREE	1,71	0,49	2,94	2,20	2,94	1,96	0,74	3,19	2,70	3,19

Table 3: Production capacity of biological category Base Elita Class obtained in Huedin micro zone in compare with Elite Class from traditional closed micro zone, First Year

Varieties	Seed tubers provenience	Seed tubers production						Total production	
		34-45 mm		45-55 mm		30-55 mm		t/ha	%
		t/ha	%	t/ha	%	t/ha	%	t/ha	%
OSTARA	Closed zone	3,38	100 <sup>mt</sup>	6,25	100 <sup>mt</sup>	9,63	100 <sup>mt</sup>	22,72	100 <sup>mt</sup>
	Huedin micro zone	3,89	115	5,57	90	9,46	98	20,47	90
PROCURA	Closed zone	4,90	100 <sup>mt</sup>	5,72	100 <sup>mt</sup>	10,62	100 <sup>mt</sup>	23,86	100 <sup>mt</sup>
	Huedin micro zone	8,45	172*	9,29	163 <sup>***</sup>	17,74	167 <sup>***</sup>	26,62	112*
SUPER	Closed zone	9,12	100 <sup>mt</sup>	7,18	100 <sup>mt</sup>	16,30	100 <sup>mt</sup>	28,36	100 <sup>mt</sup>
	Huedin micro zone	9,97	109	9,12	127*	17,40	107	27,53	97
DESIREE	Closed zone	5,11	100 <sup>mt</sup>	7,97	100 <sup>mt</sup>	13,08	100 <sup>mt</sup>	28,16	100 <sup>mt</sup>
	Huedin micro zone	5,83	114	7,55	95	13,38	102	25,86	92
OSTARA	DL 5%	2,38		0,88		1,83		5,64	
	DL 1%	4,37		1,61		3,37		10,36	
	DL 0,1%	9,69		3,57		7,47		22,96	
PROCURA	DL 5%	2,67		1,29		1,46		1,76	
	DL 1%	4,91		2,37		2,67		3,24	
	DL 0,1%	10,87		5,26		5,93		7,17	
SUPER	DL 5%	2,38		1,66		6,41		7,73	
	DL 1%	4,37		3,05		11,77		14,20	
	DL 0,1%	9,69		6,77		26,07		31,45	
DESIREE	DL 5%	1,57		1,93		2,20		8,10	
	DL 1%	2,89		3,54		4,04		14,88	
	DL 0,1%	6,40		7,85		8,96		32,98	

Table 4: Production capacity of biological category Base Elita Class obtained in Huedin micro zone in compare with Elite Class from traditional closed micro zone, Second Year

Varieties	Seed tubers provenience	Seed tubers production						Total production	
		34-45 mm		45-55 mm		30-55 mm		t/ha	%
		t/ha	%	t/ha	%	t/ha	%	t/ha	%
OSTARA	Closed zone	6,01	100 <sup>mt</sup>	10,89	100 <sup>mt</sup>	16,90	100 <sup>mt</sup>	25,90	100 <sup>mt</sup>
	Huedin micro zone	6,40	106	11,01	101	17,41	103	26,13	101
PROCURA	Closed zone	5,74	100 <sup>mt</sup>	8,26	100 <sup>mt</sup>	14,00	100 <sup>mt</sup>	27,09	100 <sup>mt</sup>
	Huedin micro zone	6,16	107	8,44	102	14,59	104	27,48	101
SUPER	Closed zone	11,38	100 <sup>mt</sup>	11,57	100 <sup>mt</sup>	22,95	100 <sup>mt</sup>	43,03	100 <sup>mt</sup>
	Huedin micro zone	11,94	105	12,73	110*	24,87	107	45,06	105
DESIREE	Closed zone	5,76	100 <sup>mt</sup>	10,66	100 <sup>mt</sup>	16,41	100 <sup>mt</sup>	32,37	100 <sup>mt</sup>
	Huedin micro zone	6,10	105	10,17	95	16,26	99	32,97	102
OSTARA	DL 5%	0,41		0,72		1,07		2,85	
	DL 1%	0,74		1,32		1,97		5,24	
	DL 0,1%	1,65		2,93		4,36		11,61	
	DL 5%	1,05		1,10		1,99		4,16	
PROCURA	DL 1%	1,93		2,02		3,65		7,63	
	DL 0,1%	4,27		4,48		8,09		16,91	
	DL 5%	1,07		0,85		1,87		5,46	
SUPER	DL 1%	1,96		1,56		3,43		10,02	
	DL 0,1%	4,35		3,47		7,61		22,20	
	DL 5%	0,35		1,00		0,97		2,62	
DESIREE	DL 1%	0,64		1,84		1,78		4,80	
	DL 0,1%	1,46		4,07		3,95		10,64	

## CONCLUSION

- Tested as seed potato zone for biological category Base and Elita production under aspects of frequency and evolution of aphid's viruses' vectors, Huedin zone was proved favorable likewise with traditionally seed potato zone Hărman and Suceava.

- In Huedin seed potato micro zone it is possible to obtain Elita potato seed with un percent of virotic

infections between legal limits if is concerning serious viruses at very sensible types of potato.

- Biological value and production capacity of Elita biological category seed potato produced in Huedin closed micro zone was practically equal in comparison with the same category biological produced in traditionally seed potato zone.

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