

PN AC9-999

101393

**RAPID PROPAGATION OF VIRUS-TESTED**

**KAZAKH POTATO CULTIVARS**

**PROJECT TA-MOU-CA 16-018**

**ANNUAL REPORT FOR THE PERIOD**

**APRIL 1 1998 – 31 March 1999**

**BY**

**DR D LEVY AND PROF G LOEBENSTEIN**

**AGRICULTURAL RESEARCH ORGANIZATION**

**BET DAGAN, ISRAEL**

**AND**

**DR V SHVIDCHENKO**

**AGRICULTURAL INSTITUTE OF ASTANA (Akmola)**

**AND**

**DR A MANADILOVA**

**INSTITUTE OF MOLECULAR BIOLOGY**

**ALMATY**

May 1999

Cooperating Scientists

Edna Fogelman

Y Itzhak

Alexandra Levine

Dr Emma Teverovsky

ABSTRACT

The following was achieved during this period

- 1 About 50 000 tubers from virus-tested Nievsky plants were planted in Astana area in 1998. Yields of 28 tons/hectare were obtained, compared with 14 tons/hectare in commercial fields (planted with non-tested "seeds")
- 2 During 1998 another batch of minitubers was obtained from the green- and screenhouses: 53000 Nievsky and 48000 Tamasha. These will be planted in 1999 in the field. In addition during 1998 another 4800 plantlets of Nievsky and 6300 plantlets of Tamasha were prepared and grown in tubes. These were later planted in the climatic rooms and in the glasshouse
- 3 Potato virus S (PVS) and M (PVM) were purified in Almaty and antisera to them were prepared. Plants from Astana were tested against 6 viruses
- 4 Plantlets raised from tissue cultures of various clones including Kazakh varieties produced minitubers, which were planted in pots to produce "seed" tubers – in Israel
- 5 Virus testing of Akmola plants obtained from Kazakhstan in tubes or minitubers was done again, and additional antisera were prepared. In Israel Kazakh Nievsky plants growing in Israel were also tested for 5 viruses

The work during this period was centered on the following

**A The work in Astana (Akmola) – Dr V Shvidchenko****1 Production of virus-tested potatoes**

In 1998 a yield of 28 tons of var Nievsky was obtained at the NURA farm from one hectare. The planting material for this field were minitubers obtained from climatic rooms,

glasshouses and screen (gauze) houses – where plantlets from the *in vitro* rapid propagation scheme were planted ( See annual report from May 1998) Yields of Nievsky in commercial crops in this area were about 14 tons/hectare compared with 28 tons/hectare from the virus-tested minitubers

During 1998 another batch of minitubers was obtained from the green- and screenhouses 53000 Nievsky and 48000 Tamasha These will be planted in 1999 in the field

In addition during 1998 another 4800 plantlets of Nievsky and 6300 plantlets of Tamasha were prepared and grown in tubes These were later planted in the climatic rooms and in the glasshouse

Test for PVX, PVY, PVS, PVM and PLRV were done partly in Astana and partly in Almaty Antisera were obtained from the Potato Institute in Moscow (Novikov B N ) and those prepared in Almaty and in Israe (PVX, PVY, PVS and PVM) Antisera for PLRV were from a commercial Boehringer-Manheim kit Results are summarized in Tables 1 and 2

As seen from Table 1 the Nievsky plantlets in the tubes, climatic chamber and gauze screenhouse reacted negatively for all the 5 viruses tested In the plants from the glasshouses and field low rates of PVY PVS and PVX were observed The presence of PVX is quite disturbing

For Tamasha results were similar but in addition PLRV was found in the field samples

## 2 Surveys of viruses in weeds

Presence of PVX PVS PVM and PVY was surveyed in three areas in Northern Kazakhstan in the Makinskoe- Voznesenka area 230 km north of Astana ( a wood-steppe zone), NURA Zelinograd area 40 km south of Astana ( steppe zone ) and on Bestjube Seletinsk 250 km east of Astana (steppe zone)

The following weeds were sampled and tested by the drop-precipitin test and by ELISA for PVX PVY PVS and PVY *Amaranthus retroflexus* *Chenopodium album* *Sonchus arvensis*

## B The Work in Almaty- Dr Alija Manadilova

- 1 Purification of viruses and preparation of antisera PVS and PVM were purified from *Chenopodium amaranticolor* and tomato, respectively For PVS 11.4 mg virus were obtained and for PVM – 4.6 mg Purified virus preparations were checked by – SDS electrophoresis and were found to be free from plant proteins After injection into rabbits about 60-75 ml of antiserum was obtained for each virus
- 2 Samples from the potato plants from Astana were tested against PVX, PVY, PVS, PVM, PVA and PLRV by sandwich ELISA Results are summarized in Tables 1 and 2 In Tamasha relatively high infection rates with PVM were observed All plants tested negatively for PVA

### **C Production of plantlets *in vitro* in Israel Dr D Levy**

Plantlets of the Clones 3, 4, 5 of Nievsky and Clones mentioned in Table 5 of the previous report (April 98) were hardened in pots (10 cm in diameter) in potting mixture containing peat and vermiculite, in a greenhouse (20-25°C) The pots were moistened and covered with a transparent plastic sheet for 3-5 days without further watering

About 90% of the plantlets were established and developed vigorous plants After 60-80 days, small tubers (minitubers) were harvested, 4-15 per pot depending mostly on the genotype and plant size Of Nievsky, 65, 44 and 91 minitubers were harvested of clones 3, 4 and 5 respectively Clone 4 was discarded due to weak development

These small tubers (minitubers) were planted in 10 l pots for the production of 'seed' tubers The plants were monitored during growth and the tubers (after harvest) were stored Dormancy was observed and after emergence the tubers were again planted in 10 l for further multiplication

The list of cultivars or clones grown in pot mixture in a 50 mesh screenhouse include Nievsky (clones 3 and 5), Idit Ori, Zohar LTL and additional clones of *S. Phureja* and of various combinations of *Solanum* species

### **D Virus testing of Astana (Akmola) plants in Israel – G Loebenstein**

Plants from plantlets and minitubers (see annual report April 98, p. 7) were again tested serologically for PVX, PVY, PVS and PVM and for PLRV (with the DIG-labeled probe) All tests were negative

The Nievsky clones 3, 4 and 5 grown in Dr Levy's screenhouse were tested twice for PVX, PVY, PVS, PVM and PLRV by ELISA and gave negative reactions for these viruses

Additional antisera for PVS and PVM were prepared. Some antisera were sent to Kazakhstan.

#### **E Collaboration**

Dr Alija Manadilova from the Institute of Molecular Biology and Biochemistry, Almaty, arrived on March 8 (1999) at the Institute of Field and Garden Crops Bet Dagan, for a period of 5 months and was involved in tissue culture research.

#### **F Plans for the coming year**

- 1 Evaluate the 'elite' seed of Nievsky (28 tons) obtained during 1998 in farmers' fields
- 2 Planting at the 'NURA' farm the minitubers of Nievsky (53000) and Tamasha (48000) produced during 1998 to produce "elite" seeds
- 3 Continue to prepare plantlets of Nievsky and Tamasha from virus-tested source plants in tubes and later transfer them to climatic chambers, green- and screenhouses for production of minitubers
- 4 Continue to test plant material from Astana in Almaty by ELISA
- 5 Develop the DIG-labelled RNA probe in Almaty
- 6 Continue the experiments with rapid propagation of Kazakh cultivars and their hardening in the greenhouse in Israel
- 7 Produce minitubers to "seed" sized tubers in Israel and compare the Kazakh cultivars to other cultivars and monitor their health status
- 8 Prepare additional antisera to supply the lab in Almaty,
- 9 Monitor by ELISA the health status of the Kazakh cultivars to be grown by Dr Levy

Table 1 Elisa tests of Nievsky (April 1998 – April 1999)

Tube plants			Chamber of artif climate				Gauze		Hothouse		Field	
Time	24/6/98	16/3/99	29/5/98 16/9/98		20/8/98 21/12/98		20/8/98 16/9/98		20/8/98 11/1/99		20/8/98 10/9/98	
No of passage 11 13 15, 16 17 19 20, 21 25, 26												
Place of testing	Almaty		Astana		Almaty		Almaty		Almaty		Astana	
Line	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection
line54A	5	0	-	-	-	-	-	-	-	-	-	-
line 8	8	0	-	-	-	-	-	-	-	-	-	-
line 17	5	0	-	-	-	-	-	-	-	-	-	-
line IV	147	0	33	0	2	0	22	0	26	0	20	PVX(1/20)
line V	147	0	33	0	2	0	22	0	26	PVY(3/26) PVS(1/26)	15	PVY(1/15)
line VI	147	0	33	0	2	0	22	0	26	0	20	PVY(1/20)
lineVII	147	0	33	0	2	0	22	0	26	PVY(1/26)	20	PVY(1/20)
line XI	147	0	33	0	2	0	22	0	26	0	44	0
lineXII	147	0	33	0	2	0	22	0	26	0	44	0

Table 2 Elisa tests of Tamasha (April 1998 to April 1999)

Tube plants			Chamber of artif Climate				Gauze		Hothouse		Field	
Time	24/6/98	20/8/98	10/6/98 16/9/98		20/8/98 16/9/98		10/7/98 16/9/98		16/9/98 12/3/99		5/6/98 10/9/98	
No of passage			3									
Place of Testing	Almaty		Astana		Almaty		Almaty		Almaty		Astana	
Line	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection	No sample	Infection
1 line C-1	5	PVY(1-5) PVS(1/5)	33	0	2	0	17	0	20	0	15	PLRV(1/15)
2 line C-2	5	0	33	0	2	0	17	0	20	0	15	0
3 line C-4	10	0	33	0	2	0	17	0	20	PVS(1/20)	15	PVY(1/15)
4 line C-5	5	0	33	0	2	0	17	0	20	0	15	PVY(1/15)
5 line C-6	5	0	33	0	2	0	17	0	20	PVS(1/20)	15	0
6 line C-7	6	0	33	0	2	0	17	0	20	0	15	PVM(1/15)
7 line 0	11	PVM(11/11) PVS(2/11)	-	-	21/12/98							
8 line 11	11	PVM(8/11) PVS(2/11)	-	-	Line? 15	PI RV (12/15)						
Time	29/9/98 - 16/3/99		Passage 5 6 7 8 11 12									
	No sample	Infection										
1 line C-1	76	0										
2 line C2	76	0										
3 line C4	76	PVX(1/76) PVS(1/76)										
4 line C-5	76	0	0									
5 line C-6	76	0	0									
6 line C-7	76	0	0									

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