

THE TRANSLOCATION OF POTATO VIRUS S, ISOLATE "EERSTELING", IN POTATO PLANTS¹

*Het transport van aardappel-S-virus, isolatie „Eersteling”, in
aardappelplanten*

J. A. DE BOKX and H. A. J. I. WATERREUS

Institute of Phytopathological Research (IPO), Wageningen

In order to obtain primarily infected potato tubers 50 potato plants of each of the varieties 'Bintje' and 'Mentor' were trimmed to one stem and grown in a glasshouse from April to June 1966. Of each variety 25 plants were inoculated four weeks after planting, and another 25 six weeks after planting, with an isolate of potato virus S. The virus isolate was obtained from the variety 'Eersteling', which had been freed from virus X (QUAK, 1960).

The inoculation was performed mechanically with sap, using Carborundum as an abrasive, on all leaflets of one compound leaf situated half way up the stem. The inoculum was obtained by expressing the sap from leaves of secondarily infected plants of the X-virus-free variety 'Eersteling'. In both groups of 25 plants of each variety the inoculated leaf and one fully developed top leaf of each of five plants were tested serologically for the presence of virus S 7, 9, 11 and 14 and 16 days after inoculation. The plants of each group were harvested three weeks after the last inoculation. At that time a top leaf of each plant of the group inoculated four weeks after planting was tested once more for the presence of virus S. No serological test was carried out on the plants of the group inoculated six weeks after planting since all leaves were in poor condition.

Serological detection of virus S was carried out by means of a precipitin test using antisera prepared both at Lisse and Braunschweig². Except for the detection of virus S in a top leaf of one plant of the variety 'Mentor', inoculated four weeks after planting and tested at the time of harvesting, in none of the inoculated or top leaves of either series could virus S be detected.

After breaking dormancy of the tubers artificially, the progeny of the inoculated plants was tested at three, four and seven weeks after planting. From the results of this test it could be concluded that only two plants of the variety 'Mentor' became infected, viz. one plant inoculated four weeks after planting and tested 16 days after inoculation (the same plant in which the virus was detected in a top leaf) and a second plant inoculated six weeks after planting and tested 11 days after inoculation.

In a second experiment 30 potato plants of each of the varieties 'Bintje' and 'Mentor' were inoculated with virus S at different stages of development (2, 3, 4, 5 and 6 weeks after planting) in the same way as described earlier.

¹ Accepted for publication 1 February, 1967.

² Thanks are due to Ir. D. H. M. VAN SLOGTEREN, Lisse, The Netherlands, and Dr. R. BARTELS, Braunschweig, Germany, for supplying the antisera.

Two and four weeks after inoculation the inoculated and a top leaf of each of three potato plants of each variety were tested serologically for the presence of virus S. In no case could virus S be detected. The tubers of these plants were later planted, after breaking dormancy artificially. The young plants grown from these tubers were also tested serologically for the presence of virus S six weeks after planting. The results of this test, presented in Table 1, show that only two tubers of the variety 'Bintje' (both originating from the same plant) were infected with virus S. No explanation for this fact can be given. On the other hand, plants of the variety 'Mentor' inoculated three weeks after planting and harvested four weeks after inoculation produced 75% infected tubers.

TABLE 1. Extent of infection of potato tubers with virus S, isolate „Eersteling”, in relation to the time of infection of the plants and the period between inoculation and harvest.

De mate van besmetting van aardappelknollen met aardappel-S-virus, isolatie „Eersteling”, in samenhang met het tijdstip van inoculatie en het tijdsverloop tussen inoculatie van het loof en het rooien der knollen.

Age of plants at time of inoculation (weeks)	Number of weeks after inoculation			
	Variety 'Bintje'		Variety 'Mentor'	
	2	4	2	4
2	0/6 ¹ = 0%	0/9 = 0%	5/8 = 62%	3/4 = 75%
3	2/8 = 25%	0/5 = 0%	2/9 = 22%	6/8 = 75%
4	0/6 = 0%	0/1 = 0%	1/7 = 14%	0/6 = 0%
5	0/5 = 0%	0/6 = 0%	0/7 = 0%	0/7 = 0%
6	0/7 = 0%	0/6 = 0%	0/10 = 0%	0/8 = 0%

Leeftijd der planten op het tijdstip van inoculatie (weken)	Aantal weken na inoculatie	
	Ras 'Bintje'	Ras 'Mentor'

¹ Numerator/denominator: number of infected tubers/number of tubers tested
Teller/noemer: aantal geïnfecteerde knollen/aantal getoetste knollen

From the results of the first experiment and from Table 1 it may be concluded that infection of the variety 'Bintje' with the isolate "Eersteling" of virus S is very difficult. Plants of the variety 'Mentor' could be infected only in a young stage (two to four weeks after planting) and the virus was translocated from the inoculated leaf to the tubers in less than 14 days.

It is striking that although the virus could not be detected serologically in the inoculated leaves of plants in the early stages of development, it was nevertheless readily translocated to the tubers. Obviously translocation occurs before a serologically detectable concentration of the virus in the inoculated leaves is reached.

The behaviour of virus S isolate "Eersteling" differs from that of the potato viruses X, Y and Y^N in this respect, that plants can be infected only from two to four weeks after planting, whereas in the case of the viruses X, Y, and Y^N infection is possible up to 11 weeks after planting under glasshouse conditions (BEEMSTER, 1961; DE BOKX, 1961).

SAMENVATTING

Uit enige infectieproeven met aardappel-S-virus, isolatie „Eersteling”, blijkt dat planten van het ras ‘Bintje’ onder kasomstandigheden zeer moeilijk met deze stam zijn te besmetten. Planten van het ras ‘Mentor’ zijn vatbaarder, maar kunnen slechts in een jong stadium (twee tot vier weken na het poten) worden besmet.

REFERENCES

- BEEMSTER, A. B. R., - 1961. Een vergelijking tussen het transport van X-virus en twee verschillende stammen van Y-virus in aardappelplanten. *T.PiZiekt.* 67:278-279.
- BOKX, J. A. DE, - 1961. Het toetsen van aardappelknollen op de aanwezigheid van Y^N-virus. *T.PiZiekt.* 67:273-277.
- QUAK, F., - 1960. Jversl. Inst. plziektenk. Onderzoek 1960:85.