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Spread of potato virus S

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Summary

An experiment with *Eersteling* (originally freed by meristem culture from PVX and PVS) and *Alpha* plants has been carried out in the field to study the spread of potato virus S. It was shown that depending on virus isolate, in a crop containing approximately 10% of plants with secondary infection, the primary infection in *Eersteling* could rise to 56–76%, whereas that percentage in *Alpha* plants rose to 2–28 only. From the pattern of infected plants it was concluded that under field conditions in the Netherlands potato virus S is probably transmitted by contact.

Introduction

Many results are presented in the literature of experiments on the spread of potato virus X (PVX) by contact of the leaves (Loughnane and Murphy, 1938; Bonde et al., 1943; Bald, 1944; Klinkowski, 1951; Cockerham, 1958; Todd, 1958).

In Scottish experiments the spread of PVX was followed over a period of 4 years in several crops of the variety *Majestic*, containing approximately 1% of infected plants. In crops grown isolated from external sources of infection, the number of infected plants increased approximately twofold between years (Cockerham, 1958). Similar results were obtained in Germany. In *Flava* and *Ackersegen* containing 3.5% and 5% PVX-infected plants respectively, the percentages of infected plants increased to 8.5% and 13.9% respectively in one year (Bartels, 1956).

The spread of potato virus S (PVS) has not yet been studied extensively. According to the results of French experiments the spread of PVS in a *Bintje* crop was very low. The percentage of PVS-infected plants increased from 3.4 to 3.9 only during one growing season (Maury et al., 1965). However, Scholz (1962) showed that an increase of PVS-infected plants is possible from 5% to 20% during one growing season.

The differences in these results prompted us to investigate the spread of PVS under conditions occurring in the Netherlands.

Materials and methods

Factors such as potato variety, virulence of virus strain, spacing between rows and distance between plants may affect spread.

Not much in known about varietal differences in susceptibility to PVS. We used

Alpha and *Eersteling* (freed by meristem culture from PVS and PVX; Quak, 1967). *Alpha* was chosed arbitrarely. In the case of *Eersteling* we wished to know the rapidity of reinfection by PVS under natural conditions.[1] Six virus isolates were used: *Eersteling*, *Ysselster*, *Leona*, *Saucisse Rouge*, *Industrie* and *Fortuna*. Although all these isolates had a similar particle length (de Bokx, 1969) they differed in other properties (de Bokx, 1968, 1969, 1970; de Bokx and Waterreus, 1971a, b).

In mid-May 1970, six plots were planted of each variety, one plot for each isolate. Except for two plots, planted with *Eersteling*, each plot contained six rows of nine plants, five PVS-infected tubers being planted at random between 49 or 40 healthy tubers (Fig. 1 and 2). The spacing in and between the rows was 40 cm. The plants were harvested on September 1970 and the progeny of all plants was grown in green-

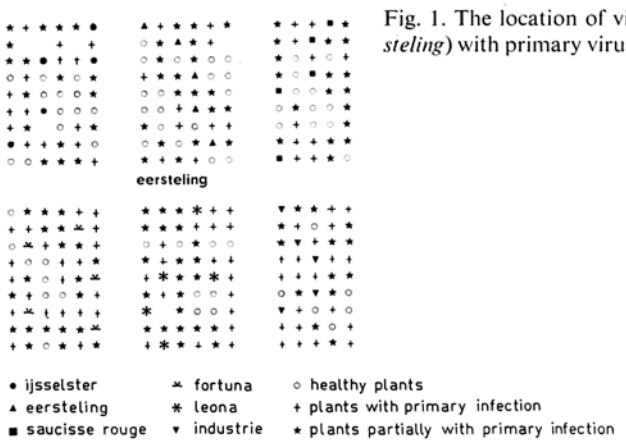

Fig. 1. The location of virus sources and potato plants (*Eersteling*) with primary virus infection.

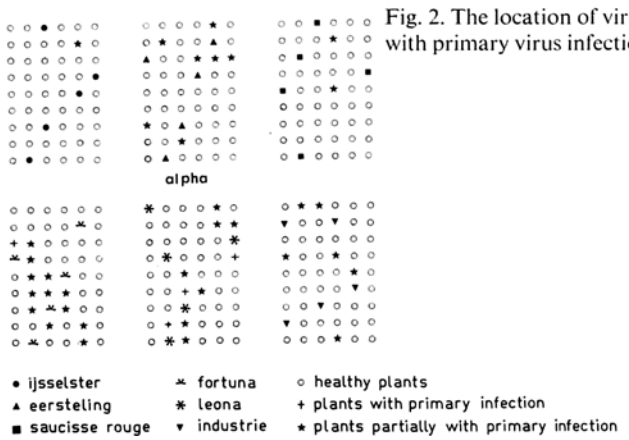

Fig. 2. The location of virus sources and potato plants (*Alpha*) with primary virus infection.

[1] Thanks are due to the Regional Inspection Service Noord-Holland, Alkmaar, the Netherlands for providing the tubers.

houses the following year. The foliage of the young plantlets was tested seriologically for the presence of PVS five weeks after planting. The precipitin micro test was used.

Results

In Table 1 the results of the testing are presented. Since all planted tubers did not come up, the total number of plants per plot differ. The percentages of *Eersteling* plants with primary infection were very high. On the other hand much lower percentages of *Alpha* plants with a primary virus infection were detected. Moreover the progeny of many *Eersteling* plants was completely diseased, whereas that of *Alpha* plants was only partially infected (Fig. 1 and 2). This indicates that the virus-free *Eersteling* is very susceptible to all isolates of PVS investigated. Thus we may conclude that the susceptibility to PVS is influenced by the potato variety. But also the virus isolate plays a role. The highest percentages of potato plants with primary infection were observed in plots with the isolates Fortuna, Leona and Industrie viz 76, 75 and 75, respectively. When the isolates Ysselster, Eersteling and Saucisse Rouge were present, percentages of plants with primary infection ranged from 56 to 64.

In Fig. 1 and 2 the location of virus sources and potato plants with primary infection are shown. As far as plants with primary infection were observed, they were located quite near the virus sources. This made it likely that Dutch isolates of PVS probably are transmitted by contact and not by aphids as was found for some German isolates of PVS (Bode and Weidemann, 1971).

Table 1. Spread of potato virus S in the field (each plot contained 10% plants with secondary infection).

Potato virus S	Percentages of plants with primary infection	
isolates	*Eersteling*	*Alpha*
Ysselster	32/50 (64)[1]	1/54 (2)
Eersteling	30/53 (56)	7/54 (13)
Saucisse Rouge	28/45 (62)	2/54 (4)
Fortuna	41/54 (76)	13/54 (28)
Leona	40/53 (75)	10/54 (18)
Industrie	34/45 (75)	6/54 (11)

[1] Numerator = number of plants with primary infection
Denominator = total number of plants in each plot
In parentheses = percentage of plants with primary infection

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