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Particle length of various isolates of potato virus S

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Abstract

The normal lengths of virus particles of five isolates of potato virus S, which in previous experiments had been detected to differ extremely in translocation speed in potato plants, were found to vary only from 641 to 655 mμ. However, these differences are not significant and the isolates are therefore considered to have a particle length of 650 mμ in agreement with Brandes' recent conclusion (1967).

Introduction

Various particle lengths have been reported for potato virus S (PVS): viz. 652 ± 11 mμ (Wetter and Brandes, 1956), 677 ± 0.8 mμ (Gold et al., 1957), 657 mμ (Brandes, 1964), 660 to 680 mμ (Oshima and Sato, 1965) and 650 mμ (Brandes, 1967). These differences might be due to slight deviations in the absolute magnification of the electron microscopes used, as well as to strain or even isolate differences. Therefore particle length was estimated in five isolates, which in previous experiments (de Bokx, 1968) had been found to differ consistently in translocation speed in potato plants with primary infection. This was also done to find out whether differences in particle length might account for different speeds of translocation.

Materials and methods

The PVS isolates used were obtained from the varieties 'Eersteling', 'IJsselster', 'Industrie', 'Fortuna', and 'Leona'. In the following they are indicated as E, YSS, IN, Fort and L, respectively. Leaves were taken from plants 5–7 weeks after planting of infected tubers.

Specimens for the electron microscope were made by the dip method combined with negative staining. A small drop of 2% potassium phosphotungstate, pH 6.5 was placed on a grid, covered with a thin film of Formvar (polyvinylformvar), backed with carbon. The freshly cut surface of the leaf was dipped for 2 sec in the stain. Excess stain was removed with a piece of filter paper 2 min after dipping. The grid was then examined in a Philips electron microscope EM 300 (Technical and Physical Engineering Research Service, Wageningen) and negatives were taken at a magnification of × 11,700. Prints were made at a magnification of × 40,000 by using a standard carbon-grating replica (54,864 lines/inch) photographed at the same magnification and time as the virus preparations. The virus particles were measured on the prints with a ruler and classified by length intervals of 1 mm, which was equivalent to 25 mμ. A histogram was drawn

for each isolate. Since the frequency idstribution was asymmetric, the normal length (= average length) was calculated from a range of five particle lengths: viz. the apex of the peak and two length groups on either side.

Results and conclusion

The results of the measurements are presented in Table 1. The normal lengths of the virus isolates are 641, 644, 648, 649 and 655 mμ (Fig. 1).
Normal lengths, calculated according to Brandes' method (1964) are reproducible with a deviation of 10 to 20 mμ (Brandes, 1967). Therefore it must be concluded that the differences in normal lengths calculated for our isolates are not significant.
The normal length of potato virus S grown in various potato varieties under glasshouse conditions at Wageningen is the same as that calculated for virus S in various German potato varieties (Wetter and Brandes, 1956).

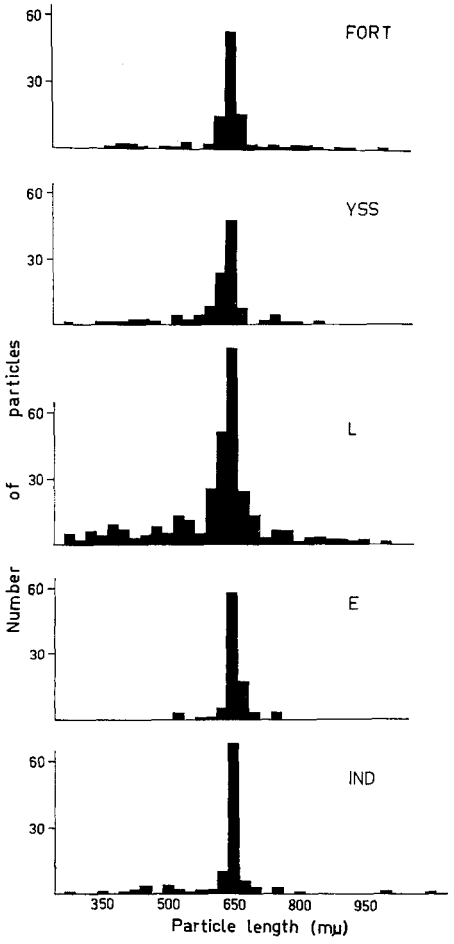

Fig. 1. Length distribution of particles in negatively stained dip preparations from potato plants infected with various isolates of potato virus S

Fig. 1. Lengteverdeling van deeltjes in negatief gekleurde indooppreparaten van aardappelplanten, geïnfecteerd met verschillende isolaten van het S-virus

Table 1. The normal length of particles in negatively stained dip preparations from potato plants infected with various isolates of potato virus S

Isolate	*Number of particles measured*	*Number of particles used to calculate normal length*	*Normal length (mμ)*
Fort	111	88	648
YSS	113	85	641
L	334	202	644
E	91	84	655
IN	121	90	649

Tabel 1. De gemiddelde lengte van deeltjes in negatief gekleurde indooppreparaten van aardappelplanten, geïnfecteerd met verschillende isolaten van het S-virus

Although various isolates of virus S differ considerably in translocation speed the particles of the isolates do not differ appreciably in size.

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Samenvatting

De lengte der deeltjes van verschillende isolaten van aardappel-S-virus

Er werd vastgesteld, dat de "normale lengte" van de virusdeeltjes van vijf isolaten van het aardappel-S-virus, waarvan in eerder uitgevoerde proeven was aangetoond dat ze met verschillende snelheden in aardappelplanten werden getransporteerd, varieerden van 641 tot 655 mμ. Aangezien de verschillen in de berekende lengten onbetrouwbaar zijn moet worden geconcludeerd dat de isolaten een gelijke "normale lengte" bezitten. Deze kan vanwege zijn overeenstemming met de gegevens van Brandes (1967) gesteld worden op 650 mμ.

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