

## Investigation on the retention of potato viruses M and Y in two species of aphids (*Myzus persicae* Sulz. and *Aphis nasturtii* Kalt.)

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Accepted for publication: 15 April 1975

### Summary

The duration of infectivity of the aphids studied, with the exception of virus Y in winged forms of *A. nasturtii*, was in general similar. Infectivity was reduced after 128 min and disappeared completely after 1024 min. Active virus Y persisted for more than 17 h in the winged forms of *A. nasturtii*. This is of high importance for a better knowledge of its epidemiology, since it could explain the transfer of virus Y for long distances.

### Introduction

Potato virus Y occurs in all regions of potato cultivation. It is known from numerous studies that it is non-persistent and that it may be transmitted by more than a dozen aphid species, including all those normally found in potato fields. It is generally believed that its most effective vector is the aphid *M. persicae* Sulz. In Poland, on the other hand, the aphids *A. nasturtii* Kalt. and *A. frangulae* Kalt. contribute most to its spread, since they are most numerous (Gabriel et al, 1975).

Potato virus M has been less studied. Until recently it was considered that in natural conditions it spreads mainly by contact. Bode & Weidemann established in 1971, however, that, like virus Y, this virus is non-persistent and transmitted by aphids. Its vectors, however, are not sufficiently known so far. From among the aphids living on potatoes and capable of carrying virus M, Bode & Weidemann quote among others *M. persicae*, *A. nasturtii* and *A. frangulae*. Schmygla et al. (1971) report that *A. fabae* Scop. may also, to some smaller extent, be a vector.

Not many studies have to date been devoted to the duration of the infectivity of vectors. As regards virus Y this problem has been investigated by several authors (cf. review by Gabriel, 1965) and lately by Karl et al. (1972). The results of these studies, however, are not exhaustive. Information is lacking in the case of virus M.

The present work was undertaken in order to establish the duration of infectivity with potato viruses Y and M in both winged and wingless forms of two aphid species, *M. persicae* and *A. nasturtii*.

## Material and methods

The aphids were kept in air-conditioned cabinets on healthy potatoes and breeding was started from one individual.

A temperature of about 21°C and an illumination of about 6000 lux were maintained in the daytime (16), and a temperature around 16°C in the night (8). The source of virus consisted of potatoes of the variety Voran infected with virus Y and of the variety Uran infected with virus M. *Nicotiana tabacum* L. var. Samsun and *Lycopersicon chilense* Dun. served as test plants for virus Y and M, respectively.

Before starting the experiment the aphids were starved for about 2 h and then placed on the diseased plants for an acquisition feeding time of 1 min. They were then placed in glass cressels covered with a thick nylon net for 1, 4, 16, 64, 128 and 1024 min. After these times the aphids were placed on the test plants for a 4-min inoculation feeding period, after which they were removed and destroyed. In each of the time combinations mentioned above 5 plants were infected, and one was left as control. This set constituted one experimental series. The numbers of series varied from 5 to 10 and are given with the results in Fig. 1. In the case of virus Y two aphids were placed on the test plants, and five in the case of virus M. Inoculation was done at room temperature (21°C). After inoculation the plants were kept in a glasshouse (at 20–25°C), and infection with the viruses was assayed on the basis of visual observations supplemented by serological and biological tests. The results were calculated as the mean percentage of infected plants in all relevant series after the particular time interval.

## Results and discussion

The results are illustrated in Fig. 1. In the wingless forms of *A. nasturtii* infectivity with virus Y was reduced after 128 min and disappeared completely after 1024 min. In the winged forms, on the other hand, infectivity was still noticeable after this latter period. This persistence after so long a time (more than 17 h) may be of high epidemiological importance. It is noteworthy, moreover, that the percentage of infected plants after all the other time intervals was rather high: 42 after 16 min, 26 after 64 min, and 30 after 128 min. It was lower at all times in the case of the wingless form, amounting to 13, 22 and 10% of infected plants, respectively.

In addition, 15 plants were inoculated with the use of winged forms of *A. nasturtii*, after 1024 min of starvation, with a control plant for each infected one. A positive result was obtained in 2 cases, this seemingly confirming the results presented in the figure.

The duration of infectivity of virus M in both forms of *A. nasturtii* seems similar. The infectivity of the aphids was limited after 64 and 128 min and disappeared after 1024 min.

Results on the duration of infectivity in the case of virus M in *M. persicae* so not allow

RETENTION OF VIRUSES M AND Y IN TWO APHID SPECIES

Infected plants (%)

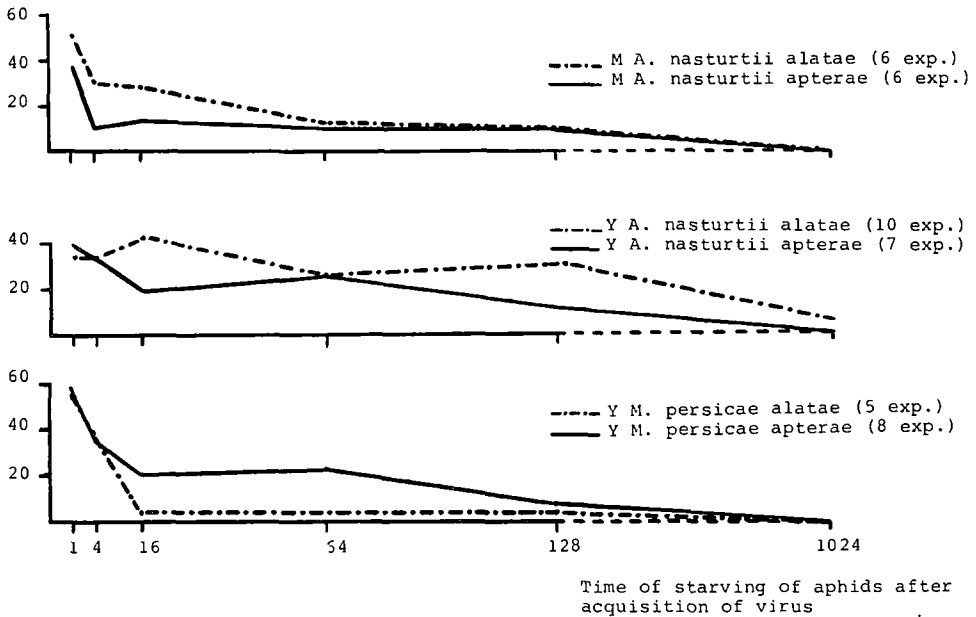


Fig. 1. Retention of viruses M and Y in *Myzus persicae* and *Aphis nasturtii* as shown by the percentage infection of test plants. Time of starving of aphids is given in minutes.

any conclusion, and are not included in Fig. 1. In the 5 experimental series, using both winged and wingless aphids, only in one case was an infected plant obtained, this being with the use of the wingless form. The only conclusion may be that under the conditions of the experiment the aphids were very poor vectors of virus M, as has also been shown by other experiments.

**Conclusions**

The investigations performed indicate that:

1. The duration of infectivity of the aphids studied, with the exception of the case of virus Y in winged forms of *A. nasturtii*, is in general similar. The infectivity of the aphids was reduced after 128 min and disappeared completely after 1024 min.
2. The persistence for so long a time (more than 17 h) of active virus Y in the winged forms of *A. nasturtii* is of high importance for a better knowledge of its epidemiology, since it explains the possibility of transfer of virus Y to large distances.

**References**

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