

Short communication

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The isolation of sharka (plum pox) virus from leaves and fruits of plum with herbaceous plants

H. J. VAN OOSTEN

Laboratorium voor Virologie der Landbouwhogeschool, Wageningen

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Sharka virus causes a serious disease of plum (*Prunus domestica*). Most varieties show symptoms either on the leaves or on the fruits or on both. The leaves show, according to the variety, diffuse chlorotic spots, rings and sometimes lines. On the fruit surface irregular or ring-shaped grooves appear (Fig. 1). The fruits become worthless. Infected trees often show a premature fruit ripening and dropping (Christoff, 1958).

From leaves and fruits with symptoms as described above, I transmitted a virus to two herbaceous plant species, known as test plants for the sharka virus, viz. *Chenopodium foetidum* (Németh, 1963; Kegler et al., 1964) and *Nicotiana clevelandii* (Kassanis and Šutić, 1965; Cropley, 1968). *N. clevelandii* plants, showing a distinct mottle after infection, were used as a source for transmitting the virus with aphids to peach seedlings in the glasshouse. Young wingless *Myzus persicae* were starved for at least 3 h. The aphids were transferred to peach seedlings after a feeding period of 1–2 min on infected *N. clevelandii* plants. After 24 h the aphids were killed with an insecticide. For each plant 15 aphids were used. In every experiment six test plants and three control plants were used. The experiments were repeated twice.

Young leaves of the peach seedlings showed a severe vein clearing 12–16 days after inoculation (Fig. 2). Somewhat later most of the tip leaves of the shoots showed deformation. Both symptoms are characteristic of sharka virus infection (Šutić, 1963; Kegler, 1963), thus indicating that the virus involved in this study was the sharka virus. It was very easy to transmit the virus with *M. persicae* from peach to peach, plum, *N. clevelandii* and *C. foetidum*. *C. foetidum* reacted with chlorotic or ochrous lesions, mostly with a dark necrotic centre. The same lesions were found after sap transmission from peach to *C. foetidum*. This shows, that *C. foetidum* really reacts upon infection with the sharka virus by developing the symptoms described.

During the summer of 1968 and 1969 I examined the utility of *C. foetidum* and *N. clevelandii* as test plants for the sharka virus. Infected plum trees were planted on isolated trial-plots in the year of discovery of the disease in some nurseries. Leaves or parts of fruits were crushed in a mortar containing a solution of 0.067 M (or 0.02 M) phosphate buffer pH 8, 0.03 M caffeine, and 0.015 M sodium-diethyldithiocarbamate. For each gram of leaves or fruits 3 ml buffer was used (Kegler and Opel, 1963). The

Fig. 1. Plum fruits 'Victoria' showing clear sharka symptoms.



Fig. 1. Pruimevruchten 'Victoria' met duidelijke sharkasympptomen.

plants were dusted with carborundum 600 mesh and were inoculated with the finger tip. *C. foetidum* reacted 6–8 days after inoculation with chlorotic or ochrous lesions, mostly with a dark necrotic centre (Fig. 3). By using leaves as source of inoculum it was sometimes possible to obtain symptoms on *C. foetidum* during the whole growing season. However, in many cases no reaction was obtained during summer and autumn.

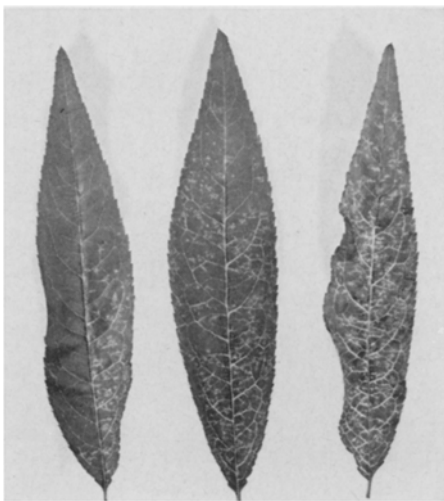


Fig. 2. Leaves of peach showing a clear vein clearing about 3 weeks after aphid inoculation with the sharka virus.

Fig. 2. Bladeren van perzik met een duidelijke oplichting van de nerven, ongeveer 3 weken na een bladluisinoculatie met het sharka-virus.

Symptoms on *C. foetidum* were easily obtained in that period when using ripe fruits as inoculum-source. Therefore, ripe fruits might be useful in test programmes for diagnosing sharka virus during summer.

N. clelandii sometimes became infected after inoculation with the sap of leaves or fruits of trees with the described symptoms, but symptoms were never observed. However, occasionally *N. clelandii* did show symptoms after inoculation with the sap of *C. foetidum* leaves with lesions. During the summer of 1968 infection was only latent, but in the following winter *N. clelandii* reacted with a systemic mottle 2–3 weeks after inoculation. Later *N. clelandii* plants were inoculated with the sap of tip leaves of *N. clelandii*, showing a distinct mottle. In that case necrotic lesions and rings appeared on the inoculated leaves 4–6 days after inoculation (Fig. 4), while the tip leaves showed a chlorotic mottle within 8–12 days after inoculation. Those symptoms were observed already more than one year. However, in test programmes for diagnosing sharka with the aid of *C. foetidum* and *N. clelandii*, only *C. foetidum* is useful as a test plant of the sharka virus.

From ripe fruits of sharka-diseased plum trees in many cases two viruses were isolated via *C. foetidum*, viz. the sharka virus and a hitherto unidentified virus. Sometimes the same unidentified virus was isolated from symptomless leaves of *C. foetidum*, infected with the sap of plum trees, which were not infected with the sharka virus. This unidentified virus was discovered by inoculating sap from *C. foetidum* leaves with chlorotic or ochrous lesions onto leaves of *Chenopodium quinoa*. On *C. quinoa* many

Fig. 3. Leaves of *Chenopodium foetidum* wit local lesions 8 days after sap inoculation with the sharka virus.

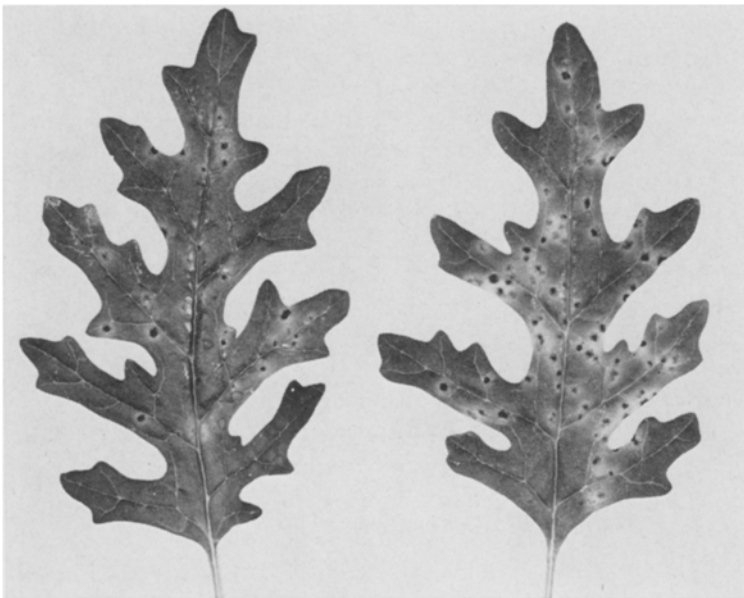


Fig. 3. Bladeren van *Chenopodium foetidum* met lokale lesies, 8 dagen na sapinoculatie met het sharka-virus.

Fig. 4. Leaves of *Nicotiana clevelandii* with necrotic local lesions, 5 days after sap inoculation with the sharka virus.



Fig. 4. Bladeren van *Nicotiana clevelandii* met necrotische lokale lesies, 5 dagen na sapinoculatie met het sharka-virus.

chlorotic lesions with some necrotic points and sometimes big irregular necrotic flecks appeared 4–6 days after inoculation. The same lesions, and sometimes chlorotic rings and lines appeared on the tip leaves 6–10 days after inoculation. Inoculation of *C. foetidum* leaves with the sap of the tips of the infected *C. quinoa* plants always resulted in a symptomless infection. As the results of other experiments showed that the sharka virus always caused only a symptomless infection of the inoculated leaves of *C. quinoa* (van Oosten, 1970), I concluded that the virus inciting lesions on *C. quinoa* is not the sharka virus.

Although *C. foetidum* is susceptible to different viruses of plum, until now only the sharka virus appears to produce specific symptoms on inoculated leaves of this species.

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Samenvatting

De isolatie van het sharka (plum pox) virus uit bladeren en vruchten van pruim met behulp van kruidachtige planten

Uit bladeren, zowel als uit vruchten van sharka-zieke pruimebomen werd een virus overgebracht op *Chenopodium foetidum* en *Nicotiana clevelandii*. *C. foetidum* reageerde

met duidelijke chlorotische of okerachtige lesies. *N. clevelandii* werd wel door het virus geïnfecteerd, maar bleek ongeschikt als toetsplant. Het virus werd met sap van *C. foetidum* naar *N. clevelandii* en met de bladluis *Myzus persicae* van *N. clevelandii* naar perzik overgebracht en terug. Zo kon worden aangetoond, dat het geïsoleerde virus het sharka virus is. Een nog niet geïdentificeerd virus kon ook van pruim op *C. foetidum* worden overgebracht, doch er werden geen symptomen waargenomen op de geïnoculeerde bladeren.

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