

## A whitefly-transmitted disease of glasshouse vegetables, a novelty for Europe

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Since a publication on yellows of outdoor lettuce and endive in the Netherlands caused by beet western yellows virus (Ashby et al., 1979), which is aphid-borne in the persistent manner, our attention has increasingly been drawn to a similar disease in glasshouse lettuce, endive, cucumber and some other crops. However, this disease could not be transmitted with aphids, nor could a virus be isolated with techniques successfully applied previously to beet western yellows virus (Ashby et al., 1979) and to the related bean leafroll virus (Ashby and Huttinga, 1979). Like with the outdoor yellows disease, plants could not be cured with magnesium dressings.

In lettuce and endive the symptoms consist of a blotchy interveinal yellowing or chlorosis of the older leaves, with the venation and some of its adjacent still green tissue clearly standing out (Fig. 1). Such plants, if infected early, may be stunted. Symptoms are essentially identical in cucumber, the yellowing being somewhat irregular and margins of affected leaves often curling downward (Fig. 2). Symptoms can be observed in lettuce crops during autumn and winter under light conditions unfavourable for symptom expression of beet western yellows virus in lettuce and in cucumber also during spring and summer.

The disease has been observed in lettuce in many glasshouses of the South Holland glasshouse district as well as near Breda and Venlo. Often a few plants scattered throughout the glasshouse or occurring in groups are attacked. In a few instances up to 50 or 75 % of the plants were affected. Infection of endive so far has been incidental. Numerous cucumber crops in glasshouses have been found attacked last early spring and summer in the South Holland glasshouse district and three in other provinces.

As other techniques of diagnosis failed, towards the end of 1979 greenhouse whiteflies (*Trialeurodes vaporariorum*) were sampled in disease-free glasshouses and used for transmission experiments both at Naaldwijk and Wageningen. The disease was readily reproduced by feeding the insects for one or two days on diseased plants and subsequent feeding for the same period of time on healthy lettuce and endive. No disease developed in control plants submitted to feeding by whiteflies previously fed upon healthy lettuce. Identical yellowing resulted in plants of *Nicotiana clevelandii* and *N. glutinosa* exposed to feeding by whiteflies from diseased lettuce plants. Simultaneous experiments with large numbers of whiteflies (up to 40 per plant) not previously fed upon diseased plants did not yield such symptoms in *N. clevelandii*, indicating that the disease does not result from insect toxemia. The incitant has meanwhile also been

Fig. 1. Glasshouse lettuce with yellows after natural infection.



Fig. 1. Kassla met vergeling na natuurlijke infectie.

Fig. 2. Glasshouse cucumber with yellows after natural infection.

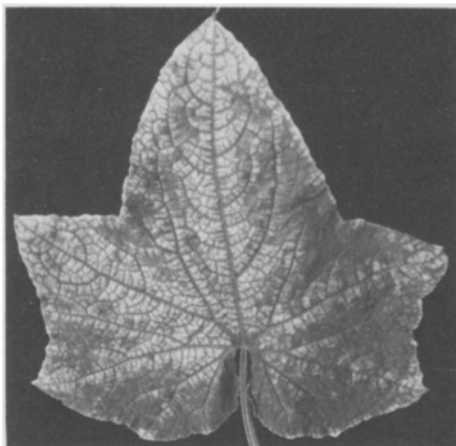


Fig. 2. Kaskomkommer met vergeling na natuurlijke infectie.

introduced into and recovered from a number of weed species, including *Capsella bursa pastoris*, *Senecio vulgaris*, *Sonchus oleraceus* and *Taraxacum officinale*.

More recent experiments at Naaldwijk have proved that the disease of glasshouse cucumbers is also readily transmissible with the greenhouse whitefly to cucumber, lettuce and *N. clevelandii*. Symptoms obtained are identical to those of lettuce yellows.

So far, whitefly-transmitted diseases have almost exclusively been restricted in occurrence to tropical and subtropical parts of the world, with *Bemisia tabaci* as the main vector and leaf curl and golden yellow mosaic being the characteristic symptoms (Bird and Maramorosch, 1978). One exception, so far, has been the greenhouse whitefly-transmissible beet pseudo-yellows virus, briefly described and reported only once in California by Duffus (1965) as a glasshouse contaminant in his experiments with the persistent aphid-borne beet western yellows virus. It was infectious to various vegetable, ornamental and wild species and was isolated a few times from wild plants in the open, including *Conium maculatum* and *Taraxacum officinale*. Some of the whitefly-transmitted diseases have already been associated with visible virus particles. Duffus (1975) considered the beet pseudo-yellows 'virus' to constitute a link between whitefly-transmitted diseases and aphid-borne yellows diseases. Our attention has been drawn to the work of Duffus by Dr. H. Lot, Montfavet, France.

The 'virus' now occurring in a number of glasshouse vegetable crops in the Netherlands is most probably identical to the incitant of Californian beet pseudo-yellows and appears to be of more than mere academic interest.

Its relationship to a yellows virus of glasshouse cucumber and melon recently reported in Japan and also transmitted by *T. vaporariorum* (Yamashita et al., 1979) is

still uncertain. That disease could not be transferred to lettuce and some other species, susceptible to beet pseudo-yellows virus. Moreover, it has been associated with flexuous particles of ca 1000 nm length, which we have not yet been able to detect.

The disease and whitefly-transmission of a plant virus are apparently new for Europe. This report is meant as a preliminary communication in English, while research is being continued.

### Samenvatting

*Een door wittevliegen overgebrachte ziekte van kasgroenten; een novum voor Europa*

Sinds eind 1978 wordt in toenemende mate onze aandacht gevraagd voor een vergelingsziekte bij sla, andijvie en komkommer, die in kassen worden geteeld. De ziekte komt soms reeds in schadelijke mate voor. De symptomen gelijken geheel op die van het door bladluizen verspreide slavergelingsvirus. De ziekte kon bij de genoemde gewassen worden overgebracht door de kaswittevlieg (*Trialeurodes vaporariorum*) maar o.a. ook op enkele tabakssoorten. Het gaat hier waarschijnlijk om een virusziekte en de verantwoordelijke verwekker is waarschijnlijk identiek aan het in 1965 in Californië beschreven en tot dusver nog maar éénmaal gerapporteerde 'beet pseudo-yellows virus' dat daar bij onderzoek als verontreiniger optrad, maar in staat was om vele plantesoorten te infecteren. Voor het virus werd de Nederlandse naam pseudo-slavergelingsvirus ingevoerd. Over de verwantschap met een onlangs in Japan beschreven verwekker van een door dezelfde wittevlieg overgebrachte kasvergelingsziekte van komkommer en meloen bestaat nog onzekerheid. Door wittevliegen overgebrachte virussen komen veelvuldig en in een schadelijke mate voor in de tropen.

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