THE OCCURRENCE OF YELLOW-NET VEIN VIRUS IN GERANIUMS IN ONTARIO[1]

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Introduction

A geranium disease similar to yellow-net vein, described in the U.S.A. for the first time in 1961 (2), has been noticed in a number of scattered greenhouses in Ontario. In March, 1963, two potted plants of the cultivar 'Red Irene' with pronounced yellow veins were found among thousands of stock plants of many cultivars in the greenhouse of a specialized geranium propagator in the Niagara Peninsula, Ontario. Late in December of the same year, a plant of the cultivar 'Princess Irene' with the same type of symptom was received from a grower in Essex County. Since that time this disease has been observed in the cultivars 'Dark Red Irene' and 'Salmon Irene'.

Symptoms

Affected plants show striking yellow vein patterns (Fig. 1b). No puckering or other distortion of the foliage occurs and the flower petals have no color breaks or other abnormalities. The stems are not pitted or marked in any way. Yellowing of the primary and secondary veins is the most conspicuous symptom but often the tertiary veinlets form a yellow network.

Expression of symptoms in the greenhouse

Grower inquiries about this disease are seasonal, suggesting that some environmental factor controls symptom development. Four naturally-infected plants were closely observed during 1964 and 1965 in an attempt to correlate the occurrence of symptoms with specific environmental conditions prevailing in the laboratory greenhouse. In December, January and February of each year these plants showed marked vein yellowing. Later in the spring and summer the symptoms became much less severe but did not completely disappear. Occasionally, some of the plants showed a series of yellow-veined leaves alternating with a series of symptomless leaves. This again suggests controlling environmental factors that fluctuate periodically, such as temperature or light intensity and winter greenhouse temperature but these factors are not necessarily the only determining factors in the expression of symptoms.

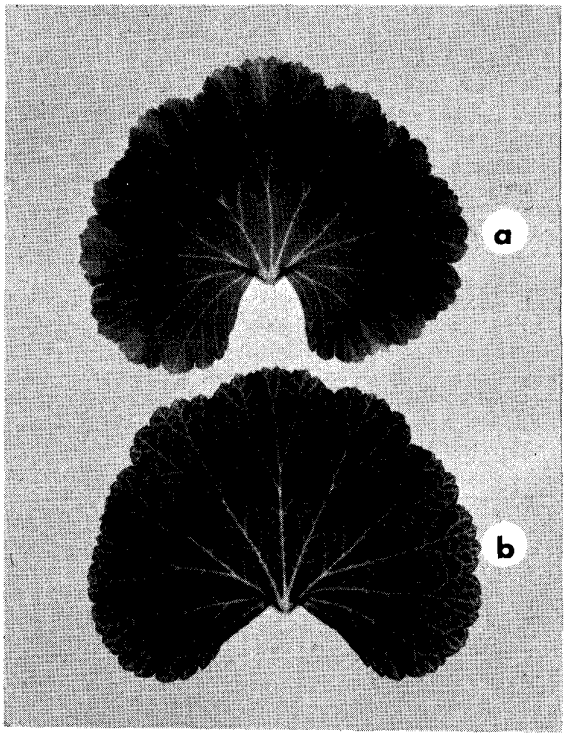

Fig. 1. (a) Normal leaf of *Pelargonium hortorum* 'Princess Irene'. (b) Symptoms of yellow net vein virus in the some cultivar.

Plants grown from cuttings taken from affected stock continued to exhibit the characteristic symptoms in the winter. By contrast, plants propagated from cuttings of the same cultivars taken from symptomless stock showed no symptoms under the same environmental conditions.

Transmission

These symptoms are different from those reported for other diseases of geraniums in Canada. They are suggestive of a virus disorder, possibly yellow-net vein. Since this virus was unreported in Canada, confirmation of its presence was sought.

In January, 1964, two scions from healthy seedlings of Pelargonium zonale Ait. were top grafted to affected 'Princess Irene'. Again in November of the same year, three scions were grafted to an unknown cultivar with pronounced symptoms. Within 4 weeks

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one of the two scions grafted to 'Princess Irene' showed pronounced yellow veins in the newest leaves. Older leaves were not seriously affected. During the seventh week, the second graft exhibited faint yellow veins on only the newest leaves. Initially, only some to the veins on a leaf were affected but later the entire vein network showed the symptoms. In the November series of grafts, only one of the scions showed symptoms and then only mild ones even though the stock plant was markedly affected at the time.

Mechanical inoculation with diseased leaf tissue ground in 0.2M phosphate buffer at pH 8.0 failed to infect beans, cowpeas, squash, snapdragons, a m - phrena globosa L., tobacco, cucumber, Chenopodium amaranticolor Coste and Reyn. and seedlings of Pelargonium zonale Ait. No fungi nor bacteria were isolated from the stems of plants showing symptoms of yellow-net vein.

Discussion and conclusions

The positive graft transmissions, although few in number, strongly suggest that the yellow-net vein symptom on 'Princess Irene' and the unknown cultivar was of virus origin. It seems reasonable to conclude from the similarity in symptoms that the other cultivars observed, but not tested, were infected with the same virus and that it is probably the same as yellow-net vein virus reported in the **U.S.A.**

In 1961, the author (1) described a disease of geranium whose symptoms include pronounced vein yellowing followed by severe leaf curl. This disease, demonstrated to be of virus origin, was named curly-top. The possibility that curly-top was a composite disease caused by multiple virus infection was not excluded at that time. It is now considered possible that curly-top was, in fact, caused by more than a single virus, one of which was yellow-net vein.

Yellow-net vein virus does not appear to be prevalent in geraniums in Ontario. It has been found mostly in 'Irene' cultivars. However, this fact and the wide differences in symptom response to this virus among seedlings of P. zonale grafted to the same infected source suggests that it might be present but not apparent in other cultivars. Since a satisfactory test plant for this virus is lacking at present, the extent of its occurrence in a masked condition would be difficult to determine.

Literature cited

1. Kemp, W. G. 1961. Curly-top, a virus disease of florists' geranium in Ontario. Can. Plant Dis. Survey 41: 265-268.
2. Reinert, R.A., A.C. Hildebrandt, and G.E. Beck. 1961. Geranium Viruses. Florists Review, August.