HRI
Horticultural Research Institute

This Journal of Environmental Horticulture article is reproduced with the consent of the Horticultural Research Institute (HRI – www.hriresearch.org), which was established in 1962 as the research and development affiliate of the American Nursery & Landscape Association (ANLA – http://www.anla.org).

HRI's Mission:

To direct, fund, promote and communicate horticultural research, which increases the quality and value of ornamental plants, improves the productivity and profitability of the nursery and landscape industry, and protects and enhances the environment.

The use of any trade name in this article does not imply an endorsement of the equipment, product or process named, nor any criticism of any similar products that are not mentioned.

Copyright, All Rights Reserved

Downloaded from https://prime-pdf-watermark.prime-prod.pubfactory.com/ at 2025-07-18 via free access

Tomato Spotted Wilt Virus Infection of Commercial *Aphelandra* sp.[1]

Robert S. Halliwell and Larry W. Barnes[2]
Department of Plant Pathology and Microbiology
Texas A&M University
College Station, Texas 77843

Abstract

Tomato spotted wilt virus (TSWV) is becoming more prevalent in Texas crops. TSWV diseases are endemic in peanuts, tomatoes, peppers, and are becoming more of a problem in greenhouse crops. TSW of *Aphelandra* sp., is described as a new disease problem in commercial greenhouse production.

Index words: *Aphelandra* sp., zebra plant, tomato spotted wilt virus (TSWV)

Introduction

The zebra plant (*Aphelandra squarrosa*) grown in a commercial greenhouse exhibited progressive light brown necrosis of the major veins of semimature terminal leaves. The discoloration frequently progressed to involve large intervenial areas resulting in extensive leaf necrosis. Symptomatic leaves were distorted, epinastic, and had a tendency to abscise prematurely (Fig. 1). Fungal and bacterial pathogens were not detected, consequently a viral etiology was suspected. A search of the literature did not reveal any previous virus disease reports on *Aphelandra* sp.

Materials and Methods

Leaf tissue from infected plants was macerated in 0.05 M phosphate buffer (pH 7.2) containing 0.01 M sodium sulfite and mechanically applied to carborundum-dusted leaves of healthy zebra plants, *Phaseolus vulgaris* L. (cv. Pinto), *Vigna sinensis* (Torner) Savi. (cv. Early Ramhorn), *Nicotiana tabacum* L. (cv. Samsun NN), *Cucumis sativis* L. (cv. Chicago Pickling), and *Chenopodium amaranticolor* Coste and Reynier.

Quick-dip preparations of diseased plants were examined with a Hitachi Hs7s electron microscope. Sap from the cut edge of a symptomatic leaf was allowed to flow into a drop of 2% phosphotungestic acid (pH 6.5), dried, and scanned for the presence of virus particles.

Symptomatic and healthy zebra plant leaf tissue was embedded in plastic for observation with the electron microscope. Tissue pieces about 2 mm^2 (2/25 in^2) were successively fixed in each of the following at 25°C (77°F): 2% gluteraldehyde in 0.1 M phosphate buffer (pH 7.2) for three hrs, 2% osmium tetroxide in 0.1 M phosphate buffer (pH 7.2) for one hour, and 1% uranyl acetate for 16 hrs. Following fixation, the specimens were dehydrated in a graded ethanol series, placed in acetone for two 15-minute intervals and embedded in a graded Epon 812 plastic. Thin sections cut on an ultramicrotome were stained in 2% uranyl acetate for one minute and 0.5% lead citrate one minute (2).

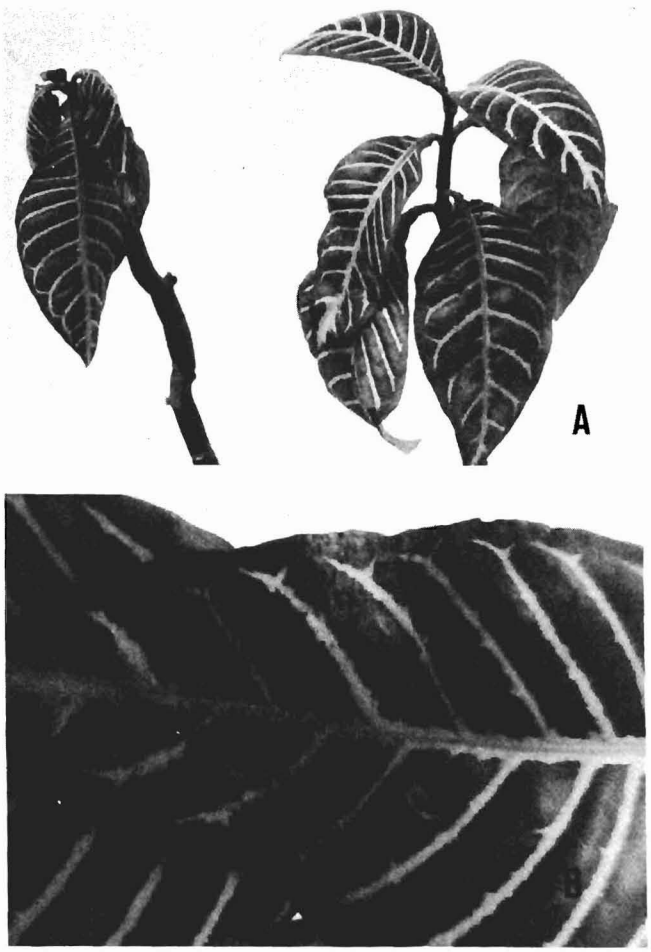

Fig. 1. ***Aphelandra*** **sp. infected with tomato spotted wilt virus. (A). Plant (left) in advanced stages of deterioration; infected by grafting from naturally infected plant. Plant (right) in early stages of infection showing epinasty and leaf necrosis; infected mechanically with known TSWV. (B). Leaf of experimentally infected plant exhibiting systemic leaf necrosis symptom.**

Results and Discussion

A pathogen was not mechanically transmitted from the infected zebra plants to plants of the same species or to any of the assay plants nor were helical or bacilliform virus

[1]Received for publication January 29, 1987, in revised form April 10, 1987.

[2]Professor, Department of Plant Pathology and Microbiology, Texas Agricultural Experiment Station, and Extension Plant Pathologist, Texas Agricultural Extension Service, resp.

Downloaded from https://prime-pdf-watermark.prime-prod.pubfactory.com/ at 2025-07-18 via free access

particles detected via quick-dip electron microscopy. However, electron micrographs of infected zebra plant leaf tissue revealed virus-like particles enveloped in membranous-like vesicles, a pecularity of tomato spotted wilt virus (Fig. 2).

Although TSWV was not transmitted from a symptomatic infected zebra plant, TSWV from peanut and tobacco was mechanically transmitted to zebra plants. Both TSWV inoculated and naturally infected zebra plants displayed identical symptoms and tested positive for TSWV in ELISA tests.

Systemic movement of the virus, implied by progressive symptom development, appeared to be acropetal only. Acropetal movement was further substantiated as buds obtained from below symptomatic leaves and grafted onto healthy plants failed to transmit the virus and were asymptomatic when forced. However, buds taken from above infected leaves were always infectious.

Significance to the Nursery Industry

TSWV has become more prevalent in field and greenhouse grown crop and nursery plants since 1984 (1). Consequently, nursery men should be alerted to the potential danger of TSWV to their industry.

The host range of TSWV includes plants in 34 families, many of which are ornamental and landscape species (3). TSWV is naturally transmitted from plant to plant by thrips. However, zebra plants and many other horticultural crops are propagated vegetatively by cuttings and propagation from TSWV infected plants could increase the disease in production greenhouses.

It is important for nurserymen to be aware of the symptoms of TSWV infection so appropriate control measures can be implemented to minimize economic loss. Appropriate sanitation measures, including roguing of symptomatic plants, as well as the use of an effective thrips-control program, should be considered for control of TSWV in greenhouse crops.

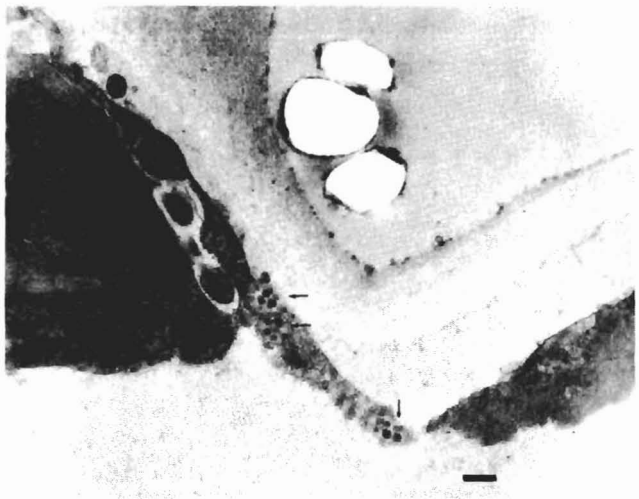

Fig. 2. Tomato spotted wilt virus in the cytoplasm of *Aphelandra* sp. Bar = 200 nm.

Literature Cited

1. Barnes, L.W., and R.S. Halliwell. 1985. Tomato spotted wilt virus infecting Begonia hybrids in Texas. Plant Dis. 69:613.

2. Halliwell, R.S., and G. Philley. 1974. Spotted wilt of peanut in Texas. Plant Dis. Rept. 58:23–25.

3. Ie, T.S. 1970. Tomato spotted wilt virus. C.M.I./A.A.B. Descriptions of Plant Viruses. No. 39. Kew Surrey, England. 4 pp.

Downloaded from https://prime-pdf-watermark.prime-prod.pubfactory.com/ at 2025-07-18 via free access