



TOMATO SPOTTED WILT VIRUS IN GLOXINIA IN NORTH CAROLINA

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In July some gloxinia plants with unusual and severe symptoms were brought to the Plant Disease and Insect Clinic from a commercial greenhouse. The symptoms suggested a virus disease. Juice from the gloxinia leaves was rubbed onto several

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test plants in the greenhouse. Symptoms were observed in 5-7 days in a wild tobacco species and several other hosts. Juice from the wild tobacco was rubbed on leaves of healthy seedling gloxinia plants. Symptoms in these inoculated plants were very similar to those observed in the original gloxinia plants. Based on the reaction of the host range plants and a positive reaction to antiserum of tomato spotted wilt virus, the disease in gloxinia was identified as tomato spotted wilt. The disease has now been found in gloxinias in another greenhouse.

This is the first time tomato spotted wilt virus has been identified occurring naturally in North Carolina. For the past several years, this disease has been unusually widespread and severe on tomatoes, peanuts and tobacco across the Gulf states and north into central Tennessee and southern Kentucky.

Tomato spotted wilt virus has a very wide host range (166 species in 34 families) of cultivated plants (see Table 1) plus numerous weeds. This virus is transmitted from plant to plant by several species of thrips, including the western flower thrips (see article by Baker on thrips transmission). With an uncontrolled population of thrips in a greenhouse, one virus-infected plant can soon lead to a severe epidemic of tomato spotted wilt.

The symptoms on gloxinia include necrotic line and ring patterns, terminal bud necrosis and stunting of young gloxinia plants. Symptoms appear on young plants about five days after mechanical inoculation. On older plants chlorotic to necrotic ring, oak leaf and line patterns occur on leaves. These symptoms may be more obvious on the lower leaf surface than on the upper surface. Flowers on infected plants are distorted with distinct line and ring spot patterns of color break (white in normally colored petals). Frequently, infected plants partially recover from the initial severe symptoms but symptoms vary widely from plant to plant. Diseased plants are completely unsaleable.

Control: Once the virus and thrips become established in a greenhouse, it will be very difficult to eliminate the problem.

Thrips control will be discussed by Jim Baker in this issue. Thrips control is a floral industry-wide problem in desperate need of a solution.

Thrips cannot only carry the virus from plant to plant within a greenhouse, but they can also carry the virus from one greenhouse operation to another. The combination of thrips plus the virus is much more damaging than either alone.

Diseased plants should be removed from the greenhouse immediately and destroyed. Once gloxinia plants become infected, there is no way to cure them. One infected plant can serve as the source of the disease for many other plants if thrips are not controlled. Purchase only virus free propagation material.

Additional Literature

Best, R. J. 1968. Tomato spotted wilt virus. In Smith, K. M. and M. A. Lauffer (Ed.). *Advances in Virus Research*, Vol. 13:66-142.

Moorman, G. W. 1985. African violets, gloxinias and other gesneriads. In Strider, D. L. (Ed.). *Diseases of Flora Crops*, Vol. 2:227-250.

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Noordam, D. 1952. Lycopersicum-virus 3 (tomato spotted wilt) bij enkele bloemisterijgewassen. Tijdscher. Plantenziekten 58:89-96.

Zettler, F. W. and J. Nagel. 1983. Infection of cultivated gesneriads by two strains of tobacco mosaic virus. Plant Disease 10:1123-1125.

Table 1. Tomato Spotted Wilt Virus Host Range.

Field Crops

peanut Arachis hypogaea
tobacco Nicotiana tabacum

Vegetables

spinach Spinacia oleracea
cauliflower Brassica oleracea var. botrytis
broad bean Vicia faba
cowpea Vigna sinensis
snap bean Phaseolus vulgaris
garden pea Pisum sativum
celery Apium sp.
tomato Lycopersicum esculentum
eggplant Solanum melongena
potato Solanum tuberosum
lettuce Lactuca spp
pepper Capsicum spp

Ornamentals

baby's-breath	<u>Amaranthus</u> spp	dahlia	<u>Dahlia variabilis</u>
delphinium	<u>Gypsophila paniculata</u>	China aster	<u>Callistephus chinensis</u>
peony	<u>Delphinium</u> sp	aster	<u>Aster</u> sp
	<u>Peonia</u> sp	zinnia	<u>Zinnia elegans</u>
	<u>Ranunculus</u> sp	chrysanthemum	<u>Chrysanthemum</u> sp
poppy	<u>Anemone</u> sp	cineraria	<u>Cineraria</u> sp
sweet pea	<u>Papaver</u> sp	coreopsis	<u>Gaillardia</u> spp
nasturtium	<u>Lathyrus odoratus</u>	cosmos	<u>Coreopsis</u> spp
begonia	<u>Tropaeolum</u> sp	calendula	<u>Cosmos</u> sp
evening primrose	<u>Begonia</u> sp	Transvaal daisy	<u>Calendula officinalis</u>
phlox	<u>Oenothera</u> sp	marigold	<u>Gerbera</u> sp
primrose	<u>Phlox drummondii</u>	calla lily	<u>Tagetes</u> sp
morning-glory	<u>Primula</u> spp	amaryllis	<u>Zantedeschia</u> sp
forget-me-not	<u>Convolvulus</u> sp	pineapple	<u>Hippeastrum</u> sp
verbena	<u>Myosotis alpestris</u>	gladiolus	<u>Ananas comosus</u>
salvia	<u>Verbena</u> sp	tiger lily	<u>Gladiolus</u> sp
petunia	<u>Salvia</u> sp		<u>Lilium tigrinum</u>
calceolaria	<u>Petunia</u> spp		
snapdragon	<u>Calceolaria</u> sp		
gloxinia	<u>Antirrhinum</u> sp		
bellflower	<u>Sinningia</u> sp		
	<u>Campanula</u> spp		
	<u>Lobelia</u> sp		

Record-Breaking Weather Doesn't Stop Record-Breaking Crowd at Bedding Plant Day

Over 200 people participated in the Bedding Plant Day in Raleigh on July 30. The hot, dry summer did not discourage enthusiastic growers from viewing the trials at University Research Unit 4. Most of the plants really were looking much better than one might expect in such weather. Lunch at the NCSU Faculty Club followed the visits at the bedding plant trial grounds, perennial garden, and arboretum.

Vinny Bonaminio, nursery extension specialist, moderated the afternoon session. The audience was welcomed by George Kriz, associate director of research of the N.C. Agricultural Research Service. Plant pathologist Ron Jones discussed diseases of chrysanthemums, with emphasis on garden varieties. "How to Include Perennials in Your Bedding Plant Operation" was the title of John Elsley's presentation. John is horticultural director of Wayside Gardens, Hodges, S.C. (A list of perennials suggested by this internationally known horticulturist is inserted at the conclusion of this article.)

Aphid and whitefly control in the greenhouse is of paramount importance in many ranges, and NCSU entomologist Jim Baker enlightened the audience about control procedures. Joe Love then reported on cultural techniques which have been followed over the years in the NCSU trial gardens. Joe has been in charge of the trial gardens for 22 years. He is ably assisted by his technician, Bernadette Scott, station superintendent John Scott, his assistant, Clifton Ryan, and part-time employees. The success of the gardens is assured by the generous contributions of seed and plant material from the following horticultural firms:

1. All America Selection, P.O. Box 216, Sycamore, IL 60178
2. Ball Seed, P.O. Box 335, West Chicago, IL 60185
3. Bodger Seeds Ltd., P.O. Box 5090, El Monte, CA 91734
4. W. Atlee Burpee Co., 300 Park Ave., Warminster, PA 18974
5. Denholm Seed Co., 222 N. "A" St., Lompoc, CA 93436
6. Ferry-Morse Seed Co., P.O. Box 5496, Tampa, FL 33605
7. Fred C. Gloeckner & Co., Inc. 15 E. 26th St., New York, NY 10010
8. Goldsmith Seeds, Inc., P.O. Box 1347, Gilroy, CA 95020
9. Joseph Harris Co., Inc., Moreton Farm, Rochester, NY 14624
10. Henry F. Mitchell Co., Church Rd., King of Prussia, PA 19406
11. Pan-American Seed Co., P.O. Box 438, West Chicago, IL 60185
12. George J. Park Seed Co., Greenwood, SC 29646
13. Royal Sluis, Koninklijke Zaaizaadbedrijven Gebroeders Sluis B. V., P.O. Box 22, Enkhuizen, Holland
14. T. Sakata & Co., 2 Kiribatake, Kanagawa-ku, P.O. Box Kanagawa No. 11, Yokahama, Japan
15. Sluis & Groot, B.V., Westeinde 62, P.O. Box 13, 1600 AA Enkhuizen, Holland
16. Vaughan's, 5300 Katrine Ave., Downers Grove, IL 60615

Garden Chrysanthemums:

17. Pan-American Seed Co., P.O. Box 438, West Chicago, IL 60185
18. Yoder Brothers, Inc., P.O. Box 230, Barberton, OH 44203

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The extent of their generosity is revealed by the list of bedding plants shown below:

<u>Plant Material</u>	<u>Number of Varieties</u>	<u>Plant Material</u>	<u>Number of Varieties</u>
Ageratum	7	Lobelia	4
Alyssum	3	Marigolds	48
Amaranthus	1	New Guinea impatiens	8
Aquilegia	1	Nicotiana	3
Aster	8	Ornamental pepper	8
Basil	1	Petunia	125
Bells of Ireland	1	Phlox	2
Carnations	6	Poppy	2
Celosia	14	Portulaca	4
Cineraria	1	Rudbeckia	1
Cleome	1	Salpiglossis	1
Cosmos	4	Salvia	15
Dahlia	9	Sanvitalia	2
Dianthus	10	Scabiosa	1
Dimorphotheca	1	Snapdragons	4
Dusty Miller	2	Statice	6
Gazania	6	Stock	1
Geraniums	45	Verbena	10
Gerbera	4	Vinca	6
Heliotrope	1	Zinnia	12
Impatiens	48		
Lisianthus	4	Garden mums	54