New Hosts of St. Augustine Decline Virus

Norani Abu-Samah and G. E. Holcomb

Former Graduate Student and Associate Professor, respectively, Department of Plant Pathology, Agricultural Experiment Station, Louisiana State University, Baton Rouge 70803. Present address of the senior author: Kuala Lumpur, Malaysia.

We thank the following persons for supplying samples of seed used in this study: W. H. Skrdla, North Central Regional Plant Introduction Station, Ames, IA; C. M. Taliaferro, Oklahoma State University, Stillwater, OK; L. C. Newell, University of Nebraska, Lincoln, NB; and E. T. Jacobsen, SCS-USDA, Manhattan, KS.

This paper is based on a portion of the senior author's M.S. thesis.

ABSTRACT

SAMAH, N. A., and G. E. HOLCOMB. 1976. New hosts of St. Augustine decline virus. Phytopathology 66:215-216.

Twenty-one *Panicum* species, plant introductions, and cultivars were tested for their reaction to St. Augustine decline virus. Eight produced systemic mosaics, seven were symptomless carriers, and five were immune. Chlorotic local lesions were observed on inoculated leaves of *P. dichtomiflorum*. The number of lesions was found to decrease with increasing inoculum dilutions. *Leptochloa filiformis* produced a systemic mosaic when inoculated with St. Augustine decline virus.

Additional key words: Stenotaphrum secundatum, local lesion host.

St. Augustine decline virus (SADV) occurs naturally on St. Augustinegrass, *Stenotaphrum secundatum* (Walt.) Kuntze, in Texas (5) and Louisiana (2). The virus is a small isometric particle serologically related to Panicum mosaic virus (PMV) (4, 7). SADV strains have recently been identified that are weakly related serologically to PMV (1). The two viruses also differ in host range and host reaction; PMV does not infect St. Augustinegrass. Host range studies (3, 5) showed that SADV systemically infects *Panicum miliaceum* L. (proso millet), *P. maximum* Jacq., *P. havardii* Vasey; *Pennisetum glaucum* (L.) R. Br. (pearl millet), *Setaria italica* (L.) Beauv. (German foxtail millet), and *Digitaria sanguinalis* L. (crabgrass). Because of inconsistent results with proso millet as an indicator plant (2) and the desire to test for a wider host range, a study was initiated to screen additional *Panicum* species for their reactions to SADV. Preliminary results of this study were published in abstract form (6).

MATERIALS AND METHODS.—Seeds of each

TABLE 1. Reaction of *Panicum* species and cultivars to inoculation with St. Augustine decline virus (Lafayette, LA isolate)

Panicum species	P.I. Number or cultivar	Plant height[a]	Stunt[b]	Host response[c]
P. stapfianum	178257	medium	none	2
P. miliare	197274	tall	moderate	4
P. capillare	220025	tall	moderate	4
P. turgidum	221079	tall	slight	SC
P. maximum	224989	tall	none	I
P. cymbiforme	238344	tall	none	I
P. bisulcatum	286485	medium	moderate	4
P. bergii	310020	medium	slight	1
P. milioides	310043	medium	none	SC
P. dichotomiflorum	315726	short	slight	LL
P. prolutum	338658	medium	slight	2
P. miliaceum	Turghai	. . .	moderate	3
P. virgatum	315723	medium	slight	SC
P. virgatum	315724	medium	moderate	SC
P. virgatum	315728	medium	slight	SC
P. virgatum	Nebraska 28	short	slight	SC
P. virgatum	Type ey	medium	none	SC
P. virgatum	Caddo	medium	none	I
P. virgatum	Pathfinder	short	none	I
P. virgatum	Kanlow	medium	none	I
P. virgatum	Blackwell	medium	none	I

[a]Based on comparisons with proso millet (cultivar Turghai).

[b]Severity of stunting based on comparisons with noninoculated plants.

[c]Numerical rating based on severity of mosaic symptoms when compared with infected plants of cultivar Turghai: 1 = mild mosaic and 4 = severe mosaic; SC = symptomless carrier, virus recovered; I = immune, symptomless and no virus recovered; LL = chlorotic local lesions in the form of spots and streaks.

Panicum species or cultivar were planted in four, 7.5-cm diameter peat pots containing soil mix and thinned to five-to-six seedlings per pot before use. Seedlings were started in the greenhouse, inoculated and moved to a growth chamber maintained at 26 C with 16 hours daylight. SADV (isolate from Lafayette, LA) inoculum was prepared from infected leaves of St. Augustinegrass (common strain) by triturating them in a mortar containing a small amount of 25-μm (600-mesh) Carborundum. Crude plant sap was diluted 1:2 with 0.01 M phosphate buffer, pH 7.0, and rubbed on all leaves of test plants in the third-leaf stage. Plants in each of three pots were inoculated and plants in one pot served as noninoculated controls to determine the stunting effect of the virus. Plant height and symptom severity were compared with inoculated 'Turghai' proso millet. Results were recorded 3 weeks after inoculations. Inocula from plants that did not show symptoms were inoculated to St. Augustinegrass to determine if the test plant was a symptomless carrier or immune to the virus.

RESULTS AND DISCUSSION.—Host range studies with SADV on 21 *Panicum* species, plant introductions and cultivars showed that eight became infected systemically, seven were symptomless carriers, five were immune and one produced local chlorotic lesions (Table 1). *Panicum miliare* Lam., *P. capillare* L., and *P. bisulcatum* Thunb. produced a more distinct mosaic than did 'Turghai' proso millet. *Panicum miliare* was the best systemic host based on distinctness of symptoms. *Leptochloa filiformis* (Lam.) Beauv., a native fall grass, was also inoculated with SADV and found to produce a typical systemic mosaic. All of the susceptible plant species listed in Table 1, except *P. miliaceum*, are new hosts for SADV. Two of these species (*P. miliaceum* and *P. capillare*), previously reported as systemic hosts for PMV (7), were also systemic hosts of SADV (Table 1). *Panicum turgidum* Hochst. ex Steud., a systemic host of PMV (8), was a symptomless carrier of SADV in our studies. *Panicum maximum*, reported immune to PMV (7), was also immune to our SADV isolate but was previously reported susceptible to a Texas isolate of SADV (3). It was interesting to note that plant introductions and cultivars of *P. virgatum* L. were either symptomless carriers or immune to SADV.

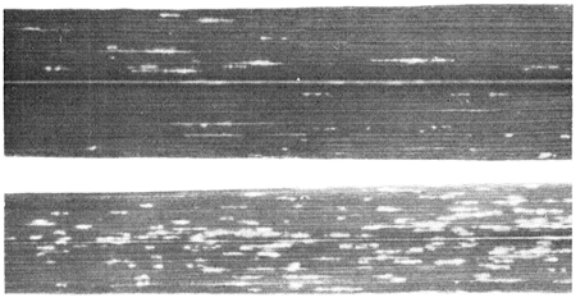

Fig. 1. Local, chlorotic spots and streaks on leaves of *Panicum dichotomiflorum* inoculated with St. Augustine decline virus (Lafayette, LA isolate).

The most significant finding in this study was the local reaction of *P. dichotomiflorum* Michx. This host produced chlorotic spots and streaks on leaves inoculated with SADV 5-7 days after inoculation (Fig. 1). Virus was recovered from individual lesions and transmitted back to St. Augustinegrass. No systemic symptoms developed on this host and virus was not recovered from noninoculated leaves sampled and assayed on St. Augustinegrass 4 weeks after local symptoms had appeared. A single experiment was conducted to determine the effects of inoculum dilution on local lesion numbers. Infectious sap was serially diluted with phosphate buffer and each dilution inoculated to three leaves of *P. dichotomiflorum* plants. The results of this test showed that the number of local lesions produced per leaf, the number of inoculated leaves with lesions, and the number of plants showing lesions, decreased with increasing dilution of the inoculum. Further tests should determine the usefulness of this host in quantitative studies on SADV.

LITERATURE CITED

1. HOLCOMB, G. E. 1974. Serological strains of Panicum mosaic virus. Proc. Am. Phytopathol. Soc. 1:21 (Abstr.).
2. HOLCOMB, G. E., K. S. DERRICK, R. B. CARVER, and R. W. TOLER. 1972. St. Augustine decline virus found in Louisiana. Plant Dis. Rep. 56:69-70.
3. LEE, T. A., JR. 1973. Isolation, purification, and characterization of the virus causing St. Augustine decline. Ph.D. Dissertation, Texas A & M University. 66 p.
4. LEE, T. A., JR., and R. W. TOLER. 1973. Purification and characterization of the virus causing St. Augustine decline (SAD). Phytopathology 63:444 (Abstr.).
5. MC COY, N. L., R. W. TOLER, and J. AMADOR. 1969. St. Augustine decline (SAD) - a virus disease of St. Augustinegrass. Plant Dis. Rep. 53:955-958.
6. SAMAH, N. A., and G. E. HOLCOMB. 1974. A local lesion host for St. Augustine decline strain of Panicum mosaic virus. Proc. Am. Phytopathol. Soc. 1:156 (Abstr.).
7. SILL, W. H., JR., and R. C. PICKETT. 1957. A new virus disease of switchgrass, Panicum virgatum. Plant Dis. Rep. 41:241-249.
8. SILL, W. H., JR., and L. T. TALENS. 1962. New hosts and characteristics of the Panicum mosaic virus. Plant Dis. Rep. 46:780-783.