

Sphaceloma Scab on *Zornia latifolia*

JILLIAN M. LENNÉ, Centro Internacional de Agricultura Tropical, CIAT Apartado Aéreo 6713, Cali, Colombia

ABSTRACT

Lenné, J. M. 1981. Sphaceloma scab on *Zornia latifolia*. Plant Disease 65:162-164.

Sphaceloma zorniae is reported for the first time as a damaging pathogen of the promising tropical forage legume *Zornia latifolia*. This fungus produces scab lesions on leaves, petioles, and stems, causing defoliation and dieback. Field screening identified three accessions resistant to the disease. At present, *S. zorniae* appears to be limited to Colombia and central Brazil, but care must be taken to prevent its spread elsewhere.

Zornia latifolia Sm., an erect, perennial legume with bifoliolate compound leaves, is native to savanna regions throughout tropical South America (12). Its potential as a forage legume for acid, infertile soils of the tropics was recognized in Colombia (1). Recent evaluations have confirmed its high quality and productivity (3).

In late 1978 and early 1979, a stem scab disease was observed on several *Z. latifolia* accessions at Centro Internacional de Agricultura Tropical (CIAT) Research Stations at Carimagua and Santander de Quilichao, Colombia. As the wet seasons progressed in 1979, this disease caused considerable defoliation and dieback of many accessions of *Z. latifolia* and closely related *Zornia* spp. at both sites.

This article reports the identity of the causal fungus and describes its morphology and cultural characters and the symptomatology of infected plants. Results from greenhouse pathogenicity

tests, field screening at both research stations, and surveys for the disease at tropical forage evaluation sites throughout Central and South America are also given.

MATERIALS AND METHODS

Small pieces of young stems (approximately 5 mm long) with young scab lesions were surface-sterilized in 70% ethanol for 1 min and in 0.1% mercuric chloride for 30 sec, rinsed three times in sterile, distilled water, and plated on potato-dextrose agar (PDA) acidified with lactic acid (two drops per plate). Plates were incubated at 28 C. In most cases, one fungus grew; these fungal isolates were recultured on acidified PDA and maintained in vials of sterile, distilled water.

Pathogenicity of the fungus was tested on *Z. latifolia* CIAT 728 seedlings 5-6 wk old. Seeds were acid-scarified and allowed to germinate on moist filter paper in petri plates. Seedlings were grown in soil from Santander de Quilichao Research Station in 8 × 8 cm biodegradable paper pots (two plants per pot) in the greenhouse. Recommended *Rhizobium* inoculum (4) was applied 1 wk after planting.

Inoculum for pathogenicity tests was prepared from cultures grown on acidified PDA for 1 wk. Equal portions of colonies of separate isolates were finely comminuted in sterile, distilled water or in solutions of 0.5% agar or 0.5% dextrose. Inoculum was strained through cheesecloth. Because conidial counts were low, no attempt was made to standardize inoculum suspensions.

Seedlings were kept at 100% humidity for 24 hr before inoculation. The three suspensions and sterile, distilled water were sprayed separately to runoff onto five pots of intact seedlings and five pots of seedlings with stems wounded with a sterile needle. Inoculated seedlings were sealed in moistened plastic bags for 48 hr. Presence or absence of lesions was recorded 10 days after inoculation.

Field ratings of disease severity were made at both research stations during the wet season. *Zornia* spp. plants were also inspected for stem scab disease at the end of the wet season at 30 tropical forage evaluation sites in Central and South America, including two sites in Belize, two in Bolivia, 11 in Brazil, five in Colombia, one in Ecuador, one in Panama, three in Peru, and five in Venezuela.

RESULTS

Isolation and identification. Because many saprophytes were present, only 5% of isolations from old lesions were successful. Seventy-five to 80% of isolations from young lesions on young leaves and stems, however, yielded the fungus. Symptomatology, cultural

characters, and fungal morphology were characteristic of the genus *Sphaceloma*. The fungus was identified as *Sphaceloma zorniae* Bitanc. & Jenkins by B. C. Sutton of the Commonwealth Mycological Institute, England.

Culture and morphology. On acidified PDA, colonies from young stem lesions were small, raised, yeastlike, and very slow in growing. Color varied from cream to pale orange to light brown. With age, the colony surface became deeply convoluted and crusted. Mature colony color varied from pale orange to reddish brown to almost black.

Conidia were produced sparsely in young colonies (up to 1 wk old), rarely in older colonies. The small, one-celled, hyaline, ovoid-elliptical conidia, $3.5\text{--}8.5 \times 2\text{--}4.5 \mu\text{m}$ (mean $7.1 \times 3.3 \mu\text{m}$), were borne on short ($4\text{--}9 \mu\text{m}$ long), usually one-celled, cylindrical conidiophores. Periodic surveys did not reveal the presence of the perfect stage either in culture or on the host.

Symptomatology. Small, elliptical to elongate, pale brown spots with reddish margins developed initially on leaves, petioles, and young stems of *Z. latifolia* and related species. In time, lesions expanded and coalesced to form raised, pale to reddish brown, corky scabs, often involving entire petioles and extended lengths of stems (Fig. 1). Defoliation and dieback were common and plants occasionally died.

Pathogenicity tests. Scab lesions were recorded on stems and petioles of all inoculated *Z. latifolia* CIAT 728 plants, with and without wounds. Because of the low concentration of conidial suspensions, the number of lesions on each plant averaged less than 20.

Field screening. Field ratings at the end of the wet season (plants 8–12 mo old) on the 32 accessions of *Z. latifolia* and related species common to both screening sites are summarized in Table 1. Accessions varied from highly susceptible to resistant. Scab was more severe at Carimagua than at Santander de Quilichao. At both locations, however, the same accessions were rated as either susceptible or resistant. Three accessions—CIAT 9190, 9199, and 9215—were completely resistant at both sites. Accessions of distantly related species, including *Z. brasiliensis* and *Z. guianensis*, were also resistant to *Sphaceloma* scab at both sites.

Disease survey. In 1979 and 1980, *Sphaceloma* scab was detected on *Zornia* spp. at seven of 30 tropical forage evaluation sites in Central and South America: four sites in Colombia (Carimagua and Villavicencio in the Llanos Orientales, and Santander de Quilichao and El Limonar in the Cauca Valley) and three sites in central Brazil (Brasilia, Sete Lagoas, and Felixlandia). The disease was also found on native *Zornia* spp. at and near the four sites in

Colombia and in the state of Minas Gerais between Sete Lagoas and Felixlandia in central Brazil. *Sphaceloma* scab has not yet been found on any other native legumes.

DISCUSSION

S. zorniae causes a damaging stem scab disease of the promising forage legume *Z. latifolia* in Colombia. Although this is the first report of *Sphaceloma* scab on *Z. latifolia*, the pathogen was reported on *Zornia* sp. in Brazil by Bitancourt and Jenkins in 1940 (5). *Sphaceloma* spp. also cause serious diseases of lima bean (*Phaseolus lunatus*) (6,9,10), soybean (*Glycine max*) (11), and other legumes, including *Canavalia* spp. (7,8) and *Dolichos lablab* (7). *Sphaceloma* scab is common on *Manihot* spp. and members of the Euphorbiaceae in Brazil and Colombia (C. Lozano, *personal communi-*

cation). Cross-inoculation studies with various legumes, nonleguminous hosts, and isolates of *Sphaceloma* spp. from a range of hosts are planned to identify the host range of *S. zorniae* and its relation to other *Sphaceloma* spp.

Further pathogenicity tests must, however, await improved conidial production in culture. This problem has been noted previously (9,13). Recent studies evaluating various media have shown greater conidial production on V-8 juice medium. Pathogenicity tests with isolates of different cultural types are also planned.

The three accessions of *Z. latifolia* that remained completely resistant to *Sphaceloma* scab at both screening sites in Colombia will be further evaluated along with all new accessions of *Zornia* spp. Because disease pressure is higher at the Carimagua site, this station is regarded as

Table 1. Average reaction of replicated plots of 32 accessions of *Zornia latifolia* and related species to *Sphaceloma* scab at two sites in Colombia from April 1979 to March 1980

Reaction	Rating ^a	CIAT Research Station	
		Carimagua	Santander de Quilichao
Highly susceptible	4–5	22	11
Moderately susceptible	3	6	12
Moderately resistant	2	1	6
Resistant	1	3 ^b	3 ^b

^a Reaction was rated on a scale of 1 to 5; 1 = no disease; 2 = few lesions, little damage; 3 = mostly small lesions, some defoliation; 4 = many lesions, coalescing to form long, corky scabs, severe defoliation; 5 = plant death.

^b CIAT accessions 9190, 9199, and 9215.

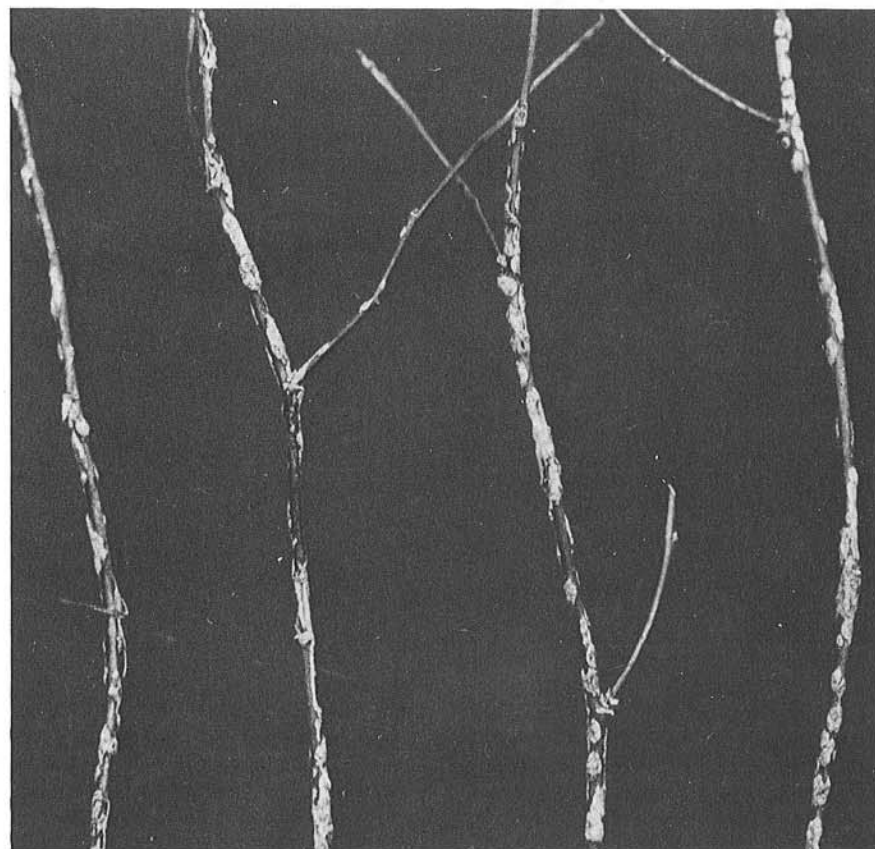


Fig. 1. Stems of *Zornia latifolia* with large, corky, coalescent scabs caused by *Sphaceloma zorniae*.

more suitable than Santander de Quilichao for screening *Zornia* spp. for resistance to *S. zorniae*. Higher rainfall and a longer wet season at Carimagua than at Santander de Quilichao (2) favor disease development.

Surveys of 30 sites in tropical Latin America suggest that *Sphaceloma* scab of *Zornia* spp. is now limited to Colombia and central Brazil. Its common occurrence on native *Zornia* spp. near evaluation sites in these two countries suggests that it is indigenous. Recent studies have shown that *S. zorniae* is borne within the seed coat of *Z. latifolia* (J. M. Lenné, unpublished). Great care must be taken to prevent the spread of this disease of *Z. latifolia* to other tropical forage evaluation sites in Central and South America.

ACKNOWLEDGMENTS

I wish to thank Amparo de Alvarez, Celina Torres, and Emiro Zamorano for technical assistance, Constanza de Téllez for typing the manuscript, and B. C. Sutton for helping to find the Bitancourt and Jenkins reference.

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