

Septoria Leaf Spot on *Canavalia kauensis*, a Native Hawaiian Bean

D. E. GARDNER, Research Plant Pathologist, National Park Service Cooperative Park Studies Unit, University of Hawaii, Honolulu 96822

ABSTRACT

Gardner, D. E. 1982. Septoria leaf spot on *Canavalia kauensis*, a native Hawaiian bean. Plant Disease 66:263-264.

A *Septoria* sp. caused extensive infections and a leaf spot on *Canavalia kauensis*, a rare, recently discovered legume native to the island of Hawaii. The pathogen is referred to *S. molleriana*. Voucher specimens were deposited in the USDA National Fungus Collections Herbarium, Beltsville, MD.

Additional key words: *Septoria canavaliae*

Canavalia kauensis St. John, a beanlike legume, was newly discovered on the island of Hawaii in the early 1970s (4). Before its discovery, this species had apparently existed for years only as dormant seeds in the soil of the Kau Desert region of Hawaii Volcanoes National Park. Elimination of extreme browsing pressure from feral goats by construction of an experimental enclosure of about 1,000 m² permitted a dramatic recovery of the vegetation within. The resulting alterations, especially in soil moisture characteristics, presumably were favorable for germination of the *C.*

kauensis seeds.

C. kauensis growth at first was vigorous, and a dense stand developed. Subsequently, these plants became uniformly infected with a leaf-spotting, fungal pathogen (Fig. 1). The spots were dark brown, circular to somewhat irregular, apparent on both leaf surfaces, and measured 0.5–1.5 mm in diameter (mean: 0.9 mm). Coalescence of spots sometimes produced larger necrotic areas. Defoliation apparently resulted from such uniform, extensive infections. Preliminary observations indicated that a species of *Septoria* was the pathogen.

MATERIALS AND METHODS

Semipermanent slides prepared of conidia mounted in lactophenol amended with cotton (aniline) blue rendered the nonstaining septa clearly discernible. Permanent slides prepared of leaf-spot tissue were made by following standard techniques for killing and fixing, dehydration in a tertiary butyl alcohol

series, and embedding in paraffin. Sections 15 μm thick were cut, mounted, stained in aqueous safranin O, and counterstained with aniline blue (5). Observations and photographs were made with a Leitz Ortholux II microscope equipped with an Orthomat automatic camera using Kodak Plus-X pan 35-mm film.

The *Septoria* sp. was isolated from fresh tissue taken from leaf spots and cultured on potato-dextrose agar (PDA). Young, healthy host plants grown from seed in the greenhouse were inoculated by applying an aqueous conidial suspension (approximately 5 × 10⁴ conidia per milliliter) from the PDA cultures to the leaves. Newly inoculated plants were covered with plastic bags for 48 hr.

Voucher specimens of the *Septoria* sp. from naturally infected *C. kauensis* leaves were deposited in the USDA National Fungus Collections Herbarium, Beltsville, MD.

RESULTS AND DISCUSSION

Observations of leaf-spot tissue revealed pycnidia and associated pycnidiospores (conidia) typical of *Septoria* sp. (Fig. 2). The pycnidia were approximately 80 μm in diameter, and the conidia were (15)20–40(46) μm long × 1.5–4.5 μm wide, with (1)2–5(6) septa.

Leaf spots on *C. kauensis* resulting from the greenhouse inoculations were somewhat larger (0.5–2.0 mm diam; mean: 1.43 mm) than were those on

Accepted for publication 18 December 1981.

The publication costs of this article were defrayed in part by page charge payment. This article must therefore be hereby marked "advertisement" in accordance with 18 U.S.C. § 1734 solely to indicate this fact.

This article is in the public domain and not copyrightable. It may be freely reprinted with customary crediting of the source. The American Phytopathological Society, 1982.

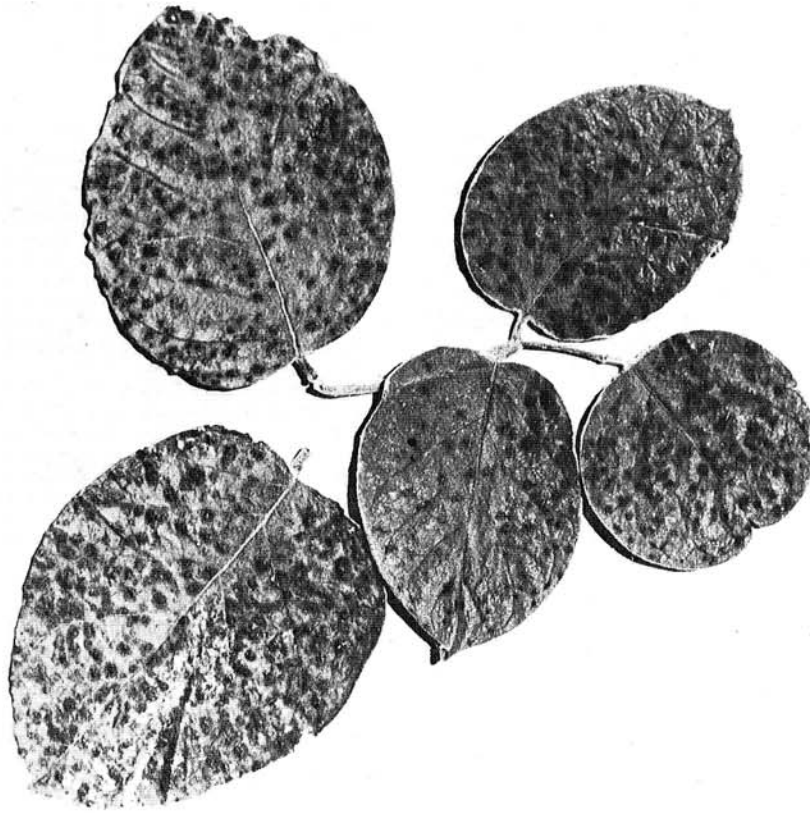


Fig. 1. Typical *Septoria* leaf-spot symptoms observed on *Canavalia kauensis* in Hawaii.



Fig. 2. Pycnidium of *Septoria* cf. *molleriana* from a leaf spot on *Canavalia kauensis*. (Scale bar represents 20 μ m.)

naturally infected leaves in the field (0.5–1.5; mean: 0.9 mm), but were otherwise comparable. Conidia similar to those with which the leaves had been inoculated were readily obtained from

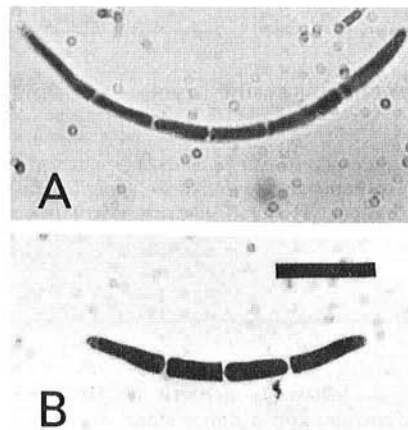


Fig. 3. *Septoria* spp. conidia: (A) *S. canavaliae* from a leaf spot on *Canavalia ensiformis*; (B) *S. cf. molleriana* from a leaf spot on *C. kauensis*. (Scale bar represents 10 μ m.)

these leaf spots, and the fungus was recultured on PDA.

S. canavaliae Lyon ex Sydow, which had previously been collected as a new species on the Hawaiian island of Oahu from leaf spots on jack bean (*C. ensiformis* (L.) DC.) (1,6,7), was initially considered to be the most likely species to which the new *Septoria* sp. should be referred. Comparison of conidia from the *C. kauensis* leaf spots with those of

herbarium specimens from infected *C. ensiformis* leaves (7), and also with the original description of *S. canavaliae* (3), however, indicated easily recognizable differences in conidial morphology (Fig. 3).

Furthermore, inoculation of *C. kauensis* and *C. ensiformis* with the new *Septoria* sp. pathogen consistently resulted in moderate to abundant infections on *C. kauensis* following about 15 days of incubation, whereas the inoculated plants of *C. ensiformis* remained entirely free of infections. *C. kauensis* was not inoculated with *S. canavaliae* because no live, infected *C. ensiformis* plants were available as a source of inoculum.

The *Septoria* sp. from *C. kauensis* is referred to *S. molleriana* Bres. & Roum. (2), which was also described from a *Canavalia* sp. (*C. obtusifolia* St. Thome) and whose description (pycnidia 70–80 μ m in diam; conidia three-septate, 25–30 μ m \times 3–4 μ m) closely approximates that of the *Septoria* sp. discussed here. Attempts to locate herbarium specimens of this *Septoria* sp. were not successful. It is commonly recognized that numerous new *Septoria* spp. have in the past been established primarily on the basis of the host with which they were associated, with little support from cross inoculation or morphological stability tests. Although the *Septoria* sp. attacking *C. kauensis* may have been described as a new species, perpetuation of this somewhat arbitrary classification method was not considered advantageous.

Although the natural, long-term population dynamics of *C. kauensis* are not known, definite periodic cycles of vigorous development followed by dying back of the stands have been observed for several years. The extent to which these cycles are correlated with *Septoria* leaf spot severity, or with other possible pathogenic or ecologic influences, is not known and must await further investigation.

ACKNOWLEDGMENTS

I am grateful to the Swedish Museum of Natural History for the use of Lyon's *Septoria canavaliae* collection and to Dina Kageler and Susan Look for technical assistance.

LITERATURE CITED

1. Lyon, H. L. 1913. Diseases of the jack bean. Hawaii. Plant. Rec. 8:284–289.
2. Roumequere, C. 1891. Revue Mycologique. p. 68.
3. Saccardo, P. A. 1931. Sylloge Fungorum. Vol. 25. p. 436.
4. St. John, H. 1972. *Canavalia kauensis* (Leguminosae), a new species from the island of Hawaii. Pac. Sci. 26:409–414.
5. Sass, J. E. 1958. Botanical Microtechnique. 3rd ed. Iowa State University Press, Ames. 228 pp.
6. Stevens, F. L. 1925. Hawaiian fungi. Bernice P. Bishop Museum Bull. 19. Bishop Museum, Honolulu. 189 pp.
7. Sydow, H. 1913. Fungi Exotici Exsiccati. No. 191.