

A SEPTORIA DISEASE OF KOELERIA MACRANTHA IN ALBERTA AND SASKATCHEWAN¹

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Abstract

A fungus regularly associated with extensive sheath and culm blackening of *Koeleria macrantha*, June grass, and collected from widely distributed locations in native pasture in Alberta and Saskatchewan is described as *Septoria andropogonis* J.J. Davis forma *specialis koeleriae*. Severe infection may reduce seed fertility in this grass and reduce its competitive ability. *S. calamagrostidis* (Lib.) Sacc. f. *koeleriae* (Cocc. & Mor.) Sprague is newly-recorded in Canada, and *S. quinqueseptata* Sprague is discussed.

Introduction

Specimens of *Koeleria macrantha* (Ledeb.) Spreng. (= *K. cristata* (L.) Pers.), June grass, showing extensive blackening of lower sheaths and culms were collected in several locations in Alberta and Saskatchewan in the fall of 1970 and 1971. *K. macrantha* is a long-lived bunch grass found from Ontario to British Columbia in native pastures from the short grass prairie to the open woods of the northern boreal forest (1). Although rarely dominant, it is a useful, palatable constituent of native grazings in western North America (1). Recent studies in the stem eyespot disease of *Festuca rubra* L. caused by *Didymella festucae* (Weg.) Holm (9,10) suggested that heavy fungal infections of the sheath and culm may reduce seed yield. The disease on *K. macrantha* was first noticed because of the pronounced blackening of culms similar to that produced by *D. festucae* on *F. rubra*. The disease may reduce seed yield, seed fertility, which is reported to be low in *K. macrantha* (1), or both. Since there is little stooling in the species this may be a factor controlling its competitive ability. Although collections were widely distributed in the two provinces, all specimens were collected in habitats at the moister end of the ecological range for the species, in seasonally dry, shallow ditches or on drainage slopes. In these situations this grass was the dominant member of the Gramineae.

The fungus

The *Septoria* sp. that was invariably associated with the culm and leaf sheath blackening is here referred to as *S. andropogonis* J.J. Davis forma *specialis koeleriae*, *Septoria calamagrostidis* (Lib.) Sacc. forma *koeleriae* (Cocc. & Mor.) Sprague, and several saprobic fungi, namely, *Mycosphaerella tassiana* (de Not.) Johanss., *Platyspora permunda* (Cke.) Wehm., and *Stagonospora graminella* Sacc., were also found on some of the specimens.

Two species of *Septoria* are known to occur on *Koeleria*, *S. koeleriae* Cocc. & Mor. and *S. quinqueseptata* Sprague. *S. koeleriae* was described by Cocconi and Morini (2) from *K. gerardii* (Vill) Shimmers (= *K. phleoides* (Vill.) Pers.) in Italy. Sprague (5) reduced it to a form of *S. calamagrostidis* (Lib.) Sacc., and recorded it as occurring on *K. macrantha* in the western United States. We have identified this fungus, *S. calamagrostidis* f. *koeleriae*, on one of the Saskatchewan specimens (vide infra). It does not appear to have been previously reported from Canada, though the type form occurs in Alaska (3). *S. calamagrostidis* f. *koeleriae* is readily recognized by the acicular, obscurely septate conidia, which are only about 1.25 µm wide (Fig. 2C). *S. koeleriae* Cocc. & Mor. var. *macrocarpa* Rayss (4) on *K. gerardii* in Israel and *S. koeleriae* var. *koeleriae* vallesiana Unamuno (11) on *K. vallesiana* (All.) Bertol. in Spain hardly justify varietal distinction.

The second species, *S. quinqueseptata*, was described by Sprague (5) from a poor specimen on *Sphenopholis obtusata* (Michx.) Scribn. In the type specimen, which we have examined (Mandan, N. Dak., J.T. Sarois, July 31, 1915, USA 80732 in BPI), the conidia are stouter than those of *S. calamagrostidis* f. *koeleriae*, 50-70 x 2-2.5 µm, and usually distinctly 5-septate (Fig. 2B). As already pointed out by Sprague (6,7,8) this fungus may only represent a form of *S. andropogonis*

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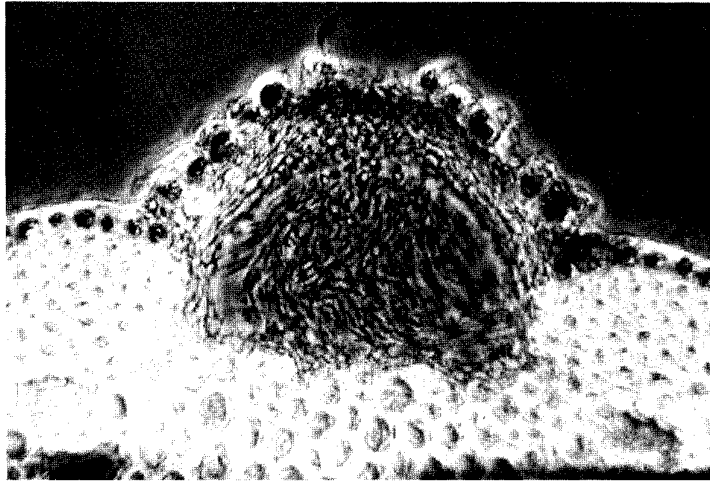


Figure 1. *Septorio andropogonis* f. sp. *koelerioe*, vertical section of pycnidium, from DAOM 138178a, X 500; note fungal hyphae in the host epidermis.

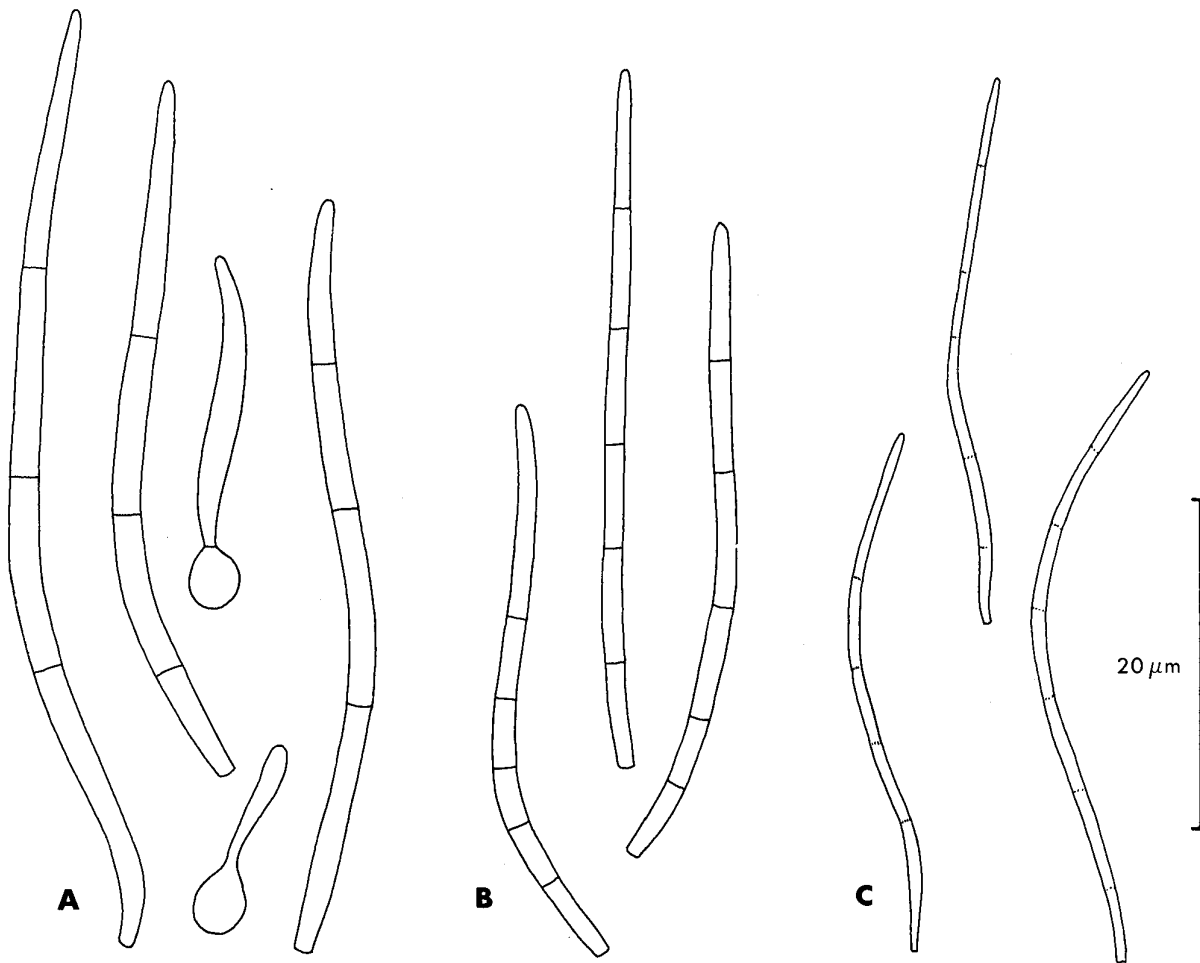


Figure 2. A) *Septorio andropogonis* f. sp. *koelerioe*, conidiogenous cells and conidia, from DAOM 138176; B) *Septorio quinqueseptata*, conidia, from type; C) *Septoria calamagrostidis* f. *koelerioe*, conidia, from DAOM 133191.

J.J. Davis. The species was subsequently recorded on K. macrantha, also at Mandan, North Dakota, by Sprague (7) and stated to be doubtfully parasitic and possibly representing an accidental development on this grass. We are of the opinion that the Sprague collection on Koeleria is not S. quinqueseptata, but is very probably the same as our Canadian fungus only less well developed. The Canadian material is considered to represent a form of S. andropogonis, and we propose to designate it andropogonis J.J. Davis f. sp. andropogonis.

The fungus resembles the type form in globose shape of the conidiogenous cells, and in the shape of the conidia, which are also 3-septate but somewhat longer, up to 90 µm but mostly 50-75 µm (Fig. 2A). It differs in symptoms, which are manifested by conspicuous blackening of culms and leaf sheaths, and which are due to extensive development of brown mycelium in the host epidermis (Fig. 1).

Specimens examined (all on K. macrantha collected by J. Drew Smith): 1) Pipestone Creek, Alberta, 13 Sept. 1970 (DAOM 133189); 2) Pipestone Creek/Wapiti R., Alberta, 16 Sept. 1970 (133190a, with Mycosphaerella tassiana); 3) Meath Park, Sask., 26 Sept. 1970 (133191a, with Septoria cakamagrostidis f. koeleriae); 4) Canwood, ME, Nebo, Sask., 30 Sept. 1970 (138175a, with Stagonospora graminea); 5) Pike Lake, Sask., 16 Nov. 1970 (138176a, with Platyspora permunda); 6) Dundurn, Sask., 21 Nov. 1970 (138177); 7) Candle Lake, Sask., 14 June 1971 (138178a, with Mycosphaerella tassiana).

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Literature cited

1. Campbell, J.B., K.F. Best, and A.C. Budd. 1966. 99 range forage plants of the Canadian Prairies. Can. Dep. Agr. Publ. 964.
2. Cocconi, G., and F. Morini. 1883. Enumerazione dei funghi della provincia di Bologna, Secunda cent., R. accad. Sci. Ist. Bologna, 5:273-300.
3. Conners, I.L. 1967. An annotated index of plant diseases in Canada. Can. Dep. Agr. Publ. 1254.
4. Rayss, T. 1943. Contribution a l'étude des Deutéromycètes de Palestine. Palestine J. Bot. 3:22-51.
5. Sprague, R. 1944. Septoria disease of Gramineae in western United States. Oregon State Coll. Biol. Monogr. 6:1-151.
6. Sprague, R. 1946. Additions to the Fungi Imperfecti on grasses in the United States. Mycologia 38:52-64.
7. Sprague, R. 1948. Some leaf spot fungi on western Gramineae-II. Mycologia 40:177-193.
8. Sprague, R. 1950. Diseases of cereals and grasses in North America. The Ronald Press Co., New York.
9. Smith, J. Drew, and C.R. Elliott. 1970. Stem eyespot on introduced Festuca spp. in Alberta and British Columbia. Can. Plant Dis. Surv. 50:84-87.
10. Smith, J. Drew, and D.R. Elliott. 1972. Didymella stem eyespot of Festuca spp. in northern Alberta and British Columbia in 1970 and 1971. Can. Plant Dis. Surv. 52:39-41.
11. Unamuno, L.M. 1942. Contribución al estudio de los hongos microscópicos de la provincia de Cuenca. Ar. Jard. Bot. Madrid 2:7-86.