ALTERNARIA FLOWER-STOCK ROT IN BROMUS INERMIS[1]

J. Drew Smith[2] and R.P. Knowles[3]

Abstract

Alternaria alternata was frequently isolated from tissues showing extensive rotting on the adaxial sides of flower stalks and from tissues between flower stalk bases of smooth bromegrass (Bromus inermis). Of four isolates tested, three caused typical rot when mycelial inoculum was applied to flower stalk axils of smooth bromegrass tillers. No toxic effect on seedlings was shown by culture filtrates of these isolates.

Résumé

Alternaria alternata a été fréquemment isolé des tissus des faces adaxiales des pédoncules, et de ceux qui provenaient de l'aisselle des pédoncules du brome inerme (Bromus inermis) et montraient des symptome de pourriture étendue. Trois des quatre isolats analyses ont provoqué une pourriture typique lorsque l'inoculum mycélien était applique à l'aisselle des pédoncules des talles du brome. Les filtrats de culture de ces isolats n'ont pas eu d'effets toxiques sur les plantules du brome.

Alternaria alternata (Fr.) Keissler, syn. A. tenuis Nees., is commonly seed-borne in grasses (4,5). It is usually regarded as a saprophyte (6) but in some circumstances behaves as a "low grade" pathogen on seedlings and mature plants (2). Some isolates produce toxic metabolites (3).

At Saskatoon, it was noticed, when scoring breeding clones of smooth bromegrass, Bromus inermis Leyss, for fertility in 1972, that dark lesions scmetimes occurred at the junctions of flower stalks with the main stem (Fig. 1 A-C). Occasionally necrosis was extensive; generally it involved tissues on the adaxial side and between flower stalks; rarely were abaxial tissues of flower stalk bases rotted (Fig. 1 C, D).

Lesioned flower stalk tissues that were surface sterilized with 70%alcohol and then plated onto potato dextrose agar yielded A. alternata almost exclusively. This fungus was isolated from 42 of 45 stalk bases; one of the remainder yielded Stemphylium botryosum Wallr., another Trichothecium roseum Link., and a third a sterile mycelium. The isolates of A. alternata sporulated on cornmeal-malt-yeast extract medium (CMMY) but varied considerably in morphology.

The pathogenicity of four morphologically dissimilar isolates of A. alternata to smooth bromegrass was tested. Fragments scraped from CMMY cultures of the fungus were placed in stalk axils in separate tillers of plants of a breeding group of smooth bromegrass clones in a greenhouse held at 21±3°C. Uninoculated agar fragments placed in similar locations in other tillers served as checks. There were five replicates. Seed set had occurred in most clones. Following inoculation, complete inflorescences were covered with polyethylene bags to maintain high humidity for 7 days. After a further 7 days the test inflorescences were removed and examined using a binocular microscope. Eight of the 25 inoculated inflorescences showed flower stalk lesioning (Fig 2), but five checks did not. One of the four isolates failed to cause disease. A. alternata was recovered from all rotted flower stalks and from adjacent lesions on the main stem.

The possible involvement of toxic metabolites in stalk rot. was considered.

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[1]Contribution No. 511, Research Station, Agriculture Canada, Saskatoon, Saskatchewan S7N 0X2.

[2] Plant Pathologist.

[3] Head, Plant Breeding Section.

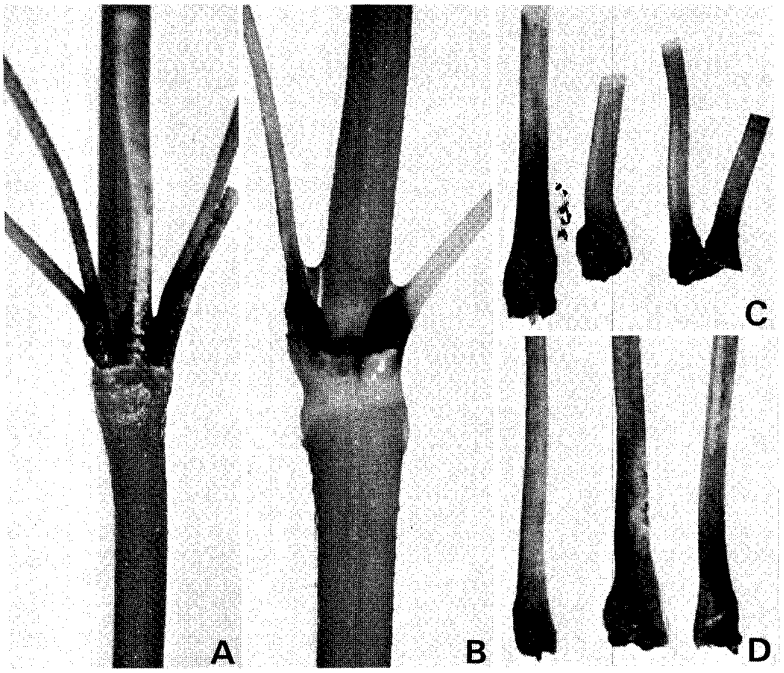

Figure 1. Field material of ***Bromus inermis*** showing lesioning of flower stalk bases due to natural infection by ***Alternaria alternata.*** In 1C and 1D stalk bases have been detached.

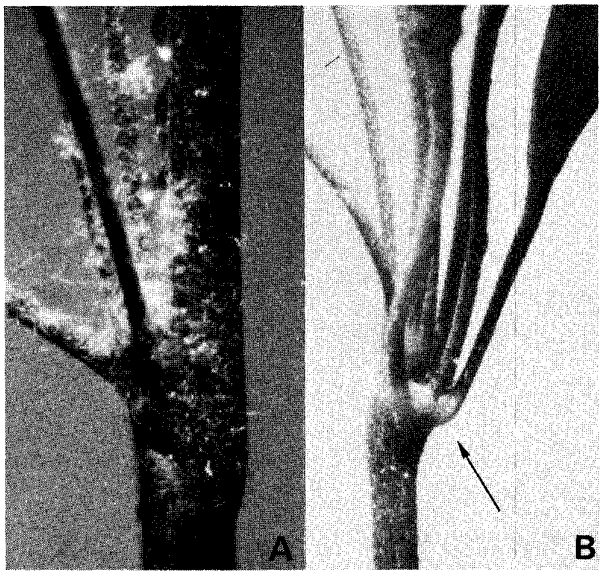

Figure 2. Flower stalk bases of ***Bromus inermis,*** A) artificially inoculated and incubated in a moist chamber to show mycelium **of *A. alternata;* B)** uninoculated, showing location of light-colored susceptible tissues (arrow) at base of flower stalks.

However, culture filtrates of four isolates grown in modified Richards solution and tested by the method described by Fulton et al. (3) showed no toxic effects towards seedlings of smooth bromegrass, Italian ryegrass (Lolium multiflorum Lam.), and common wheat (Triticum aestivum L.).

Flower stalk rot in smooth bromegrass may be incited by A. alternata and the junction of the flower stalks with the main stem is probably a favorable fungal infection site. Pollen trapped in this location and the sheltered microclimate there may provide nutrients for initial growth of the fungus and a favorable infection court. Ripening of the inflorescence in most grasses, and therefore general senescence of tissues, starts at the distal end and progresses downwards, The involvement of smooth bromegrass flower stalk base tissues in this rotting seems to be related to earlier senescence of these than of adjacent culm regions. The progress of rotting here in relation to maturation and filling of caryopses may be reflected in poor seed fertility since the ability of flower stalks to conduct nutrient may be impaired. Rotting may also be related to premature seed and spikelet shedding which is occasionally a problem in smooth bromegrass. Although there was no evidence that the isolates of A. alternata produced toxins capable of inhibiting chlorophyll formation in grass seedlings, as noted in some plant species (3), perhaps other toxic metabolites produced at sites such as flower stalk bases might initiate or increase rotting.

Literature cited

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