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Variability and Viability of Sorghum Ergot Sclerotia

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Introduction

Sorghum ergot pathogen (*Claviceps sorghi* and *C. africana*) infects ovaries that develop into spore bearing masses (sphacelia) in sorghum (*Sorghum bicolor)* panicles. The hard textured sclerotia of *C. africana* rarely protrude more than a few millimeters beyond the glumes while those of *C. sorghi* and *C. sorghicola* may protrude 15-20 mm beyond the glumes. For several ergot pathogens, sclerotia are the resting structures through which they survive in the interval between harvest and the next crop. The sclerotium germinates to produce asci, which produces ascospores that can infect the new crop. How long can these sclerotia remain viable and cause infection? Sangitrao et al. (1997) have reported viability of sclerotia for a maximum of three years. In this article, results on variability and viability of 10-year-old sorghum ergot sclerotia are reported.

Materials and Methods

Ergot sclerotia collected from sorghum crop during 1992 from Akola (20°70' N and 77° 10' E) in Maharashtra, India were stored under laboratory conditions (25±1"C) at ICRISAT, Partancheru, India. The morphological variability of sclerotia was studied by measuring their size and shape. The viability was tested by pathogenicity tests. To test the pathogenicity, 25 sclerotia of varying morphology were macerated in 30 ml sterilized distilled water using pestle and mortar. The suspension was filtered through sterilized muslin cloth. The filtrate had only mycelial bits and no conidia were seen. The filtrate was made up to 50 ml and was transferred to 100 ml atomizer. The inoculum was sprayed on 10 panicles of sorghum cultivar 296A at 50% stigma emergence stage, using 5 ml panicle^{-1}. The inoculated panicles were covered with polythene bags to maintain high relative humidity ($\simeq$95%) at 25°C and were placed in the greenhouse (25±2°C) for five days. Before the appearance of honeydew in the panicles, spikelets containing sphacelia

were collected in sterilized minigrip bags. The sphacelia were scooped out and surface sterilized in 0.1 % sodium hypochlorite, followed by thorough washing in sterile distilled water. The sphacelia were cut into small bits and were plated on potato-dextrose agar (PDA) and incubated at 25°C for 30 days with 12 h light/dark cycle. Later the culture was characterized for radial growth, colony color, puckering nature, sporulation and sectoring. The sclerotial samples and culture were deposited at the Mycological Herbarium, Indian Agricultural Research Institute, New Delhi, India and the herbarium number was obtained.

Results and Discussion

The pathogenicity test carried with 10-year-old sclerotia (Herbarium number: 44440) recorded 65% infection indicating that sclerotia can remain viable for several years and can still cause infection. Sclerotial viability has been reported to be for 3 years based on its germinability in soil under greenhouse conditions (Sangitrao et al. 1997). However, we report here the viability of 10-year-old sclerotia based on pathogenicity test.

The sclerotial morphology indicated wide variation in their size (3-10 mm in length) and basal width (1.5-3 mm). The distal width varied from 1 to 2 mm. The sclerotial shape was both straight and curved (Fig. 1). The sclerotia were categorized into six groups: (1) short and straight with slight curvature; (2) long and curved; (3) long and curved with constricted distal end; (4) short and curved; (5) small and oval; and (6) branched.

The colonies were white, cottony, compact and granular. Radial growth of the colony varied from 27 to 30 mm with distinct sporulation towards the periphery and devoid of puckering and sectoring. Based on Munsell's scale, the colony pigmentation matched at 10YR/7/3 (Anonymous 1973).

Figure 1. Variability in morphology of ten-year-old sclerotia from Akola, Maharashtra, India (size: 0.3-1.0 cm in length, a = basal end, and b = distal end).

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Mechanical Harvesting Reduces Sphacelia/Sclerotia Levels of *Claviceps africana*

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Introduction

In Australia, ergot caused by *Claviceps africana* is endemic on *Sorghum* species used for grain and forage production, and on *Sorghum* weed species (Ryley et al. 2003). The disease has a significant impact on the Australian sorghum *(Sorghum bicolor)* industry by necessitating the use of triazole fungicides in breeder's nurseries and hybrid seed production, forcing the adoption of new management practices for sorghum grain growers, and creating uncertainty about the toxicity of sphacelia/sclerotia (Ryley et al. 2002). Australian research has demonstrated that high levels of dihydroergosine, the major alkaloid component of sphacelia/sclerotia, is detrimental to livestock by causing agalactica in cows and sows (Blaney et al. 2000b), and hyperthermia and reduced weight gain in beef cattle (Blaney et al. 2000a). In Australia, the maximum allowable limit for sphacelia/sclerotia in sorghum grain intended for stockfeed is 0.3% (w/w), although there is considerable variation in the alkaloid content between sphacelia/sclerotia of similar ages (Blaney et al. 2003).

Management options for sorghum grain growers include early planting to reduce the risk of flowering during cool weather in late March-April, sowing when soil moisture and nutrient levels are optimum to assist in