# Sugary Disease of Sorghum in Brazil: an Overview



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***Abstract***

*Since it was observed in Brazil in April 1975 sugary disease of sorghum (**Claviceps africana**) has been a serious threat to seed production. The impact of the disease on sorghum seed business in Brazil resulted in an integrated effort involving private sector, University of Passo Fundo and Empresa Brasileira de Pesquisa Agropecuaria (Maize and Sorghum Research Center) to develop strategies to adequately manage this disease. This paper summarizes the achievements from this effort.*

Sugary disease of sorghum, caused by *Claviceps africana* Frederickson, Mantle & de Milliano, was reported for the first time in Brazil in April, 1995 simultaneously in Cravinhos (São Paulo) and Lavras (Minas Gerais), 400 km apart. In a period of 30 days, several additional reports of the presence of the disease were made from different locations including the states of Minas Gerais, São Paulo, Mato Grosso do Sul, Goiás and Paraná. The disease was later reported in the State of Rio Grande do Sul in a late plantings of sorghum. Honeydew exudations were also observed in many different grasses close to the sorghum crop.

The primary concerns of sorghum scientists in Brazil about the disease were its impact on hybrid seed production in the country and the presence of any substance that could be toxic to animals. According to reports from private companies, the majority of seed production fields were at the grain filling stage when the disease was first observed. Losses at that time were estimated at roughly US $400,000 and was primarily due to the effects of sugary exudation on seed quality. In the second year, in an attempt to escape from more favorable environmental conditions for disease development, seed production fields were established earlier than usual. This change resulted in poor nicking of flowering in the parental lines and poor pollen production. Losses were higher and estimated to be around U$800,000.

## Research Achievements and Decisions Taken

Due to the impact of the disease on the sorghum production and seed business in Brazil, an proactive effort including the private seed sector, Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), and the University of Passo Fundo (RS) was initiated in June 1995 to develop strategies for adequately managing this disease. Part of the achievements resulting form these efforts will be reported in this paper, and in more details by others in these Proceedings.

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### *Sources of Resistance*

The greatest need of sources of resistance to sugary disease is in male-sterile lines. Chances of identifying male-sterile resistant lines are very small considering the role of pollen in the disease (Bandyopadhyay 1992). Despite this low probability, all A lines of the sorghum breeding program of CNPMS/EMBRAPA were evaluated under natural infection in 1996. All lines evaluated were susceptible.

### *Chemical Control*

Information on chemical control of *C. africana* on sorghum are very limited. In South Africa, the fungicides benomyl, bitertanol, carbendazim + flusilazole, procymidone, propiconazole, tebuconazole, and triadimenol did not control *C. africana* economically when sprayed once at flowering time (McLaren, 1994). Results obtained by scientists of CNPMS/EMBRAPA showed that fungicides Tebuconazole and Triadimenol were efficient in the control *C. africana,* although Triadimenol showed some phytotoxicity to sorghum seeds. More recent results have indicated that the fungicide Propiconazole and the mixture Propiconazole + Difenoconazole are also efficient in the control of this pathogen (Pinto et al. 1999).

### *Alternate Hosts*

The host range of *C. africana* under Brazilian conditions has been examined at CNPMS/EMBRAPA. Sorghum was inoculated with honeydew from *Panicum maximum* (colonião), *Panicum* sp. (coloniãozinho), *Brachiaria mutica* (bengo), *Brachiaria decumbens* (brachiaria), *Sorghum verticuliflorum, Cenchrus* sp., *Zea mays*, and *Pennisetum typhoides* (pearl millet). In all tests a non-inoculated control was included. Test hosts were also inoculated with honeydew from sorghum. Isolates from *P. maximum, Panicum* sp., *B. mutica,* and *B. decunbens* had low pathogenicity to sorghum and isolates from sorghum were nonpathogenic to *P. maximum, Panicum* sp., and *B. decunbens* and of low pathogenicity to *B. mutica.* Isolates from sorghum were of intermediate pathogenicity to *S. verticiliflorum.* Infectivity of inoculum from *S. verticiliflorum* plants was not tested on sorghum.

### Other Initiatives

As part of an integrated strategy several decisions were taken in the search for ways to minimize the problem, These include:

- Several meetings involving farmers and the extension services were held to inform them about the presence of the disease in Brazil.
- Training courses in seed production and seed quality control, to correctly identify the disease symptoms in the field and the presence of sclerotia in contaminated seeds.
- A 0% tolerance of sclerotia was fixed as a standard in all processed seed for the State of Minas Gerais.
- Registration of a fungicide for the control of *C. africana* in sorghum, based on research conducted by CNPMS/EMBRAPA.
- Monitoring of seed production fields and elimination of sclerotia during seed processing.

- A national workshop on ergot was held to establish standards in seed quality control on a national basis.

## Final Comments

Sugary disease of sorghum has become a serious constraint in hybrid seed production in Brazil as well as in other parts of the world where the disease was recently observed. The collaborative research program developed by Brazilian scientists, from the public and private sector, has been, mostly successful in finding ways to reduce the impact of the disease on the sorghum seed business despite the large area and explosive occurrence of the disease in the country. We believe that the establishment of research strategies based on international cooperation, which is the main goal of this Conference, is fundamental for the control of this disease

## References


Bandyopadhyay, R. 1992. Sorghum ergot. Pages 235-244 *in*: Sorghum and millets diseases: a second world review. (W. A. J. de Milliano, R. A. Frederiksen, and G. D. Bengston eds). Patancheru, A. P. 502324, India: International Crops Research for the Semi Arid Tropics,

McLaren, N. W. 1994. Efficacy of systematic fungicides and timing of preventive sprays in the control of sugary disease of grain sorghum (*Sorghum bicolor*). South African Journal of Plant and Soil 11:30-33.

Pinto, N. F. J. A., da Silva Ferreira, A., and C. R. Casela. 1999. Chemical control of sugary disease of sorghum (*Claviceps africana*). Pages158-160 *in* Proceedings of the Global conference on Ergot of Sorghum, J.A. Dahlberg and C.R. Casela (eds.) 1-8 June 1997, Sete Lagoas, Brazil. INTSORMIL, University of Nebraska, Lincoln, NE. Publication 99-1.

Pinto, N.F.J.A., Ferreira, A.S., and Casela, C.R. Ergot (Claviceps *african*) ouença açucarada do sorgo. Sete Lagoas, MG:EMBRAPA-CNPMS, 1997. 24 pp. (EMBRAPA-CNPMS. Circular Tecnica, 23).