POSSIBLE SOURCE OF SUGARCANE SMUT IN GUYANA AND MARTINIQUE

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Abstract

The route whereby Guyana and Martinique gained sugarcane smut is postulated and the implications of this disease as a threat to the sugarcane industries of the Caribbean, Central America and the United States mainland are discussed.

Introduction

Smut was reported to be present in British Guiana (now Guyana) and Trinidad in the early part of this century. However, Baker *et al*[4] stated that these records were erroneous, and that the disease did not occur in the Caribbean. Sugarcane smut was positively identified in Guyana during December, 1974 (Bates[6]), and it has subsequently been reported in Martinique (Anon[2]).

Discussion

As smut is present in Argentina (Fawcett[8]) and Brazil (Anon[1]), it may be assumed that the recent infection identified in the Guyanan industry originated from those areas of South America. However, not only are the distances for dissemination great, but the wind currents over the continent of South America are ill-defined and weak (Rudder[19]). Consequently, had smut come into Guyana by this route, the causal fungus would have had to depend on the presence of alternate hosts. Admittedly there is evidence to show *Erianthus saccharoides* and *Imperata arundinacea* (Luthra *et al*[16]), *Saccharum spontaneum* (Chona and Gattani[7]; and Leu[15]), *Sorghum vulgare* (Hutchinson[10]), and *Zea mais* (Hirschhorn[9]) will act as hosts to the causal fungus of sugarcane smut, *Ustilago scitaminea* Sydow. However, these infections have been induced artificially. It is therefore still speculatory whether such infections would occur naturally on the alternate hosts. In addition, *Imperata braziliensis*, common in the sugarcane area of Guyana, has not been found to show the symptoms of sugarcane smut infection.

In the absence of evidence of any direct importation of smut-infected sugarcane into the region (Walker[20]), one can postulate that smut spores could be transported in a similar manner to the dust deposited on Barbados. Prospero *et al*[18] have shown that this dust deposited from the Caribbean atmosphere can be traced to dust storms on the continent of Africa. Particles of sand have been isolated from the dust deposited on Barbados during the April through July period. Sugarcane smut spores (7,5 microns in diameter) are well within the dust particle sizes given by Prospero *et al.*[18] This route of infection would explain why Martinique gained smut so soon after Guyana. The wind pattern northward from Guyana to Martinique is very indefinite, so the likelihood of this and other Caribbean islands gaining smut from Guyana by wind is less tenable than the easterly trade wind infection source postulated.

Law[14] has stated that it would take between 8 to 10 days for a dust cloud to travel from West Africa to the Caribbean area with the trade winds in the April through July period. In the trade wind zone the temperature at the lowest altitudes necessary for unimpeded dissemination (3 000-5 500m) is approximately 0°C. The transport of particles carried in the atmosphere closer to sea level would be more influenced by surface squalls and storms than those particles borne at higher altitudes. Recent observations on smut spores stored at −9°C have shown that the spores will germinate after 16 days storage at that temperature, although the viability decreases significantly with time (Table 1). The smut spores for this experiment were stored in tubes loosely plugged with cotton wool and placed in the freezing compartment of an ordinary domestic refrigerator. Dust samples are to be examined in Barbados to see whether sugarcane smut spores are present in aerosols collected during summer and winter (Prospero[17]).

TABLE 1

Germination of sugarcane smut spores after storage at −9°C

	Days storage at −9°C				
0	2	4	8	12	16
71,5%	56,6%	31,7%	31,4%	20,4%	15,6%

Barat[5] has reported that many countries in French-speaking Africa, south of the Sahara, are planning to create national sugar industries. Of these countries, Upper Volta and Chad in particular were found to have very high levels of smut incidence on cane that had been unofficially introduced. The smut levels were severe in these countries because of their climates. Nigeria too has experienced high levels of sugarcane smut infection at Bacita (Innes[11]).

HJ 5741 is the major commercial variety in Guyana. In addition, it is extremely popular in Jamaica, while in other Caribbean islands it is becoming so because of its high sugar yields. However, this variety was shown to be extremely susceptible to smut infection in Guyana. In addition, the second most popular high yielding variety in that country, DB 414-60, was shown to be almost equal in its susceptibility to the disease (James[13]). James[12] has shown that many sugarcane varieties from Barbados, Mexico and the United States (Florida and Louisiana) are highly smut-susceptible. The suggested route of infection therefore exposes all the rest of the region's industry to smut infection (see also Arceneaux[3]). The bigger the land mass of a country the greater chance that country has of receiving smut infection from the atmosphere. Obviously hurricanes will increase the spread of this atmospheric dust deposition. Therefore one can assume that the Central American and North American sugarcane industries could also be exposed to infection by smut.

Experience with sugarcane smut in Guyana shows how serious this disease can become in a very short time in a highly susceptible variety such as HJ 5741. It is of interest that, in Rhodesia, NCo 376 can be maintained as the major variety by a strict roguing programme which costs R$7-10 per hectare per annum, even though the variety is highly smut susceptible.

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