



**BIOLOGY OF USTILAGO SCITAMINEA SYD.,  
THE CAUSAL AGENT OF SMUT DISEASE IN SUGARCANE,  
WITH SPECIAL REFERENCE TO HOST-PARASITE RELATIONSHIPS.**

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## Abstract

Biology of Ustilago scitaminea Syd.,  
the causal agent of smut disease in sugarcane  
with special reference to host-parasite relationships.

A variety of sugars and complex soil, sand and plant  
extracts when tested on chlamyospore germination of Ustilago  
scitaminea revealed

1. That glucose and galactose supported high germination; Sucrose, D-xylose, maltose and mannitol supported moderate germination and lactose supported low germination. Sugars differed widely on the optimum concentration required for chlamyospore germination. D-xylose and mannitol were inhibitory at higher concentrations.
2. Soil extracts at higher concentrations were stimulatory while sand extracts were neither stimulatory nor inhibitory to germination.
3. Plant extracts from resistant and susceptible varieties showed no differential effect on chlamyospore germination. Nevertheless, a marked differential effect was found in extracts originating from cane or bud differing in maturity, a fact attributed to different reducing sugar contents of the extracts.

Chlamyospores germinated over a wide pH range of 2.2 to 8.8. The optimum pH was determined to be 6.4.

In all germination experiments there was a marked relationship between percentage of germination and promycelial length.

Among the six methods of artificial inoculation tested the partial vacuum method was found to be reliable and convenient. The efficiency of this method was adduced to increased entry of the inoculum into areas between bud scales.

A relationship existed between density of chlamyospores in the inoculum and infection either as latent bud infection or as visual symptoms of smut whip formation. Density of chlamyospores, however, did not cause any difference in the severity of infection. The optimum density required for infection varied with the variety used.

Storage at 15°C increased the viability of chlamyospores. However, there was no evidence of relationship between viability and infectivity of chlamyospores specially when stored for prolonged periods at the lower temperature.

Smut infection was influenced by the variety, age of bud and mechanical damage to bud scales.

The severity of latent infection varied with the variety and on this basis three infection types based on spread of mycelium and necrosis of host tissue were demonstrated. A positive correlation exists between latent infection and smut whip formation.

In resistant varieties Co 527 and Pindar increase in nitrogen supply increased their susceptibility to smut infection. Susceptibility was also determined by increased quantity of nitrogen applied during the first month from planting. Nitrogen source had no effect on resistance, but increased application of phosphorus and potassium increased resistance.

Five isolates of *U. scitaminea* failed to show physiologic specialization when tested on twelve sugarcane varieties; this is attributed either to absence of physiologic specialization at Kantalai or inability of hybrid test varieties to respond to physiologic races.