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Introduction

- The available literature suggested that there are at least two types of resistance mechanisms in sugarcane plants to smut (*Sporisorium scitamineum*):
 - bud scale or external resistance and
 - internal resistance
- The external resistance is believed to be chemical or physical barriers on sugarcane buds which prevent smut teliospores from penetrating and establishing infection.
- On the other hand, internal resistance is governed by the interaction of plant and fungus within the invading plant tissue.
- The aims of this study were to (i) understand the resistance mechanisms of some important commercial varieties, (ii) understand the relationship between age of bud and smut resistance, and (iii) identify the gene(s) involve in the resistance.

Method

- A number experiments were established at the BSES Bundaberg experiment station and CSIRO Brisbane, Qld, Australia.
- The treatments were:
 - Dip inoculation – buds dipped 10 min in spore suspension.
 - Injection – Spore suspension injected into base of the bud using a hypodermic syringe.
 - Bud positions – top to bottom of stalk (1= top -5 bottom).
 - Inoculate the progenies from crosses between an internal and an external resistant parents for their disease resistance mechanisms using dip inoculation and injection method.

Results and discussion

- Research suggested that the majority of the Australian commercial varieties possessed external resistance mechanisms.
- Major varieties such as, Q208^(b), Q200^(b) and KQ228^(b) possessed external resistance and Q183^(b), Q171^(b) and Q232^(b) possessed internal resistance mechanism.
- Age of the bud has significant effects on smut infection. Younger buds were more susceptible to smut compared to older bud.
- A study of progeny from a cross between a cultivar that contained internal resistance and a cultivar with only external resistance suggested major genes were responsible for internal resistance.
- Future works are being planned using new molecular and histopathological techniques to elucidate the external and internal resistance mechanisms identified in the current studies.



Figure 1: Sugarcane bud (a), sugarcane smut mycelium inside bud tissue (b), mycelium with haustoria within a cell (c).

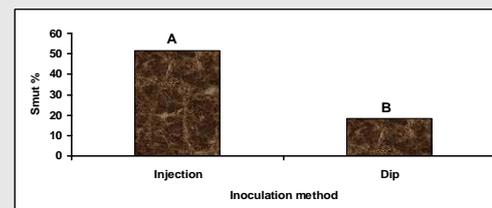


Figure 2: Incidence of smut on 18 sugarcane varieties inoculated by injection and dip methods.

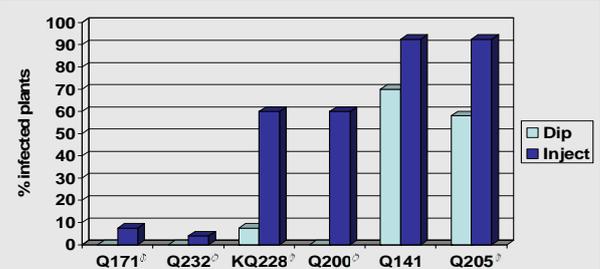


Figure 3: Smut infection some important commercial varieties.

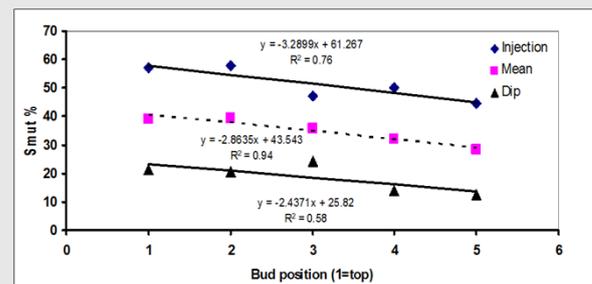


Figure 4: Relationship between bud position and smut incidence.