TELIOSPORE GERMINATION AND COMPATIBILITY GROUPS IN SPHACELOTHECA TANGLINENSIS

by

G. LIM & Y. H. ONG

Botany Department, University of Singapore, Singapore

ABSTRACT

Teliospores of *S. tanglinensis* germinate readily in tap water, each producing a 4-celled promycelium bearing 4 sporidia. Sporidia become 2 or more celled after detaching from the promycelium. Fusion between compatible sporidia occurs in a number of ways resulting in hyphae formation. Teliospores form in 3-month old compatibly mated sporidial cultures. Compatibility in *S. tanglinensis* is a bipolar type.

The smut fungus *Sphacelotheca tanglinensis* (TRACY & EARLE) ZUNDEL (syn. *S. ischaemicola* LING) infects the inflorescences of *Ischaemum indicum* (HOUTT.) MERR. and *I. timorense* KUNTH. in Singapore and Malaya. Its teliospore germination, subsequent growth features and compatibility groups have not been previously studied, except for some observations on teliospore germination (11). These aspects therefore were examined.

MATERIALS AND METHODS

Teliospores were collected fresh around the University Campus and germinated in tap water at room temperature (28°C) on specially constructed glass slides (Fig. 1) kept in humidified petri dishes.

[Diagram: Fig. 1. Glass slide for germination studies. (2 mm squares drawn with diamond pencil.)]

1) Adapted from thesis submitted by the junior author to the University of Singapore for the M. Sc. degree. Accepted for publication: 16.VI.1969.
In order to observe nuclei during the germinative process, Hir- 
Schorn's method (8) using Heidenhain's haematoxylin (10) was 
followed.

For compatibility tests, 6 sets of 4 sporidia each were obtained by 
micromanipulation from 6 teliospores designated A, B, C, D, E and 
F. Each sporidium isolated by the micromanipulator was allowed 
to bud for 20—24 hours at room temperature (28 °C) on 1.5 % water 
agar and then subcultured onto potato-dextrose agar (PDA) slants. 
The monosporidial cultures thus obtained were numbered according to 
the position of the original sporidium on the promycelium of the 
teliospore. The sporidium at the tip of the promycelium was desig- 
nated No. 1 and the one nearest the teliospore as No. 4.

20 days old monosporidial cultures of the 4 sporidia from each 
teliospore were mated in all possible combinations on PDA plates. 
Cross-combinations between monosporidial cultures (20 days old) 
from three teliospores were also made. Compatibility was deter- 
mimed by the "Bauch Test" in which compatible and non-compa- 
tible pairs were distinguished on the basis of growth form (6). Com- 
patible pairings were identified macroscopically by cottony aerial 
mycelial growth, and incompatible pairings by absence of such 
growth.

**Observations and Results**

**Germination studies**

Teliospores germinated readily within 1½—2 hours. The pro- 
mycelium began to septate when about three-quarters of its maxi-
umum length, and eventually consisted of 4 cells, sometimes 3. This 
stage was completed 1—1½ hours after commencement of germi-
nation. 2 hours later, 1 to 4 sporidia developed on the septate pro-
mycelium (Fig. 2), the latter number being most common. Gener-
ally the sporidium borne at the tip of the terminal promycelial cell 
developed first, the other 3 sporidia arose laterally, close to the 
septa without definite sequence. Development of sporidia was ac-
companied by a withdrawal of granulated protoplasm from the 
promycelial cells into the sporidia, leaving the former partly empty 
(Fig. 3).

The mature teliospore contained a single nucleus (Fig. 4). During 
germination, a nucleus appeared in the promycelium which eventu-
ally contained 1 nucleus in each promycelial cell, with the fourth 
nucleus of the inconspicuous basal promycelial cell often retained in 
the teliospore itself and not visible (Fig. 5). When sporidia de- 
veloped, the nuclei of the promycelial cells were no longer seen. Each 
sporidium before detaching from the promycelium possessed a 
central nucleus.

At the end of 6 hours from the time germination began, the spori-
dia became detached from the promycelium. They were fusiform in