TELIOSPORE GERMINATION AND COMPATIBILITY GROUPS IN SPHACELOTHECA TANGLINENSIS

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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.

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

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In order to observe nuclei during the germinative process, Hirschorn'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 designated 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 determined by the "Bauch Test" in which compatible and non-compatible pairs were distinguished on the basis of growth form (6). Compatible 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 promycelium began to septate when about three-quarters of its maximum length, and eventually consisted of 4 cells, sometimes 3. This stage was completed 1–1½ hours after commencement of germination. 2 hours later, 1 to 4 sporidia developed on the septate promycelium (Fig. 2), the latter number being most common. Generally 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 accompanied 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 eventually 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 developed, 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 sporidia became detached from the promycelium. They were fusiform in