

THE MODES OF TELIOSPORE GERMINATION
OF *USTILAGO TRICHOPHORA* (LINK)
KUNZE EX KÖRNICKE OCCURRING IN POLAND

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ABSTRACT

Ustilago trichophora affects *Echinochloa crus-galli* and other species of *Echinochloa* genus. *U. trichophora* is a member of the order Ustilaginales, of which the germinating teliospores form a promycelium with sporidia. Investigations by Ingold (1996) proved that spores coming from various parts of the world germinate in a different way. The aim of the investigation was to determine the mode of germination of *U. trichophora* spores found in Poland.

KEY WORDS: *Echinochloe crus-galli*, Ustilaginales.

INTRODUCTION

Ustilago trichophora is a pathogenic fungus infecting grass species of the genus *Echinochloa*. In the literature there are only few publications concerning this pathogen. In September 1998 *Ustilago trichophora* was found in association with cocksbur panic-grass [*Echinochloa crus-galli* (L.) Beauv.] growing near Wrocław (Pusz, Kita 2001). In the next years *U. trichophora* has also been found in Rakowice Wielkie located in Lower Silesia (Madej, Błaszczkowski, Tadych 2001). *U. trichophora* has probably got into the Polish territory from Germany or the Czech Republic, where it had been previously recorded (Mordue 1995; Ingold 1996).

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The aim of the investigation was to determine the mode of germination of *U. trichophora* spores found in Poland.

MATERIAL AND METHODS

Clusters of teliospores associated with cocksbur panic-grass growing in a corn field were collected in October 2001. In the laboratory, teliospores were spread on the surface of Petri dishes containing 2% malt agar. They were subsequently incubated at room temperature (about 20°C).

Beginning from about the 18th hour of incubation the spore germination was daily observed, as Ingold (1996) suggested. One-cm² fragments of the nutrient medium with abundantly germinating teliospores were cut out and prepared for microscopic observation (Ingold 1996). The germinating spores were examined and measured at one-hour intervals through four hours.

RESULTS

The germination of teliospores of *U. trichophora* examined in this study started after 20-24 hours of their incubation on 2% malt agar. To determine the mode of germination of *U. trichophora* teliospores coming from Poland, two spores differing in diameter were selected from the numerous incubated material.

The first spore of 9.6 µm in diameter started to germinate at the 20th hour of incubation producing a promycelium of a length of 24 µm (Fig. 1Aa). In the next hour, a second offshoot, of 16.8 µm in length, appeared (Fig. 1Ab). The first offshoot ceased to grow. At the third hour of incubation, a third offshoot of a length of 19.2 µm of the promycelium developed (Fig. 1Ac). Sporidia started to form at the end of each of the offshoots so far produced. At the fourth hour of incubation, a fourth offshoot of the promycelium formed. At that time, the sporidia were present on all the developed offshoots (Fig. 1Ad).

The second observed teliospore was bigger, having a diameter 12 µm. Twenty hours after sowing, a promyce-

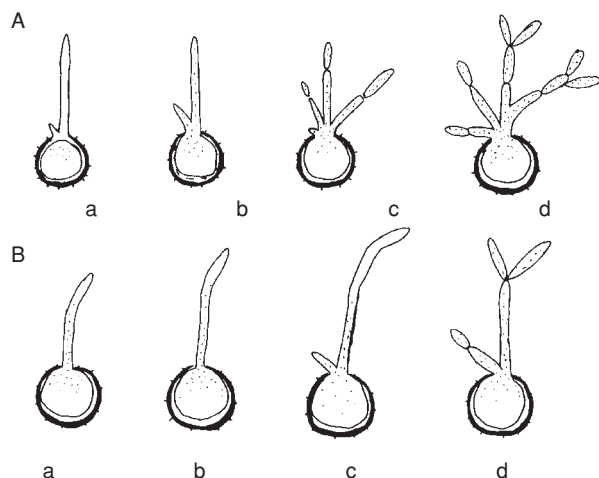


Fig. 1. The modes (A, B) and stages (a-d) of germination of *Ustilago trichophora* teliospores determined at 1-hour intervals. Draw by Z. Nowak.

lium of a length of 28.8 μm developed from the spore (Fig. 1Ba). One hour later, the length of the promycelium increased up to 38.4 μm and an offshoot of a length of 16.8 μm developed in the next hour (Fig. 1Bb, Fig. 1Bc). At the end of the first offshoot, a sporidium was noticed. At the last observation, sporidia were present on all the offshoots produced (Fig. 1Bd).

Most of the remaining spores germinated similarly as those characterised above. The attempt to germinate spores on a potato nutrient agar medium failed. None of the spores formed a promycelium.

DISCUSSION

The comparison of the mode of germination of the teliospores of *U. trichophora* found in Poland with that of spores coming from Germany, Hungary, India and Venezuela

characterised by Ingold (1996) showed that one of the Polish teliospores investigated germinated identically as those from Germany and Venezuela. The germinating spore first produced a non-branched hypha of a promycelium, from which later four offshoots grew up. Sporidia were produced at the end of each of the offshoots of the promycelium formed (Fig. 1A). Both the length of the promycelia of the compared specimens of different origin and their rate of growth were also similar.

The second Polish *U. trichophora* (Fig. 1B) selected teliospore germinated LIKE spores coming from India. The promycelium of the germinated spore consisted of the Polish and Hungarian teliospores. According to Ingold (1996), germinating spores from Hungary, produce a short (2 μm) promycelium with no branches.

The percent of germination determined by the author of this papers was higher when the teliospores occurred in aggregates. A similar phenomenon was observed by Madej, Błaszowski and Tadych (2001).

The similar mode of germination of *U. trichophora* teliospores coming from Poland and those from Germany and Venezuela suggest that *U. trichophora* has been introduced to Poland from Germany. This should be supported in further investigations. According to Ingold (1996), the mode of germination of teliospores of fungi of the order Ustilaginales may not depend on their geographical origin.

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TYPY KIELKOWANIA TELIOSPOR *USTILAGO TRICHOPHORA* (LINK) KUNZE EX KÖRNICKE WYSTĘPUJĄCEGO W POLSCE

STRESZCZENIE

Zbadano sposób kiełkowania zarodników *Ustilago trichophora* występującego w Polsce. Zarodniki *U. trichophora* wysiano na szalki Petriego z 2% pożywką maltozową. Teliospory kiełkowały od 18 do 24 godzin od momentu wysiania na pożywkę. Obserwacje kiełkowania prowadzone były co godzinę. Stwierdzono, że większość teliospor kiełkuje w krótką przedgrzybnię, z której wyodrębniają się sporydia. Część teliospor skiełkowała w długą przedgrzybnię na której wytworzyły się sporydia.

Porównano sposób kiełkowania polskiej populacji *U. trichophora* z populacjami pochodzącymi z Indii, Niemiec, Węgier i Wenezueli, a opisanymi w pracy Ingolda (1996). Stwierdzono, że teliospory *U. trichophora* zebrane w Polsce kiełkują w podobny sposób co zarodniki z Niemiec i Wenezueli, a odmienny niż teliospory pochodzące z Węgier i Indii.

SŁOWA KLUCZOWE: *Echinochloe crus-galli*, Ustilaginales