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Occurrence of Fusarium crookwellense in Poland

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Paper presents the occurrence of the new species *Fusarium crookwellense* on cereals and potato tubers in Poland in 1985-1986.

INTRODUCTION

Fusarium crookwellence Burgess, Nelson et Toussoun was found for the first time in 1971 in Australia and so far has been included only in Nelson's et al. (1983) taxonomic system. S i n c e 1971 over 1000 strains of this fungus, obtained mainly from pasture soils as well as turfgrass and maize in America, Australia, South Africa, Asia and Western Europe have been found (B u r g e s s et al. 1982). In Poland first isolates of *Fusarium crookwellense* were obtained from infected wheat, rye, triticale kernels and glumes as well as from maize ears, in 1985.

The further studies on the occurrence of *Fusarium crookwellense* on cereals and other plants were undertaken. During the survey of fields at different localities in Poland in 1985 and 1986, closer observation revealed that many wheat and rye ears, maize ears and as well as potato tubers were colonized by a *Fusarium* sp. producing orange sporodochia, later identified as *Fusarium crookwellense*. Also, a few isolates found already in 1982 and 1984 on the wheat ears and potato tubers and suspected of being *Fusarium graminearum* have been those of *Fusarium crookwellense*.

MATERIAL AND METHODS

Samples of visible *Fusarium*-infected wheat and rye ears, maize ears and stems, as well as potato tubers were collected at different localities (Brzozowo, Dukla Kielce, Kraków, Modlin, Poznań, Radzików, Warszawa, Wrocław) in Poland in 1985 and 1986 occasionally also in 1982 and 1984). Isolation and

culture of *Fusarium* species visible *Fusarium*-infected (mainly with orange sporodochia on its surface) wheat, rye and maize kernels were surface-sterilized in a 2% aqueous solution of sodium hypochlorite for 2 min, rinsed twice with sterile water and plated out onto potato dextrose agar PDA containing 50 μg per ml chlorotetracycline. Sometimes, red discoloured areas with sporodochia occurring mainly on the wheat, rye glumes and maize stems were wiped with 70% ethanol, washed with sterile water and small pieces of infected tissue were aseptically cut out and transferred on potato dextrose agar PDA. Plates were incubated at + 25°C in the dark for 10 days. Next, single spore isolates (on 1% agar) of *Fusarium* strains selected for furher study were prepared. Following incubation at + 25°C for 10-14 days on the potato dextrose agar PDA (fresh potatos) 400 g, agar 20 g, distilled water 1 l) and SNA (KH_2PO_4 – 1,0 g, KNO_3 – 1,0g, $MGSO_4 \cdot 7\ H_2O$ – 0,5 g, KCl – 0,5 g, glucose – 0,2 g, sucrose – 0,2 g, agar – 15 g, distilled water – 1 l) agar, the cultures were identified according to Nelson et al. (1983) taxonomy system.

RESULTS

The wheat, rye and maize fields at different localities (Fig. 1), in Poland examined during harvest in 1985 and 1986, occasionally in 1982 and 1984, were found to be infected by the *Fusarium crookwellense* Burgess, Nelson et Toussoun. This new species of *Fusarium* was also isolated from potato tubers found in Warszawa and Poznań. *Fusarium* infections were visible as a pink discoloration and orange sporodochia mainly on the glumes and kernels of wheat, rye and maize, as well as on the maize stem and potato tuber surface. On potato dextrose agar *Fusarium croockwellense* grows rapidly. The growth rate after 4 days of incubation at + 24-25°C is 8-9 cm. Aerial mycelium dense, floccose, white to carmine tinged with yellow to brown. Orange to brown sporodochia generally appear early in the centre and later in other parts of the culture, sometimes below the undersurface. Microconidia absent. Macroconidia strongly septate, thick-walled, with the widest central part, strongly arched and with more curved dorsal than ventral surface, with the basal cell distinctly foot-shaped and apical cell distinctly curved and tapering to a narrow tip. The size of 3-5 septate macroconidia range 30-60 x 4-6 μm. Macroconidia are formed from singly monophalides or more often from branched conidiophores which terminate in short monophalides. Conidiophores aggregate into sporodochia. Chlamydospores generally present, intercalary, single, in chains of in clumps, globose, thick-walled, hyaline to pale brown, 10-12 μm in diametr. They may also be found in macroconidia (Fig. 2). So far *Fusarium crookwellense* has been discovered mainly in the central and southern Poland (Fig. 1).

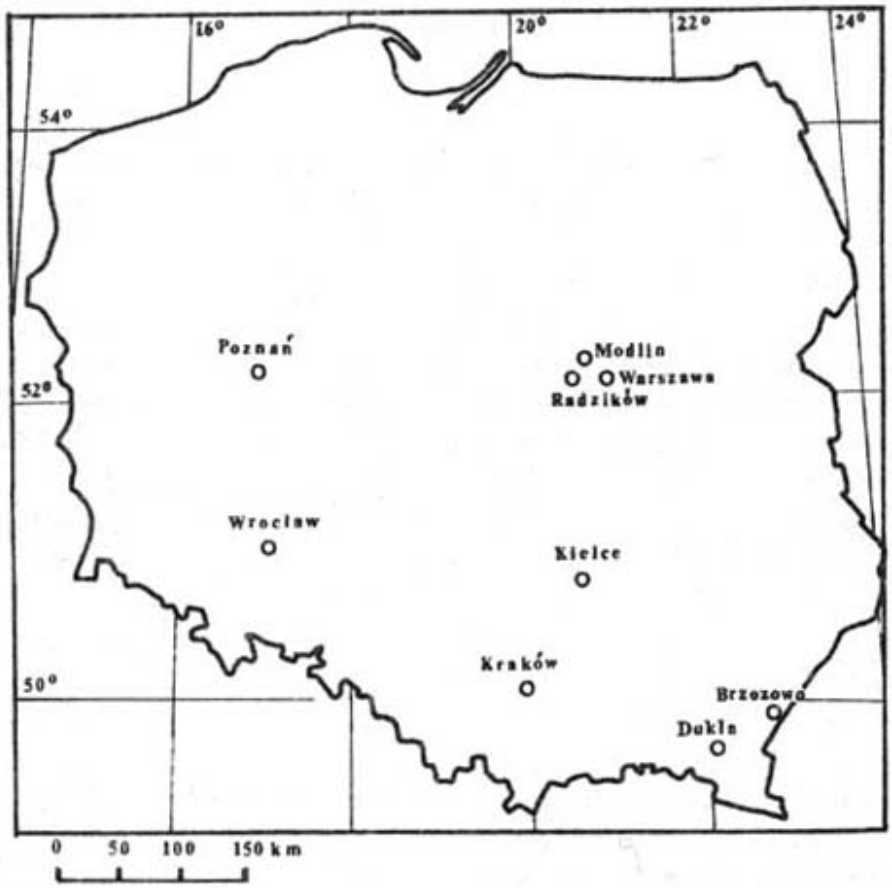

Fig. 1. Occurrence of *Fusarium crookwellense* in Poland

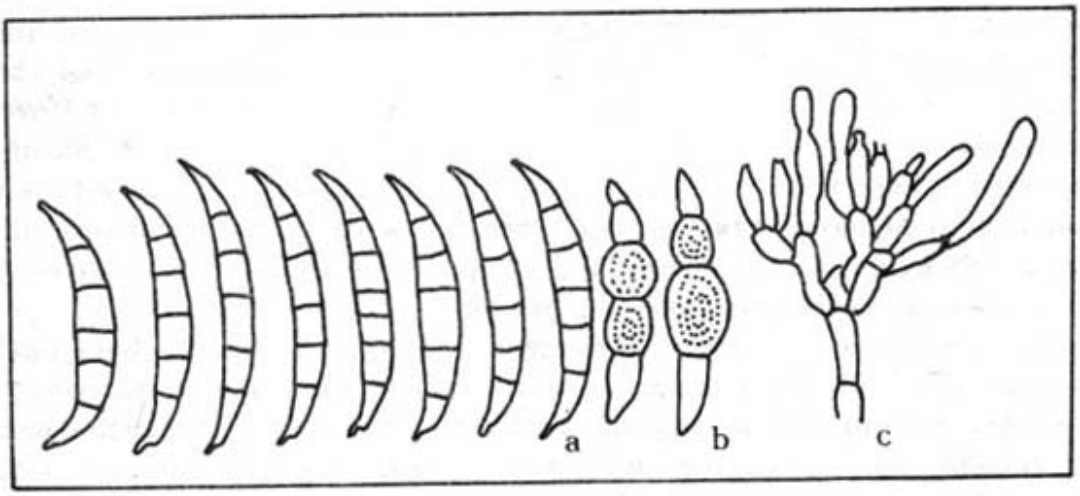

Fig. 2. *Fusarium crookwellense*

a – macroconidia produced in sporodochia (x 1000), *b* – macroconidia with chlamydospores, *c* – conidiophores (monophialides)

DISCUSSION

Wheat, rye and maize fields examined in central and southern Poland in 1985 and 1986 were found to be infected by *Fusarium crookwellense* Burgess, Nelson et Toussoun. The species was isolated also form potato tubers with visible *Fusarium* infections which confirme the results of *Burgess* et al. (1982) who also isolated *F. crookwellense* from nectrotic lesions on potato tubers. In Australia *Fusarium crrokwellense* was obtained mainly from pasture soils but in North America, South Africa, Columbia and China it was isolated from turfgrass, maize and other cereals. In Europe, so far, it has been obtained only from soil in the southeastern France (Burgess et al. 1982) and from wheat, rye, triticale and maize ears in Poland. It is the first report on *Fusarium crookwellense* colonizing cereals plants in the field in Poland. Till now, there were no data on the occurrence of the species in this region, however we connot exclude the supposition that it had occurred but due to the culture charakter and morphology of its macroconidia it which are intermediate between those of *Fusarium culmorum* and *Fusarium graminearum* and according to the previously used taxonomic systems (Booth 1971; Gerlach 1981; Snyder, Hansen 1945; Wollenweber, Reinking 1935) not including *Fusarium crookwellense* species, it was misidentified as *Fusarium culmorum*, *Fusarium graminearum* or unidentified. On PDA medium *Fusarium crookwellense* similarly to *F. culmorum* and *F. graminearum* produces dense, carmine red to yellow tan mycelium. Yellow to brown sporodochia may be produced by *F. crookwellense* already after 4-5 days of incubation. Formation of sporodochia as early as that is also typical of *F. culmorum* (*Booth* 1971; Nelson et al. 1983) but not of *Fusarium graminearum* which often produces them sparsly and only when the culture is more than 30 days old (Booth 1971; Nelson et al. 1983). The use of agar with a low nutrient content, SNA (Nirenberg 1976), stimulates the development of the macroconidia in sporodochia and differentiates the colour and character (density) of sporodochia which are yellow-brown confluent to pionnotal in the case of *F. culmorum*, yellow-brown punctiform and dense in the case of *F. crockwellense* and pink punctiform, very small in the case of *F. graminearum*. First macroconodia produced in sporodochia on SNA agar suggest sometimes *F. culmorum*. They are of the same shape and size but typical 14-days old *F. crookwellense* macroconidia are longer with apical cell tapering to a narrow tip, distinctly and unequally curved always with the widest central part of conidia. As the culture ages macroconidia may be confused with *F. graminearum* spores. They tend to be somewhat longer and more narrowly falcate.

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WYSTĘPOWANIE FUSARIUM CROOKWELLENSE W POLSCE

Streszczenie

W 1985-1986 roku (sporadycznie w 1982 i 1984) w Polsce stwierdzono występowanie na roślinach uprawnych nowego gatunku: *Fusarium crookwellense* Burgess, Nelson and Toussoun. Był on izolowany z kłosów pszenicy i żyta, z kolb i łodyg kukurydzy oraz bulw ziemniaka z objawami nekroz lub pomarańczoworóżowymi przebarwieniami.

Zebrane na polu fragmenty roślin z objawami porażenia przez *Fusarium* spp. sterylizowano powierzchniowo 2% wodnym roztworem podchlorynu sodu, a w przypadku obecności typowych sporodochiów przemywano je delikatnie 70% alkoholem etylowym, płukano w sterylnej wodzie destylowanej, dzielono na fragmenty i wykładano na pożywkę glukozowo-ziemniaczaną. W okresie zarodnikowania grzybów przygotowywano kultury jednozarodnikowe, które po 10-14-dniowej inkubacji w temperaturze +25°C na pożywce glukozowo-ziemniaczanej (PDA) oraz pożywce zubożonej w składniki pokarmowe (SNA) (Nirenberg, 1976) identyfikowano opierając się na pracy Nelsona i wsp. (1983).