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Leaf Blight: A New Disease of *Xanthium strumarium* Caused by *Exserohilum rostratum* in Sudan

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Abstract: The fungus *Exserohilum rostratum* was consistently isolated from necrotic spots and blight of *Xanthium strumarium* leaves. It was identified on the basis of microscopic and macroscopic characters. Pathogenecity was demonstrated by pressurized hand sprayer inoculation. This is the first record of leaf blight caused by *E. rostratum* on *X. strumarium* in Sudan.

Key words: ***X****anthium*; leaf blight; *Exserohilum rostratum*; biological control

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Xanthium strumarium (Cocklebur), a member of the family Asteraceae (Braun *et al*. 1991, is one of the worst weeds in the world (McRao and Auld 1988). It is known in the Sudan as 'Ramtouk' (Braun *et al*. 1991), infesting cultivated areas and along water canal edges. Prior to 2007, the only major disease reported on this plant in Sudan was powdery mildew, caused by *Sphaerotheca fuliginea* (Gamiel *et al*. 2002). During the 2007 rainy season, serious unusual leaf necroses were observed for the first time in fields in the Rahad Scheme and along the Rahad River.

Small irregular light-brown lesions were observed on the lower leaves of young plants having 6-8 leaves. They gradually increased in size and spread over the entire leaf surface. Infected tissues eventually became necrotic and dark brown in colour. On mature plants, the symptoms began as small irregular yellow spots that turned brown. Later, the spots enlarged to form either dark brown spots or marginal and apical necrosis (Fig.1) that extended to cover most of the leaves. Infected leaves eventually died and no leaf shedding was observed even in heavily infected plants. Symptoms of the disease were observed on plants of different ages, from seedlings to mature plants.

Fig 1. Naturally infected *Xanthium strumarium* showing (a) necrotic lesions (b) marginal leaf blight and (c) apical and marginal leaf blight, caused by *Exserohilum rostratum*

Infected leaves with different symptoms were collected from different locations. Isolations consistently yielded the same fungus which was identified as *Exserohilum rostratum*. The isolate identification was based on its cultural characteristics on potato dextrose agar (PDA) and conidia shape under the microscope (Ellis 1971). The fungal growth on PDA was velvety gray, after 7 day's incubation at 27^{o}C. Under the microscope, the fungus mycelium was smooth, thick, brown and septate (dematiaceous). The conidia were multiseptate (5 to 8 septa) with predominant hilum. The hilums were protruding, truncated and sympodially produced (Fig 2), a characteristic of the genus *Exserohilum* (Ellis 1971). The septa at the hilum and at the conidia tip were characteristically thick and dark brown which is suggestive of the species *E. rostratum* (Peerapur *et al*. 2004).

A pathogenicity test was conducted under laboratory conditions by inoculating 8 days old leaves of *Xanthium strumarium* seedlings with spore suspension obtained from 7 days old culture of *Exserohilum rostratum* incubated in the dark at 27^{o}C. The plants were grown from seeds in clay pots with a soil mixture of clay and sand (1:1 volume). The plants were kept under laboratory conditions of temperature, humidity and day length.

Spore suspension was prepared by blending fungal culture on PDA with sterile distilled water for few seconds in an electric blender. The suspension was filtered through cheese cloth. Spore suspension was diluted to a concentration of 0-100 spores /µl. Five top leaves of each of 9 plants were inoculated with the spore suspension using a pressurized hand sprayer. The control plants were similarly sprayed using sterile distilled water. Inoculated plants were individually covered with clear polythene bags, and a wet cotton plug was inserted to maintain high humidity. Yellow spots initially developed on inoculated leaves 3 days after treatment. Ten days later, the spots turned brown and extended to give leaf blight symptoms typical to naturally infected leaves (Fig 3). No symptoms were observed on the control plants. Isolations performed from symptoms developed on inoculated leaves yielded the same fungus used for infection.

This is the first record of leaf blight disease caused by *Exserohilum rostratum* on *Xanthium strumarium* in Sudan.

Although the role of infected plant debris in the epidemiology of this disease was not studied, the high and severe incidence in the present observation together with the published information on transmission of *Exserohilum* spp. (Leach *et al*. 1977; Yehouda and Yigal 1983; Campbell and Madden 1990; Zhang 1997; Ngugi *et al*. 2000) suggest that contaminated plant debris could act as a source of infection in the following seasons. The effects of the disease on cultivated crops have not been investigated; yet, the fungus *Exserohilum rostratum* might be a good option for the biological control of the noxious weed *Xanthium strumarium* in the future.

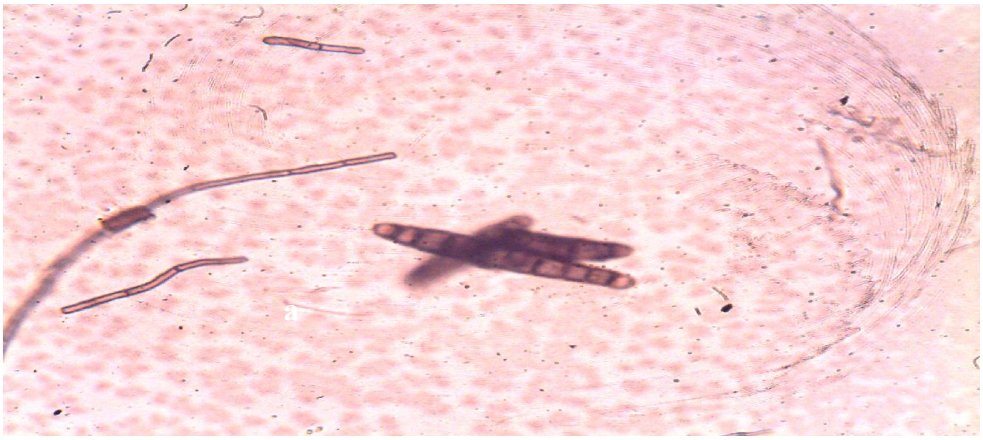

Fig 2. Slide preparation of *Exserohilum rostratum* isolate showing brown, thick walled, septate hyphae and typical, large, multiseptate conidia with hilum

Fig 3. Reaction of *Xanthium strumarium* after inoculation with *Exserohilum rostratum*. Leaves showing (a) necrotic lesions at initial phase of development, (b) large necrotic lesions and (c) dead leaves

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لفحة الأوراق: مرض جديد فى حشيشة *Xanthium strumarium* يسببه الفطر *Exserohilum rostratum* فى السودان

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موجز البحث: عزل الفطر *Exserohilum rostratum* بصورة منتظمة من التبقع النخرى ولفحة اوراق الرانتوك *Xanthium strumarium* وتم التعرف عليه على أساس الصفات المورفولوجية والمجهرية. تم توضيح الإمراضية باستخدام الرشاشة اليدوية الضاغطة. يعد هذا أول تسجيل لمرض لفحة الأوراق الذى يسببه الفطر *E. rostratum* على الرانتوك *X. strumarium* فى السودان.