

## The mycoflora of wheat field debris, Part II

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### ABSTRACT

Descriptions are given of four fungus species isolated from stubble of a wheat field in the Heilbron district: *Ascochyta hordei* Hara, *Ascochyta sorghi* Sacc., *Phoma pomorum* Thüm. and *Alternaria tenuissima* (Fr.) Wiltshire.

### Résumé

#### LA MYCOFLORE DES DÉBRIS D'UN CHAMP DE BLÉ

On décrit quatre espèces de fungi isolés du chaume d'un champ de blé dans le district d'Heilbron. Ce sont: *Ascochyta hordei* Hara, *Ascochyta sorghi* Sacc., *Phoma pomorum* Thüm. et *Alternaria tenuissima* (Fr.) Wiltshire.

The object of this study has been given in the first part of this series (Papendorf & Jooste, 1974). The four species described here have been deposited as live cultures in the Potchefstroom University culture collection and as dried down cultures in the Mycological Herbarium (PREM) of the Plant Protection Research Institute at 590 Vermeulen Street, Pretoria.

Materials and methods are similar to those described previously. When required, cultures were incubated under near U.V. light (330-480 nm) for 12h per day at 20 °C. The distance from the light source to the cultures was 400 mm.

*Ascochyta hordei* Hara, in Sprague & Johnson, *Mycologia* 42, 544-546 (1950); Sprague in *Diseases of Cereals and Grasses in North America*, New York: The Ronald Press Co., p. 156-158 (1950).

#### Figures 1, 2, 3 & 9

Colonies on 1,5% Malt extract agar growing moderately fast, reaching a diameter of 80 mm in 12 days at 25 °C. Mycelium olivaceous-black to olivaceous-grey, raised, floccose. Hyphae light to dark olivaceous, septate, smooth or verruculose, varying in diameter from 2-12,5 µm, wide hyphae often thick-walled and generally dark olivaceous, constrictions at the septa common, branches often arising at right angles. Pycnidia superficial, single or in clusters, globose, subglobose, oblong-ellipsoidal or pyriform, with a single neck and ostiole when young but developing multiple necks and ostioles when older, thin-walled, olivaceous to olivaceous-brown, hyphal outgrowths on pycnidia 3-6 µm wide and up to 30 µm long, young pycnidia with single ostioles up to 250 µm wide and 375 µm long with the neck up to 60 µm long and 50 µm wide, extremely variable in dimensions when older. Pycnidiospores ellipsoidal, tapering to rounded ends, mostly straight, occasionally curved or twisted, smooth, hyaline to light honey, 1-septate, rarely 2-septate, cytoplasm granular, 17,5-25,0 × 4,5-6,0 µm, ave. 21,4 × 5,5 µm.

*Specimen examined:* P.U. Culture Collection No. 1189, PREM 44954 dried down culture on 1,5% malt extract agar.

According to Sprague & Johnson (*l.c.*) the spores of this species can vary between 17-29 µm in length and 5-9 µm in width. It follows that this isolate is well within the range of variation already recorded. The main distinguishing character of *A. hordei* is the

predominance of spores which taper from the middle to the ends. The variation observed in the shape of the pycnidia as well as the proliferation of necks and ostioles at maturity is a feature not recorded before.

*Ascochyta sorghi* Sacc., in *Sylloge Fungorum* III, 406, (1884); Sprague & Johnson in *Mycologia* 42, 530-536 (1950), lists 7 synonyms; Sprague in *Diseases of Cereals and Grasses in North America*, New York: The Ronald Press Co., p. 159-161 (1950).

#### Figures 4, 5 & 10.

Colonies on 1,5% malt extract agar growing slowly, reaching a diameter of 60 mm in 13 days at 20 °C. Mycelium raised, floccose, off-white to light buff. Pycnidia formed only under near UV light. Hyphae smooth, septate, slightly constricted at the septa, hyaline to light honey, straight or flexuous, branches arising at right angles, 2-5 µm diam. Pycnidia superficial, covered by hyphae, light amber, thin-walled, globose, subglobose or ellipsoidal, variable in size, 60-225 µm diam., with one or more terminal as well as lateral ostioles, necks inconspicuous with cells surrounding ostioles slightly darker. Pycnidiospores hyaline, subcylindrical with ends rounded or subfusiform and one end often truncate, usually 1-septate, occasionally 2-septate, rarely constricted at the septa, 12,0-25,0 × 2,0-4,0 µm, ave. 17,5-2,7 µm.

*Specimen examined:* P.U. Culture Collection No., 1191, PREM 44955 dried down culture on 1,5% malt extract agar.

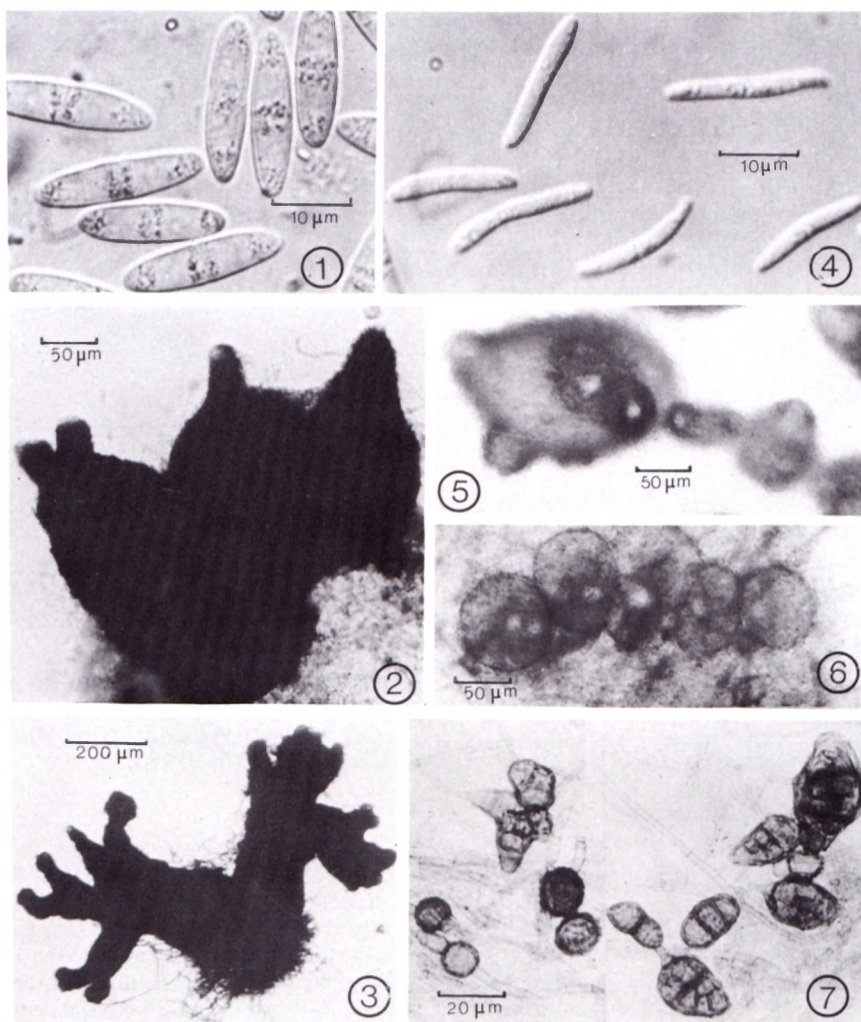
The pycnidiospores of *A. sorghi* was described by Saccardo (*l.c.*) as oblong ovoid. Following the study of a large number of isolates Sprague & Johnson (*l.c.*) characterized the spores as "fusoid to ovate fusoid or subcylindric and often constricted at the septum". According to this description the present isolate is more cylindrical or subcylindric than is characteristic of *A. sorghi*. Furthermore, the one truncate end has not been noted before. At present it is convenient to refer to this isolate as *A. sorghi* since it does not seem warranted to describe it as a new species.

*Phoma pomorum* Thüm., in Saccardo, *Sylloge Fungorum* III, 152, (1884); Boerema, Dorenbosch & Van Kesteren in *Persoonia* 6, 172 (1971); Boerema & Dorenbosch in *Studies in Mycology* 3, 36-37 (1973).

*Phoma prunicola* (Opiz.) Wollenw. & Hochpf. in *Z. ParasitKde.* 8, 595 (1936); Boerema, Dorenbosch & Van Kesteren in *Persoonia* 4, 59-63 (1965); Dorenbosch in *Persoonia* 6, 9 (1970); Morgan Jones in *C.M.I. Descriptions of Pathogenic Fungi and Bacteria*, 135 (1971).

*Phoma bismarkii* Kidd & Beaumont in *Trans. Br. mycol. Soc.* 10, 104-105 (1924).

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FIGS. 1-7.—1, 2 and 3, *Ascochyta hordei* pycnidiospores, pycnidia and multiple necked mature pycnidia; 4 and 5, *Ascochyta sorghi* pycnidiospores and pycnidia; 6 and 7, *Phoma pomorum* pycnidia and chlamydospores.

Figure 6, 7, 8.

Colonies growing moderately fast on oatmeal agar reaching a diameter of 70 mm in 8 days under near UV light at 20 °C. Mycelium on oatmeal agar delicately cottony, olivaceous grey, pycnidia abundant. Hyphae hyaline to olivaceous brown, smooth or verruculose, septate, branched, 3,75-5,0 µm diam. Pycnidia globose to subglobose, partly submerged, thin-walled, ostiolate with one or more ostioles, light to dark umber, variable in size, up to 250 µm diam, neck inconspicuous. Chlamydospores globose to subglobose, mostly intercalary, single or in chains, verruculose or verrucose, thick-walled, umber to dark umber, mostly continuous, rarely 1-septate, 10-14 µm diam. Dictyochlamydospores verrucose, dark honey when young, umber when mature, terminal or intercalary, a mucous sheath often enveloping the spore, irregularly obovoid, ellipsoid or obclavate, transversely as well as longitudinally septate with a variable number of septa. Pycnidiospores hyaline, ovoid to ellipsoid, often slightly curved, continuous, with one or more guttules, 5,5-9,0 × 1,8-3,0 µm, ave. 6,8 × 2,8 µm.

Specimen examined: P.U. Culture Collection No. 1212, PREM 44956 as a dried down culture on oatmeal agar.

*P. pomorum* is a common fungus with a wide host range and is well known as *P. prunicola* (Boerema & Dorenbosch, *l.c.*). The most important diagnostic character is the presence of two types of chlamydospores. The present isolate corresponds well with

those previously described; however, it varies in having verrucose dictyochlamydospores which are often enveloped in a mucous sheath.

On 1,5% malt-extract agar the growth of the colonies are rapid reaching a diameter of 85 mm in 8 days under near UV light at 20 °C. The mycelium is delicate, floccose and olivaceous brown. Numerous pycnidia develop partly submerged in the agar.

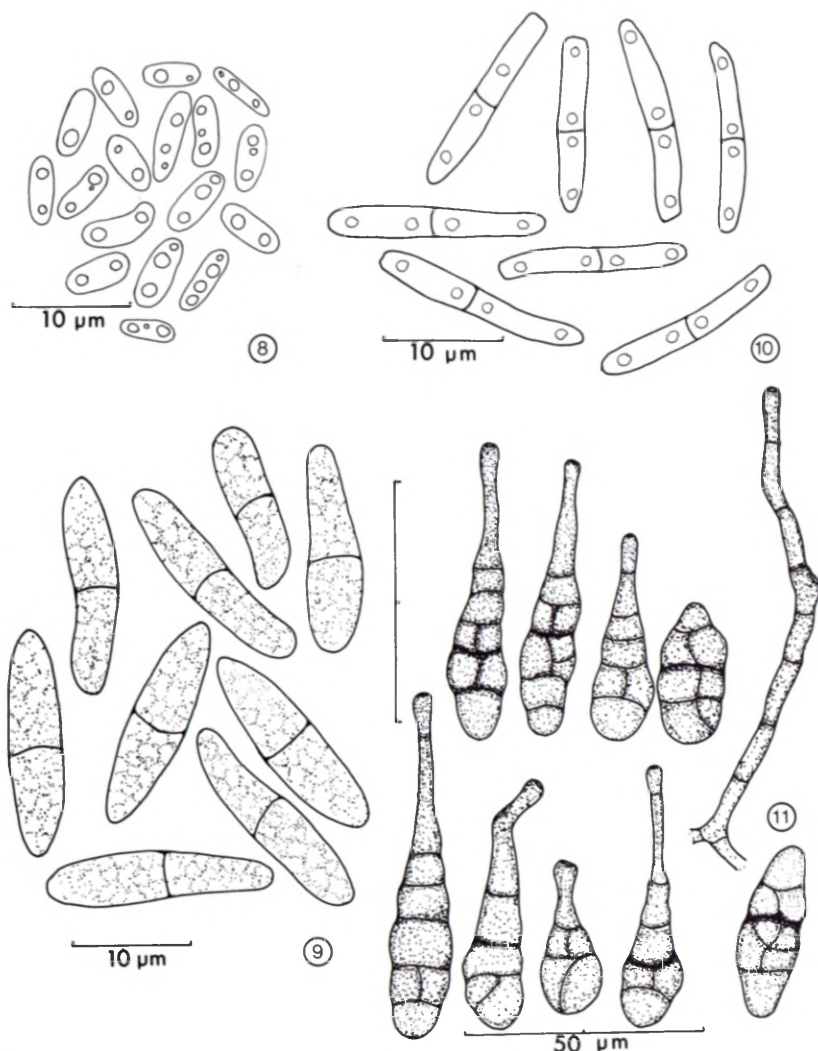
This fungus has been recorded in South Africa as *Phyllosticta prunicola* (Opiz.) Sacc. on *Prunus armeniaca* L. [Doideg in Bothalia 6, 629 (1950)].

*Alternaria tenuissima* (Fr.) Wiltshire in Trans. Br. mycol. Soc. 18, 157 (1933); Neergaard in Danish Species of *Alternaria* and *Stemphyllium*, Copenhagen: Einar Munksgaard, p. 145 (1945); Joly in Encycl. Mycol. 23, 123-132 (1964) gives 37 synonyms; Ellis in Dematiaceous Hyphomycetes, Kew: Commonwealth Mycological Institute, p. 477 (1971).

*Macrosporium tenuissimum* Fr. in Systema Mycologicum 3, 374 (1832).

Figure 11.

Colonies growing rapidly on oatmeal agar reaching a diameter of 80 mm in 10 days at 25 °C. Mycelium olivaceous black, velvety, no pigment diffusing into the agar and no evidence of crystals in the agar. Hyphae light honey, smooth, septate, branched, 3,0-6,5 µm diam. Conidiophores macronematous, mononematous, isabelline, smooth, septate, often branched with branches of unequal length, often geniculate with 1-4 geniculations or a single terminal



FIGS. 8-11.—8, pycnidiospores of *Phoma pomorum*; 9, pycnidiospores of *Ascochyta hordei*; 10, pycnidiospores of *Ascochyta sorghi*; 11, conidia of *Alternaria tenuissima*.

conidiogenous cell, 40–155  $\mu\text{m}$  long, mostly 40–60  $\times$  4–5  $\mu\text{m}$ , conidiogenous cells terminal, integrated, sympodial, scars flat and slightly sunken, usually one per cell. Conidia isabelline to dark isabelline, obclavate, obovoid or ellipsoidal, smooth, verruculose to verrucose, septate, generally with transverse, longitudinal and diagonal septa, however conidia with only transverse septa common, slightly to mildly constricted at the septa, with or without false beaks, beaks usually with a swollen or geniculate terminal conidiogenous cell, beak length usually not exceeding two thirds of the length of the conidia, catenate with up to 8 conidia per chain, unbeaked spores 24–38  $\times$  12,5–19,0  $\mu\text{m}$ , ave. 30,0  $\times$  14,5  $\mu\text{m}$ , beaked spores 24,0–84,0  $\times$  11,0–19,0  $\mu\text{m}$ , ave. 51,5  $\times$  14,0  $\mu\text{m}$ .

*Specimen examined*: P.U. Culture Collection No. 1233, PREM 44957 dried down culture on oatmeal agar.

According to Wiltshire (*l.c.*) *A. tenuissima* was originally published by Nees in 1818 on Kunze's specimen as *Helmsporium* (*Helminthosporium*) *tenuissimum*. Furthermore, Persoon in *Mycol. Eur.* 1, 18 (1822) also quoted the Kunze specimen as *H. tenuissimum*. Fries (*l.c.*) made *H. tenuissimum* synonymous with *Macrosporium tenuissimum* Fr. According to Wiltshire (*l.c.*) Fries probably based *M. tenuissimum* on specimen No. 212 of the *Dezmazières exsiccata* because of the fact that the conidia of Kunze's specimen in the Fries Herbarium lacks beaks while those of *Dezmazières*'s specimen is beaked. He proposed that the *Dezmazières* specimen be chosen to represent *A. tenuissima*. It therefore follows that the Kunze

specimen, which was published by Nees in 1818 and Persoon in 1822, should not be used as the type. This was subsequently supported by Neergaard (*l.c.*). Ellis (*l.c.*) indicated the authors of *A. tenuissima* as "(Kunze ex Pers.) Wiltshire". In view of the foregoing this should be regarded as incorrect and *A. tenuissima* (Fr.) Wiltshire accepted.

The isolate described here corresponds well with descriptions of Wiltshire (*l.c.*), Neergaard (*l.c.*), Joly (*l.c.*) and Ellis (*l.c.*) although the conidia are somewhat smaller. Considering the variation in spore dimensions given by Joly (*l.c.*) it is appropriate to regard it as *A. tenuissima*.

#### ACKNOWLEDGEMENTS

The financial support of the Department of Agricultural Technical Services and the C.S.I.R. is gratefully acknowledged. Prof. M. C. Papendorf is thanked for his interest and reading of the manuscript. Dr H. A. van der Aa of the Central Bureau voor Schimmelcultures Baarn, Netherlands, is thanked for suggesting the identity of the *Ascochyta* and *Phoma* species.

#### UITREKSEL

*Beskrywings word gegee van vier swamspesies wat geïsoleer is uit stoppels van 'n koringland in die Heilbronse distrik: Ascochyta hordei Hara, Ascochyta sorghi Sacc., Phoma pomorum Thüm. en Alternaria tenuissima (Fr.) Wiltshire.*

#### REFERENCES

- PAPENDORF, M. C. & JOOSTE, W. J., 1974. The mycoflora of wheat field debris, Part I. *Bothalia* 11: 207–210.