Phomopsis pisi – a New Species Causing Pea Stem Canker

Michal ONDŘEJ, Lenka ODSTRČILOVÁ and Radmila DOSTÁLOVÁ

AGRITEC, Research, Breeding & Services, Ltd., Šumperk, Czech Republic

Abstract

Ondřej M., Odstrčilová L., Dostálová R. (2006): *Phomopsis pisi* – **a new species causing pea stem canker**. Plant Protect. Sci., **42**: 95–98.

The new species *Phomopsis pisi* Ondřej sp. n. (Anamorphic Fungi – Coelomycetes) occurred on stems of pea (*Pisum sativum* L.) cv. Adept at Šumperk-Temenice (Czech Republic). The fungus caused plants to die at the green maturity stage. The new species differs from *Phomopsis pisicola.* It differs in the length and width of conidiophores and conidia.

Keywords: pea; stem canker; *Phomopsis pisi*; new species; Czech Republic

Several fungal species with the anamorph *Phomopsis* parasitise on stems of leguminous plants and cause stem canker. The corresponding teleomorph *Diaporthe* Nietschke (*Diaporthales*) (Wehmeyer 1933; Athow & Caldwell 1954; Lehman 1923; Wood & Sivasithamparam 1989; Sutton 1998) was found for each *Phomopsis* species except *P. fabae* (Ondřej 1991). The highest attention was focused on *Diaporthe phaseolorum* (Cook *et* Ell.) Sacc. and its varieties or *formae speciales*: var. *phaseolorum* (Cook *et* Ell.) Sacc. (*Phaseolus*), var. *meridionalis* (Fernandez & Hanlin 1996) (*Glycine*), var. *sojae* (Lehman 1923; Wehmeyer 1933) (*Glycine*) and var. *caulivora* (Athow & Caldwell 1954) (*Glycine*). According to Ford *et al.* (1975), *Diaporthe phaseolorum* is a broadly polyphagous species capable to parasitically attack different leguminous genera (*Phaseolus*, *Glycine*, *Lupinus*, *Vigna* and *Arachis*). This species is not able to infect the genera *Pisum*, *Vicia* and *Faba*. Of particular interest is *Diaporthe* on Lupins: *Diaporthe woodii* Punith. and *Diaporthe toxica* Williamson. Livestock can be killed when fed with infected plants (lupinosis) (Sweetingham *et al.* 1998; Wood & Sivasithamparam 1989).

All of the mentioned *Diaporthe* species have one identical characteristic: pycnidia (conidiomata) of the anamorph species *Phomopsis* (from *Phaseolus*, *Glycine*, *Faba* and *Lupinus*) are multilocular, 1–3 ostiolate and they produce conidia of two basic types (alpha and beta). Conidiomata reach the size of 200–550 µm in diameter. A new parasitic species of *Phomopsis* with unilocular conidiomata was observed on stems of pea (*Pisum sativum* L.) in 2003.

Description and characterisation of the new species

Dying of pea plants at the green maturity stage was observed under field conditions on a leaf type of pea (cv. Adept) at the locality Šumperk-Temenice in 2003. The observed symptoms on stems and petiole insertions were longitudinal

Supported by the Ministry of Agriculture of the Czech Republic, Project No. QF 3071, and by the Ministry of Education, Youth and Sports of the Czech Republic, Project No. MSM 2678424601.

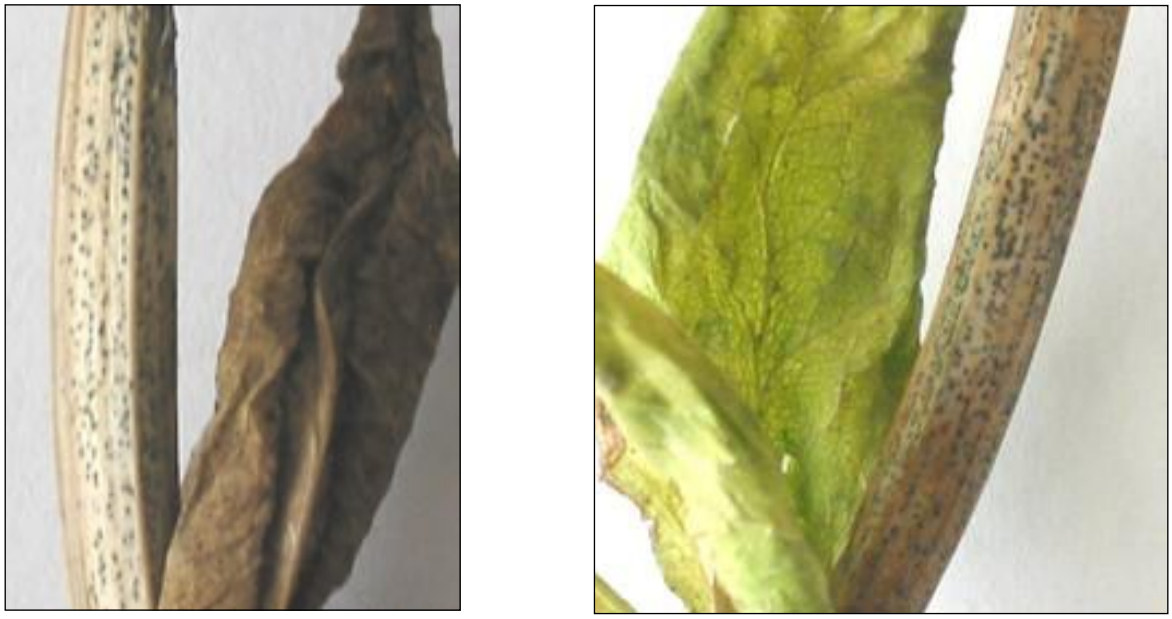

Figure 1. Conidiomata of *Phomopsis pisi* on stems of pea (*Pisum sativum* L.)

pale brown lesions (1–4 cm) with dark brown margins (Figure 1). The lesions coalesced and the main stem died. Pycnidia of the anamorph fungus *Phomopsis* (Sacc.) Sacc. (*Coelomycetes*) were found on lesions.

Conidiomata: (50) 80–160(200) × 60–130(150) µm, dark brown, immersae, separate, globose to subglobose, some times linear aggregated, unilocular, uniostiolate (Figure 2). Ostiole single, circular 8–20(26) µm.

Conidiophores: branched and septate mainly on base, filiform, hyaline, formed from the inner cells of the locular walls 6–14(20) × 1.8–2.6 µm. Conidiogenous cells enteroblastic, phialidic.

Beta conidia absent. Alpha conidia (Figure 3) straight, hyaline, aseptate, ellipsoid to fusiform, biguttulate (one guttule at each end), (7)10–16 (22) × (2)2.5–3.5(4.5) µm.

Mycelium isolated from living pea stems was cultivated on Czapek-Dox (CZD) and potato-dextrose agar (PDA). Dark brown colonies formed on which no pycnidia or perithecia were produced. On agar culture pseudoperithecial bases developed only rarely.

Living culture (No. PPI 1204) is deposited in AGRITEC Ltd. laboratory.

Pathogenicity trials were performed on stem segments *in vitro* (in Petri dishes). The stems were

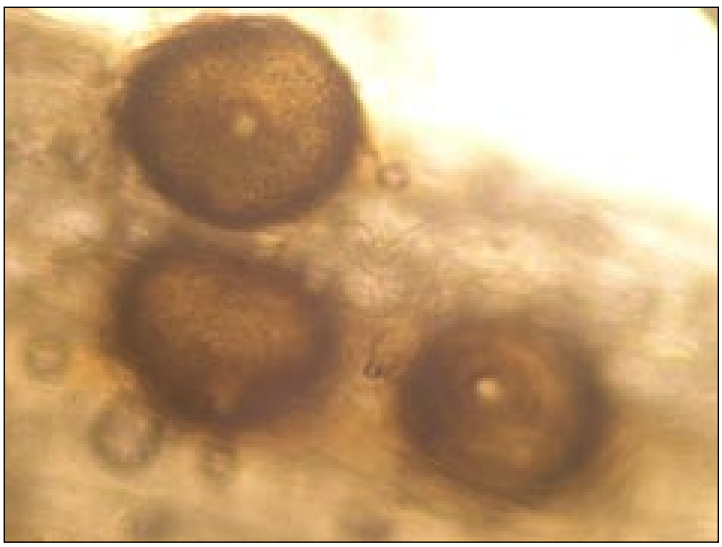

Figure 2. Conidiomata of *Phomopsis pisi*

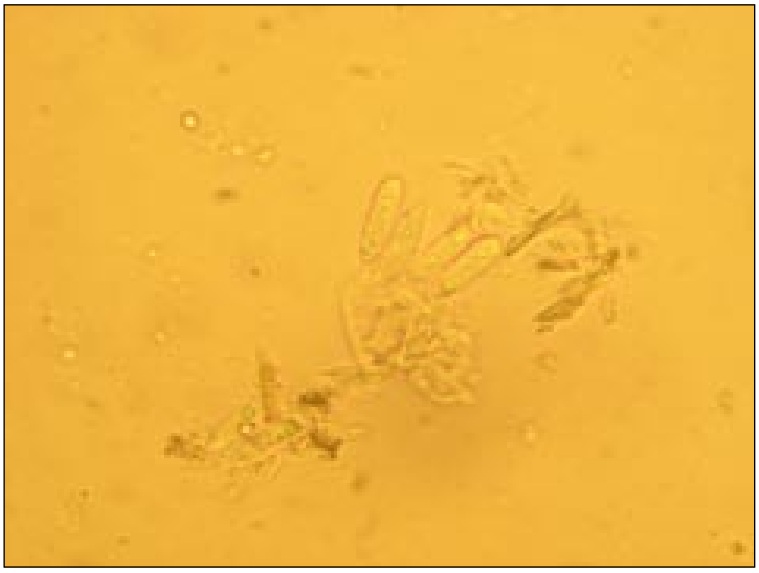

Figure 3. Alpha-conidia of *Phomopsis pisi*

wounded with a scalpel and inoculated with a 3 mm diameter CZD mycelial plug. Control stems were similarly wounded but no mycelial plugs were applied. Symptoms developed within 4 days from inoculation (lesions at 10 d age were 1–2.5 cm in diameter). The control stems were symptomless. Conidiomata of *Phomopsis pisi* develop rarely only at wounded points.

Phomopsis pisi **Ondřej** spec. *nova* (Figure 4)

Maculis elongatis vel irregularibus, griseis, obscure anguste marginalis 1–4 cm longis. Pycnidiis (Conidiomata) seriatim dispositis, immersis, partim erumpescentibus, nigrobrunneis, globosis vel subglobosis, singularis, separatis interdum aggregatis 80–160(200) × 60–130(150) µm. Uniostiolatis, ostiola fere circularia, 8–20(26) µm. Conidiophoris rectis, hyalinis 6–14(18) × 1.8–2.6 µm, interdum ramosis, cellulis conidiogenis monophialidicis, α-conidiis ellipsoideis vel fusiformibus, hyalinis, continuis, guttulatis (7)10–16(22) × (2)2.5–3.5(4.5) µm, β-conidiis absunt.

In caulibus vivis: *Pisum sativum* L. (cv. Adept), Bohemia, Moravia septentrionalis, Šumperk-Temenice, 24. VI. 2003, M. Ondřej legit. Holotypus in Herbario Musei Nat. Pragae (PRM), asservatur No. PRM 857041.

Both above mentioned *Phomopsis* anamorphs from the genus *Pisum* (*P. pisicola* and *P. pisi*) differ from hitherto described species from leguminous plants: conidiomata size is smaller (to 200 µm), they are unilocular with one ostiole and they do not produce beta-conidia.

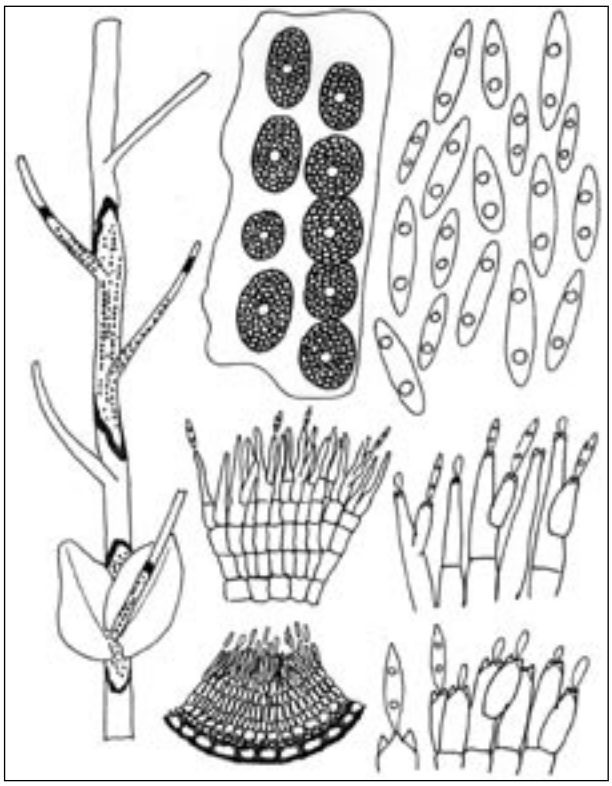

Figure 4. *Phomopsis pisi* (Ondřej *et al.* 2006) – necrotised stalk of pea; conidiomata with one ostiole; conidia and conidiophores

DISCUSSION

The conidiomata of *Phomopsis pisicola* Petrak *et* Ciferri which were originally described in 1930 on dry stems of *Pisum sativum* in the Dominican Republic (Santo Domingo, Moca, Espaillat Prov.,

leg. Petrak, V. 1929, No. 2292) were of similar size, 120–200 µm in diam. The conidiophores were 5–8(10) × 1–1.5 µm and α-conidia were 5–7.5 × 1.5–2.5 µm. They were shorter and narrower than those of the new species *Phomopsis pisi*.

The species designated as *Phomopsis pisicola* (Petrak & Ciferri 1930) was not accepted in the world literature. Its description is only in German, the Latin diagnosis is missing; the holotype and where it had been deposited are unknown. This species had not been proven to be parasitic on living plants but had been found saprophytic on dry stems of pea.

References

Athow K.L., Caldwell R.M. (1954): A comparative study of *Diaporthe* stem canker and pod and stem blight of soybean. Phytopathology, **44**: 319–325.

Fernandez F.A., Hanlin R.T. (1996): Stem cancer of soybean. Mycologia, **88**: 425.

Ford R.E., Shurtleff M.C., Sinclair J.B. (1975): Compendium of Soybean Diseases. The American Phytopathological Society, St. Paul.

Lehman S.G. (1923): Pod and stem blight of soybean. Annals of the Missouri Botanical Garden, **10**: 111–178.

Ondřej M. (1991): Nový druh *Phomopsis fabae* Ondřej. Česká Mykologie, **45**: 65–67.

Petrak F., Ciferri R. (1930): Fungi dominicani. Annals of Mycology, **28**: 407–420.

Sutton B.C. (1998): The Coelomycetes. Fungi Imperfecti with Pycnidia, Acervuli and Stromata. CMI, CAB International Publ., Wallinford.

Sweetingham M.W., Jones R.A.C., Brown A.G.P. (1998): Diseases and pests. In: Gladstones J.S., Atkins C., Hamblin J. (eds): Lupins as Crop Plants: Biology, Production and Utilization. CAB International Publ., Wallinford.

Wehmeyer L.E. (1933): The Genus *Diaporthe* Nitschke and its segregates. University of Michigan Studies Scientific Series 9: 1–349.

Wood P.McR., Sivasithamparam K. (1989): *Diaporthe woodii* (anamorph *Phomopsis leptostromiformis*) – a toxigenic fungus infecting cultivated lupins. Mycopathologia, **105**: 79–86.

Received for publication April 6, 2006
Accepted after corrections September 29, 2006

Corresponding author:

RNDr. Michal Ondřej, CSc., AGRITEC, výzkum, šlechtění a služby, s. r. o., Zemědělská 16. 787 01 Šumperk, Česká republika
tel.: + 420 583 382 133, fax: + 420 583 382 999, e-mail: odstrčilova@agritec.cz