Historia naturalis bulgarica 48 (11): 419–424
ISSN 2603-3186 (online) | ISSN 0205-3640 (print) · nmnhs.com/historia-naturalis-bulgarica
https://doi.org/10.48027/hnb.48.112
Publication date [online]: 2 November 2026

Research article

First record of *Septorioides strobi* Wyka & Broders (Septorioidaceae) in pine plantations in Bulgaria

Maria Dobreva[1], Margarita Georgieva[2, 3], Pencho Dermendzhiev[4], Rumen Nachev[5], Georgi Georgiev[3, 6]

(1) Forest Protection Station – Plovdiv, 82 Slavyanska Street, 4000 Plovdiv, Bulgaria, mr_dobreva@abv.bg
(2) [Corresponding author] Forest Research Institute, Bulgarian Academy of Sciences, 132 St Kliment Ohridski Blvd, 1756 Sofia, Bulgaria, margaritageorgiev@gmail.com; https://orcid.org/0000-0003-3165-1992
(3) Center of Competence 'AgriFood Systems and Bioeconomy', 26 Maritsa Street, 4000 Plovdiv, Bulgaria
(4) Forest Protection Station – Plovdiv, 82 Slavyanska Street, 4000 Plovdiv, Bulgaria, p.t.dermendzhiev@gmail.com
(5) Forest Protection Station – Plovdiv, 82 Slavyanska Street, 4000 Plovdiv, Bulgaria
(6) Forest Research Institute, Bulgarian Academy of Sciences, 132 St Kliment Ohridski Blvd, 1756 Sofia, Bulgaria, ggeorgiev.fri@gmail.com; https://orcid.org/0000-0001-5703-2597

Abstract: *Septorioides strobi* Wyka & Broders (Ascomycota, Botryosphaeriales, Septorioideaceae), the causal agent of Septorioides needle blight, was detected for the first time in Bulgaria and Europe in 2023. Over the past three years, the pathogen has caused significant damage of *Pinus sylvestris* L. within the State Forest Enterprises (SFEs) Ardino, Smilyan, Smolyan, Zlatograd (South-eastern Bulgaria), and of P. nigra Arn. in SFE Karlovo (South-central Bulgaria). In most plantations, *S. strobi* occurred together with other fungal pathogens, including *Lecanosticta acicola* (von Thümen) Sydow, *Diplodia sapinea* (Fries) Fuckel, *Cyclaneusma minus* (Butin) DiCosmo, Peredo & Minter, *Pestalotiopsis funerea* (Desmazières) Steyaert, and *Lophodermium* sp. The spread of the disease in pine plantations was documented from 2023 to 2025.

Keywords: Europe, first record, pine plantations, Septorioides needle blight, *Septorioides strobi*

Introduction

Recently, the genus *Septorioides* was placed in a new family, Septorioideaceae (Ascomycota, Botryosphaeriales) (Wyka & Broders, 2016), which comprises two species: *Septorioides pini-thunbergii* (Kaneko) Quaedvl. Verkley & Crousn and *Septorioides strobi* (Wyka & Broders) (Wyka & Broders, 2016). *S. pini-thunbergii*, once the only known species of the genus, occurs as a needle pathogen of *Pinus thunbergii* Parl. in Japan (Kaneko et al., 1989; Suto, 2000; Kihara et al., 2015), *P. densiflora* Siebold & Zucc. in South Korea (Zhu et al., 2018), and *P. sibirica* Du Tour in the Middle Siberia (Sheller et al., 2020).

Septorioides strobi was first identified and described in 2016 on *Pinus strobus* L. in New England, USA (Wyka & Broders, 2016). The fungal pathogen causes Septorioides needle blight on *P. strobus, P. cembra* L., P. *contorta* Douglas, *P. flexilis* James, *P. mugo* Turra, *P. nigra* Arn., *P. ponderosa* Douglas ex Lawson, *P. resinosa* Sol. ex Aiton, *P. rigida* Mill., *P. sylvestris* L., *P. thunbergii* and *Picea rubens* Sarg (Brazee, 2023). In recent decades, *P. strobus* across the Northeastern United States were infected by a disease complex called White Pine Needle Damage caused *Lecanosticta acicola* (Thümen) Sydow, *Lophophacidium dooksii* Corlett and Shoemaker, *Bifusella linearis* Peck and *S. strobi* (Munck et al., 2012; Broders et al., 2015; Laflamme et al., 2015; Wyka & Broders, 2016). At present, there is no data regarding the occurrence of species of the genus *Septorioides* in Europe.

This study reports the first record of the pathogen *S. strobi* in Bulgaria and Europe.

Received: 26 May 2026; accepted: 2 October 2026 · Editor: Stanislav Abadjiev

Table 1. Pathogens identified on the needles of *Pinus sylvestris* and *P. nigra* in the studied forest plantations.

No.	State Forest Enterprise	Forest unit	Tree species	Age, years	Altitude, m	Year of collection	Fungal pathogen, identified in needles (*most frequently detected on needles)
1	Ardino	243-i2	*P. sylvestris*	50	600	2023	*L. acicola**, *C. minus, S. strobi*
2	Ardino	252-l	*P. sylvestris*	50	700	2023–2025	*L. acicola**, *S. strobi*
3	Ardino	269-b1	*P. sylvestris*	40	750	2023	*L. acicola**, *S. strobi, C. minus*
4	Smilyan	144-i	*P. sylvestris*	55	850	2023–2024	*L. acicola**, *S. strobi, C. minus*
5	Smilyan	153-u	*P. sylvestris*	80	900	2023	*L. acicola**, *S. strobi, P. funerea*
6	Zlatograd	445-n	*P. sylvestris*	45	700	2023	*L. acicola**, *S. strobi*
7	Karlovo	147-v	*P. sylvestris*	60	450	2024	*S. strobi**
8	Karlovo	262-m	*P. nigra*	60	650	2024	*S. strobi**
9	Ardino	198-a1	*P. sylvestris*	65	600	2024–2025	*S. strobi**, *D. sapinea, C. minus, Lophodermium* sp.
10	Smilyan	43-u	*P. sylvestris*	50	900	2024	*S. strobi**, *L. acicola*
11	Smilyan	161-k	*P. sylvestris*	50	950	2024	*S. strobi**, *L. acicola*
12	Smilyan	44-t	*P. sylvestris*	60	1050	2024	*L. acicola**, *S. strobi*
13	Smolyan	150-a	*P. sylvestris*	70	900	2024–2025	*S. strobi**, *L. acicola, C. minus, Lophodermium* sp.
14	Smolyan	2072-f	*P. sylvestris*	60	850	2024	*S. strobi**, *L. acicola, D. sapinea*
15	Smolyan	2137-v	*P. sylvestris*	50	750	2024–2025	*S. strobi**, *L. acicola, D. sapinea*
16	Smolyan	3110-t	*P. sylvestris*	80	900	2024–2025	*L. acicola**, *S. strobi*
17	Zlatograd	441-k	*P. sylvestris*	65	700	2025	*S. strobi**, *Lophodermium* spp., *C. minus*
18	Zlatograd	441-p	*P. sylvestris*	55	750	2025	*S. strobi**, *C. minus, Lophodermium* sp.

Materials and methods

During the period June–October 2023–2025, samples of *P. sylvestris* and *P. nigra* trees exhibiting symptoms of needle cast disease were collected from forest plantations aged 40–80 years at 18 locations within the State Forest Enterprise (SFE) Ardino, Smilyan, Zlatograd, Karlovo, and Smolyan (Table 1).

Branches with partially or fully affected needles were transported to the Forest Protection Station in Plovdiv and the Laboratory of Phytopathology at the Forest Research Institute in Sofia. A total of 24 samples were analysed. Each sample consisted of 3 to 10 twigs ranging from 30 to 50 cm in length. Needles were surface-sterilised by immersion in 95% ethanol for 5 sec, 0.5% sodium hypochlorite for 2 min, and finally 70% ethanol for 2 min. The samples were placed in Petri dishes lined with moistened filter paper at 22–23° C under artificial light to induce fruiting bodies and spores. The fruiting bodies were observed with a stereomicroscope at 40× magnification (Zeiss Stemi 305), equipped with a Dino-Lite AM-423X digital camera for detailed imaging. The size of the conidia (100 pcs.) was measured at 125× magnification using a micrometre on an Olympus CH20 light microscope. Species identification was based on the morphological features of the conidiomata and conidia, described by Wyka & Broders (2016).

Results

In October 2023, severe needle blight was observed on *P. sylvestris* trees in the SFE Ardino, Smilyan, and Zlatograd, South-eastern Bulgaria (Fig. 1A). The

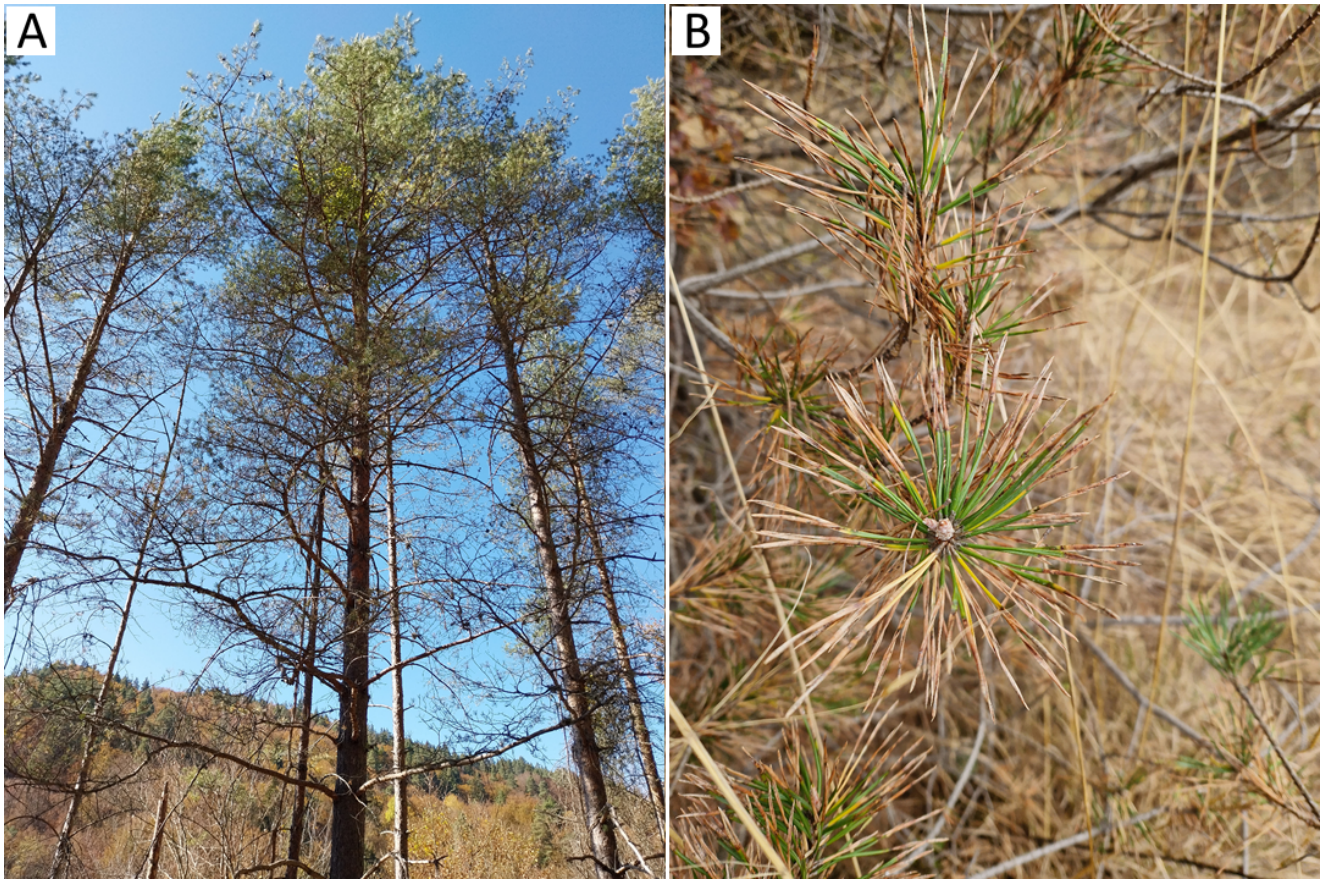


Fig. 1. Scots pine trees affected by *Septorioides strobi* and *Lecanosticta acicola* (SFE Smilyan, 23 October 2023): A – damaged trees; B – infected needles.

infection most often developed at the tips of the needles, while the bases remained green (Fig. 1B). The infected needles turned yellow-brown to brown and fell prematurely. *S. strobi* were detected on pine needles together with *L. acicola* in all studied pine plantations (Fig. 1B). In samples from SFE Ardino and Smilyan, *Cyclaneusma minus* (Butin) DiCosmo, Peredo & Minter, and *Pestalotiopsis funerea* (Desmazières) Steyaert occurred together with both pathogens (Table 1). In 2023, *L. acicola* was more frequently detected on symptomatic needles than on those of other fungal pathogens.

In June–October 2024–2025, Septorioides needle blight was detected in new forest units of SFE Ardino, Smilyan, Smolyan and Zlatograd (South-eastern Bulgaria), causing severe defoliation. In the autumn, the infected needles changed colour and dropped, leaving only the current season's needles on the trees. Over the years, *S. strobi* has shown increased development, established in association with *L. acicola, C. minus*, and *Diplodia sapinea* (Fries) Fuckel (Table 1). New sites of the disease were registered in 2024 in *P. nigra* plantations in SFE Karlovo (South-central Bulgaria).

The lower part of the infected trees was most severely damaged (Fig. 2A). Black, scattered acervuli of *S. strobi* were formed on the needles (Fig. 2B). Under laboratory conditions, fruiting bodies form within 3 to 24 days, depending on the sampling period and the average room temperature. After moistening, a whitish mass of spores was released from the top of acervuli (Fig. 2C). The isolated macroconidia were elongated, either straight or slightly curved, with slightly rounded ends and a single septum located near the centre (Fig. 2D). 39.6-55.9 (50.2) × 4.4-5.2 (4.7) µm.

Discussion

Pinus nigra and *P. sylvestris* are the main species used in forest plantations in the Eastern Rhodopes (South-

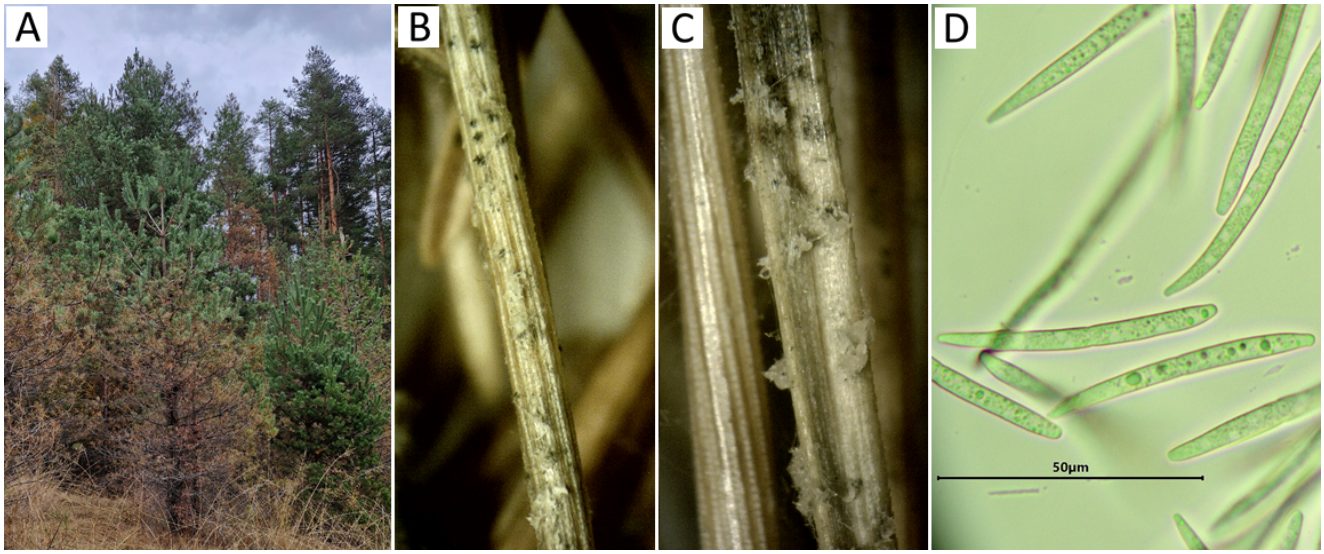


Fig. 2. *Septorioides strobi* on Scots pine needles (SFE Smilyan, 23 October 2023): A – a damaged tree; B – acervuli on a needle; C – a mass of conidia; D – macroconidia.

eastern Bulgaria) for afforestation of eroded terrain. In the last decade, these habitats have experienced increased moisture deficits, deterioration in plant physiological conditions and a decline in resistance to abiotic and biotic factors. Brown spot needle blight, caused by *Lecanosticta acicola*, was first reported in this area in 2017 on *P. sylvestris* plantations within (SFE Ardino) (Stamenova et al., 2018). Since then, the disease has been increasingly reported in *P. sylvestris* and *P. nigra* plantations in SFE Ardino, Smilyan, Kirkovo, Zlatograd and Smolyan (Georgieva, 2020; Tubby et al., 2023).

This study documents the first occurrence of *Septorioides strobi* on pine needles in Bulgaria and Europe. Most probably, *S. strobi* and *L. acicola* were introduced into South-eastern Bulgaria by infected plant material.

The morphology of the identified *S. strobi* macroconidia in our study corresponds with the description provided by Wyka & Broders (2016). According to the authors, *S. strobi* can be distinguished from *S. pini-thunbergii* based on macroconidial characteristics. Specifically, the macroconidia of *S. pini-thunbergii* measure approximately 70.0–80.0 µm in length, whereas those of *S. strobi* are nearly half as long, averaging 36.0 µm (39.6–55.9 µm in our research). Furthermore, Wyka & Broders (2016) reported that the macroconidia of *S. pini-thunbergii* typically have 3 to 6 septa, with a maximum of 10, whereas those of *S. strobi* generally have only 1 septum, rarely 2 or 3 (1 septum was observed in our research). However, the identification of the species needs to be confirmed by DNA analyses.

Silvicultural thinning in mature stands affected by *S. strobi* and *L. acicola* was carried out to reduce infection rates and defoliation severity. Additional research on the association of both fungal pathogens is required to assess their potential for spreading to new regions within the country and their capacity to damage pine stands.

Acknowledgements

This work was conducted within the framework of the project 'Threats from aggressive insect pests and fungal pathogens in green urban ecosystems in Bulgaria', Contract No. KP-06-COST/18, dated 14.12.2023, and was funded by the National Science Fund. The research was partially funded by project BG16RFPR002-1.014-0012-C01 "Establishment and sustainable development of a Center of Competence AgriFood Systems and Bioeconomy'', financed by the European Regional Development Fund through the "Program for Research, Innovation and Digitalisation for Smart Transformation'' (PRIDST).

Conflicts of interest

No potential conflict of interest has been reported by the authors, reviewers, or subject editor.

Author' contributions

(using CrediT)

Maria Dobreva: data curation, investigation, resources, visualisation, writing—original draft; Margarita Georgieva: data curation, writing—original draft; Pencho Dermendzhiev: data curation, investigation, resources; Rumen Nachev: investigation, resources; Georgi Georgiev: data curation, writing—original draft.

References

Brazee N. 2023 Septorioides needle blight. Center for Agriculture, Food, and the Environment UMass Extension Landscape, Nursery and Urban Forestry Program, University of Massachusetts Amherst. https://ag.umass.edu/landscape/fact-sheets/septorioides-needle-blight

Broders K., Munck I., Wyka S, Iriarte G., Beaudoin E. 2015 Characterization of fungal pathogens associated with white pine needle damage (WPND) in Northeastern North America. Forests 6: 4088–4104. https://doi.org/10.3390/f611408

Costanza K.L., Whitney T., McIntire C., Livingston W., Gandhi K. 2018 A synthesis of emerging health issues of eastern white pine (*Pinus strobus*) in eastern North America. Forest Ecology and Management 423: 3–17. https://doi.org/10.1016/j.foreco.2018.02.049

Georgieva M. 2020 Spread of the invasive pathogen *Lecanosticta acicola* on species of Pinus in Bulgaria. Silva Balcanica 21 (1): 83–89. https://doi.org/10.3897/silvabalcanica.21.e54610

Kaneko S., Fujioka H., Zinno Y. 1989 A new species of *Septoria* on Japanese black pine. Transactions of the Mycological Society of Japan 30: 463–466. (In Japanese)

Kihara J., Ueno M., Arase S. 2015 PCR-Mediated detection of endophytic and phytopathogenic fungi from needles of the Japanese black pine, *Pinus thunbergii*. Open Journal of Forestry 5: 431–442. https://doi.org/10.4236/ojf.2015.54037

Laflamme G., Broders K., Cote C., Munck I., Iriarte G., Innes L. 2015 Priority of *Lophophacidium* over *Canavirgella*: taxonomic status of *Lophophacidium dooksii* and *Canavirgella bandfieldii*, causal agents of a white pine needle disease. Mycologia 107: 745–753. https://doi.org/10.3852/14-096

Munck I., Burns B., Ostrofsky W., Lombard K., Weimer J. 2012 Eastern White Pine Needle Damage Survey, 2011 in Maine, New Hampshire, and Vermont. USDA Forest Service. https://extension.unh.edu/sites/default/files/migrated_unmanaged_files/Resource003566_Rep5105.pdf

Sheller M.A., Shilkina E.A., Ibe A.A., Razdorozhnaya T.Y., Sukhikh T.V. 2020 Phytopathogenic fungi in forest nurseries of Middle Siberia. iForest 13: 507–512. https://doi.org/10.3832/ifor3507-013

Stamenova S., Ivanova I., Georgieva M. 2018 A new established quarantine pest in a result of official observations during the monitoring of quarantine pests on forest species. Plant Protection: 5: 1–4. (In Bulgarian)

Suto Y. 2000 *Septoria pini-thunbergii*: A fungus produced on dead needles of *Pinus thunbergii* and *P. ponderosa*. Applied Forest Science 9: 163–164. (In Japanese)

Tubby K., Adamčikova K., Adamson K., Akiba M., Barnes I., Boroń P., Bragança H., Bulgakov T., Burgdorf N., Capretti P., Cech T., Cleary M., Davydenko K., Drenkhan R., Elvira-Recuenco M., Enderle R., Gardner J., Georgieva M., Ghelardini L., Husson C., Iturritxa E., Markovskaja S., Mesanza N., Ogris N., Oskay F., Piškur B., Queloz V., Raitelaitytė K., Raposo R., Soukainen M., Strasser L., Vahalík P., Vester M., Mullett M. 2023 The increasing threat to European forests from the invasive foliar pine pathogen, *Lecanosticta acicola*. Forest Ecology and Management 536: 120847. https://doi.org/10.1016/j.foreco.2023.120847

Wyka S.A., Broders K.D. 2016 The new family Septorioideaceae, within the Botryosphaeriales and *Septorioides strobi* as a new species associated with needle defoliation of *Pinus*

strobus in the United States. Fungal Biology 120: 1030–1040.
https://doi.org/10.1016/j.funbio.2016.04.005

Wyka S.A. Munck I.A. Brazee N.J., Broders K.D. 2018 Response of eastern white pine and associated foliar, canker and root rot pathogens to climate change. Forest Ecology and Management 423: 18–26.
https://doi.org/10.1016/j.foreco.2018.03.011

Zhu H.-Y., Tian C.-M., Fan X.-L. 2018 Studies of botryosphaerialean fungi associated with canker and dieback of tree hosts in Dongling Mountain of China. Phytotaxa 34 (2): 63–76.
https://doi.org/10.11646/phytotaxa.348.2.1