

The host spectrum of *Dothistroma* needle blight *Mycosphaerella pini* E. Rostrup – new hosts of *Dothistroma* needle blight observed in the Czech Republic

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ABSTRACT: *Dothistroma* needle blight *Mycosphaerella pini* E. Rostrup and its anamorphic stage *Dothistroma septospora* (Dorog.) Morelet was detected for the first time in the territory of the Czech Republic in a consignment of imported plants of Austrian pine *Pinus nigra* Arnold in 1999. In 2000, it was also found on *Pinus nigra* in an open planting in a plantation of Christmas trees by the village of Jedovnice near Brno in South Moravia. In the Czech Republic, *Dothistroma* needle blight was identified on 13 species of pine. *Pinus nigra* Arnold and *Pinus mugo* Turra are the most frequent hosts. In addition to these species, *Dothistroma* needle blight was observed on *Pinus ponderosa* Douglas ex Lawson, *Pinus jeffreyi* Grev. et Balf., *Pinus banksiana* Lamb., *Pinus contorta* Douglas, *Pinus rotundata* Link, *Pinus leucodermis* Ant. and *Pinus sylvestris* L. Finds on *Pinus aristata* Engelm., *Pinus rigida* Mill., *Pinus heldreichii* H. Christ. and *Pinus cembra* L. var. *sibirica* (Du Tour) G. Don. are a certain rarity. These species are not mentioned anywhere as potential hosts of *Dothistroma* needle blight. As for the species of other genera *Picea pungens* Engelm., *Picea abies* L. Karst. and last but not least *Picea schrenkiana* Fisch. & C. A. Mey were also observed as hosts. The host range of *Dothistroma* needle blight recorded in papers is noted as well.

Keywords: *Dothistroma* needle blight; *Dothistroma septospora*; *Mycosphaerella pini*; pines; quarantine pests; *Picea abies*

The causal agent of *Dothistroma* needle blight is the fungus *Mycosphaerella pini* E. Rostrup apud Munk, syn. *Scirrhia pini* Funk & Parker, *Eruptio pini* (Rostr. apud Munk) M. E. Barr, anamorph *Dothistroma septospora* (Dorog.) Morelet, *Dothistroma pini* Hulbary, *Cytosporina septospora* G. Doroguine, *Actinothyrium marginatum* Sacc., *Septoriella septosporum* (Dorog.) Sacc.

The disease was described from Europe, more exactly from Russia, as *Cytosporina septospora* Dorog in 1911 (DOROGUINE 1911). SACCARDO (1920) described the *Dothistroma* needle blight fungus found on *P. ponderosa* in Idaho as *Actinothyrium marginatum* Sacc. *Cytosporina septosporum* was later transferred to the genus *Septoriella* Oudem. as *S. septosporum* (Dorog.) Sacc. (TROTTER 1931). Later, this anamorphic stage was described as

Dothistroma pini Hulbary (HULBARY 1941). The connection between the American and European pathogen was given when GREMMEN (1968) and MORELET (1968) realized that the fungus described in Europe as *C. septosporum* was the same as *D. pini* causing *Dothistroma* needle blight in the United States. MORELET (1968) found that it referred to the same fungus and created a new combination *Dothistroma septospora* (Dorog.) Morelet. Both names are commonly used. Some papers note differences between these two anamorphs. E.g. BARNES et al. (2004) found out on the basis of phylogenetic studies that *D. septospora* and *D. pini* made up two distinct phylogenetic lineages. *Dothistroma septosporum* has a worldwide distribution and it is the causal agent of the disease that has severely damaged plantations of *P. radiata* grown as an exotic on the Southern Hemi-

sphere. In contrast, *D. pini* is an important pathogen of pines whose distribution currently appears to be restricted to the North Central United States. The species found in the Czech Republic should be classified as *Dothistroma septospora*.

A sexual stage was first described as *Scirrhia pini* Funk and Parker but subsequently it was newly included in the genus *Mycosphaerella* as *Mycosphaerella pini* E. Rostrup apud Munk. Based on the study of diversity of the genus *Mycosphaerella* BARR (1996) reclassified the teleomorph to a new genus *Eruptio* as the species *Eruptio pini* (Rostr. apud Munk) M. E. Barr. Subsequent phylogenetic analyses proved that the classification into the genus *Mycosphaerella* was much more suitable (GOODWIN et al. 2001). The anamorphic stage was divided into three varieties on the basis of differences in the length of conidia. Within *D. pini* Hulbary THYR and SHAW (1964) distinguished a variety *pini* (syn. *D. septospora* var. *septospora*) with the length of conidia 15.4–28.0 (mean 22.4) µm and *D. pini* Hulbary var. *linearis* (syn. *D. pini* var. *lineare*) with the length of conidia 23.0–42.0 (31.9) µm. IVORY (1967) distinguished another variety *D. pini* Hulbary var. *keniensis* (syn. *D. septospora* var. *keniense*) with mean lengths of conidia 13.0–47.5 (28.9) µm. EVANS (1984) stated that *D. pini* came from mixed forests of Central America and occurred on isolated mountain “islands” at altitudes above 1,500 m.

As compared with the anamorphic stage, the teleomorphic stage *Mycosphaerella pini* (syn. *Scirrhia pini*) occurs rather exceptionally. In the majority of countries with the occurrence of the anamorphic stage of *Dothistroma pini* or *D. septospora* no teleomorph was found at all. A perfect stage is mentioned from Canada, parts of the USA, Germany, Yugoslavia, Poland and Portugal (BRADSHAW 2004). The perfect stage of *M. pini* is related to *D. pini* var. *linearis*. In *D. pini* var. *pini* and *D. pini* var. *keniensis*, the perfect stage has not been described (IVORY 1967).

Virtually, more than 70 host species of *Dothistroma* needle blight are mentioned from all continents. Particularly various species of pine are hosts of the needle blight. *Dothistroma* needle blight is also reported from *Picea abies* (L.) Karst. (LANG 1987), *Picea omorika* (Pančić) Purkyně (KARADZIĆ 1994), *Picea pungens* Engelm. (JANKOVSKÝ et al. 2004), *Picea sitchensis* (Bong.) Carr. (GADGIL 1984), *Pseudotsuga menziesii* (Mirb.) Franco (DUBIN, WALPER 1967), *Larix decidua* Mill. (BASSETT 1969), etc.

Dothistroma needle blight caused by *Mycosphaerella pini* (or its anamorph *Dothistroma pini*) was first recorded in the Czech Republic on an imported *Pinus nigra*

nigra in 1999. In 2000, it was found in the open planting. Its occurrence was noticed in more than 50 localities in the territory of Moravia and Silesia and Eastern Bohemia (JANKOVSKÝ et al. 2004). At present, it is a serious problem particularly in Christmas tree plantations as well as in forest nurseries.

The aim of the paper is to evaluate the host spectrum of *Mycosphaerella pini* on the basis of distribution studies of *Dothistroma* needle blight in the Czech Republic.

MATERIAL AND METHODS

Within monitoring carried out in 2000–2004, pine needle samples were examined that were taken mainly in the territory of Southern and Central Moravia, Silesia and Eastern and Central Bohemia, individually also from other areas of the CR. Samples were taken with symptoms of damage to the needles of pines from more than 60 localities.

The presence of the pathogen was always investigated according to characteristic symptoms such as red bands, dying tips of needles or the occurrence of subepidermal sporocarps, acervuli. A precise identification was proved on the basis of microscopic analyses of conidia. Records of the study are deposited in the herbarium of the Department of Forest Protection, Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry Brno (BRNL).

RESULTS AND DISCUSSION

More than 70 host species of *Dothistroma* needle blight are mentioned in the literature. It refers particularly to species of the genus *Pinus* but also species of the genus *Picea* similarly like *Larix decidua* or *Pseudotsuga menziesii* are represented (BROWN et al. 2003).

In the Czech Republic, *Dothistroma* needle blight was identified on 13 species of pine. *Pinus nigra* Arnold and *Pinus mugo* Turra are the most frequent hosts. In addition to these species, *Dothistroma* needle blight was observed on *Pinus ponderosa* Douglas ex Lawson, *Pinus jeffreyi* Grev. et Balf., *Pinus banksiana* Lamb., *Pinus contorta* Douglas, *Pinus rotundata* Link, *Pinus leucodermis* Ant. and *Pinus sylvestris* L. Finds on *Pinus aristata* Engelm., *Pinus rigida* Mill., *Pinus heldreichii* H. Christ. and *Pinus cembra* L. var. *sibirica* (Du Tour) G. Don. are a certain rarity. These species are not mentioned anywhere as potential hosts of *Dothistroma* needle blight. As for the species of other genera *Picea pungens* Engelm. and *Picea*

abies L. Karst. also were noted as hosts. *Picea schrenkiana* Fisch. & C. A. Mey as a host of *Dothistroma* needle blight is also a certain rarity.

Dothistroma needle blight was identified in 6-year-old seedlings of Norway spruce *Picea abies* in Bavaria (LANG 1987). Thus, its detection on Norway spruce in the CR is not exceptional, however, it is not possible to expect a mass spread of the fungus. It is rather the result of a heavy infection stress than an incipient outbreak. A similar situation occurs in *Picea pungens*. Even there, the mass adaptation of *Mycosphaerella pini* to a new species does not threaten. On other conifers, *Dothistroma* needle blight has not been observed in the Czech Republic yet.

An attacked bristlecone pine *Pinus aristata* occurs in a castle park in Lednice na Moravě. It is a tree aged about 15 years. Another infected tree aged about 20 years was discovered in Adamov near Brno. *Pinus rigida* infected by *Dothistroma* needle blight was found on roughly 5-year-old trees in a Christmas tree plantation in Central Bohemia near Golčův Jeníkov. An infected *Pinus heldreichii* was noted in a private garden near Brno.

Pinus cembra var. *sibirica* was corroborated as a host in the area of the Research Institute of Forestry and Game Management in Kunovice near Uherské Hradiště. Characteristic drying of the lower part of the crown was evident. Acervuli were visible on needles. Conidia were hyaline corresponding to *Dothistroma septospora*. Characteristic red bands were not observed.

Infected *Picea pungens* (about 20 years old) was noted in the Knížecí les pheasantry near Židlochovice in the close proximity of a heavily attacked stand of *Pinus nigra*. On dried lower branches, noticeable red bands with acervuli occurred on dead needles (JANKOVSKÝ et al. 2004).

Dothistroma needle blight was also noticed on Norway spruce *Picea abies*. Three to four-year-old trees of spruce from natural seeding under the planting of *Pinus nigra* were infected in the area of Chřiby near Osvětimany in Southern Moravia. Needles of young spruce trees were dried in the whole crown and red bands as well as acervuli were noticeable on particular needles. Infected spruce trees occurred under heavily attacked *Pinus nigra* which was the source of infection. The infection was not observed on spruce trees in the vicinity of the planting. In addition to the high infection stress the infection was markedly supported by high air humidity under the stand.

Picea schrenkiana Fisch. & C. A. Mey infected with *Dothistroma* needle blight was found in the Křtiny Arboretum at the Forest Training Enterprise Křtiny by Brno. Only one young, about seven years old tree

was identified. There were typical visible symptoms such as red stripes and acervuli on infected needles in the whole crown.

Other host trees are mostly the components of amenity plantings in parks, gardens, urban green areas but also of special-purpose plantings e.g. in pheasantries, on reclaimed areas, etc.

It was not possible to prove the occurrence of ascospores in any studied sample. Fruit bodies of the perfect stage were not, however, detected. In all localities, only conidia occurred. External symptoms of the *Dothistroma* needle blight infection differ according to hosts and the symptoms are not standard. Red coloured bands on needles of some host species were not noted. A microscopic analysis is necessary.

Dothistroma needle blight is particularly a risk for a number of pines. Under conditions of the CR it applies to plantings of *Pinus nigra* creating continuous stands. In the case of *Dothistroma* needle blight attack, the infection spreads rapidly and if adequate measures are not taken, disintegration of the stand may occur. *Pinus sylvestris* can virtually be endangered only under conditions of a heavy infection stress from a neighbouring stand. As compared with the other species of pine, symptoms of the attack are little obvious and rather individual trees are infected in common plantings with *Pinus nigra*. According to GADGIL (1984), *Pinus sylvestris* is highly susceptible. According to data from Great Britain, PETERSON (1982) however reported that the attack occurred very rarely.

Other host species of pine are mainly used in amenity plantings in parks, gardens or as a part of municipal greenery. Infection probably occurs already in forest nurseries. Particularly higher air humidity in the environment of irrigated beds or glasshouses creates favourable optimum conditions for the spread of the disease. The occurrence of *M. pini* on pines *Pinus aristata*, *Pinus leucodermis*, *Pinus rigida*, *Pinus heldreichii* and *Pinus cembra* var. *sibirica* is sporadic. These species are not mentioned in the list of *Dothistroma* needle blight hosts in available literature.

The list of hosts of *Dothistroma pini* and/or *Dothistroma septospora* (taxonomy and nomenclature of Pines according to FARJON and STYLES (1997), EARLE (2005) and according to IPNI (2004); black-face – species observed as hosts also in the CR):

1. *Larix decidua* Mill. (BROWN, ROSE, WEBBER 2003)
2. *Picea abies* (L.) Karst. (BROWN, ROSE, WEBBER 2003)
3. *Picea omorika* (Pančić) Purkyně (BROWN, ROSE, WEBBER 2003)

4. *Picea pungens* Engelm. (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ 2004)
5. *Picea schrenkiana* Fisch. & C. A. Mey (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ unpubl.)
6. *Picea sitchensis* (Bong.) Carr. (BROWN, ROSE, WEBBER 2003)
7. *Pinus albicaulis* Engelm. (BROWN, ROSE, WEBBER 2003)
8. *Pinus aristata* Engelm. (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ 2004)
9. *Pinus arizonica* var. *cooperi* (Blanco) Darjin, syn. *Pinus cooperi* Blanco, *Pinus lutea* Blanco ex Martinez (BROWNE 1968)
10. *Pinus attenuata* (Lemm) × *radiata* D. Don. (BROWNE 1968), syn. (= *Pinus* × *attenuradiata* Stockwell & Righer) (BROWN, ROSE, WEBBER 2003)
11. *Pinus attenuata* Lemm. (BROWN, ROSE, WEBBER 2003)
12. *Pinus ayacahuite* Ehrenb. ex Schlecht (BROWN, ROSE, WEBBER 2003)
13. *Pinus banksiana* Lamb. (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ 2004)
14. *Pinus brutia* Ten. (KARADZIĆ 2004)
15. *Pinus bungeana* Zuccarini ex Endlicher (BROWN, ROSE, WEBBER 2003)
16. *Pinus canariensis* C. Smith (BROWN, ROSE, WEBBER 2003)
17. *Pinus caribaea* Morelet (BROWN, ROSE, WEBBER 2003)
18. *Pinus cembra* L. var. *sibirica* (Du Tour) G. Don (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ 2004)
19. *Pinus cembroides* Zuccarini (BROWN, ROSE, WEBBER 2003)
20. *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg. (KARADZIĆ 2004)
21. *Pinus contorta* Douglas ex Loudon × *banksiana* (Lambert) (BROWN, ROSE, WEBBER 2003)
22. *Pinus contorta* Douglas ex Loudon (BROWN, ROSE, WEBBER 2003)
23. *Pinus contorta* subsp. *latifolia* (Engelm.) Critchfield (BROWN, ROSE, WEBBER 2003)
24. *Pinus coulteri* D. Don (BROWN, ROSE, WEBBER 2003)
25. *Pinus cubensis* Griseb. (KARADZIĆ 2004)
26. *Pinus densiflora* Siebold and Zuccarini (BROWN, ROSE, WEBBER 2003)
27. *Pinus devoniana* Lindl. (BROWN, ROSE, WEBBER 2003), syn. *P. michoacana* Martin. (KARADZIĆ 2004)
28. *Pinus echinata* Miller (BROWN, ROSE, WEBBER 2003)
29. *Pinus echinata* Miller × *taeda* L. (BROWN, ROSE, WEBBER 2003)
30. *Pinus elliottii* Engelm. (BROWNE 1968)
31. *Pinus elliottii* var. *densa* Little and Dorman (BROWN, ROSE, WEBBER 2003)
32. *Pinus engelmannii* Carr. (KARADZIĆ 2004)
33. *Pinus flexilis* E. James (BROWN, ROSE, WEBBER 2003)
34. *Pinus halepensis* Miller (BROWN, ROSE, WEBBER 2003)
35. *Pinus hartwegii* Lindley (BULMAN et al. 2004), syn. *Pinus montezumae* Lambert var. *hartwegii* (Lindl.) Shaw (BROWNE 1968), syn. *Pinus montezumae* Lambert var. *rudis* (Endl.) Shaw (BROWNE 1968), syn. *Pinus rudis* Endl. (BROWN, ROSE, WEBBER 2003)
36. *Pinus heldreichii* H. Christ (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ unpubl.)
37. *Pinus heldreichii* H. Christ var. *leucodermis* (Antoine) Markgraf ex Fitschen, syn. *Pinus leucodermis* Ant. (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ 2004)
38. *Pinus jeffreyi* Grev. et Balf (BROWN, ROSE, WEBBER 2003)
39. *Pinus kesiya* Royle ex Gordon (= *Pinus insularis* Endl., *Pinus khasya* Royle) (BROWN, ROSE, WEBBER 2003), syn. *Pinus insularis* Endl. (KARADZIĆ 2004)
40. *Pinus lambertiana* Douglas (BROWN, ROSE, WEBBER 2003)
41. *Pinus massoniana* Lambert (BROWN, ROSE, WEBBER 2003)
42. *Pinus maximinoi* H. E. Moore (= *Pinus tenuifolia* Benth.) (BROWNE 1968)
43. *Pinus merkusii* Jungh. and de Vriese (BROWN, ROSE, WEBBER 2003)
44. *Pinus montezumae* Lambert (BROWN, ROSE, WEBBER 2003)
45. *Pinus monticola* Douglas ex D. Don (BROWN, ROSE, WEBBER 2003)
46. *Pinus mugo* Turra (BROWN, ROSE, WEBBER 2003)
47. *Pinus mugo* Turra var. *mughus* (Scopoli) Zenaria (BROWN, ROSE, WEBBER 2003)
48. *Pinus muricata* D. Don (BROWN, ROSE, WEBBER 2003)
49. *Pinus nigra* Arnold (BROWN, ROSE, WEBBER 2003)
50. *Pinus nigra* Arnold subsp. *salzmannii* (Dunal) Franco var. *corsicana* (Loudon) Hylander; syn. *Pinus nigra* Arnold var. *laricio* (Poiret) Maire, *Pinus nigra* Arnold var. *maritima* (Aiton.) Melville., *P. nigra* Arnold ssp. *laricio* (Poiret) Maire, *P. laricio* Poiret (BROWN, ROSE, WEBBER 2003)
51. *Pinus occidentalis* Swartz (BROWN, ROSE, WEBBER 2003)

52. *Pinus oocarpa* Schiede ex Schlechtendahl (BROWN, ROSE, WEBBER 2003)
53. *Pinus palustris* Miller (BROWN, ROSE, WEBBER 2003)
54. *Pinus patula* Schiede ex Schlechtendahl & Chamisso (BROWN, ROSE, WEBBER 2003)
55. *Pinus pinaster* Aiton (BROWN, ROSE, WEBBER 2003)
56. *Pinus pinea* L. (BROWN, ROSE, WEBBER 2003)
57. ***Pinus ponderosa* Douglas ex Lawson** (BROWN, ROSE, WEBBER 2003)
58. *Pinus pseudostrobus* Lindley (BROWN, ROSE, WEBBER 2003)
59. *Pinus pungens* Lambert (BROWN, ROSE, WEBBER 2003)
60. *Pinus radiata* D. Don (BROWN, ROSE, WEBBER 2003)
61. *Pinus radiata* D. Don var. *binata* Eng. (BROWN, ROSE, WEBBER 2003), syn. *Pinus muricata* D. Don var. *cedrosensis* Howell, *P. radiata* D. Don var. *cedrosensis* (Howell) Silba (BROWN, ROSE, WEBBER 2003)
62. *Pinus resinosa* Aiton (BROWN, ROSE, WEBBER 2003)
63. ***Pinus rigida* Miller** (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ unpubl.)
64. ***Pinus rotundata* Link = *Pinus mugo* notho-subsp. *rotundata* (Link) Janchen & Neumayer** (JANKOVSKÝ, BEDNÁŘOVÁ, PALOVČÍKOVÁ unpubl.)
65. *Pinus roxburghii* Sargent (BROWN, ROSE, WEBBER 2003)
66. *Pinus sabiniana* Douglas ex D. Don (BROWN, ROSE, WEBBER 2003)
67. *Pinus serotina* Michaux (BROWN, ROSE, WEBBER 2003)
68. *Pinus strobiformis* Engelmann (BROWN, ROSE, WEBBER 2003)
69. *Pinus strobus* L. var. *chiapensis* Martinez (BROWN, ROSE, WEBBER 2003)
70. *Pinus strobus* L. (BROWN, ROSE, WEBBER 2003)
71. ***Pinus sylvestris* L.** (BROWN, ROSE, WEBBER 2003)
72. *Pinus tabuliformis* Hort. ex Carrière (KARADZIĆ 2004)
73. *Pinus taeda* L. (BROWN, ROSE, WEBBER 2003)
74. *Pinus tecunumanii* Eguiluz and J.P. Perry (BROWN, ROSE, WEBBER 2003)
75. *Pinus thunbergii* Parlatores, syn. *Pinus thunbergiana* Franco (BROWN, ROSE, WEBBER 2003)
76. *Pinus torreyana* Parry ex Carrière (BROWN, ROSE, WEBBER 2003)
77. *Pinus wallichiana* A. B. Jackson (BROWN, ROSE, WEBBER 2003)
78. *Pseudotsuga menziesii* (Mirb.) Franco (BROWN, ROSE, WEBBER 2003).

CONCLUSION

Dothistroma needle blight caused by *Mycosphaerella pini* and/or mostly by its anamorphic stage *Dothistroma septospora* is one of the most important harmful organisms making problems in decorative nursery practice and forestry. In the Czech Republic, the spectrum of hosts includes *Pinus aristata*, *Pinus banksiana*, *Pinus cembra* var. *sibirica*, *Pinus contorta*, *Pinus heldreichii*, *Pinus jeffreyi*, *Pinus leucodermis*, *Pinus mugo*, *Pinus nigra*, *Pinus ponderosa*, *Pinus rigida*, *Pinus rotundata*, *Pinus sylvestris*, *Picea abies*, *Picea pungens* and *Picea schrenkiana*. The needle blight is dangerous mainly for *Pinus nigra* particularly in Christmas tree plantations and in nurseries. However, problems were also observed in open plantings. *Pinus mugo* and three-needle pines *Pinus jeffreyi* and *Pinus ponderosa* are also ranked among sensitive species.

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Hostitelské spektrum červené sypavky borovic *Mycosphaerella pini* E. Rostrup – noví hostitelé červené sypavky v České republice

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ABSTRAKT: Červená sypavka borovic *Mycosphaerella pini* E. Rostrup, resp. anamorfní stadium *Dothiostroma septospora* (Dorog.) Morelet, byla na území České republiky poprvé zaznamenána v roce 1999 v zásilce importovaných sazenic borovice černé *Pinus nigra* Arnold. V roce 2000 byla nalezena rovněž na borovici černé *Pinus nigra* ve volné výsadbě na plantáži vánočních stromků poblíž obce Jedovnice. Červená sypavka byla v ČR zjištěna na 13 druzích borovic. Nejčastějším hostitelem je *Pinus nigra* Arnold a *Pinus mugo* Turra. Mimo tyto druhy byla červená sypavka zaznamenána na *Pinus ponderosa* Douglas ex Lawson, *Pinus jeffreyi* Grev. et Balf, *Pinus banksiana* Lamb., *Pinus contorta* Douglas, *Pinus rotundata* Link, *Pinus leucodermis* Ant. a *Pinus sylvestris* L. Určitou zvláštností je nález na *Pinus aristata* Engelm., *Pinus rigida* Mill., *Pinus heldreichii* H. Christ. a *Pinus cembra* L. var. *sibirica* (Du Tour) G. Don. Tyto druhy nejsou nikde uváděny jako případní hostitelé červené sypavky borovic. Z druhů mimo borovic byli jako hostitelé zaznamenáni *Picea pungens* Engelm., *Picea abies* L. Karst. a zcela ojedinělý je nález na *Picea schrenkiana* Fisch. & C. A. Mey.

Klíčová slova: červená sypavka borovic; *Dothiostroma septospora*; *Mycosphaerella pini*; borovice; karanténní škůdci; *Picea abies*

Původcem červené sypavky borovic je vřeckovýtrusá houba *Mycosphaerella pini* E. Rostrup apud Munk, syn. *Scirrhia pini* Funk & Parker, *Eruptio pini* (Rostr. apud Munk) M. E. Barr, anamorfa *Dothistroma septospora* (Dorog.) Morelet, syn. *Dothistroma pini* Hulbary, *Cytosporina septospora* G. Doroguine. Červená sypavka byla v ČR zjištěna na 13 druzích borovic. Nejčastějším hostitelem je *Pinus nigra* Arnold a *Pinus mugo* Turra. Kromě těchto druhů byla červená sypavka zaznamenána na *Pinus ponderosa* Douglas ex Lawson, *Pinus jeffreyi* Grev. et Balf, *Pinus banksiana* Lamb., *Pinus contorta* Douglas, *Pinus rotundata* Link, *Pinus leucodermis* Ant. a *Pinus sylvestris* L. Určitou zvláštností je nález na *Pinus aristata* Engelm., *Pinus rigida* Mill., *Pinus heldreichii* H. Christ. a *Pinus cembra* L. var. *sibirica* (Du Tour) G. Don. Tyto druhy nejsou nikde uváděny jako případní hostitelé červené sypavky borovic. Z druhů kromě borovic byli jako hostitelé zaznamenáni *Picea pungens* Engelm., *Picea abies* L. Karst. a v neposlední řadě i *Picea schrenkiana* Fisch. & C. A. Mey.

Napadená borovice osinatá *Pinus aristata* se nachází v zámeckém parku v Lednici na Moravě. Jedná se o jedince ve věku asi 15 let. Další infikovaný strom byl zaznamenán v Adamově u Brna, jeho věk byl 20 let.

Pinus rigida infikovaná červenou sypavkou byla zjištěna na plantáži vánočních stromků u Golčova Jeníkova na zhruba pětiletých stromcích. Infikovaná *Pinus heldreichii* byla zaznamenána v soukromé zahradě u Brna.

Pinus cembra var. *sibirica* byla jako hostitel potvrzena v areálu Výzkumného ústavu lesního hospodářství a myslivosti v Kunovicích u Uherského Hradiště. Zřejmé bylo charakteristické prosychání spodní části koruny. Na jehlicích byly viditelné plodnice acervuli. Konidie byly hyalinní a odpovídaly druhu *Dothistroma septospora*. Charakteristické červené proužky nebyly pozorovány.

Infikovaný smrk pichlavý *Picea pungens* (asi 20 let) byl zaznamenán v bažantnici Knížecí les u Židlo-

chovic v těsné blízkosti silně napadeného porostu borovice černé *Pinus nigra*. Na proschlých spodních větvích byly na odumřelém jehličí zřetelné červené proužky, ve kterých se nacházely acervuli (JANKOVSKÝ et al. 2004).

Picea schrenkiana Fisch. & C. A. Mey, napadený červenou sypavkou borovic, byl objeven v arboretu Křtiny. Jednalo se pouze o jeden přibližně sedmiletý stromek. Byly nalezeny typické symptomy, jako jsou výrazné červené proužky a acervuli na jehlicích v celé koruně.

Červená sypavka borovic byla v České republice rovněž zaznamenána na smrku ztepilém *Picea abies*. Infikovány byly tříleté až čtyřleté stromky smrku nalétnuté pod výsadbu *Pinus nigra* v oblasti Chřibů u obce Osvětimany. Jehličí mladých smrků bylo proschlé v celé koruně, na jednotlivých jehlicích byly zřetelné červené pruhy a rovněž acervuli. Nápadné bylo zrezivění celého předposledního ročníku jehlic. Infikované smrky se nacházely pod silně napadenými borovicemi černými *Pinus nigra*, které jsou zdrojem infekce. Na smrcích v okolí výsadby nebyla infekce pozorována. Vedle vysokého infekčního tlaku se na infekci výraznou měrou podílela i vysoká vzdušná vlhkost pod porostem.

Ostatní hostitelské dřeviny jsou většinou součástí okrasných výsadeb v parcích, zahradách, městské zeleni, ale jedná se i o účelové výsadby např. v bažantnicích, na rekultivovaných plochách apod. Červená sypavka borovic způsobovaná houbou *Mycosphaerella pini*, resp. jejím anamorfním stadiem *Dothistroma septospora* je jedním z nejdůležitějších škodlivých organismů působících problémy v okrasném školkařství a lesnictví. Nebezpečím je tato sypavka hlavně pro borovici černou *Pinus nigra* zvláště na plantážích vánočních stromků a ve školkách. Zaznamenány byly problémy i ve volných výsadbách. Citlivými druhy jsou rovněž *Pinus mugo* a tříjehličkové borovice *Pinus jeffreyi* a *Pinus ponderosa*.

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