

Review

Mycobiota on *Robinia pseudoacacia* in East-Central Europe: Diversity, Ecological Roles, and Potential Links to Climate Change

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Abstract

The long history and widespread occurrence of *Robinia pseudoacacia* L. in Europe are increasingly associated with numerous fungal species, including pathogens. Based on literature review data from East-Central Europe (Belarus, Lithuania, Poland, western Ukraine, and northern Germany), 137 fungal taxa were identified on this tree species, including 50 Ascomycota and 87 Basidiomycota. Bearing in mind the varied history of mycological research in the analysed countries, the highest number of taxa was recorded in Poland (108), followed by northern Germany (34) and western Ukraine (24), while Belarus (6) and Lithuania (4) provided the fewest records. Saprotrophic fungi dominated (57%), whereas obligate and facultative parasites accounted for 43%. Among the identified fungi, 71 species caused white rot, and three caused brown rot. The most represented genera were *Coprinellus*, *Crepidotus*, and *Fusarium*. The results of the literature review indicate that *R. pseudoacacia* serves as an important host and substrate for many fungal species. We hypothesise that this may be influenced, among others, by increased trade, changes in land use, climate change (shifts in the distribution of the tree and individual fungi) and the native fungi's ability to colonise a new host. In the context of further climate change and the increasing importance of this invasive tree in Europe, fungal pathogens may significantly affect the sustainability of its stands. The greatest threats include root pathogens of the genus *Armillaria*, wood-decaying fungi such as *Fomitiporia robusta* and *Laetiporus sulphureus*, powdery mildews (*Erysiphe* spp.), and fungi of the genus *Fusarium*. On the other hand, *R. pseudoacacia* may have a positive impact on biodiversity in the environment, providing a habitat or substrate for at least 30 threatened fungal species.

Keywords: alien tree species; fungal pathogens; wood decay; forest health; saprotrophic fungi; threatened fungi

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1. Introduction

Native to North America, *Robinia pseudoacacia* L. (black locust) was introduced to Europe as early as the 17th century [1]; however, the history of its emergence in individual countries varies considerably. In Germany, the first record dates to 1672, and the first afforestation occurred in 1787 [1]. In Poland (Wielkopolska Region), the species has been known since the second half of the 18th century [2] and was more widely introduced in the 19th century [3]. In Polish forests, the cultivation of *R. pseudoacacia* was promoted at the beginning of the 20th century [4]. In Lithuania, black locust was introduced in the 18th century and was planted as a forest in 1954 and 1958 [5]. In Ukraine, *R. pseudoacacia* was first used at the end of the 18th century [6], and in the 20th century, it was widely used in afforestation schemes, e.g., within the Northern Steppe [7]. In Belarus, this tree species was not planted until the 1940s, after which it began to spread into natural forests [8].

In many countries, black locust was initially planted as an ornamental in parks, gardens, and shelter belts along roads and railway lines [1,8,9]. Some black locust trees are even protected as natural monuments; for example, 426 such trees have been designated in Poland [10], fewer than 10 have been designated in Ukraine [11], but none have been designated in Lithuania [12]. Over time, its production capacity also came to be recognised [7]. The wood of *R. pseudoacacia* is highly valued for its durability, resistance to biotic factors, and calorific value [1,13–15]. Due to its high tolerance of climatic conditions less favourable to many tree species (higher temperatures, reduced rainfall), *R. pseudoacacia* was (is) propagated to stabilise sandy soils against erosion [7,16] and in afforestation of poor-quality land [17–19]. *R. pseudoacacia* was also considered for the purpose of limiting the development of the root-rot tree pathogen *Heterobasidion annosum* (Fr.) Bref. [20,21]. Additionally, black locust is known for high honey productivity [22].

On the other hand, allelopathic substances present in the bark and roots of black locust, and the resulting inhibition of the growth of many plants [23], have caused this species to become expansive and adversely affect biodiversity and the functioning and sustainability of forest ecosystems [6,24–27]. A particularly significant loss to the natural environment is the spread of *R. pseudoacacia* into valuable, protected areas, including national parks, landscape parks [28,29] and nature reserves [6,30]. *R. pseudoacacia* has become invasive in many regions of the world, including the Central European Lowlands—from Germany to Belarus and Ukraine [5,30–33]. Even the Carpathian and Sudety Mountains did not form a barrier to the spread of this species, similar to other tree species, to the north-east [34,35]. Predicted strategies for the migration of woody plant species under advancing climate change, increasing carbon dioxide concentrations and air temperatures, and decreasing water availability also account for the northward expansion of *Robinia*'s range in Europe [36,37].

R. pseudoacacia is among the more than “100 worst” alien species in Europe [38], with the highest invasiveness class, e.g., in Poland [31]. Here, it covers 273,000 hectares within the State Forests National Forest Holding, which accounts for approximately 0.1% of the area occupied by dominant species [39–41]. In Ukraine, the area of forests with black locust admixture exceeded 422,000 hectares in 2018 (4.4% of the forested area) [42], and at present, this species colonises forest areas destroyed by ongoing warfare [43]. In Germany, this species is recorded on at least 34,000 hectares [1]. In Belarus and Lithuania, this species is more commonly found in the cultural landscape and is present only to a limited extent in forests—for example, in Lithuania, it is about 50 ha [5,8,44]. Due to the invasive nature of *R. pseudoacacia*, approaches to its cultivation, selection, and seed production in European forestry vary widely, ranging from harvesting valuable timber to controlling its spread. A similar situation exists in Central and Eastern European countries, where the species' seed base comprises seed-tree stands, seed orchards and parents of family [1,6,45–50]. However, in Poland, for example, the black locust seed bank currently serves only as

a source of material for establishing fast-growing tree plantations (on non-forest land), rather than for expanding its range or occurrence within forests [51].

Despite the above-mentioned negative aspects of its presence in Europe, *R. pseudoacacia* attracts attention in discussions about global warming as a relatively drought-resistant species. Trees affected by drought, especially due to climate change, are predisposed to biotic stress, resulting from weakened defences and the loss of mycorrhizae, making them more susceptible to pathogen attack [52–54]. It should be noted that the occurrence of some diseases, e.g., root infections caused by *Armillaria*, will probably increase with rising temperatures and decreasing precipitation [55–57]. Weakened trees become hosts to certain species of *Armillaria* fungi, which act as opportunistic pathogens or exacerbate existing disease [57,58]. Trees that are more resistant to drought and high temperatures are more likely to avoid this scenario.

At the same time, as a nitrogen-fixing species, black locust increases nitrogen levels in wood, which may explain the susceptibility of wood to infection by many species of parasitic and saprotrophic fungi and the progressive decomposition of woody tissues [59–63]. Hepting [64] and Huntley [13] report that, in countries where *Robinia* occurs naturally, it is heavily attacked by insects and pathogens, including those that cause wood decay. The widespread growth of this species is increasingly showing the presence of disease agents, even outside its natural range [15,23,65–68]. Alien plant hosts play an important role as vectors of dangerous pathogens affecting the sustainable development of the native environment. However, knowledge of pathogens of many host species remains limited [69,70]. Few studies have examined the occurrence of fungi associated with *R. pseudoacacia* in Europe, including the East-Central European region (e.g., [62,63,71–74]). A few publications present comprehensive lists of fungi found on black locust trees; consequently, a lack of such knowledge may adversely affect the ability to manage forests containing *Robinia* effectively and sustainably.

This study aims to address this gap by compiling a list of fungi reported in the literature on *R. pseudoacacia* in Poland and neighbouring countries, along with their general characteristics. This study's overall goal is to determine the species composition and ecological characteristics of fungi recorded on *R. pseudoacacia* in East-Central Europe, based on literature data, with particular emphasis on their phytopathological significance, trophic groups, wood-decay types, and conservation status. Based on the information gathered, we are also formulating hypotheses about the potential relationship between observed fungal species richness/diversity and climate change. Our work could improve the management of *R. pseudoacacia* in managed and urban forests, as well as other green spaces, by enhancing the understanding of the fungal risks and benefits associated with this tree species.

2. Materials and Methods

In this paper, the analysis covers the area called East-Central Europe, which geographically includes the eastern part of the Central European Plain (northern, lowland part of Germany and the entire area of Poland) and the western part of the East European Plain (Lithuania, Belarus, and the western part of Ukraine). In the lowland part of Germany, the following federal states or parts thereof were considered: Mecklenburg-Western Pomerania, Schleswig-Holstein, Hamburg, Bremen, Lower Saxony, Brandenburg, Berlin, Saxony-Anhalt, and North Rhine-Westphalia. In Ukraine, divided into 25 oblasts, data from 10 western oblasts (Volyn, Rivne, Zhytomyr, Lviv, Ternopil, Khmelnytskyi, Vinnytsia, Zakarpattia, Ivano-Frankivsk, Chernivtsi) were analysed (Figure 1). The designated areas were selected based on their lowland location, similar latitude, and comparable climatic and habitat conditions.



Figure 1. The area covered by the analysis (shown in green) on a map of Europe. Solid lines indicate national borders, whilst dotted lines indicate the boundaries of parts of countries.

This review focuses only on tree-dwelling fungi recorded on *Robinia pseudoacacia*. This means that mycorrhizal fungi and terrestrial saprotrophs associated with black locust are not taken into account.

The literature query was conducted on 4 February 2026 and focused on the Scopus [75] and Web of Science [76] databases, selected for their broad coverage of ecological and environmental sciences. The query carried out separately for each country or part of a country and without a specific time frame contained narrow combinations of words: tree species (*Robinia pseudoacacia* or black locust), AND fungi (fungus or fungi), AND area analysed (Belarus or Lithuania or Poland or (Northern) Germany/name of federal state or (Western) Ukraine/name of oblast). After rejecting the duplicates, the word combination used yielded very few publications, from 0 for Belarus, 1 for Lithuania, 2 for all Ukraine (from which 0 related to its western oblasts), 12 for Poland, to 25 for all Germany, from which 13 related to the federal states under study. After verification of the title, abstract and, in cases of doubt, of the publications' content in terms of tree-dwelling fungi on *Robinia pseudoacacia* in the considered area, the number of publications containing valuable information in individual countries was: Belarus—0, Lithuania—0, Poland—2, Northern Germany—2, and Western Ukraine—0.

Therefore, the authors expanded their range of information sources. Firstly, Google Scholar was searched on 8 February 2026. We used keyword combinations mycobiota “*Robinia pseudoacacia*” Europe (261 results) and checklist grzyby “*Robinia*

pseudoacacia" (198 results), without a specific time frame. The authors speak Polish, English, French, German and Russian; for Ukrainian or Belarusian texts, they used an online translation tool. After rejecting the duplicates, all searched publications were screened in the same way as in the first search to obtain more information. The publications listing the fungal species found on *R. pseudoacacia* in the study area were crucial to the results. In our article, we used 17 results from the Google Scholar search.

Secondly, some articles from the first and second reviews were used to locate supplementary literature via the snowballing method (using the same criteria). Thirdly, the authors drew on additional published articles and monographs familiar to them through their professional experience, as well as on sources of information recommended by academics from Poland, Germany, Ukraine and Belarus. All additional references (not included in the initial search) were independently verified for species identification reliability by at least two authors to ensure reproducibility. From our results, we excluded fungal species reported from *R. pseudoacacia* in studies where other authors subsequently questioned the correctness of their identification and if subsequent literature had either excluded their occurrence on *Robinia* or indicated that there was insufficient evidence to confirm the original identification (e.g., when the identification was based solely on a photograph of the sporocarps).

The list of fungi recorded on black locust in Poland was compiled from critical lists of Polish fungi [77–79] and from mycological studies of both synanthropic and natural areas. A similar set of sources was used to compile a list of fungi recorded in Germany; however, in this case, the critical list covered only the north-eastern part of the country, within the borders of the former German Democratic Republic [80]. The aforementioned critical lists (checklists) of fungal species contain data from a review of the literature published up to the date of their edition, with references to those publications. No equivalent critical lists of fungi that specify their hosts are available for the other countries in the study area, with the exception of Ukraine [81], where, however, the records of aphyllophoroid fungi on *Robinia* were from outside our study region. References containing data for the remaining countries are provided in Appendix A, where different types of information sources—databases, checklists (critical lists) of fungi and scientific publications—are colour-coded.

All fungal names were checked and follow the Index Fungorum database [82]. However, in some cases in Appendix A, synonymic names have been added in brackets alongside the current name of the fungi. The authors considered that readers might be more familiar with these names than the current name listed in the Index Fungorum database. The trophic group was assigned based on the literature cited in the work and on the literature used to determine the type of wood decay. We listed the ecological preferences (trophic groups, p/s or s/p) in the order they are reported in the cited sources, prioritising the options most frequently mentioned. The type of wood decay was indicated according to (in chronological order): Domański [83–87], Domański et al. [88], Ryvarden & Gilbertson [89,90], Worrall et al. [91], Schwarze et al. [92], Schmidt [93], Ryvarden & Melo [94], Bernicchia & Gorjón [95], and Rivoire [96].

Analysing the conservation status of fungal species found on *R. pseudoacacia*, only the categories EX (extinct), CR (critically endangered), EN (endangered) and VU (vulnerable) [97] or equivalent categories used in certain countries of the region (Germany: 0–3 and R; Poland: E, V, R; Belarus: I, II, III; Ukraine: Znikli, Znikaûči, Vrazlivì, Ridkìsnì) were considered.

When hypothesising the potential relationship between observed fungal species richness and diversity and climate change, attention was drawn to the nature and direction of climate change in the region under study, the mechanism of spread of the black locust (including barriers) and fungi, the relationship between trees and fungi, as well as other

factors that may have influenced the results obtained. To this end, we used some of the publications previously identified for compiling the species list, supplemented with new ones found online using thematic search terms (e.g., climate change in Poland).

3. Results

3.1. Species Diversity

In the analysed area, 137 fungal taxa were recorded on *R. pseudoacacia*, of which 135 were at species rank (Appendix A). Of these, 50 taxa, including 48 at species rank, belonged to the Ascomycota phylum, and 87 belonged to the Basidiomycota phylum. The highest number of taxa was recorded in Poland (108). The next-highest numbers of taxa were recorded in northern Germany (34) and western Ukraine (24 species). The fewest taxa were recorded in Lithuania (4) and Belarus (6) (Figure 2).

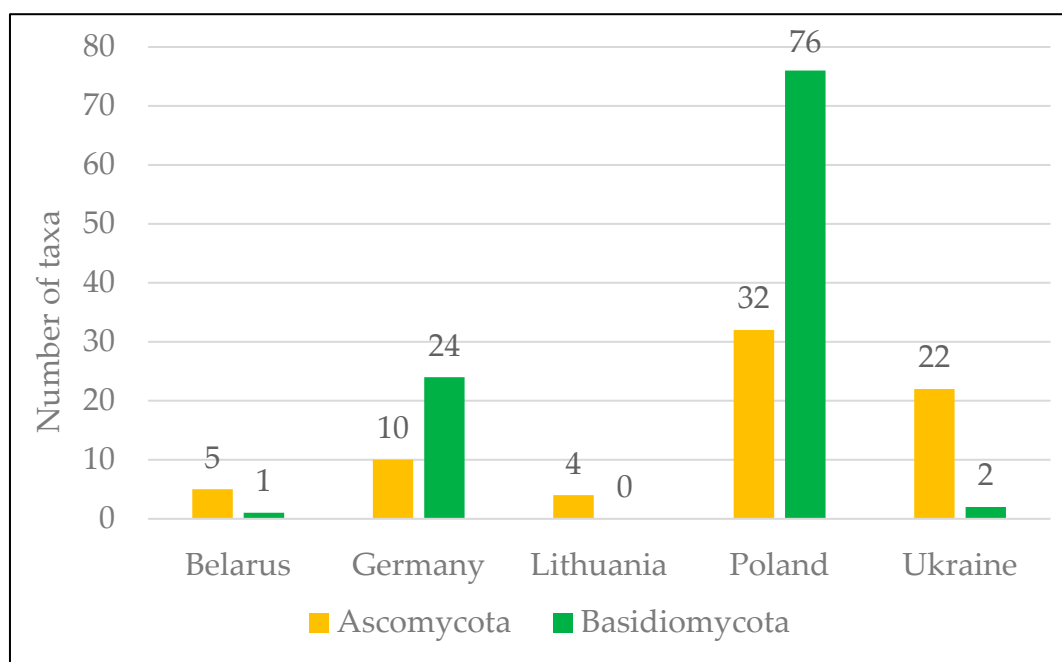


Figure 2. The number of fungal taxa belonging to the Ascomycota and Basidiomycota phyla recorded on *Robinia pseudoacacia* in individual countries.

The most species-rich genera are: *Coprinellus* (6), *Crepidotus* (5), *Fusarium* (5), *Armillaria* (4), *Erysiphe* (4), *Mycena* (4) and *Pluteus* (3). One species (*Diaporthe oncostoma*—Figure 3) was common across all the countries analysed, and two species were recorded in four countries: *Phloeospora robiniae* in Poland, Belarus, Lithuania, and Ukraine; and *Erysiphe trifolii* in Poland, Lithuania, Germany, and Ukraine.



Figure 3. Conidiomata of *Diaporthe oncostoma* (Duby) Fuckel on a dead twig of *Robinia pseudoacacia* (photo A. Szczepkowski). The red arrow points to one of them.

3.2. Trophic Groups

The dominant trophic group, comprising 78 taxa (57%), consists of saprotrophic species, while the remaining group (59–43%) includes obligate and facultative parasites (Figures 4 and 5, Appendix A).

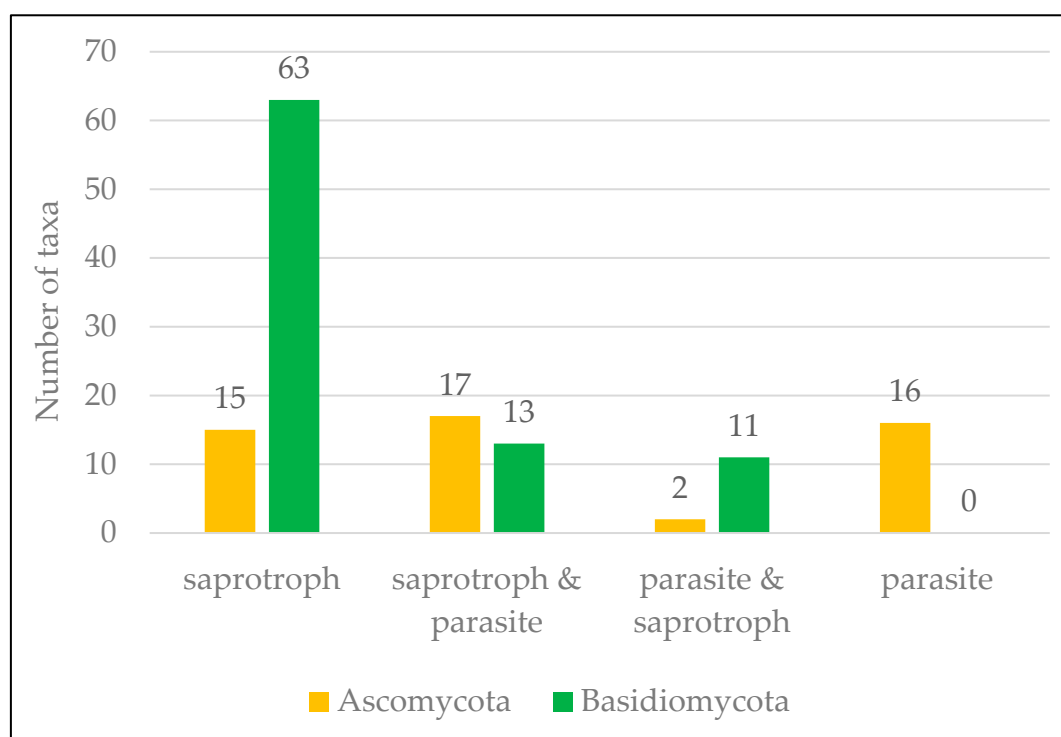


Figure 4. The number of fungal taxa recorded on *Robinia pseudoacacia* in East-Central Europe by trophic groups.

Ten species (e.g., *Erysiphe* spp., *Phloeospora robiniae*, *Phyllosticta advena*) were leaf parasites. Black locust seedlings are infected by *Fusarium* spp., while shoots and branches are attacked by pathogens causing necrosis and bark cancer, including *Phoma* spp., *Phomopsis*

spp., and *Pseudovalsa convergens*. The group of polyphagous taxa with a wide range of infected host organs included several species (e.g., *Botrytis cinerea*, *Cladosporium* spp.).



Figure 5. Conidiomata of *Microdiplodia robiniae* (Peck) Koshk. are found on dying and dead branches of *Robinia pseudoacacia* (photo M. Wołkowyci). The red arrow points to one of them.

3.3. Type of Wood Decay

The group of lignicolous fungi recorded on *Robinia pseudoacacia* in East-Central Europe with confirmed wood-decay abilities comprises 74 species (Figure 6, Appendix A).

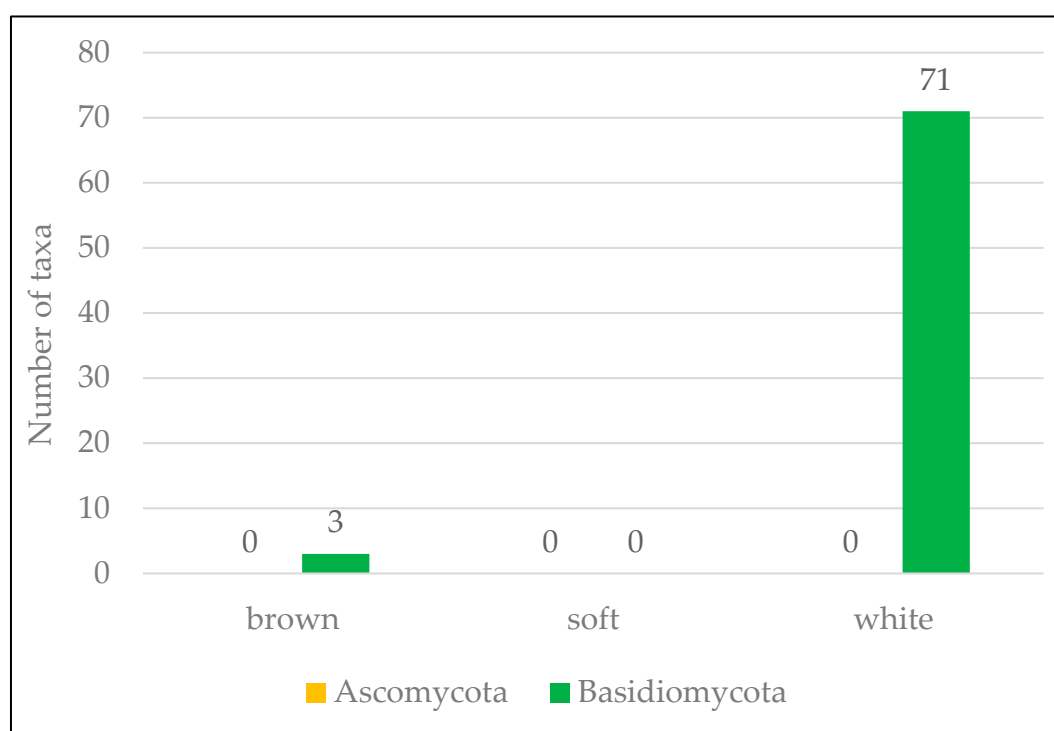


Figure 6. The number of fungal taxa recorded on *Robinia pseudoacacia* in East-Central Europe by type of wood decay.

Of these 74 species, 71 were white-rot species (e.g., *Fomitiporia robusta*—Figure 7, *Ganoderma applanatum*, *Trametes* spp.), and three were brown-rot species (*Dacrymyces*

stillatus, *Laetiporus sulphureus*, *Postia balsamea*). No soft-rot species was recorded. This group of lignicolous fungi includes several dangerous pathogen species that decompose the roots and trunks of living trees (e.g., *Armillaria* spp., *Ceriporus squamosus*, *F. robusta*, *Ganoderma* spp., *L. sulphureus*).



Figure 7. Basidiomata *Fomitiporia robusta* (P. Karst.) Fiasson and Niemelä on a trunk of uprooted *Robinia pseudoacacia* (photo A. Szczepkowski).

3.4. Conservation Status

Of the fungi recorded on *R. pseudoacacia* in East-Central Europe, none are listed on the global Red List of Threatened Species under the categories EX, CR, EN or VU (based on [97]). However, some are included on national or regional lists. The only representative of Ascomycota is *Sarcoscypha austriaca*, which is threatened in Mecklenburg-Western Pomerania [98], North Rhine-Westphalia [99], and Bremen and Lower Saxony [100]. Among the Basidiomycota, up to 29 species have been classified as threatened (Table 1), of which 25 are in Germany, six are in Poland, one is in Lithuania, and one is in Belarus. None of the fungi recorded on *R. pseudoacacia* are threatened in western Ukraine (based on [101,102]). Only three species are endangered in more than one country (Table 1): *Crepidotus luteolus* (Germany, Poland), *Perenniporia medulla-panis* (Germany, Lithuania), and *Volvariella bombycina* (Germany, Poland, Belarus) (Figure 8).

Table 1. Endangered species of Basidiomycota fungi found on *Robinia pseudoacacia* in East-Central Europe.

Country	Species	References
Germany ¹	NW: <i>Armillaria cepistipes</i> , <i>Clitopilus hobsonii</i> , <i>Crepidotus epibryus</i> , <i>Deconica crobula</i> , <i>Flagelloscypha minutissima</i> , <i>Fuscoporia contigua</i> , <i>Ganoderma adspersum</i> , <i>Gymnopus erythropus</i> , <i>Pellidiscus pallidus</i> , <i>Resupinatus poriaeformis</i> , <i>Volvariella bombycina</i>	[99]
	BS: <i>Bjerkandera fumosa</i> , <i>Crepidotus cesatii</i> , <i>Fomitiporia robusta</i> , <i>Ganoderma adspersum</i> , <i>Hypochnicium punctulatum</i> , <i>Inonotus hispidus</i> , <i>Volvariella bombycina</i>	[100]

	BE: <i>Coprinellus xanthothrix</i> , <i>Crepidotus luteolus</i> , <i>Pluteus cinereofuscus</i> , <i>Pluteus nanus</i> , <i>Psathyrella cortinarioides</i> , <i>Psathyrella cotonea</i>	[103]
	SH: <i>Fuscoporia contigua</i> , <i>Hyphodontia arguta</i> , <i>Hypochnicium punctulatum</i> , <i>Inonotus hispidus</i> , <i>Lachnella alboviolascens</i> , <i>Volvariella bombycina</i>	[104]
	SA: <i>Hypochnicium punctulatum</i> , <i>Perenniporia medulla-panis</i> , <i>Vanderbylia fraxinea</i>	[105]
	MV: <i>Perenniporia medulla-panis</i>	[98]
Poland	<i>Ceriporiopsis subvermisporea</i> , <i>Coprinellus flocculosus</i> , <i>Crepidotus luteolus</i> , <i>Etheirodon fimbriatus</i> , <i>Porostereum spadiceum</i> , <i>Volvariella bombycina</i>	[106]
Lithuania	<i>Perenniporia medulla-panis</i>	[107]
Belarus	<i>Volvariella bombycina</i>	[108]

¹ Notes: NW—North Rhine-Westphalia, BS—Bremen and Lower Saxony, BE—Berlin, SH—Schleswig-Holstein, SA—Saxony-Anhalt, MV—Mecklenburg-Western Pomerania.



Figure 8. *Volvariella bombycina* (Schaeff.) Singer, which is also found on *Robinia pseudoacacia*, is an endangered species in Poland, Belarus and Germany (photo A. Szczepkowski).

3.5. Climate Change—Does It Matter?

Since the end of the last ice age, approximately 15,000 years ago, the climate in Central and Northern Europe has warmed, allowing the recolonisation of large areas by numerous flora, fauna, and fungi [109]. Although climate variability over time is an inherent feature of the climate and warmer periods alternate with cooler ones, the rate of change observed since the late 1970s as part of the current warming period in Europe is much greater than in the past dozen or so centuries [110]. In Poland (the central country of the study area), the average air temperature was 7.61 °C in the decade 1951–1960 and 9.68 °C in the decade 2016–2025 [111]. The annual temperature trend in Poland since 1951 is significantly stronger than the global annual temperature trend and slightly stronger than that in the temperate zone of the Northern Hemisphere [112]. Regarding precipitation,

over the last 500 years up to the beginning of the 21st century, no clear long-term trends were recorded in Europe (and in Poland), only considerable year-to-year and decade-to-decade variability [110,113]. In Poland, however, the increasing frequency of dry years can be observed since 2015 [111]. The current period of accelerated warming caused by human activity influences observed changes in the original ranges of many organisms [109,114,115]. Furthermore, these processes are complemented by the introduction of numerous organisms, such as *Robinia pseudoacacia* [18,19].

Black locust is expanding its range across Europe due to rising atmospheric CO₂ concentrations, milder winters, reduced drought stress mediated by arbuscular mycorrhizal fungi, and a longer growing season [116,117]. Along with the spread of this species, associated organisms (e.g., fungi) are also expanding their ranges. Additionally, it is worth noting that several fungal species, including those found in the area studied on black locust (*Auricularia auricula-judae*, *Ganoderma adspersum*, *Schizophyllum commune*), have been spreading across Europe over the past few decades, expanding their range from south to north, probably due to climate warming [109,118]. This applies in particular to wood-destroying Basidiomycota [109]. We hypothesise that the phenomena mentioned, which may be linked to changes in climatic conditions, may be a factor influencing the number of fungal species currently found on *R. pseudoacacia* in the study region. In the case of Lithuania and Belarus, however, the harsh climatic conditions (especially frost in late spring, short vegetation period, cold climate), the low level of urbanisation in the region (starting from north-eastern Poland), and the extensive areas of primeval forests and wetlands with relatively undisturbed vegetation do not favour the expansion of geographically alien species, including black locust [1,8,119,120]. Therefore, we hypothesise that climatic circumstances may partly explain the lower number of species recorded on *R. pseudoacacia* in these two countries to date. However, to fully confirm the relationships between fungal occurrence in the analysed region and climate change, it would be necessary to map fungal records against drought indices, temperature, precipitation, or climatic appropriateness.

We are, however, aware that the set of results obtained is more complex and depends also on many other factors. We therefore hypothesise that the second factor influencing the number and distribution of fungal species found on *R. pseudoacacia* in the study region is sampling intensity, bearing in mind the overall increase in knowledge of fungal distribution [109]. The great popularity of *R. pseudoacacia* in Europe (and globally) has led to a large body of literature on its subject. By 1961, Funk and Roach [121] had compiled over 300 items, mainly in English, about, among others, its morphology, genetics, ecology, artificial regeneration, silviculture and management, health, and wood. However, our online search, realised 60 years later, for articles on the occurrence of fungi on *R. pseudoacacia* in East-Central Europe revealed surprisingly few such cases. Further research and consultations with scientists from the various countries within this study's scope were required. We noticed that most sources of information and research focus on only one country (Poland), which resulted in the highest number of recorded species; at the same time, some countries are underrepresented due to the limited number of studies and/or the shorter history of black locust's presence in their areas (e.g., Belarus). We also noticed that publications in local journals or those available only in print are of particular significance; these are sometimes difficult to locate and may therefore be overlooked. This means our overall understanding of fungi on black locust in East-Central Europe remains incomplete and evolving, including in Poland. This is demonstrated by the list of 11 new fungal species on black locust in Poland (including nine new to the region under study) recently recorded by the authors of the article (Supplementary Materials).

Our third hypothesis about the factors influencing the number and distribution of recorded fungi concerns the availability of the host/substrate. According to the data

presented in the Introduction, there is a disparity in the area occupied by black locust across countries. Apart from the individual history and intensity of this species' introduction, the factors limiting its occurrence or further spread (as a host/substrate) are the climate, as mentioned earlier, and also the availability of habitat. An analysis of the map showing maximum habitat suitability for *R. pseudoacacia* confirms that Lithuania has a lower proportion of such habitats than Poland or Germany (Belarus and Ukraine were not included in this study) [120]. It should be borne in mind, however, that over time, as a result of climate change, this optimum may gradually shift to include regions where habitat conditions are currently less favourable for black locust. *R. pseudoacacia* readily colonises open areas in urban and industrial environments, agrarian landscapes (especially abandoned agricultural land), and disturbed sites, e.g., degraded, destroyed by warfare, post-industrial and post-fire ones [1,43,44,122]. Such areas are found in each of the countries covered by the analysis, often due to changes in land use [122], which create potential opportunities for the spread of black locust and its availability as a host/substrate for fungi in the future. For example, in Poland in 2025, there were about 465,731 ha of wastelands and about 60,000 ha of devastated and degraded land [123]. Even if only a small proportion of these areas were suitable for black locust to colonise, together with the remaining areas (e.g., in towns and cities), this would enable the species to spread further.

We also hypothesise that the fourth factor important for the number and distribution of fungi recorded on *R. pseudoacacia* is the quality of the host/substrate. It should be noted that, in the case of older studies, the *Robinia* specimens available were usually not only fewer in number but also, moreover, relatively young—in Poland, this species was widely propagated during the post-war afforestation programme [17–19], and in Belarus, it was not propagated until the mid-20th century [8]. Over time, as the species expanded, more specimens became available for study, and these were increasingly older. Meanwhile, the older a tree is, the more parasitic fungi can develop on it [124–131]. This is therefore a historical factor, which may also have influenced the development of the list of fungi associated with black locust over the last few decades in the region under analysis. It should be emphasised, however, that it is not only the history of the last few decades that is significant but also the entire history of the species' presence in the region/Europe. For non-native tree species, the longer the time elapsed since their introduction, the greater the diversity of associated pathogens [132,133]. *R. pseudoacacia* was introduced in Europe about 400 years ago [1], which makes this species well-suited to serving as a host or substrate for a significant number of fungi, as confirmed by the findings of our literature review. On the other hand, native species, including fungi, are acquiring new hosts and substrates [134,135], like *R. pseudoacacia* colonising new areas.

It should also be hypothesised that the number of fungi recorded on black locust in East-Central Europe may result from the intensification of the international trade in plants and plant products. In European forests, the rate at which invasive tree pathogens are being introduced and their numbers have risen sharply in recent decades [136]. Negative effects are observed not only within individual continents but also between continents as a result of international trade in timber, packaging materials and wood products [137]. Improvements in identification methods, utilising genetic testing [128,138], may also affect the number of fungal species found on *Robinia* in the study region.

It can therefore be concluded that the conditions affecting the number and distribution of fungi found on *R. pseudoacacia* in East-Central Europe are highly complex, depending on the region and on natural, historical and anthropogenic factors. This is a dynamic system, and it can therefore be assumed that the established list and distribution of species remain an open question.

4. Discussion

The presence of black locust in existing stands, as well as its potential expansion into new areas under ongoing climate change, may have significant implications for the sustainable management of natural ecosystems. This concerns not only tree plantations, parks, and commercial forests where black locust occurs but also the sustainable production, utilisation, and trade of timber and wood products in global markets [139–143].

In its native range, *R. pseudoacacia* is attacked by at least 114 species of fungi, including dangerous agents that cause trunk wood decay (e.g., *Phellinus rimosus* (Berk.) Pilát, *Vanderbylia robiniphila* (Murrill) B.K. Cui & Y.C. Dai), which create major problems for the timber industry in producing high-quality raw material [13,65]. In East-Central Europe, more fungal taxa have been identified than in its native range in the USA, at least 137. A similar observation regarding a higher number of fungi associated with black locust outside its natural range was reported by Polak [144]. However, we caution against making a statement about greater fungal species richness on black locust in East-Central Europe than in North America. Differences in sampling effort, geographical scope, and historical study intensity between the two areas (native vs. non-native) make a direct comparison difficult.

Only in Poland itself was a similar number of species (108 from the literature review in Appendix A + 11 in the Supplementary Materials) found as was reported in the original range of the black locust. Three species reported from *R. pseudoacacia* in Poland were not included in our list in Appendix A because they are questionable. Wilkaniec et al. [73] reported *Erysiphe polygoni* D.C. on *R. pseudoacacia*, which seems unlikely. We found no literature on the occurrence of this powdery mildew species on black locust (e.g., [145–147]). Adamska and Czerniawska [148] and Kocanowski and Adamska [149] reported *Septoria acaciae* Neerg. on *R. pseudoacacia*. The data are likely erroneous, as this species is restricted to members of the genus *Acacia*. Furthermore, the species characteristics provided by the authors point to *Phloeospora robiniae*, as described by Wołczańska [150]. In the mycological database grzyby.pl [151], *Phellinus rimosus* was reported from numerous localities in Poland on black locust. In our opinion, this identification is doubtful. The photos in that work actually illustrate *Fomitiporia robusta*. Similarly, all basidiomata collected by the authors from black locust trees in Mazovia (Ciechanów, Kampinos National Park, Bielański Forest, Natoliński Forest, Szaniawski Nature Reserve, Warsaw Ursynów, Warsaw Bielany, Warsaw Praga) and in Białowieża Forest (Piaski) (see Supplementary Materials), which were morphologically similar to basidiomata of “*Phellinus/Fomitiporia robustus*”, were examined based on microcharacteristics and were found to represent *Fomitiporia robusta*, not *Phellinus rimosus*. *Phellinus rimosus* is distinctive in Europe by its southern distribution; the black, cracked basidiocarps of an ungulate form with relatively large pores; strongly coloured globose spores; and the absence of setae [94–96].

Outside Poland, we recorded a relatively large number of fungi associated with *R. pseudoacacia* in Germany (34) and Ukraine (24), although in both cases, the study areas covered only parts of the countries (northern Germany and western Ukraine). In comparison, in southern Germany, 69 lignicolous fungal species have been identified on black locust [67], significantly more than in the north, including more than 40 species not yet recorded in our study area. These include common species (e.g., *Hypoxylon* spp., *Phellinus ferruginosa* (Schr.: Fr.) Bourd. & Galzin, *Peniophora cinerea* (Fr.) Cooke, *Xylaria hypoxylon* (L.: Fr.) Grev.), which are also known, e.g., in Poland from their occurrence on other hosts. This suggests they may soon be found on black locust in northern Germany and Poland as well. In Ukraine, at the beginning of the 21st century, Andrianova et al. [152] recorded about 90 fungal taxa on *R. pseudoacacia* across the entire country, which is three times the number found in this study for the western part of Ukraine. However, it should be noted that black locust is particularly common, e.g., within the Northern Steppe [7] or the steppe

Don region [22], i.e., outside the region of our research. For example, among all aphylloroid species reported in the country, the three recorded on *Robinia* spp. are found only in eastern Ukraine: *Fuscoporia ferruginosa*, *Phellinus robiniae* (Murrill) A. Ames = [*Phellinus robustus* f. *robinia* Bondartsev], and *Trechispora microspora* [81].

Information on the occurrence of fungi on *R. pseudoacacia* is also available from other European countries. For example, in Greece, fungi such as *Diaporthe oncostoma* (*Phomopsis oncostoma*), *Massaria anomia* (*Aglaospora profusa* (Fr.) De Not.), and *Camarosporidiella elongata* (Fr.) Wanas., Wijayaw. & K.D. Hyde (*Cucurbitaria elongata*) have been reported [66], all of them included in Appendix A. In the former Czechoslovakia, located south of the region considered in this study and separated partially from it by the Carpathian Mountains, which constitute a natural geographical barrier, Kotlaba [153,154] recorded 18 species of polypores on *R. pseudoacacia*. Notably, 11 of these species had not previously been recorded on *R. pseudoacacia* in Eastern-Central Europe (Appendix A). These included, i.e., *Cerioporus varius* (Pers.) Zmitr. & Kovalenko, *Fistulina hepatica* (Schaeff.) With., *Fomitopsis pinicola* (Sw.) P. Karst., *Fomitopsis quercina* (L.) Spirin & Miettinen, *Ganoderma resinaceum* Boud., *Irpex latemarginatus* (Durieu & Mont.) C.C. Chen & Sheng H. Wu, and *Xanthoperen-niporia tenuis* (Schwein.) B.K. Cui & X. Ji. With regard to the wider region of Western Europe, Cierjacks et al. [23] prepared a list of 58 taxa of fungi for black locust, which includes 23 taxa from Appendix A. The above data indicate that the mycobiota of black locust in Europe is characterised by high species richness, potentially exceeding that observed in its native range.

Our findings demonstrate that *R. pseudoacacia* may provide suitable habitats or resources for threatened species. A significant proportion of the fungi recorded on black locust in the study region (30 species, 21.9%) are listed as threatened, indicating that the presence of this invasive tree has, in some cases, a positive impact on biodiversity. However, the presence of *R. pseudoacacia* as a host does not necessarily mean that this invasive tree increases the viability of an endangered fungus's population. On the other hand, we also recorded the undesirable presence of a fungal species alien to Poland, Belarus, Lithuania and Germany (*Erysiphe palczewskii*) [155–158]; a species considered alien in Germany (*Erysiphe pseudoacaciae*) [155]; and species alien to Lithuania (*Auricularia auricula-judae*, *Microdiplodia robiniae*, *Diplodia profusa*, *Phloeospora robiniae*, *Diaporthe oncostoma*) [156]. In the case of Ukraine, none of the species listed in Appendix A appear on the list of alien Ascomycota species [159]. Additionally, Wilgan et al. [138] found, through genetic studies, an increase in the abundance of pathogens and decomposers in the soil microbiome of *Robinia* and a decrease in the abundance of root-associated endophytes and symbionts. These observations—together with the fact that the black locust is a host for dangerous forest tree pathogens—highlight the potentially multifaceted role of this non-native tree species in supporting fungal diversity. Therefore, the effects of *R. pseudoacacia* on environmental sustainability are complex and context- and place-dependent. Although the species may provide certain ecosystem benefits, under favourable environmental conditions, it can also negatively affect biodiversity and alter ecosystem functioning [160–162], generating potentially difficult trade-offs between forest health risks and biodiversity conservation benefits.

According to Sitzia et al. [120], threats to black locust in Europe are much fewer and of lower intensity than those in its native range (North America). However, Najberek et al. [70] compiled a list of 23 pathogens on black locust in Europe. Igmandy [59,163] highlights a significant threat to *Robinia* stands in Hungary posed by a few species of the genus *Phellinus* and by *Laetiporus sulphureus* (Figure 9).



Figure 9. Basidiomata *Laetiporus sulphureus* (Bull.) Murrill on a trunk of *Robinia pseudoacacia* (photo A. Szczepkowski).

Ryvarden & Gilbertson [89,90], in their monograph European Polypores, listed *Robinia* as a host/substrate for 44 species of polypore fungi, including the dangerous forest tree pathogen *Heterobasidion annosum*. However, this species was not reported in the area we discussed (East-Central Europe), which is cause for optimism. At the same time, the group of polypore fungi, the most effective wood-decay agents, comprises 19 species (Appendix A), representing about 5% of those recorded in Europe [164]. On the other hand, *R. pseudoacacia* was considered a tree less frequently infected by *Armillaria* spp. [165]. Our results indicate a relatively large number of sites infested with various *Armillaria* species (Figure 10), which, given the existing inoculum of this pathogen (rhizomorphs and roots) [57], poses a significant threat to the health of *Robinia* should its range expand. Our literature review for East-Central Europe identified only species responsible for white and brown wood rot (Appendix A). We are, however, convinced that the absence of identified causative agents of soft rot stems from the still incomplete data on the occurrence of fungi on *R. pseudoacacia* in the region under study, especially in countries with a relatively large amount of available substrate (Poland, Germany, Ukraine). This is evidenced by the presence of fungi on black locust causing soft rot, confirmed in southern Germany [67], as well as the authors' own observations from Poland (Supplementary Materials).

The above considerations regarding the health of black locust, and thus its survival and potential usefulness in promoting biological diversity (e.g., as a host/substrate for endangered fungi) and supporting industry, take on new significance in the context of predicted climate change and the migration of forest tree species. Climate scenarios for global warming (RCP +2.6, +4.5, and +8.5) account for the increasing proportion (+129%) and geographical range of *Robinia*, particularly towards north-eastern Europe, including Lithuania [36]. *R. pseudoacacia* is therefore becoming an important factor in discussions about the future species composition of commercial stands, which have so far been dominated by *Pinus sylvestris* and *Picea abies* in the East-Central part of Europe—the “losers” in the

context of climate change [36,37,166]. Environmental changes driven by climate warming are expected to promote the growth and activity of fungi colonising black locust wood by extending the period favourable for pathogen development (like *Armillaria*—Figure 10) and reducing trees' natural resistance to saprotrophic fungal wood decay [57,58]. Projections indicate that higher-latitude regions (like East-Central Europe) will become more vulnerable to pathogen pressure [167]. Additionally, predictions for some fungal pathogens, including *Fusarium oxysporum* and *Heterobasidion* spp., indicate northward and eastward shifts in climatic suitability, mainly driven by rising temperatures and changes in precipitation regimes [168,169]. This would therefore also mean an increased risk to *R. pseudoacacia* trees and to black locust wood from the fungi described above in the future.



Figure 10. Rhizomorphs of *Armillaria* (some of them are marked by red arrows) on a stump of *Robinia pseudoacacia* (photo A. Szczepkowski).

Further observations and research in the East-Central Europe region should focus on a comprehensive identification of the diversity of fungi colonising black locust; the threats to the tree posed by pathogens and ways of counteracting them; an assessment of the 'gains' and 'losses' resulting from the presence of this non-native tree species in the context of both fungi and overall biodiversity and human needs; and the relationships between the tree and its mycobiota in the context of climate change.

5. Conclusions

The long history of *Robinia pseudoacacia* in Europe has made this alien tree species a host to a large group of fungi across various trophic groups. The number (at least 137 taxa) and the distribution (from four in Lithuania to 108 in Poland) of fungal species found on *R. pseudoacacia* in the study region (East-Central Europe) are influenced by a number of natural, historical and anthropogenic factors. We have highlighted and discussed the significance and interrelationships between, amongst other things, the expanding range of the tree and the fungal species resulting from climate change, various sampling intensities, the history of the host introduction, its availability and quality, as well as the colonisation of a new host by fungi native to the area or the role of international trade on plants and plant products. The greatest fungal threats to the health of this tree species appear to be root pathogens of the genus *Armillaria*, wood-decaying species that attack living tree trunks (*Fomitiporia robusta*, *Laetiporus sulphureus*), powdery mildews (*Erysiphe* spp.), and black locust shoot/stem canker (*Diaporthe* spp., *Fusarium* spp.). On the other hand, *R. pseudoacacia* may provide habitat or substrate for 30 fungal species listed on Red Lists in this part of Europe. This means that, as the area of *R. pseudoacacia*'s occurrence in lowland Europe increases, the impact of this species on forest ecosystems may be expressed through changes not only in tree species composition but also in mycobiota and associated organisms. Recognition of this fact should form the basis for the sustainable management of this tree species in the future.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/su18199973/s1>, Table S1: List of fungi recorded by the authors on *Robinia pseudoacacia* in Poland (unpublished data).

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Abbreviations

The following abbreviations are used in this manuscript:

BE	Berlin
BS	Bremen and Lower Saxony
CR	Critically endangered species
EN or E	Endangered species
EX	Extinct species
MV	Mecklenburg-Western Pomerania
NW	North Rhine-Westphalia
R	Rare species
RCP	Representative concentration pathways
SA	Saxony-Anhalt
SH	Schleswig-Holstein
VU or V	Vulnerable species

Appendix A

Table A1. List of fungi recorded on *Robinia pseudoacacia* in East-Central Europe.

No.	Species	Type of Wood Decay	Trophic Group	Substrate	Country	References
Ascomycota						
1	<i>Arachnopeziza aurata</i> Fuckel	-	s	leaves	PL	[170]
2	<i>Ascocoryne cylichnium</i> (Tul.) Korf	-	s	stump	PL	[170]
3	<i>Botrytis cinerea</i> Pers.	-	s/p	-	PL	[79]
4	<i>Calycellina populina</i> (Fuckel) Höhn.	-	s	leaves	PL	[170]
5	<i>Camarosporidiella elongata</i> (Fr.) Wanas., Wijayaw. & K.D. Hyde	-	s	shoots, sprouts, twigs	PL	[79] (as <i>Cucurbitaria elongata</i> (Fr.) Grev.)
					UA	[152] (as <i>Cucurbitaria elongata</i> (Fr.) Grev.)
6	<i>Camarosporium pseudoacaciae</i> Brunaud	-	s/p	shoots, twigs	UA	[152]
7	<i>Camarosporium subfenestratum</i> (Berk. & M.A. Curtis) Sacc.	-	s/p	twigs	UA	[152]
8	<i>Cladosporium fumago</i> Link	-	s	-	PL	[79]
9	<i>Cladosporium herbarum</i> (Pers.) Link	-	s/p	-	PL	[79]
10	<i>Clonostachys squamuligera</i> (Sacc.) Forin & Vizzini 2020	-	s/p	twigs	UA	[152] (as <i>Nectria squamuligera</i> Sacc.)
11	<i>Diaporthe fasciculata</i> Nitschke	-	p/s	dead twigs	PL	[79]
					PL	[79]
					DE	[171]
					LT	[172]
					BY	[173]
12	<i>Diaporthe oncostoma</i> (Duby) Fuckel (=Phomopsis oncostoma (Thüm.) Höhn.)	-	p	dead twigs, shoots	UA	[152]
13	<i>Didymella macrostoma</i> (Mont.) Qian Chen & L. Cai	-	s/p	-	PL	[79]
14	<i>Diplodia profusa</i> De Not.	-	p/s	bark, twigs	PL	[79]
					UA	[152]
					BY	[174]
15	<i>Erysiphe palczewskii</i> (Jacz.) U. Braun & S. Takam.	-	p	leaves	DE	[175] (as <i>Microsphaera palczewskii</i> Jacz.)
					UA	[74,176]; [152] (as <i>Microsphaera palczewskii</i> Jacz.)
16		-	p	leaves	BY	[174]

					DE	[177]
	<i>Erysiphe pseudoacaciae</i> (P. D. Marchenko) U. Braun & S. Takam.				UA	[152] (as <i>Microsphaera pseudoacaciae</i> (P.D. Marchenko) U. Braun))
17	<i>Erysiphe robiniae</i> Grev.	-	p	leaves	BY	[178] (as <i>Erysiphe robiniae</i> var. <i>robiniae</i> Grev.)
					UA	[74]
18	<i>Erysiphe trifolii</i> Grev.	-	p	leaves, petiole	PL	[79]
					LT	[179]
					DE	[177]
					UA	[152]
19	<i>Eutypa lata</i> (Pers.) Tul. & C. Tul.	-	s/p	decorticated branches and trunks	PL	[79]
20	<i>Fusarium lateritium</i> Nees	-	p	-	PL	[79] (as <i>Gibberella baccata</i> (Wallr.) Sacc.)
21	<i>Fusarium avenaceum</i> (Fr.) Sacc.	-	s/p	young stem	DE	[180]
22	<i>Fusarium sambucinum</i> Fuckel	-	s/p	young stem, twigs	DE	[180] (as <i>F. sambucinum</i> Brond.)
					UA	[152] [181]; [182] (as <i>Gibberella pulicaris</i> (Fr.) Sacc.)
23	<i>Fusarium sporotrichioides</i> Sherb.	-	s/p	young stem	DE	[180]
24	<i>Fusarium tricinctum</i> (Corda) Sacc.	-	s/p	young stem	DE	[180]
25	<i>Fusarium</i> sp.	-	s/p	twigs, branches	DE	[171,183]
26	<i>Hymenoscyphus immutabilis</i> (Fuckel) Dennis	-	s	fallen leaves	PL	[170]
27	<i>Lachnum virgineum</i> (Batsch) P. Karst.	-	s	branch	PL	[184]
28	<i>Massaria anomia</i> (Fr.) Petr.	-	s/p	dead twigs; branch	PL	[79] (as also <i>Aglaospora profusa</i> (Fr.) De Not.); [185,186]
					UA	[152] (as <i>Pseudovalsa irregularis</i> J. Schröt and <i>Pseudovalsa profusa</i> (Fr.) G. Winter
29	<i>Massaria inquinans</i> (Tode) De Not.	-	s	twigs	UA	[152]
30	<i>Metasphaeria pseudoacaciae</i> J. Schröt.	-	s/p	petioles	PL	[79]
31	<i>Microdiplodia robiniae</i> (Peck) Koshk.	-	p	bark, twigs	PL	[79] (as <i>Camarosporium robiniae</i> (Westend.) Sacc.)
					LT	[156] (as <i>Camarosporium robiniae</i> (Westend.) Sacc.)
					UA	[152] (as <i>Camarosporium robiniae</i> (Westend.) Sacc.))
32	<i>Mollisia cinerea</i> (Batsch) P. Karst.	-	s	branch	PL	[170]
					DE	[171,183]
33	<i>Nectria cinnabarina</i> (Tode: Fr.) Fr.	-	s/p	dead twigs, trunks	UA	[152] (as also <i>Tubercularia granulata</i> Pers.)
34	<i>Oidium</i> sp.	-	p	leaves	UA	[152]
35	<i>Orbilia xanthostigma</i> (Fr.) Fr.	-	s	branch	PL	[170] (as <i>Orbilia delicatula</i> (P. Karst.) P. Karst.)
36	<i>Peroneutypa scoparia</i> (Schwein.) Car-marán & A.I. Romero	-	s/p	branch	PL	[185]
37	<i>Phloeospora robiniae</i> (Lib.) Höhn.	-	p	leaves	PL	[73] [79]
					LT	[156]

<https://doi.org/10.3390/su18199973>

					DE	[80] (as <i>Coprinus micaceus</i> (Bull.) Fr.)
66	<i>Coprinellus xanthothrix</i> (Romagn.) Vilgalys, Hopple & Jacq. Johnson	w	s	twig	PL	[170]
67	<i>Coprinellus truncorum</i> (Scop.) Red-head, Vilgalys & Moncalvo	w	s	base of the trunk	PL	[185]
68	<i>Coprinellus flocculosus</i> (DC.) Vilgalys, Hopple & Jacq. Johnson	w	s	fallen twigs	PL	[77] [195]
69	<i>Coprinopsis atramentaria</i> (Bull.) Red-head, Vilgalys & Moncalvo	w	s	-	PL	[77] (as <i>Coprinus atramentarius</i> (Bull.: Fr.) Fr.)
70	<i>Crepidotus epibryus</i> (Fr.) Quél.	w	s	twig	PL	[170]
71	<i>Crepidotus caspari</i> Velen.	w	s	branches	PL	[170] (as <i>Crepidotus lundellii</i> Pilát)
72	<i>Crepidotus cesatii</i> (Rabenh.) Sacc.	w	s	fallen twigs	PL	[77] [195]
73	<i>Crepidotus luteolus</i> Sacc.	w	s	branches	PL	[170]
74	<i>Crepidotus variabilis</i> (Pers.) P. Kumm.	w	s	fallen twigs and branches	PL	[194,195]
75	<i>Cylindrobasidium laeve</i> (Pers.) Chamuris	w	s	-	PL DE	[77] [80]
76	<i>Deconica crobula</i> (Fr.) Romagn.	-	s	twigs	PL	[170] (as <i>Psilocybe crobula</i> (Fr.) Singer)
77	<i>Dacrymyces stillatus</i> Nees	b	s	branch	PL	[77] [170,196]
78	<i>Daedaleopsis confragosa</i> (Bolton) J. Schröt.	w	s/p	-	PL	[77]
79	<i>Etheiroduon fimbriatus</i> (Pers.) Banker = <i>Steccherinum fimbriatum</i> (Pers.) J. Erikss.	w	s	-	PL	[197] (as <i>Odontia fimbriata</i> Pers.); [77] (as <i>Irpex fimbriatus</i> (Pers.) Kotir. & Saaren.)
80	<i>Exidia glandulosa</i> (Bull.) Fr.	w	s	branch	PL	[170]
81	<i>Flagelloscypha minutissima</i> (Burt) Donk	-	s	-	PL	[77]
82	<i>Flammulina velutipes</i> (Curtis) Singer	w	s	-	PL	[77]
83	<i>Fomes fomentarius</i> (L.) Fr.	w	p/s	-	PL	[77]
84	<i>Fomitiporia robusta</i> (P. Karst.) Fiasson & Niemelä	w	p/s	trunks	DE	[80] (as <i>Phellinus robustus</i> (P. Karst.) Bourdot & Galzin); [124] (as <i>Fomes ignarius</i> L.)
85	<i>Fuscoporia contigua</i> (Pers.: Fr.) G. Cunn.	w	s/p	branch	PL	[77] (as <i>Phellinus contiguus</i> (Pers.) Pat.); [170,193]
86	<i>Ganoderma applanatum</i> (Pers.) Pat.	w	p/s	stump	PL	[77]; [170] (as <i>Ganoderma lipsiense</i> (Batsch) G.F. Atk.)
87	<i>Ganoderma adpersum</i> (Schulzer) Donk	w	p/s	trunks	DE	[63]
88	<i>Gymnopus erythropus</i> (Pers.) Antonín, Halling & Noordel.	-	s	-	PL	[77]
89	<i>Hapalopilus nidulans</i> (Fr.) P. Karst.	w	s	wood	PL	[196]
90	<i>Helicogloea lagerheimii</i> Pat.	-	s	log	PL	[185]
91	<i>Hyphodontia arguta</i> (Fr.) J. Erikss.	w	s	branches	PL	[77] [170]
92	<i>Hypholoma fasciculare</i> (Huds.) P. Kumm. var. <i>fasciculare</i>	w	s	stump	PL	[77] (as <i>Psilocybe fascicularis</i> (Huds.: Fr) Noordel.); [170,193]
93	<i>Hypochnicium punctulatum</i> (Cooke) J. Erikss.	w	s	-	PL	[77]
94	<i>Inonotus hispidus</i> (Bull.) P. Karst.	w	p/s	-	DE	[80]
95	<i>Lachnella alboviolascens</i> (Alb. & Schwein.) Fr.	-	s	branches	PL DE	[170,196,198] [80]

96	<i>Lachnella villosa</i> (Pers.) Donk	-	s	wood	DE	[80]
					PL	[77] [170,191,193,194,199,200]
97	<i>Laetiporus sulphureus</i> (Bull.) Murrill	b	p/s	trunks	DE	[80]; [124] (as <i>Polyporus selfureus</i> (Bull.))
					UA	[152]
98	<i>Lentinus brumalis</i> (Pers.) Zmitr.	w	s	branch	PL	[170] (as <i>Polyporus brumalis</i> (Pers.) Fr.)
					DE	[80] (as <i>Polyporus brumalis</i> (Pers.) Fr.)
99	<i>Lyomyces sambuci</i> (Pers.) P. Karst.	w	s	branches	PL	[77] [170] (as <i>Hyphodontia sambuci</i> (Pers.: Fr.) J. Erikss)
					BY	[201]
					DE	[80] (as <i>Rogersella sambuci</i> (Pers.) Liberta & A.J. Navas)
100	<i>Megacollybia platyphylla</i> (Pers.) Kotl. & Pouzar,	w	s	-	PL	[77]
101	<i>Merismodes anomala</i> (Pers.) Singer	-	s	branches	PL	[170]
					DE	[80] (as <i>Cyphellopsis anomala</i> (Pers.) Donk)
102	<i>Mycena abramsii</i> (Murrill) Murrill	w	s	branch	PL	[170]
103	<i>Mycena galericulata</i> (Scop.) Gray	w	s	-	PL	[77]
104	<i>Mycena haematopus</i> (Pers.) P. Kumm.	w	s	branch	PL	[170]
105	<i>Mycena leptcephala</i> (Pers.) Gillet	w	s	twigs	PL	[170]
106	<i>Pellidiscus pallidus</i> (Berk. & Broome) Donk	-	s	branch	PL	[170]
107	<i>Peniophora incarnata</i> (Pers.) P. Karst.	w	s	branch	PL	[77] [170]
108	<i>Perenniporia medulla-panis</i> (Jacq.) Donk	w	s	stump	DE	[80] (as <i>Poria medulla-panis</i> (Jacq.) Pers.)
109	<i>Phlebia tremellosa</i> (Schröd.) Nakasone & Burds.	w	s	branch	PL	[170]
110	<i>Pholiota aurivella</i> (Batsch) P. Kumm.	w	s/p	-	PL	[77]
111	<i>Pholiota squarrosa</i> (Vahl) P. Kumm.	w	p/s	stumps	PL	[170]
					DE	[80]
112	<i>Pleurotus dryinus</i> (Pers.) P. Kumm.	w	s/p	-	PL	[77]
113	<i>Pleurotus ostreatus</i> (Jacq.) P. Kumm.	w	s/p	trunks	PL	[77] [195]
114	<i>Pluteus cervinus</i> (Schaeff.) P. Kumm.	w	s	stumps	PL	[77] [194] (as <i>Pluteus atricapillus</i> (Batsch) Fayod); [170]
115	<i>Pluteus cinereofuscus</i> J.E. Lange	w	s	fallen branches	PL	[195]
116	<i>Pluteus nanus</i> (Pers.) P. Kumm.	w	s	fallen branch	PL	[170]
117	<i>Porostereum spadiceum</i> (Pers.) Hjortstam & Ryvarden,	w	s	fallen branches	PL	[77] [170,193,196,198,202]
					DE	[80] (as <i>Lopharia spadicea</i> (Pers.) Boidin)
118	<i>Postia balsamea</i> (Peck) Jülich	b	s	-	DE	[80] (as <i>Spongiporus balsameus</i> (Peck) A. David)
119	<i>Psathyrella cortinarioides</i> P.D. Orton	-	s	twigs	PL	[170]
120	<i>Psathyrella cotonea</i> (Qué.) Konrad & Maubl.	-	s	stump	PL	[170]
121	<i>Radulomyces confluens</i> (Fr.) M.P. Christ.	w	s	branches	PL	[77] [170]
					DE	[80]
122	<i>Resupinatus poriaeformis</i> (Pers.) Thorn, Moncalvo & Redhead	w	s	branch	PL	[170]
123	<i>Resupinatus trichotis</i> (Pers.) Singer	w	s	branches	PL	[170,196]

124	<i>Rhizochaete filamentosa</i> (Berk. & M.A. Curtis) Gresl., Nakasone & Rajchenb.	w	s	stump	PL	[170] (as <i>Phanerochaete filamentosa</i> (Berk. & M.A. Curtis) Burds.)
125	<i>Rhizochaete radicata</i> (Henn.) Gresl., Nakasone & Rajchenb.	w	s	-	PL	[193]
126	<i>Rigidoporus sanguinolentus</i> (Alb. & Schwein.) Donk	w	s	-	PL	[77] (as <i>Physisporinus sanguinolentus</i> (Alb. & Schwein.) Pilát)
127	<i>Schizophyllum commune</i> Fr.	w	s/p	-	PL	[77]
128	<i>Schizopora paradoxa</i> (Schrad.) Donk	w	s/p	-	DE	[80]
129	<i>Stereum gausapatum</i> (Fr.) Fr.	w	s/p	-	DE	[80]
130	<i>Stereum hirsutum</i> (Willd.) Pers.	w	s	branch	PL	[170]
131	<i>Trametes ochracea</i> (Pers.) Gilb. & Ryvarden	w	s	-	PL	[77]
132	<i>Trechispora farinacea</i> (Pers.) Liberta	w	s	branches	PL	[77] [170]
133	<i>Tubaria furfuracea</i> (Pers.) Gillet	-	s	fallen twigs	PL	[77] [195]
134	<i>Vanderbylia fraxinea</i> (Bull.) D.A. Reid	w	p/s	lower trunk, woody roots	DE	[63,71] (as <i>Perenniporia fraxinea</i> (Bull.) Ryvarden)
135	<i>Volvariella bombycina</i> (Schaeff.) Singer	w	s	trunk	PL	[77] [203]
136	<i>Xylodon brevisetus</i> (P. Karst.) Hjortstam & Ryvarden	w	s	branch	PL	[170] (as <i>Hyphodontia breviseta</i> (P. Karst.) J. Erikss)
137	<i>Xylodon nesporii</i> (Bres.) Hjortstam & Ryvarden	w	s	branch	PL	[77] [170] (as <i>Hyphodontia nesporii</i> (Bres.) J. Erikss. & Hjortstam)

Abbreviations: PL—Poland, BY—Belarus, DE—Germany, LT—Lithuania, UA—Ukraine; trophic group: p—parasite, s—saprotroph, s/p—saprotroph and parasite, p/s—parasite and saprotroph; type of wood decay: b—brown, s—soft, w—white; type of references: red—database, green—critical list, yellow—scientific publication.

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