

Localities of *Fomitopsis officinalis* in Poland

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Between 1998 and 2003, 43 forest stands (including 41 reserves) with larch trees were inspected and reviewed in search of *Fomitopsis officinalis* (Vill.: Fr.) Bond. et Sing. A list of localities, together with short descriptions of the forest sites, is given, and location sketches with the localities are provided. The number of infected trees, their dimensions and health state, as well as the number of recorded fruitbodies, their dimensions and location on the trees, are given.

Key words: *Fomitopsis officinalis*, distribution, fungal conservation, Poland, *Larix*

INTRODUCTION

Fomitopsis officinalis (Vill.: Fr.) Bond. et Sing. parasitises on conifers of the family *Pinaceae*. When the tree dies, the fungus develops as a saprobiont on an already dead but standing tree. It also grows on stumps, fallen trees and windfalls. The fungus causes brown rot of heartwood of live trees. The infected wood cracks both in the radial direction and along annual rings, and crumbles into tiny cubes. Cracks are filled with a white, patchy, thick mycelium. Consequently, wood becomes destroyed, creating hollows and resulting in windfalls.

The fungus is a holarctic species, distributed in the entire temperate zone of the northern hemisphere. It has been reported from Africa (Marocco), Northern America (Canada, USA), Asia (China, India, Japan, Korea, Mongolia, Russia), as well as from Europe (Austria, Belarus, France, Greece, Spain, the Netherlands, Lithuania, Germany, Poland, Russia, Romania, Slovakia, Slovenia, Switzerland, Ukraine, Italy) (Browne 1968; Kotlaba 1984; Fedorov 1987; Ryvarden and Gilbertson 1993; Anonymous 2001; Chlebicki 2001; Chlebicki and Łuszczynski 2002; Dahlberg and Croneborg 2003).

It has been most frequently recorded on trees belonging to the genus *Larix*, and less frequently on *Pseudotsuga*, *Abies*, *Pinus*, *Picea*, *Tsuga*, *Cedrus*. With the excep-

tion of Spain, where it was found on *Pinus nigra* subsp. *salzmannii*, it occurs in Europe exclusively on larch trees: *Larix decidua*, *L. decidua* var. *polonica*, *L. sibirica* (Domański et al. 1967; Browne 1968; Kotlaba 1984; Ryvar den and Gilbertson 1993; Łuszczynski 2000).

F. officinalis is now very rare in entire Europe. According to Dahlberg and Cronborg (2003), since 1980 the greatest number of localities has been reported from France (40) and Switzerland (30). On the other hand, 4 localities were reported from Austria, 4 – Germany, 3 – Slovenia, 2 – Poland, and 1 – Romania. The European Council for the Conservation of Fungi (ECCF) proposed it for inscription on the European list of protected fungi (Anonymous 2001). It has been under strict protection in Poland since 1983. It is also red-listed as an endangered species (E) on the Red List of threatened fungi (Wojewoda and Ławrynowicz 1986, 1992).

Fruitbodies are perennial, sessile, mostly hoof-shaped or cylindrical, sometimes grown together, forming irregular concentrations (Domański et al. 1967). Vanin (1955) as well as Zhuravlev et al. (1974) claim that fruitbodies of *F. officinalis* may grow for as long as 75 years. Their dimensions can be as follows: width up to 15 cm, length 23 cm and height – up to 60 cm (Domański et al. 1967; Breitenbach and Kränzlin 1986; Ryvar den and Gilbertson 1993). Their fresh mass reaches 7 kg (Svrček and Vančura 1987), 8 kg (Konev 1972), or even 10 kg (Zhuravlev et al. 1974; Marchand 1975), while its height could be 1 m (Blanchette et al. 1992). The upper surface of the fruitbody is strongly cracked, rough, sometimes knobby, covered with a thin coating, white, creamy or nut-coloured, indistinctly banded with yellow, cinnamon-brown concentric bands (Domański et al. 1967). Older individuals are usually darker, grey to grey-black, strongly cracked, often overgrown with lichens (Breitenbach and Kränzlin 1986). The margin of the fruitbody is blunt, rounded. A very bitter taste of the flesh, caused by agaricin, is an important diagnostic feature. The flesh is initially soft, toughening with age and becoming light and crumbly, chalky white, sometimes with a yellow tint and a floury smell (Domański et al. 1967). Small fragments of bark and wood or other foreign matter over which the fungus grows during its rapid development may occur in the flesh (Svrček and Vančura 1987).

Tubes are arranged in indistinct layers, the colour of the context. They are between 3 and 20 mm long in each layer and grow annually. Pores are circular or angular, 0.2–0.3 mm in diameter, which gives ca. 3–4 pores per 1 mm. The hymenophore surface is initially whitish, becoming ochre when dried (Domański et al. 1967, Domański 1974). There were 18 to 30 such layers at the most in the individuals studied in Poland (Chlebicki and Łuszczynski 2002). Fruitbodies of the fungus are often sterile (Svrček and Vančura 1987).

The medicinal properties of *F. officinalis* for which the fungus was sought have led to its disappearance. Considered to be a panacea for all ailments, *F. officinalis* was available in pharmacies as pills (Muszyński 1954) or as powder called Agaricus Albus Pulveratus (Rządowski and Sabiniewicz 1936). It was used as a purgative and anti-cancer agent or to decrease the production of sweat (Muszyński 1954), as an antipyretic and analgesic drug to substitute quinine (Knopf 1984), as an abortive agent or to inhibit bleeding (Keizer 1998), in disorders of the teeth, as an anti-swelling agent or a sedative (Borzini 1941), to cure disorders of the diges-

tive system (Rządkowski and Sabiniewicz 1936; Semerdžieva and Vesel'ský 1986). In Yakutia, fruitbodies of *F. officinalis* were used to make soap and red dye, while in the USA it served to replace hop in domestic beer production (Vanin 1955). In Germany and Switzerland, it was used to dye silk (Bill 1860). As the price of the powdered mass of fruitbodies was high, it was falsified by some collectors with powdered *Laetiporus sulphureus*, which also occurs on larch trees, although rarely, and the colour of its dry context is similar to that of *F. officinalis* (Jahn 1990). *F. officinalis* was collected for trade purposes primarily in Russia, in the northern forests of Siberia, from where, for instance, 8 000 kg of the dried medicinal polypore was exported in 1879 (Dominik 1957). The Indians of North America called fruitbodies of *F. officinalis* "ghost bread" or "tree biscuits," to be used in shaman rituals (Blanchette et al. 1992). In the past, the demand for larch wood and non-wood plant substances (resin, tanbark) brought about excessive exploitation of larch forests (Kluk 1808, Barański 1963), which has also contributed to the disappearance of *F. officinalis*.

Łuszczynski (2000), and Chlebicki and Łuszczynski (2002) have recently conducted a review of historical and contemporary localities of *F. officinalis* in Poland. Of the 13 Polish localities, they list only two currently existing, confirmed localities, situated in the Świętokrzyskie Mountains (Chelmowa Góra, Świnia Góra).

Only few records of the occurrence of *F. officinalis* in Poland, not always fully documented, have been reported since the beginning of the 20th century. Orłóś (1951) provided a short description of the fungus and a photograph taken on 10 July, 1947, in the Święta Katarzyna Forest District, without specifying the exact location. The photograph was most probably taken on Chelmowa Góra, which at the time belonged to the Święta Katarzyna Forest District. Domański et al. (1967) documented the occurrence of *F. officinalis* on Świnia Góra using the photographs taken by Orłóś in July 1957 and by Zielińska (no date, from the collection of the Department of Phytopathology, Warsaw Agricultural University). The fungus was recently found in the Świnia Góra reserve by Łuszczynski (2000) and Bujak (2002). In the Carpathian Mountains, Skirgiełło (1959) reports only one locality from the vicinity of Krościenko. The fruitbody was collected on 28 Sept. 1955 from a live larch (leg. A. Skirgiełło, det. H. Orłóś – WA-7195). Komorowski (1986) listed a photograph (erroneously captioned) with two fruitbodies of the fungus on a larch from Chelmowa Góra. Zaręba (1991a) also noticed *F. officinalis* in this forest, on the banks of the Pokrzywianka River. The photographs, together with the descriptions of the fruitbodies from Chelmowa Góra, can be found in Zaremba (1998), Piętka (2000) and Bujak (2002). In September 1996, two fruitbodies of *F. officinalis* (leg. M. Bischoff-Byk, det. A. Szczepkowski), collected from a fallen larch on Chelmowa Góra, were handed over to the Department of Mycology and Forest Phytopathology, Warsaw Agricultural University. Both fruitbodies are stored in the herbarium of the Department (WAML), and a photograph of one of them was published by Szczepkowski (2001). In the Modrzewina reserve in the lowlands of Poland, three fruitbodies of *F. officinalis* were collected by M. Ławrynowicz (pers. com) in June 1977, deposited in the collections of the University of Łódź (LOD). In the 1990's, foresters noticed the fungus (Milanowski pers.

com) in the Dalejów reserve (Suchedniów Forest District), located in the vicinity of the Świnia Góra reserve.

MATERIAL AND METHODS

As part of the studies on possible active conservation of *F. officinalis*, conducted in the Department of Mycology and Forest Phytopathology, Warsaw Agricultural University, since 1997, it was set out to identify current localities and to establish the number of trees and fruitbodies of this fungus in Poland. For this purpose, 41 nature reserves with *Larix* spp., as listed in Walczak et al. (2001), were reviewed and investigated between 1998 and 2003. The following areas were studied: Lenki (Southern Baltic Littorals); Bielawy, Bobrowisko, Duszniczki, Klasztorne Modrzewie near Dąbrówka Kościelna, Laski, Rezerwat Modrzewiowy in Noskowo, Stare Modrzewie, Tomkowo (Southern Baltic Lakelands); Buczyzna Szprotawska (Saxony-Lusatia Lowlands); Annabrzeskie Wąwozy, Bażantarnia, Brzeźniczka, Bukowa Góra, Czerwona Róża, Jaśkowice, Leśna Woda, Lubiaszów, Modrzewina, Pępowo, Przysiecz, Śmiechowice, Trębaczew (Central Poland Lowlands); Przylęk (Sudetes and Sudetes Foreland); Lesisko, Modrzewiowa Góra, Rajchowa Góra, Smoleń (Silesia-Cracow Upland); Ciechostowice, Dalejów, Dziki Staw, Modrzewie, Piotrowe Pole, Świnia Góra (Małopolska Upland); Wydrze, Zmysłówka (Northern Subcarpathian Region); Las Lipowy Obrożyska, Modrzewie I, Modrzyna (Outer Western Carpathians); Koniuszanka II (Eastern Baltic Lakelands); Skrzypny Ostrów (Wołyńsko-Podolska Upland). Additionally, the former Zatonie reserve (Central Poland Lowlands) and the protective area of the Świętokrzyski National Park (ŚNP) – Chelmowa Góra (Małopolska Upland) were investigated.

The circumference of the trees was measured at 1.3 m above the ground level. Exact measurements of fruitbodies situated along the tree butt, i.e. up to ca. 3 m of the tree height, were taken, while those of the fungi growing above this height were estimated.

RESULTS AND DISCUSSION

As a result of the review and the investigation of 43 forest stands, fruitbodies of *F. officinalis* were found in 5 localities in Poland (Fig. 1).

- Ciechostowice reserve (Fig. 2), (Małopolska Upland, Gielniowski Ridge), also known in literature as the „Larch reserve in the Skarżysko Forest District” or „Mroczków” (Białobok 1986, Zaręba 1991b). The partially protected forest reserve covers 7.46 ha, comprising subsections 115i, 133b and 134a, b. The reserve was established to preserve the fragment of the mixed forest in which the Polish larch, *Larix decidua* var. *polonica*, occurred. The area became protected in the period between the world wars; the tree stands have not been subject to management since 1928. In 1938, its status as a strict reserve was formally approved. The forest finally became a partial reserve in 1953. The oldest larch individuals are 180 years old (Anonymous 1998a). Two fruitbodies of *F. officinalis* growing on 2 tree trunks were recorded in the reserve; two other fruitbodies lay on the ground.

- Modrzewie reserve (Fig. 3), (Małopolska Upland, Itza Foreland). The reserve, 5.08 ha, was established in 1971 to protect the natural oak-lime forest, bearing the characteristics of the oak-lime-hornbeam forest, in which the Polish larch occurred. The oldest larch trees are more than 220 years old (Anonymous 1998b). Two trees with 4 fruitbodies of *F. officinalis* were found in the reserve.

- Modrzewina reserve (Fig. 4), (Central Polish Lowlands, Rawa High Plain). The reserve, initially covering 7 ha, was founded in 1927. It was expanded to comprise an additional 60 ha during World War II. Since 1959, it has covered 332.15 ha, under partial protection. Modrzewina was established to preserve the mixed forest, bearing the characteristics of the primeval forest, with a large participation of the Polish larch whose oldest individuals are ca. 250 years old (Anonymous 1982, Urbaniak 1987, Zaręba 1991b, Chylarecki 2000). One tree with 1 dead fruitbody was recorded in the reserve.

- Chełmowa Góra protective area in the ŚNP (Fig. 5), (Małopolska Upland, Świętokrzyskie Mountains). Reserve protection of Chełmowa Góra, 163.1 ha, goes back to 1920. In 1950, the area became part of the Świętokrzyski National Park. Currently, 13.36 ha of Chełmowa Góra is under strict protection (part of sections A-2 and A-4), while the remaining part is under partial protection (Krzos 1996). Nine Polish larches with 18 fruitbodies *F. officinalis* were inventoried on Chełmowa Góra. Zaremba (1998) listed 5 trees with 8 fruitbodies, while Bujak (2002) located 8 trees with 13 fruitbodies.

- Świnia Góra reserve (Fig. 6), (Małopolska Upland, Suchedniowski Plateau). The reserve, established in 1938, is under strict protection. It covers 50.78 ha, including 32.18 ha delineated on a hill called Świnia Góra. The reserve borders were determined in 1953. The individuals of *Larix decidua* var. *polonica* occurring in the re-



Fig. 1. Contemporary localities of *F. officinalis* in Poland.

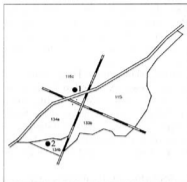


Fig. 2. Distribution of *F. officinalis* in the Ciechostowice reserve.

1 – sec. 116c; live tree, trunk circumference 305 cm, growing at a crossroad a few meters beyond the reserve border; live fruitbody (size: length 22, width 21, height 22 cm) in a crack in the trunk at the height of 0.5 m, on the S side; the place where a fruitbody was torn off visible below, the remains of the fruitbody lying under the tree indicative of the size similar to that of the growing fruitbody (Phot. 1), 08.07.2003.

2 – sec. 134b; live tree, trunk circumference 395 cm, with a longitudinal hollow between 4 and 6 m on the W side and numerous knobs on the trunk; fruitbody diam. ca. 12 cm growing at the height of 20 m, on the S side; another fruitbody (dim: ca. 20 x 15 x 15 cm), old, badly damaged, lying under the tree, 08.07.2003.

serve are characterised by low branching, typical of long crowns. The oldest individuals of the larches in the reserve are 130-180 years old (Anonymous 1995). During the investigation, 3 Polish larches colonised by *F. officinalis* were found. Six fruitbodies were recorded, three of which were live and three dead, lying on the ground. Łuszczynski (2000) found only 1 fruitbody; Bujak (2002) also located 1 tree with 1 fruitbody.

The revision has shown that *F. officinalis* occurs in 5 localities in Poland, exclusively in protected forest sites (4 ones in upland areas in the Świętokrzyskie Moun-

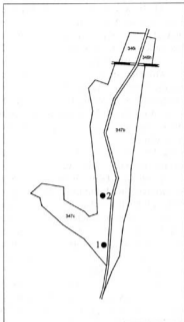


Fig. 3. Distribution of *F. officinalis* in the Modrzewie reserve.

1 – sec. 347c; windfall, 2.5 m tall, circumference 250 cm, standing a few meters from the Bałtów - Sienno road; two fruitbodies: one dead (diam: 8 x 5.5 x 7 cm) at the height of 1 m in the crack on the SW side, and one live (19 x 10.5 x 17 cm) at the height of 1.2 m on the E side (Phot. 2), 06.07.2003.

2 – sec. 347c; live tree, circumference 230 cm, with cracks and tears in the bark; one fruitbody (diam ca. 12 cm) at the height of ca. 7.5 m on the W side; the other fruitbody, diam. 10 cm, growing at the height of ca. 12 m on the NE side; 06.07.2003.

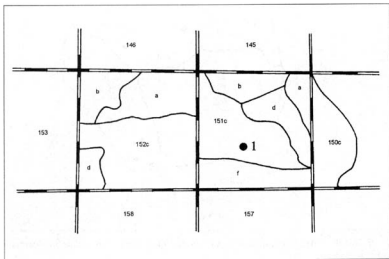


Fig. 4. Distribution of *F. officinalis* in the Modrzewina reserve.

1 – sec. 151c; live tree, circumference 300 cm; dead young fruitbody, ingrown together with a few smaller ones (dim: 27 x 17 x 12), at the height of 0.5 m, on the W side (Phot. 3), 16.08.2003. In 2002, a dead, strongly decomposed fruitbody was observed at the height of 0.5 m on the N side on the same tree.

tains; one in the lowlands). All the identified localities of *F. officinalis* are situated within the historical area of its occurrence in Poland; it has not been reported, however, from 3 localities (Ciechostowice, Bałtów and Modrzewina). 17 infected trees were recorded (11 live, 2 weakened, 4 dead) on which a total of 27 fruitbodies occurred, including 9 fruitbodies up to 5 m, 11 between 5 m and 10 m, and 7 above 10 m. Furthermore, 5 fruitbodies were found lying on the ground. The majority of the fruitbodies grew on the N-W side (Fig. 7). The larches on which fruitbodies of *F. officinalis* were recorded were usually of monumental size (tree circumference at 1.3 m was between 195 cm and 395 cm), and were some of the oldest trees in the studied forest areas. The age of the trees ranged between ca. 100 and 250 years, and more. Currently, the fruitbodies occurring on the roadside trees in the Ciechostowice and Bałtów reserves are most susceptible to damage.

The lack of areas suitable for the development of *F. officinalis*, i.e. old larch tree-stands growing under stress conditions, contributes to the occurrence of the fungus in a number of isolated forest areas in Poland. At the moment, Chelmowa Góra seems to be the best place for its growth. Krzos (1996) and Podlaski (2001) report a process of systematic deterioration of the health state of the larches in this area, caused by a high level of air pollution and a decrease in the level of the ground water table. Consequently, the number of infected larches in Chelmowa Góra will

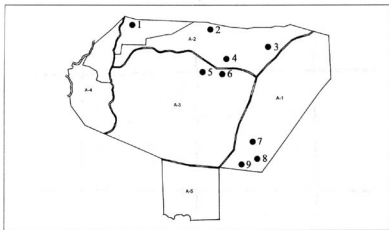


Fig. 5. Distribution of *F. officinalis* in the Chelmowa Góra protective area in the Świętokrzyski National Park.

1 – sec. A-2i; tree, circumference 240 cm, broken at the height of ca. 11 m; fruitbody (diam. ca. 18 cm) at ca. the height of 10 m, on the N side, 07.07.2003.

2 – sec. A-2a; weakened tree, circumference 380 cm; three fruitbodies: first fruitbody (diam. ca. 15 cm) at the height of ca. 6.5 m, on the SW side; second fruitbody (diam. ca. 10 cm) at the height of ca. 7.5 m, on the SW side; third fruitbody (diam. ca. 12 cm) at the height of ca. 10 m, on the N side, 07.07.2003.

3 – sec. A-2a; live tree with the top broken off, circumference 370 cm; one fruitbody (ca. 40 x 25 x 25 cm) growing at the height of ca. 7 m, on the NW side of the trunk, 07.07.2003.

4 – sec. A-2a; live tree, trunk circumference 250 cm; first fruitbody (diam. ca. 15 cm) growing in the place of a broken-off branch, at the height of ca. 7.5 m, on the W side, second fruitbody (diam. ca. 12 cm) is at the height of ca. 10 m, on the W side, 07.07.2003.

5 – sec. A-3b; live tree, circumference 305 cm; three fruitbodies on the N side of the trunk: a bracket fruitbody, diam. ca. 20 cm, visible at the height of ca. 9 m of the trunk; second fruitbody strongly elongated (cylindrical) at the height of ca. 10 m (ca. 12 x 10 x 35 cm); third fruitbody, diam. ca. 12 cm, situated at the height of ca. 11 m, 07.07.2003.

6 – sec. A-3b; live tree, circumference 270 cm; live fruitbody (23 x 16 x 13 cm), which developed in 2000, at the height of 1.5 m, on the N side, in the place where two fruitbodies, grown together with the tree fragment, were acquired by the staff members of the Department of Mycology and Forest Phytopathology, Warsaw Agricultural University, in 1997 (Phot. 4), 07.07.2003.

7 – sec. A-1j; live tree, circumference 390 cm, three-part top, three fruitbodies visible at the height of ca. 14-15 m; diam. of one fruitbody – ca. 15 cm; diam. of the other two – ca. 10 cm, on the NW side, 07.07.2003.

8 – sec. A-1j; dead tree, trunk circumference 240 cm; two fruitbodies: one live (22 x 22 x 11 cm), growing in a trunk crack at the height of 1 m, on the E side; dead fruitbody, diam. ca. 7 cm, visible on the NW side, at the height of ca. 3.5 m, 07.07.2003.

9 – sec. A-1j; live tree, trunk circumference 195 cm, bark slightly burnt in the tree butt section; remains of a damaged fruitbody at the height of 1 m in a shallow tree hollow on the N side, a place with another burnt fruitbody visible below, 07.07.2003.



Phot. 1. Fruitbody of *F. officinalis* on a larch growing a few meters beyond the border of the Ciechostowice reserve (Phot. J. Piętka).



Phot. 2. Fruitbody of *F. officinalis* on a windfall in the Modrzewie reserve in the vicinity of Baltów (Phot. A. Szczepkowski).



Phot. 3. Young, dead fruitbody of *F. officinalis* on a larch in the Modrzewina reserve in the vicinity of Grójec (Phot. A. Szczepkowski).



Phot. 4. Fruitbody of *F. officinalis* on a larch in Chełmowa Góra, developed in the place where the fungus was acquired for examination in 1997 (Phot. A. Szczepkowski).

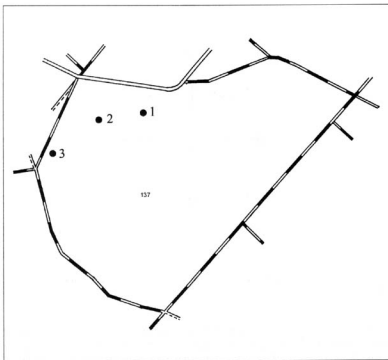


Fig. 6. Distribution of *F. officinalis* in the Świnia Góra reserve.

1 – sec. 137 (probably subsection i), live tree, trunk circumference 290 cm; two live fruitbodies: first one (ca. 25 x 15 x 20 cm) at the height of ca. 5.5 m, on the N side; second one, diam. ca. 10 cm, at the height of ca. 14 m, on the SW side, 08.07.2003.

2 – sec. 137 (probably subsection k), live tree, circumference 350 cm; one live fruitbody (6 x 5 x 3 cm) in a shallow hollow, at the height of 0.65 m, on the W side; old fruitbody (22 x 17 x 13 cm), dead, slightly damaged, lay on the ground beneath the hollow, 08.07.2003.

3 – sec. 137 (probably subsection m), dead tree, trunk circumference 310 cm, with the top broken off at the height of ca. 14 m; two badly damaged fruitbodies lying on the ground by the top, where the place of growth was identified and intense brown trunk rot was diagnosed, also visible at the top of the standing windfall, 08.07.2003.

increase in the nearest future.

The areas comprising *F. officinalis* should be placed under partial protection, geared towards purposeful conservation and preservation of larches, which are the only hosts of the fungus in Poland. The cutting of damaged, old or fallen trees hinders the development of this very rare fungal species. The results of this study could be used to help devise protection plans of the forest sites in which *F. officinalis* oc-

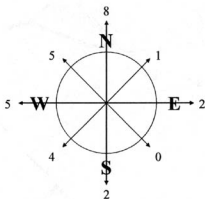


Fig. 7. Frequency of fruitbodies of *F. officinalis* on larch trunks in relation to geographical direction.

curs. The area in the direct vicinity of the Ciechostowice reserve where the infected tree grows should be included in the reserve, and the tree itself, situated at a cross-road, should be fenced off to prevent damage to the newly occurring fruitbodies of *F. officinalis*.

Active conservation forms could also be implemented to reinforce the small Polish population of *F. officinalis*. Translocation activities, including artificial infection of trees, initiated by the Department of Mycology and Phytopathology, Warsaw Agricultural University, in 1997, yielded highly promising results (Piętka 2003).

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Stanowiska *Fomitopsis officinalis* w Polsce

Streszczenie

Pniarek modrzewiowy *Fomitopsis officinalis* (Vill.: Fr.) Bond. et Sing. od 1983 znajduje się pod ochroną ścisłą, umieszczony został również na Czerwonej liście grzybów zagrożonych w Polsce, w kategorii E - gatunków wymierających. Ten posiadający uznane właściwości lecznicze gatunek notowany był w Polsce wyłącznie na modrzewiach. Stąd też w latach 1998-2003 dokonano lustracji 43 obiektów leśnych (w tym 41 rezerwatów), w których składzie gatunkowym wymieniany jest modrzew, w poszukiwaniu tego grzyba. Przeprowadzone lustracje wykazały, iż *F. officinalis* występuje w Polsce na 5 stanowiskach, wyłącznie w obiektach podlegających prawnej ochronie (4 na obszarze wyżynnym w rejonie Gór Świętokrzyskich, 1 na niżu Polski). Wszystkie stanowiska *F. officinalis* znajdują się na obszarze historycznego występowania tego grzyba w Polsce, z tym że 3 z nich (Ciechostowice, Bałtów oraz Modrzewina) nie były do tej pory podawane. Stwierdzono 17 porażonych drzew, na których występowało 27 owocników, znaleziono również 5 owocników leżących na ziemi. Przedstawiono frekwencję owocników *F. officinalis* na pniach modrzewi w zależności od kierunku geograficznego oraz wysokości. W pracy zamieszczono krótki opis obiektów

tów oraz szkice sytuacyjne z zaznaczonymi miejscami występowania grzyba, wraz z opisem owocników oraz drzew żywicielskich. Obecnie Chelmowa Góra wydaje się być najbardziej odpowiednim miejscem dla rozwoju pniarka modrzewiowego. W innych obiektach jego obecność jest w dużym stopniu zagrożona i ściśle wiąże się ze stanem zdrowotnym modrzewi. Rezerwat Ciechostowice powinien zostać powiększony o obszar z porażonym drzewem, rosnącym bardzo blisko granicy rezerwatu, przy skrzyżowaniu dróg, a teren wokół drzewa ogrodzony ze względu na fakt niszczenia pojawiających się owocników *F. officinalis*.

Obiekty, w których występuje *F. officinalis* powinny być objęte ochroną częściową, ukierunkowaną na świadome popieranie modrzewia. Jednocześnie w celu wzmocnienia bardzo małej polskiej populacji *F. officinalis* można również skorzystać z form czynnej ochrony.