CZECH MYCOL. 47 (4), 1994

Species of Taphrina on Populus in Slovakia

KAMILA BACIGÁLOVÁ

Institute of Botany, Slovak Academy of Sciences, Dubravská cesta 14, 842 23 Bratislava, Slovak Republic

Bacigálová K. (1994): Species of Taphrina on Populus in Slovakia. – Czech Mycol. 47: 277–283

The paper deals with the species Taphrina populina Fr. on Populus nigra L. as well as Taphrina johansonii Sadeb. on Populus tremula L. till now unsufficiently known from the Slovakian territory. The author presents some new data on biology, ecology and distribution of the fungi and their host plants. Ecological characteristics of new localities are described.

Key words: Taphrina, Populus, Slovakia, biology, ecology, distribution.

Bacigálová K. (1994): Druhy rodu Taphrina rastúce na topole na Slovensku. – Czech Mycol. 47: 277–283

Autorka uvádza v mykoflóre doteraz málo známe druhy Taphrina populina Fr. na Populus nigra L. a Taphrina johansonii Sadeb. na Populus tremula L. na Slovensku. Opisuje symptómy ochorenia hostiteľských rastlín, anatomicko-morfologickú charakteristiku húb, lokality ich výskytu a ich ekologickú charakteristiku.

The previous papers (Bacigálová 1992,1993) treated the phytopathogenic fungi *Taphrina* on *Alnus, Carpinus* and *Parageum montanum* as host plants in the ecological conditions of Slovakia. This paper completes the studied problem and presents basic information on *T. populina* and *T. johansonii* on *Populus*.

MATERIAL AND METHODS

Material was obtained from mycofloristic research in Slovakia and from existing herbarium items at the following institutes: Mycological Herbarium of the Slovak National Museum, Bratislava – BRA, Tatry National Park, Tatranská Lomnica – TNP, Moravian Museum, Brno – BRNM, Mycological Department of the National Museum, Prague – PRM, Department of Botany, Faculty of Natural Sciences, Charles University, Prague – PRC, and collected specimens of *Taphrina* deposited in the Herbarium of the Institute of Botany, Slovak Academy of Sciences, Bratislava – SAV.

For the identification of the fungi and their anatomical-morphological characteristic a method used earlier (Bacigálová 1992) was applied. An evaluation was made by help of a Zeiss "Amplival" microscope with microphotographic equipment.

The locations of the fungi and their host plants are arranged in maps. A list of locations grouped according to their phytogeographical classification (Futák 1966) was compiled.

All collected specimens of *Taphrina* are deposited in the Herbarium of the Institute of Botany, Slovak Academy of Sciences, Bratislava – SAV.

Notes: R. – river, B. – brook, surr. – surroundings

Fig. 1 Yellow convex-concave spots caused by *T. populina* on *P. nigra*.

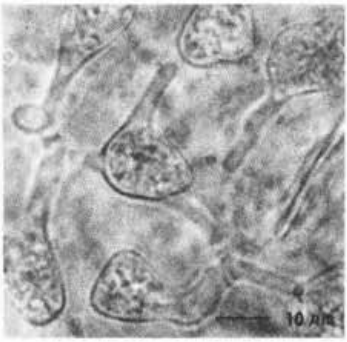

Fig. 2 Mycelium cells become enlarged to form ascogenous cells inthe subcuticular leaf layer.

Taphrina populina Fries, Syst. Mycol. 3:520.1832.

Symptoms. The fungus causes convex-concave golden yellow spots on the leaves of *Populus* (Fig. 1). They are often small (5-10 mm large), sometimes confluent and extensive involving half of the leaf blade. The yellow spots change to greyish-black, and remain as a scab on living leaves till leaf fall.

Anatomical and morphological characteristics. The vegetative mycelium is intercellular and subcuticular. The cells of the mycelium are thin, elongated and divided by layered septa which appear to be composed of several bands of cell wall material. The size of the cells increases and in the region between epidermal cells and leaf cuticle the cells become strongly thickened and are disintegrated into shapeless, later ovoid, thick-walled ascogenous cells (Fig. 2 and 3). During their further development the ascogenous cells increase in length and asci are formed (Fig. 4).

The asci are two-celled, cylindric, at the top rounded, at the base narrowed and attached to the host cells by a sheath (the rest of the outer ascogenous cell layer). The stalk cells are variable in form, often triangular wedge-shaped or bluntly

rounded (Fig. 4). The asci have gold yellow epiplasma. They measure 55-85 x 10-22 μm, mostly 65-70 x 15-17 μm. The stalk cells are 2.5-10 μm in diameter, most frequently 5-7.5 – 13-15 μm.

The asci have 8 ascospores. They are round or ellipsoid 4-6 x 3-4 μm, budding at once to fill the ascus with numerous blastospores.

The asci show size and form variability on different host species of Populus and the stalk cell may be present or not (Mix 1949). According to his opinion, it is possible to distinguish different asci for each host species, but variability in types growing on the same host species is not common. Our evaluations correspond with the mentioned opinion as well with the measurements of the following authors: according to Mix (1949), the asci are 30-122 x 13-30 μm, the stalk cells 4-27 x 8-32 μm, according to Salata (1974), the asci are 30-120 x 13-30 μm, most frequently 60-85 x 12-20 μm, the stalk cells triangular in form, 4-27 x 8-23 μm, according to Naidenov (1986), the asci are 48.6-113.8 x 13.8-42.1 μm, the stalk cells 3.9-41.2 x 8.2-16.7 μm.

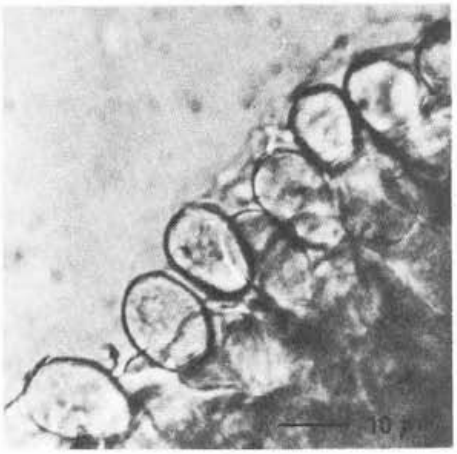

Fig. 3 Maturing thick-walled ovoid ascogenous cells.

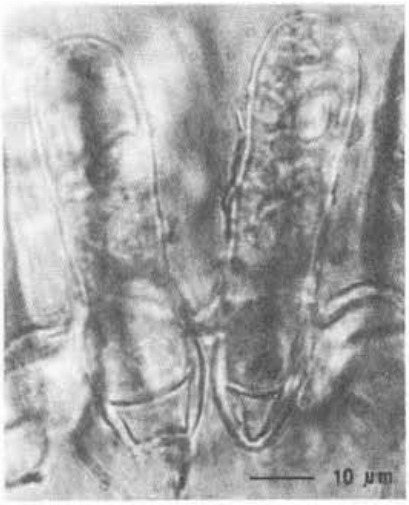

Fig. 4 Mature asci of *T. populina* with ascospores and blastospores.

Locations of the fungus and their ecological characteristics. *T. populina* was collected on *P. nigra* by Hazslinsky at Eperjes (Prešov) and by Bäumler at Pozsony (Bratislava) (Moesz 1939). Later the fungus was collected on P. pyramidalis by A.Kmeť in 1895 in the region Sitno, at Šipice (Štiavnické vrchy Mts.) (BRA), at Levoča by Greschik in 1918 and 1920 (BRA), on Populus sp. at Levoča by Greschik in 1923 (Jeschková 1957), and in Piešťany on *P. nigra* by Fuksa in 1920 (Jeschková 1957).

During our mycofloristic observations we found new locations of the fungus situated in Central, North and East Slovakia, occurring predominantly on solitarily

growing trees of P. nigra along rivers or roads. The fungus was not found on locations in the south and west of Slovakia, detected by Fuksa in 1920, or any other locations detected earlier by Bäumler in Poszony (Moesz, 1939) and Linhart in 1884 on *P. nigra* at Óvar (Mosonmagyaróvár) near Bratislava (TNP). The absence of the fungus can be explained by its possible reaction on rapid climate changes in the mentioned regions during the last 90 years such as decreasing precipitation and soil humidity, global warming – greenhouse effect, and other changes (Závodský et Závodská, 1992, Lapin, 1993). The suitable conditions for *T. populina* are a minimum humidity of 75% and a maximum temperature of 15-20 °C.

List of locations (Fig. 5): 6. Podunajská nížina Lowlands: Poszony, 1887; leg. Bäumler, (Moesz 1939). Piešťany, old park, 1920; leg. Fuksa, (Jeschková 1957). 14e. Štiavnické vrchy Mts.: Šipice 1895; leg. Kmeť, (BRA). 15. Slovenské rudohorie Mts.: Čierny Balog, 1992; Krásna hôrka Motel, Rožňavské Bystré, 1989; omnia leg. Bacigálová, (SAV). 18. Stredné pohornádie: Margecany near bridge, Jaklovce,surr. Hnilec R., 1989; leg. Bacigálová, (SAV). 19. Slánske vrchy Mts.: Kapušany near bridge, 1992; leg. Bacigálová, (SAV). 20. Vihorlat Mts.: Dúbrava, 1989; leg. Bacigálová, (SAV). 22. Nízke Tatry Mts.: Švermovo, along road, 1989; leg. Bacigálová, (SAV). 23. Vysoké Tatry Mts.: Podbanské along road, 1992; leg. Bacigálová, (SAV). 26b. Spišské kotliny: Levoča, 1918; 1920; 1921; leg. Greschik, (BRA), ibid. Greschik 1923; (Jeschková 1957), Poprad-Kvetnica,1989; leg. Bacigálová, (SAV). 28. Západné Beskydy Mts.: Zázrivá, surr. Zázrivka R., Zázrivá-Kozinská, Zázrivá-Minoľa, Kysucký Lieskovec, surr. Kysuca R., 1989; leg.Bacigálová, (SAV). 30a. Šarišská vrchovina Mts.: Eperjes (Prešov), leg. Hazslinszky, (Moesz 1939), Žipov, 1989; Prešov, 1989; 1992; omnia leg. Bacigálová, (SAV). 30b. Čergov Mts.: Ľubotnín, surr. Poprad R., 1989; leg. Bacigálová, (SAV). 30c. Nízke Beskydy Mts.: Chotča, 1989; Nižný Orlík, 1989; Nižná Polianka, 1989; 1992; Demjata B., Tulčik, 1992; Demjata-Raslavice, 1989; Smilno, 1989; omnia leg. Bacigálová, (SAV).

T. populina is wide-spread on various species of *Populus* in Europe, North America, China, Japan and India (Mix 1949). In Europe it was found on *P. balsamifera* L., *P. berolinensis* Dipp., *P. canadensis* Moench, *P. deltoides* Marsh., *P. nigra* L. and *nigra* cv. Italica in Norway (Gjaerum 1964), on *P. canadensis* Moench, *P. nigra* L., and *nigra* cv. Italica in Poland (Salata 1974), on *P. nigra* in Bulgaria (Naidenov 1986), in Ukraine (Zerova 1969), and on Sicilia (Venturella 1991). According to American authors (Faar et al. 1989) and authors from Georgia (Kolektiv 1986), the fungus also appears on Alnus species.

Taphrina johansonii Sadebeck, Jahrb. Hamb. Wiss. Anst. 8: 9.61-95.1890

Symptoms. The fungus causes yellow hypertrophied enlargements of ovaries and all catkins of *Populus tremula* L.

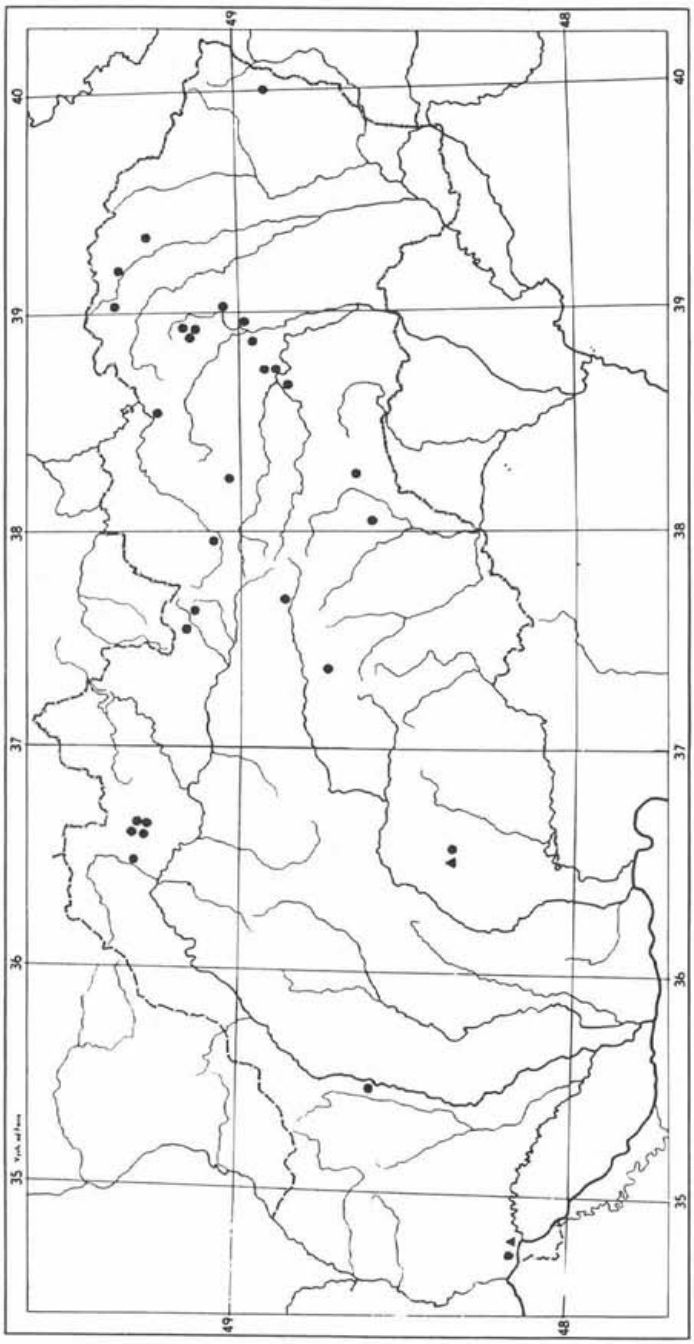

Fig. 5 Distribution map of *T. populina* on *P. nigra* – ● and *T. johansonii on P. tremula* ▲

Taphrina johansonii was collected on *P. tremula* by Bäumler in 1889 in the Malé Karpaty Mts. near Bratislava (PRC), in Pozsony, in 1897, and by Tuzson in Vihnye (Vyhne) (Štiavnické Mts.), Moesz (1939). During our mycofloristic observations no other new location of this fungus was found, and we had no possibility to observe authentic infected material from Slovakian territory.

T. johansonii was found parasitizing on *P. tremula* in Bulgaria (Naidenov 1986) and in Georgia (1986). A few locations are known from Poland (Salata 1974, 1975) and from Norway (Gjaerum 1964). The fungus occurs on *P. grandidentata* Michx. and on *P. tremuloides* Michx. in North America and on *P. sieboldii* Miq. in Japan (Salata 1974).

SUMMARY

New data on the biology and ecology of *Taphrina populina* Fr. on *Populus nigra* L. and *Taphrina johansonii* Sadeb. on *Populus tremula* L. including a list of locations in Slovakia are given. The contemporary occurrence of *T. populina* Fr. predominantly in north-east Slovakia points out that climate conditions – lower temperature and higher humidity – are favorable in this region. We suppose that booth *Taphrina* species prove to be sensitiv to environmental changes.

A c k n o w l e d g e m e n t s

The author is grateful to Mrs. G. Vosátková for her technical assistance.

REFERENCES

BACIGÁLOVÁ K. (1992): Taphrina potentillae (Farl.)Johans. on Parageum montanum (L.) Hara, a new species in Slovakia. – Čes. Mykol. 46 (1-2): 138-142.

BACIGÁLOVÁ K. (1993): New localities of Taphrina carpini (Rostr.) Johans. on Carpinus betulus L. in Slovakia. – Čes. Mycol. 46 (3-4): 296-302.

BACIGÁLOVÁ K. (1993): Species of Taphrina Fr. on Alnus in Slovakia. – Czech Mycology, in press.

FARR D. F., BILLS G. F., CHAMURIS G. P. and ROSSMAN A. Y. (1989): Fungi on plants and plant products in the United States. – APS Press USA, 986-987.

FUTÁK J. (1966): Fytogeografické členenie Slovenska. – In: Futák et all., Flóra Slovenska I. Vyd. SAV, p. 533-538.

GJAERUM H. B. (1964): The genus Taphrina in Norway. – Nytt Mag. Bot., 11:5-26.

JESCHKOVÁ R. (1957): Studium řádu Taphrinales ČSR. – Diplomová práce, Přírodovědecká fakulta University Karlovy, Praha, 109 p.

KOLEKTIV (1986): Flora sporovych rastenij Gruzii. – Tbilisi, 885-886.

LAPIN M. (1993): Possible impacts of climate change upon water balance in Slovakia. – In: A. Backer et al., Evaporation, water balance and deposition. Proc. of Symp. on Precipitation and Evaporation, Vol. 3 Bratislava, Slovakia, 20-24. September, 1993., p.195-200.

MIX A. J. (1949): A monograph of the genus Taphrina, – Univ.Kans. Sci. Bul. 33: 3-167.

MOESZ G. (1939): Fungi hungariae III. Ascomycetes 1., – Annales Mus. Nat. Hungarici, XXXII. Pars Botanica, 10-14.

NAIDENOV Y. (1986): Distribution of certain species from Taphrina Sadeb. genus on the forest vegetation in this country. – Gorskostopanska nauka, 5: 35-40.

SALATA B. (1974): Grzyby Tom VI. Szpetkowe-Taphrinales. – Panstwowe Wydawnictwo Naukowe, Warszawa-Kraków, 87 p.
SALATA B. (1975): Rozmieszczenie geograficzne szpetkowych (Taphrinales) w Polsce. – Acta Mycol. 11: 23-48.
VENTURELLA G. (1991): A check-list of Sicilian fungi. – Bocconea 2: 47-48.
ZÁVODSKÝ D. and ZÁVODSKÁ E. (1992): Kvalita ovzdušia a zmeny klímy. – Národný klimatický program ČSFR, Praha, 5-50.
ZEROVA D. N. (1969): Vyznačnik gribov Ukrainy Tom II, – Kijev, 24-32.