

New localities of *Taphrina carpini* (Rostr.) Johans. on *Carpinus betulus* in Slovakia

Nové lokality *Taphrina carpini* (Rostr.) Johans. na *Carpinus betulus* na Slovensku

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Taphrina carpini (Rostr.) Johans. till now not very well-known species of the genus *Taphrina* is recorded on *Carpinus betulus* in oak hornbeam forest community in Slovakia. The author presents some new data from the field of biology, ecology and distribution of the fungus and its host plants in Slovakia. The ecological characteristics of new localities are also described.

Je popísaný na Slovensku doteraz málo známy druh rodu *Taphrina* Fr., *Taphrina carpini* (Rostr.) Johans. (Grmanik hrabový) na *Carpinus betulus* (Hrab obyčajný) v dubovo-hrabovom lesnom spoločenstve. Sú opísané symptómy, anatomicko-morfologická charakteristika patogéna ako aj nové lokality výskytu huby na Slovensku a ich ekologická charakteristika.

By the study on biology, ecology and distribution of the species of the genus *Taphrina* sp. and their host plants in Slovakia territory during the period 1987-1991, we observed the occurrence of *T. carpini* (Rostr.) Johans. on *C. betulus* in oak-hornbeam forests.

Taphrina carpini was reported for the first time in Slovakia by A. Kmeť in 1887 in Štiavnické Mts. (Herbarium of Slovak National Museum, Bratislava). The survey of further localities of the fungus occurrence in Czechoslovakia on the base of herbarium specimens was published by Jeschková (1957). In spite of the fact that the Slovak territory lies in the middle of area of oak-hornbeam forest distribution, the occurrence of *Taphrina carpini* is recorded only sporadically. Though the mentioned fungus does't belong to the serious phytopathogenic agents, it is necessary to know its biology and ecology. It is possible that under some conditions this fungus may have an unfavourable influence on the production of biomass of host plants or on their estetical appearance in some localities.

Infection symptoms: The biotrophic pathogen *T. carpini* causes "Witches brooms" on host plants which have character of the nests or shrubs. They consist of thin, differently long, clustered branches growing closely on end twigs, limbs (fig. 1a) or on tree trunks (fig. 1b). The surface of leaves of infected branches of "Witches brooms" is enlarged and swollen either on the entire leaves or on some parts of the leaves. They have a pale green colour, the leaf tissues are thin and water-soaked. The lower parts of the leaves are covered by fungal asci as a white cover. In this stage the leaves are rolling convexly and in the consequence of hypertrophy and hyperplasia of leaf tissues they dry, turn brown, and remain on the twigs till the autumn (fig. 2).

Anatomical and morphological characters of the fungus

The thin cross and longitudinal sections were made by the aid of blade from naturally infected leaves and twigs of *Carpinus betulus* and then observed in the drop of 50% lactic acid. The evaluation was made by the help of interferential microscope "Amplival" with microphotographic equipment and by the help of raster microscope JEOL 35 (Japan) at voltage 25 kV.

Our studies revealed that mycelium of *T. carpini* may infect all parts of the young twigs, buds and leaves of *C. betulus* as an intercellular parasite. The mycelium is found between the cells of the bark of 1 - year old branches in "witches brooms" (fig. 3a), in bud scales and in young leaves growing from buds (fig. 3b). The vegetative mycelium forms elongated, cylindrical cells divided by layered septa, and contains one or two nuclei. It follows the vessels and spaces between palisade or spongy cells and more frequently a layer between cuticle and epidermis. Their size changes in dependence on intercellular spaces of host parenchyma. In region between the epidermal cells and the leaf cuticle, the mycelial cells have become much thickened and being packed together and become cuboidal in form (fig. 4a). At this stage thick - walled ascogennous cells are forming (fig. 4b). During their further development the cuticle is ruptured and the fungal cells increase in length and form asci (fig. 5a).

The asci are one - celled, oval, in the apical part rounded, in the basal part broadened and attached to the host cells by the sheath (the rest of outlayer) (fig. 5b). The hypogenous asci of the fungus are 17,5-30 x 10-15 μm (the most frequently 20-25 x 10-12,5 μm).

According to Mix (1949) they are 20-30 x 7-14 μm ; 17-32 x 9-15 μm according to Gjaerum (1964) and 20-30 x 8-14 μm and most frequently 23-27 x 10-12 μm according to Sařata (1974). The asci have 8 ascospores. They are oval or round 3,5-5,5 x 3,5-5 μm , they are budding into blastospores of ovoid size, 2,5-3,5 x 2-3 μm . Later they reach the size of ascospores.

On the base of literature data (Mix 1949, Jeschková 1957, Gjaerum 1964, Zerova 1969, Sařata 1974, Najdenov 1986), *T. carpini* parasitizes on *C. betulus* in European countries and in Russian Gruzija. According to Mix (1949) *T. carpini* appears on *Carpinus orientalis* in Soviet Russia and Sweden. Farr et al. (1989) report occurrence of *Taphrina australis* (Atk.) Giesenh on *Carpinus* spp. in Northern America.

We found some new localities of the fungus in Slovak territory. They are situated in southern regions of Slovakia in Carpathian oak-hornbeam forest. In south-western Slovakia (Malé Karpaty Mts. and Devinska Kobyla Hill) the localities of the fungus reach the altitude 750 m above s. l. and in south- eastern region of Slovakia (Slovenský kras) the altitude 475 m a. s. l. The localities of the fungus occurrence in Slovak territory are illustrated on the map (fig. 6).

With regard to the occurrence of the fungus in warmer southern regions of Slovakia, the temperature is limiting factor determining occurrence of the fungus and the host plant. This fact was also recorded in literature data from Poland, Bulgarian and Ukraine (Sařata 1979).

All collected herbarium specimens are preserved in the Institute of Botany, Slovak Academy of Sciences, Bratislava.

Summary

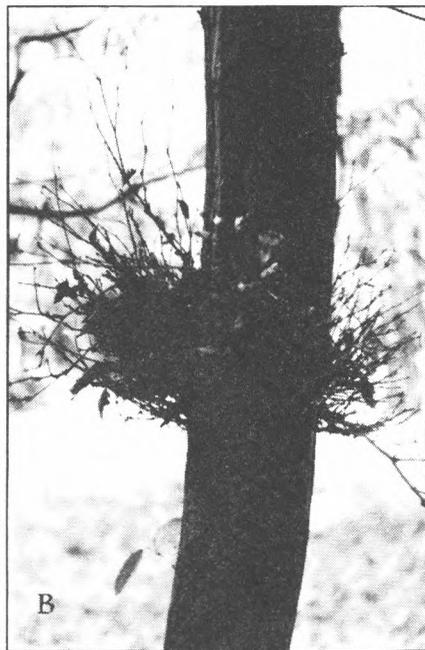
The new knowledge on the biology and ecology of the pathogenic fungus *Taphrina carpini* (Rostr.) Johans. in Slovak territory was obtained, and some new localities of its occurrence on *Carpinus betulus* in oak-hornbeam forest in Slovakia were recorded. The link-up of its occurrence to ecological conditions of low highland (altitude 300-800 m a. s. l.) in southern regions of Slovakia points out that the temperature is a limiting factor of its occurrence in Slovakia territory.

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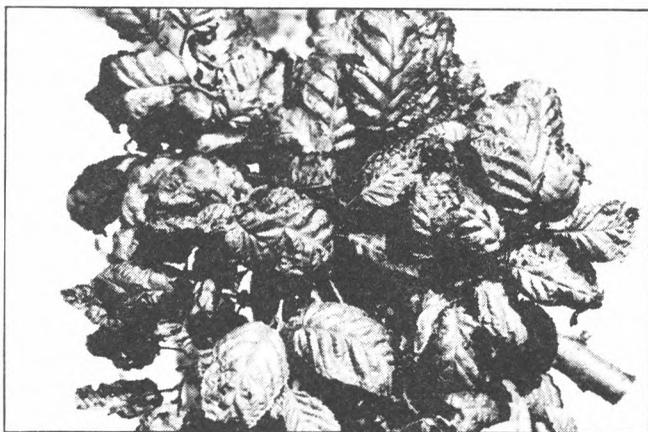
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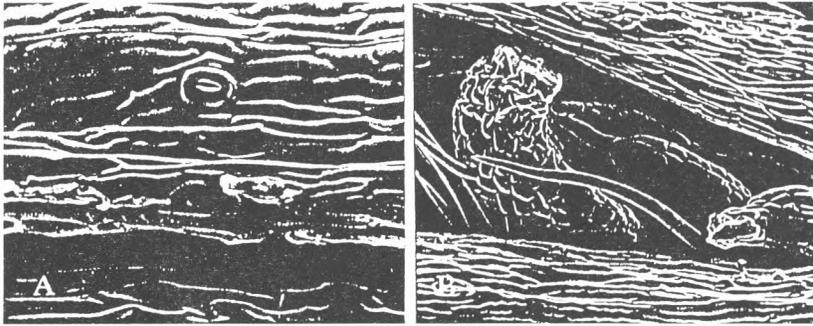
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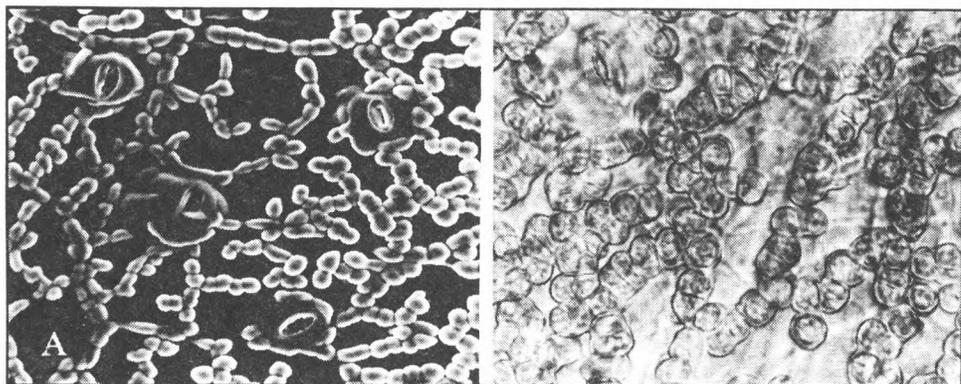
1a, b. The "witches brooms" caused by *Taphrina carpini* on *Carpinus betulus*.



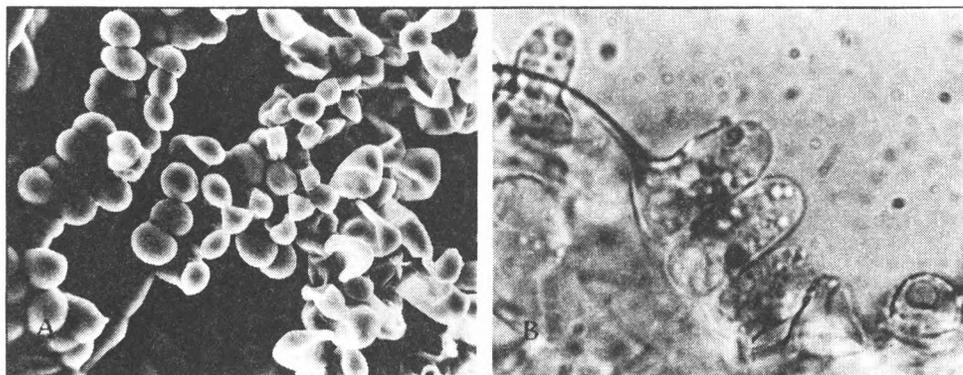
2. The infected leaves of "witches brooms" remain dry on the twigs till the autumn.



3. Mycelium of *Taphrina carpini* in "witches brooms" on *Carpinus betulus* a) under the bark of twigs x 400; b) under the cuticle of scales of leaf buds x 400.



4. Thick-walled ascogenous cells of *T. carpini* in subcuticular layer of *C. betulus* leaves a) x 400; b) x 800.



5. a) The outer layer of ascogenous cells ruptures and the ascus is growing up x 860; b) The asci of *T. carpini* with ascospores x 1200.

6. The map of localities of *T. carpini* on *C. betulus* in Slovakia;
 ▲ - herbarium data in relation to fungus occurrence
 △ - the new fungus localities.

