

## Occurrence of fungus *Cryphonectria parasitica* (Murr.) Barr on oak trees in the Carpathian-basin

Gábor Tarcali<sup>1</sup>, László Radócz

Department of Plant University of Debrecen, Centre for Agricultural Sciences, Protection,  
Böszörményi str. 138., H-4032 Debrecen, Hungary,

<sup>1</sup>E-mail: tarcali@agr.unideb.hu

### Abstract

TARCALI, G., RADÓCZ, L. 2006. Occurrence of fungus *Cryphonectria parasitica* (Murr.) Barr on oak trees in the Carpathian-basin. *Folia oecol.*, 33: 129–132.

“Chestnut blight“ caused by the fungus *Cryphonectria parasitica* (Murr.) Barr is the most important disease of *Castanea* spp. in Europe. In the 20-th century, this serious disease caused serious damage to chestnut populations throughout the world, including the Carpathian-basin. Towards the end of the last century, typical blight symptoms were observed on oak trees in several other European countries as well, and the fungus was also detected on some young *Quercus petraea* trees in Hungary. We studied the manifestation of *C. parasitica* on oaks, in several regions across the Carpathian-basin. Our examinations confirmed that the blight fungus has infected several oak trees in Romania and in Hungary, and potentially it could be a serious disease agent for the oak species.

### Key words

*Cryphonectria parasitica*, *Castanea sativa*, *Quercus petraea*

### Introduction

*Cryphonectria parasitica* (Murr.) Barr (syn: *Endothia parasitica* [Murr.] And.) is a very important pathogen of the *Castanea* species. At the beginning of the twentieth century, this fungus killed almost all American chestnut (*Castanea dentata*) populations in the USA (ANAGNOSTAKIS, 1987). At the middle of the century, it was also for the first time recorded in Europe, in an European chestnut (*Castanea sativa*) forest near Genova – Italy, 1938 (BIRAGHI, 1946), and later it caused the “Chestnut blight“ disease spreading across the continent.

In Europe, *C. parasitica* spread epidemically and heavily infected the chestnut stands. Then symptoms of the fungus were detected in the Carpathian basin, including Hungary (KÖRTVÉLY, 1970), Austria (DONAUBAUER, 1964), Slovakia (JUHÁSOVÁ, 1976), Romania (FLOREA and POPA, 1989) and Ukraine (RADÓCZ, 2001).

Towards the end of the last century, typical symptoms of “Chestnut blight“ were observed on some oak trees in the USA and in some South European countries (TORSELLO et al., 1994). In Hungary, *C. parasitica* was

detected on *Castanea sativa* only since 1998. But later there were found some young *Quercus petraea* trees showing typical blight symptoms in mixed chestnut-oak forests at Zengővárkony and Kőszeg (RADÓCZ and HOLB, 2002). Although these symptoms were not such serious on *Quercus petraea* as on *Castanea sativa*, it seems that *Cryphonectria parasitica* became a new serious threat for young oak trees in the Carpathian basin, mainly in heavily infected chestnut forests. The first observation of fungus *C. parasitica* on oak trees was reported by JUHÁSOVÁ and LEONTOVYČ (1996), JUHÁSOVÁ et al., 2002.

We made field investigations in South Hungary and in North-West Romania with the aim to find blight symptoms on oaks. During the field works, bark samples were collected for laboratory examinations and identifications. The main goals of our studies were the following:

- o Investigation of damages caused by *C. parasitica* on oak trees
- o Analysis of the collected samples and testing the isolates in laboratory.

## Material and methods

Field examination was done in two different regions of the Carpathian-Basin (North-West Romania, at the town of Baie Mare, and South Hungary in the Mecsek-Mountain by the Bakonya village – Fig. 1) in chestnut-oak mixed forests. During the field works, we either investigated all oak trees in the examined populations, or we selected a sampling plot with definite number of oak trees and examined only these trees. Bark samples for laboratory identifications and further examinations were collected from the infected or suspect trees with a sterile sharp scalpel.

PDA (potato-dextrose-agar) media were used in the laboratory examinations. Surface sterilized bark samples were cultivated on the PDA media and the isolates were incubated for 7 days in an acclimatising chamber. Then, there were done tests of vegetative compatibility, in which the isolates were paired to study their compatibility. Finally, the pure cultures of isolates were paired with the EU-tester strains with the aim to classify their Vegetative Compatibility Groups (VCG-s). Those isolates that formed a visible barrage zone at the edge of their growing mycelia were classified into different VCG-s.

## Results and discussion

### Examinations in South-Hungary

In 2004, we made field examinations in four chestnut-oak mixed populations on the south oriented slopes of the Mecsek-Mountain (1. Bakonya I., 2. Bakonya II., 3. Boda, 4. Hetvehely), with the chestnut trees infected by the chestnut blight fungus. We checked 150 randomly selected oak trees in all growing areas, and examined them for blight symptoms.

Table 1. The number of the oak trees infected by *C. parasitica* and the infection rates in the South-Hungarian examined sites

Test site	Number of examined trees	Number of infected trees (by <i>C. parasitica</i> )	Infection rate (%)	EU-strain (EU 1-31)
BAK I.	150	40	26.66	Not identified
BAK II.	150	0	0	–
BO	150	0	0	–
HET	150	0	0	–

BAK – Bakonya, BO – Boda, HET – Hetvehely

Symptoms of the pathogen were found on sessile oak trees in only one of the examined areas (Bakonya I.). Oak trees in the other studied populations were healthy (Bakonya II., Boda, Hetvehely) as it is shown in Table 1.

A test site with 150 oak trees was established in the forest with infected oak trees by the Bakonya village (04. 07. 2004). Since then, all trees in the test site were checked yearly, so we accomplished 3 examinations: in 2004, 2005 and 2006. We could observe progressive increase in number of infected oak trees in the examined test site. The results of the yearly surveys are presented in Table 2. It was also detected that the symptoms of the fungus were aggravated with the time (Table 3).

Table 2. The number and the rate of the oak trees infected by *C. parasitica* in Bakonya I. test site

Time of field-examination (at Bakonya I.)	Number of examined trees	Number of infected trees (by <i>C. parasitica</i> )	Infection rate (%)
2004. 12. 07.	150	40	26.66
2005. 11. 10.	150	51	34.0
2006. 09. 28.	150	52	34.6

Table 3. Symptoms of *C. parasitica* fungus on the trees according to the infection rate classification system

Infected tree number	Infection	Infected tree number	Infection
BAK I.	2ab	67.	3b
6.	4a	73.	4ab
7.	5	80.	4a
8.	5	81.	4b
12.	2ab	86.	4ab
17.	2ab	87.	3ab
19.	2b	88.	4ab
20.	3b	89.	3ab
21.	2b	91.	5
23.	3ab	93.	3ab
24.	4ab	96.	2b
30.	2ab	97.	3ab
31.	2b	99.	5
33.	3ab	100.	3b
34.	2ab	109.	4ab
35.	3ab	110.	3ab
38.	4ab	116.	3b

Table 3. Continued

Infected tree number	Infection	Infected tree number	Infection
41.	5	118.	4ab
49.	3ab	119.	4ab
50.	2ab	126.	3ab
53.	5	132.	4ab
55.	5	137.	5
56.	4ab	145.	4ab
62.	3ab	148.	2a
63.	3ab	149.	3ab
66.	2b	150.	4ab

2 – a – suspect symptom in the crown of the tree

2 – b – suspect symptom on the trunk of the tree

3 – a – 1 cancer symptom in the crown

3 – b – 1 cancer symptom on the trunk

4 – a – more cancers in the crown

4 – b – more cancers on the trunk

5 – killed tree by *C. parasitica*

### Examinations in North-West Romania

Field examinations were done in 2004 and 2005, near the town of Baie Mare in five different chestnut populations with admixture of several oak trees (1. site – Baie Mare-Tautii de S., 2. – Baie Mare-Köbánya, 3. – Baie Mare-Borpaták, 4. – Baie Mare-Veresvíz, 5. – Tautii Magheraus). During the field studies it was observed that chestnut trees were infected by *Cryphonectria parasitica* in all the examined sites. Apart from this, there were found several infected young oak trees in three chestnut growing areas. In two other sites, no infected oak trees were detected until 2005, as it can be seen in Table 4.

Table 4. Results of field examinations in chestnut-oak mixed populations near Baie Mare town, North-West Romania

Test site	Number of examined trees	Number of infected trees	Infection rate (%)	EU-strain (EU 1-31)
BM-TS	20	2	10	EU-12
BM-K	50	0	0	–
BM-B	20	0	0	–
BM-V	50	6	12	EU-12
TM	50	18	36	EU-12

BM-TS – Baie Mare Tautii de S., BM-K – Baie Mare- Köbánya, BM-B – Baie Mare-Borpaták, BM-V – Baie Mare-Veresvíz, TM – Tautii Magheraus.

The laboratory examinations confirmed that *Cryphonectria parasitica* has infected several oak trees in Romania and in Hungary. However, the infected oak trees only occurred in populations mixed with chestnut. The fungus has not hitherto caused such serious injuries to oaks as to the chestnut trees, but in future it may turn to a serious endangering agent for the oak species in the Carpathian-basin.

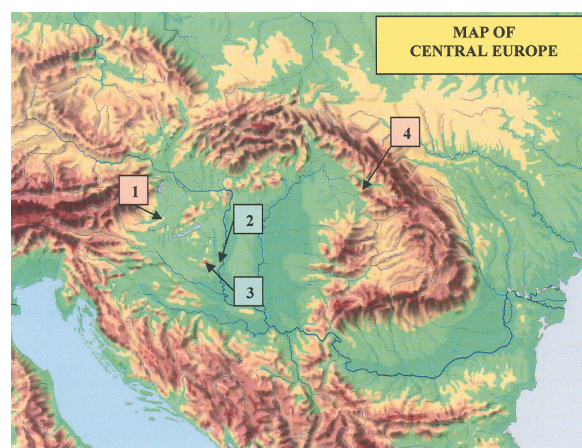


Fig. 1. Map of Central-Europe with the examined sites 1 – Kőszeg, 2 – Zengővárkony, 3 – South-Hungarian study sites, 4 – Romanian study sites

### References

- ANAGNOSTAKIS, S. L. 1987. Chestnut blight: The classical problem of an introduced pathogen. *Mycologia*, 79: 23–37.
- BIRAGHI, A. 1946. Il cancro del castagno da *Endothia parasitica*. *Ital. Agric.*, 7: 406–412.
- DONAUER, E. 1964. Untersuchungen über die Variation der Krankheitsanfälligkeit verschiedener Pappeln. *Mitt. Forstl. Bundesvers.-Anst. Mariabrunn*, p. 70–120.
- FLOREA, S. POPA, I. 1989. Diseases of the edible chestnut reported in the fruit growing area of Baie Mare. In *Cercetarea stiintifica in sluibă productiei pomicole 1969–1989*. Bucuresti, Romania. 365–372.
- JUHÁSOVÁ, G., 1976. A summary of knowledge on fungal diseases of Spanish chestnut in Slovakia. *Forestry*, 38: 449–460.
- JUHÁSOVÁ, G., LEONTOVYČ, R. 1996. Rakovina kôry gaštana jedlého a dubov [Chestnut blight diseases on chestnuts and oaks]. *Les*, 8: 12–13.
- JUHÁSOVÁ, G., KOBZA, M., LEONTOVYČ, R. 2003. Nové ohrozenie dubov karanténou hubou *Cryphonectria parasitica* (Murr.) Barr na Slovensku. [New oak endangering by the quarantine fungus *Cryphonectria parasitica* (Murr.) Barr in Slovakia]. In *Ochrana lesa 2002: zborník z medzinárodnej konferencie*

- usporiadanej pri príležitosti 195. výročia lesníckeho vysokoškolského štúdia na Slovensku a 50. výročia pôsobenia Technickej univerzity vo Zvolene. Zvolen: Technická univerzita, p. 103–106.
- KÖRTVÉLY, A., 1970. A gesztenye endotíás kéregelhalása [Bark destruction caused by *Endothia parasitica* (Murr.) Anderson on chestnut trees]. *Növényvédelem*, 6: 38–361.
- RADÓCZ, L., 2001. Study of subpopulations of the chestnut blight (*Cryphonectria parasitica*) fungus in the Carpathian-basin. *For. Snow Landsc. Res.*, 76 (3): 368–372.
- RADÓCZ, L., HOLB, I. J. 2002. Detection of natural infection of *Quercus* spp. by the chestnut blight fungus (*Cryphonectria parasitica*) in Hungary. *Int. J. Hort. Sci.*, 8 (2): 54–56.
- SIVANESAN, A., HOLLIDAY, P. 1981. Incidence of *Cryphonectria parasitica* cankers on scarlet oak (*Quercus coccinea*) in Pennsylvania. *Pl. Dis.*, 78: 313–315.
- TORSELLO, M. L., DAVIS, D. D., NASH, B.L. 1994. Incidence of *Cryphonectria parasitica* cankers on scarlet oak (*Quercus coccinea*) in Pennsylvania. *Pl. Dis.*, 78: 313–315.

## Výskyt huby *Cryphonectria parasitica* (Murr.) Barr na duboch v Karpatskej kotline

### Súhrn

Huba *Cryphonectria parasitica* je najvýznamnejší pôvodca ochorenia druhov rodu *Castanea* spp. v Európe. Je pôvodcom rakoviny kôry gaššana jedlého a spôsobuje vážne škody vo všetkých pestovateľských oblastiach gaššana jedlého vo svete. V polovici 20. storočia sa choroba objavila aj v strednej Európe a huba sa za niekoľko desaťročí stala hlavným patogénom gaššana jedlého (*Castanea sativa* Mill.) v takmer všetkých pestovateľských oblastiach. Huba sa do Karpatskej kotliny dostala v poslednej tretine minulého storočia. Najprv bola zaznamenaná v Maďarsku, neskôr aj na Slovensku, aj v týchto krajinách spôsobila obrovské škody.

Na konci minulého storočia sa pozorovali typické rakovinové rany aj na duboch v mediteránnych krajinách, neskôr na Slovensku aj v Maďarsku. Doteraz bola huba zistená predovšetkým na mladých duboch v zmiešaných alebo susediacich s porastmi gaššana jedlého. V práci sú uvedené výsledky rozšírenia huby *C. parasitica* na duboch v jednotlivých porastoch v Karpatskej kotline a zhodnotenie škôd, ktoré spôsobuje.

Terénny výskum sme robili v južnom Maďarsku, resp. Severnom Erdélyi v okolí Nagybánya v zmiešaných porastoch gaššana jedlého s dubmi. Zistili sme, že huba v menšej alebo väčšej miere napadla aj duby v oboch oblastiach, a to dub zimný (*Quercus petraea*) a bola zistená aj na mladom dube *Quercus petraea* v Maďarsku. Študovali sme hubu *C. parasitica* na duboch vo viacerých regiónoch v Karpatskej kotline. Naš výskum potvrdil, že huba infikovala niekoľko dubov v Rumunsku a v Maďarsku a potenciálne predstavuje závažnú chorobu druhov rodu *Quercus*.

V pohorí Mecsek sledujeme štyri porasty na juhozápadných svahoch, z ktorých sme hubu *C. parasitica* na duboch identifikovali len v jednom poraste. Výskumnú plochu sledujeme od 7. októbra 2004 pravidelne každý rok a zistili sme, že počet infikovaných stromov rastie z roka na rok.

V okolí Baie Mare sme sledovali 5 lokalít, z nich na troch sme našli napadnuté mladé duby zimné (Tabuľka 4). Výsledky laboratórnych prác potvrdzujú, že ten istý kmeň huby (EU-12), ktorý intenzívne ničí gaštany, infikoval aj duby.

Výsledky našej práce poukazujú na to, že huba *C. parasitica* sa stala vážnym potenciálnym patogénom dubov. Ochorenie nespôsobovalo doteraz také škody na duboch ako na gaštane jedlom, ale potenciálne treba počítať s tým, že v budúcnosti sa môžu škody stupňovať aj na duboch.