

## "CHESTNUT BLIGHT" FUNGUS - A NEW POTENTIAL DANGER FOR OAK TREES IN THE CARPATHIAN-BASIN

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### Abstract

„Chestnut blight” fungus is the most important disease for *Castanea* spp. in Europe. This serious disease caused big damages on chestnut populations throughout the world, including the Carpathian-basin in the XX-th century. At the end of the last century typical blight symptoms were observed on some oak trees too in several countries, and the fungus was detected on some young *Quercus petraea* trees in Hungary too. We studied on the examination of *C. parasitica* on oaks, in many regions of the Carpathian-basin. Our examinations confirmed that blight fungus infected several oak trees in Romania and in Hungary, and potentially it could be a serious disease for oak species.

**Key words:** Chestnut blight fungus, oak trees

### INTRODUCTION

*Cryphonectria parasitica* (Murr.) Barr (syn: *Endothia parasitica* [Murr.] And.) is an introduced pathogen for *Castanea* species in North-America and Europe. This parasite destroyed almost the whole American chestnut (*Castanea dentata*) populations in the USA at the beginning of the last century (Anagnostakis, 1987). Later it was reported in Europe too from a European chestnut (*Castanea sativa*) forest in Italy near Genova in 1938 (Biraghi, 1946), and it caused the "Chestnut blight" disease in the continent. In Europe the fungus spread epidemically and heavily infected the chestnut stands. Then *C. parasitica* symptoms were detected on the Carpathian-Basin, including Hungary (Körtvély, 1970), Slovakia (Juhasova, 1976), Romania (Florea, Popa, 1989) and Ukraine (Radócz, 2001).

At 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).

The fungus was detected in Hungary on *Castanea sativa* only until 1998. But then some young *Quercus petraea* trees were found in mixed chestnut-oak forests which showed typical symptoms of chestnut blight at Zengővárkony and Kőszeg (Radócz, Holb, 2002).

Although blight symptoms were not so serious on *Quercus petraea* than *Castanea sativa*, it seems that *Cryphonectria parasitica* become a new

serious threaten for young oak trees in the Carpathian-Basin mainly in heavily infected chestnut forests.

We made some field investigations on different places of the Carpathian-Basin (South-Hungary, North-West-Romania and Carpathian-Ukraine) to find blight symptoms on oaks. During the field works bark samples were collected for laboratory examinations and identifications. Main goals of our studies were investigating damages caused by *C. parasitica* on oak trees, analysing the collected samples and testing the isolates in laboratory.

## **MATERIALS AND METHODS**

Field examination were done on three different region of the Carpathian-Basin, in North-West-Romania at the town of Baia Mare, in Carpathian-Ukraine near Uzhgorod and Munkacevo and in South-Hungary on the Mecsek-Mountain near Bakonya willage in chestnut-oak mixed forests. During the field works we investigated all of the oak trees in the examined populations, or we selected a sample-field with definded number of oak trees and those trees were examined only. Bark samples were collected from the infected or suspicious trees by a disinfected sharp scalpel for laboratory identifications and further examinations.

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

## **RESULTS AND DISCUSSION**

### Examinations in North-West Romania:

Field examinations were done in 2004 and 2005 near the town of Baie Mare on five different chestnut populations which were mixed several oak trees (1. site- Baia Mare-Tautii de S., 2.- Baia Mare-Kőbánya, 3.- Baia Mare-Borpatak, 4.- Baia Mare- Veresvíz, 5.- Tautii Magherus). It was detected during the field studies, that chestnut trees were infected by *Cryphonectria parasitica* on all examined sites. Besides there were found some infected young oak trees on three chestnut growing areas. On two other sites any infected oak trees were not detected until 2005, as it is illustrated in Table 1.

Table 1

**Results of field examinations in chestnut-oak mixed populations near Baia Mare town,  
North-West Romania**

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

Remarks: BM-TS - Baia Mare Tautii de S.  
 BM-K - Baia Mare - Kőbánya  
 BM-B - Baia Mare - Borpatak  
 BM-V - Baia Mare - Veresvíz  
 TM - Tautii Magherus

Examinations in West-Ukraine:

Field studies were done in 2004, 2005 and 2006 on six examination fields of the Sub-Karpathian region ( 1. site - Szeredne, 2. - Gluboka, 3. - Bobovisce, 4. - Rostovjatsja, 5. - Gajdos, 6. - Uzhgorod).

In Ukraine *C. parasitica* infection on chestnut was reported first in 2001 on Seredne (Radócz, 2001). Then it was observed that the number of the infected chestnut trees were bigger year by year. On this studies our goal was to check oak trees concerning to a possible *C. parasitica* infection. Results of our investigating works were that all the Ukrainien oak trees of the examined sites next to infected chestnuts are healthy until this time (it is shown on Table 2). But we must listen to these growing ares because of a possible change on this situation near in the future.

Examinations in South-Hungary:

We made field examinations in 2004 in four chestnut-oak mixed populations on the southern hill-sides of the Mecsek-Mountain. (1. Bakonya I., 2. Bakonya II., 3. Boda, 4. Hetvehely) where chestnut trees were infected by the chestnut blight fungus. We checked 150 randomly selected oak trees in all growing areas, and blight symptoms were searched.

Table 2

## Results of the examinations on Ukrainian chestnut-oak mixed populations

Test site	Number of examined oak trees	Number of infected oak trees (by <i>C.parasitica</i> )	Infection rate (%)	EU-strain (EU 1-31)
<b>SZER</b>	10	0	0	—
<b>BOB-I.</b>	20	0	0	—
<b>BOB-II.</b>	50	0	0	—
<b>ROSZ</b>	100	0	0	—
<b>GLU</b>	50	0	0	—
<b>GA</b>	100	0	0	—
<b>UNG</b>	50	0	0	—

Remarks: SZER - Szeredne BOB - Bobovisce  
 ROS - Rosztovjatszja GLU - Gluboka  
 GA - Gajdos UZS - Uzsgorod

Symptoms of the pathogen were found on sessile oak trees on one examined area (Bakonya I.). Oak trees in the other examined populations were healthy (Bakonya II., Boda, Hetvehely) as it is shown in Table 3.

A test site with 150 oak trees were selected in that forest where several infected oak trees were found at Bakonya village (04.07.2004.). All of the trees of the test site were checked yearly since that time, so we could make 3 examinations on the signed oak trees of this test sites until 2006. It was detected that more and more oak trees become infected year by year on the examined test site. Results of the yearly examinations are contained on Table 4. It was detected also that symptoms of the fungus had been more and more heavily on oak trees year by year (Table 5).

Table 3

The number of the infected oak trees by *C. parasitica* and the infection rates on 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)
<b>BAK-I.</b>	150	40	26,66	Not identified
<b>BAK-II.</b>	150	0	0	—
<b>BO</b>	150	0	0	—
<b>HET</b>	150	0	0	—

Remarks: BAK - Bakonya  
 BO - Boda  
 HET - Hetvehely

Table 4

The number and the rate of the infected oak trees by *C. parasitica* on 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 5

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

Infected tree number	Infection	Infected tree number	Infection
<i>BAK. I.</i>	2ab	<i>67.</i>	3b
<i>6.</i>	4a	<i>73.</i>	4ab
<i>7.</i>	5	<i>80.</i>	4a
<i>8.</i>	5	<i>81.</i>	4b
<i>12.</i>	2ab	<i>86.</i>	4ab
<i>17.</i>	2ab	<i>87.</i>	3ab
<i>19.</i>	2b	<i>88.</i>	4ab
<i>20.</i>	3b	<i>89.</i>	3ab
<i>21.</i>	2b	<i>91.</i>	5
<i>23.</i>	3ab	<i>93.</i>	3ab
<i>24.</i>	4ab	<i>96.</i>	2b
<i>30.</i>	2ab	<i>97.</i>	3ab
<i>31.</i>	2b	<i>99.</i>	5
<i>33.</i>	3ab	<i>100.</i>	3b
<i>34.</i>	2ab	<i>109.</i>	4ab
<i>35.</i>	3ab	<i>110.</i>	3ab
<i>38.</i>	4ab	<i>116.</i>	3b
<i>41.</i>	5	<i>118.</i>	4ab
<i>49.</i>	3ab	<i>119.</i>	4ab
<i>50.</i>	2ab	<i>126.</i>	3ab
<i>53.</i>	5	<i>132.</i>	4ab
<i>55.</i>	5	<i>137.</i>	5
<i>56.</i>	4ab	<i>145.</i>	4ab
<i>62.</i>	3ab	<i>148.</i>	2a
<i>63.</i>	3ab	<i>149.</i>	3ab
<i>66.</i>	2b	<i>150.</i>	4ab

Remarks of table 5.:  
 2 - *a* - suspicious symptom in the crown of the tree  
       - *b* - suspicious symptom on the trunk of the tree  
 3 - *a* - 1 cancer symptom in the crown  
       - *b* - 1 cancer symptom on the trunk  
 4 - *a* - more cancers in the crown  
       - *b* - more cancers on the trunk  
 5 - killed tree by *C. parasitica*

## DISCUSSIONS

Laboratory examinations confirmed that *Cryphonectria parasitica* infected several oak trees in Romania and in Hungary. However infected oak trees occurred only in mixed populations with chestnut. All of oak trees

in Ukraina were healthy till the time of our field-examinations. On the basis of the results we can establish that *C. parasitica* have not caused so serious destruction on oaks as on chestnut trees until now, but potentially it could be a serious disease for oak species in the Carpathian-basin.

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