NATURAL INFECTION OF *QUERCUS* SPP. BY THE CHESTNUT BLIGH FUNGUS IN NORTH-ROMANIA

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Abstract:

Cryphonectria parasitica (Murill) Barr [syn.: Endothia parasitica (Murr) Anderson] caused almost total destruction of the American chestnut (Castanea dentata) and had spread widely on European chestnut (Castanea sativa) in many European countries. In Hungary, the fungus threatened most of the Hungarian chestnut stands. Chestnut blight disease were reported on other countries of the Carpathian-Basin too (Slovakia, Romania, Ukraine). The fungus was detected only on Castanea sativa until 1998, then on some trees of Quercus petrea in mixed chestnut forests also shoved the tipical bligh symptoms in Hungary. It was supposed that this fungus a possible parasite of oak trees on other growing areas too. Investigations were done in Romania, near Baie Mare on chestnut-oaks mixed populations, and the blight symptoms were founded there too. Laboratory examinations verified the Cryphonectria parasitica infection on oak trees in Romania, on mixed chestnut-oaks growing are near Baia Mare.

Key words: *Cryphonectria parasitica, Castanea sativa, Quercus* spp.

INTRODUCTION

Cryphonectria parasitica (Murr.) Barr (syn: *Endothia parasitica* [Murr.] And.) caused big damages of the chestnut-stads throughout the world. First at the beginning of the XX. century were destroyed almost the whole American chestnut (*Castanea dentata*) populations in the USA (*Anagnostakis*, 1987) by this parasite. After the pathogen was transferred to Europe in the middle of the XX. century and infected the European chestnut (*Castanea sativa*) populations in West-Europe and caused the disease named „chestnut blight". It was reported first in Italy near Genova in 1938 (*Biraghi*, 1946).

This serious disease spread gradually from the Western-European chestnut sites towards the Central- and Eastern-European territories and arrived to the Carpathian-Basin too.

It was reported on chestnut first in Austria (*Donaubauer*, 1964), in Hungary (*Körtvély*, 1970), in Slovakia (*Juhasova,* 1976.), in Romania (*Florea, Popa*, 1989), and in Ukraine (*Radócz*, 2001). In Hungary chestnut stands have already been seriously dameged by this parasite (*Radócz,*

1999.). Now the Middle- and East-European region are registered by the experts as the "frontline" of the spreading of *C. parasitica*.

Up to this time this fungus had been the most important disease for European chestnut, but the importance of this parasite is more increasing because it is able to infect other tree species of the *Fagaceae* plant family (oak, beech). The fungus was detected in Hungary only *Castanea sativa* until 1998. Then on some *Quercus petrea* trees in mixed chestnut forest near Kőszeg and Zengővárkony also showed the blight symtoms (*Radócz*, *Holb*, 2002.). Although blight symptoms are not so serious in *Quercus* spp. than *Castanea* spp., it seems that *Cryphonectria parasitica* frequently threatens the young Hungarian *Quercus* spp. mainly in heavily infected chestnut forests. Therefore it could be a more serious potential parasite for our forests.

We made field investigations in 2004 near Baia Mare, North-West Romania chestnut-oak mixed populations where had been identified the chestnut bligh on chestnut trees first in 1985. Main goals of our studies were to investigate damages caused by *C. parasitica* on oak trees, and to examine in laboratory of the collected samples and isolates.

Literature

Discription of the pathogen (*Sivanesen, Holliday*, 1981)

Casual agent:

The chestnut blight fungus [*Cryphonectria parasitica* (Murrill) Barr. (syn.: *Endothia parasitica* (Murr) Anderson)] is an ascogenous pathogen causing blight on some species of *Fagaceae* family, such as *Castanea*, *Fagus* spp., *Quercus* spp..

Fruiting bodies and spores:

Stromata. Stromata scattered, often confluent, at first immersed in the peridium, becoming erumpent, valsoid, yellow to yellowish brown, prosenchymatous, up to 3 mm wide and 2.5 mm high.

Peritecia, asci, ascospore. Peritecia grouped, more or less oblique, globose to depressed dlobose, up to 400 γm broad with dark brown to black. Cylindrical, ostiolar beak converging throughn the stromatic disc and exposing the dark papilla at the surface with the pore lined on the inside by hyaline, filiform, periphyses; beaks up to 900 γm long and 200 γm wide. Peritecia produces numerous asci and ascospores. Asci clavate to clavate cylindrical, thin walled, 8 spored, and 32-55 x 7-8 γm. Ascospores irregularly biseriate in the ascus, hyaline, one septate, elliptic, usually straight, and 7-12 x 3-5.5 γm.

Conidioma, Conidiophore, Conidia. Conidiomata pseudostromatic, immersed, erumpent, separate or aggergated, yellow to yellowish brown, globose, variable in size up to 300 γm wide, 60 γm long. Conidioma

produces numerous conidia on conidiophores. Conidiophores branched, septate, hyaline, smooth, tapering at the apex with an indistinct channel and collarete. Conidia hyaline, one celled, ellipsodical, to somewhat bacilliform, and 3.5 x 1-1.5 γm.

Symptoms:

On young stems, brown lesions form on the smooth bark, some discoloration also occurs when older stems are atacked, mainly through wounds. Lesions become sunken as bark and cambium are killed; there is swelling and cracking of the outer bark. Death of the cambium of this ringporous tree prevents formation of the xylem vessels needed for liquid transport, and this causes wilting of the leaves above (beyond) the cancer. Pycnidia are very abundant on the cankered bark, exuding spore tendrils in moist conditions. Pale brown, mycelial fans form can bo found in the inner bark. European chestnut trees generally with one or more cankers, die within 1 or 2 years after cankers are apparent.

MATERIALS AND METHODS

Field examinations

Our field examinations were done on 10-11 of June, 2004., near Baie Mare, Romania, in four chestnut-oak mixed populations. It was the first examination to check the symptoms of *C. parasitica* fungus on oak in Romania. Bark samples were collected from the founded cancers for laboratory isolations and furthermore investigations.

Laboratory examinations

Surfice sterilized bark samples were cultivated on potato-dextroz-agar (PDA) media (200 g potato, 20 g dextroz, 20 g agar-agar). Samples were incubated during 7 days in a climated chamber. After a week samples were isolated again to get a pure culture. Then vegetative compatibility tests were done, when we paired the isolates with each other to study their compatibility. After the isolates were paired with EU-tester strains (EU-1-31). The vegetatively compatible isolates were classified into the same Vegetative Compatibility Group (VCG). The isolates which formed a visible barrage zone at the edge of the growing mycelia were classified into different VCG.

RESULTS

We made our investigations on four different chestnut-oak mixed sites where the chestnut blight infection on chestnut trees were examined before two years (in 2002). The disease was spread throughout the territory on chestnut, symptoms were visible well, and the destruction by

Cryphonectria parasitica were significant. Infection ratio were between 24 % and 90 % in these examined chestnut populations .

It was established that chestnut bligh symptomps were visible on oak trees. There were found young oak trees infected by *C. parasitica* in every investigated growing areas. There were found initial symptoms on the young oak trees mostly, but there were a few more serious symptoms with fruiting bodies of the pathogen on some trees, and there were found destroyed trees by *C. parasitica* too. There were not found any symptoms on the oldest oak trees. Our main goal was only a primary examination about the possible infection of chestnut blight on the oak trees. It had been established that some of the oak trees on the measured romanian growing areas are infected by chestnut blight fungus. There were not measured the infection ratio on this examination, it will be a following study. During the field examinations barks samples were collected from infected or killed oak trees on the examined sites for laboratory isolations and furthermore investigations.

Barks samples were cultivated on PDA media to get pure cultures on the first step of the laboratory investigations. It verified the *C. parasitica* infection on the barks. Then vegetative compatibility tests were done on the isolates. The isolates which were origined from the same growing areas were vegetatively compatible with each other, and the results were the same when isolates from different areas were paired with each other (results are shown in the Table 1.). It shows the presence only one VCG of *C. parasitica* on oak trees on the growing areas near Baia Mare. Then the isolates from oaks were paired with EU-tester strains. The result was that EU-12 strain was compatible with the oak isolates. There were incompatibility with the other EU-tester strains (results are shown in the Table 2.).

CONCLUSIONS

On the basis of the field investigations and the laboratory results we can establish that young oak trees are threatened by *C. parasitica* near Baia Mare in Romania too, similar than in Hungary, Although symptoms are not so serious in *Quercus* spp. than in *Castanea sativa*, *C. parasitica* seriously threatens the young *Quercus* spp. in mixed forests near Baia Mare. Consequently, more research is required on the practical use of hypovirulent strains of *C. parasitica* on both *Castanea* and *Quercus* species.

Table 1

Vegetative compatibility tests with oak isolates were origined from different growing areas (Baia Mare, Romania, 2004)

	BMV-2	BMV-5	BMK-1	BMK-3	BMT-1	BMT-4	BMTM-1	BMTM-3
BMV-2	X							
BMV-5	+	X						
BMK-1	+	+	X					
BMK-3	+	+	+	X				
BMT-1	+	+	+	+	X			
BMT-4	+	+	+	+	+	X		
BMTM-1	+	+	+	+	+	+	X	
BMTM-3	+	+	+	+	+	+	+	X

Remarks:

BMV	-	Baia Mare-Veresvíz
BMK	-	Baia Mare-Kőbánya
BMT	-	Baia Mare-Tautii de S.
BMTM	-	Baia Mare-Tautii Magherau
+	-	vegetatively compatible isolates
-	-	vegetatively incompatible isolates

Table 2

Vegetative compatibility examination between oak isolations and EU-tester strains

	BMV-2	BMV-5	BMK-1	BMK-3	BMT-1	BMT-4	BMTM-1	BMTM-3
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
EU-1	-	-	-	-	-	-	-	-
EU-2	-	-	-	-	-	-	-	-
EU-3	-	-	-	-	-	-	-	-
EU-4	-	-	-	-	-	-	-	-
EU-5	-	-	-	-	-	-	-	-
EU-6	-	-	-	-	-	-	-	-
EU-7	-	-	-	-	-	-	-	-
EU-8	-	-	-	-	-	-	-	-
EU-9	-	-	-	-	-	-	-	-
EU-10	-	-	-	-	-	-	-	-
EU-11	-	-	-	-	-	-	-	-
EU-12	+	+	+	+	+	+	+	+
EU-13	-	-	-	-	-	-	-	-

0	1	2	3	4	5	6	7	8
EU-14	-	-	-	-	-	-	-	-
EU-15	-	-	-	-	-	-	-	-
EU-16	-	-	-	-	-	-	-	-
EU-17	-	-	-	-	-	-	-	-
EU-18	-	-	-	-	-	-	-	-
EU-19	-	-	-	-	-	-	-	-
EU-20	-	-	-	-	-	-	-	-
EU-21	-	-	-	-	-	-	-	-
EU-22	-	-	-	-	-	-	-	-
EU-23	-	-	-	-	-	-	-	-
EU-24	-	-	-	-	-	-	-	-
EU-25	-	-	-	-	-	-	-	-
EU-26	-	-	-	-	-	-	-	-
EU-27	-	-	-	-	-	-	-	-
EU-28	-	-	-	-	-	-	-	-
EU-29	-	-	-	-	-	-	-	-
EU-30	-	-	-	-	-	-	-	-
EU-31	-	-	-	-	-	-	-	-

Remarks:

BMV	-	Baia Mare-Veresvíz
BMK	-	Baia Mare-Kőbánya
BMT	-	Baia Mare-Tautii de S.
BMTM	-	Baia Mare-Tautii Magherau
EU	-	EU-tester strains
+	-	vegetatively compatible isolates
-	-	vegetatively incompatible isolates

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