

THE INFLUENCE OF THE ATTACK OF THE FUNGUS *MELAMPSORELLA CARYOPHYLLACEARUM* (DC.) J. SCHRÖT. ("WITCH BROOMS" ON FIR) ON THE PEROXIDASE AND CATALASE ACTIVITY IN HOST PLANT

ALEXANDRU MANOLIU^{1*}, ROMEO IRIMIA²,
PETRONELA GRĂDINARIU¹, EUGEN UNGUREANU³

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Abstract: In this paper are presented the results concerning the influence of the attack of the fungus *Melampsorella caryophyllacearum* ("witch brooms" on fir) on the peroxidase and catalase activity in host plant. The research were effected in year 2007 in the stationary Izvorul Muntelui and Cerebuc from Ceahlău massif and the obtained results highlights the fact that those two biochemical parameters were influenced differently by the attack of the parasitic fungus.

INTRODUCTION

Melampsorella caryophyllacearum is an obliged parasitic fungus, belonging to *Basidiomycotina*, *Uredinomyces*, *Uredinales*, *Pucciniastraceae*. It is a hetero - macrociclical euforme species (0+I=II+III), with two alternative hosts: 0 – spermogons (pynidium), I – aecidium on *Abies* and *Picea species*, and II – uredosorus and III - teleutosorus on *Cerastium* and *Stellaria species*. The attack on coniferous caused characteristic formations, named "witch brooms" determined by the fungus penetrations in the meristematic tissues, causing an active growth of supernumerary gemmae. These gemmae grow and form new and elastic shoots upward, arranged in fascicles as brooms, with reduced leaves, soft and yellow, who are falling slightly; "witch brooms" can resist several years (over to 20) because they have their own cambium, they grow every year and may reach over 1m high. To the starting place of the "witch brooms", on strain as on the branches grows "broom rust", formations in the shape of cask, who keeps ticking and after the "brooms" disappearing. In the broom rust, the wood suffers structure modifications, the year rings are bigger, the tracheal route is irregular, the wood is solid, splits up heavily, became breakable and crack irregular; the bark next to the broom rust falls, developing the wood, permitting the penetration of other fungi especially firs tinder, who produces woods rot (Cojocaru D.C.).

In Romania, this fungus is very frequent, a synthesis of dates being published relatively recent by Vera Bontea (Bontea Vera).

Because of damages produced by this species, were made by a lot of researches, especially to a world level, from whom we mention those concerning the structure of the fungus haustorium (Berndt R. et al.), the management of the factors who influence the occurrence of this disease (Solla A. et al.), the damages produced in different countries (Merriece W. et al., Nicolotti G. et al.), biochemical changes produced in the host plant (Solla A. et al., Yamada T. et al.).

In the Biological Research Institute Iasi, carried out some complex researches about the physiological and biochemical reactivity of plants to the attack of some phytopatogen agents (Antohe Anca et al., Jurca Valentina et al., Manoliu Al. et al., Merriece W. et al., Pistică - Donose Alice et al., Roșu Crăița - Maria). In this paper it presents the influence of the attack of the fungus *Melampsorella caryophyllacearum* on the peroxidase and catalase activity on fir, comparatively with the healthy plant.

MATERIALS AND METHODS

The research were performed during the year 2007 and they have permitted the monitoring of the biochemical parameters (peroxidase and catalase activity) in the host plant healthy and parasited by the *Melampsorella caryophyllacearum*. The samples were gathered from the stationary Izvorul Muntelui and Cerebuc, Ceahlău massif. The working material for the determination of peroxidase and catalase activity it constituted from vegetative organs (diseased and healthy leaves). To determine peroxidase and catalase activity was used the iodometrical method (Cojocaru D.C.).

RESULTS AND DISCUSSIONS

Peroxidase (EC 1.11.1.7) is an enzyme involved in several metabolism processes from plants, being one of the best studied plant enzymes.

Peroxidase participates directly in the resistance mechanism of the plants against the pathogens agents, being considered a biochemical marker which can be used for preventing the disease resistance, the general tendency found being of enzymatic level growth with the evolution of symptoms (Roșu Crăița – Maria).

Our results concerning the influence of *Melampsorella caryophyllacearum* attack on peroxidase activity are presented in figure 1, from which occurs that in both stationary, this biochemical marker presented higher values in the diseased leaves comparatively with healthy leaves.

So, in the Izvorul Muntelui stationary the activity of peroxidase was 0.1232 UP/g min. in diseased leaves and 0.0308 UP/g min. in healthy leaves; in Cerebuc stationary the activity of peroxidase had the following values: 0.0295 UP/g min. in the diseased leaves and 0.0164 UP/g min. in healthy leaves. Those dates confirm the obtained results from other authors concerning the plants reactivity to the actions of phytopatogens agents.

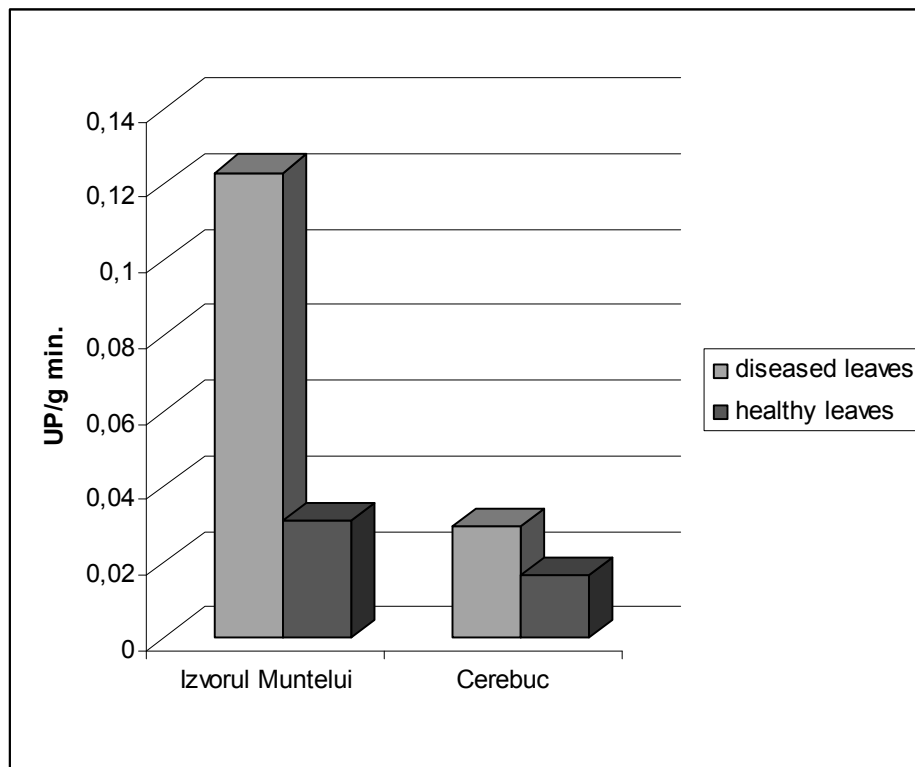


Fig. 1. The influence of *Melampsorella caryophyllacearum* attack on peroxidase activity

Catalase is an enzyme with heteroproteical structure, whose actions is coupled with many other biochemical reactions of the metabolism, which explains the presence of this enzyme in the living cell. The enzyme catalyzes, the degradation of hydrogen peroxide reaction in the living cell, removing the toxic effect of the hydrogen peroxide resulted after redox processes in a cellular level. Until now exists few works concerning the catalases role in the host plant –

parasite relationship. Also the researches made to the patho-system *Beta vulgaris* – *Cercospora beticola* have emphasized that there are fluctuations depending on the catalase activity with the appearance of the first symptoms of disease (Roșu Crăița – Maria).

The data concerning the attack of the *Melampsorella caryophyllacearum* on the catalase activity are presented in figure 2, from which resulted that in the Izvorul Muntelui stationary this enzyme had the value 65.60 UC mg/min. in the diseased leaves and 70.00 UC mg/min. in the healthy leaves; in the Cerebuc stationary the value of this enzyme had been of 60.80 UC mg/min. in the diseased leaves and 85.70 UC mg/min. in the healthy leaves.

These results don't confirm the obtained dates after the researches made to other species of plants (Antohe Anca et al., Pistică - Donose Alice et al.).

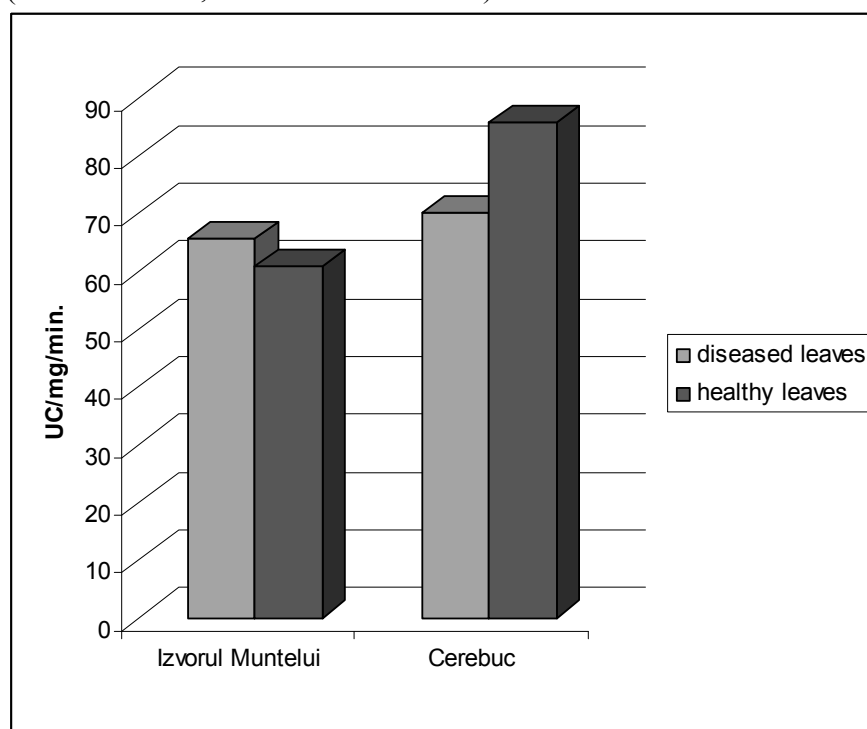


Fig. 2. The influence of *Melampsorella caryophyllacearum* attack on catalase activity

CONCLUSIONS

The attack of *Melampsorella caryophyllacearum* determined a growth of peroxidase activity in diseased leaves, comparatively in healthy leaves in both stationeries taken in the study.

Instead the attack of *Melampsorella caryophyllacearum* a diminution of catalase activity in diseased leaves, comparatively in healthy leaves in both stationeries taken in the study.

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1 Biological Research Institute Iasi

2 Ocolul Silvic Oituz, Bacău

3 „Alexandru Ioan Cuza” University of Iasi, Faculty of Biology

* alexandru.manoliu@uaic.ro