STUDY REGARDING THE INCIDENCE OF BLACKBERRY RUST (*PHRAGMIDIUM RUBI-IDAEI*) ON SOUTH WESTERN PART OF ROMANIA.

Cerasela CIUI (MOȚ), A. BORCEAN
B.U.S.A.M.V. „King Michael I of Romania" from Timisoara

Abstract. *In 2017, the first year of PhD student experience, I performed evaluations of Rosaceae family plant pathogens from the spontaneous flora in the northern part of the area designated for observation. This region is situated between Minis River and Caras River in South Western Part of Romania. Blackberries are one of the Rosaceae family most often seen plants on the area. Bushes of blackberry could be found on the forests, in the areas where trees have low density or where there are gaps resulting by tree falling or cutting. Also there are regions where on the forest clearing could be found larger populations of blackberry. Due to the density of plants that make up local populations it can be appreciated that these species is well adapted to the climate and soil conditions of the area. One of the most common diseases in the soil was the rust affecting the leaves of the plants. Considering the frequency and intensity of pathogen attack, it can be said that rust is endangering the integrity of blackberry populations in the reference area. This disease start to show up on the plants leaves starting on June and finish late on the autumn, only when the vegetation time period is on the end. The pathogen involve blackberry rust is Phragmidium rubi-idaei. This pathogen affect blackberry leaves and has as major effect a premature drying of the leaves. I found the first signs of the fungus attack starting to appear on the middle of June and this pathogeny phase could prolong to the first half of July, depending on plant position reported to the sun and also a major influence is due to rainfall amount on the area. The last phase of the fungus attack is consumed, as previously I point out starting with the lastdacade of August and it is ending within the autumn when the blackberry shrubs leaves are falling.*

Key words **.** *Phragmidium rubi-idaei, blackberrie, rust*

INTRODUCTION

Research area is situated on the border area between two very important natural parks, Caras River Canyon to the North – East and Nera River Canyon to the South-East. This area is a typical area of mountain depression. All the area is very rich on wild medicinal plants, and there are a lot of species from *Rosacea* family as *Rubus sulcatus, Rubus proceru., Rubus banaticus, Rubus thyrsanthus, Rubus tomentosa, Rubus hirtus and Rubus caesius* (DĂNEȚ CARMEN ELENA, 2008). One of this are the blackberry species. The shrubs of blackberry (*Rubus sp*.) are commonly presence over the research area but they are patchy distributed and they are mostly well known as a weed on pastures. But never the less *Rubus* species are a component of stabilized flora from the area where we care to collect the data for the present paper.

The practical importance of this paper is narrowed by the fact that for the present time the blackberry plantation farms are rare on the region. The crop plants are potentially very good hosts for the rust but in the same time these species varieties represent are a nice oportunity on the region for people who want to start a farm because of the low economic potential area. Any way the rust is just one of the disease problems of the blackberry plants from any plantation on the area. At this point I take in consideration the high number of blackberry products, because blackberry fruits could be used either for fresh consumption and as dry fruits and leaves to make tea, or the fruits could be prepared in different ways as jam, syrup or alcoholic preparations(TĂMAȘ M., ET AL, ,2007).

Never the less one of the most important issue that come to underline the necessity to

keep under surveillance the rust fungus is the infectious potential of the *Phragmidium violaceum* fungus (figure 1) because, generally speaking, there is a rule which bring the necessity to use the lowest amount of pesticides used for protecting medicinal plants against diseases, pests and weeds and to minimize the risk to bring some active substances molecules from the pesticides on the plants harvested for different medicinal uses.

Figure 1. Blackberry leaves affected by rust (*Phragmidium violaceum)*

The data regarding blackberry pathogens were collected during the summer of 2017 as a part of a larger study concerning pathogens of medicinal plants from Rosaceae family which are on the wild flora from South Western part of Romania. This area is well known as a very rich region from diversity of vegetal species point of view. As prove of the diversity it is enough to say that it was clearly determined that on this region there are 6 species of what we call blackberry: *Rubus sulcatus, Rubus procerus, Rubus banaticus, Rubus thyrsanthus, Rubus tomentosa, Rubus hirtus and Rubus caesius.* All this species are expesed to fungus *Phragmidium violaceum* and for this reason, on the present paper, I will refer to host plant species as *Rubus sp*.

The final objective of my researches is to fiind aut if there is a potential difference of pathogen behavior on the different blackberry population on the same region as there was found in other cases(LAINE ANNA-LIISA, 2004). This conclusion could have a relatively answer only after a few years of pathogen *Phragmidium violaceum* threat assesmet.

MATERIAL AND METHOD

For a better quantification of pathogens attack frequency and intensity values on the reference area we preferred to define previously some representative populations for the plants which are the subject of the observations. These populations were named after the closest known location on the area. The values of the attack frequency and intensity for each repeat are in fact an average of ten determinations, both for attack frequency and intensity. Statistics was calculated after the method for one factor experiences with three repeats. The same method was also used for other diseases of medicinal plants from wild flora.

A number of 10 determinations for each variant where considered sufficient because specialized literature data indicate that errors in various measurements applied to samples or measurements are below the limit of significance, if the number of samples or measurements is greater than 10 according to the literature (ELZINGA C. L, ET AL, 1998). Locations where samples were carried out were relatively small in size, less than 2 hectares, which also led to

the hint that 10 evaluation marks made on each point are sufficient to obtain relevant data and to avoid errors. As control for data comparing was used the average of the populations.

RESULTS AND DISCUSSIONS

Blackberry rust was found in all the investigated areas in which we perform the diseases threat assessment, with different values of frequency and intensity. As can be seen blackberry rust was present in all three locations with different values of frequency and intensity on blackberry plants.

In table 1 are notes for rust frequency of attack. The general idea of these values is that over the analyzed time period frequency values of the blackberry rust ranged between 15% and 50%. These values clearly indicate that the pathogen is well adapted both to the climate conditions and blackberry host species.

Regarding the attack frequency results, statistical analyze of the assesments shown in table 1, point out that comparing to regional average as control, the most sensitive population to rust infectious preasure is the Bradet population which classified at a very significant differece to control. At the same time and using the same measuremet criteria, population from forester house „Lup" was placed at a very significan negative difference and we can say that under the climatic conditions from summer of 2017 these population plants prove to be the most tolerant to fungus *Phragmidium violaceum* infectious pressure. The third blackberry population situated on the northern part of the city of Anina has an attack frequency average close to control, placed under any significance limit(table 1).

Table 1

Values of blackberry rust (*Phragmidium violaceum*) attack frequency at various local populations

Factor A Population	Repetition 1	Repetition 2	Repetition 3	Averages of factor A	Differences	Signific ation
Population of forester house "Lup"	15.0	25.0	20.0	20.0	-11.7	ooo
Population of Bradet	35.0	30.0	25.0	30.0	-1.7	-
Population of Anina North	40.0	45.0	50.0	45.0	13.3	***
Area averages	30.0	33.3	31.7	31.7	Control	-

DL 5% = 6.2 DL 1% = 8.7 DL 0,1% = 11.6

The second set of measurement performed on those three populations was those concerning the attack intensity of the to fungus *Phragmidium violaceum* which point out the virulence of the pathogen. The figures from the assessment of this indicator (table 2) point out that the plants populations shown the same behavior as in case of pathogen attack frequency.

Table 2

Attack intensity of fungus *Phragmidium violaceum* on different blackberry local populations.

Factor A Population	Repetition 1	Repetition 2	Repetition 3	Averages of factor A	Differences	Signification
Population of forester house "Lup"	15	10	15	13.3	-13.9	ooo
Population of Bradet	35	45	40	40	12.8	***
Population of Anina North	20	30	35	28.3	1.1	-
Area averages	23.3	28.3	30	27.2	Control	-

DL 5%= 4.7 DL 1% = 7.6 DL 0,1% = 9.3

The most affected blackberry leaves by rust were those from Bradet population which register an attack intensity average situated at a very significant difference to control. The forester house "Lup" population had a completely different behavior because the attack intensity register an average situated at a very significant negative difference to control. Anina North population registered an average of attack intensity very close to Control and this make a placement under the significance threshold value.

CONCLUSIONS

1. Blackberry leaf rust *(Phragmidium violaceum)* affect blackberry plants in all three populations analyzed but the differences between those populations point out that there must be at least one environmental factor that affect the relation between plants and pathogen and conduct to those behaviours.
2. Leaf rust is one of the diseases which can lead to premature foliation and because the pathogen need all summer to develop all the pathogenicity phases, it is easy to suppose an endemic behavior.
3. The survival of blackberry plants on a long time relation with the pathogen could be explained only in the case of a genetic induced tolerance of the plants to rust pathogen virulence.

BIBLIOGRAPHY

1. BORCEAN A., COLCEA MIHAELA, NITA SIMONA, 2016, Blackberry leaf and fruit diseases in wild flora from South Western part of Romania, Research Jounrnal of Agricultural Science, vol 48.
2. DOCEA E., SEVERIN V., 1990, Ghid pentru recunoaşterea şi combaterea bolilor plantelor agricole, Ed. Ceres, Bucureşti,.
3. DĂNEŢ CARMEN ELENA, 2008, Teză de doctorat, Bibiloteca Universităţii de Ştiinţe Agricole şi Medicină Veterinară a Banatului Timişoara.
4. ELZINGA C. L., SALZER D. W., WILLOUGHBY J. W., 1998, Measuring and monitoring plant populations, Bureau of Land Management, U.S. Department of the Interior
5. LAINE ANNA-LIISA, 2004, Resistance variation within and among host populations in a plant-pathogen metapopulation: implications for regional pathogen dynamics, Journal of Ecology, vol. 92, nr.6, pag. 990-1000
6. TĂMAŞ M., MUNTEANU L., MUNTEAN S., DUDA M. VÂRBAN D., FLORIAN S., Tratat de plante medicinale, 928 pag.., Ed. Risoprint, Cluj Napoca, 2007