DISEASES OF PLANTS FROM MALVACEAE FAMILY FROM SPONTANEOUS FLORA IN THE SOUTH WESTERN PART OF ROMANIA

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Abstract. *As principle, spontaneous plant species related to those used as crops constitute the intermediate hosts for most pathogens especially where the pathogens, from epidemiological point of view, have a large number of vectors and forms of dissemination. In the case of plants from Malvaceae family, most common species in the wild flora of the reference area are Althea officinalis and Malva silvestris. Both species are used as herbs but one that is cultivated as a medicinal plant is Althea officinalis. Also both species are in significant populations in the wild flora of Nera Canyon National Park, which is area where the observations were made. This area has a high variety of herbs species and populations due to the rugged terrain. The observations were made between 2013 and 2015. In present paper we present the situation of the one of the most important pathogens from the populations of Althea officinalis and Malva silvestris which we considered to be rust (Puccinia malvacearum). This leaf pathogen was present over all observation period in all populations where observations was carried out. Important to know is that from mallow plants there are known from antiquity till today to be used roots and leaves and flowers for different pharmaceutical preparations, from simple teas to complex tinctures and also they could be used directly in food (from simple salads to more complex dishes, boiled or fried). The pathogen affects leaves, the attack on plants can produce significant losses of leaf area and so they can compromise their quality for use as pharmaceutical or nutrition purposes. Secondary, the loss of leaf area due to pathogens attack significantly affects both the number of flowers and seeds quantity produced on this plants because the attacks starts before the development of floral buds. In present paper we present results regarding leaf rust (Puccinia malvacearum) attack between 2013 and 2015.*

Key words: *Althea officinalis, Malva silvestris, Puccinia malvacearum*

INTRODUCTION

Marshmallow (*Althea officinalis*) and high mallow(*Malva silvestris*) are both species of the same botanical family and for these reason both were found on the research area with leaves affected leaf rust (*Puccinia mavacearum*) .

The data regarding mallows leaf rust and powdery mildew were collected during a period of three years, from 2013 till 2015 as a part of a larger study concerning pathogens of medicinal plants from wild flora of the region of National Park Cheile Nerei – Beusnita which is well known as a region with a wide diversity of vegetal species. The main prove of the diversity on the present paper is to say that it was clearly determined that on this region there are 2 species of what we call "mallow": *Althea officinalis* and *Malva silvestris.*

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 locality and those are Cărbunari, Sasca and Potoc.

To collect the data necessary for statistic calculation the defined populations were divided in three parts, each part represent an experimental repeat. 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 bifactorial experiences with three repeats. The experimental factors were considered to be the populations and the experimental years.

RESULTS AND DISCUSSIONS

First remark is that fungus *Puccinia malvacearum* has a constant presence all over the observation area. Under this circumstances the figures for attack frequency point out that all three populations of mallow registered an attack with an average over 20 % over the evaluation period. As it point out from table 1, statistic calculations show that there are no significant differences between mallow populations reported the frequency average. If we report to the values of the attack frequency, it is obvious that the differences between the populations was under 2 % which show clearly a very constant infectious pressure of the fungus *Puccinia malvacearum* over the mallow populations.

If we compare the averages of the population's frequency from each year of the time period when the observations were carried out (table 2) there is obvious that the highest values where registered in 2014 which year value of frequency was placed at a significant difference by the average of the time period. In the same time the lowest value of mallow rust attack frequency was on the year 2013 when the average registered a value placed at a significant negative difference by the time average.

Table 1

Attack frequency of *Puccinia malvacearum* on different mallow local populations

Factor A - population	Factor B - year	First repeat	Second repeat	Third repeat	Averages of factor A	Differences	Significance
Population of Cărbunari	2013	10	10	20	22.22	0.56	-
	2014	35	20	30			
	2015	20	25	30			
Population of Potoc	2013	15	25	15	20.00	-1.67	-
	2014	20	25	35			
	2015	15	10	20			
Population of Sasca	2013	25	15	25	22.78	1.11	-
	2014	25	20	10			
	2015	20	35	30			
Averages	2013	16.67	16.67	20.00	21.67	Control	-
	2014	26.67	21.67	25.00			
	2015	18.33	23.33	26.67			

DL 5% = 5,24 DL 1% = 7,52 DL 0,1% = 12,16

Table 2

Attack frequency of *Puccinia malvacearum* over the research period

Factor B -year	2013	2014	2015	Average
Averages	17.78	24.44	22.77	21.66
Difference	-3.88	2.78	1.11	Control
Significance	0	x	-	-

DL 5% = 2.43 DL 1% =4.16 DL 0,1% = 7.32

Regarding to mallow rust (*Puccinia* malvacearum) attack intensity it is obvius that there are no significant differences between populations (table 3) over the observations period of time. Even in this circumstances we have to consider the fact that the differences of attack intensity between populations are over 3 % but this values are to low to consider that there are significant differences of the mallow populations resistence to fungus *Puccinia malvacearum*.

Table 3

Attack intensity of *Puccinia malvacearum* on different mallow local populations

Factor A - population	Factor B - year	First repeat	Second repeat	Third repeat	Averages of factor A	Differences	Significance
Population of Cărbunari	2013	25	15	10	16.11	1.48	-
	2014	20	25	25			
	2015	5	15	5			
Population of Potoc	2013	20	10	10	15.00	0.37	-
	2014	15	20	15			
	2015	25	10	10			
Population of Sasca	2013	10	15	10	12.78	-1.85	-
	2014	15	20	20			
	2015	5	15	5			
Averages	2013	18.33	13.33	10.00	14.63	Control	-
	2014	16.67	21.67	20.00			
	2015	11.67	13.33	6.67			

DL 5%= 3,12 DL 1% = 5,23 DL 0,1% = 8,22

Table 4

Attack intensity of *Puccinia malvacearum* over the research period

Factor B - experimental year	2013	2014	2015	Average
Averages	13.88	19.44	10.55	14.62
Differences	-0.74	4.82	-4.07	Control
Significance	-	xxx	00	

DL 5%= 2,24 DL 1% = 3,16 DL 0,1% = 4,43

If we consider the figures from table 4, which analyze the attack intensity evolution on the period of time when observations were done it is obvious that the attack of rust on mallow plants is major influenced by the weather conditions. There is a very high fluctuation between attack intensity registered on the three observations years, when it was registered o very significant difference between average of intensity from 20114 and the general average of attack intensity(experimental control for statistic calculation). On the other hand, the average value of the year 2015, as the year in row to 2014, was placed at a significant negative difference to control. In absolute values, the attack intensity of mallow rust between 2014 and 2015 is 8.89 % which is relatively high comparing to average where difference is near 4 %.

CONCLUSIONS

Mallow plants from all three populations are under a relatively constant infectious pressure of the fungus *Puccinia malvacearum*, variations between years of this fungus attack frequency proved to be very low, with values near statistic significance.

Even if the infectious pressure is constant, there was significant differences between years from attack intensity point of view which prove a high influence of weather conditions over the relations between fungus *Puccinia malvacearum* and mallow plants (*Althea officinalis*, *Malva silvestris*).

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