

**THE DYNAMICS OF THE ATTACKS OF POWDERY MILDEW –
PODOSPHAERA LEUCOTRICHA (Ell. et Ev.) Salm. IN THE APPLE
ORCHARDS FROM SIBIU COUNTY DURING THE
PERIOD 2006-2008**

**DINAMICA ATACULUI DE FĂINARE – *PODOSPHAERA LEUCOTICHA* (Ell.
et Ev) Salm. ÎN LIVEZILE DE MĂR DIN JUDEȚUL SIBIU, ÎN PERIOADA
2006-2008**

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Abstract: The researches presented in this paper include pathogen *Podosphaera leucotricha* (Ell. et Ev) Salm, producing „apple’s flouring” in *Malus pumila* fruit-growing species. The monitoring of flouring on apple orchards in the county of Sibiu, in the period 2006-2008, was realized with the purpose of establishing annual strategies to combat the endangering agent, by maintaining it under the limit of the economical threshold of danger.

Rezumat: Au fost efectuate observații în perioada de vegetație a mărului, la soiul Jonathan (soi sensibil la atacul de făinare) în perioada 2006-2008, în ceea ce privește cunoașterea biologiei ciupercii *Podosphaera leucotricha* (Ell. et Ev) și dinamica atacului ce-l provoacă pe frunze și lăstari, în trei bazine pomicole din județul Sibiu (Dobârca, Mediaș, Sibiu). Ca rezultat al infecției, poate fi observat momentul - atac. Atacul este reprezentat ca valoare de atac prin intermediul gradului de atac (G.A.).

Key words: *Podosphaera leucotricha* (Ell. et Ev.) Salm, (Ell. et Ev), monitorization, dynamics.

Cuvinte cheie: *Podosphaera leucotricha* (Ell. et Ev) Salm., monitorizare, dinamică.

INTRODUCTION

Powdery mildew is prevalent in all countries where the apple is cultivated. It was pointed out for the first time in the U.S.A, state of Iowa, in 1877 by Bessy. The attack of the fungus, manifest it selves on leaves, sprouts and sometimes on young fruits, beginning in the spring until the autumn, its high intensity being reached during the months May-June. Early in springtime (April), leaves are attacked, then during the blooming time the flowers and the young branches. Thick white felt appears on leaves and branches. Leaves and branches attacked deform and become fragile. The pulverulent mass (conidia) becomes yellow-orange. The attack produced on flowers is very serious because the flowers become unfruitful. The fruits are rarely attacked.

Sprouts which are attacked have the mark of a thick off-white felt, don’t grow normally, wood doesn’t ripen, it dries in summertime or freeze during wintertime. If the attacked sprouts exceed 20%, then production declines and in 2-3 years periodicity of fructification is installed.

The pathogen agent which causes this disease is *Podosphaera leucotricha* (Ell. et Ev) Salm. with the conidian form of *Oidium farinosum* Cke.

The fungus transmission from one year to another is made by the mycelium of resistance.

In springtime from the contaminated buds grow flowers and infected sprouts. The primary infection may be also produced during spring by ascospores and the secondary infections during the vegetation period is realised throughout conidia.

MATERIAL AND METHODS

The biological material used in the research is represented by the Jonathan apple species harvested in the orchards from the areas of Dobarca , Medias and Sibiu.

The biological material used in the experiments was represented by apple leaves and offshoots, during the culture's vegetation period.

There were used mycology and phyto-pathology classical methods for the isolation and identification of pathogens (HULEA, 1969). The microscopic laboratory tests were made in the laboratory diagnosis of the Phytosanitary Unit of Sibiu.

RESULTS AND DISCUSSIONS

Apple's flowering is influenced by: the sensitivity of apple's variety, culture's phenology stages and climate conditions of the fruit-growing basin. The evolution of *Podosphaera leucotricha* (Ell. et Ev.)Salm. pathogenic agent was observed on 3 trees, on 5 scions/tree representative for the mentioned area of the variety of the Jonathan apple. In the orchards of Dobarca and Dumbraveni , it is applied the technology of culture, and in the orchard of Medias, during the years 2006, 2007 and 2008, was not applied the specific technology for to culture.

Tracking the evolution of the endangering agent was conducted in three stages:

STAGE I - autumn before harvesting fruit - surveys for determining the degree of attack (D.A.) on leaves and offshoots (Table 2).

D.A.% = F x I/100 (F% = Attack frequency, I% = The intensity of attack).

The assessment of the attack was included under "List of major pathogens of cultivated plants, and evaluation of their attack" issued by the Central Laboratory for Phytosanitary Quarantine, Bucharest (table 1).

Table 1

		Attack on leaves				
		Powerless	Moderate	Powerful	Very powerful	Extremely powerful
D.A.		<10	10-25	25-50	50-75	>75

Table 2

Locality	Attack degree on leaves and offshoots											
	2006				2007				2008			
	leaves		offshoots		leaves		offshoots		leaves		offshoots	
	D.A.%	F%	I%	D.A.%	D.A.%	F%	I%	D.A.%	D.A.%	F%	I%	D.A.%
DOBARCA	6	9	1.0	0.09	13	11	2	0.22	8	12	1.1	0.3
MEDIAS	21	31	5.8	1.7	26	42	7.9	3.3	46	75	11.3	8.4
SIBIU	9	6	1.1	0.06	10	9	1.7	0.15	10	14	4.4	0.6

STAGE II - In Winter (January-February) there were taken average samples of branches from the same areas on which were made the observations in autumn. The sample was taken from 50 trees with the purpose of getting at least 300 crop buds. Branches were placed in pots with water at the room temperature (Fig. 1). The branches developed the phenology phases in the laboratory conditions. The phase of 'inflorescence's raising" led to the

establishment of attack's frequency (F%) - attack caused by 'flouring' on 'fruit germs', on the short young branches (table 3).



Figure 1. Vases with branches

Table 3

Attack degree on the branches taken in the winters of 2006, 2007, 2008

Locality	Attack degree on fruit germs on laboratory conditions								
	2006			2007			2008		
	F%	I%	D.A.%	F%	I%	D.A.%	F%	I%	D.A.%
DOBÁRCA	8	100	8	10	100	10.0	6	100	6.0
MEDIAS	16	100	16.0	18	100	18.0	21	100	21.0
SIBIU	8	100	8.0	12	100	12.0	9	100	9.0

The branches, that were put in the vases with water, were taken before the agro technical applications in the two orchards (Dobarca, Sibiu) a very high percentage of the new offshoots attacked by the flouring are cut, thus it was lowered the biological part of the source of the growth of the flouring.

STAGE - III- the observations during the vegetation period, in the 'after the petals shedding' phenological phase.

There were 3 trees under analysis, representing the average of the orchard. There were analyzed leaves of each tree, from 100 offshoots for control. It was observed the frequency of the flouring attack on leaves (F%=D.A%).

There were made some observations at 100 new branches/tree at the same trees and it was noted the frequency and the intensity of the attack (Table 4).

It is necessary to consider the intensity of the attack because the flouring attacks the offshoots from the top to the bottom (the relative value that gives the degree of the covering or the extension of the attack on attacked organ, reporting the attacked surface to the total observed surface, in marks of intensity).

Table 4

The attack on the leaves and offshoots in the 'after the shedding of the petals' phenological phase

Locality	2006				2007				2008			
	leaves		offshoots		leaves		offshoots		leaves		Offshoots	
	D.A	F%	I%	G.A%	G.A.	F%	I%	G.A%	G.A	F%	I%	G.A%
DOBARCA	4	5	0.8	0.04	5	6	1.8	0.10	4	7	0.5	0.03
MEDIAS	26	30	4.2	1.2	35	39	5.3	2.0	48	65	6.1	3.9
SIBIU	6	4	0.6	0.02	8	7	1.0	0.07	10	9	1.3	0.1

The conclusion is that during the vegetation period the annual offshoots are infected right after the shedding of the petals.

There were no signs of attack on fruit.

CONCLUSIONS

- The first visible symptoms of flouring on the apple leaves in the 3rd year studied, appeared at the burgeoning phenological phase in all the three locations;
- The intensity of the leaf attack is 100% including its petiole(leaf stalk);
- The intensity of the offshoot attack varies because the infection is produced from the top to the bottom of the new branch, the attack being observed in the whole year;
- During the vegetation period the annual offshoots are infected, the symptoms of the attack being observed right after the shedding of the petals;
- The degree of the attack on the leaves in the farms that apply the specific technical of the culture is weak, but in Medias the attack got stronger and stronger every year;
- In the orchard that were taken cared the frequency of the attack to the flowery and vegetative crop bud of the short branches there were between 6-9 % F in winter getting lower and lower after the cutting and the application of the phitosanitary treatment;
- In the orchard in Medias the flouring produced by *Podosphaera leucotricha*(*Ell. et Ev.*)*Salm.* on the apple leaves F = 48% and the offshoots F = 65% is an alarm signal for both the tree territory and adjacent area (according to the 'Methods of prognosis and advising the treatment against the pest and the pathogenical agent of the culture', when there are 2-5 % flowery and vegetative buds of the short branch and the offshoots attacked by flouring meaning that in spring and summer if it is wet and warm, the attack on the trees that weren't taken cared can reach 45-80% of the leaves and offshoots;
- Throughout the observation of the dynamic of the attack of flouring in 2006-2008 in the orchards of the apple trees in Sibiu there can be scientifically applied the most appropriate protective phitosanitary measures;
- The prevent of the infections and the fight against the apple flouring must be regarded as part of the programme of an integrated combat (pest, agents) in order to assure the health of the orchards according to the protection of the environment in the studied territory of the trees.

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