

RESULTS REGARDING THE INFLUENCE OF CLIMATIC CONDITIONS ON DYNAMICS EVOLUTION OF PATHOGENS IN PLUM CULTURE OF S.C. TERRA VIVA LLC BALS DURING 2007-2009

REZULTATE PRIVIND INFLUENȚA CONDIȚIILOR CLIMATICE ASUPRA DINAMICII EVOLUȚIEI AGENȚILOR PATOGENI DIN CULTURA DE PRUN DIN S.C. TERRA VIVA S.R.L. BALȘ ÎN PERIOADA 2007 – 2009

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Abstract. *The plum alongside the apple is another fruit growing species that prevails in SC Terra Viva LLC Bals, the area occupied by it being 25 ha. Data from the plum plantation checks have revealed pathogen attack: Monilinia Laxa (Aderh et Ruhl.) Honey, Stigmata carpophylla (Lev.) Ellis and Polystigma rubrum (Pers.) D.C. to combat these pathogens in scientific reasoning, warning is a basic measure, most commonly based on the phenological criterion, biological reserve of the pathogen and the evolution of the climate conditions, each climatic factor having a well-established influence on pathogens that affect plant fruit.*

Key words: plum, pathogen attack, dynamics, evolution.

Rezumat. *Prunul, alături de măr, este o altă specie pomicolă care predomină în S.C. Terra Viva S.R.L. Balș, suprafața ocupată de acesta fiind de 25 ha. Datele obținute la controalele efectuate în plantația de prun au evidențiat atacul patogenilor: Monilinia laxa (Aderh et Ruhl.) Honey, Stigmata carpophylla (Lev.) Ellis și Polystigma rubrum (Pers.) D.C. pentru combaterea acestor patogeni în cadrul raționamentului științific, avertizarea este o măsură de bază, ea fiind întemeiată cel mai frecvent pe criteriul fenologic, rezerva biologică a agentului patogen și evoluția condițiilor climatice, fiecare factor climatic având o influență bine determinată asupra agenților patogeni care afectează plantele pomicele.*

Cuvinte cheie: prun, patogen, atac, dinamică, evoluție.

INTRODUCTION

Plum, as well as other fruit species is susceptible to pathogens attack that cause production losses and adversely affect fruit quality which requires the application of prevention and control measures (Mitrea Rodi, 2006). The correct identification of pathogens and establishing of interaction between host biology, pathogen ecology, climatic elements represents a first step in ascertain the most effective prevention and control measures to be applied at some point.

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MATERIAL AND METHOD

The biological material studied was represented by the Angeleno and President plum varieties grown in SC Terra Viva LLC Bals.

The results regarding the spreading and evolution of the main pathogens of plum culture were recorded in the climatic conditions of the years 2007 - 2009 (table 1).

The estimation of the attack made by the reported pathogens was carried out accordingly to the methodologies used in Forecasting and Warning Stations. Thus, frequency (F%), intensity (I%) was established for each pathogen and the (GA%) degree of attack was calculated, the collected data being processed by the usual formulas (Săvescu A., Rafailă C., 1978).

Collecting of data on pathogens attack of plum culture in SC Viva Terra LLC Bals was carried out through surveys, which means the act of observing, counting and analysis of target organs.

RESULTS AND DISCUSSIONS

Alongside temperature, precipitations and relative air humidity are factors whose action directly impacts the dynamics and performance of pathogen infections (Gheorghieș C., Geamăn I., 2003).

Thus, analyzing the evolution of the main pathogens causing damage in plum plantation in SC Terra Viva LLC Bals, in the climatic conditions of the years 2007 - 2009 the following has been established:

Table 1

Climatic elements from the plum growing season, influencing pathogens' attack in S.C. Terra Viva LLC Bals during 2007 -2009

Year	March			April			May			June		
	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %
2007	9,6	49,0	63,5	13,1	2,0	60,2	17,1	97,7	59,6	25,9	14,4	61,2
2008	10,8	17,2	62,7	16,9	73,8	65,1	22,7	37,6	67,5	24,9	65,8	66,3
2009	8,6	52,4	64,7	11,9	13,8	62,7	17,4	28,6	63,7	21,4	170,4	60,0

Year	July			August			September			October		
	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %	T ⁰ C	P mm	U %
2007	26,5	10,8	56,5	24,5	178,2	62,7	17,3	27,6	66,1	13,7	130,2	68,3
2008	25,9	91,2	64,5	25,5	0	61,8	19,7	74,8	64,5	13,8	70,2	74,3
2009	23,9	112,8	66,3	25,1	2,6	65,5	22,5	21,8	64,9	13,9	126,0	73,4

For the *Monilinia laxa* pathogen, which spreads through conidia, which germinate and produce infections within wide temperature range (0 to 25⁰C) and frequent precipitations (Tomșa M., Tomșa Elena, 2003), the Agro Expert System of Olt Phytosanitary Unit has advised the application of some treatments at different times in relation to climatic changes.

In the year 2007, the first treatment was advised on March the 15th when the trees were in green button phenological stage and when, as a result of the rainfall, the conditions have become favourable for the attack.

Treatment two was advised on the 22nd March, when the plum was in the phenological stage of "white button" - the opening of the first flowers.

Treatment three was advised on April the 5th, when 15 - 20% flowers had fallen petals.

In the subsequent phenophases, of fruit formation, another treatment was advised, as a result of May rainfalls. In this year's plum crop in S.C. Terra Viva LLC Bals, there was a weak pathogen attack (table 2). In the year 2008, the conditions for the installing of primary infections were recorded on the 14th of March, the environmental conditions being similar to those recorded in 2007. For the second treatment, the Agro Expert station has warned about the presence of favourable conditions on the 21st of March, thus recommending the implementation of this treatment at 7 days after the first one.

When 15-20% of the flowers had fallen petals namely on the 8th of April, the third treatment was advised, in the fruit formation phenophase as a result of low rainfall no other treatment has been advised, the year 2008 being a dry year, unfavourable for the attack of the *Monilinia laxa* fungus. The attack recorded this year was a weak one (table 2).

In the climatic conditions of the 2009 spring, the first treatment was advised in SC Terra Viva LLC Bals on 31st of March in order to fight the *Monilinia laxa* pathogen, recommending the treatment to be carried out in 2-3 days. Treatment two was advised in the phenological stage of "white button" that corresponded to the date of April the 6th. Treatment three was warned on April the 13th, when the flowers had shaken petals on a ratio of 15-20%.

This year, due to the small amounts of precipitation fallen in spring months, the attack produced by the *Monilinia laxa* fungus can be placed in the category of a weak attack (table 2).

Table 2

Dynamics of the attack produced by *Monilinia laxa* in plum culture of SC Terra Viva LLC Bals, in the period 2007 – 2009

Year	F%	I%	GA%	%	Differences	Significance
2007	40,5	12,2	4,9	144,1	1,5	xx
2008	34,8	10,6	3,7	108,8	0,3	
2009	20,3	8,4	1,7	50	-1,7	00
Average / 3 years	31,8	10,4	3,4	100	-	-

DL 5% = 0,1

DL 1% = 1,2

DL 0,1 = 2,4

As seen from the data given in table 2, regarding the attack of the *Monilinia laxa* fungus, the latter has recorded values oscillating between 1,7% in 2009 and respectively 4,9% in 2007.

The differences from the three-year average, taken as witness, were statistically ensured as significantly distinct positive for the year 2007 and respectively significantly distinct reduced for 2009.

For the *Stigmina carpophilla* pathogen, in springs with high humidity, when the temperature is above 20°C, the fungus' resistance mycelium becomes active by forming conidiophores with conidia, which provide the pathogen spread throughout the growing season. Thus, the presence of the infection source throughout the plum growing season, results in the warning of a large number of treatments, except for the dry years.

As a result, for the *Stigmina carpophilla* pathogen the Agro Expert System has warned the application of some preventive treatments according to the year of culture.

In the 2007 climatic conditions, the treatments to combat the *Stigmina carpophilla* fungus the following phenological phases have been advised:

Treatment one at buds before the flowering, the second decade of March.

Treatment two at the end of the flowering, in the second decade of April.

Treatment three when fruits have normal size, in the second decade of June (the 22nd of June).

The 2008 climatic conditions were similar to those of 2007. The summers were dry, with days when there were frequently temperatures that exceed the biological threshold of 34,5°C.

To combat the *Stigmina carpophilla* fungus, as in happened in 2007, 3 treatments have been advised at the same phenological stages.

For the year 2009 two treatments have been advised to combat the *Stigmina carpophilla* pathogen, namely:

- Treatment one at buds, before the flowering;

- Treatment two at the end of the flowering.

The dynamics of the attack produced by *Stigmina carpophilla* during 2007 - 2009 is presented in table 3.

Table 3

Dynamics of the attack produced by *Stigmina carpophilla* in plum culture of SC Terra Viva LLC Bals, in the period 2007 – 2009

Year	F%	1%	GA%	%	Differences	Significance
2007	26,6	5,3	1,4	70	-0,6	-
2008	30,3	6,7	2,0	100	0	-
2009	46,8	7,8	3,7	185	1,7	x
Average / 3	34,6	6,6	2,0	100	-	-

DL 5% = 1,4

DL 1% = 2,6

DL 0,1% = 3,4

The notation of frequency and intensity of the attack on the leaves was carried out in the field, and the degree of attack was calculated in the laboratory.

Data analysis written in table 3, show that the highest value of the degree

of attack was recorded in 2009 (GA% = 3,7%), year in which the difference from the variants' average taken as witness was statistically ensured as significantly positive.

At the *Polystigma rubrum* fungus, the projection of the ascospores providing primary infections is possible after heavy rains, that occur after tree leafing and the temperature has influence on the incubation period, which is long, ranging between 16 to 31 days. Therefore, for this pathogen, for the plum culture in SC Terra Viva LLC Bals, the Agro Station Expert advised the application of 4-5 treatments at different times in relation to the climatic changes, during 2007 - 2009.

Thus, for the *Polystigma rubrum* pathogen, the 2007 climatic conditions allowed the warning to five preventive treatments to the next application times:

- treatment one, when 15-20% of the flower petals were shaken (April the 5th);
- treatment two, on the April the 24th;
- treatment three, on May the 14th;
- treatment four, on June the 2nd;
- treatment five, on June the 6th.

In the climatic conditions of the year 2008, following treatments were advised in order to prevent the attack of the *Polystigma rubrum* pathogen:

- treatment one when 15-20% of the flowers have fallen petals (April 8th);
- treatment two, on 14th May;
- treatment three, on 23rd May;
- treatment four, on 13th June.

In the climatic conditions of the year 2009, for the plum culture in SC Terra Viva LLC Bals four prevention treatments were advised, as follows:

- treatment one , on 14th May;
- treatment two, on 22nd May;
- treatment three, on 12th June;
- treatment four, on 24th June.

The centralization of data related to the attack of the *Polystigma rubrum* fungus in plum culture of SC Terra Viva LLC Bals are presented in table 4.

Table 4

Dynamics of the attack produced by *Polystigma rubrum* in plum culture of SC Terra Viva LLC Bals, in the period 2007 – 2009

Year	F%	1%	GA%	%	Differences	Significance
2007	24,2	2,6	0,6	50	-0,6	-
2008	30,4	4,6	1,3	108,3	0,1	-
2009	32,1	5,8	1,9	158,3	0,7	-
Average	28,9	4,3	1,2	100	-	-

DL 5%-0,9

DL 1%=1,4

DL 0,1% = 2,7

The analysis of data recorded in table 4, shows that regarding the attack of the *Polystigma rubrum* pathogen the lowest values of the degree of attack occurred in 2007 (0,6%) and in 2008 (1,3%). In the three years studied, the differences from the average of the years taken as a witness were not ensured in terms of statistics.

CONCLUSIONS

1. In the plum culture from the SC Terra Viva LLC Bals the simultaneous attack of pathogens *Monilinia laxa* (Aderh et Ruhl.) Honey, *Stigmina carpophilla* (Lev.) Ellis and *Polystigma rubrum* (Pers.) D.C. has occurred during 2007 – 2009.

2. For fungi reported in the period under review, 3-5 treatments were advised depending on the pathogen's ecobiology, plum's phenology, and the changing of climate conditions.

3. As regarding the *Monilinia laxa* pathogen, in the period under study, the attack on the fruit showed values between 1,7 – 4,9% while for the *Stigmina carpophilla* the value of the degree of attack on leaves fluctuated between 1,4 – 3,7% and for *Polystigma rubra* from 0,6 to 1,9%.

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