THE PHYTOSANITARY PROTECTION IN CHERRY PLANTATIONS

PROTECȚIA FITOSANITARĂ ÎN PLANTAȚIILE DE CIREȘ

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Abstract: *In the period 2012-2014, at SCDP Iaşi we carried out researches regarding the control of the main pathogen agents and pests in the cherry species. The experiment took place on a cherry plantation for the breeds Van, Stela and Boambe de Cotnari. The experiments aimed at controlling anthracnose, moniliosis, the San Jose scale and the cherry fruit fly by using products for plant protection such as: Signum 0.03%, Copernico 0.2%, Funguran 0.2% Decis 25 WG 0.003%, Calypso 0.02%,Rovral 0.075%, Novadim 0.13%,Decis Mega 0.0125%.*
Key words*: Cocomyces hiemalis, fertilizers, phytoprotection, Rhagoletis cerasi*

Rezumat: *În perioada 2012-2014, la SCDP Iaşi s-au efectuat cercetări cu privire la combaterea principalilor patogeni şi dăunători întâlniţi la specia cireş. Experienţa s-a desfăşurat într-o plantaţie de cireş pe soiurile: Van, Stela şi Boambe de Cotnari. În cadrul experimentărilor s-a urmărit combaterea antracnozei, moniliozei şi a muştei cireşelor, utilizându-se s produse de protecţia plantelor de ultimă generaţie: Signum 0,03%, Copernico 0,2%, Funguran 0,2% Decis 25 WG 0,003%, Calypso 0,02%, Rovral 0,075%, Novadim 0,13%, Decis Mega 0,0125%.*
Cuvinte cheie*: Cocomyces hiemalis, fertilizanţi, fitoprotecţie, Rhagoletis cerasi*

INTRODUCTION

The importance of cherry culture is well known and it has a significant weight in the Romanian pomiculture due to its large flexibility of adaptation to edaphic conditions of our country (Budan and Grădinariu, 2000, Cârdei et al., 2010*)*.

The cherry tree like all the other fruit-growing species is attacked by numerous pathogens and pests.

In our country, in recent years, the diseases and pests having a special economic importance for the cherry tree have been the brown rot (*Monilinia fructigena)*, anthracnose (*Coccomyces hiemalis*), the cherry fruit fly (*Rhagoletis cerasi*) and San Jose scale (*Quadraspidiotus perniciosus Comst)*.(Sumedrea et al., 2009). The prevention or the reduction of losses caused by them is achieved by the application of phytosanitary hygiene, agrotechnical, biotechnical, biological and chemical measures gathered under the name of integrated control (Cârdei, 2005, Cârdei and Rominger, 1997). Chemical control has a special role within this concept.

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MATERIAL AND METHOD

Thus, at SCDP Iași in the period 2012 - 2014, we carried out researches regarding the control of main pathogens and pests frequently encountered in the cherry species by using leading-edge products for plant protection.

The experiment was carried out in a cherry plantation for the species Van, Stela, and Boambe de Cotnari. During the experiments, we tried to control anthracnose, the brown rot, the San Jose scale and the cherry fruit fly by using leading-edge products for plant protection (table 1).

The phytosanitary treatment programme applied in the interval 2012-2014 contained 5 or even 6 treatments (in 2013), their number varying depending on the meteorological conditions that have a determining role in the evolution of pathogens and pests (table 2).

We applied 5-6 phytosanitary treatments out of which one was prefloral phase and one was postharvest. We performed observations and determinations related to the frequency, the intensity and the attack level of *Coccomyces hiemalis* and *Monilinia fructigena* fungi as well as the attack of cherry fruit fly.

As it is well known, the evolution of pathogens and pests is influenced by the climatic conditions. In the period of experiment they varied from one year to another. Despite all these, each year there were optimal conditions for the evolution of pathogens and pests.

In general, the monthly average temperatures in the period April-August fitted into the normal values, the precipitations representing the climatic element that mainly influenced the rapid evolution and attack of brown rot.

For example, in the past two years, in May-June, 293 mm (2013) and 118.2 mm (2104) were registered exactly in the period of ripening and maturation of fruits. The number of rainy days was also high varying between 8-20 days in 2013 and 8-16 days in 2014. These precipitations correlated with the high temperatures and moisture favored the evolution of diseases.

RESULTS AND DISCUSSIONS

The climatic conditions from the interval 2012-2014 were favorable for the evolution of the main diseases and pests and in the past two years they were even very favorable for the brown rot.

Thus, in the phytosanitary programme we used leading-edge products for plant protection having a special efficacy in the control of anthracnose, brown rot and the cherry fruit fly.

Besides these pesticides, in the phytosanitary programme we also used foliar fertilizers which have an important role in yield both from the qualitative and the quantitative viewpoints.

Table 1

Phytosanitary programme applied to plant cherry species - SCDP Iaşi

No. trat.	Phenophase	Pathogens and pests combat	Used Products		
			2012	2013	2014
1	opening of the buds	moniliosis, leave shot-holing, anthracnose	Zeamă bordoleză 0,5%(7,5 kg/ha)+ Evobor 0,07%(1 l/ha)	Zeamă bordoleză 0,5%(7,5 kg/ha)+Boro Et 0,07%(1,0 kg/ha)	B. Bordelaise 0,5% (7,5kg/ha) + Evobor 0,07% (1.0 l/ha)
2	started shaking petals	antrachnose, moniliosis,insects	Signum0,03%(0,6 kg/ha + Boro Et 0,05%(1,0 kg/ha)+Agrifol 0,2%(4 l/ha)	Signum 0,04%(0,6 kg/ha)+ Decis Mega 0,0125%(0,25 kg/ha)+Fertileader BPK 0,2%(3 kg/ha)	Signum 0,04% (0,6 kg/ha) Rezistevo 0,2%(3 l/ha) + Decis Mega 0,0125% (0,25 l/ha)
3	Upon entering the first fruits of the variety Ramon Oliva	moniliosis, rhagoletis	Signum 0,03%(0,6 kg/ha + Calypso 0,02%(0,4 l/ha)+ Agrifol 0,2%(4 l/ha)+Fertileader Magical 0,2%(4 l/ha)	Signum 0,04%(0,6 kg/ha)+ Calypso 0,027%(0,4 l/ha)+ Agrifol 0,3%(4,5 l/ha)	Signum 0,04% (0,6 kg/ha) + Rezistevo 0,2%(3 l/ha)+ Calypso 0,027% (0,4 l/ha)
4	7 days after the previous	rhagoletis moniliosis, antrachnose	Rovral 0,05%(1,0 l/ha)+ Decis 25WG0,003%(0,06 kg/ha)+ Agrifol 0,2%(4 l/ha)+Fertileader Magical 0,2%(4 l/ha)	Rovral 0,075%(1,5 l/ha)+ Decis Mega0,016%(0,25 l/ha)+ Agrifol 0,13%(2,0 l/ha)	Rovral 0,07% (1 l/ha) + Decis Mega 0,0125%(0,25 l/ha)+ Rezistevo 0,2%(3 l/ha) (4 kg/ha)
5	Post-harvest	antrachnose, moniliosis, aphides	Copernico 0,2%(4,0 kg/ha)+ Novadim Progres 0,1%(2,0 l/ha)	Keramin 0,3%(3,0 l/ha)+ Rezistevo 0,4%(4 kg/ha)+ Copfort 0,25%(2,5 l/ha)	Copernico 0,27% (4kg/ha) + Novadim Progres 0,13%(2 l/ha)
6		San Jose, antrachose	-	Funguranl 0,2%(3,0 l/ha)+Novadim 0,13%(2 l/ha)	-

Table 2

Main climatic elements of 2012 – 2014 in Iaşi locality

month	2012				2013				2014			
	Temperature			Precip	Temperature			Precip	Temperature			Precip
	mean	Low	High	mm	mean	low	high	mm	mean	low	high	(mm)
I	-2,7	-18,3	11,9	8,9	-3,5	-16,3	6,2	60,4	-1,9	-19,9	10,6	12,8
II	-9,2	-24,3	8,4	18,2	0,3	-7,6	7,2	20,4	-1,0	-18,5	10,7	26,8
III	4,1	-11,0	21,7	19,6	2,0	-10,8	17,6	37,8	7,7	-1,4	22,5	23,8
IV	12,7	-1,4	30,9	62,0	12,0	-1,3	30,8	36,0	10,9	-0,6	24,0	73,0
V	17,3	5,8	31,3	84,2	18,3	8,7	30,2	113,4	15,6	0,1	30,5	113,0
VI	21,2	10,7	37,0	32,0	21,3	10,0	32,9	179,6	18.0	8,9	29,3	35,2
VII	25,3	12,8	38,5	24,8	19,8	9,4	32,8	76,4				
VIII	22,3	8,6	41,3	22,4	20,2	9,0	33,0	41,6				
IX	18,2	7,9	31,4	53,0	13,7	4,9	25,0	105,6				
X	11,3	-0,6	27,7	41,4	10,6	-0,2	22,7	2,6				
XI	5,8	-3,7	19,0	21,6	7,1	-6,3	23,0	25,4				
XII	-4,0	-14,0	7,0	59,2	0,1	--8,6	12,4	8,8				
total	**10,1**	**-24,3**	**41,3**	**447,3**	**10,1**	**-16,3**	**33,0**	**708**				

Table 3

Efficiency of phytosanitary treatments applied during the period 2012 at S.C.D.P. Iaşi

Variety	Antrachnose		Moniliosis on fruits		Moniliosis on shoots		Rhagoletis
	F%	I%	F%	I%	F%	I%	
Van	2,8	5,0	2,5	9,0	1,7	5,0	0,5
Stela	3,0	9,2	2,9	9,5	1,9	8,0	0,8
Boambe de Cotnari	3,5	10,0	3,0	10,0	2,0	10,0	1,2
untreated control	64,8	45,6	38,8	50,0	40,4	50,0	70,1

Table 4

Efficiency of phytosanitary treatments applied during the period 2013 at S.C.D.P. Iaşi

Variety	Antrachnose		moniliosis on fruits		moniliosis on shoots		Rhagoletis
	F%	I%	F%	I%	F%	I%	
Van	3,6	5,0	4,1	10,0	3,2	5,0	0,4
Stela	3,8	10,0	4,5	10,0	3,5	10,0	0,2
Boambe de Cotnari	4,0	10,0	4,5	10,0	3,8	10,0	0,8
untreated control	68,5	60,5	45,8	70,1	45,6	50,0	70,3

Table 5

Efficiency of phytosanitary treatments applied during the period 2014 at S.C.D.P. Iaşi

Variety	Antrachnose		moniliosis on fruits		moniliosis on shoots		Rhagoletis
	F%	I%	F%	I%	F%	I%	
Van	3,1	5,0	2,8	10,0	2,0	5,0	0,0
Stela	3,5	10,0	3,2	10,0	2,5	10,0	0,2
Boambe de Cotnari	4,2	10,0	3,7	10,0	2,7	10,2	0,5
untreated control	66,3	50,0	40,8	60,0	42,4	50,0	67,3

The results related to the efficacy of the phytosanitary complex applied at SCDP Iași in the period 2012-2014 is presented in tables 3, 4 and 5.

Following the application of treatments, the products used to control anthracnose and brown rot registered a high efficacy. At the beginning of the vegetation period (white bud phenophase) we used cupric products (Bordeaux mixture), and then systemic products (Signum and Rovral). Thus, the attack of anthracnose produced by *Cocomyces hiemalis* pathogen agent encountered favorable conditions for development and attack in the experiment period confirmed by the high values of the attack level 68.5% - 66.3% for the untreated control samples. The fungicides used in the phytosanitary programme (Signum and Rovral) had high efficacy with frequency values of 2.8-4.2% for Van and Boambe de Cotnari species.

As for the brown rot attack, this manifested both on shoots and fruits. The brown rot frequency on fruits for the untreated control sample ranged between 38.8-45.8% as compared to 2.5-4.5% for the treated variants (Signum and Rovral), and on shoots the frequency was 40.4-45.6% for the untreated control sample as compared to 1.7-3.8% for the treated species.

In the 3 years of experiments, we noticed that the pathogen attack was more intense in 2013 due to the precipitations that registered important values in this period and favored the attack of brown rot especially on shoots and fruits. For example, in 2013, the frequency of brown rot on shoots for the treated variants of the 3 species registered values between 3.2-3.8% as compared to 2012 when the values were 1.7-2.0%. Almost the same values were also registered for the brown rot on fruits.

Although the fungicides applied were the same, the more reduced efficacy in 2013 may be explained by the fact that in June there were heavy precipitations in the period of ripening-maturation when most cherries cracked. The fungus formed on the lesions appeared and enjoyed of all the conditions necessary for a rapid evolution. That is why in 2013 we performed one supplementary treatment as compared to years 2012 and 2014.

The foliar fertilizers such as Feartileader BPK 0.2%, Feartileader Magical 0.2%, Boro Et 0.07%, Keramin 0.3%, Rezistevo 0.2%, Copfort 0.25% also had an important role in the phytosanitary programme for the phenomenon of cherry cracking and the obtaining of a healthy crop. They have a high content of macro and microelements and directly influence the evolution of cultures in terms of quality and quantity. For example, Keramin product is a nutrient and complex biostimulator improving fructification, intensifying the fruit colour, increasing the sugar content and preventing fruit falling. At the same time, Fertileader BPK applied after the blooming phase has a high content of boron besides the macro and microelements it contains, and Fertileader Magical and Rezistevo contribute to the prevention of fruit cracking by their high content of calcium (16%).

In these very favorable conditions for the evolution of pathogens, especially anthracnose and brown rot, fungicides Signum and Rovral were highly efficient ensuring a good yield both quantitatively and qualitatively.

As for *Rhagoletis cerasi,* in order to control it, we carried out two phytosanitary treatments upon warning by using insecticides such as Calypso, Decis 25 WG and Decis Mega, which proved to be very efficient. The untreated control sample registered values between 67.3-70.3% that are very high values as compared to the treated variants where the percentage was very low having values between 0.0% in 2014 and 1.2% in 2011.

After the cherries were harvested, we applied a treatment with cupric products for the control of diseases and insecticides (Novadim progres 0.13%) aimed at destroying the San Jose scale larvae.

CONCLUSIONS

The integrated control of cherry tree diseases and pests is and will be a major problem especially in certain climatic conditions when certain pathogens and pests become extremely aggressive.

We used the newest products for plant protection during the experimental period.

The climatic conditions of this period were highly favorable for the evolution of diseases (anthracnose and brown rot) and less favorable for the attack of the cherry fruit fly (*Rhagoletis cerasi*).

In the control of the diseases (brown rot and anthracnose), we obtained the best results with the products Signum 0.03% (0.6 kg/ha), Rovral 0.075% (1.5 l/ha), Funguran 0.3% (4.5 kg/ha) and Copernico 0.2% (4.0 kg/ha).

At the same time, the insecticides such as Calypso 0.02% (0.4 l/ha), Decis Mega 0.016% (0.25 l/ha) and Decis 25 WG 0.03% (0.06 kg/ha) registered a high efficacy in the control of cherry fruit fly and the products Seizer and Novadim progres helped us control the San Jose scale.

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