

## **Chemical Control of Scab (*Venturia inaequalis*) in the Seini Fruit Basin**

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**Abstract.** The aim of this experimental research was to survey the spreading area of scab in the Seini fruit trees basin, monitoring the behavior of different varieties versus the attack of *Venturia inaequalis* fungi, to set up a scheme of scab control using the fenologic model and to determine the efficiency of the chemical treatment for the control of these fungi.

**Keywords:** resistance, fitopathogenic fungi, sensitive, scab

### **INTRODUCTION**

The territory of Romania is part of the continental area with temperate climate that favors the development of a rich sort of fruit trees. As a part of the large fruit tree sorts, the apple tree has a special importance; that is why it is largely spread all over the country (1). The importance of apple trees cultivation is due to the food, taste, therapeutic and prophylactic value of the fruits. Apples form one of the main components of the modern nourishment (2). In the agricultural practice, the activity of protection is highly important, measures of preventing and controlling the signaled fitopathogene being necessary (3). Apple growing is better spread in the northern regions of the country and in the meridional sub-Carpathian areas, where half of the total apple production of this country is obtained (4).

Apple tree growing represents a heritage of the tree cultivation in the Maramures County, being spread in the Baia Mare fruit tree basin, with its centers in Somcuta Mare, Copalnic, Seini, and Sighetu Marmatiei (5). The obtained production is intended for fresh fruit consumption, compote, natural juice, jam, confiture, and improper fruits are intended for distillation, thus being obtained the “Horinca de Maramures” brandy (6).

### **MATERIAL AND METHOD**

The experimental research was performed on the fruit trees plantation of the company SC MARMALUS SRL, at its Seini work place. The experiment was placed on a production plot; the fungicides were tested on 17 years old trees, the plantation distances being 4 x 2m, with the varieties Johnathan, Golden delicious and Idared. On the plot 3, experimental variants were performed, and each variant comprised of 5 trees, using the interrupted linear pitch method.

The monitoring was made on 3 trees/variant, as 2 trees represented the control to which the reference was made. From each tree, 300 leaves were collected for analysis, to elaborate the treatment schemes. For the scab control, 10 fungicides were tested, and their efficiency was assessed by reference to the untreated control. The assessment of the attack was valued by frequency, intensity and attack degree. The climate data were recorded using

the Agro Expert computerized system, which is set up with sensors for temperature, air relative humidity, rainfall.

Taking into account the importance of the environment factors on the pathogen organisms' emergence and spreading over the orchards, the interpretation of the attack degree, the climate elements which influenced the fungi and the other fitopatogenic agents' biologic activity were considered. Evident climate modifications apparent by increased temperatures with profound ecologic effects were noted, during the research year of 2012.

## RESULTS AND DISCUSSIONS

The biologic efficiency of some fungicides for the scab control of the Johnathan, Golden delicious and Idared varieties was monitored, in the conditions of the year 2012.

Tab. 1

The biologic efficiency of the treatments against apple scab, on the leaves of the Idared variety, during 2012

Experimental variant	Density %	Attack frequency %	Attack intensity %	Biologic efficiency %
Control	-	88.1	67.7	-
V <sub>1</sub> SYSTANE FORTE	0.02%	33.6	11.7	82.7
V <sub>2</sub> KING 250 EW	0.05%	34.2	15.6	76.9
V <sub>3</sub> STROBY DF	0.013%	22.6	12.5	81.5

The decrease of the intensity of the attack on leaves is noted from 67.7% in case of the untreated control to 11.7%, with the biologic efficiency of around 83% in the V<sub>1</sub> instance. The variants V<sub>2</sub> and V<sub>3</sub> have a good biologic efficiency, being placed between 76.9 and 81.5%; this is why they are recommended to be used in the scheme of the scab control.

Tab. 2

The biologic efficiency of the treatments against apple scab on the leaves of the Golden delicious variety, during 2012

Experimental variant	Density %	Attack frequency %	Attack intensity %	Biologic efficiency %
Control	-	90.6	70.2	-
V <sub>1</sub> SYSTANE FORTE	0.02%	36.1	12.1	82.8
V <sub>2</sub> KING 250 EW	0.05%	37.2	13.2	76.9
V <sub>3</sub> STROBY DF	0.013%	25.6	13.5	81.8

For all the three variants, a biologic efficiency comprised between 76.9 and 82.8% for the fungicides tested on the Golden delicious variant was noticed; this is why they could be successfully used.

The products used for the scab control of this variety gave very good results both in case of primary infections and in the secondary ones.

Tab. 3

The biologic efficiency of the treatments against apple scab on the leaves of the Johnathan variety, during 2012

Experimental variant	Density %	Attack frequency %	Attack intensity %	Biologic efficiency %
Control	-	70.5	62.7	-
V <sub>1</sub> SYSTANE FORTE	0.02%	30.6	9.7	84.5
V <sub>2</sub> KING 250 EW	0.05%	31.2	12.6	79.9
V <sub>3</sub> STROBY DF	0.013%	20.5	10.5	83.3

The fungicides biologic efficiency for the scab control was observed, in order to introduce them into the new fitosanitary treatment programs for apple trees growing. From all the fungicides used during the entire year, three fungicides were only tested to fix the product with the higher biologic efficiency in the scab control. Analyzing the three experiments, resulted that the product from V<sub>1</sub> (Systane forte) proved to be the highest biologic efficiency, comprised between 82.8 and 84.5%. Another observed aspect was to highlight the production per one tree, using more fungicides for the scab control.

Tab. 4

The fruit production and quality obtained by the Idared variety, during 2012

Item no.	Product	Density %	Total average production Kg/tree	Fruit quality / kg		
				Extra	1 <sup>st</sup>	2 <sup>nd</sup>
1	FOLPAN 80 WP	0.2%	100.7	70.7	22.3	7.7
2	CAPTAN 80 WDG	1.15%	100.0	69.7	22.3	8.0
3	CHORUS 75 WG	0.02%	100.0	70.0	23.0	7.0
4	STROBY DF	0.013%	101.5	69.0	24.5	8.0
5	MACCANI	0.15%	100.0	70.0	23.0	7.0
6	SYSTANE FORTE	0.02%	106.3	74.3	24.7	7.3
7	KING 250 EW	0.015%	101.0	70.0	24.0	7.0
8	SHAVIT F 72WDG	0.2%	99.0	68.0	23.8	7.2
9	SCORE 250 EC	0.05%	98.8	68.8	23.0	7.0
10	TOPSIN AL 70 PU	0.1%	100.1	69.4	23.3	7.4
11	UNTREATED	-	77.0	36.7	28.7	11.6

The monitoring was made during September; the fruit production was between 77.0 and 100.7 kg/tree, and from the 10 tested products, 5 of them, as: Systane forte, Stroby DF, King 250 EW, Folpan 80 WP, Topsin AL 70 PU, gave very good results, by significant increases of the fruit production with over 100 kg/tree, and superior fruit quality, belonging to the extra and 1<sup>st</sup> quality class with over 70%.

Tab. 5

The fruit production and quality obtained by the Golden delicious variety, during 2012

Item no.	Product	Density %	Total average production Kg/tree	Fruit quality / kg		
				Extra	1 <sup>st</sup>	2 <sup>nd</sup>
1	FOLPAN 80 WP	0.2%	98.0	65.2	24.9	7.9
2	CAPTAN 80 WDG	1.15%	91.0	61.2	21.6	8.2
3	CHORUS 75 WG	0.02%	97.1	65.9	24.0	7.2
4	STROBY DF	0.013%	100.2	69.2	24.0	7.0
5	MACCANI	0.15%	96.0	63.5	24.9	7.6
6	SYSTANE FORTE	0.02%	100.3	69.3	23.7	7.3
7	KING 250 EW	0.015%	100.0	69.0	24.0	7.0
8	SHAVIT F 72WDG	0.2%	92.3	92.5	22.7	7.1
9	SCORE 250 EC	0.05%	94.2	63.8	23.4	7.0
10	TOPSIN AL 70 PU	0.1%	98.5	66.0	24.5	8.0
11	UNTREATED	-	62.0	34.9	15.5	11.6

The fruit production of the Golden delicious variety comprised between 62.0 and 100.3, the best results were noticed after using the products: Systane forte, Stroby DF, King 250 EW. The apples of the extra class quality were of 66% and those of the 1<sup>st</sup> class of 23%.

Tab. 6

The fruit production and quality obtained by the Johnathan variety, during 2012

Item no.	Product	Density %	Total average production Kg/tree	Fruit quality / kg		
				Extra	1 <sup>st</sup>	2 <sup>nd</sup>
1	FOLPAN 80 WP	0.2%	100.7	64.8	24.9	11.0
2	CAPTAN 80 WDG	1.15%	99.0	65.0	24.3	9.7
3	CHORUS 75 WG	0.02%	103.3	72.3	23.7	7.3
4	STROBY DF	0.013%	119.0	85.2	26.9	6.9
5	MACCANI	0.15%	106.0	76.0	23.0	7.0
6	SYSTANE FORTE	0.02%	125.7	89.9	26.9	8.9

Tab. 6 – continued

The fruit production and quality obtained by the Johnathan variety, during 2012

Item no.	Product	Density %	Total average production Kg/tree	Fruit quality / kg		
				Extra	1 <sup>st</sup>	2 <sup>nd</sup>
7	KING 250 EW	0.015%	122.5	86.5	26.5	9.5
8	SHAVIT F 72WDG	0.2%	92.3	62.6	25.3	4.4
9	SCORE 250 EC	0.05%	91.3	60.3	25.3	5.7
10	TOPSIN AL 70 PU	0.1%	100.0	66.0	23.0	11.0
11	UNTREATED	-	77.0	25.0	31.7	20.3

The fruit production of the Johnathan variety was between 77.0 and 125.7 kg/tree, a superior quality of apples belonging to the extra and the 1<sup>st</sup> quality class with over 70%.

The results of the experiment could have a real use in fruit growing, by setting up a fair prognosis using adequate fungicides; the treatments had maximum efficiency, obtaining higher productions comparatively with the untreated control.

## CONCLUSION

During 2012, in the Seini fruit tree growing basin, the meteorological conditions were favorable to the scab development. The treatments were performed between the phenol-phases of shooting forth buds until the fall of leaves, according to the warning bulletins, based on the pathogens biology, trees phenology, climate conditions, strength of varieties. The monitoring of the fruits production and quality of the three varieties were performed in September, during the harvest. The appreciation of the fruits production and quality of the three variants (Idared, Golden delicious, Johnathan) was performed by the testing of 10 fungicides that are specific to the scab control, by reference to the untreated control. Good results were observed for the products: Systane forte, Stroby DF, Folspan, Captan 80 WDG, Maccani and Topsin Al 70PU. They could be recommended to be included in the protection system of the apple varieties that are sensitive to scab.

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