ASPECTS REGARDING THE PRODUCTIVITY, RESPECTIVELY THE SCAB SENSITIVENESS OF A CERTAIN APPLE TREES VARIETIES

Pantea Stelian*, Bako Liana, Caradan Adina Mioara*****

*University of Oradea, Faculty of Environmental Protection, 26 Gen, Magheru St., 410048 Oradea, Romania, e-mail stelian_pantea"yahoo.com
** National College "Emanuil Gojdu", 3-5 Spiru Haret St., Oradea, Romania
*** coala pentru educa ie incluzivă nr.3, oradea, Str. Cuza Vodă, nr.11, Oradea, Romania

Abstract

Five apple trees varieties have been tested on M9 mother plants. The varieties were planted in spring 2000 on the Delifood Urvind orchard.
These varieties have a genetic scab resistance.The planting distances used are of 4 metres among the rows and 1,2 metres between two trees on a row, resulting 2083 trees on a hectare.
The Rajka, Rubinola, Topaz, Otava and Goldstar varieties were chosen for the study.
None of the specific scab treatments were used. .All the varieties studied within the project had a high resistance and a productive efficiency. The Rajka, Rubinola and Topaz varieties had the biggest total productivity. The Goldstar variety had the biggest fruits, but they were the least colourful.

Key words: Apple, *Venturia inequalis*, scab resistance.

INTRODUCTION

The scab of the apples, caused by the *Venturia Inequalis* fungus, is one of the major problems of the apple tree growers.
The fruit growers' aim is to obtain high productive fruits with a high scab resistance.
The growing and improving programs are being elaborated in order to obtain scab resistant varieties in most of the countries involved in fruit tree growing.
More genetic scab resistant apple trees varieties have been obtained lately, but most of all haven't satisfied the producers and consumers' needs because of a weak efficiency and a reduced taste fruit quality.
There are also extremely tolerant, but not genetic scab resistant apple trees varieties.
The planting of these weak scab resistant varieties is being possible with a reduced mobility of the protection program and lately even without any chemical intervention.
This experience was made in order to estimate an increased fruit quality, respectively the scab resistance levels without any protection treatments for the varieties mentioned above.

MATERIAL AND METHOD

The experiment was implemented on the Delifood Urvind orchard, Bihor country.
The plantation was founded in 2000 with Rajka, Rubinola, Topaz, Goldstar and Otava apple trees varieties, the trees being grafted on M9 mother plants.
We wanted to test the high genetic scab resistance of these varieties in the North-West of Romania although it is known that these varieties were created to have the scab resistance.
There are 1.2 metres between two trees on a row and 4 metres among the rows, that is 2083 apple trees/ hectare. The crown shape adopted was of a thin spindle. There were 12 planted trees in each combination in 4 repetitions (there being 3 apple trees/ repetition).

We used a 1-9 maeking scale in order to make the differences of the attack degrees, 1- standing for the highest infection degree and 9- standing for the lowest infection degree.

Tabel 1

The scab infection evolution scale on leaves and fruits

The infection degree	The scab infection	
	Fruits %	Leaves %
1	≤30.0	≤75.0
3	15-29.9	35 – 74.9
5	7.5 – 14.9	12 – 34.9
7	3 – 7.4	9 – 11.9
9	0.5 – 2.9	0.5 – 2.9

The transversal trunk section area, the fruit/ tree production, the fruit weight, fruits with the diameter more than 7 cm, fruits with more than 50% red surface have been established as a result of the measurements.
The total fruit/ tree production (kg/ tree), the total production on a hectare (t/ ha), and the productivity index have been established using these parameters.
The results were processed statistically using the variant analysis.
The differences analysis was evaluated using the Duncan test for p=0,05, being then expressed procentually.

RESULTS AND DISCUSSION

In the year 2007, Rajka, Rubinola, Topaz, Otava and Goldstar varieties registered no scab symptoms on fruits and leaves.
As a result, the planting of these five varieties is being possible without a scab protection alike the other varieties planted on the same orchard where there was a high infesting degree and thus their protection is required.

Tabel 2

The Scab Incidence Degree on Leaves and Fruits

The Apple Trees Varieties	The Scab Incidence (2007) (scale de 1 - 9)	
	Leaves	Fruits
Rajka	9	9
Rubinola	9	9
Topaz	9	9
Otava	9	9
Godstar	9	9

The measured vegetative growing through the trunk transversal section is varied and depends on the tree variety. (Szklarz, 2004).
The Rajka, Rubinola and Topaz varieties registered quick growings after 10 years since the trees were planted.
The Otava variety had lower values at the trunk transversal section.

Tabel 3

The Vigour and Productivity of the Varieties

The Variety	The Trunk Transversal Section Area (cm^2)	The Total Production 2000-2007 Kg/tree	The productivity index 2000-2007 kg/cm^2
Rajka	56.3d	112.2d	1,9a
Rubinola	48.7d	81.9bc	1.5a
Topaz	42.3cd	96.4cd	2.0a
Otava	30.3ab	70.1b	2.2ab
Goldstar	32.bc	100.9cd	2.7b

* The numbers followed by the same letter don't differ significantly at p.= 0.05.

A single fruit was obtained in the third year after the plantation, but the fructification increased significantly in the next years.
The Rajka variety obtained the highest productivity between 2000-2007 (112.2 kg/tree, respectively 233.71 t/hectare).
The Rajka variety is very productive according to Kruczynska 1998-2002.
The Topaz variety has the lowest efficiency regarding the productivity.
Rejman asserts that the productivity depends not only on the genetic inheritage but also on the maintenance.
The Goldstar variety obtained the best results regarding the total productivity index (kg/cm2) for the trunk transversal section area (that is 2.9 kg/cm2).
Lower values of the productivity index obtained the Rajka, Rubinola and Topaz varieties (Tabel.3).
The fruit weight vary significantly for the studied varieties. Goldstar variety registered the highest values (178,7g), the Goldstar apples being also the biggest(a 97% diameter), while the Rajka apples had the smallest diameter (63%).
The Rajka apples were the most colourful (100%), (Szklarz 2004 and 2006) obtained similar results, while the Goldstar apples were the least colourful (5%).

Table 4

The Fruit Quality for the Studied Varieties

The Variety	The Fruit Weight	Fruits with the Diameter >7	Fruits with Red Surface >1/2
Rajka	161.3 bc	62.3 a	100.0 d
Rubinola	157.1 b	87.3 bcd	94.9 bc
Topaz	168.3 bc	94.6 cd	94.3 bc
Otava	139.9 a	66.9 ab	92.3b
Goldstar	178.7 c	97.7 d	5.1 a

* The numbers followed by the same letter don't differ significantly at p.= 0.05.

CONCLUSIONS

1. The planting of the Rajka, Rubinola, Topaz, Otava and Goldstar varieties was possible without any chemical scab protection.
2. The Rajka, Rubinola and Topaz varieties are the most vigorous.
3. The Rajka, Rubinola and Topaz varieties registered the highest productivity.
4. The Goldstar variety had the biggest apples, while the Rajka apples were the smallest.
5. The Rajka apples were the most colourful while the Goldstar were the least colourful.
6. The Goldstar, Rubinola and Topaz varieties are the most adequate for production in the modern orchards.

REFERENCES

1. Blažek J., 2004, Response to diseases in new apple cultivars from the Czech Republic. J. Fruit Ornam.Plant Res. 12: 241-250.
2. Czynczyk A., Bielicki P., Mika A., Krawiec A., 2005, Growth and yielding in six scab- resistant apple cultivars grafted on three dwarfing rootstocks in integrated fruit production. J. Fruit Ornam. Plant Res. 13: 19-23.
3. Kruczyńska D., 2002, Jabłonie nowe odmiany. Hortpress, Warszawa, pp. 123-129.
4. Krűger J., 1989, Scab resistance of apple cultivars, selections and progenies with the Vf gene. OILB Working Group "Integrated Control of Pome Fruit Diseases" Vol. II. WPRS Bull. XII/6: 161-167.
5. Blažek J., Michalek S., 2006, Effects of climatic conditions on fruit quality of apple cultivars assessed by public sensory evaluations in the Czech and Slovak Republics 1999-2004. J. Fruit Ornam. Plant Res. 14 (Suppl.2): 219-227.
6. Rejman A., 1994, Pomologia. In: Jabłonie. (ed.), PWRiL. Warszawa, pp. 41-42.
7. Sansavini S., Donati F., Costa F., Tartarini S., 2004, Advances in apple breeding for enhanced fruit quality and resistance to biotic stresses: new varieties for the European market. J.Fruit Ornam. Plant Res. 12: 13-52.
8. Szklarz M., 2004, Evaluation of apple cultivars with different susceptibility to scab (*Venturia inaequalis* Aderh.).J. Fruit Ornam. Plant Res. 12: 89-95.
9. Szklarz M., 2006, Evaluation of apple cultivars resistant for apple scab (*Venturia inaequalis* Che.). J. FRUIT Ornam. Plant Res. 14: 183-88.