

## STUDY REGARDING THE POSSIBILITY TO MAINTAIN APPLE VARIETIES IN AN ECOLOGICAL SYSTEM

Pantea Stelian

University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048  
Oradea, Romania, e-mail: [stelian\\_pantea@yahoo.com](mailto:stelian_pantea@yahoo.com)

### **Abstract**

*During the period 2007-2010 several varieties of apple or selections of those were tested within the fruit-growing farms which belong to S.C. Delifood S.R.L.*

*The trees are grafted on father plant M9 and the plantation distances are 4 x 1.2m.*

*Bioinsecticides were applied against the aphides 2 times per year, but against the diseases no treatment was performed.*

*As such, the Ionagold variety was significantly attacked by mildew (*Podosphaera leucotricha*).*

*The trees belonging to the variety Rajka were the most vigorous ones and the largest production belonged to the varieties Rubinola and Topaz.*

*The largest average weight of the fruit belonged to the variety Rubinola (272g) and the smallest fruits belonged to the variety Florina*

*The fruits belonging to the varieties Rajka, Rubinola, Topaz and Goldstar had the best taste.*

**Key words:** fruits, production, taste, varieties.

### **INTRODUCTION**

The concern of people for a healthy nourishment stimulated the fruit producers to establish ecological plantations or to exploit the existing ones in such a manner as to be able to supply to the consumers organically cultivated products.

The production of fruits from Europe resulted from “bio” cultures nowadays has a pretty low percentage on the market, somewhere between 1% and 5%, which cannot satisfy the market request.

The reduced offer of fertilizers, respectively of substances for combating the diseases and pests in a bio-ecological system is directly correlated to the surfaces exploited in this system/for this purpose.

Due to the fact that the majority of apple varieties existing on the plantations from Romania, especially the old ones which are affected by scurf (*Venturia inaequalis*), the best means to get rid of this disease is to establish plantations with varieties resistant to this scurf. The new types manifest superior qualitative parameters in comparison to the old ones.

## **MATERIAL AND METHOD**

The experience was installed within the fruit-growing farm which belongs to SC Delifood SRL. Trees were planted in the age of 1 year grafted on father plant M9, at the distance of 4 m between rows and 1.2 m between trees on the row.

Bioinsecticides were applied against aphides twice a year, but against scurf or mildew no treatment was performed.

For the resistance to scurf the varieties Rajka, Rubinola, Topaz, Otava and Goldstar were tested.

For these varieties were assessed: transversal section of the trunk ( $\text{cm}^2$ ), production (t/ha), productivity index ( $\text{kg}/\text{cm}^2$ ), average weight of fruits (g), taste of fruits (marks), the incidence of scurf, respectively of mildew (%) on the leaves assessed.

The transversal section of the trunk was calculated in relation to the diameter of the trunk measured at 25 cm from the grafting point.

The production of fruits was assessed through their weighing on each tree and expression in t/ha.

The productivity index is expressed as an average of productivity indexes of the years in which the study was performed and it is given by the relation between weight of fruits at the surface of the transversal section of the trunk ( $\text{g}/\text{cm}^2$ ).

In order to express the weight of fruits a sample of 100 harvested apples from the entire lot was used.

The sensorial analysis was achieved at the end of the month of December by a group made up of 5 evaluators which gave to fruits marks from 1 to 5.

The incidence of diseases on leaves was elaborated through observations in the second decade of the month of July and expressed through the formula  $P = n/N \times 100$ . (n – number of leaves attacked, N – total number of fruits investigated).

The experimental data was subject to the analysis of the version, then the Duncan test -  $P = 0.05$

## **RESULTS AND DISCUSSIONS**

The tested varieties were not attacked by scurf.

The Jonagold variety is distinguished with a higher sensitivity to mildew, the incidence of the disease being of 23, 4%. The other varieties

manifested a decreased sensitivity towards mildew and were not affected during the years of observations.

Table 1

Apple tree indices

No.	Name of the variety	Incidence of scurf %	Incidence of mildew %
1	Rajka	0a	0a
2	Rubinola	0a	0a
3	Topaz	0a	0a
4	Otava	0a	0a
5	Goldstar	0a	0a
6	Florina	0a	0a
7	Jonagold	0a	22.6b

Table 2

Apple tree growth, yield and fruit quality

No.	Varieties	TSCA cm <sup>2</sup>	Mean yield t/ha	Productivity index kg/cm <sup>2</sup>	Mean fruits weight g	Taste score 1-5 scale
1.	Rajka	15.2	4.2	0.27	170	4.4 bc
2.	Rubinola	15.5	4.2	0.23	179	4.6 c
3.	Topaz	13.5	5.9	0.37	157	4.5 bc
4.	Otava	12.1	4.1	0.32	151	4.1a
5.	Goldstar	10.2	4.9	0.59	171	4.5 bc
6.	Florina	17.9	14.7	0.68	158	4.3 b
7.	Jonagold	11.4	6.2	0.52	157	4.4 bc

Following the 4 years of observations, Florina variety proved to be the most vigorous, the surface of transversal section of the trunk having the value of 17.9 cm<sup>2</sup>. For the vigorous trees, the formation cuttings of crowns, as well as the maintenance ones have a larger volume, which also significantly increases the maintenance expenses.

The varieties Rajka, Rubinola, Topaz are distinguished through moderate increase vigour and the varieties Goldstar, Jonagold and Otava are distinguished through a decreased level of the increase of surface of transversal section of the trunk, for these being ranged between 10.2 and 12.1 cm<sup>2</sup>.

The variety Florina 14.7 t/ha was the most productive one, and the Otava and Golstar varieties were the least productive ones, 4.1 – 4.9 t/ha.

Taking into account the fact that the experience was assembled in a young orchard, in the future the trees shall be able to develop in different manners. Since the first year we may notice that certain varieties are more precocious and others more belated.

An experiment performed in Poland by Czynczyk A. in 2008 showed that the varieties Rajka and Topaz maintained through a very reduced number of treatments were, in average, the most productive ones, meanwhile Goldstar and Rubinola varieties were the most weak ones.

The productivity of apple varieties does not depend only of the genetic luggage, but also of their maintenance or of the biotop.

The varieties with increased productivity index produce the most fruits on the unit of vegetation mass. Thus, the varieties Florina and Goldstar were the most efficient ones from the point of view of our experiment.

The value of productivity index for these varieties was ranged between 0.59-0.68 kg/cm<sup>2</sup>.

The less efficient varieties from the point of view of the experiment were Rajka and Rubinola with the productivity index ranging between 0.23 and 0.37 kg/cm<sup>2</sup>.

In the experience performed by Blazek Krelinova 2006 regarding the efficiency of cultivation of varieties, respectively their productivity, the Topaz variety had the best efficiency.

The variety Florina, cultivated on a plantation in Poland had an increased productivity index in the lots in which no phyto-sanitary treatment was performed, phenomenon which is comparative to the cultivated parcels from a plantation in Poland had an increased productivity index in the lots where no phyto-sanitary treatment was performed, in comparison to the parcels cultivated with Topaz variety in which several phyto-sanitary treatments were performed, but which were, also, efficient from the point of view of the productivity (Czynczyk et. All. 2008). The efficiency of productivity as output may vary in relation to the age of trees, as well as of other factors.

The Rubinola variety had the biggest fruits in our assessment, with a mass of 179g.

The weight of fruits at the varieties Goldstar and Rajka had values of 170 respectively 171 g, and the smallest values of the weight of fruits of 131g was registered at Otava variety.

With average values of the weights of fruits were registered the varieties Topaz and Florina with 157, respectively 158g.

The fruits of Rajka variety obtained the best score in which concerns the quality of taste with values ranging between 4 and 6.

The varieties which obtained a good score, but inferior to the variety Rubinola were Rajka, Goldstar and Topaz.

If in the past was difficult to harvest the varieties resistant to scurf at industrial scale due to the poor quality fruits, now it was proven that these are at least equal to any current commercial plantation. (Godec 2004).

In which concerns the storage of fruits, the varieties which fit the longest period of storage area Rubinola, Topaz, Goldstar.

## CONCLUSIONS

1. The varieties tested were, in general, resistant to diseases.
2. The variety Florina had the highest production.
3. In which concerns the taste of the varieties Rajka, Rubinola, Topaz, Goldstar, these are very good.
4. The most productive variety from the early age proved to be Florina variety.
5. If we anticipate the profitability of the varieties for large orchards, the varieties Rajka, Rubinola, Topaz and Godstar would have to be promoted.

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