Physiological and biochemical studies of healthy and virus-diseased raspberry cultivars

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Abstract

The aim of present study was to establish photosynthetic and transpiration rate and stomatal resistance content of pigments resistance of healthy and diseased raspberry plants cv. Lulin, Gradiпa and Nuburg and determine the selective value of analysed cultivars for aims of the hybridisation. The high biological potential of selection is established for cv. Gradina. On the second place is cv. Nuburg and on the third – cv. Lulin. The data of TR determine highest humid of cv. Nuburg, i.e. this cv. need by more humid area, compered to cv. Gradina and Lulil1.

Key words: *raspberry plants cv. Lulin, Gradina and Nuburg; biological potential.*

Introduction

There are not enough studies on the pl1ysiological and biochemical condition of raspberry plant after virus infections, although they are the agricultural basis of it growing: choice of cultivar and area, sensibility to pathogens and enemies and breeding. The data from these studies present information of norm of reaction and genotype of investigated cultivars.

The aim of present study was to establish photosynthetic and transpiration rate and stomatal resistance content of pigments resistance of healthy and diseased raspberry plants cv. Lulin, Gradiпa and Nuburg and determine the selective value of analysed cultivars for aims of the hybridisation.

Pigents (chlorophyll and carotenoids) were dermined by exprexion wis 80% (azotone "a"), 645 (chlorophyll "b") and 440,5 (carotenoids) nm.

Photosynthetic and Transpiration rate (PhR, TR) and Stomatal resistance (SR) were detemined by automatic gasometric system Li 6000 of USA fiгm LiCOR.

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Table 1. ***Content of pigments – mg g fresh weight***

Cultivars	**Chlorophyll**			**Relation**	**Carrotenoids**
	"a"	"b"	"a+b"	**"a":"b"**	
Lulin					
Healtied	1.876	0.821	2.697	3:1	0.355
Diseased	1.557	0.646	2.203	2:1	0.301
Gradina					
Healtied	0.692	0.298	0.990	3: 1	0.189
Diseased	0.718	0.698	1.416	1.5: 1	0.191
Nuburg					
Healtied	0.440	0.244	0.684	3: 1	0.157
Diseased	1.080	0.620	1.700	2:1	0.206

Table 2. ***Photosynthetic rate (PhR) - mg CO_2 m^{-2} s^{-1}, Transpiration rate (TR) – mg H_2O m^{-2} s^{-1} and Stomatal resistance (SR) - s cm^{-1}***

Cultivars	**PhR**	**TR**	**SR**
Lulin Healtied	0.023	77.6	2.87
Diseased	0.014	93.5	2.42
Gradina Healtied	0.005	100	2.41
Diseased	0.052	106.9	2.19
Nuburg Healtied	0.007	176.0	0.91
Diseased	0.031	113.2	2.00

Results and Discussion

The data of pigment content are presented on the table 1. From the third healthy analysed cultivars the pigment content of cv. Lulin is highest; the lowest is this of cv. Nuburg. The quantity of pigments of cv. Gradina is near to this of cv. Nuburg. Two times more is the chlorophyll content of Lulin than this of cv. Gradina and Nuburg (fig. 1). The relation between chlorophyll "a" and chlorophyll "b" is 3:1.

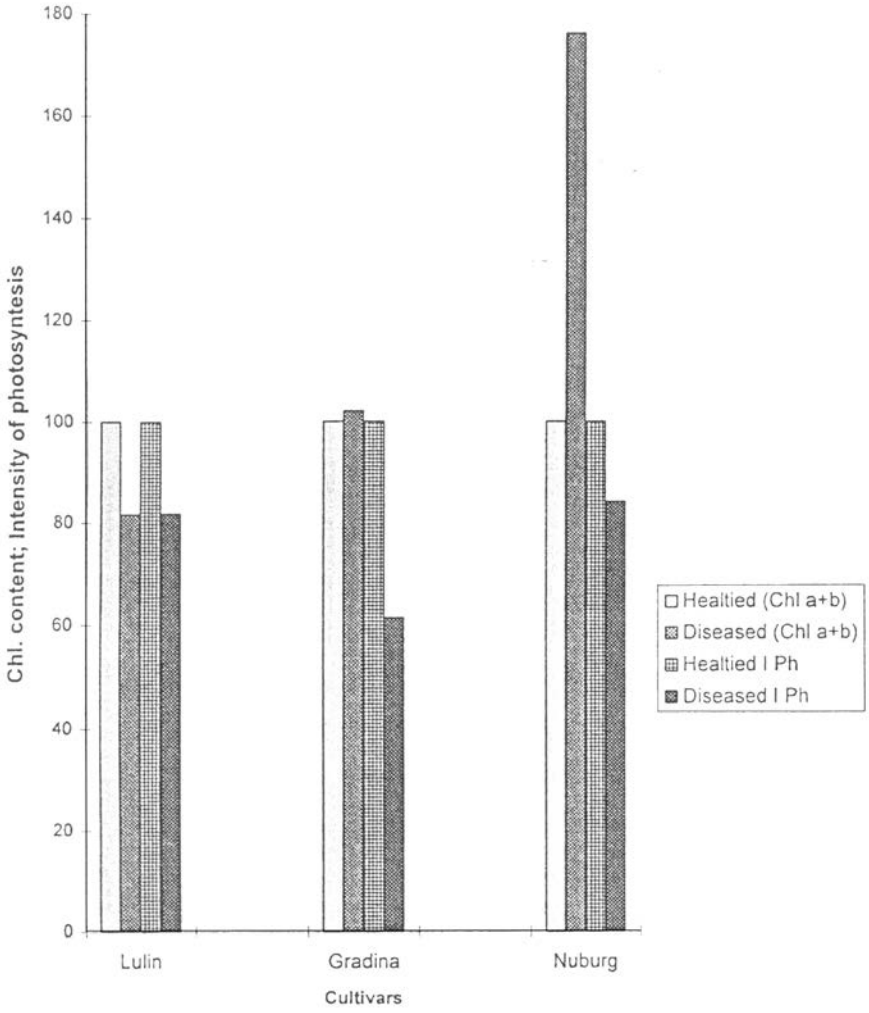
PhR of cv. Lulin is highest or 3,5 times more than PhR of Gradina and 4 times more compared to cv. Nuburg TR of Nuburg is highest, followed by cv. Lulin and Gradina.

Any correlatioп is not established between TR and SR. RS of Lulin is highest followed by Gradina and Nuburg.

The data of PhR and TR show that cv. Lulin is most variable about photosynthesis, as about TR such is cv. Nuburg.

Chlorophyll content and PhR and TR are changed after virus infection.

Chlorophyll of cv. Lulin decreases with 20%; this of Gradina and Nuburg increases with 5 and 45% respectively (Table 1, Fig. 1). The relation of chlorophylls changes from 3: 1 to 1.5-2:1.



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The correlation between TR cv. Lulin and Gradina increases once; this of cv. Nuburg decreases 1.5 times.

It is known the synthesis "de novo" catalytic active proteins are very typical processes of plant cells, infected by viruses, provoked by their metabolites.

Their activity touches nucleus, ribosome, mitochondria, chloroplasts and other cell organelles. These data reflect different points of interaction between raspberry plant and Raspberry vein chlorosis virus.

Conclusions

The study on the chlorophyll quantity and photosynthesis and transpiration in strawberry plants and grape wine are known. But obtained results are not used from agricultural and selective vue point.

These data show different reaction of analysed raspberry cultivars, provoked by virus infection, which reveal selective value of those sorts.

The high biological potential of selection is establisl1ed for cv. Gradina. In the second place is cv. Nuburg and on the third - cv. Lulin.

The data of TR determine highest humid of cv Nuburg, i. e. this cv. need by more area compered to cv. Gradina and Lulin.

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