INFLUENCE OF VARIETY AND TYPE OF CULTIVATION (ORGANIC AND CONVENTIONAL) ON QUALITY, IN FOUR TABLE GRAPE VARIETIES, GROWN IN CLUJ COUNTY, ROMANIA

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Abstract. *Four table grape varieties (Timpuriu de Cluj, Napoca, Chasselas doré, Muscat Hamburg) were tested in 2007-2008, Cluj county, Romania, under two types of cultural practices: organic and conventional. In the conventional system were used chemical fungicides and for the organic treatments were applied ecological products. In this study the following parameters were analyzed for the five wine grape varieties: average weight of grapes (g), the total acidity of must (gH_2SO_4 /l must) and sugar content of grape (g sugar/l must). The experiment was a bifactorial series (cultivar x type of cultivation) with four table grape varieties grown in two different systems, organic and conventional. The Napoca variety has registered good values for all parameters analyzed and these results recorded suggests that is a high adaptability to the organic culture system for this cultivar.*

Keywords: quality**,** table grape varieties, *Plasmopara viticola,* organic farming.

INTRODUCTION

Grape quality is an indicator that varies according to variety, climate conditions, growing area and the agrophytotechnical applied level and qualitative differentiation of harvest is based on sensory criteria, morphological (average weight of grapes) and biochemical (Oprea, 2001). Most authors (Botu, 1994; Sestraş, 2004) argue that for determining the quality of grapes considering priority biochemical criteria, that must sugar content and acidity, which can add others, such mineral salts, vitamins, enzymes and also phytochemicals (Waterhouse, 2002).

The objective of this paper is to evaluate and to compare the qualitative parameters, for the table grape varieties analyzed, cultivated in two different systems: organic and conventional.

MATERIAL AND METHOD

The biological material used in this study was comprised by four table grape varieties: Timpuriu de Cluj, Napoca, Chasselas doré, Muscat de Hamburg tested in 2007-2008, in Cluj county, observing the following parameters: average weight of grapes (g), the total acidity of must (g H_2SO_4 /l must) and sugar content of grape (g sugar/l must). The design of the experiment was linear, bifactorial series type (type of culture x variety, two years 2007-2008), and statistical interpretation of the results was made using Duncan test (Ardelean, 1986). Types of culture were differentiated by treatment for diseases, especially downy mildew of grapevine, caused by

Plasmopara viticola (Berk & Curt) Berl & de Toni which is one of the most serious diseases of grapevine worldwide (Agrios, 2005) and by different fertilizing for organic practices and for the conventional.

Conventional treatment consisted in the application of next fungicides: Ridomil Gold MZ 68 WP, Melody Duo 66.8 WP, Curzate manox SC, Quadris max SC, Folpet 50 WP and Dithane M 45 in May 3rd decade - July 1st decade. Organic treatments were applied with the following products: Bordeaux mixture 0.5% + spraying with purine of greater nettle fermented 1/20 dilution, copper sulphate 1%, Kocide 101 WP, Bordeaux mixture 1%, soluble sulphur 0.4% and Trichodex 25 WP.

RESULTS AND DISCUSSION

Average weight of grapes (g) is a very important character that is both a productivity factor and an element of quality grapes (Sestraş, 2004). Moreover this character is of particular importance in terms of commercial aspect, in table grapes. In our case, during two years of experience, results regarding the average weight of table grapes are presented in table 1.

Table 1

Influence of cultivar, type of systems and cultivar x system interaction on average weight of grapes (g)

Cultivar / System	Organic	Conventional	***Mean of variety***
Timpuriu de Cluj	219 e	245 de	232 N
Napoca	283 b	357 a	320 M
Chasselas doré	154 f	164 f	158 Q
Muscat de Hamburg	233 de	251 cd	242 N
Mean of treatment	222 B	254 A	

DS 5% for two cultivar means = 21 g

DS 5% for two systems means = 15 g

DS 5% for two cultivar x system interaction means = 30 g

Note: Difference between any two values, followed by at least one common point is insignificant.

The data in table 1 shows that of the four varieties of table grape tested, the highest mean weight of grapes had a variety Napoca (320 g), followed by a significant difference with M. Hamburg and Timpuriu de Cluj which recorded an average weight of 242 g, respectively 232 g.

And the two types of treatment, organic and conventional, have significantly influenced on the average weight of grapes. As expected, in the conventional system of cultivation, regardless of years, those four varieties of table grapes had an average weight of grape 254 g, significantly higher than that obtained in the organic system, namely 222 g. Analyzing the significance of differences from eight variant cultivar x system interaction variety of factors, it appears that Napoca varieties gives best results both in the organic farming (357g) and in the conventional culture system (283g).

However the average weight of grapes in the organic system for Napoca variety is clearly superior than average weight recorded in conventional system by

the other three varierties tested. This allows us to hold that Napoca is very well suited for both culture systems (organic and conventional) and especially for the organic one.

The content of total acidity of must and the concentration of sugars are some of the most important biochemical criteria for determining the quality of grapes (Oprea, 2001; Nastasia Pop, 2003). Total acidity content of table grape varieties tested in two experimental years and two different culture systems is presented in table 2.

Table 2

Influence of cultivar, type of systems and cultivar x systems interaction on total acidity of must (g H_2SO_4 /l must)

Cultivar / System	Organic	Conventional	Mean of variety
Timpuriu de Cluj	4.2 c	4.6 b	4.4 N
Napoca	3.7 d	3.8 d	3.8 Q
Chasselas doré	4.1 c	4.5 b	4.3 N
Muscat de Hamburg	4.6 b	5.3 a	5.0 M
Mean of treatment	4.2 B	4.6 A	

DS 5% for two cultivar means = 0.2 g/l H_2SO_4

DS 5% for two systems means = 0.1 g/l H_2SO_4

DS 5% for two cultivar x system interaction means = 0.2 g/l H_2SO_4

Note: Difference between any two values, followed by at least one common point is insignificant.

Of four varieties of table grape analyzed, the highest acid content was developed by the Muscat de Hamburg variety that irrespective of years and type of treatment has made an average of 5.0 g H_2SO_4 /l must followed at a significant difference by Chasselas Doré and Timpuriu de Cluj varieties who scored statistically equal in terms of total acidity (4.4 g/l H_2SO_4 and 4.3 g/l H_2SO_4). Analysing the significance of differences between the eights variants resulting from interaction of variety × type of system, it should be noted that given the Muscat de Hamburg variety best results both in the conventional system (5.3 g/l H_2SO_4) and in the organic cultivation system (4.6 g/l H_2SO_4).

Considering these aspects, we can say that for eco-climatic conditions of NE Transylvania, Muscat de Hamburg is well adapted to the organic system.

Although acidity of Napoca variety (3.7 organic and 3.8 conventional) was a poor, values are normal and fall within limits presented by other authors like Nastasia Pop (2005), Dobrei (2008) and Olteanu et al.(2002). Also equal values recorded by both the variety shows the adaptability of Napoca for both culture systems (organic and conventional).

In conclusion we can say that the variety Muscat Hamburg is best suited for organic farming systems and with Napoca recommend it for both systems.

Of carbohydrates, monosaccharides are most important because they represent over 95% of total sugars in the grapes and two monosaccharides, glucose and fructose are the most representative (Ţârdea et al., 2000). At the table grape varieties ratio between the two main sugars (glucose and fructose) should be in favor of glucose (Neagu, 1975; Ardelean, 1986).

In our study, conducted over two years (2007-2008) and in two different culture systems (organic and conventional), the results achieved by the four varieties of table analyzed variances, about sugar content, are shown in table 3.

According to data in this table Chasselas doré has accumulated the largest amount of sugar (162 g/l) regardless of years and type of system applied, followed very close to Timpuriu de Cluj (156 g/l) at a nonsignificant difference.

It should be noted the Napoca variety, for both experimental variants showed statistically undifferentiated values, which we indicate, probably, a good adaptability to ecological systems of culture.

Table 3

Influence of cultivar, type of system and cultivar x systems interaction on sugar content of must (g sugar /l must)

Cultivar / System	Organic	Conventional	***Mean of variety***
Timpuriu de Cluj	151 c	162 b	156 MN
Napoca	147 cd	155 bc	151 N
Chasselas doré	146 cd	179 a	162 M
Muscat de Hamburg	137 d	146 cd	141 Q
Mean of treatment	145 B	160 A	

DS 5% for two cultivar means = 8 g/l sugar

DS 5% for two system means = 5 g/l sugar

DS 5% for two cultivar x system interaction means = 11 g/l sugar

Note: Difference between any two values, followed by at least one common point is insignificant.

Looking inside the table, where the significance of differences between the eight variants from interaction variety x system, notes Chasselas doré, which gives the best results in conventional culture system, followed by Timpuriu de Cluj and Napoca at a significant difference but equal to each other in terms of statistical.

CONCLUSIONS

● The average weight of grapes in the organic system for Napoca variety is clearly superior than average weight recorded in conventional system by the other three varierties tested. This allows us to hold that Napoca is very well suited for both culture systems (organic and conventional) and especially for the organic one.

● Regarding acidity content, the variety Muscat Hamburg is best suited for organic farming systems and with Napoca recommend it for both systems.

● Finally we can say that in terms of sugar accumulation, in conditions of NE Transylvania, Chasselas doré variety which gives the best results in conventional culture system, followed by Timpuriu de Cluj and Napoca at a significant difference. The Napoca variety, for both experimental variants showed statistically undifferentiated values, which we indicate, a good adaptability to ecological systems of culture.

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