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Changes in the chromatic properties of red wines from *Vitis vinifera* L. cv. Merlot and Pinot Noir during the course of aging in bottle

Alin Dobrei *, Mariana-Atena Poiana, Florin Sala, Alina Ghita and Iosif Gergen
Banat's University of Agricultural Sciences and Veterinary Medicine, 119 Calea Aradului Street, 300645, Timisoara, Romania.
**e-mail: alin1969tmro@yahoo.com*

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Abstract

Differences in color of red wines from *Vitis vinifera* L. cv. Merlot and Pinot Noir grapes (vintage 2005, winemaking center Recas) were examined during the course of aging in bottle for a period of two years. The parameters evaluated in our study included chromatic parameters (color intensity and tonality), color structure (color due to monomeric anthocyanins, polymeric pigments and copigmented anthocyanins), monomeric anthocyanins content, "chemical age" and ionization of anthocyanins for red wines as young and after 4, 10, 18 and 24 months of aging in bottle. During the aging, the color intensity decreased and the tonality increased. The highest value of color intensity was registered for the young red wine Merlot (8.708) and the lowest values for Pinot Noir aged for 24 months (6.611). For color tonality, the highest value was recorded for Merlot wine after ageing in bottles for 24 months (0.96) and the smallest for young red wine Merlot (0.64). During the course of aging in bottle, the monomeric anthocyanins content decreased from 179.44 to 122.29 mg L^{-1} for Merlot wine and from 132.81 to 85.72 mg L^{-1} for Pinot Noir. By ageing, the fraction of color due to polymeric pigment increased on the basis of decreasing of color percentage due to monomeric and copigmented anthocyanins. Percentage of color assigned of copigmented anthocyanins after ageing in bottles for 24 months decreased for both analyzed wines from 22.71% to 10.87% for Pinot Noir wine and from 35.49% to 19.19% in the case of Merlot wine. Pinot Noir aged in bottle for 24 months showed the greatest contribution of polymeric pigments (67.96%) to the wine color. The "chemical age" of the wines, assessed on the basis of I_1 and I_2 indices, increased for both analyzed red wines but in different manner according to the color stabilization phenomenon. The values of these indices are very different in rapport with grapes variety and the aging time. The results are important in anticipation of the red wine color evolution during the course of aging. It outlines the idea that the red wine color can be influenced by the choosing of the aging time.

Key words: Red wine, Merlot, Pinot Noir, chromatic parameters, anthocyanins, aging process, "chemical age".

Introduction

The color of red wines is one of the most important qualities yet it has proven itself to be one of the most poorly understood. The color of red wine derives from the phenolic class of anthocyanidins and has been elusive to define because it is controlled by many factors, among the more important being grape variety, oenological treatments, temperature and aging period. Also, a big importance on the color of red wines presents the anthocyanins content, copigmentation phenomenon, procyanidins, acetaldehyde, free bisulfite, acids, polymeric pigments and tannins content [6, 7, 9, 20]. This level of complexity makes red wine color both intriguing and difficult to understand. Bottle aging of red wine is a result of many chemical reactions taking place over time. Over 30 years ago Somers observed as red wines aged they went through a change in spectral characteristics [16]. Malvidin-3-glucoside, the most abundant anthocyanin, principally responsible for wine's red color had declined over time [10, 13, 18]. The remaining colored compounds had unknown structures but were defined by their ability to resist bleaching bisulfite and became known as polymeric pigment. Work over the last thirty years trying to define the chemical structures of polymeric pigments has yielded very few conclusive results. Some of the results demonstrated that anthocyanins are not lost during wine aging; in fact, anthocyanins form covalent adducts with tannin, undergo derivatization by keto-acids and are linked to tannins by acetaldehyde. As a wine ages, this process of direct condensation causes anthocyanidin pigment to accumulate in the polymeric form, leading to improved color stability. Polymeric pigments are known to have different characteristics than malvidin-3-glucoside. They are resistant to bisulfite bleaching and are not as pH dependent as malvidin-3-glucoside. These two combined features spawned the term "stable color". The polymeric pigment is more resistant to the change in pH than total anthocyanins [8, 12, 19]. Somers estimated that polymeric pigments retained more than 50% of their maximum color at wine pH, whereas anthocyanins only retained about 23% of their color [17]. This demonstrates that at wine pH a significant portion of the color is coming from polymeric pigment. Copigmented anthocyanins are the complexes that result by reaction between anthocyanins and copigments molecules or co-factors. Co-factors are colorless compounds that when added to a solution containing anthocyanins will act to enhance the color of the solution. This phenomenon causes a hyperchromic effect and a bathochromic shift. The most important copigments in wine are expected to be flavan-3-ols and flavanols, hydroxycinnamic acids and even anthocyanin molecules [2, 3, 11]. As wine ages the free anthocyanins react to form polymeric pigments, this shifts the equilibrium to replenish free anthocyanins by releasing them from the

copigmented stacks. Therefore, as wine ages the stacks tend to break-up and co-pigmentation decreases as a result of this equilibrium [11]. During aging of the wine in bottles structural changes take place, and one of the most studied of those changes concerns red wine color evolution. In the ageing time, it has been demonstrated that initially present grape pigments slowly turn into new more stable red pigments. This phenomenon goes on for weeks, months and years [1, 15]. On this basis, we investigated the changes of chromatic characteristics of red wine stored in bottles with the aging time since aging in bottle is a very important step in red wine manufacture and great physical and chemical changes take place during this period.

Material and Methods

Samples: Red wines of Merlot (M) and Pinot Noir (PN) were obtained in winemaking center Recas (Western part of Romania) from the grapes harvested in 2005. Five red wine categories were investigated: young wines (0-M and 0-PN) and wines aged in bottles at 18°C and kept in the dark for 4, 10, 18 and 24 months: 4-M, 4-PN, 10-M, 10-PN, 18-M, 18-PN, 24-M, 24-PN. The storage area for wine must be dark because ultraviolet (UV) light will damage wine by causing the degradation of otherwise stable organic compounds found in red wine. The initial wines (0-M and 0-PN) were elaborated following the same winemaking techniques.

Determination of chromatic parameters: Chromatic parameters were determined according to Glories method [5]. The color intensity (IC), expressed in AU-absorbance units, was given by the sum of the absorbance to 420, 520 and 620 nm or A_{420}, A_{520} and A_{620}. The color tonality or hue (T) was expressed by the ratio of the A_{420} and A_{520}. Chromatic structure of wine was expressed by the yellow, red and blue pigment contribution (%) to the red wine color.

Red wine color analysis: Color analysis was done spectrophotometrically in accordance with Boulton's method [3] using the UV-VIS spectrophotometer (Analytic Jena Specord 205). For each wine the following parameters were measured by spectrophotometric assay: fraction of color due to monomeric anthocyanins (MA), copigmented anthocyanins (CA) and polymeric pigments (PP).

The samples were filtered and the wine pH was adjusted to 3.60 before analysis, 0.1 mL of 10% (v/v) acetaldehyde was added to 5.0 mL of wine and after 45 min at room temperature the absorbance was measured at 520 nm in a 1mm cuvette. Reading was multiplied by10.2. This is $A_{520}^{CH_3CHO}$ and represents the total color of the wine. To another 5.0 mL of wine, 0.1 mL of 3% potassium metabisulfite was added, and then the value of absorbance was measured at 520 nm in a 1 mm cuvette. Reading was multiplied by 10.2. This is $A_{520}^{SO_2}$ and represents the color due to polymeric pigments.

For co-pigmentation evaluation, to a 10 mm cuvette containing 1.9 mL of buffer, 0.1 mL of wine was added and after 10 minutes the value of absorbance was measured at 520 nm. Reading was multiplied by 20. This is A^{20} and represents the color due to monomeric and polymeric pigments. The difference $A_{520}^{CH_3CHO} - A_{20}$ represents the color due to copigmented anthocyanins and the difference $A_{20} - A_{520}^{SO_2}$ the color due to monomeric anthocyanins. The percentage of each fraction of pigment color assigned was calculated as the ratio of color due to the fraction in question and the total wine color multiplied by 100.

Evaluation of "chemical age": Evaluation was done on the basis of two indices I_1 and I_2, according to Somers and Evans method [16]. To 0.1 mL of wine, 10 mL of 1 N HCl was added and the value of absorbance was measured at 520 nm in a 10 mm cuvette after 60 minutes. Reading was multiplied by 101. This is A_{520}^{HCl}. At this pH, all anthocyanins are in flavilium form. Somers and Evans [15] proposed the following relationships for "chemical age" evaluation: $I_1 = \frac{A_{520}^{SO_2}}{A_{520}^{CH_3CHO}}$ and $I_2 = \frac{A_{520}^{SO_2}}{A_{520}^{HCl}}$

Determination of anthocyanin ionization degree: The α (%) gives a measure of the amounts of monomeric anthocyanins in the red colored form (carbonium ion) and was calculated as:

$$\alpha(\%) = \frac{A_{520(pH=3.6)} - A_{520}^{SO_2}}{A_{520}^{HCl} - \frac{5}{3} \times A_{520}^{SO_2}} \times 100$$

The $A_{520(pH=3.6)}$ can be obtained by adjusting the wine pH to 3.6 and measuring the absorbance at 520 nm [16]. In accord with Bakker *et al.* [1], the $\frac{5}{3} \times A_{520}^{SO_2}$ term represents the absorbance due to polymeric pigments at pH =1.

Determination of total monomeric anthocyanins content: Total monomeric anthocyanins were quantified by the pH-differential method [4] Anthocyanin pigments undergo reversible structural transformations with a change in pH. The colored oxonium form predominates at pH = 1.0 and the colorless hemiketal form at pH=4.5. The anthocyanin content (mg L^{-1}) was calculated as cyanidin-3-glucoside.

Results and Discussion

For simple and total characterization of Merlot and Pinot Noir red wine color, on the basis of optic densities at bandwidth characteristics, we foresaw a series of indices, out of which we recall color intensity, color tonality or hue and the chromatic structure expressed by the weight of every color. Red wine color can be evaluated by adding the three components: red, yellow and blue. The yellow component (absorbance to 420 nm or A_{420}) is ascribed to tannin and anthocyanin degradation products. The red component (A_{520}) is ascribed to the free anthocyanins under flavilium cations form and anthocyanins-tannins combinations in older wines. The blue component (A_{620}) is ascribed to free anthocyanins under the chinonic form or combinations between tannins and anthocyanins[14].

Table 1 shows the chromatic structure obtained by Glories method. During the wine aging, the percentage of color due to

Table 1. The changes in the chromatic parameters of red wines during the course of aging.

Wine sample	A_{420}	A_{520}	A_{620}	IC	T	Chromatic structure (%) yellow	(%) red	(%) blue
0-M	3.117	4.898	0.693	8.708	0.64	35.79	56.25	7.96
4-M	3.184	4.476	0.705	8.365	0.71	38.06	53.51	8.43
10-M	3.352	3.973	0.713	8.038	0.84	41.70	49.43	8.87
18-M	3.449	3.831	0.724	8.004	0.90	43.09	47.86	9.05
24-M	3.528	3.671	0.742	7.941	0.96	44.43	46.23	9.34
0-PN	2.711	3.979	0.512	7.202	0.68	37.64	55.25	7.11
4-PN	2.749	3.647	0.519	6.915	0.75	39.75	52.74	7.51
10-PN	2.777	3.353	0.536	6.666	0.83	41.66	50.30	8.04
18-PN	2.832	3.278	0.548	6.658	0.86	42.54	49.23	8.23
24-PN	2.903	3.119	0.589	6.611	0.93	43.91	47.18	8.91

Table 2. Dynamics of red wines color structure during the course of aging in bottle.

Wine type	PP (%)	MA (%)	CA (%)
0-M	10.33	54.18	35.49
4-M	18.71	48.92	32.37
10-M	27.96	43.88	28.16
18-M	44.55	32.68	22.77
24-M	53.99	26.82	19.19
0-PN	26.68	50.61	22.71
4-PN	34.39	46.16	19.45
10-PN	51.1	32.52	16.38
18-PN	53.8	34.17	12.03
24-PN	67.96	21.17	10.87

yellow component increased and the fraction of color due to red component decreased, but the chromatic structure was more equilibrated in the aged red wines. The blue component participates to the red wines color in low measure (in the range of 7.96-9.34% for Merlot and 7.11-8.91% for Pinot Noir wine). In the case of young red wines, the largest share of color is attributed to red components and the yellow component contributed with less than 40% to the red wine color. It can be said that during aging the red wine color components recorded changes: the values registered for A_{520} decreased, accompanied by increasing of A_{420} and A_{620}. The highest values of color intensity were registered in the case of young red wines, in particular, for the Merlot young red wine (8.708). The smallest values for IC were observed for aged red wines (for 18-PN the IC value was 6.611). The results presented in Table 1 reveal the fact that the color intensity drops for aged red wines, while the wine color hue intensifies. The IC diminuation is due to the disappearance of monomeric anthocyanins in the aging time. In this phase, due to the fact that A_{420} is increasing and A_{520} is decreasing, the color tonality is emphasized, so that it increased from 0.64 and 0.68, values which correspond to young red wines 0-M, respectively 0-PN, to 0.96 and 0.93, values corresponding to wines aged for 24 months. The decrease of A_{520} is due to condensed tannins precipitation.

The decrease of monomeric anthocyanins content in the aging time is shown in the Figs. 1 and 2. The monomeric anthocyanins content decreased from 179.44 to 122.29 mg L^{-1} for Merlot wine and from 132.81 to 85.72 mg L^{-1} for Pinot Noir wine.

Total wine color was an aggregate number of three components: copigmentation, free anthocyanins or monomeric anthocyanins and polymeric pigment (Table 2). The contribution to color due to copigmented anthocyanins in these aged red wines remained at 19.19% for 24-M and 10.87% for 24-PN and monomeric anthocyanins at 26.82% for 24-M and 21.17% for 24-PN. From these data results that during aging the fraction of color due to polymeric pigments increased. In parallel, the color assigned monomeric and copigmented anthocyanins decreased with aging time advance. In this period, the monomeric anthocyanins turn into polymeric anthocyanins with different molecular mass. In practice, the phenomenon of red wine color evolution is known as the aging of wine [16]. These changes are attributed to the red wine color stabilization.

The color stabilization can be attributed to diminishing of monomeric and copigmented anthocyanin contents. As a result of these changes the combinations between tannin and anthocyanins, polymeric pigments and intermolecular associations that have red color appear. The polymeric pigments are very stable compounds responsible for color of aged red wine [1, 10, 13]. Copigmented anthocyanins are the complexes that result by reaction between anthocyanins and copigment molecules. This phenomenon causes an enhancement of young red wine color due to the association of anthocyanins with co-factors with the effect of a bathochromic and a hyperchromic shift. These associations cause the pigments to exhibit far greater color than it would be expected from their concentration [2, 3, 16].The small value of copigmented anthocyanins in the case of 0-PN (22.71% comparatively with 34.49% registered for 0-M) is due to the specifics of Pinot Noir grape variety that contains a little amount of cofactor (especially flavan-3-ols and flavanols). From Table 2 it can be observed that the copigmented anthocyanins are destroyed by ageing. The co-pigmented anthocyanins also act as a reservoir for free flavylium ion, and we see a decrease in the contribution of co-pigmentation to color over time. Therefore, as wine ages the stacks tend to break-up and co-pigmentation decreases as a result of this equilibrium [3]. The polymeric pigments are present in a low measure in the young red wine Merlot (10.33) and their contribution to the total red wine color increases with aging in the bottle. The time for color stabilization is different in rapport with grape variety, maturation and ageing conditions [12, 14]. Lower degree of copigmentation identified for Pinot wines is due to the grapes of this variety which contain a small quantity of cofactor [2]. Percentage of color assigned copigmented anthocyanins after ageing in bottles for 24 months decreases for both analyzed wines from 22.71% to 10.87% for Pinot Noir wine and from 35.49% to 19.19% in the case of Merlot wine. By aging of Pinot Noir wine, the color due to polymeric pigments increased until 67.96%. From these data

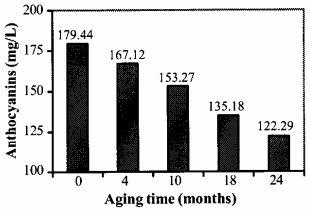

Figure 1. Evolution of monomeric anthocyanins content during the course of Merlot wine aging.

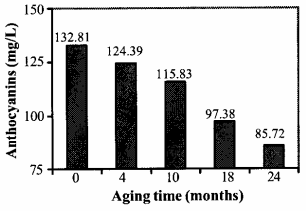

Figure 2. Evolution of monomeric anthocyanins content during the course of Pinot Noir wine aging.

it results that the Pinot Noir color is more stable thanthat of Merlot. Merlot requires more ageing time for color stabilization. This process could be extended during several months or even years. From the data presented in the Tables 1 and 2 we can see that by ageing the decrease of color intensity was correlated with the diminishing of copigmented and monomeric anthocyanins.

Fig. 3 and 4 present the "chemical age" evolution registered by ageing wine. The so-called "chemical age" of wine was quantified by two indices, I_1 and I_2. The ratios are close to zero in new wine, but increase to about 1.0 and 0.9, respectively, for wines older than 10 years [16]. Based on the I_1 values the contribution of polymeric pigments to total red wine color can be appreciated. For the young wines, I_1 and I_2 showed reduced values for both 0-M and 0-PN wines and, once with the ageing the value of these indices reached to 0.54 and 0.51, for 24-M 0.68 and 0.64 for 24-PN. These data show that after 24 months of aging, the color due to polymeric pigments represents 54% from the total wine color for wine Merlot and 68% for wine Pinot Noir. On the basis of I_2 values, the color due to polymeric pigments represents 22-51% from the color of anthocyanins in flavilium form for Merlot wine and 32-64% for Pinot Noir. On the basis of these indices, it can be observed the gradual conversion of monomeric anthocyanins to polymeric form in relation to wine aging.

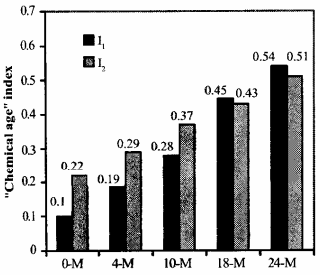

Figure 3. Evolution of "chemical age" indices for Merlot during aging in bottle.

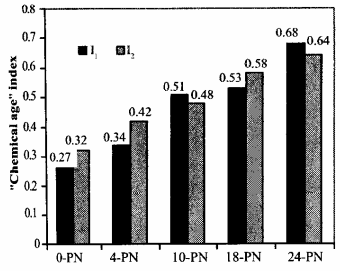

Figure 4. Evolution of "chemical age" indices for Pinot Noir during aging in bottle.

Fig. 5 shows that in the ageing time the degree of pigment coloration (α) registered a significant increase from 46.79% for 0-M to 75.37% for 24-M and from 33.545 for 0-PN to 68.19 for 24-PN. This value indicates the percentage of anthocyanins found in the flavilium or ionized form, being associated with the power of anthocyanin coloration.

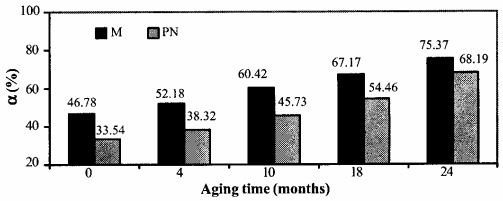

Figure 5. The changes of degree of anthocyanin ionization from Merlot and Pinot Noir wine during the course of aging.

Conclusions

The color components of red wines were changed during the aging: the percentage of color due to polymeric pigments increased and due to monomeric and copigmented anthocyanins decreased. The polymeric pigments, that are prevalent in the aged wines, are the stable color compounds. Along with the aging process forward, the proportion of yellow pigments contributed most to the total wine color, while red pigments contribution was reduced. During the ageing of both Merlot and Pinot Noir red wines, the color intensity decreased and the tonality increased.The magnitude of these changes is influenced by the grapes variety and the aging time. The color intensity is correlated with quantitative variation of free anthocyanin content. For young Merlot and Pinot Noir red wines, copigmentation seems to result in both a higher pigment concentration and an enhancement in the color of those pigments. The "chemical age" of the wines assessed on the basis of I_1 and I_2 indices proportionally increases with the color evolution of red wine to form more stable chemical structure. From these data we can say that red wine color stabilization involves transformation of free anthocyanins into polymeric forms. This process can continue with increasing aging time. The class of monomeric anthocyanins participates in the highest measure to the young red wines color and their contribution decreases in rapport with the aging time. Polymerization reactions of anthocyanins prevailed over pigment degradation reactions, and copigmentation was still relevant after two years of bottle aging. These might provide a substantial basis for the further researches on control of wine color during winemaking.

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The influence of the soil maintaining systems upon the maturing evolution of the Burgund grapes

Sfetcu Andreea Adriana [1*], Dobrei Alin [1]

Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture and Sylviculture

*Corresponding author. Email: timis_randreea27@yahoo.com

Abstract The soil maintaining systems represent an important technological sequence through which important savings can be accomplished if the pollution in the environment reduces and the vineyard and wine products reduce.

In the past couple of years, different attempts to find an alternative to the classical method of soil maintaining, the method of (energofarasi) which presents with a high rate of pollution, emerged.

The research took place in 2009 and was based of the Burgund variety; and they aim at the following experimental variables: grassing with Ryegrass (Lolium sp.), grassing with Fescue (Festuca sp.), grassing with Ryegrass and Fescue, grassing with Vicia.

The interpretations were compared to the classical soil maintaining method: black fallow soil.

The alternative soil maintaining systems have had a positive influence on the quality and quantity of the production. The exception was the Vicia (Borceag). All the other alternative variables recorded that the must had high sugar content.

Key words

soit matenance systems, grassing, quantity, quality, corp

The soil maintenance process is an expensive technological sequence, through which about one third of the total yearly costs. That's why, this tehnological sequence, althogh scrutinized, it continues to be perfected, expecialy considering the climate changes nowadays.

Because the classical method of soil maintaining - (black fallow field), which is energofarasi, with an unpropitious impact upon the soil, alternative soil maintenance systems must be found.

Materials and Methods

The researches ware made in the year 2009, in the Timisoara Didactical Plantation Resort, at the Burgund variety, analysed some ecological soil maintenance systems, based on permanent grassing with diferent species: Lolium Sp., Festuca sp. and Lolium sp + Festuca sp and one variant grassing with Vicia.

The research was related to the clasical soil maintenance system (black fallow field), which is still the most common in the Romanian viticulture.

During the vegetation period several observation and determinations were made regarding: the grapes maturation, for finding out which is the optimal gathering moment and for obseving the quantity and quality of the crop: the midst weigth of one truss, the production on one vine, the production on one hectare, the sugar and acidity content of the must.

The vineyard where the research was made, is one found in the absolute stage of maturation, with planting distances of 2.2 m between rows and 1 m between vines on the row.

Results and Discussions

The production quality was expresed in relation to the must sugar quantity related with its acidity. The suger quantity limits were betwen 190 g/l at the Vicia grassing variant and 207 g/l at the Lolium +Festuca variant.

Comparing the results with the control (black fallow field), the only variable which recorded smaller values than the control, was the Vicia variable. The other variables redorded values greater than 200 g/l.

Regarding the must acidity, the recorded values were situated betwen 4,5 g/l H_2SO_4 at Festuca grassing variety, and 5,1 g/l H_2SO_4 at Vicia's; this last variable having negative values comparing to the control. The Festuca grassing variable and Lolium+Festuca variable recorded

acidity values of 4,5 g/l H_2SO_4, value that is superior than the control. The Lolium grassing variable recorded the 4,6 g/l H_2SO_4 value, equal with the control value.

The No.2 table shows the quantitative elements of the Burgund variety recorded by the soil maintenance systems. The average weight of one truss oscillates between 180 g at Lolium and Lolium+Festuca grassing variables, and 193 g at Vicia grassing variable.

In comparison with the control, the Vicia variable was the only one that recorded superior values, while the others recorded smaller results.

The number of the trusses on one vine varies between 13,3 at the Lolium variant and Festuca and 14,4 at Vicia grassing variant.

It is observed that all the researched variables were subordinate when compared to the control, except Vicia grassing variant, whitch recorded a superior value.

The minimal value of the production on one vine was 2,39 kg/vine at Lolium grassing variables and the maximum 2,77 kg/vine at Vicia variable.

From this point of view, the Lolium, Festuca and Lolium+Festuca variables recorded smaller values than the control, while the Vicia grassing variable was recorded at a higher weight than the.

Table 1

The influence of the soil maintenance systems upon the quality of the Burgund variety crop

The soil maintenance system	Parameters	Data						
		25 IIV	2 IX	9 IX	11 IX	15 IX	18 IX	20 IX
Black field (MT)	Sugar (g/l)	163	175	187	190	193	197	199
	Acidity (g/l H_2SO_4)	6,3	5,8	5,5	5,1	4,9	4,7	4,6
	The weight of 100 grain	218	221	223	224	225	226	226
Lolium sp. grassing	Sugar (g/l)	170	176	193	197	199	202	203
	Acidity (g/l H_2SO_4)	5,9	5,7	5,4	5,3	4,8	4,7	4,6
	The weight of 100 grain	187	190	206	210	217	217	218
Festuca sp. grassing	Sugar (g/l)	172	189	197	201	203	204	206
	Acidity (g/l H_2SO_4)	5,7	5,5	4,9	4,8	4,7	4,6	4,5
	The weight of 100 grain	190	195	206	209	213	214	215
Lolium + Festuca grassing	Sugar (g/l)	172	186	197	203	205	206	207
	Acidity (g/l H_2SO_4)	5,8	5,6	5,1	4,9	4,7	4,6	4,5
	The weight of 100 grain	170	187	199	204	207	211	214
Vicia grassing	Sugar (g/l)	158	163	176	181	185	189	190
	Acidity (g/l H_2SO_4)	6,5	6,3	5,7	5,5	5,4	5,3	5,1
	The weight of 100 grain	205	210	212	215	217	218	220

Table 2

The quantity elements of the Burgund variety related to the soil maintenance systems

Soil maintenance system	The midst weight of one truss (g)	The number of the trusses on one vine	The production on one vine (kg)	The difference with the control)	Significance
Black field (Control)	190	14,3	2,71	-	-
Lolium sp. grassing	180	13,3	2,39	-0,32	0
Festuca sp. grassing	182	13,3	2,42	-0,29	0
Lolium + Festuca grassing	180	14,3	2,57	-0,14	-
Vicia grassing	193	14,4	2,77	+0,06	-
Average		13,92	2,57	-	-

Dl 5% = 0,25; Dl 1% = 0,64; Dl 0,1% = 1,12

Table. 3

The influence of the soil maintenance systems upon the production quantity of Burgund variety

Soil maintenance system	The production on one vine (kg)	The production on hectare (kg/ha)	The difference with the control	Significance
Black field (Control)	2,71	12316	-	
Lolium sp.grassing	2,39	10862,5	- 1453,5	00
Festuca sp. grassing	2,42	10998,9	- 1317,1	0
Lolium + Festuca grassing	2,57	11680.6	- 635,4	0
Vicia grassing	2,77	12589.6	+ 273,6	-
Average	2,57	11680.6	-	

Dl 5% = 530,2; Dl 1% = 1320,1; Dl 0,1% = 2200,4

The influence of the soil maintenance systems upon the production of the Burgund variety in The Timisoara Didactical Plantation Resort conditions of the year 2009 were obvious; from the statistical point of view the difference between the experimental variables recorded were significant.

The production on the hectare varied between 10862,5 kg/ha at the simple Lolium grassing variant and 12589,6 kg/ha at the Vicia grassing variant. The only variable recording a higher production than the control was the Vicia grassing variable, producing. The lowest production was recorded in the case of the Lolium and Festuca grassing variable, which recorded a production loss of over 1500 kg/ha.

In order to draw a fundamental conclusion it is necessary to consult next year's production results because of the harsh drought that took place between the months of July and August 2009 that had a negative influence upon the plantation.

Conclusions

1 Compared with the other soil maintenance systems, the Vicia variable came with an aditional nitrogen contribution, whitch assures a

production plus, but slightly affects the sugar and acidity content.

2. The Vicia grassing variable is recomended in the ecological viticulture, because it replaces, partially or even totally, the usage of the chemical fertilizers. In the case of other variables, the positive effect was not so obvious, because of the late planting, which affected the germination of the seeds and the extend of soil cover.

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Research concerning local valuable grape varieties and biotypes Timis County, Romania

Dobrei A.[1*]., Mălăescu Mihaela[1], Ghiţă Alina[1], Cristea T.[1], Moş Victoria[1]

[1]USAMVB Timisoara, Faculty of Horticulture and Sylviculture

*Coresponding author. E-mail: alin1969tmro@yahoo.com

Abstract Research focused on different areas in the Timiş County in an attempt to identify local grape varieties and biotypes cultivated on private plantations or in family gardens that are not known and, therefore, cannot be properly valorised.
We made observations and measurements of the ampelographic, physical and chemical, and technological features of the local grape varieties and biotypes in several localities of the Timiş County (Buziaş, Silagiu, Ghiroda, Timişora, Şarlota, Izvin, Săcălaz, and Urseni). We analysed and identified 52 valuable local grape cultivars (16 local grape biotypes have features specific to table grapes, 17 fir wine-making, and 19 have mixed features) that we compared with the best known and most representative varieties in the area.
For the 52 local grape varieties and biotypes we noted the locality in which they were found, the common name, the initial of the street on which the households are, the street number, and important ampelographic and technological features.

Key words

local and biotypes grape varieties, ampelographic and technological features

Grape vine appeared long before man and it later spread on all the continents: the proof – the large number of varieties and biotypes (over 10,000-12,000).

Beside these varieties, there are also less spread ones; they are usually local varieties within limited areas that deserve more attention from viticulturists and plant breeders, because they have a lot of valuable features that have not been exploited enough.

The Banat area is an area of tradition in grape vine cultivation: the proof – the famous viticultural areas such as Recaş, Buziaş, Silagiu, Teremia, Jamu Mare, Giarmata, Bencec, etc. Beside these areas, there are also numerous valuable local, typical, genuine grape varieties and biotypes that bear the mark of their origin. Obtaining these produce creates the premises for covering some niches on the extremely competitive world grape and wine market.

Material and Method

Research was carried out in 2008 and 2009 and consisted in identifying, observing, and studying the local grape germoplasm in different localities of Timiş County (Buziaş, Silagiu, Ghiroda, Timişora, Şarlota, Izvin, Săcălaz, and Urseni).

During out field trips we identified and sampled over 100 local varieties and cultivars in the Timiş County. As a result of analyzing the samples from the point of view of their ampelographic, physical and chemical, and technological features we found out that 52 local grape cultivars are of interest for our research.

The research methods we used are usual in this type of research. The local grape varieties and biotypes identified as interesting for our research were compared to the best known and most representative varieties in the area aiming at drawing some conclusions.

In order to characterise cultivars ampelographically we referred to the most important ampelographic descriptors: leaves, cluster, and fruit. To establish the name of local grape varieties and cultivars we appealed to numerous criteria (common local name if any, initials of the locality where thy were found, initials of the streets where they were found, the number of the farmstead, predominant ampelographical and technological features, etc.).

Results and Discussions

The 52 local grape cultivars were found in the localities mentioned in Table 1. Among them, 16 local grape biotypes have features specific to table grape varieties, 17 fit wine-making, and 19 have mixed features (table grapes and wine grapes).

Table 1

The distribution of the local varieties and biotypes on areas and localities

Area	Locality	Discovered local varieties and biotypes			Total
		Table	Wine	Both	
TIMIS	Timisoara	2	-	-	2
	Sarlota	-	-	2	2
	Buzias	8	10	11	29
	Silagiu	4	6	3	13
	Izvin	1	-	-	1
	Ghiroda	-	1	2	3
	Sacalaz	-	-	1	1
	Urseni	1	-	-	1
	Total	16	17	19	52

Table 2

Ampelographical description of table grape varieties

Variety	Leaf	Cluster	Berry
Ramuros de Buzias	Medium, cuneiform, slightly palmate, sharp indentation	Medium to large, branchy, cylinder-conical, spare berries	Large, cylindrical, thin, elastic, translucid, yellow-greenish skin, Muscat flavoured, one-seeded
Frumoasa alba de Buzias	Medium, almost round, palmate	Large, with well developed branches, Mare, conic, and spare berries	Uneven in size and coloration, thin, elastic, yellow-greenish to yellow-gold, 1-2 seeds
Auriu de Buzias	Medium, round, trilobed	Small to medium, sometimes winged	Small, spherical, yellow-gold skin
Alb aripat de Silagiu	Large, cuneiform, slightly palmate, sharp mucronate indentation	Medium, cylindrical-conical, spare berries	Large, elliptical, yellow-greenish, rigid skin covered with pruine, 2-4 seeds
Alb de Timisoara	Medium to small, almost round, full	Medium, slightly cylindrical-conical, very compact	Medium, spherical, slightly deformed, green skin with not persisting pruine, 3-4 seeds
Roz indesat de Silagiu	Medium, palmate, cordiform	Large, cylindrical-conical, curved tip, dense deformed berries	Uneven in size, pink-greenish, thick, elastic skin with pruine, rudimentary seeds
Aripat de Buzias	Medium, cuneiform, foliar polymorphism	Medium, cylindrical-conical, winged, with rather sparse berries	Medium, spherical-ovoid, uneven in size and shape, yellow-rusty skin
Marele alb de Izvin	Large, cuneiform, trilobate	Large to very large, conical, rather dense berries	Large, elongated-ovoid, thick, elastic, green-yellowish skin
Coada de vulpe	Small to medium, cuneiform, palmate	Large to very large, cylindrical, winged, bifid top	Medium, spherical, thin, reddish skin covered with fine pruine, 2 seeds
Alb de Buzias	Small, kidney-like, palmate	Large, cylindrical-conical, branchy	Small, spherical, uneven, slightly elongated, yellow-gold skin, no seeds
Mare roz de Buzias	Medium to small, round, palmate	Very large, cylindrical-conical, dense berries	Medium to small, uneven in size and shape, ellipsoidal, thin, green and pink skin, easy cracking, 1-2 seeds
Victorita de Silagiu	Small, palmate, round-kidney-like	Medium, conical, spare berries	Elongated-ovoid, medium to large, green-yellowish skin, 2-4 seeds
Bulgare alb	Medium, orbicular, slightly trilobate	Small to medium, cylindrical	Medium, almost spherical, yellow-rusty skin, 2 small piriform seeds
Negru vinetiu de Silagiu	Medium, round, palmate	Medium, cylindrical-conical, branchy, lose, spare berries	Medium, ellipsoid, black-purplish skin, 2-4 seeds
Coarna visinie	Medium, orbicular, full	Large, cylindrical-conical, spare berries	Medium, elongate-ovoid, deformed, pink-cherry skin, 2 seeds
Mare aripat de Urseni	Large, cordiform, slightly trilobate	Large, cylindrical-conical, winged, lose, spare berries	Large, elongated, ovoid, Green, translucid skin, 1-2 seeds

Table 3

Ampelographical description of mixed grape varieties

Variety	Leaf	Cluster	Berry
Buzias AS 33	Large, cuneiform, palmate	Conical, lose, well developed primary ramifications	Spherical, yellow-gold skin
Regina viei 21	Small, cuneiform, palmate, small sinuses	Large, conical, well developed ramifications, sparse berries	Spherical, uneven in size, thick, yellow-gold, translucid skin, rudimentary seeds
Capsunica	Medium, cuneiform, trilobite	Small, sometimes winged, cylindrical-conical	Medium, spherical, greenish, elastic skin covered with pruine, 2 seeds
Roz de Silagiu	Small, cuneiform, palmate	Medium, cylindrical, dense berries	Small to medium, spherical, bead-like, thin, pink-greenish skin, 1-2 seeds
Verde cu boabe rare	Medium, round to cuneiform, palmate	Medium, cylindrical-conical, sparse berries	Medium to large, ovoid, thick, green skin covered with fine pruine, 3 seeds
Alb verzui	Medium, cuneiform, tri-lobate or palmate	Medium, cylindrical-conical, sometimes winged	Medium, spherical, thick, yellow-greenish skin covered with fine pruine
Rozaliu de Buzias	Medium, round, cordiform, full	Medium, conical, sparse berries	Very large, spherical, slightly oval, green and pink skin, wild strawberry flavoured, 2-4 seeds
Alb verzui de Ghiroda	Medium to small, almost round, full	Medium, cylindrical, compact	Medium, spherical, slightly deformed, green skin, 3-4 small seeds
Galben lax	Medium, cuneiform, trilobite	Large to very large, winged, cylindrical-conical, lose, sparse berries	Large, slightly oval to spherical, green-yellowish, translucid skin, 1-2 seeds
Buzias TH	Large to very large, kidney-like to cuneiform, foliar polymorphism	Medium, cylindrical, winged	Spherical, black-bluish, easy cracking skin, 1-2 seeds
Negru rar de Buzias	Large, cuneiform, palmate	Cylindrical-conical, winged, sparse berries	Spherical, medium, black-bluish skin, 3 seeds
Fraga neagra de Buzias	Large, kidney-like, full	Small, winged, conical, lose, sparse berries	Medium, spherical, thin, elastic, black-bluish skin, wild strawberry flavoured, 3-4 seeds
Buzias ASH	Large to very large, cuneiform, palmate	Medium, cylindrical, winged, sparse berries, tendency to shrink and bead	Spherical, black-purplish skin, 1-3 seeds
Negru de Buzias	Very large, cuneiform, palmate	Medium to large, cylindrical, rather dense berries	Large, spherical, black-bluish skin
Negru vanat de Silagiu	Medium, round, palmate	Medium, cylindrical-conical, branchy, lose, sparse berries	Medium, ellipsoidal, black-purplish skin, 2-4 seeds
Negru ramuros de Silagiu	Medium, round, palmate	Medium to large, branchy, conical	Medium, slightly elongated, thin, black-bluish skin, 3 seeds
Negru de Sarlota	Medium to large, cuneiform, palmate	Medium, winged, conical	Medium, uneven in size, spherical, black, elastic skin, 2 large seeds
Negru mare de Ghiroda	Large, almost cordiform, slightly trilobite	Medium, very lose, cylindrical-conical	Medium, almost spherical, black-purplish skin, 3 medium seeds
Negru de Sacalaz	Large to very large, full, almost orbicular	Large to very large, cylindrical-conical, winged	Spherical, large, black-purplish skin covered by dense pruine

Table 4

Ampelographical description of wine grapes

Variety	Leaf	Cluster	Berry
Roz de Buzias	Medium, cuneiform, palmate	Medium, conical, dense berries, shrinking, beading berries	Small, spherical, thin, pink skin covered with pruine, 1-2 seeds
Fraga alba de Silagiu	Medium, cuneiform, trilobate	Small to very small, cylindrical, rather rare berries	Small, spherical, thick, crackly, green-yellowish skin covered with pruine, 3 seeds
Ruginiu de Silagiu	Medium to large, cuneiform, palmate	Medium, sometimes winged, dense berries	Medium, spherical, elastic, yellow-gold, medium-thick skin, 2 seeds
Roz marunt de Buzias	Medium, cuneiform, palmate	Medium, conical, dense berries, shrinking, beading berries	Small, spherical, thin, pink skin covered with pruine, 1-2 small seeds
Roz batut de Silagiu	Medium, round, palmate	Medium, cylindrical, dense berries	Small or medium, elongate, pink-reddish skin
Roz batut de Buzias	Small, almost kidney-shaped, trilobate, superficial indentation	Small, cylindrical-conical, slightly turned tip, dense, deformed berries	Small, spherical-flattened, thin, pink-greenish skin covered with fine pruine, 2-3 seeds
Roze de Silagiu	Small, cuneiform, palmate	Medium, cylindrical, dense berries	Small to medium, spherical, tendency to beading, pink-greenish skin
Roz cu aripioara	Large, cuneiform, palmate, largely indented	Small to medium, cylindrical-conical, rather rare berries, developed ramification at the basis	Small, oval-elongated, pink, translucid, thin skin covered with fine pruine, 2 seeds
Compact de Buzias	Small to medium, cordiform, palmate, small, slightly mucronate indentation	Small, cylindrical, dense, deformed berries, compact	Small to medium, spherical, deformed, green-yellowish, thin, translucid skin, obvious pistil point, 2 seeds
Pintenat de Buzias	Small, round, palmate, rare, mucronate indentation	Small, cylindrical, dense berries	Medium, spherical, slightly elongated, thin, green-gold, translucid skin covered with fine pruine, very obvious pistil point, 2-3 seeds
Roz deformat de Buzias	Small, almost kidney-like, trilobite, superficial indentation	Small, cylindrical-conical, tip slightly turned, dense deforming berries	Small, spherical-flattened, thin, pink-greenish skin covered with fine pruine, 2-3 seeds
Roz de Ghiroda	Small, cuneiform, trilobate	Small, cylindrical, sparse berries	Small, spherical, pink skin
Negru mic de Silagiu	Medium, palmate, cuneiform	Small, cylindrical, rather dense berries	Medium, spherical, black-purplish, elastic skin intensely covered with pruine
Negru mic de Buzias	Large, cuneiform, palmate	Small, cylindrical, rare berries	Medium-small, spherical, black-bluish skin
Negru pruinat de Buzias	Kidney-like, medium, palmate	Small to medium, conical, rather dense berries	Small to medium, slightly ellipsoidal, elastic, black-purplish skin covered with dense pruine, 4 seeds
Rosu compact	Medium to large, cuneiform, palmate	Medium, cylindrical-conical, tendency to winging	Medium, spherical, thick, elastic, reddish, green on the side not exposed to the sun skin, 1-2 seeds
Negru aripat de Silagiu	Large to very large, round, full, mucronate indentation	Medium, cylindrical-conical, winged, dense berries	Medium to large, spherical, thick, elastic, black-bluish skin covered with pruine, 2 large seeds

Wine grapes are, from an ampelographical point of view, smaller clusters, which is not an impediment in these varieties, cluster size being no determining feature.

The technological and physical and chemical features of cultivars are shown separately per directions of production; results are presented comparatively with the varieties Chasselas dore, Feteasca regala, and Cabernet Sauvignon (Tables 5, 6 and 7). Technological and physical and chemical features of local grape varieties and biotypes destined to fresh consumption have been analysed comparatively with the variety Chasselas dore and focused on sugar content, acidity, gluco-acidimetric index, and marketable yield.

As for sugar content, there were local varieties and biotypes that overrun the control Chasselas dore though this variety is known for its highest sugar content among table grape varieties.

The variety Coadă de vulpe has the highest sugar content (+ 15 g/l), followed by the varieties Rămuros de Buziaş (+ 11 g/l) and Marele alb de Izvin (+ 9 g/l). The rest of the cultivars had, compared to the control, lower sugar contents – 59 g/l in the variety Frumoasă albă de Buziaş and 2 g/l in the variety Mare aripat de Urseni.

As for marketable yield, most of the local cultivars have overrun the control, which is an important aspect in table grape varieties. To note the high marketable yields of the varieties Mare aripat de Urseni (86%), Frumoasă albă de Buziaş (84%), Marele alb de Izvin and Rămuros de Buziaş (83% each), followed by Mare roz de Buziaş (82%).

The varieties Alb aripat de Silagiu, Roz îndesat de Silagiu, Aripat de Buziaş and Negru vineţiu de Silagiu yielded less compared to the control variety.

Most local varieties and biotypes with mixed features have a pleasant commercial aspect, close to that of table grapes, and some of them have a balanced chemical composition that recommends them for savoury, balanced, low-alcohol consumption wines – which corresponds to world wine-making trends. To note in this group the varieties Buzias TH, Negru mare de Ghiroda and Verde cu boabe rare.

In the group of wine grape varieties we noted for white wines the varieties Ruginiu de Silagiu, Fraga alba de Silagiu, Pintenat de Buzias and Compact de Buzias with high sugar concentrations compared to the control variety Fetească regală.

Among the local grape varieties and biotypes for red wines, the only one that overrated the content in sugar content was Negru mic de Buziaş.

Table 5

Technological, physical and chemical features of the local biotypes and varieties of grapes for fresh consumption

Variety	Sugar (g/l)	Acidity (g/l H_2SO_4)	Gluco-acidimetric index	Yeld %	Difference to the control (Sugar)
Ramuros de Buzias	186	4,2	44,28	83	+11
Frumoasa alba de Buzias	116	4,55	25,49	84	-59
Auriu de Buzias	175	3,2	54,68	73	0
Alb aripat de Silagiu	147	3,62	40,60	68	-28
Alb de Timisoara	175	3,4	51,47	81	-
Roz indesat de Silagiu	129	3,75	34,4	65	-46
Aripat de Buzias	158	3,25	48,61	71	-17
Marele alb de Izvin	184	4,2	43,80	83	+9
Coada de vulpe	190	3,6	52,77	81	+15
Alb de Buzias	172	4,8	35,83	78	-3
Mare roz de Buzias	160	5,2	30,77	82	-15
Victorita de Silagiu	150	6,1	24,59	81	-25
Bulgare alb	175	4,5	38,89	72	-
Negru vinetiu de Silagiu	161	5,2	30,96	70	-16
Coarna visinie	142	6,8	20,88	82	-33
Mare aripat de Urseni	173	4,6	37,60	86	-2
Chasselas dore(Control)	175	3,15	55,55	72	-

In most varieties, must has a balanced composition. In some varieties, high sugar content results in high-quality wines that can be turned into dry, demi-dry, demi-sweet or sweet wines, thus meeting the requirements of a large range of consumers (Roz de Buzias, Fraga alba de Silagiu, Ruginiu de Silagiu, and Negru mic de Buzias).

Other varieties are to be noted for their surplus of acidity which makes them fit for bubbling wines or for acidity correctors in deficitary varieties or in warm, dry years.

In the case of the varieties destined exclusively to wines, we noted a difference of the varieties depending the area of origin.

Table 6

Technological, physical and chemical features of local biotypes and varieties with mixed features

Variety	Sugar (g/l)	Acidity (g/l H_2SO_4)	Gluco-acidimetric index	Alcoholic potential	Difference to the control (Sugar)
Buzias AS 33	171	4,9	34,89	10,05	-4
Regina viei 21	114	4,51	25,27	6,70	-61
Capsunica	127	6,3	20,15	7,47	-48
Roz de Silagiu	155	4,9	31,63	9,11	-20
Verde cu boabe rare	191	4,3	44,41	11,2	+16
Alb verzui	160	5,8	27,58	9,4	-15
Rozaliu de Buzias	156	7,1	21,97	9,17	-19
Alb verzui de Ghiroda	190	4,6	41,30	11,1	+15
Galben lax	136	8,2	16,58	8,0	-39
Buzias TH	191	4,2	45,47	11,23	+16
Negru rar de Buzias	158	4,7	33,61	9,29	-17
Fraga neagra de Buzias	127	6,5	19,53	7,47	-48
Buzias ASH	140	5,8	24,13	8,23	-35
Negru de Buzias	147	5,4	27,22	8,64	-28
Negru vanat de Silagiu	166	4,5	36,88	9,76	-9
Negru ramuros de Silagiu	153	4,9	31,22	9,0	-22
Negru de Sarlota	168	4,4	38,18	9,88	-7
Negru mare de Ghiroda	186	5,1	36,40	10,9	+11
Negru de Sacalaz	169	5,4	31,29	9,9	-6
Chasselas dore (Control)	175	3,15	55,55	10,29	-

Table 7

Technological, physical and chemical characteristics of local varieties and cultivars for wine

Variety	Locality	Sugar (g/l)	Acidity (g/l H_2SO_4)	Gluco-acidimetric index	Alcoholic potential	Difference to the control (Sugar)
White						
Roz de Buzias	Buzias	171	5,6	30,53	10,05	-17
Fraga alba de Silagiu	Silagiu	204	3,9	52,3	12,0	+16
Ruginiu de Silagiu	Silagiu	217	3,1	70	12,76	+29
Roz marunt de Buzias	Buzias-A.Saguna	182	3,8	47,89	10,7	-6
Roz batut de Silagiu	Silagiu	125	7,5	16,66	7,35	-63
Roz batut de Buzias	Buzias	178	5,6	31,78	10,4	-10
Roze de Silagiu	Silagiu	175	5,8	31,89	10,2	-13
Roz cu aripioara	Buzias	129	8,1	15,92	7,5	-59
Compact de Buzias	Buzias	194	4,2	46,19	11,4	+6
Pintenat de Buzias	Buzias	197	4,1	48,04	11,58	+9
Roz deformat de Buzias	Buzias	156	6,1	25,57	9,1	-32
Roz de Ghiroda	Ghiroda	174	5,8	30,00	10,2	-14
Feteasca Regala(Control)	Timisoara	188	4,3	43,72	11.05	-
Reds						
Negru mic de Silagiu	Silagiu	186	4.6	40,43	10,9	-8
Negru mic de Buzias	Buzias	213	3,1	68,70	12,52	+19
Negru pruinat de Buzias	Buzias	186	4,5	41,33	10,9	-8
Rosu compact	Buzias	151	6,4	23,59	8,8	-43
Negru aripat de Silagiu	Silagiu	152	6,3	24,12	8,9	-42
Cabernet Sauvignon (Control)	Timisoara	194	3,5	55,42	11,41	-

Table 7

e to the trol gar)
17
16
29
-6
-63
-10
-13
-59
+6
+9
-32
-14
-
-8
+19
-8
-43
-42
-

Conclusions

The reference area is noted for its abundance of local grape varieties and biotypes, some of which very valuable, most of which are very little known – in some cases only to those who grow them.

There are numerous local grape varieties and biotypes that are noted for their high yields, pleasant commercial aspect, and balanced sugar content and acidity, which could, within rational cultivation technologies, is a high-quality raw matter for special wines.

Most mixed features varieties have a pleasant commercial aspect, close to that of table grapes and a balanced chemical composition which recommends them for both fresh consumption and savoury, balanced, low-alcohol wines, the new trend worldwide.

In the varieties destined exclusively to wine-making, we noted a difference between the varieties depending on the area of origin. The varieties from the Buzias-Silagiu have higher sugar content and lower acidity content.

Another important result of our research was that we succeeded in capturing the attention, the interest, and cooperation of several individuals that have become more interested in this field and who understood that they have, in their gardens, true treasures.

As a result of research, we managed to identify and study numerous local grape varieties and biotypes; but in the reference area there are many other varieties that we could not identify during the two research years – which will be our main focus in our future research.

Acknowledgements

The researches which formed the basis of obtaining these results were funded by CNCSIS Bucharest project: Development of some models of advanced viticultural technologies in accordance with the pedoclimatic conditions, the varietal assortments and sustainable viticulture principles, PNII-IDEI, code 1128, No. 355/01.10.2007, Project Manager: Prof. dr. Dobrei Alin.

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Research concerning the impact of the soil maintenance system through permanent grass-cover on growth and fructification in several grape vine varieties

Dobrei A.[1*], Ghiţă Alina[1], Mălăescu Mihaela[1], Cristea T.[1], Drăgunescu Anca[1]

[1]USAMVB Timisoara, Faculty of Horticulture and Sylviculture

*Coresponding author. E-mail: alin1969tmro@yahoo.com

Abstract We carried out research on the impact of permanent grass-cover on growth and fructification in several table and wine grape vine varieties cultivated in the viticultural plantation of the Didactic Station in Timişoara, located on a relatively plane land. We made observations and measurements concerning the impact of permanent grass-cover on total annual growth, on mature annual growth, on foliar area, on the quantity and quality of grape yield.

We also analysed the impact of this system on yield expenses per ha and on the number of days of labour necessary per ha and per year.

Permanent grass cover led to a diminution of total annual growth, but it also led to an increase of the percentage of annual mature wood, which is a great advantage since it ensures an increase of wintering resistance. Wintering resistance is very important particularly in the climate changes of the last years and of the very low minimum temperatures during winter which affected bud viability and even wood viability, particularly in table grape varieties that are very sensitive.

At the same time, permanent grass-cover led to a decrease of annual expenses and of the number of labour days per ha; these economic benefits together with the limitation of pesticide and fuel consumption promote this maintenance system for use in viticultural practice.

Key words

grass-cover, growth, fructification, grape vine varieties

Maintaining the soil is a costly technological step which needs a high labour, fuel, and pesticide volume that sometimes have a negative impact on soil features.

The concept of sustainable viticulture that supposes a diminution of the soil pollution degree and of viti- and wine produce asks for alternative solutions for soil maintenance circumscribed to non-polluting cultivation technologies.

Material and Method

Research was carried out in 2008 and 2009 on the viticultural plantation and on the ampelographic collection of the Viticulture Department of the Didactic Station in Timişoara. They aimed at studying the impact of soil maintenance system through grass-cover on stock vigour, on quantity and quality of yield in four wine grape varieties (Muscat Ottonel, Feteasca Regală, Riesling italian, and Burgund) and in six table grape varieties (Perlă de Csaba, Victoria, Muscat de Hamburg, Muscat de Adda, Alphonse Lavallee, and Italia).

Our control variant was the classical system of maintaining the soil, which is still the most widespread in practice.

The experiment was set after the randomised block method and the statistical calculus method we used was variance analysis. We also monitored the impact of grass cover on the number of labour days and of expenses per ha.

Results and Discussions

Table 1 presents the impact of soil maintenance through permanent grass cover on stock vigour, assessed on the ground of total annual growths, of foliar area, and of annual mature growth.

Total annual growths in the ten experimental varieties were higher in the classical system compared to the permanent grass cover system soil maintenance system, the greatest differences being in the more vigorous varieties: Riesling italian (21.1 m compared to 19.2 m), Burgund (21.7 m compared to 19.6 m) and Italia (21.1 m compared to 19.2 m).

In the less vigorous varieties (Muscat Ottonel and Perlă de Csaba), the differences in annual growths

between the control and permanent grass cover were smaller.

Reducing annual growths due to permanent grass cover is not a disadvantage in the conditions in which they did not affect significantly the yielding potential of the stocks; on the contrary, slowing down growth led to a better wood maturation.

Table 1

Impact of permanent grass cover on stock vigour

Variety	Annual total growth (m/vine)		Leafs surface (m^2/vine)		Annual maturated growth (% from totale)	
	Permanent grass cover	Black field	Permanent grass cover	Black field	Permanent grass cover	Black field
Muscat Ottonel	8,6	9,8	5,9	6,3	87	85
Fetească regală	16,8	17,9	7,2	7,8	78	74
Riesling italian	19,2	21,1	9,3	10,1	75	72
Burgund	19,6	21,7	8,2	9,6	81	78
Perlă de Csaba	9,2	10,1	5,3	6,2	88	85
Victoria	18,7	20,2	8,1	9,5	72	69
Muscat de Hamburg	15,3	16,4	6,8	7,2	69	66
Muscat de Adda	16,4	17,9	7,1	8,0	72	68
Alphonsse Lavallee	18,2	19,9	7,3	8,2	70	66
Italia	19,2	21,1	9,1	10,5	68	65

From the point of view of annual mature growth, the impact of permanent grass cover was positive in all the varieties, ensuring between 2 and 4 percentiles more mature wood than in the control variant.

A better maturation of the wood results in a higher frost resistance of the stocks, which is a major advantage in lower temperature winters. The higher frost genetic sensitivity of the varieties, the more important this advantage is (Muscat de Hamburg, Muscat de Adda, Victoria, Italia and Alphonse Lavallee).

The grape yield was less influenced by the maintenance systems; though, the permanent grass cover variant yielded slightly less than the control variant. The differences were not statistically covered, except for the variety Perlă de Csaba.

In general, table grape varieties cultivated with the permanent grass cover, compared to wine grape varieties cultivated in the same conditions, yielded more than the control variant.

We can say that the advantages of permanent grass cover compared to the control compensate a lot the small differences in yield obtained (Table 2).

Table 2

Impact of permanent grass cover on yield quality

Variety	Sugar (g/l)		Acidity (g/l H_2SO_4)	
	Permanent grass cover	Black field	Permanent grass cover	Black field
Muscat Ottonel	202	204	3,2	3,0
Fetească regală	188	191	5,2	4,9
Riesling italian	192	195	5,5	5,2
Burgund	190	193	5,6	5,3
Perlă de Csaba	162	164	4,1	4,0
Victoria	148	150	3,4	3,1
Muscat de Hamburg	161	162	4,6	4,5
Muscat de Adda	165	167	4,6	4,4
Alphonsse Lavallee	152	155	4,8	4,6
Italia	141	142	5,6	5,4

During our research years, yield quality in all the varieties was good and very good, with no significant differences between the two variants.

The small variants do not affect the alcoholic potential of the must and, consequently, of the wine (Table 3).

Table 3

Impact of permanent grass cover on yield amount

Variety	Production (kg/ha)		Different to the control	Significance
	Permanent grass cover	Black field (Control)		
Muscat Ottonel	6125	6250	-125	-
Fetească regală	11170	11320	-150	-
Riesling italian	10520	10550	-25	-
Burgund	11225	11235	-10	-
Perlă de Csaba	6820	7210	-390	0
Victoria	12995	13250	-225	-
Muscat de Hamburg	9025	9220	-195	-
Muscat de Adda	8975	8790	-215	-
Alphonsse Lavallee	10110	10375	-265	-
Italia	11875	11990	-115	-

Muscat Ottonel	DL 5%=225,2	DL1%=480,1	DL 0,1%= 792,3
Fetească regală	DL 5%=324,3	DL1%=617,2	DL 0,1%=1120,1
Riesling italian	DL 5%=301,2	DL1%=594,3	DL 0,1%= 1075,1
Burgund	DL 5%=325,6	DL1%=620,4	DL 0,1%=1135,3
Perlă de Csaba	DL 5%=230,2	DL1%=531,3	DL 0,1%= 924,5
Victoria	DL 5%=432,1	DL1%=793,5	DL 0,1%=1271,4
Muscat de Hamburg	DL 5%=292,3	DL1%=571,5	DL 0,1%= 997,2
Muscat de Adda	DL 5%=273,1	DL1%=533,4	DL 0,1%=925,2
Alphonsse Lavallee	DL 5%=310,2	DL1%=601,1	DL 0,1%=1125,3
Italia	DL 5%= 398,6	DL1%=698,2	DL 0,1%= 1195,2

Table 4

Impact of permanent grass cover on the number of labour days and on the expenses per ha

Variety	Number of labour days/ha/year		Production expenses (Lei/ha)	
	Permanent grass cover	Black field (Control)	Permanent grass cover	Black field (Control)
Muscat Ottonel	81	88	6810	7560
Fetească regală	81	88	6810	7560
Riesling italian	81	88	6810	7560
Burgund	81	88	6810	7560
Perlă de Csaba	88	95	7020	7770
Victoria	88	95	7020	7770
Muscat de Hamburg	88	95	7020	7770
Muscat de Adda	88	95	7020	7770
Alphonsse Lavallee	88	95	7020	7770
Italia	88	95	7020	7770

Table 4 presents the economical advantages of permanent grass cover compared to the control variant.

With less and less financial resources, with less and less labour force and with less and less trained labour force, the impact of permanent grass cover system on the viticultural ecosystem is obvious. Both in table grape and in wine grape varieties, soil maintenance through permanent grass cover (meaning less soil works, such as ploughing and tillage) led to a smaller number of labour days per ha and per year (7 labour days less).

Besides the economy of labour days, due to the limitation of fuel and pesticide consumption permanent grass cover also led to lower annual expenses per ha (750 Lei less).

Conclusions

Besides economic advantages, permanent grass cover also ensures a series of advantages such as: reducing soil erosion, reducing structural degradation, possibility of applying phyto-sanitary treatments at the optimal time, reducing soil water losses, etc.

The soil maintenance system through permanent grass cover proved a viable system compatible with the principles of sustainable viticulture that can partially replace the classical system of soil maintenance.

Since there were slight negative impacts on the grapes sugar content, this system can be recommended with no reservations in table grape varieties.

Acknowledgements

The researches which formed the basis of obtaining these results were funded by CNCSIS Bucharest project: Development of some models of advanced viticultural technologies in accordance with the pedoclimatic conditions, the varietal assortments and sustainable viticulture principles, PNII-IDEI, code 1128, No. 355/01.10.2007, Project Manager: Prof. dr. Dobrei Alin.

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AGRICULTURAL AND FORESTRY SCIENCES ACADEMY - CRAIOVA BRANCH
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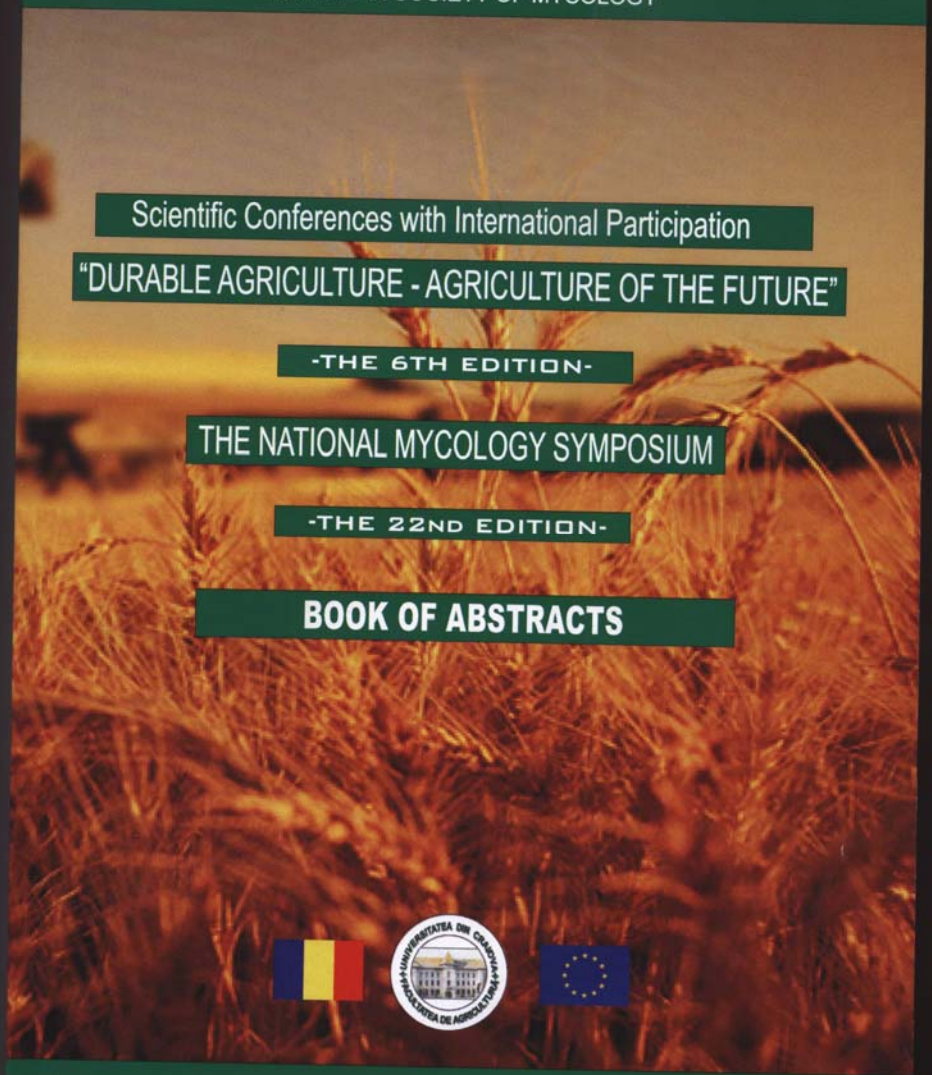

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BOOK OF ABSTRACTS

CRAIOVA
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RESEARCH ON GRAPEVINE IMPROVEMENT TECHNOLOGIES BY INCREASING DEGREE OF MECHANIZATION AND REDUCTION OF MANUAL WORK

DOBREI A., GHIȚĂ ALINA, MĂLĂESCU MIHAELA, SAVESCU IASMINA, GROZEA IOANA

Keywords: mechanized growing technologies, economic efficiency

ABSTRACT

Lack of skilled labor, more exaggerated claims of the existing workforce and increasing the quality of the service reduced its search for technological solutions necessary to perform the majority of mechanical work, without affecting product quality without negatively impacting the culture medium. The research was carried out in the vineyard planting S.D.Timişoara and private plantations and so are covered the technologies for establishment of vineyard, as well as the maintenance. Compared with conventional technologies have been proposed alternatives and results were weighed and economic efficiency.

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OVERALL STRATEGIES RECOMMENDED OF THE DEVELOPMENT ROMANIAN VITICULTURE-WINE SECTOR IN THE EUROPEAN CRISIS CONDITIONS OF OVERPRODUCTION

CĂTĂLIN GALAN, MARIANA MARICA, MIHAI SEPTIMIU MARICA, FLORENTINA EREMIA

Key words: romanian viticulture sector, wine market, grafted vines, hybrid direct producers.

ABSTRACT

The study examines in depth the environment economic and legislative current wine market, both nationally and globally. All factors that can influence directly or indirectly sectoral policies for the development of trade in wine and the main macro-economic indicators are all in the past review. All economic, social and political mechanisms, which may cause or even impose certain development trends at the national and international are also dismantled.

***

NEW EUROPEAN LEGISLATIVE STIPULATIONS REGARDING THE NOTION OF ECOLOGICAL AGRICULTURE AND THEIR INFLUENCE ON THE QUALITY OF FOOD PRODUCT

GALAN CATALIN, DUMITRESCU CARMEN, CARETU GEORGETA, ATUDOSIEI NICOLE–LIVIA

Key words: ecological agriculture, G.M.O., Rules (E.U.) nr.271/2010, label of ecological products.

ABSTRACT

The paper makes an analysis of the main European legislative standards regarding ecological agriculture, increasing new stipulation adopted through the rule nr. 271, from 24th of March, 2010.

September, when training and intense accumulation of tubers, which occurs with great frequency in all areas of culture in the country.
Potato varieties tested in SCDCPN Dabuleni regarding the dynamics of accumulation in tubers showed that the factor variety is important technological link. Choosing the right variety of potato crop leads to success.

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THE EFFECT OF BIOSTIMULATORS ON SOIL AND THE GROWTH OF RED GLOBE RADISHES

MARIA DINU,SAVESCU P., LASCU N., ANA MARIA DODOCIOIU
dinumariana@hotmai.com

Keywords: solarium, bio stimulators, electrical conductivity, soil analysis

ABSTRACT

*Throughout Europe, ecological agriculture has known constant growth over the last years. Farmers who practice ecological agriculture return the favour by maintaining and even improving – where possible – the natural parameters and the quality of these resources. The present study illustrates this, by having used only bio stimulators on a crop of red globe radishes grown in solarium. We concluded that the use of **Bio Rootz** determined a growth in P and K on which it was applied; the use of **Humusil, humic acids, Bio Leafz Pro Balace** and **P&R** determined a growth of the morphological elements of the plant (leaf count and leaf size); upon establishing the results had on electrical conductivity, we concluded that the effects of these bio stimulators were highly positive, yet distinct for each case.*

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RESEARCH ON USE OF LOCAL VINE GERMPLASM AS A SOURCE OF TYPICAL AND AUTHENTICITY

DOBREI A., MĂLĂESCU MIHAELA, GHIȚĂ ALINA, SALA F., KOCIȘ ELISABETA

Keywords: local vine germplasm, typical wines

ABSTRACT

Intensifying competition on the world wine market by joining the last time new competitors (Chile, Argentina, Australia, China) with renowned producers (France, Italy, Spain,etc.) solutions should be sought to maintain market share for Romanian producers. In achieving this high quality wine varieties already known is required but not always successful, established itself as a strong need to offer typical products, authentic to meet consumer demands. This is possible by the restoration of the value old Romanian varieties who were in obscurity a long period and seeking new varieties and valuable local biotypes which are abundant in the western part of Romania and they are not known by consumers.

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Keywords: mechanized g

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RESEARCH ABOUT THE INFLUENCE OF GREEN MANURE ON YIELDS OF SOME VARIETIES OF GRAPES FOR WINE

Alin DOBREI, Mariana POIANĂ, Alina GHIȚĂ, Mihaela MĂLĂESCU

Banat's University of Agricultural Sciences and Veterinary Medicine, Timisoara-Romania, Faculty of Horticulture

Corresponding author:alin1969tmro@yahoo.com

Abstract: *The concept of sustainable viticulture increasingly involves among others the current restrictions on the use of chemicals in viticulture and finding alternatives for their replacement without affecting the quantity and quality of grape production, which is responsible to these studies. In this research has concerned the replacement of conventional fertilization with chemical fertilizers, by using of green fertilizers in several variants for fertilization bearing vines. In the western area in recent years began to have concerns regarding alternatives to traditional technology, but they limited themselves to an alternative grassing intervals without taking into account the use of green fertilizer plant by intake of nutrients to the ground partially or totally replace chemical fertilizers. Experimental variants were found in cultivation in the interval between rows of vines of: V1 - Hungarian vetch, V2 - vetch;, V3 sainfoin . Were left rooted to the line protection strips of 40 cm. I followed for three years (2007-2009) the effect of experimental variations on wood maturation, bud viability, maturation of the grapes, the quality and quantity of production in some varieties of wine grape grown in the vineyard Buziaș-Silagiu. The results were encouraging, all variants providing numerous advantages compared with control version (use of complex fertilizers). In the future importance of these types of research will become increasingly important with increasing environmental concerns and obtain wine products as healthy for human body.*

Key words: *sustainable viticulture, green manure, quantity – quality, impact, environment*

INTRODUCTION

The concept of fertilisation in viticulture has been steadily changing these years to better fit the concept of sustainable viticulture.

Intensive chemical fertilisation of the previous years is less used nowadays, being replaced partially or even totally by organic fertilisation. Limiting or even replacing chemical fertilisers, aims at obtaining high-quality viticultural and wine products that do not endanger, in time, because of their cumulative effect, the consumer's health.

At the same time, organic fertilising diminishes the negative impact of viticultural activity on the environment, contributing to the improvement of the physical and chemical features of viticultural soils exposed to complex man-made activities.

MATERIALS AND METHODS

Research was carried out between 2007 and 2009, on a viticultural plantation in progressive maturity, located in the viticultural centre Buziaș-Silagiu.

Experimental variants consisted in cultivating, between the rows green manure crops as an alternative to classical maintenance of the black field soil. Experimental variants were as follows: V_1 – interval cultivated with Hungarian vetch; V_2 – interval cultivated with vetch; V_3 – interval cultivated with sainfoin; V_4 – interval maintained as black field (control variant).

Green crops were sown in stripes along the intervals between the rows, leaving close to the vine protective stripes 40 cm broad that were maintained through tillage.

The crops were mowed during flowering, when they could ensure the proper biomass amount. They were left on the soil as mulch and incorporated later during the fall tillage.

.esearch aimed at the varieties Riesling Italian, Sauvignon Blanc, Muscat Ottonel, , and Cabernet Sauvignon.

Ve made observations and measurements concerning total and mature annual)ud viability, amount and quality of the grapes.

tESULTS AND DISCUSSION

'he impact of experimental variants on total and mature annual growths is obvious, control variant, and with statistically ensured differences.

'he higher annual increases compared with the black field control were in the with higher growth vigour, Cabernet Sauvignon and Riesling Italian.

Higher annual increases determined a higher yielding potential as a result of a superior ıthesised area.

As for the annual mature growths, there were values close to that of the black field ıe experimental variants, which denotes that vigour increase had no significant nces on the maturation of the shoot tissues.

To note, nevertheless, a decrease in all the variants of the share of mature chord l to total growths; there was no negative impact on the stocks, since the immature)ortions were at the tip of annual chords, to be normally removed during fructification

Table 1

of green manure crops on total and mature annual growths (average for the period 2007-2009)

y	Experimental variants	Total annual growths (m/vine)	Maturated annual growths		Difference to the control	Significance
			m/vine	% from total		
ıg ı	V_1- Hungarian vetch	15,7	10,7	68,2	+2,8	**
	V_2 – vetch	17,2	10,7	62,3	+4,3	**
	V_3- sainfoin	16,5	10,6	64,7	+3,6	**
	V_4- black field (Control)	12,9	10,5	81,4	-	-
ıon	V_1- Hungarian vetch	13,1	8,4	64,5	+1,4	*
	V_2 – vetch	14,2	8,7	61,7	+2,5	**
	V_3- sainfoin	13,8	8,5	62,3	+2,1	*
	V_4- black field (Control)	11,7	8,9	76,5	-	-
at el	V_1- Hungarian vetch	10,9	7,6	70,5	+1,1	-
	V_2 – vetch	12,3	8,1	66,2	+2,5	*
	V_3- sainfoin	11,6	8,05	69,4	+1,8	*
	V_4- black field (Control)	9,8	7,9	81,3	-	-
ıoir	V_1- Hungarian vetch	10,4	7,8	75,9	+0,9	-
	V_2 – vetch	11,6	8,1	70,3	+2,1	**
	V_3- sainfoin	10,8	7,8	72,4	+1,3	*
	V_4- black field (Control)	9,5	8,1	85,2	-	-
net non	V_1- Hungarian vetch	17,5	12,1	69,3	+1,9	*
	V_2 – vetch	19,2	11,7	61,2	+3,6	**
	V_3- sainfoin	18,3	11,8	64,5	+2,7	*
	V_4- black field (Control)	15,6	12,5	80,3	-	-

Riesling italian	DL5 %=1,50	DL 1 %=2,61	DL 0,1 %=4,72
Sauvignon blanc	DL5 %=1,35	DL 1 %=2,42	DL 0,1 %=4,37
Muscat Ottonel	DL5 %=1,27	DL 1 %=2,35	DL 0,1 %=3,96
Pinot noir	DL5 %=1,08	DL 1 %=1,96	DL 0,1 %=3,17
Cabernet Sauvignon	DL5 %=1,59	DL 1 %=2,83	DL 0,1 %=4,98

As for the impact of green manure on bud viability, there is a decrease of the share of le eyes compared to the control, the differences being rarely ensured statistically.

During normal winters, green manure had no negative effect on bud viability, despite fact that the number of buds affected by the frost was larger. Since they are located to the f the chords, they were not taken into account in fructification charge calculus.

Among experimental variants, the variant V_1 – Hungarian vetch – had the lowest ct on the decrease of the share of viable eyes, reason for which in bud frost risk areas this e most favourable of the three variants.

As for the yield, the impact of experimental variants is obvious, ranging above the trol in all the varieties.

The largest yields were obtained in the variant V_2 – vetch, which yielded compared to control, differences of 1,109 kg/ha in the case of the variety Riesling Italian, 1,197 kg/ha in Sauvignon blanc variety, 825 kg/ha in the Muscat Ottonel variety, 949 kg/ha in the Pinot variety, and 901 kg/ha in the Cabernet Sauvignon variety. All these differences are red statistically.

The smallest differences were in the variant V_3 – sainfoin, which is not ensured tically no matter the variety.

The variant V_1 – Hungarian vetch yielded superior results ensured statistically only in ase of the varieties Riesling Italian, Sauvignon Blanc and Pinot noir.

Table 2

Impact of green manure crops on bud viability

Variety	Experimental variants	Buds viability(%) (Mean 2007-2009)	Difference to the control	Significance
esling italian	V_1- Hungarian vetch	85,3	-4,4	-
	V_2 – vetch	79,3	-10,4	0
	V_3- sainfoin	83,2	-6,5	-
	V_4- black field (Control)	89,7	-	-
vignon blanc	V_1- Hungarian vetch	87,2	-0,1	-
	V_2 – vetch	79,6	-7,7	0
	V_3- sainfoin	82,5	-4,8	-
	V_4- black field (Control)	87,3	-	-
scat Ottonel	V_1- Hungarian vetch	84,2	-6,4	-
	V_2 – vetch	81,2	-9,3	0
	V_3- sainfoin	83,6	-6,9	0
	V_4- black field (Control)	90,5	-	-
Pinot noir	V_1- Hungarian vetch	90,9	-3,3	-
	V_2 – vetch	86,8	-7,4	0
	V_3- sainfoin	87,6	-6,6	0
	V_4- black field (Control)	94,2	-	-
et Sauvignon	V_1- Hungarian vetch	87,9	-3,9	-
	V_2 – vetch	83,7	-8,1	-
	V_3- sainfoin	86,2	-5,6	-
	V_4- black field (Control)	91,8	-	-

lian	DL5 %=7,3	DL 1 %= 12,8	DL 0,1 %=21,2
lanc	DL5 %=6,98	DL 1 %= 11,16	DL 0,1 %=20,32
el	DL5 %=6,42	DL 1 %= 10,33	DL 0,1 %=18,16
	DL5 %=5,98	DL 1 %=9,76	DL 0,1 %=17,2
gnon	DL5 %=8,23	DL 1 %=15,26	DL 0,1 %=28,73

Table 3

Impact of green manure crops on yield

Experimental variants	Production								Difference to the control (mean kg/ha)	Significance
	2007		2008		2009		Mean			
	Kg/ vine	Kg/ha	Kg/vine	Kg/ha	Kg/ vine	Kg/ha	Kg/vine	Kg/ha		
V_1- Hungarian vetch	2.66	12115	2.72	12385	2.77	12593	2.72	12364	+910	*
V_2 – vetch	2,7	12310	2,76	12579	2,81	12800	2,76	12563	+1109	*
V_3- sainfoin	2,62	11935	2,63	11975	2,72	12385	2,66	12098	+644	-
V_4- black field (Control)	2,47	11260	2,51	11425	2,56	11678	2,52	11454	-	-
V_1- Hungarian vetch	2,22	10025	2,22	10120	2,28	10380	2,23	10175	+772	*
V_2 – vetch	2,26	10315	2,33	10610	2,39	10875	2,33	10600	+1197	**
V_3- sainfoin	2,14	9730	2,18	9920	2,23	10175	2,18	9942	+539	-
V_4- black field (Control)	2,01	9150	2,04	9310	2,14	9750	2,06	9403	-	-
V_1- Hungarian vetch	1,85	8410	1,93	8790	1,97	8975	1,91	8725	+615	-
V_2 – vetch	1,91	8720	1,97	8975	2,00	9110	1,96	8935	+825	*
V_3- sainfoin	1,82	8275	1,87	8517	1,92	8760	1,87	8517	+407	-
V_4- black field (Control)	1,74	7915	1,78	8120	1,82	8295	1,78	8110	-	-
V_1- Hungarian vetch	1,66	7560	1,75	7995	1,80	8217	1,74	7924	+687	*
V_2 – vetch	1,72	7825	1,81	8236	1,86	8497	1,80	8186	+949	**
V_3- sainfoin	1,56	7130	1,61	7327	1,76	8005	1,64	7487	+250	-
V_4- black field (Control)	1,52	6950	1,56	7135	1,67	7625	1,59	7237	-	-
V_1- Hungarian vetch	1,82	8275	1,85	8410	1,93	8810	1,86	8498	+574	-
V_2 – vetch	1,87	8535	1,92	8765	2,01	9175	1,94	8825	+901	**
V_3- sainfoin	1,78	8120	1,80	8205	1,87	8535	1,82	8287	+363	-
V_4- black field (Control)	1,67	7620	1,71	7813	1,83	8340	1,74	7924	-	-

Riesling italian DL5 %=724 DL 1 %=1275 DL 0,1 %=1973
Sauvignon blanc DL5 %=652 DL 1 %=1097 DL 0,1 %=1763
Muscat Ottonel DL5 %=635 DL 1 %=974 DL 0.1 %=1426
Pinot noir DL5 %=572 DL 1 %=873 DL 0,1 %=1275
CabernetSauvignon DL5%=631 DL1%=926 DL0,1%=131

Table 4

Impact of green manure crops on yield quality

ty	Experimental variants	Sugar (g/l) (Mean 2007-2009)	Acidity(g/l H_2SO_4) (Mean 2007-2009)	Difference to the control(sugar g/l)	Significance
	V_1- Hungarian vetch	185	5.6	-5	-
ng	V_2 – vetch	184	5,7	-6	-
in	V_3- sainfoin	185	5.6	-5	-
	V_4- black field (Control)	190	5,5	-	-
	V_1- Hungarian vetch	186	4,9	-6	-
non	V_2 – vetch	185	4,9	-7	-
ie	V_3- sainfoin	187	4,8	-5	-
	V_4- black field (Control)	192	4,6	-	-
	V_1- Hungarian vetch	192	3,6	-3	-
at	V_2 – vetch	190	3,8	-5	-
el	V_3- sainfoin	193	3,6	-2	-
	V_4- black field (Control)	195	3,5	-	-
	V_1- Hungarian vetch	204	4,5	-6	-
noir	V_2 – vetch	202	4,6	-8	0
	V_3- sainfoin	205	4,5	-5	-
	V_4- black field (Control)	210	4,2	-	-
	V_1- Hungarian vetch	202	4,6	-6	-
met	V_2 – vetch	201	4,7	-7	-
gnon	V_3- sainfoin	203	4,6	-5	-
	V_4- black field (Control)	208	4,5	-	-

Riesling italian DL5 %= 6,01 DL 1 %=9,16 DL 0,1 %=17,25
Sauvignon blanc DL5 %=7,21 DL 1 %=13,62 DL 0,1 %=23,41
Muscat Ottonel DL5 %=6,16 DL 1 %= 11,72 DL 0,1 %=21,31
Pinot noir DL5 %=7,82 DL 1 %= 14,01 DL 0.1 %=27,16
CabernetSauvignon DL5%=7,63 DL1%=14,51 DL0,1%=24,16

Les obvious results in the case of the variant V_3 – sainfoin can be explained through t
egetal volume in the Buziaş – Silagiu area compared to the other two variants.

As for the impact of green manure on yield quality (sugar content and acidity), the
ices compared to the control are much less obvious.

Experimental variants recorded a surplus of acidity and a minus of sugar compared to
rol, but these differences were not ensured statistically.

CONCLUSIONS

With more and more concern for sustainable viticulture, for diminishing environmental pollution, and for healthy viticultural and wine products, maintaining the soil through the cultivation of green manure crops is more and more important.

Experimental variants had a positive impact in all the varieties, yielding more without affecting grape quality.

Yield increases were higher due to higher amounts of vegetal volume which, incorporated in the soil led to an important supply of nutrients, particularly nitrogen.

Green manure can at least periodically replace chemical fertilisers thus diminishing the degree of chemisation of this crop.

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THE USAGE OF SMALL VOLUME FERTILIZERS AND OSTIMULATORS FOR INCREASING THE BIOPRODUCTIVITY OF THE VINE GROWING SYSTEM

Alin DOBREI, Florin SALA, Alina GHIȚĂ, Mihaela MĂLĂESCU

Banat's University of Agricultural Sciences and Veterinary Medicine, Timisoara-Romania
Faculty of Horticulture
Corresponding author:alin1969tmro@yahoo.com

act: *The large production of biomass which rvested every year from the vine growing soils res finding some modern methods, as less tant as possible, which would give back to the at least a part of the substances which the e vine has extracted from it. he necessity of ning profit constrains the vine growing itations to permanently improve their ologies, but at the same time to take into deration also the concept of durable vine ing. The purpose of the present research was entify modern methods of fertilization which chemical products in as small amounts as ble, but which at the same time assure the ing or maintaining the bioproductivity of the growing system at an appropriate level of ency.The experimental variants have consisted ing different combinations of three types of foliar chemical fertilizers and biostimulators which have replaced the classical chemical fertilizers frequently used in vine growing. These fertilizers can't permanently replace the classical fertilizers, but used temporarily they assure a series of advantages, not only of economic nature, but also regarding the reduction of soil contamination and of vineyard products by the chemical compounds. he research has been carried out in the vineyard and ampelografic collection of S.D. Timişoara, on some breeds of table grapes in the case of which the commercial aspect is an essential factor regarding the consumer's choice. We were mainly interested in observing the influence of these experimental variants on some quantitative but mostly qualitative aspects of production, and also their influence on the endurance of the breeds at low temperatures and freeze.*

words: *fertilisation, foliar fertilisers, biostimulators, quantity, quality, table grapes*

INTRODUCTION

Due to their gradual period of maturation, table grapes varieties are an important ce of incomes for farmers from July to October; thus they can partially finance table grapes esting and wine making.

Since table grapes are first "eaten with the eyes", their commercial aspect is very ortant and it can be improved through fertilisation. On the other hand, sustainable ulture supposes limiting pesticide amounts to be introduced into the viticultural ecosystem.

In this respect, foliar fertilisers and biostimulators used in smaller amounts and with er costs per area unit are viable alternatives to the classical chemical fertilisation.

MATERIALS AND METHODS

Research was carried out in 2008 and 2009 in the viticultural plantation of the actic Station in Timişoara, on the following table grape cultivars: Muscat de Hamburg toria, and Silvania.

The viticultural plantation is 16 years old, and is now at its full maturity. Experimental ants concerned the use of foliar fertilisers Fertiactyl GZ, Basfoliar Extra, Microfert-Fer, biostimulators Berelex and ProGibb, compared to classical chemical fertilisation. ending on the variants, experimental rates were as follows:

$V_1 - N_{100}P_{100}K_{100}$ (MT)

Fertiactyl GZ – 10 l/ha
Basfoliar Extra – 10 l/ha
Microfert-Fer – 3 l/ha
ProGibb – 30 g/ha in 1,000 l of water
Berelex – 30 g/ha in 1,000 l of water

e fertilisers were applied according to instructions, i.e. phosphorus and potassium before tillage, and nitrogen in the spring, and foliar fertilisers and biostimulators wering.

During vegetation, we made observations and measurements concerning total and rowths; bud viability was examined in the winter following application; yield per ha quality were estimated depending on sugar content, on acid content, on the mean f a cluster and on the marketing yield in percentiles.

RESULTS AND DISCUSSION

Table 1 presents data concerning the impact of biostimulators and of foliar fertilisers d mature annual growths. Foliar fertilisers in all the varieties led to an intensification al growths compared to the classical variant of fertilisation V_1-$N_{100}P_{100}K_{100}$ (MT).

he highest differences were in the varieties Muscat de Hamburg and Victoria in the 2, in which we used Fertiactyl GZ. Biostimulators had values close to those of the even slightly inferior.

a for the annual mature growths expressed as shares of the total annual growths we a positive impact of foliar fertilisers in the variants V2 Fertiactyl GZ – 10 l/ha and ert-Fer – 3 l/ha, with statistically ensured differences compared to the control.

Table 1

mpact of foliar fertilisers and of biostimulators on total and mature annual growths (average for the period 2008-2009)

	Variety	Total annual growths (m/vine)	Maturated annual growths (% from total)	Different to the control	Significance
	Muscat de Hamburg	17,2	62	-	-
ee	Victoria	18,95	78	-	-
	Silvania	14,3	75	-	-
	Muscat de Hamburg	18,6	70	+8	**
yl	Victoria	20,3	85	+7	**
	Silvania	16,1	81	+6	**
	Muscat de Hamburg	17,7	64	+2	-
ar-	Victoria	19,4	81	+3	-
	Silvania	14,9	78	+3	-
	Muscat de Hamburg	18,2	67	+5	*
ert-	Victoria	20,1	83	+5	*
	Silvania	15,8	79	+4	*
	Muscat de Hamburg	17,1	60	-2	-
bb	Victoria	18,5	76	-2	-
	Silvania	14,1	72	-3	-
	Muscat de Hamburg	16,9	59	-3	-
x	Victoria	18,1	74	-4	0
	Silvania	13,9	70	-5	0
	Muscat de Hamburg	DL 5% 4,25	DL 1% 7,92	DL 0,1% 12,26	
	Victoria	DL 5% 3,78	DL 1% 6,58	DL 0,1% 11,10	
	Silvania	DL 5% 3,27	DL 1% 5,95	DL 0,1% 10,0	

ning high shares of matured cords is particularly important in table grapes: since ensitive particularly to frost, in winters with negative temperatures below -18°C, ne a problem.

imulators Pro-Gibb and Berelex recorded slightly inferior shares of annual compared to the control.

Table 2

Impact of foliar fertilisers and of biostimulators on bud viability (average of the years 2008-2009)

Variants	Variety	Buds viability (% from total)	Different to the control	Significance
	Muscat de Hamburg	60,2	-	-
)0	Victoria	73,1	-	-
	Silvania	78,6	-	-
	Muscat de Hamburg	68,5	+8,3	**
1	Victoria	79,2	+6,1	*
	Silvania	83,1	+4,5	*
	Muscat de Hamburg	64,2	+4,0	*
r	Victoria	76,1	+3,0	-
	Silvania	75,2	-3,4	-
	Muscat de Hamburg	65,8	+5,6	*
t-	Victoria	73,5	+0,4	-
	Silvania	79,2	+0,6	-
	Muscat de Hamburg	57,3	-2,9	-
)b	Victoria	68,4	-4,7	0
	Silvania	75,2	-3,4	-
	Muscat de Hamburg	56,2	-4,0	-
x	Victoria	69,0	-4,1	0
	Silvania	73,5	-5,1	0

Muscat de Hamburg DL 5% 4,0 DL 1% 7,8 DL 0,1% 12,1
Victoria DL 5% 3,92 DL 1% 6,83 DL 0,1% 11,02
Silvania DL 5% 3,74 DL 1% 6,12 DL 0,1% 10,83

table grape varieties, bud resistance to frost is lower compared to wine grape his is why it is important to know the impact of foliar fertilisers and of ors on bud frost resistance.

e three varieties studied in our research have different resistance to frost: thus, Hamburg is a sensitive variety, Victoria is a medium-resistance variety, and Silvania ost-resistant variety. Results from this point of view speak for themselves.

liar fertilisers had a positive impact on bud frost resistance due to the intensification o-synthesising capacity that led to the accumulation of large amounts of sugars.

ie impact was more obvious in the variety Muscat de Hamburg, a variety with sitivity to frost. Differences compared to the control in this variety are distinctly in the variant V2 Fertiactyl GZ, significant in the variants V3 Basfoliar Extra and ert-Fer. The variants V5 and V6, in which we used the biostimulators ProGibb and esulted in slightly lower results compared to the control, but with no statistical e.

the variety Victoria, the differences compared to the control were significant only ant V2 Fertiactyl GZ, while in the variants V3 Basfoliar Extra and V4 Microfert-Fer, slightly to the control, but with no statistical significance. Biostimulators yielded lts in this variety, significantly negative.

In the variety Silvania, the differences between the experimental variants and the ol variant were less obvious; foliar fertilisers yielded results superior to those of the rol, results statistically covered only in the variant V2 Fertiactyl GZ.

Table 3

Impact of foliar fertilisers and of biostimulators on yield (average of the period 2008-2009)

Variants	Variety	Production Kg/vine	Production Kg/ ha	Different to the control	Significance
V_1- $N_{100}P_{100}K_{300}$ (MT)	Muscat de Hamburg	2,00	9125	-	-
	Victoria	2,79	12710	-	-
	Silvania	2,47	11230	-	-
V_2- Fertiactyl	Muscat de Hamburg	2,19	9975	+850	**
	Victoria	2,97	13520	+810	**
	Silvania	2,67	12175	+945	**
V_3- Basfoliar	Muscat de Hamburg	2,04	9279	+154	-
	Victoria	2,85	12985	+275	-
	Silvania	2,58	11760	+530	*
V_4- Microfert-Fer	Muscat de Hamburg	2,11	9625	+500	*
	Victoria	2,89	13179	+469	*
	Silvania	2,63	11980	+750	*
V_5- ProGibb	Muscat de Hamburg	1,96	8930	-195	-
	Victoria	2,75	12530	-180	-
	Silvania	2,41	10995	-235	-
V_6- Berelex	Muscat de Hamburg	1,95	8885	-240	-
	Victoria	2,74	12475	-235	-
	Silvania	2,42	11015	-215	-

Muscat de Hamburg DL 5% 375 DL 1% 623 DL 0,1% 1173
Victoria DL 5% 368 DL 1% 597 DL 0,1% 1072
Silvania DL 5% 432 DL 1% 751 DL 0,1% 1283

Grape yields per plant and per ha were also influenced by foliar fertilisers and ulators.

The variants V2, V3, and V4 in which we used foliar fertilisers yielded results to those of the control, most of which were statistically covered.

The highest values were recorded in all the varieties in the variety V2 Fertiactyl GZ, yielded increases in yield between 810 Kg/ha in the variety Victoria and 945 Kg/ha in ety Silvania.

In the variant V2 Fertiactyl GZ, all the differences are distinctly significant compared control variant. In the variant V4 Microfert-Fer, the differences compared to the control were superior, statistically significant. The fertiliser Basfoliar extra recorded, compared control, higher yield differences which, except for the variety Silvania, are not ically ensured.

The variants treated with biostimulators yielded, compared to the control variant, lower yields, without statistical significance.

In table grape varieties, beside quantity, quality and commercial aspect are other main in determining the purchasing decision of the consumers.

In table grape varieties, beside classical quality elements, sugar and acid contents are y important, as well as mean weight of a grape cluster and marketable weight s percentile of the total yield.

liar fertilisers yielded, compared to the control, small positive differences from the of the sugar and acid contents. In exchange, results are more obvious from the of the mean weight of a cluster and of the marketable yield.

Table 4

Impact of foliar fertilisers and of biostimulators on yield quality

	Variety	Sugar content (g/l)	Acidity (g/l H_2SO_4)	Mean bunch weight (g)	Commodity production (% from total)
	Muscat de Hamburg	175	4,3	280	70
100	Victoria	150	3,6	420	80
	Silvania	170	4,5	185	73
	Muscat de Hamburg	179	4,1	298	81
tyl	Victoria	152	3,5	450	88
	Silvania	172	4,3	193	85
	Muscat de Hamburg	175	4,3	282	75
iar	Victoria	150	3,6	438	83
	Silvania	170	4,5	190	81
	Muscat de Hamburg	176	4,2	290	76
Fer	Victoria	153	3,5	440	82
	Silvania	176	4,2	192	80
	Muscat de Hamburg	175	4,3	289	75
ibb	Victoria	149	3,9	439	81
	Silvania	168	4,6	191	80
	Muscat de Hamburg	176	4,2	290	74
ex	Victoria	149	3,9	440	83
	Silvania	167	4,6	190	82

n the variety Muscat de Hamburg, all the variants yielded superior results compared ıtrol variant from the point of view of the mean weight of a grape cluster. The best : was in the variant V2 Fertiactyl GZ which yielded a surplus of 19 g compared to the ɔllowed by the variants V4 Microfert-Fer and V6 Berelex.

ın the varieties Victoria and Silvania, results concerning the mean weight of a cluster ımost the same results as the variety Muscat de Hamburg.

As for the marketable yield, all the experimental variants yielded superior yields l to the control variant.

CONCLUSIONS

Foliar fertilisers and biostimulators applied at much smaller rates compared to fertilisers can be temporarily alternative variants to classical fertilisation which limits nt of fertilisers introduced into the ecosystem.

As for mature growths and wintering resistance, foliar fertilisers yielded superior ımpared to botn the control variant and to biostimulator-treated variants.

Commercial aspect of table grapes is much improved through the use of foliar ; and of biostimulators which means more chances to valorise the grapes as quick as

Acknowledgements

The researches which formed the basis of obtaining these results were funded by Bucharest project: Development of some models of advanced viticultural gies in accordance with the pedoclimatic conditions, the varietal assortments and ɔle viticulture principles, PNII-IDEI, code 1128, No. 355/01.10.2007, Project : Prof. dr. Dobrei Alin.

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BIOTYPES AND LOCAL VARIETIES OF VINES IN WESTERN ROMANIA – SOURCE FOR OBTAINING OF SOME LOCAL, TYPICAL AND AUTHENTICAL WINES

BIOTIPOVI I LOKALNE VRSTE VINOVIH LOZA U ZAPADNOJ RUMUNJSKOJ – IZVORI ZA DOBIVANJE NEKIH LOKALNIH, TIPIČNIH I AUTENTIČNIH VINA

DOBREI, Alin; SALA, Florin; POIANA, Mariana; GHITA, Alina & MALAESCU, Mihaela

Abstract: *Research has concerned the identifying of new wine local germoplasm sources from western region of Romania. As a result of research were identified 39 valuable biotypes and local grapes varieties which were analysed compared with the varieties Royal Feteasca and Cabernet Sauvignon, two of the most varieties grown in this area. During the research we conducted observations and measurements regarding: the ampelographic characters and physico-chemical characteristics of the grapes. Following research was highlighted as valuable and interesting for the science and practice of wine varieties: Ruginiu de Silagiu, Patrujarca, Fraga alba de Silagiu, Pintenat de Buzias and Vulpe.*

Keywords: *western Romania, the local germoplasm, quality*

Sažetak*:Istraživanje se bavi određivanjem novih vina lokalne germoplazme s područja zapadne Rumunjske. Rezultat istraživanja je 39 vrsta vrijednih biotipova i lokalnih sorti grožđa koje su analizirane u usporedbi sa sortama Royal Feteasca i Cabernet Sauvignon, dvije najčešće uzgajane vrste u ovom području. Istraživanja i mjerenja odnosila su se na ampelografske karakteristike i fizikalno-kemijske karakteristike grožđa. Istraživanje je zanimljivo i vrijedno za vinske sorte: Ruginiu de Silagiu, Patrujarca, Fraga alba de Silagiu, Pintenat de Buzias i Vulpe*

Ključne riječi: *zapadna Rumunjska, lokalna germoplazma, kvaliteta*

Authors´ data: Alin **Dobrei,** Professor, alin1969tmro@yahoo.com; Florin **Sala,** Professor, florinsala@yahoo.com; Mariana **Poiana,** Associate Professor, atenapoiana@yahoo.com; Alina **Ghita**, Assistant, ghitaalina@yahoo.com; Mihaela **Malaescu**, Assistent, ghizmut@yahoo.com, Banat' University of Agricultural Sciences and Veterinary Medicine, Calea Aradului, Timisoara, Romania

1. Introduction

European Community Council Directive no. 1467/94 of 20 June 1994 aims to coordinate the conservation, characterization and utilization of genetic resources in agriculture with particular attention to biotypes and varieties better adapted to local environmental conditions. For *Vitis* was drafted the EU-project GENRES CT96 No 81 (Genres081) „European network for grapevine genetic resources conservation and characterisation", which has as main objective to establish a database for each participating country, ampelographic description and agronomic characters evaluation for biotypes and local grapes varieties [1].
To meet the requirements of the European Community in Romania is necessary to fund a comprehensive study on indigenous vine germoplasm and taking advantage of it. Expanding scientific database on strategic reserve of germoplasm growing in Romania will be based on a unified description under EU rules. Interest in this subject is evidenced by the large number of research in recent years [2][3][4][5].
The aim of our concerns, evidenced by previously published articles is to restore and enhance the biotypes and local grape varieties in the western region of Romania. Western part of Romania represented by the counties Timis, Arad, Caras Severin, Alba and Hunedoara is an area with a climate favourable to vine culture, to add a great tradition and experience in this field [6][7].
Table 1 shows the distribution of the local grapes varieties and biotypes on areas and localities. Wines obtained in renowned wine growing areas from this geographical region (Recas, Minis-Maderat, Buzias-Silagiu) were known and appreciated in ancient times, including the royal courts of Europe [8][9].

Area	Locality	Discovered local wine varieties and biotypes
Timis	Buzias	12
	Recas	1
	Silagiu	9
	Ghiroda	1
Arad	Rosia	4
	Maderat	2
	Ineu	2
Caras-Severin	Moldova Noua	1
Alba	Alba Iulia	1
	Petresti	1
	Sebes	1
	Aiud	4
Total		39

Table 1. The distribution of the local varieties and biotypes on areas and localities

In the last years the viticulture in this region has encountered different economic, financial and social difficulties due to globalization of variety assortments. A number of specific local varieties have disappeared or are in small scale by local vineyards and gardens without being known [10].

Besides these difficulties add others, related research in viticulture sector, thereby increasing the danger erosion or even loss of very important sources of valuable vines germoplasma.

2. Matherials and methods

Investigations were carried out during the three years (2007, 2008, 2009) of research in various areas vines and localities in the counties Timis, Arad, Caras Severin, Alba and Hunedoara (Table 1) and have targeted identification, analysis, conservation and enhancement of some local vine varieties and biotypes grown mainly in courts and gardens population.
Observations and determinations were performed on ampelographic attributes, sugar content, acidity, glucose-acidimetric index and alcoholic potential of grape.
Each chosen biotypes and local grapes varieties was ampelographical described according to the standard description of the cultivar (ampelographic database of the Faculty of Horticulture, Banat' University of Agricultural Sciences and Veterinary Medicine from Timisoara) using Office International de la Vigne et du Vin descriptors [11] modified by the European Union Project GENRES 081.
Name of local varieties and cultivars was given according to local popular name if any, places where initials were discovered, the initials that were discovered street, house number householders, technologic and ampelographic prevalent features. To characterize in ampelographic terms the variety and biotypes have made reference to the most important ampelographic descriptors: leaves, grapes and berries.
Chemical characteristics of investigated grapes were determined according to AOAC Official Method [12].

3. Results and discutions

The results obtained after evaluation of ampelographic characteristics of grapes varieties for white wines are shown in the Table 2 and in the Table 3 are characterized the of grapes varieties for red wines.
Data obtained by physico-chemical analysis of local grapes varieties and biotypes for white wines are represented in the Table 4, respectively in the Table 5 for local grapes varieties and biotypes for red wines.

Variety	Leaf	Cluster	Berry
Alb aromat de Rosia	Large, cuneiform, palmate	Small, cylindrical	Small, spherical, green-yellowish skin
Aripat roz de Rosia	Medium, round, trilobate	Small - medium, cylindrical, wing	Medium, spherical, pink skin
Mustoasa de Maderat	Medium, cordiform, pentalobate	Large, cylindrical-conical	Small to medium, spherical, green-yellowish skin
Mustoasa de Maderat-selectie	Medium, round, almost palmate	Conical, very large	Medium, spherical, green skin

clonala			
Ineu 1	Medium, pentalobate	Medium, conical-cylindro-conical	Medium to small, spherical, pink skin
Roz de Buzias	Medium, cuneiform, palmate	Medium, conical	Small, spherical, thin, pink skin
Galben lax	Small, almost cuneiform, pentalobate	Branches, very lax, wing	Uneven in size, ovoid, golden-yellow skin
Aramiu de Silagiu	Large, cuneiform, pentalobate	Large, conical	Small, round, yellow gold skin
Patrujarca	Small to medium, slightly orbicular, pentalobate	East, conical tip slightly bent	Small to medium, inversely ovoid shape with a skin yellowish green
Fraga alba de Silagiu	Medium, cuneiform, trilobate	Small to very small, cylindrical	Small, spherical, thick, green-yellowish skin
Ruginiu de Silagiu	Medium to large, cuneiform, palmate	Medium, sometimes winged	Medium, spherical, yellow-gold skin
Roz marunt de Buzias	Medium, cuneiform, palmate	Medium, conical	Small, spherical, thin, pink skin
Roz batut de Silagiu	Medium, round, palmate	Medium, cylindrical	Small or medium, elongate, pink-reddish skin
Roz batut de Buzias	Small, almost kidney-shaped, trilobate, superficial indentation	Small, cylindrical-conical,	Small, spherical-flattened, pink-greenish skin
Roze de Silagiu	Small, cuneiform, palmate	Medium, cylindrical, dense berries	Small to medium, spherical, pink-greenish skin
Roz cu aripioara	Large, cuneiform, palmate, largely indented	Small to medium, cylindrical-conical	Small, oval-elongated, pink skin
Compact de Buzias	Small to medium, cordiform, palmate, small, slightly mucronate indentation	Small, cylindrical, dense	Small to medium, spherical, green-yellowish skin
Pintenat de Buzias	Small, round, palmate, rare, mucronate indentation	Small, cylindrical, dense berries	Medium, spherical, green-gold skin
Roz deformat de Buzias	Small, almost kidney-like, trilobite, superficial indentation	Small, cylindrical-conical	Small, spherical-flattened, pink-greenish skin
Roz de Ghiroda	Small, cuneiform, trilobate	Small, cylindrical, sparse berries	Small, spherical, pink skin
Roze Macui	Great, cordiform	Small, cylindrical-conical,	Spherical, pink skin
Verde Rar de Petresti	Middle, cordiform, with trilobare trending	Small, cylindrical	Small, spherical, green skins
Auriu batut de Aiud	Lower-middle cuneiform, pentalobat	East, cylindrical-conical	Small, spherical, green and gold skins
Rar de Aiud	Small to medium, cuneiform, trilobate	Small, cylindrical	Spherical, small to medium, dark green skin
Ruginiu de Aiud	Small cuneiform, trilobite	Small to medium, cylindrical	Small, spherical, golden-rust color skin

Table 2. Ampelographical description of grapes varieties for white wines

Variety
Negru batut de Rosia
RD negru
Ineu 2
Cabasma neagra
Negru compact de Silagiu
Vulpe
Negru mic de Silagiu
Negru mic de Buzias
Negru pruinat de Buzias
Rosu compact
Negru aripat de Silagiu
Negru aromat de Moldova Noua
Vinetiu de Sebes
Negru rar de Aiud

Table 3. A

Local grape
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um to small, spherical, skin
l, spherical, thin, pink
en in size, ovoid, n-yellow skin
, round, yellow gold
to medium, inversely shape with a skin vish green
, spherical, thick, -yellowish skin
ım, spherical, yellow- kin
, spherical, thin, pink
or medium, elongate, eddish skin
, spherical-flattened, greenish skin
to medium, spherical, greenish skin
, oval-elongated, pink
to medium, spherical, yellowish skin
ım, spherical, green- kin
spherical-flattened, greenish skin
spherical, pink skin
ical, pink skin
spherical, green skins
spherical, green and kins
cal, small to medium, reen skin
spherical, golden-rust kin

vines

Variety	Leaf	Cluster	Berry
Negru batut de Rosia	Large, cordiform, pentalobate	Medium size, cylindrical	Spherical to ovoid, small-medium. The skin is black
RD negru	Medium size, pentalobate	Small, cylindrical wing.	Medium to large, sferical. Black skin
Ineu 2	Medium size, tri-pentalobate	East, cylindrical-conical	Small, round, black skin
Cabasma neagra	Medium, round, almost full	Medium, cylindrical	Medium to large, spherical, black skin
Negru compact de Silagiu	Medium, cuneiform, trilobite	Medium, cylindro-conical	Small, spherical, black skin
Vulpe	Medium to small cuneiform, pentalobate	Large to very large, cylindrical, bifurcated ad tip	Medum, sferical, reddis skin
Negru mic de Silagiu	Medium, palmate, cuneiform	Small, cylindrical, rather dense berries	Medium, spherical, black-purplish, skin
Negru mic de Buzias	Large, cuneiform, palmate	Small, cylindrical, rare berries	Medium-small, spherical, black-bluish skin
Negru pruinat de Buzias	Kidney-like, medium, palmate	Small to medium, conical, rather dense berries	Small to medium, slightly ellipsoidal, black-purplish skin
Rosu compact	Medium to large, cuneiform, palmate	Medium, cylindrical-conical	Medium, spherical, green skin
Negru aripat de Silagiu	Large to very large, round, full, mucronate indentation	Medium, cylindrical-conical	Medium to large, spherical, black-bluish skin
Negru aromat de Moldova Noua	Medium to large, cuneiform, pentalobate	Small to medium, cylindro-conical	Small, spherical, black skin
Vinetiu de Sebes	Medium, round, palmate	Small, cylindrical	Medium, spherical, egg plant skin
Negru rar de Aiud	Medium , cuneiform, pentalobate	Small , conical	Spherical, black skin

Table 3. Ampelographical description of grapes varieties for red wines

Local grapes varieties and biotypes for white wines were analyzed in terms of sugar content, acidity and alcoholic potential of grape versus Royal Feteasca considered one of the most valuable Romanian varieties.

From this perspective grapes varieties behaved very differently, remarking some varieties which have a high sugar content (Ruginiu de Silagiu - 217 g/L, Patrujarca - 213 g/L, Fraga alba de Silagiu - 204 g/L, Pintenat de Buzias - 197 g/L si Compact de Buzias - 196 g/L). Remaining varieties and biotypes of this category showed lower values or close to blank.

Variety	Locality	Sugar (g/L)	Acidity (g/L H_2SO_4)	Gluco-acidimetric index	Alcoholic Potential (% vol.)	Difference to the control (Sugar)
Mustoasa de Maderat	Maderat	173	6,6	26,21	10,17	-15
Mustoasa de Maderat –clonal selection	Maderat	167	6,9	24,20	9,82	-21
Alb aromat de 'Rosia	Rosia	165	6,2	26,61	9,70	-23
Aripat roz de Rosia	Rosia	116	7,9	14,68	6,82	-72
Ineu 1	Ineu	160	4,3	37,2	9,41	-28
Roz de Buzias	Buzias	188	4,3	43,72	11.05	0
Galben lax	Recas	136	8,2	16,58		-52
Aramiu de Silagiu	Silagiu	187	4,2	43,57	10,7	-1
Patrujarca	Buzias	213	4,0	53,25	12,5	+25
Fraga alba de Silagiu	Silagiu	204	3,9	52,3	12	+16
Ruginiu de Silagiu	Silagiu	217	3,1	70	12,76	+29
Roz marunt de Buzias	Buzias	186	3,8	47,89	10,7	-2
Roz batut de Silagiu	Silagiu	125	7,5	16,66	7,35	-63
Roz batut de Buzias	Buzias	178	5,6	31,78	10,4	-10
Roze de Silagiu	Silagiu	175	5,8	31,89	10,2	-13
Roz cu aripioara	Buzias	129	8,1	15,92	7,5	-59
Compact de Buzias	Buzias	196	4,2	46,19	11,4	+8
Pintenat de Buzias	Buzias	197	4,1	48,04	11,58	+9
Roz deformat de Buzias	Buzias	156	6,1	25,57	9,1	-32
Roz de Ghiroda	Ghiroda	174	5,8	30,00	10,2	-14
Roze Macui	Alba-Iulia	126	9,8	12,85	7,41	-62
Verde Rar de Petresti	Petresti-Alba	163	8,1	20,41	9,58	-25
Auriu batut de Aiud	Aiud	179	6,4	27,97	10,52	-9
Rar de Aiud	Aiud	162	8,1	20,00	9,52	-26

Ruginiu de Aiud
Feteasca
Regala Mt

Table 4. Physicc
white wines

The values of g
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varieties: Roz dc
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Variety	Loc
Negru batut de Rosia	Ros
RD negru	Ros
Ineu 2	Ineu
Cabasma neagra	Buz
Negru compact de Silagiu	Sila
Vulpe	Sila
Negru mic de Silagiu	Sila
Negru mic de Buzias	Buz
Negru pruinat de Buzias	Buzi
Rosu compact	Buzi
Negru aripat de Silagiu	Silag
Negru aromat de Moldova Noua	Mol Nou
Vinetiu de Sebes	Sebe
Negru rar de Aiud	Aiud
Cabernet Sauvignon Mt	Timi

Ruginiu de Aiud	Aiud	156	8,6	18,14	9,17	-32
Feteasca Regala Mt	Timisoara	188	4,3	43,72	11,05	-

Table 4. Physico-chemical characteristics of local grapes varieties and biotypes for white wines

The values of glucose-acidimetry index show a very balanced composition of the wort at most local varieties and biotypes, standing out from this point of view the varieties: Roz de Buzias, Aramiu de Silagiu, Patrujarca, Fraga alba de Silagiu, Roz marunt de Buzias, Compact de Buzias si Pintenat de Buzias. Balanced ratio between sugar and acidity recorded for these varieties offer the possibility to obtaining of quality wines, typical for culture areas which can be an alternative to wines made from varieties already devoted in this area.

Variety	Locality	Sugar (g/L)	Acidity (g/L H_2SO_4)	Gluco-Acidimetric index	Alcoholic Potential (% vol.)	Difference to the control (Sugar)
Negru batut de Rosia	Rosia	185	3,7	50	10,88	-5
RD negru	Rosia	149	6,2	24,03	8,76	-41
Ineu 2	Ineu	198	3,5	55,14	11,35	+8
Cabasma neagra	Buzias	160	4,2	38,09	9,4	-30
Negru compact de Silagiu	Silagiu	177	4,4	40,22	10,4	-13
Vulpe	Silagiu	190	4,3	42,32	10,7	-
Negru mic de Silagiu	Silagiu	198	4.6	40,43	10,9	+8
Negru mic de Buzias	Buzias	213	3,1	68,70	12,52	+23
Negru pruinat de Buzias	Buzias	186	4,5	41,33	10,9	-4
Rosu compact	Buzias	151	6,4	23,59	8,8	-39
Negru aripat de Silagiu	Silagiu	152	6,3	24,12	8,9	-38
Negru aromat de Moldova Noua	Moldova Noua	175	5,8	30,17	10,29	-15
Vinetiu de Sebes	Sebes	171	7,6	22,50	10,05	-19
Negru rar de Aiud	Aiud	198	5.4	36,67	11,64	+8
Cabernet Sauvignon Mt	Timisoara	190	3,5	55,42	11,41	-

Table 5. Physico-chemical characteristics of local grapes varieties and biotypes for red wines

In the situation of grape varieties and biotypes for red wines, the comparison was made with a variety of highly valued by many experts considered the "*king of red wine varieties*" - Cabernet Sauvignon. However, there local grapes varieties and biotypes were accumulated higher amounts of sugars compared with controls (Negru mic de Buzias - 213 g/L, Ineu - 219 g/L, Negru rar de Aiud - 198 g/L, Negru mic de Silagiu - 198 g/L).
Naturally, most local grapes varieties and biotypes for red wines had a lower sugar content then Cabernet Sauvignon.
In this category, the values of glucose-acidimetric index show that a number of local grapes varieties and biotypes must have a balanced composition that allows obtaining balanced wine quality (Negru batut de Rosia, Ineu 2, Vulpe and Negru pruinat de Buzias).

4. Conclusions

Reference area is distinguished by an abundance of local grapes varieties and biotypes, some really very valuable, which are mostly little known, perhaps only those in whose household is found. From the distribution of local varieties and biotypes identified and retained for research shows the suitability of areas for obtaining of certain types of wine. The areas from Alba country provide special conditions for white and aromatic biotypes, while the areas from Timis and Arad counties provide special conditions for both red and white varieties. Local grapes varieties and biotypes represent an important source of biodiversity and also a valuable source for obtaining of authentic and typically wines. If intended solely to obtain wine varieties have noticed a difference depending on the variety of origins. Varieties of the Alba Iulia, Aiud stands a pronounced acidity, while the sugar content is lower. Varieties of the Buzias-Silagiu have a higher sugar content and lower acid content. Positive qualities of local varieties and biotypes are more valuable as they are obtained by a minimal technology, the treatments against diseases and pests are missing or limited to 1-2 spraying with copper-calcium solution. Finally we can say that a rational culture technology can significantly improve the quality of grapes produced from local varieties and biotypes. The results of this study help to differentiation and identification of grapevine varieties and to assure the availability and exchange of germplasm. In addition they are an information platform for research, breeding and viticulture by providing grapevine variety specific data.

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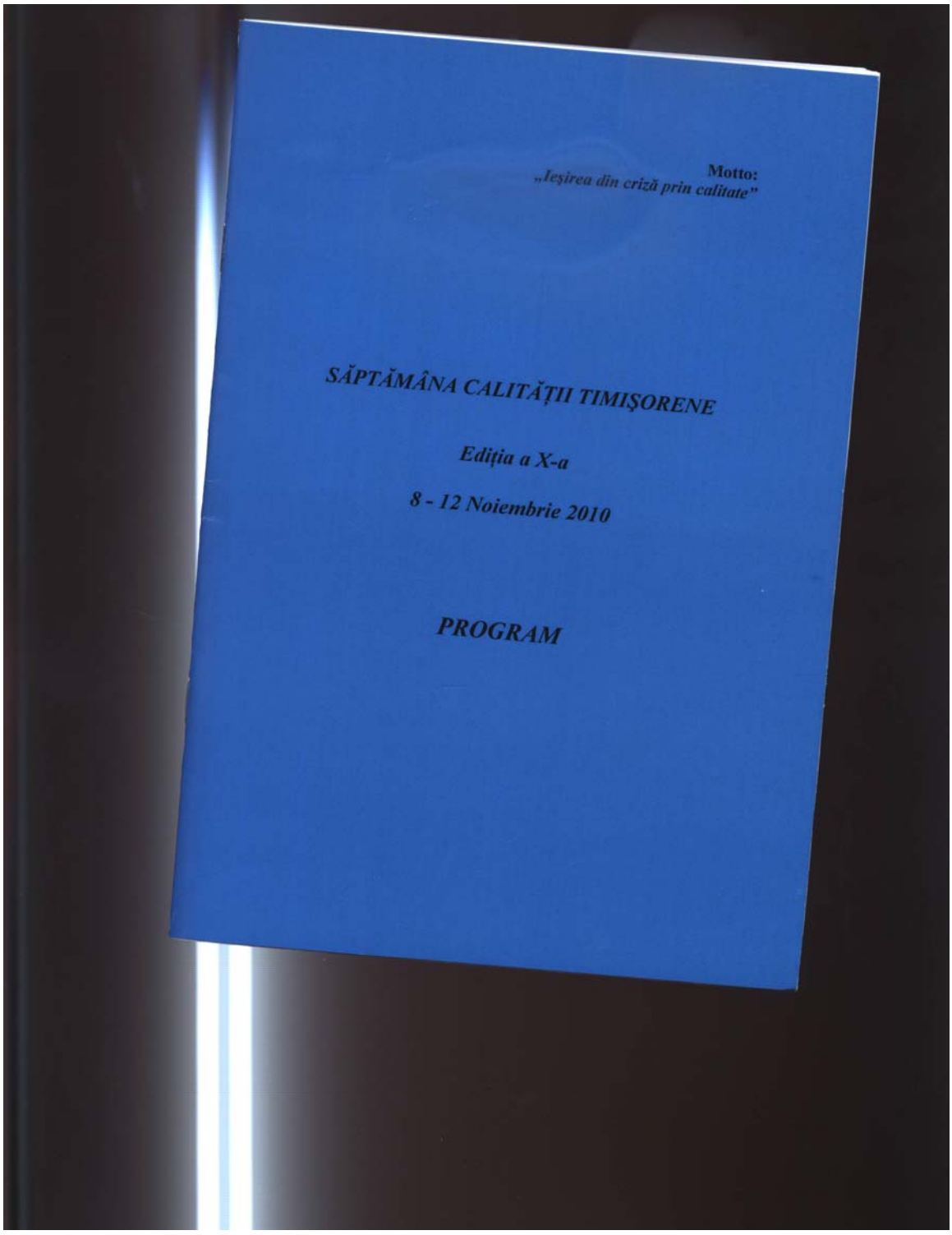
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Nr. crt.	Data	Ora	Denumirea acţiunii	Locul de desfăşurare
1	2	3	4	5
1	Luni 08.11	12^{00}	Simpozion de deschidere a Săptămânii Calităţii Timişorene	Sala de Consiliu a Primăriei Municipiului Timişoara
2	Luni 08.11	14^{00}	Simpozion "Horticultura contemporană între eficienţă şi calitate"	USAMVB, Facultatea de Horticultură şi Silvicultură, Sala de Viticultură, Calea Aradului, Nr. 119, Timişoara
3	Luni 08.11	17^{00}	Masă rotundă "Îmbunătăţirea calităţii în construcţii prin utilizarea unor metode eficiente de organizare"	UPT, Facultatea de Construcţii, ASPC – Sala A 215, Str. Ioan Râmneanţu, Nr. 2, Timişoara
4	Luni 08.11	17^{00}	Conferinţa "Managementul calităţii învăţământului superior în România şi în Ungaria	Universitatea Ioan Slavici, Sala 302, Str. Aurel Păunescu Podeanu, Nr. 144, Timişoara
5	Marţi 09.11	11^{00}	Masă rotundă "Soluţii sustenabile pentru proiectarea şi realizarea infrastructurii rutiere"	UPT, Facultatea de Construcţii, Amfiteatrul Constantin Avram, Str. Traian Lalescu, Nr. 2, Timişoara
6	Marţi 09.11	12^{00}	Masă rotundă "Calitatea apei şi viaţa"	Direcţia Apelor Banat, Bd. Mihai Viteazu, Nr. 32, Timişoara
7	Marţi 09.11	12^{00}	Masă rotundă "Energiile regenerabile şi calitatea vieţii"	UPT, Facultatea de Mecanică, Corpul Vechi, Sala 102, Bd. Mihai Viteazu, Nr. 1, Timişoara

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FACULTATE DE HORTICULTURĂ
ŞI SILVICULTURĂ

DEPARTAMENTUL
HORTICULTURĂ

SIMPOZION

cu tema: HORTICULTURA CONTEMPORANĂ ÎNTRE EFICIENŢĂ ŞI CALITATE

Data: Luni, 8 noiembrie 2010, ora 14^{00}
Locul: USAMVB – Facultatea de Horticultură şi Silvicultură, Sala de Viticultură

Moderatori: Prof. dr. ing. Viorel BERAR
Prof. dr. ing. Maria BĂLA
Prof. dr. ing. Olimpia IORDĂNESCU

Prezentări:

1. *Cultura tomatelor în sere, în diverse substraturi nutritive, pentru obţinerea unor producţii sănătoase*, Prof. dr. ing. Viorel BERAR, Conf. dr. ing. Gheorghe POŞTA
2. *Studiul influenţei sistemelor de susţinere şi de fezabilitate ale plantelor asupra potenţialului productiv şi calitativ a unor hibrizi de tomate cultivaţi în solarii*, Prof. dr. ing. Arseni HORGOS, S.l. dr. ing. Alexandra BECHERESCU
3. *Calitatea strugurilor, condiţie esenţială pentru obţinerea unor vinuri competitive*, Prof. dr. ing. Alin DOBREI, Dr. ing. Alina GHIŢĂ, Asist. dr. ing. Ioana MĂLĂESCU, Dr. ing. Teodor CRISTEA
4. *Calitatea materialului floricol obţinut la specia Freezia hybrida, premergător desfacerii acestora pe piaţă*, Prof. dr. ing. Maria BĂLA, Drd. ing. Daniel BERECICI

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Hódmezővásárhely

SUSTAINABILITY OF AGRICULTURAL SYSTEMS AND RURAL DEVELOPMENT IN BANAT, ROMANIA

SALA F., DOBREI A.

Banat University of Agricultural Sciences and Veterinary Medicine, Timişoara, Romania
Corresponding author: F. SALA, e-mail: florin_sala@yahoo.com

ABSTRACT

The studies and research at the basis of the present paper aimed at assessing agricultural systems in the context of sustainable development in Banat, Romania.

Taking into account both the complexity of agriculture as social and economic activity and the features and large number of types of agriculture practiced in the world nowadays, we have focussed our research on the area of the locality Buzias-Silagiu, in particular the vine growing systems, fig. 1.

Within the framework of the Land Fund Act nr. 18/1991, they excessively divided land property into small plots (about 20,000,000) with serious effects on the use of irrigation and soil erosion prevention systems, on agricultural works and on production costs, on the constitution of mainly subsistence family farms – with limited possibilities of increasing production and of integrating into the economic flows necessary for the agriculture to develop, etc.

Fig. 1. The area of the locality Buzias-Silagiu, Romania.

In this context, in the area of the locality Buzias-Silagiu, an area of tradition in the field of viticulture, with favourable soil and climate conditions, they got to divide lands through land redistribution on the grounds of different reasons of technical, economic, and socio-professional nature, thus resulting in a depreciation of the vine plantations down to critical levels.

In order to become profitable, these vine plantations need high investments, which their owners cannot make, resulting in plantation losses.

Thus, from a vine plantation of about 820 ha exploited in 1989 at the level of vine cultivation and wine-making technologies of the time, they only had in 2009 148 ha of exploited vine cultures and over 430 ha of abandoned vine cultures, with some of the plants removed.

The most considerable diminution of the planted areas are in white wine vine plantations (from 383 to about 50 ha), in fruited wine vine plantations (from 252 to about 40 ha), and in red wine vine plantations (from 137 to about 46 ha). As for table grapes, tough cultivated areas were not too large, they decreased from about 50 to about 12 ha, i.e. a smaller diminution than in the case of the other assortments.

Another negative aspect is the area of the new land properties, which made them unprofitable. The last years they aimed at reuniting vine cultivation areas in order to be able to apply successfully new cultivation technologies.

The level of production in table grapes increased from an average of 9,350 kg/ha in 1989 to 10,315 kg/ha in 2009, with no significant depreciation. This reflects the level of soil and climate conditions and the vine cultivation potential of the area.

After liberalising the land market, they established viticulture exploitations with legal status which started to recover the viticulture heritage of Silagiu through the establishment of new plantations, resulting in a changing viticulture area landscape.

***Key words**: agricultural systems, sustainability, rural development, vine exploitations, wine grapes, table grapes, grape production*

INTRODUCTION

Concerns about sustainable development are about 40 years old, more precisely they were developed at the Conference on the Environment in Stockholm (1972) where they agreed on the imperative necessities of solving the issues of environmental damage, of preventing serious ecological unbalance, and of ensuring ecologic balance on Earth.

At the World Summit in Johannesburg they established new directions of action, directions that were mentioned in the Johannesburg Declaration on Contemporary World Sustainable Development, better known as Agenda 21.

Strictly related to agriculture, the Declaration underlines that it plays a main role in covering the needs of world's increasing population: in this context, "a viable agriculture and proper rural development are essential in the implementation of an integrated approach in increasing food production and food safety in a sustainable manner".

The concept of sustainable agriculture is relatively new and it acquired a world status due to the main topic of the 21st Congress of the World Association of Agrarian Economists in Tokyo, in 1994.

The development of sustainable agriculture aims at the following: preserving environmental quality and the quality of natural resource agriculture relies on, meeting human needs for food and fibber, supporting the viability of agricultural activities and the increase of farmers' life quality, etc.

Conceptually, it has been defined by the Australian John W. Longworth (Presidential Address, Human capital for sustainable agricultural development, Tokyo, 1991), as having three main components: economic increase (capital), distribution (market), and environment (ecological component).

Developing a sustainable agriculture is a long-term process whose bases are in the present, but oriented towards the future.

We need to take into account the contradictions existing between necessities and capital sources, between producer prices and consumers, etc., under the conditions developed by the Land Fund Act nr. 18/1991, which led to excessive land breaking into small plots (about 20,000,000), with serious effects on irrigation systems use and on soil erosion control, on agricultural works, and on production costs; and to the development of subsistence family farms with limited possibilities of increasing production and of integrating into the economic flows necessary for agriculture to develop, etc.

Because of all this, developing sustainable agriculture in Romania should start from the following:

- increasing land property size and developing medium agricultural exploitations through land purchase, letting agricultural land by non-agricultural or old land owners, associating while preserving the property rights on land;
- developing a competitive agriculture that creates an economic surplus necessary to its own development;
- developing alternative agricultural systems (ecological agriculture) through the implementation of very strict norms concerning the use of chemical substances and of mineral fertilizers, adopting price incentives for non-polluting foods, applying rational agricultural techniques, observing the principles of diversification and of recycling, etc.

It is in this context that we have analysed the area of the locality Buzias-Silagiu (Banat, Romania) from the point of view of the agricultural systems and, particularly, from the point of view of viticulture – organisation, productivity, role to play in the development of the locality.

MATERIAL AND METHOD

Approaching the different objectives was done through the *post factum* systemic analysis of the indicators established in the area of the locality Buzias-Silagiu.

We have analysed the structure and organisation of vine plantations and of wine-making establishments in the Viticulture Centre Buzias-Silagiu, cultivar structure, technology, production and productivity between 1989 and 2009.

Results were statistically processed and interpreted in the context of the level and prospects of development of the locality in relation to the Agenda 21 and to the Sustainable Development Plan.

RESULTS AND DISCUSSION

The viticulture centre in Buzias-Silagiu (Timis County) located near the town of Buzias covers the Silagiului Hill and Bacova. Its main goal is high quality white and fruited wines production (with a predominance of the Italian Riesling and Muscat Ottonel cultivars), but they also produce high quality red wines of the cultivars Cabernet Sauvignon, Pinot noir, Merlot, and Burgund. The table grapes assortment is limited to the cultivars whose maturation times are III and IV.

Officially, the cultivation of vine on the Silagiului Hill was confirmed for the first time in 1825, in a contract between the Religionary Fund and the farmer Trăila Savu.

In the years 1840-1850, German and Hungarian colonists settled in Silagiu: though in small numbers, they knew the craft of making wine.

In 1888, Silagiu is attacked by the Phylloxera, which destroyed all the plantations in the following 3 years.

In 1895, vine cultivation is taken over on the lands uncultivated for 7 years. They imported vine cultivars of the best well-known ones which they adapted to the soil and climate conditions there: Italian Riesling, Muscat Ottonel, Hamburg Muscat, and Steinschiler, that they grafted on American vines.

After grafting noble cultivars on American vines, the first harvest was in 1989. The owner, Dick Jacob from Bacova, carried his first grapes from Silagiu to Bacova accompanied by joy and music.

Owners of vine plantations on the Silagiului Hill lived in Silagiu, Buziaş, Bacova, Timişoara, Lugoj, and even Budapest, and works were done by day workers from Silagiu and the neighbourhoods.

More and more houses are built on the vine plantations (about 600), some of which with wine cellars. From March to October, the hill looked like a settlement, because some of the farmers sued to stay in the vineyard for a week or more to do all the works.

In 1919, the Silagiu Hill had about 579 ha cultivated with vine.

After World War One, they planted more vine in the lower parts of the hill, where they used to cultivate cereals (Guran, Strâmba, and Valea Secerii). These vine plantations start to bear fruit in 1924-1925; in 1938, the area cultivated with vine measured about 803 ha.

În 1933, between February 25 and 26, the Agricultural Chamber of the Timiş-Torontal County organised in Buzias a wine exhibition in which 240 samples of wine are exhibited, of which 4/5 were wines from the Silagiului Hill.

After 1945, the vineyards started to be expropriated and they were passed into State ownership and into cooperatives.

During this period of time, areas cultivated with vine grow and they re-organise the range of assortments.

After 1990, the situation of viticulture in Silagiu got critical: the ex-State Agricultural Enterprise Buziaş to whom all the vine plantations used to belong reach financial decline and hundreds of ha stop being maintained for a number of years. The result: when all these plantations were resituated in accordance with the Act nr. 18/1991 and 1/2000, they were old and very weak. The same happened in the case of the cooperatives. Table 1 shows the evolution of the situation of the vineyards.

Table 1

Evolution of fruitful vineyards in the Buziaş-Silagiu area

Year	Total area (ha)	Area exploited		Abandoned vineyards	
		(ha)	%	(ha)	%
1989	878	820	93.4	28	6.6
1997	530	70	13.2	460	86.8
2000	530	57	10.7	493	89.3
2005	575	102	17.7	473	82.3
2006	585	109	18.6	476	81.4
2007	585	125	21.3	460	78.7
2008	585	137	23.4	448	76.6
2009	585	148	25.3	437	74.7

*Source: Registrul plantatiilor viticole**

*Because all vine plantations owners are not recorded, the data in the vine plantation register differ from real ones

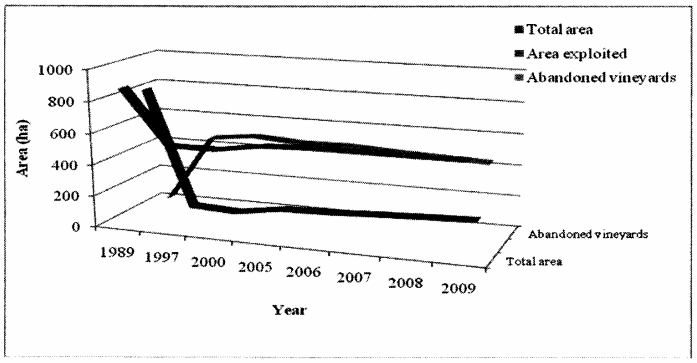

Figure 2. Graph of the evolution of fruitful vineyards in the conditions of the viticulture centre in Buzias-Silagiu.

Table 2

Evolution of fruitful vineyards structure in the Buziaş-Silagiu area

Year	Area	Cultivars							
		Table grapes		White wine grapes		Red wine grapes		Fruited wine grapes	
		Ha	%	Ha	%	Ha	%	Ha	%
1989	820	48	5.8	383	46.7	137	16.7	252	30.8
1997	70	5	7.1	32	45.7	7	10.0	26	37.2
2000	57	4.5	7.9	23	40.3	7	12.2	22.5	39.6
2005	102	7	6.8	36	35.2	20	19.6	39	38.4
2006	109	8	7.3	36	33.0	26	23.8	39	35.9
2007	125	10	8.0	41	32.8	34	27.2	40	32.0
2008	137	12	8.7	45	32.8	40	29.2	40	29.3
2009	148	12	8.1	50	33.8	46	31.1	40	27.0

*Source: Registrul plantatiilor viticole**

*Because all vine plantations owners are not recorded, the data in the vine plantation register differ from real ones

Table 3

Evolution of total production and of production per ha in table grapes cultivars in the Buziaş-Silagiu area

Year	Cultivated area (ha)	Production (kg)		
		Per ha	Total	Difference to control (kg/ha)
1989 (control)	48	9,350	448,800	-
1997	5	8,375	41,875	-975
2000	4.5	8,980	40,410	-370
2005	7	9,375	65,625	+25
2006	8	9,750	78,000	+400
2007	10	10,120	101,200	+770
2008	12	10,315	123,780	+965
2009	12	10,850	130,200	+1,500

In the context of major causes that determined the changes on the viticulture exploitations in the Buzias-Silagiu area, we identified a series of factors with specific action and we estimated the share of impact on the exploitation activity as shown in Table 4.

Table 4

Factors of impact on the efficiency of viticulture exploitations in the Buzias-Silagiu area

Nr.	Factor of impact	Participation (%)
1	Exaggerate breaking down of properties and difficulty of reuniting them	20
2	Lack of financial means for the application of performing technologies	30
3	Lack of knowledge and of trained personnel	5
4	Lack of performing viticulture machines and equipment	5
5	Improper assortment variety	5
6	A large number of cultivars that make difficult production specialisation	5
7	Lack of one's own units for the processing of table grapes on most exploitations	10
8	Lack of organisation in production valorisation	10
9	Lack of trained labour force	5
10	Lack of proper infrastructure	5
	TOTAL	**100**

In order to make vine plantations profitable, vineyard owners need large amounts of money which they do not have, causing loss of plantations.

Another negative aspect is the small areas making up the new properties which led to lack of profitability. These years they aimed at reuniting the small plots to allow new cultivation technologies to be applied.

After liberalising the land market, they established legal status viticulture exploitations, and these exploitations started the remaking of the viticulture heritage of Silagiu through new plantations, which resulted in a change of the viticulture landscape.

In 2005-2006, the viticulture centre Silagiu had 849 ha of vineyard (real situation) of which 478 ha were exploited individually and 371 ha represented legal status plantations some of which with foreign participation.

After Romania joined the U.E. on January 1, 2007, the rules concerning agriculture and viticulture (cultivated areas, cultivars, and treatments) need to be reconsidered and harmonised with European rules.

CONCLUSIONS

Research points out the time evolution off vine exploitations in the Viticulture Centre of Silagiu from the point of view of areas, ownership structure, range of assortments, technology, and production.

We identified a series of causes and factors with both general and specific action with impact that determined the evolution of viticulture and wine-making exploitations these last years. Among the factors that led to the decline of the vine exploitations in the Buzias-Silagiu area – as well as in other similar area in Romania – we can mention the following ones: legislation and lack of cohesion in applying it, technical and economic conditions of the new owners, training level of the owners, improper technologies, low domestic wine market, impossibility of penetrating external markets as a result of relatively low and inconsistent production.

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