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VLIV RŮZNÝCH STANOVIŠŤ NA OBSAH FENOLICKÝCH LÁTEK V HROZNECH A VÍNĚ Z ODRŮDY SAVILON V PODMÍNKÁCH JIŽNÍ MORAVY

The influence of vineyard site on phenolic compounds in berries and wine produced from white grape variety Savilon, South Moravia

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Abstrakt

Fenoménem poslední doby se stávají antioxidanty, jejichž podstatou jsou fenolické látky hroznů a vína, které působí pozitivně na lidské zdraví. Během výzkumu byla sledována spektrofotometricky a pomocí HPLC série vybraných ukazatelů hroznů a vína, odpovídajících za antioxidační vlastnosti. Výsledky podporují hypotézu, že výběr stanoviště významně ovlivňuje vlastnosti hroznů a vína, včetně obsahu fenolických sloučenin. Výsledky našeho pozorování ukazují, že ze čtyř stanovišť pro odrůdu Savilon nejzajímavější vlastnosti mají vinice v Novém Přerově, což je suchý a teplý region, kde dominují těžší kamenité půdy.

Klíčová slova: fenolické látky, bíle víno, antiradikálová aktivita, odrůda Savilon, STANOVIŠTĚ

Abstract

Nowadays the study of phenolic compounds in grapes and wines is of great interest due to their beneficial influence on human health. Their antioxidant properties are well known. In our experiments we have studied different parameters with antiradical properties by means of spectrophotometry and HPLC analysis. Our results support the hypothesis that vineyard site affects the parameters of berries and wine. During the study we found out that the most interesting vineyard site among four studied is the vineyard in Novy Prerov, dry, warm site where heavy rocky soils dominate.

Key words: phenolic compounds, white wine, antioxidant activity, Savilon, vineyard site.

Introduction

Nowadays the study of phenolic compounds and their content in food is of great interest due to their versatile capabilities, and above all their beneficial influence on human health. According to numerous research works grape phenolic compounds are able to decrease the level of cardiovascular diseases, and have bactericidal, fungistatic, antioxidant and vitamin properties. These molecules come from various parts of the grape bunches and are extracted during winemaking; they also assist vines in standard development. Concentrations of condensed tannins in white wines vary from 100 to 300 mg/l, that is far less than in red wines (14). Numerous research works have been recently dedicated to trans-resveratrol content, especially in case of red wines (up to 40 mg/l in some wines), as it is considered to be a strong antioxidant, and as antioxidant it could slower the oxidative aging (15,17). The average trans-resveratrol content in white wines is about 0,05-1,8 mg/l. Important indexes of wine beneficial properties as well as high content of phenolics are antiradical activity (AA) and ferric reducing ability of plasma (FRAP) (1, 16). The phenolic content in wine is influenced by different factors such as: soil-climatic conditions, variety and rootstock selection etc.(6)

Different studies have shown that vineyard site selection could influence the growth and metabolic activity of vine as well as various processes in grape berries, metabolic pathways and synthesis of different compounds. The vineyard site means the series of factors; among the most important are soil, climate and light. Soil structure and chemical composition influence the development of root system and consequently water and mineral nutrition; soil has also dramatic influence on microclimate which is able to reduce the adverse effect of certain vintage. The amount of light can influence the accumulation of sugars, acids, phenolic and aromatic compounds, as well as the initiation of inflorescences. The role of the most important climatic indicators (i.e. temperature, light, water) is indisputable in zoning the vines (12).

This work aims to study the effect of vineyard site on the content of phenolic compounds in berries and wine produced from white grape variety Savilon. The Mikulov sub-region of South Moravia is characterized by dry and warm climate and soils with increased content of active lime that determines the choice of variety and rootstock under these conditions.

Materials and methods

We studied berries and wine from white grape variety Savilon, that derives from complex interspecific crosses made by group of breeders under guidance of Doc.Ing. Miloš Michlovský, DrSc. Savilon was recorded in the State Register in 2010. This variety is vigorous, with rather loose, large, conical elongated clusters, berries are medium and spherical with rather hard greyish skin which contributes to mechanical harvest. The sensory properties of Savilon wines are similar to those of Sauvignon blanc. Savilon is quite resistant to different pathogenes (downy mildew, grey rot).

Among the studied vineyard sites are:

Perna (Purmice) – warm, dry site with typical and flood plane grey chernozems on marls and clays, the soils are heavy with medium heavy topsoil and heavy subsoil, often waterlogged. Soil pH is slightly akaline (pH=7,6). The vineyard was planted in 1997 with spacing 2,4 x 0,9 m. The pruning load is 8-10 eyes.

Klentnice (Nad sv.Leonardem) – warm, dry site with chernozems, brown soils and slightly gleyed, eroded soils on terraced slopes, soils are medium heavy. Soil pH is slightly akaline (pH=7,7). The vineyard was planted in 2004 with spacing 2,4 x 0,9 m. The pruning load is 8-10 eyes.

Pritluky (Neu Pery) – warm, dry site, with medium-strong topsoil (30-70 sm) formed by chernozems, below are more sandy and lighter horizons on sandy and alluvial subsoils. Soil pH is slightly akaline (pH=7,7). The vineyard was planted in 2005 with spacing 2,4 x 0,9 m. The pruning load is 8-10 eyes.

Novy Prerov (Na strekach) – warm, dry site with brown soils on marls, clays and sedimentary rocks of carpathian flysch, soils are heavy to very heavy with low permeability. Soil pH is acid to slightly akaline (pH vary from 5,9 to 7,7). The vineyard was planted in 2003 with spacing 2,4 x 0,9 m. The pruning load is 10-12 eyes.

Savilon grapes were collected from all studied sites on October 5-9, 2009 and on October 5, 2010 after reaching technologic maturity.

As reference variety Rheinriesling (Riesling onwards) was chosen in Perna-Purmice vineyard site. During the comparison of several indexes one must keep in mind that pruning load of Riesling was 6 eyes per plant due to its moderate vigor.

The climatic conditions in 2009 differed a lot from those in 2010 that should be kept in mind during assessment and comparison. The average day temperature was lower by 2-3 °C and the average rainfall increased by 40-50 mm during veraison in 2010. In contrast to *Vitis vinifera* varieties Savilon showed increased resistance to downy mildew and grey rot. However one should consider the fungal pressure in 2010.

A complete randomized block of 10 replicates each of the same load was used. The experimental plot was buffered on either side with a single row of vines.

The agrobiological indexes were studied according to Lazarevsky method (19).

The grapes were processed utilizing the standard techniques for small lot winemaking used at Vinselekt Perná.

Standard wine analyses were carried out using Winescan method.

Sensory analysis was performed by experienced judges utilizing UKZUS method (9).

Spectrophotometric analysis (total phenolics, total flavanols, antiradical activity and reducing power) and HPLC analysis (inividual phenolics) was carried out using nonpublished method, developed in the laboratory of MENDELU, Department of Viticulture and Enology, Faculty of Horticulture, Lednice.

Differences between means were determined using Fischer's least significant difference test (α=0,05). Linear correlation analysis was also performed between some means.

Results and discussion

Must parameters

The differences of selected indexes of vine productivity and grape quality are listed in tables I and II, probably occurred due to differences in climatic conditions of the years of trial (2009/2010).

The increase in cluster weight and productivity per m^2 in 2010 is presumably due to the good soil permeability and hence water availability for plant root system.

In general one can note that growing conditions in Klentnice (the vineyards are located on terraces, a moderate water deficit can be observed during veraison, the soils are lighter and poorer) are more stressful for vines than in Perna, Pritluky or Novy Prerov, which leads to lower productivity and increased acidity of must.

When comparing variety Savilon with reference variety in Perna one can note that Riesling had lower cluster weight and lower productivity (app. 4 times), at the same time the sugar content is lower and the acidity of must is higher.

Table I. The influence of vineyard site on Savilon must parameters and productivity, 2009

Vineyard site	The weight of one cluster, [g]	Productivity, [g.m^{-2}]	Sugar content, [°ČNM]	pH	Total acidity, [g.l^{-1}]
Klentnice	122,94	569,4	20,0	3,15	7,00
Perna	168,36	1039,7	22,5	3,22	6,10
Novy Prerov	151,72	766,6	23,0	3,25	4,30
Pritluky	177,71	1234,1	24,0	3,34	5,00
Riesling (Perna)	127,60	620,3	20,5	3,02	7,50

The spectrophotometric analysis of grape berries

Table III presents the data of spectrophotometric analysis of grape berries in 2009. In assessing the vineyard site the maximum polyphenol content was observed in Perna (3509,4 mg/l), and minimum – in Novy Prerov (2366,5 mg/l). The maximum value of flavanol content was observed in Klentnice (612,3 mg/l), no significant difference was found with Pritluky.

Table II. The influence of vineyard site on must parameters and productivity of Savilon variety, 2010

Vineyard site	The weight of one cluster, [g]	Productivity, [g.m^{-2}]	Sugar content, [°ČNM]	pH	Total acidity, [g.l^{-1}]
Klentnice	113,81	1253,0	17,5	3,13	11,20
Perna	103,77	903,0	18,0	3,10	10,60
Novy Prerov	193,90	2367,6	19,0	3,09	10,30
Pritluky	173,88	2468,7	16,5	3,15	10,80
Riesling (Perna)	73,36	216,2	18,0	2,99	15,10

The minimum value of flavanol content was observed in Perna (359,7 mg/l, 40% below maximum). In terms of antiradical activity the maximum values were observed in Pritluky (788,5 mg/l), and minimum – in Klentnice (496,3 mg/l, 37% below maximum), at the same time no significant differences were observed between Klentnice and Perna. There was found a weak correlation between the indexes of flavanol content and antiradical activity with reducing power while moderate negative correlation was established between the indexes of total phenols and antiradical activity. The differences between sites are likely to be due to soil-climatic conditions. The soils and microclimate differ significantly between sites, and hence the conditions during maturation, that could cause a moderate water deficit, which affects berry size and composition.

The differences in microclimate create the different conditions for pathogens development that also have an impact on berry phenols. The most "stressful" site is Klentnice on terraces where the most of all studied parameters are increased. One of important factors of increased polyphenol content in grape berries is likely to be UV radiation which favors the increased levels of enzymes responsible for the synthesis of phenolic compounds (3,4).

When comparing the spectrophotometric indexes of grape berries with reference variety one could state that total phenolic content in Riesling berries is lower, total flavanol content is average, and the rates of antiradical activity and reducing power are increased.
One should keep in mind that anthocyanin content was also estimated using spectrophotometry as red grape varieties were used in breeding. However anthocyanin content doesn't exceed trace amounts (2).

Table IV presents the data of spectrophotometric analysis of grape berries in 2010. In assessing the vineyard site the maximum polyphenol content (2991,9 mg/l), flavanol content (750,9 mg/l) and antiradical activity (826,2 mg/l) were observed in Klentnice, the minimum values of these indexes were observed in Novy Prerov and Pritluky without significant differences. The maximum value of reducing power was in Perna (505,1 mg/l), and minimum – in Novy Prerov and Klentnice without significant differences. In general no significant correlation was found between indexes of 2009 and 2010.

Table III. The spectrophotometric analysis of total polyphenols, total flavanols, antiradical activity and reducing power of Savilon grape berries, 2009

Vineyard site	Total polyphenols, [mg.l^{-1}] gallic acid	Total flavanols, [mg.l^{-1}] gallic acid	Antiradical activity, [mg.l^{-1}] gallic acid	Reducing power, [mg.l^{-1}] gallic acid
Klentnice	3347,5	612,3	496,3	408,6
Perna	3509,4	359,7	497,6	261,6
Novy Prerov	2366,5	475,2	582,0	282,1
Pritluky	2619,4	610,6	788,5	203,2
Riesling (Perna)	2042,0	572,4	641,4	424,9

When comparing the spectrophotometric indexes of Savilon grape berries with reference variety in Perna in 2010 one could observe increased values of all indexes in Riesling except reducing power.

The differences in indexes are probably due to the differences in soil structure and composition. The nitrogen and macro elements content can affect the content and composition of polyphenol compounds in grape berries.

Summarizing the results of two years on the effect of vineyard site on most of the selected polyphenolic indexes of Savilon variety, one can assume that the most “interesting” site is Klentnice.

Reference variety Riesling was more affected by climatic conditions of certain year (vintage) than Savilon variety. The weather conditions of 2010 favored downy mildew and grey rot development and hence stimulated the synthesis of certain phenolic compounds in grape berries, while Savilon variety shows significant increase in most parameters at all sites in 2010 with exception of the total polyphenol content. It is known that this parameter depends on the stage of grape maturity, which was higher in 2009.

Table IV. The spectrophotometric analysis of total polyphenols, total flavanols, antiradical activity and reducing power of Savilon grape berries, 2010

Vineyard site	Total polyphenols, [mg.l^{-1}] gallic acid	Total flavanols, [mg.l^{-1}] gallic acid	Antiradical activity, [mg.l^{-1}] gallic acid	Reducing power, [mg.l^{-1}] gallic acid
Klentnice	2991,9	750,9	826,2	167,2
Perna	2376,3	601,9	817,3	505,1
Novy Prerov	1975,3	461,7	633,2	168,8
Pritluky	2110,1	464,1	612,1	364,4
Riesling (Perna)	2830,7	883,4	868,2	127,2

HPLC analysis of grape berries

HPLC analysis of grape berries was carried out in 2009. Tables V, VI and VII represent the obtained data.

The content of certain phenolic acids

Concentration of phenolic acids usually is on the order of 10-20 mg/l in white wines. Caftaric acid in wine is one of the major substrates for phenoloxidase, responsible for browning of white must. The derivatives of caftaric and coutaric acids play a certain role in coloring white wines. From an organoleptic standpoint, these compounds have no particular flavor or odor. They are, however, the precursors of volatile phenols produced by the action of certain microorganisms (yeasts in the genus *Brettanomyces* and bacteria). In white wines vinyl phenols are accomplished by vinyl guaiacols. These compounds result from the breakdown of p-coumaric and ferulic acids. It is believed that gallic acid has the most pronounced antioxidant effect (13).

In assessing the impact of vineyard site on phenolic acids content, maximum content of all studied acids was observed in Pritluky. The minimum content of gallic and caffeic acids was observed in Perna, minimum content of caftaric, coutaric and fertaric acids in Novy Prerov (Table V).

It was found that Riesling berries have higher content in phenolic acids (with the exception of gallic acid).

The content of certain flavan-3-ols

The basic flavanols in grapes are catechin and epicatechin, they are usually present in skins and seeds. Concentrations are about 10-30 mg/l in white wines. Catechin and epicatecnin are believed to play the major role in antioxidant properties of grapes and wine. Their concentrations vary according to different factors, genetic factors and soil-climatic conditions are among them.

The maximum values of catechin and epicatechin content were observed in Pritluky, while the minimum value of catechin content – in Novy Prerov, and the minimum value of epicatechin – in Klentnice (Table V).

The catechin content in Riesling berries exceeded the maximum value of Savilon berries by 50%, the epicatechin content retained average.

Table V. The content of important phenolic acids and flavan-3-ols in Savilon grape berries, 2009

Vineyard site	Gallic acid, [mg.l^{-1}]	Caftaric acid, [mg.l^{-1}] of caffeic acid	Caffeic acid, [mg.l^{-1}]	Coutaric acid, [mg.l^{-1}] of coumaric acid	Fertaric acid, [mg.l^{-1}] of ferulic acid	Catechin, [mg.l^{-1}]	Epicatechin, [mg.l^{-1}]
Klentnice	0,728	6,229	6,957	1,643	0,554	27,25	10,063
Perna	0,871	3,325	4,196	1,171	0,452	29,091	11,823
Novy Prerov	1,742	1,591	3,333	0,467	0,43	24,64	14,3
Pritluky	6,151	7,974	14,125	3,515	0,675	37,936	35,471
Riesling (Perna)	1,473	17,603	21,456	3,112	1,984	56,74	26,637

The content of certain stilbenes

Among the stilbenes studied were tran- and cis-isomers of resveratrol and piceid. The stilbenes are usually produced in response to stressful conditions; their beneficial effect on human health has been confirmed by many researches (17,18). Stilbene concentrations in grapes depend on variety used, soil climatic conditions, fungal infection. Concentrations of trans-resveratrol in white grapes are on the order of 0,01-0,18 mg/l (7,8,10).

Maximum values of almost all stilbenes studied were observed in Perna, minimum values– in Novy Prerov (Table VI).

Stilbene content in reference variety in Perna was 10 times lower than in Savilon grapes.

The content of certain flavonols

Flavonols are yellow pigments of grapes. Biosynthesis of flavonols is light-induced, accordingly with the role of flavonols as UV-protectant. Those compounds seem to possess antioxidant properties (5). According to literature quercetin content in grape berries is about 0,5 mg/l, and flavonol glycosides content can reach values of 100 mg/l in red wines (11).

Maximum values of quercetin glycoside and quercetrin were observed in Perna, all the other parameters reached their maximum in Pritluky, minimum values were observed in Novy Prerov (Table VII).

In general we can state the higher content in flavonols of Savilon variety compared to literature data.

In comparison with Savilon variety flavonol content in Riesling berries was 10 times lower.

Chemical analysis of wine

Selected parameters of wine chemical analysis are listed in tables VIII and IX. When comparing the data of chemical analysis of Savilon wines and reference variety Riesling for two years (2009/2010) one can observe low alcohol content, high acidity and low pH, high reduced extract in reference wine sample, one could also state the initiation of malolactic fermentation.

Table VI. The content of certain stilbenes in Savilon berries, 2009

Vineyard site	**Trans-resveratrol [mg.l^{-1}]**	**Trans-piceid, [mg.l^{-1}] of resveratrol**	**Cis-resve-ratrol [mg.l^{-1}]**	**Cis-piceid, [mg.l^{-1}] of resveratrol**	**Trans-piceatannol, [mg.l^{-1}]**	**Astringin, [mg.l^{-1}] of resveratrol**
Klentnice	0,776	0,423	0,018	1,901	0,263	0,330
Perna	1,884	1,358	0,006	3,291	0,578	0,858
Novy Prerov	0,365	0,196	0,039	0,799	0,283	0,166
Pritluky	1,503	0,919	0,208	2,368	0,469	0,376
Riesling (Perna)	0,281	0,152	0,032	0,381	0,150	0,075

Table VII. The content of certain flavonols in Savilon berries, 2009

Vineyard site	Rutin [mg.l^{-1}]	Quercetin-3- ß -D-glycoside [mg.l^{-1}]	Quercetrin [mg.l^{-1}]	Myricetin [mg.l-1]	Quercetin [mg.l-1]	Kampferol [mg.l-1]	Isorhamnetol [mg.l-1]
Klentnice	26,693	60,528	3,593	0,021	0,477	0,052	0,042
Perna	40,211	127,614	6,616	0,014	2,664	0,316	0,359
Novy Prerov	10,103	17,295	0,61	0,016	0,792	0,041	0,097
Pritluky	44,126	113,452	6,606	0,031	7,64	0,82	0,885
Riesling (Perna)	12,632	12,42	1,127	0,008	0,466	0,049	0,029

The spectrophotometric analysis of wine

Table X shows the data of spectrophotometric analysis of wine in 2009. The maximum values of total polyphenols (325,2 mg/l), total flavanols (21,2 mg/l) and antiradical activity (47,4 mg/l) were observed in Perna, the maximum value of reducing power (82,3 mg/l) was observed in Novy Prerov. There was no correlation between the indexes of wine and berries.

The indexes of Riesling variety were higher than those of Savilon, with the exception of flavanols.

Table VIII. Chemical analysis of wine, 2009

Vineyard site	Alco-hol, [% vol.]	Reduced sugars, [g.l^{-1}]	pH	Total acidity, [g.l^{-1}]	Volatile acidity, [g.l^{-1}]	Malic acid, [g.l^{-1}]	Lactic acid, [g.l^{-1}]	Citric acid, [g.l^{-1}]	Glycerol, [g.l^{-1}]	Reduced extract, [g.l^{-1}]
Klentnice	11,57	13,82	2,85	6,81	0,31	2,32	0,59	0,33	8,21	20,08
Perna	13,34	10,47	2,98	6,06	0,3	2,28	0,25	0,34	8,34	18,43
Novy Prerov	12,93	10,95	2,98	5,7	0,28	1,95	0,21	0,34	8,49	17,75
Pritluky	13,22	14,49	3,02	5,82	0,19	2,31	0,01	0,38	8,35	18,31
Riesling (Perna)	12,89	5,42	2,78	7	0,46	1,91	0,46	0,26	8,91	20,08

Table IX. Chemical analysis of wine, 2010

Vineyard site	Alco-hol, [% vol.]	Reduced sugars, [g.l^{-1}]	pH	Total acidity, [g.l^{-1}]	Volatile acidity, [g.l^{-1}]	Malic acid, [g.l^{-1}]	Lactic acid, [g.l^{-1}]	Citric acid, [g.l^{-1}]	Glycerol, [g.l^{-1}]	Reduced extract, [g.l^{-1}]
Klentnice	12,92	1,76	2,46	9,62	0,32	4,32	0,18	0,22	8,31	19,34
Perna	12,17	3,18	2,39	10,27	0,33	4,7	0,08	0,27	8,46	20,02
Novy Prerov	11,75	3,49	2,43	9,21	0,31	4,28	0,12	0,27	8,55	18,91
Pritluky	11,75	2,88	2,52	9,79	0,49	4,78	0,27	0,24	8,77	20,82
Riesling (Perna)	9,64	2,67	2,16	12,47	0,55	5,31	0,3	0,22	8,03	23,93

Table X. The spectrophotometric analysis of wine, 2009

Vineyard site	Total polyphenols, [mg.l^{-1}] gallic acid	Total flavanols, [mg.l^{-1}] gallic acid	Antiradical activity, [mg.l^{-1}] gallic acid	Reducing power, [mg.l^{-1}] gallic acid
Klentnice	307,7	17,3	39,4	42,1
Perna	325,2	21,2	47,4	51,8
Novy Prerov	272,8	12,7	32,2	82,3
Pritluky	306,3	15,6	34,4	40,7
Riesling (Perna)	315,8	6,7	46,9	110,3

Table XI shows the data of spectrophotometric analysis of wine in 2010. The maximum values of total polyphenols (220,jc9 mg/l, 32% lower than in 2009), total flavanols (20,7 mg/l) and antiradical activity (41,3 mg/l) were observed in Perna, the maximum value of reducing power (51,7 mg/l 37% lower than in 2009) was observed in Klentnice. There was no correlation between the indexes of wine and berries.

The indexes of Riesling variety were far lower than those of Savilon.

Table XI. The spectrophotometric analysis of wine, 2010

Vineyard site	Total polyphenols, [mg.l^{-1}] gallic acid	Total flavanols, [mg.l^{-1}] gallic acid	Antiradical activity, [mg.l^{-1}] gallic acid	Reducing power, [mg.l^{-1}] gallic acid
Klentnice	209,1	19,0	34,3	51,7
Perna	220,9	20,7	41,3	20,2
Novy Prerov	219,8	20,6	38,8	21,0
Pritluky	180,3	18,6	38,7	49,5
Riesling (Perna)	180,6	2,9	22,3	37,0

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Sensory analysis of wine

Sensory analysis was carried out by 5 experienced judges. Our results show that the best sample in 2009 was from Novy Prerov, as it was balanced and similar to Sauvignon blanc, then sample from Pritluky followed. One should keep in mind that wines produced from Savilon variety have very expressive aroma similar to Sauvignon blanc aromas both of thiol origin (grapefruit, passion fruit, boxwood) and methoxypyrazines (green pepper, gooseberry). Reference variety Riesling had more expressive notes of autolysis and rather spicy aftertaste with excessive acidity.

In 2010 in aromas of all samples dominated methoxypyrazines. Though the most balanced and interesting samples were from Perna and Pritluky. The samples from Klentnice and Novy Prerov had excessive acidity. The reference sample was rated lower than studied Savilon samples.

Summary

Our results confirm the hypothesis that vineyard site can influence the parameters of grape berries and wine, including the polyphenolic content and sensory evaluation.

The study of four vineyard sites shows significant differences. The site Klentnice can be characterized as vineyard with more stressful conditions, here the grapes has lower yields, lower sugar content, higher acidity; the wines are more fresh and zesty, extractive, with strong forest notes due to the presence of methoxypyrazines. The wines from Pritluky and Novy Prerov are quite similar to those produced from Sauvignon blanc due to different thiols, causing the aromas of tropical fruits, citrus, boxwood and broom. As to the content of certain phenolics in grape berries Savilon from Pritluky is particularly noticeable. The wines from Perna are more open, the aromas are rich and mature. The content of polyphenolics in grape berries seemed to be influenced by the climatic conditions of the year.

A number of studied Savilon parameters (especially the stilbene and flavonol content and sensory characteristics of wine) are superior to those of reference variety Riesling. However Riesling berries have higher content of catechin and cinnamic acids. In general Savilon variety is more resistant to different pathogens (downy mildew, grey rot); the wine character is similar to Sauvignon blanc.

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