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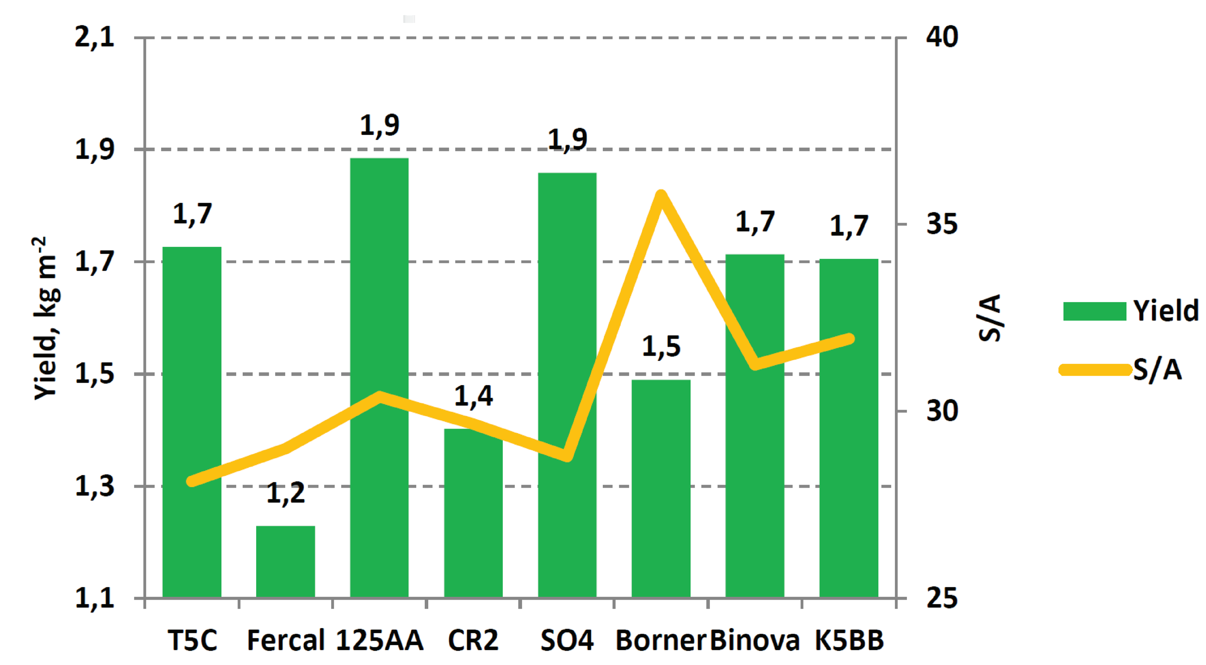
EFFECT OF ROOTSTOCK ON BERRY AND WINE COMPOSITION OF NEW WHITE GRAPEVINE CULTIVAR SAVILON

Nowadays the interaction between scion and rootstock with regard to grape composition, in particular phenolic compounds, is unclear. The study and introduction of new rootstocks of different origin is necessary for quality grape and wine production. In this study the effect of eight rootstocks on berry and wine composition of new white resistant grapevine cultivar Savilon was evaluated over three vintages. The studied cultivar/rootstock combinations were grown on the same vineyard in South Moravia, Czech Republic. The rootstocks belonging to three different groups of origin were studied: 1) *V.berlandieri x V.riparia* (SO4, Binova, Teleki 5C, Kober 125AA, Kober 5BB, Craciunel 2); 2) *V.riparia x V.cinerea* (Börner); 3) *V.vinifera x V.berlandieri* (Fercal). Rootstock SO4 was chosen as control rootstock cultivar as it is the most widespread rootstock in Czech Republic. Agrobiological indexes, berry composion (HPLC analysis of 17 phenolic compounds comprising phenolic acids, stilbenes, flavonols, flavanols, spectrophotometric analysis of polyphenolic compounds), wine composition (spectrophotometric analysis of polyphenolic compounds and standard chemical wine analysis) and wine sensory analysis were performed over three vintages. The results of our study indicate that rootstocks influence significantly most of studied phenolic compounds, though it was also shown that the influence of the year is more prominent than the influence of studied factor (rootstock). The groups of rootstocks showing similarities in phenolic profiles were determined by means of hierarchical cluster analysis. The main sources of metabolic variations of different rootstock genotypes were identified by PCA.

Figure 1. Average yield (kg m^{-2}) and S/A ratio (^{0}NM / g l^{-1} in tartaric acid)



Aim

The objective of the study was to select the most suitable rootstocks for the Savilon cultivar in given conditions based on the grape berry and wine analysis as well as on the analysis of profile of phenolic compounds.

Figure 2. Average values of Total phenols (TP), Total flavanols (TF) and Antiradical activity (AA) in berries, g kg^{-1} GAE

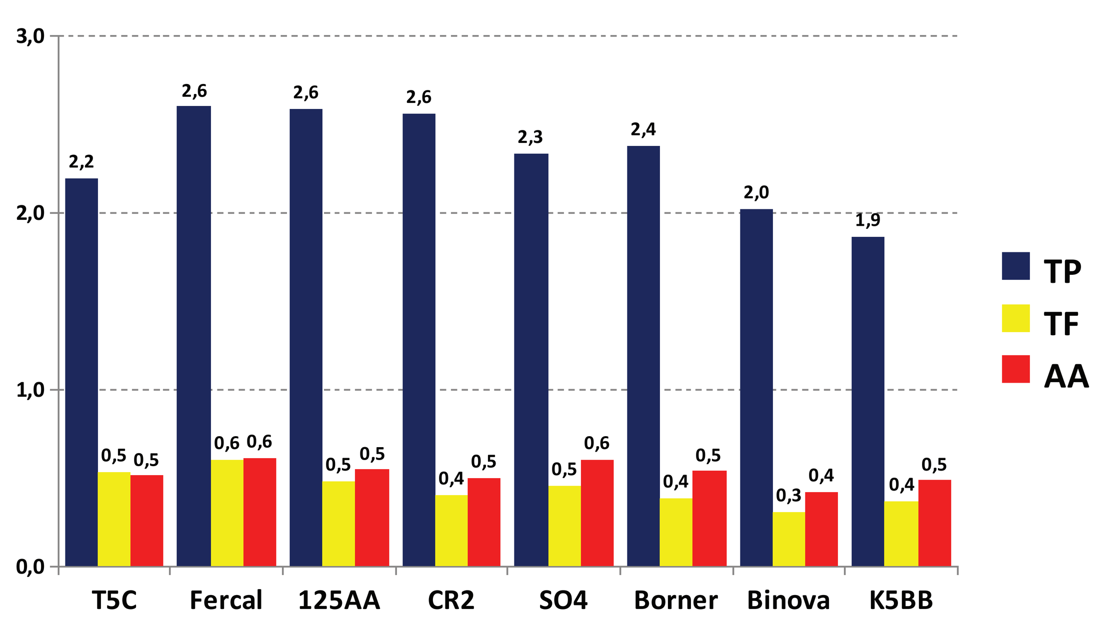


Figure 3. Influence of year and rootstock on content of caftaric acid and catechin in berries, mg kg^{-1}

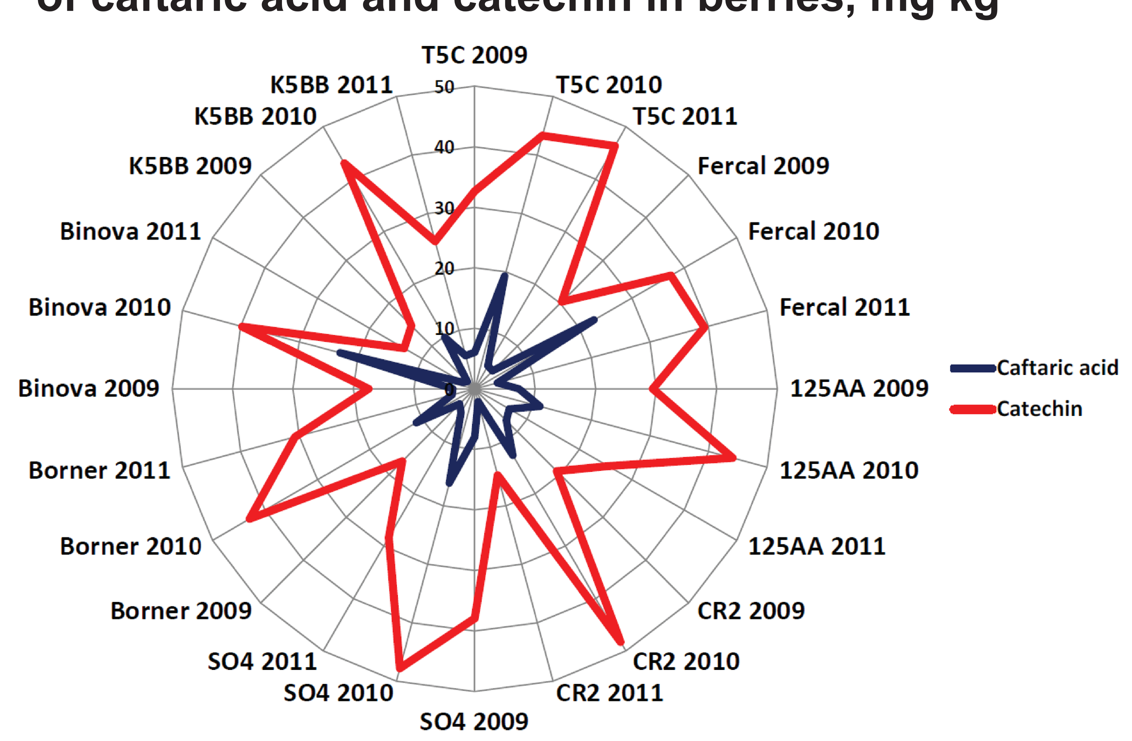
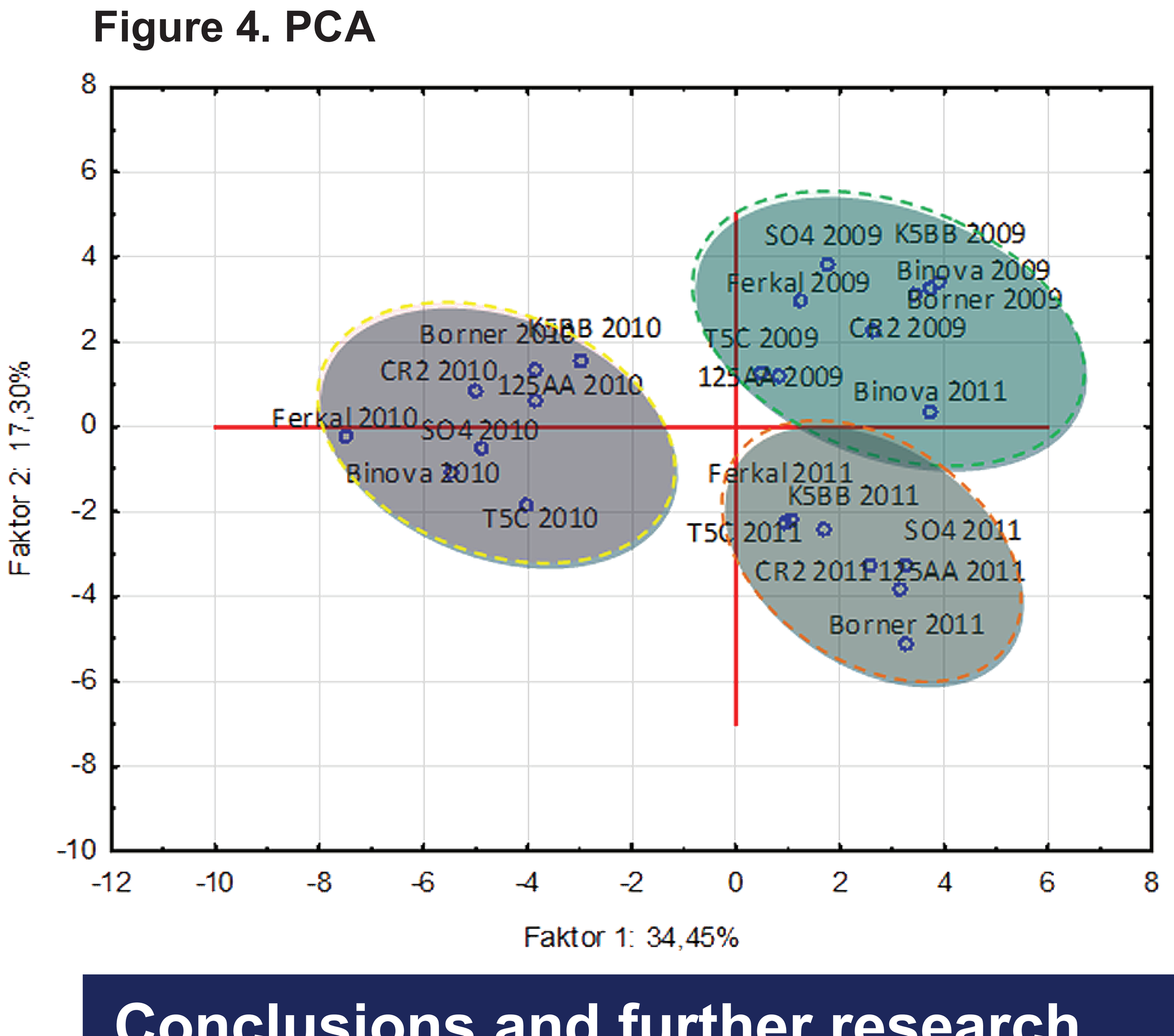


Figure 4. PCA



Cultivar Savilon

Cultivar Savilon is a new white wine cultivar with high resistance level to downy and powdery mildew and grey rot, therefore it is highly suitable for organic viticulture. The wine is of high quality, with distinct "Sauvignon blanc-like" aromas. The genealogical analysis showed that the heritage basis of Savilon cultivar included 20% of of six American species (*Vitis rupestris, Vitis lincecumi, Vitis aestivalis, Vitis cinerea, Vitis berlandieri, Vitis labrusca)* and 80% of *Vitis vinifera.* Malvasia rose and Merlot contributed 25% each, further 30% of the heritage basis was contributed by other *V.vinifera* cultivars.

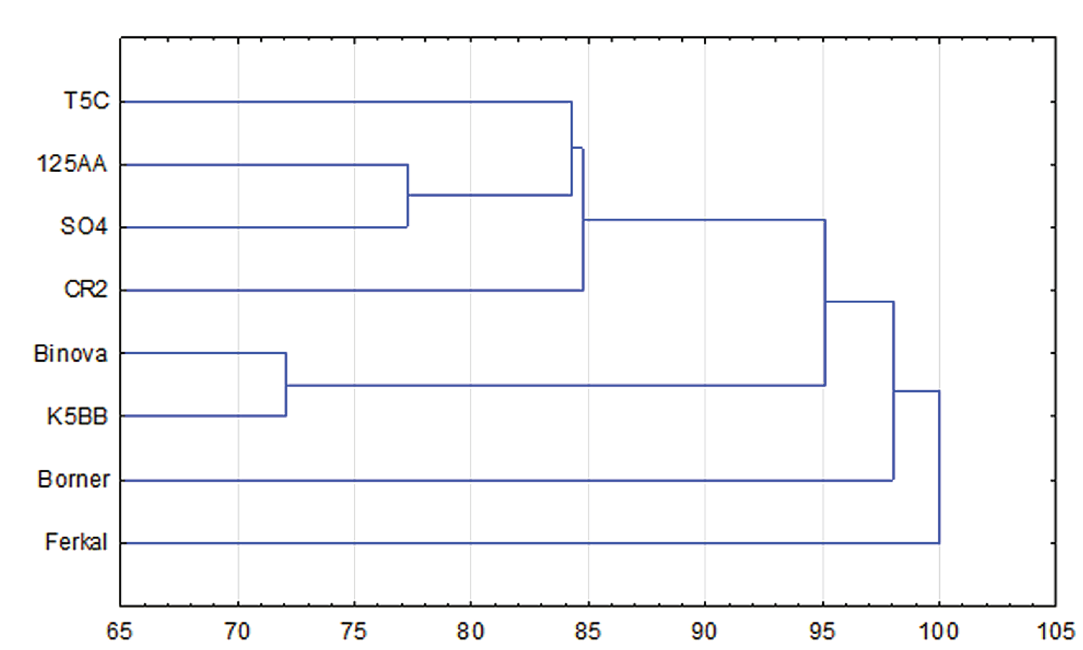
Results

- ***SO4*** had higher cluster weight and yield, along with lower TA (total acidity) and malic acid content in wine, higher values of selected spectrophotometric indexes. The wines had higher sensory evaluations due to distinct "sauvignon-like" aromas.
- ***Fercal*** had lower cluster weight along with higher TA, TP, TF of grape juice and higher TA, malic acid and non-reducing extract content in wines. It also had lower TP of wines and quercetrin content in berries. Fercal had wines with negative characteristics as high acidity, short, herbaceous aromas.
- ***T5C*** had lower cluster weight along with higher TA, TF of grape juice, higher content of malic acid in wine and higher content of piceid isomers, *trans*-astringin and quercetin-3-ß-D-glucoside in berries.
- ***Binova*** had higher TF along with lower AA of grape juice. The content of flavanols in berries, non-reducing extract and TF in wine, as well as malic acid content was low. This rootstock tends to delay maturity due to higher vigor, and had lower content of individual phenolics and lower values of selected spectrophotometric indexes.
- ***Börner*** had lower TA of grape juice.
- 125AA had higher TP and AA of grape juice, as well as higher content some individual phenolics in grape berries.
- ***CR2*** had higher values of selected spectrophotometric indexes. The wines had higher sensory evaluations due to distinct "sauvignon-like" aromas.
- K5BB had lower TP of grape juice, higher content of non-reducing extract in wine. This rootstock tends to delay maturity due to higher vigor, and had lower content of individual phenolics and lower values of selected spectrophotometric indexes.

PCA

The whole dataset covering all rootstocks was subjected to PCA to verify correlations between different biological replicates and to identify the main sources of metabolic variations for different rootstock genotypes tested. The first two principal components (PC) explained 51.8 % of overall variation. The first principal component is strongly correlated with caftaric acid (-0.905), rutin (0.735), catechin (-0.739), TA of must (-0.956), TA of wine (-0.924) and malic acid (-0.962), and explains 34.5% of the total variance, while *trans*-piceid (-0.843), *cis*-piceid (-0.767), quercetin-3-ß-D-glucoside (-0.676), quercetin (0.643), TF wine (-0,826) and non-reducing extract (-0.628) contribute more to the second principal component, which explains 17.3% of the total variance. In Fig. 4 rootstock*year combinations are plotted on the plane defined by the two principal components. From the figure combinations of the "good years" (2009 and 2011) appear on the right side of the plane, grouped by the year of harvest, while the combinations of the "bad" year (2010) are plotted on the left side of the plane. This year had lower temperature and higher precipitation rate during the veraison and harvest. The second principal component mainly differentiates between two good harvests (2009 and 2011). 2011 had higher temperature along with lower precipitation rates and higher number of sunny days during the veraison and harvest when compared to the other two years.

Figure 5. Cluster analysis



Cluster analysis

The application of cluster analysis to the 38 parameters analyzed in three years for 8 rootstocks produces the dendrogram obtained with STATISTICA program (Fig. 5). This analysis was used to classify the individual rootstocks into groups showing similar properties; the contents of studied parameters were used as variables. The dendrogram shows the classification of rootstocks on 4 main groups which is more or less based on the origin of the rootstocks. In *V.berlandieri x V.riparia* rootstocks two clusters appeared: 1) K5BB and Binova and 2) T5C, 125AA, SO4, CR2. The main sources of variations are: catechin content, flavonols, total acidity, pH and non-reducing extract.

Conclusions and further research

- The most suitable rootstocks for Savilon cultivar in given conditions were SO4 and CR2,
- Rootstocks Fercal, Binova and K5BB seem to be less suitable for Savilon variety,
- The effect of the year is more prominent than the influence of the studied factor,
- Strong positive correlation was observed in between the indexes of AA of must and catechin, caftaric acid content in berries,
- Further research is needed in order to understand the scion-rootstock interaction and its influence on phenolic content in berries and other parts of vine plant along with its possible effect on the incidence of main fungal and bacterial diseases and positive effect on final products (wine, juices, concentrates) and human health.