"The ADER Project:" Research on the Identification and Definition of Typical Elements of Romanian Wines. Valorization of the Sanogenic Potential of Wines by Increasing the Phenolic Content

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**Project Objective:** To develop new products, practices, processes and technologies integrated into horticultural production by improving the range of food products and their safety in accordance to national and international requirements by improving the sanogenic potential of wines with a high phenolic content on human health.
PHASE 1. Documentation Regarding the Identification of Typical Elements of Romanian Wines in Relation with the Viticultural Terroir

**OBTAINED RESULTS:**

- **Activity 1.1.** Database on elements defining the viticultural terroir: soil, microclimate, varieties recommended in different Romanian vineyards: Murfatlar, Dealu Mare, Târnave, Dealu Bujorului and Copou-Iasi

- **Activity 1.2.** The grape ripening process database regarding ecoclimatic conditions of the 5 studied vineyards

- **Activity 1.3.** Database on the qualitative and technological potential of the most representative varieties authorized to obtain DOC quality red wines (9 grape varieties for red wine as follows in the table below)

<table>
<thead>
<tr>
<th>Viticultural Region</th>
<th>Vineyard</th>
<th>Noble Vine Varieties Under Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colinele Dobrogei</td>
<td>Murfatlar</td>
<td>Cabernet Sauvignon, Fetească neagră, Merlot, Pinot noir, Mamaia</td>
</tr>
<tr>
<td>Dealurile Munteniei și Olteniei</td>
<td>Dealu Mare</td>
<td>Cabernet Sauvignon, Fetească neagră, Merlot, Pinot noir</td>
</tr>
<tr>
<td>Dealurile Moldovei</td>
<td>Dealul Bujorului</td>
<td>Băbească neagră, Burgund mare, Cabernet Sauvignon, Fetească neagră, Merlot</td>
</tr>
<tr>
<td></td>
<td>Iașilor</td>
<td>Arcas, Cabernet Sauvignon, Busuioacă de Bohotin</td>
</tr>
<tr>
<td>Podișul Transilvaniei</td>
<td>Târnave</td>
<td>Cabernet Sauvignon, Fetească neagră, Pinot noir</td>
</tr>
</tbody>
</table>

OBTAINED RESULTS:

- **Activity 2.1.** 10 demonstrative plots for analyzing and experimenting the increasing of phenolic potential of red wine grapes CO: SCDVV Murfatlar (organic Feteasca Neagra and organic Cabernet Sauvignon), P1: ICDVV Valea Calugareasca (Feteasca Neagra and Cabernet Sauvignon), P2: SCDVV Blaj Cabernet Sauvignon), P3: SCDVV Bujoru (Feteasca Neagra and organic Merlot), P4: SCDVV Iasi (Cabernet Sauvignon, Arcas)

- **Activity 2.2.** Among the practices that can affect the phenolic composition during grape ripening phenophases, three types of fruit load were experimented for each studied variety:
  - Blank= 28 buds/vine
  - T1= 20 buds/vine
  - T2=36 buds/vine

- **Activity 2.3.** Database on the phenological spectrum of studied varieties under the influence of wine-making practices applied in the wine-growing areas under study.
PHASE 3. Elaboration and Testing of Technological Links Applied in a Conventional and / or Organic System in Order to Improve the Extraction of Phenolic Compounds in Wines

OBTAINED RESULTS :

• **Activity 3.1.**: The phenology spectrum database of studied varieties under the influence of applied viticultural practices

• **Activity 3.2.**: Database regarding phenolic maturity and superior limit of phenolic content for experimental variants: varieties / fruit load (M = 28 buds, T1 = 20 buds, T2 = 36 buds) / vineyard

• **Activity 3.3.**: In order to elaborate the database on the optimization of phenolic compounds extraction according to anthocyanins extractability from skin and seeds, two technological variants of fermentation and maceration were tested on the marc:
  - maceration-fermentation on the marc for 8 days;
  - maceration-fermentation on the marc for 16 days

• **Activity 3.4.**: The database on the evolution of phenolic compounds (anthocyanins, total polyphenols) during fermentation process on marc (8 or 16 days respectively) and determination of the phenolic optimum for obtaining high quality red wines.

OBTAINED RESULTS :

• **Activity 4.1.**: Database regarding the influence of fruit load (M = 28 buds, T1 = 20 buds, T2 = 36 buds) on the phenolic composition of grapes on the two varieties under 2016 conditions.

• **Activity 4.2.**: Physico-chemical and sensorial quality database of wines obtained in a conventional and / or ecological system on experimental variants.

• **Activity 4.3.**: Database for phenolic profiles (phenolic acids, flavonols, flavanols, stilbens, acylated and cumaric monoglucosides) of wines obtained from the experimental variants.

• **Activity 4.4.**: The database on antioxidant capacity of wines in relation to their phenolic constituents.
PHASE 5. Further Testing of Conventional Technology and / or Environmental Technology for Improved Phenolic Compounds Extraction in Wine

OBTAINED RESULTS :

• **Activity 5.1.**: Setting a database on phenolic maturity and phenolic superior limit on experimental variants

• **Activity 5.2.**: Database for the best practices on vine-management that improve phenolic quality of grapes, raw material for winemaking

• **Activity 5.3.**: Database on the qualitative and technological potential of grapes on experimental variants

• **Activity 5.4.**: The database on evolution of phenolic compounds (anthocyanins, total polyphenols) during the fermentation process on marc (8 or 16 days respectively) and establishing of the phenolic optimum for obtaining high quality red wines.
PHASE 6. Verifying the Effectiveness of Innovative Technologies Applied in Conventional and / or Organic Experimental Plots to Improve the Phenolic Quality of Wines

OBTAINED RESULTS:

• **Activity 6.1.** The database obtained by statistical calculation of the most efficient technologies that improve the phenolic compounds extraction in wine. Factors analyzed: variety, fruit load, fermentation-maceration period on marc.

<table>
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<th>Antocyanins (520 nm)</th>
<th>Total polyphenolic content</th>
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• **Activity 6.2.** Physico-chemical and sensory quality database of wines obtained in a conventional and / or organic system

• **Activity 6.3.** Database of phenolic profiles (phenolic acids, flavonols, flavanols, stilbens, acylated and cumaric monoglucosides) for wines obtained as a result of experimental variants
Phase 7. Demonstration of applied technologies efficiency in a conventional and organic system in order to improve the phenolic quality of Romanian grapes and wines

OBTAINED RESULTS:

• **Activity 7.1.** Database on the qualitative and technological potential of varieties by experimental variants.

• **Activity 7.2:** Database of the obtained wines by quality. Statistical analysis.

• **Activity 7.3:** Demonstrative visits, comparative tasting of organic and / or conventional wines with high sanogenic value.
In order to increase the phenolic potential of grapes for red wines we recommend to lower fruit load.

The phenolic composition of wines was significantly improved by increasing the period of maceration of marc based fermentation.

In the obtained wines were identified significant amounts of gallic, siringic, p-hydroxybenzoic, ferulic acids, flavanols (catechin and epicatechin) for the extended 16-day fermentation maceration on the marc, in comparison to the 8-day macerated wines that were richer in chlorogenic acid, p-cumaric acid, caffeine, flavones (naringin, quercitin and miricetin but also resveratrol).

For the complexity of this study, the three-year development period (2015-2018) was inadequate given the many factors that influence the accumulation and extraction of phenolic compounds in grapes and red wines, so we propose to continue this project in order to deepen the study on the improvement of phenolic quality of red wines, taking into account the modern consumer preferences for wines rich in phenolic compounds with sanogenic effects.