

## **Application of Rapid Methods of Spectrophotometric Analysis (OD<sub>280</sub>) for Identification of Total Phenols from Grape Berries**

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**Abstract.** Polyphenols are the principal grape compounds associated with beneficial health effects. Analytical techniques for the quantification of phenolic compounds of grapes are mostly complicated, time consuming and costly. Method published by Somers and Evans in 1977 for determination of total polyphenols from grapes is rapid and inexpensive.

**Keywords:** total polyphenols, grapes, absorbance, Folin-Ciocalteu, OD<sub>280</sub>

**Introduction.** The relatively low concentrations of these compounds and their structural diversity are both hindering factors their analysis (Håkansson *et al.*, 2003). Absorbance measurements are simple techniques to measure the total anthocyanins of grape. There are several forms of absorbance indexes. The Office Internationale de la Vigne et du Vin (OIV) described a color index where a wine's color strength is the summation of the absorbencies measured at 420, 520 and 620 nm respectively (OIV, 1978). Somers and Evans (1977) published other measure for determination of total polyphenols in natural conditions: Total phenolics (Absorbance units) = Absorbance<sub>280nm</sub> (Absorbance measurement at 280 nm provides an estimate of the phenolic concentration of wine and grapes).

**Aims and objectives.** The Folin-Ciocalteu value is the most used method for estimation of the total phenols present in grapes and wine. Another method is OD<sub>280</sub> value. The advantages of measuring the absorbance at 280 nm rather than doing the Folin-Ciocalteu test include time saving and repeatability. There are however certain molecules, such as cinnamic acids and chalcones, which have no absorption maximum at this wavelength. This doesn't raise a problem because those molecules are present at very low concentrations and any error in the value will be very small and can be ignored.

**Materials and methods.** Six varieties of table grapes were analyzed: 'Timpuriu de Cluj', 'Napoca', 'Victoria', 'Chasselas doré', 'Someșan', 'Muscat de Hamburg', harvested from the didactic collection of the University of Agricultural Sciences from: Cluj-Napoca and Timișoara. Total phenols were measured spectrally as OD<sub>280nm</sub>; the results are expressed in mg/kg equivalent gallic acid.

**Results and Discussion.** Table 1 shows the results of total polyphenols concentration from skin, seed and rachis of table grape varieties, expressed in mg/kg equivalents gallic acid. The variety 'Napoca' (Cluj) in both phenophases (grapes veraison - 2781 and grapes maturity - 2739 mg / kg grape) has significantly higher values than the other variants. Regarding total polyphenol content of seeds, 'Muscat de Hamburg' from Cluj stands out. The polyphenols from rachis at variety 'Napoca' registered the highest values (3936 and

3845 mg / kg), significantly higher than the other variants. The data are in concordance with those obtained by other authors for ‘Muscat de Hamburg’ (Orak, 2007), confirming that in areas with cold climates polyphenols are found in greater quantities in grapes (Jensen et al., 2008).

Tab. 1

Total polyphenol concentration from skins and seeds of table grapes

| Varieties           | Area      | Phenophase | Total phenolics skins (mg/kg) | Total phenolics seeds (mg/kg) | Total phenolics rachis (mg/kg) |
|---------------------|-----------|------------|-------------------------------|-------------------------------|--------------------------------|
| ‘Timpuriu de Cluj’  | Cluj      | maturity   | 2087 ± 112 b                  | 1852 ± 379 bc                 | 1346 ± 114 hi                  |
|                     |           | veraison   | 1699 ± 80.9 c                 | 1914 ± 278 b                  | 1415 ± 56.5 ghi                |
| ‘Napoca’            | Cluj      | maturity   | 2739 ± 129 a                  | 1449 ± 155 cde                | 3875 ± 236 a                   |
|                     |           | veraison   | 2781 ± 190 a                  | 1681 ± 88.8 bcd               | 3936 ± 191 a                   |
| ‘Chasselas doré’    | Cluj      | maturity   | 1186 ± 61.1 def               | 1281 ± 204 de                 | 1450 ± 49.3 ghi                |
|                     |           | veraison   | 1378 ± 119 d                  | 1499 ± 256 bcde               | 1609 ± 173 g                   |
|                     | Timișoara | maturity   | 1057 ± 92.7 efg               | 1168 ± 112 ef                 | 1333 ± 206 i                   |
|                     |           | veraison   | 1304 ± 164 de                 | 1373 ± 102 de                 | 1500 ± 307 gh                  |
| ‘Victoria’          | Cluj      | maturity   | 1336 ± 117 d                  | 1454 ± 115 cde                | 2764 ± 219 cd                  |
|                     |           | veraison   | 1411 ± 172 d                  | 1627 ± 122 bcd                | 2621 ± 348 cde                 |
|                     | Timișoara | maturity   | 835 ± 139 g                   | 457 ± 44.8 h                  | 2014 ± 183 efg                 |
|                     |           | veraison   | 1014 ± 102 fg                 | 706 ± 210 gh                  | 1983 ± 165 fg                  |
| ‘Someșan’           | Cluj      | maturity   | 1071 ± 233 efg                | 776 ± 87.3 fgh                | 2975 ± 578 b                   |
|                     |           | veraison   | 1706 ± 232 c                  | 1047 ± 208 efg                | 2807 ± 287 bc                  |
| ‘Muscat de Hamburg’ | Cluj      | maturity   | 1827 ± 37.6 bc                | 2525 ± 406 a                  | 2630 ± 95.8 cd                 |
|                     |           | veraison   | 2044 ± 72.5 b                 | 2510 ± 540 a                  | 2907 ± 218 b                   |
|                     | Timișoara | maturity   | 1752 ± 195 c                  | 1308 ± 147 de                 | 2145 ± 331 ef                  |
|                     |           | veraison   | 1825 ± 225 bc                 | 1129 ± 204 efg                | 2346 ± 176 e                   |
| <i>p</i> value      |           |            | < 0.0001                      | < 0.0001                      | < 0.0001                       |

Average value ± standard deviation (n=3). Different letters are significantly different for  $P \leq 0.05$ . The difference between any two values, followed by at least one common letter, is insignificant.

**Conclusion.** Determination of total polyphenols by the method presented by Somers and Evans (1977) turns out to be more rapid and cheaper than Folin-Ciocalteu method.

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