Chemical characterization and antioxidant activity of new rose genotypes (*Rosa hybrida*)

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Introduction

Roses belong to the family Rosaceae, genus *Rosa*, which is made of about 200 species and 30000 cultivars. The most important products of roses are essential oil, rose water, rose concrete, and rose concentrate. Rose flowers are rich in phenolics, flavonoids, anthocyanins, and carotenoids. These compounds can act as hydrogen donors and reducing agents which results in potent antioxidant activity [1].

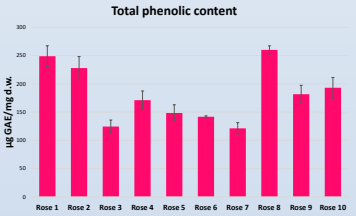
The aim of this study was to evaluate the potential use of new rose genotypes as a source of natural antioxidant compounds.

Materials and Methods

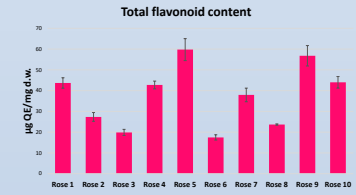
Flowers from 10 new rose genotypes designed in company Pheno Geno Roses D.O.O. (Ostojićevo, Serbia) were collected in September 2021. Flowers were macerated with 80% MeOH (2 cycles, 48h, RT), after which, extracts were evaporated to dryness (vacuum, 35°C). The dry resin was dissolved in DMSO to a concentration of 200 mg/mL.

Chemical composition was evaluated by determining total phenolic and flavonoid content, as well as by LC-MS-MS analysis of selected compounds. Antioxidant activity was evaluated by DPPH· and FRAP assays [2].

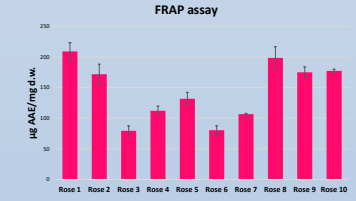
Results



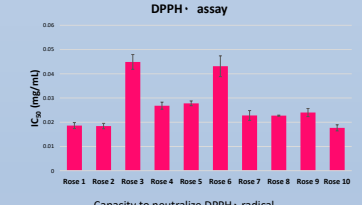
Total phenolic content expressed as μg gallic acid equivalents/mg d.w.



Total flavonoid content expressed as μg quercetin equivalents/mg d.w.



Total reducing power (FRAP)expressed as μg ascorbic acid equivalents/mg d.w.



Capacity to neutralize DPPH· radical

Table 1. Results of quantitative analysis of selected compounds by LC-MS-MS (mg/g d.w.)

Compound	Rose 1	Rose 2	Rose 3	Rose 4	Rose 5	Rose 6	Rose 7	Rose 8	Rose 9	Rose 10
Protocatechuic acid	0.044	0.012	0.002	0.001	0.061	0.008	0.001	0.052	0.015	0.013
p- Coumaric acid	0.0002	0.0040	0.0012	0.0061	0.0029	0.0004	0.0003	0.0001	0.0001	0.0002
Gallic acid	0.023	0.042	0.033	0.018	0.029	0.036	0.018	0.022	0.030	0.036
Quinic acid	**168.4**	**148.0**	**131.6**	**163.7**	**133.8**	**93.86**	**142.8**	**239.3**	**149.6**	**215.4**
5-O-Caffeoylquinic acid	0.001	0.001	0.008	0.001	0.001	0.006	0.012	0.001	0.003	0.006
Kaempferol	0.002	0.004	0.043	0.022	0.010	0.021	0.018	0.002	0.006	0.006
Catechin	0.019	0.023	0.219	0.053	0.144	0.072	0.105	0.133	0.031	0.026
Quercetin	0.031	0.024	0.014	0.012	0.059	0.012	0.006	0.053	0.015	0.017
Kaempferol-3-O-Glc	**23.48**	**57.60**	**386.6**	**406.6**	**239.6**	**306.9**	**244.7**	**11.47**	**114.5**	**142.7**
Quercitrin	**139.4**	**76.63**	**10.07**	**26.97**	**106.5**	**22.94**	**5.384**	**29.78**	**93.38**	**85.64**
Quercetin-3-O-Glc + Quercetin-3-O-Gal	**82.67**	**109.9**	**46.30**	**42.31**	**199.5**	**52.84**	**16.24**	**39.81**	**119.7**	**147.1**
Rutin	**22.35**	**15.06**	**5.979**	**2.509**	**21.93**	**6.165**	**9.541**	**7.031**	**21.88**	**26.63**

Conclusion

- Based on total phenolic content these new rose genotypes are a good source of phenolics
- Highest content of total phenolics is determined in roses 1, 2, and 8, while the highest content of total flavonoids was detected in roses 5 and 9
- LC-MS-MS results show that the major components of rose extracts are quinic acid, kaempferol-3-O-glucoside, quercitrin, quercetin-3-O-galactoside and glucoside, and rutin
- Based on FRAP assay highest antioxidant potential showed roses 1 and 8, followed by roses 9, 10 and 2
- Based on the ability to neutralize DPPH· radical lowest antioxidant potential was determined in roses 3 and 6 while other roses showed similar activity
- New rose genotypes are a good source of phenolic compounds and have good antioxidant activity

References

1. Alizadeh, Z. et al., Scientia Horticulturae, 2021, 288, 110341.
2. Lesjak M. et al., Journal of Functional Foods, 2014, 7, 257-268.

Acknowledgments

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