

Screening for dietary phenolics and antioxidant capacity of faba bean (*Vicia faba*) and vetches (*Vicia* spp.)

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Abstract: The phenolics in faba bean and vetches may act as antioxidants, thereby reducing the risk of atherosclerosis and coronary heart disease, which can be caused by oxidation of low-density lipoproteins. The results of our study showed that the examined *Vicia* species differed greatly in their phenolics levels, as well as that the phenolics content should be considered as an important feature of *Vicia* species since some of its nutritive and pharmacological effects.

Key words: bioactive compounds, faba bean, phenolics, vetches

Faba bean (*Vicia faba* L.) and vetches (*Vicia* spp.) belong to the family Fabaceae and represent indigenous species and traditional food in some parts of the Balkans. Although primarily grown for their protein and vitamin content and diuretic and lithontriptic properties, they also may be considered a potential biological source of dietary phenolics. The phenolics in faba bean and vetches may act as antioxidants, thereby reducing the risk of atherosclerosis and coronary heart disease, which can be caused by oxidation of low-density lipoproteins (2, 3). For the reasons of alimentary and pharmaceutical purposes, the aim of this study was to select the *Vicia* populations with higher phenolics content and increased antioxidant activity.

The 70% aqueous acetone extracts of ten *Vicia* species, grown as autochthonous populations in different regions of Serbia, were used for determination of total polyphenols, tannins and proanthocyanidins amounts (1). Amounts of total flavonoids were estimated from MeOH : H₂O : CH₃COOH extracts (140 : 50 : 10) (4). Antioxidant activity was evaluated by DPPH-radical scavenging activity assay (5). Correlation between phenolic classes contents and antioxidant activity was established by regression analysis.

The results showed that the examined *Vicia* species differed greatly in their phenolics levels. The content of total polyphenols ranged from 160.2 mg catechin 100 g⁻¹ to 608.7 mg catechin 100 g⁻¹, while tannins varied between 26.2 mg catechin 100 g⁻¹ and 297.9 mg catechin 100 g⁻¹ of dry matter (DM). Flavonoids levels were much lower, up to 0.15 mg rutine 100 g⁻¹ DM, while the content of proanthocyanidins ranged from 5.5 mg leucoanthocyanidin 100 g⁻¹ DM to 92.4 mg leucoanthocyanidin 100 g⁻¹ DM. The DPPH values varied widely between 21.1% and 89.6% of neutralized radicals, which mainly correlated with total polyphenols and tannins contents, with *r* ranging from 0.74 to 1.00 (Fig. 1 and Fig. 2).

The results obtained suggest that the phenolics content should be considered as an important feature of *Vicia* species, as some of its nutritive and pharmacological effects could be attributed to their presence.

References

- (1) Hagerman A, Harvey-Mueller I, Makkar HPS (2000) Quantification of Tannins in Tree Foliage – A Laboratory Manual. FAO/IAEA, Vienna
- (2) Malenčić Đ, Popović M, Miladinović J (2007) Phenolic content and antioxidant properties of soybean (*Glycine max* (L.) Merr.) seeds. Mol 12:576-581
- (3) Malenčić Đ, Cvejić J, Miladinović J (2012) Polyphenols content and antioxidant properties of colored soybean seeds from central Europe. J Med Food 15:89-95
- (4) Marckam KR (1989) Methods in Plant Biochemistry. Academic Press, London
- (5) Washida K, Abe N, Sugiyama Y, Hirota A (2007) Novel DPPH radical scavengers, demethylbisorbibutenolide and trichopyrone, from a fungus. Biosci Biotechnol Biochem 71:1052-1057

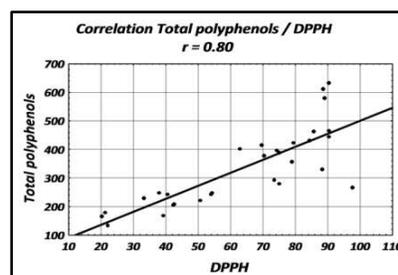


Figure 1. Correlation between DPPH and total polyphenols in *Vicia* species

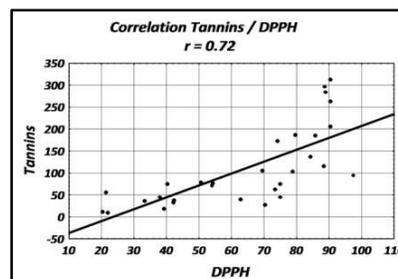


Figure 2. Correlation between DPPH and total tannins in *Vicia* species

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