and onion to help with several different types of aliments, high cholesterol, high blood pressure, excess blood clotting and coagulation, atherosclerosis, inflammation, bacterial and fungal infections. Garlic is also functional food product composed of numerous macronutrients, vitamins, organosulfur active compounds.

The aim of our study was to investigate different cultivated (*Allium nutans* L., *A. fistulosum* L., *A. vineale* L., *A. pskemense* B. Fedtsch, *A. cepa* L. and *A. sativum* L.) and wild (*A. flavum* L., *A. sphaerocephalum* L., *A. atroviolaceum* Boiss, *A. schoenoprasum* L., *A. vineale* L., *A. ursinum* L., *A. scorodoprasum* L., *A. roseum* L. and *A. subhirsutum* L.), *Allium* species, in order to evaluate their antioxidant properties.

All the antioxidant enzyme activities were determined spectrophotometrically at 25°C using phosphate buffer (pH 7) plant extracts. The amount of reduced glutathione (GSH) was determined with Ellman reagent, lipid peroxidation (LP) was determined by the thiobarbituric acid (TBA) method. Hydroxyl radical (·OH) was determined by the inhibition of deoxyribose degradation, total flavonoids were estimated according to Marckam and soluble protein content was determined by the method of Bradford. Radical scavenging capacity was determined using 1, 1-diphenyl-2-pycril-hydrasil radical (DPPH) and ESR. Reduction of DPPH radical was determined measuring disappearance of DPPH. Total antioxidant capacity was estimated according to the FRAP. Lipofuscin pigments (LFS), were determined fluorimetricaly.

Our results are one more confirmation that antioxidant and scavenger activities influence the pharmacological activity of garlic and other *Alliums*. In leaves of *Allium fistulosum* L., LFS accumulation was also not observed. As LFS is generated as a product of tissue decay, caused by toxic oxygen species it means it has a high antioxidant capacity. The scavenger activity of *Allium fistulosum* L. was also high; in its presence, generation of the ·OH radical (the most toxic oxygen species) was reduced by 87.09%. Other results concerning *Allium fistulosum* L. support this assessment because the activities of all antioxidant enzymes SOD, CAT, GPX, and GP were high, concentrations of $O_2^{\cdot-}$, ·OH and MDA were low, and the quantity of GSH, flavonoids, vitamin C and soluble proteins were high, as was the carotenoids content.

Presented results indicated that crude extract of *Alliums* from Vojvodina exhibited antioxidant and scavenger abilities in all investigated plant parts especially in leaves. Therefore overground part of *Alliums* could be used as the source of natural antioxidants in the pharmaceutical, cosmetic and food industries for manufacturing antoxic products with potent medicinal and antioxidant activity.

Comparison of antioxidant power in fruits of commercial apple cultivars and cultivar candidates grown in Hungary

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The apple (*Malus domestica* Borkh.) has a privileged role among fruits in the temperate zone. Its consumption is not limited to any particular season because several cultivars are available to cover supply during the whole year. Furthermore, it can be processed, *i.a.* it is an essential components of baby foods. Its valuable inner contents greatly contribute to the wide applicability of this fruit. Apple has remarkable contents of energy and raw fibre and it is also a rich source of vitamins and mineral elements. Apple is one of the most consumed fruits in Hungary, and hence its valuable compounds (vitamins, minerals, polyphenolic compounds) may significantly contribute to the health-promoting effects of human diet.

The aim of this study was to characterize the inner contents, antioxidant power, total phenolic content and mineral nutrient element contents of commercial apple cultivars in comparison with perspective cultivar candidates and estimate their contribution to the coverage of physiological requirements.

Among the main inner content parameters, total phenolic content and antioxidant capacity (FRAP) were measured spectrophotometrically. Mineral element contents in fruits were determined by ICP-OES. Different apple genotypes (well-known commercial cultivars and perspective cultivar candidates) grown under the same conditions were used for the analyses. Antioxidants were compared in different parts (skin and flesh) of the apple samples.

Our results indicate significant differences in all measured parameters among the assayed cultivars and cultivar candidates. Different antioxidant assays revealed 2- to 3-fold differences between the lowest and the highest values in commercial cultivars and cultivar candidates. The antioxidant power of fruits was much influenced by the skin/flesh ratio as smaller fruits

with higher skin/fruit flesh ratios had increased antioxidant capacity compared with larger fruits. It indicates that the antioxidant compounds predominantly accumulate in fruit skin. Considering that all samples were collected in orchards located in the same region, these differences are likely to be explained by the different genetic backgrounds of cultivars and cultivar candidates. Some cultivar candidates were characterized by higher antioxidant capacities and mineral element contents than the main commercial cultivars pointing to the possibility for increasing health-benefits of apple even under constant level of fruit consumption.

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Temporal changes of antioxidant parameters in *Acorus calamus* L.

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Sweet flag (*Acorus calamus* L., Araceae) is widely used medicinal plant as extracts or dried rhizome for several diseases, for external or internal use, as well. Numerous studies performed its antioxidant effects such as decrease of lipid peroxidation in noise-stressed rat brain after application of alcoholic extracts of Acorus. Since, sweet flag is under protection in Hungary and we have relatively little information about antioxidant properties of Hungarian population we decided to estimate some antioxidant parameters and temporal changes of these during vegetation period.

Plant material was collected twice in 2008 (June and October) and after washing with distilled water leaves (L), rhizome with (H) and without bark (HL) were used freshly (homogenate) or as alcoholic and watery extracts made of dried drugs. Parameters measured were FRAP (ferric reducing–antioxidant power), glutathione (GSH) level and free radical scavenging ability using DPPH. Statistical analysis was performed using STATISTICA 8.0 software (analysis of variance and correlation).

Our results showed that homogenate and alcoholic extract of leaves had significantly higher FRAP-values compared to those of watery extracts, in June. Antioxidant capacity in rhizome was usually lower than in leaves. In temporal aspect, a significant decrease (40%) of FRAP appeared in alcoholic samples of leaves, while there were no changes in rhizome. Glutathione (GSH) level was 4-6-fold higher in leaves than in both forms of rhizome and was in significantly positive correlation with FRAP. Fraction of residual DPPH radical (%) was the highest in rhizome with bark (H) which means that it had quite low reducing ability, nevertheless, free radical scavenging capacity of homogenates of leaves and rhizome with bark showed to be significantly higher in October compared to June. According to FRAP we can make a sequence qualifying the three types of samples: homogenate > alcoholic extract > watery extract.

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Table beet and red cabbage, as natural source of antioxidant compounds

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Free radicals derived from oxygen play an important part in the pathomechanism of different illnesses. Living organisms are supplies with an effective defence system against oxygen radicals. The first defence line is composed of antioxidant enzymes but different vitamins and low molecule compounds, such as phenols, thiols and flavonoids, are also effective against radicals. These compounds can be found in high quantities in vegetables. These compounds are mostly of polyphenol type and are able to bind free radicals and protect from the oxidation of biological molecules, membranes and tissues induced by active oxygen and free radicals. In evaluating bioactive content of vegetables an important role is provided to those compounds and are able to bind free radicals and protect from the oxidation of biological molecules, membranes and tissues induced by active oxygen and free radicals. Such are for example phenol type substances whose group includes pigment content as well. The colour materials of table beet and the red cabbage are suitable for natural pigment production and the same time they have favourable nutrition effect too.