ESSENTIAL OILS (incl. Flavour and Fragrance)

NPARR 2(3), 2011-0274, Application of lavandula officinalis L. antioxidant of essential oils in shelf life of confectionary

Chemically synthesized compounds such as butylated hydroxy-anisole (BHA) and butylated hydroxytoluene (BHT) are used as antioxidants in food products. The safety of some of these compounds have been a great concern. So, there is a great interest in finding antioxidants from natural sources for food. Lipids, known as Lavandula officinalis L. in this work, harvested in the north of Iran was distilled in a Clevenger apparatus to obtain essential oil, which was analyzed by gas chromatography (GC) and GC-mass spetrophotometry (MS). Antioxidant activity of essential oil was evaluated by peroxide value, iodine value and conjugated dienes. Also, the influence of this antioxidant on the shelf life of the confection's type was investigated. As a result, 1,8-cineole and borneol were the most used components in the chemical analysis of essential oils. Free fatty acid from the 1st to 9th week was increased significantly and as such, peroxide value increased directly with storage time. Variation of both synthetic and natural antioxidant in the aspect of iodine values was reduced slowly. However, conjugated dienes changes in oil sample containing essential oil and the BHA still remains the same [Mefatizade, H.* Moradkhani, H., Barjin, A.F., Naseri, B.(ACECR Medicinal Plants Center, Ilam, Iran), African Journal of Biotechnology, 2011, 10(2), 196-200].

NPARR 2(3), 2011-0275, Chemical composition, cytotoxicity effect and antimicrobial activity of Ceratonia siliqua essential oil with preservative effects against Listeria inoculated in minced beef meat

The present study describes the phytochemical profile and the protective effects of Ceratonia siliqua pods essential oil (CsEO), a food and medicinal plant widely distributed in Tunisia. Twenty five different components were identified in the CsEO. Among them, the major detected components were: Nonadecane, Heneicosane, Naphthalene, 1, 2-Benzenedicarboxylic acid dibutylester, Heptadecane, Hexadecanoic acid, Octadecanoic acid, 1,2-Benzenedicarboxylic acid, Phenyl ethyl tiglate, Eicosene, Farnesol 3, Camphor, Nerolidol and n-Eicosane. The antimicrobial activity of CsEO was evaluated against a panel of 13 bacteria and 8 fungal strains using agar diffusion and broth microdilution methods. Results have shown that CsEO exhibited moderate to strong antimicrobial activity against the tested species. In addition, the inhibitory effect of this CsEO was evaluated in vivo against a foodborne pathogens Listeria monocytogenes, experimentally inoculated in minced beef meat (2×10^2 CFU/g of meat) amended with different concentrations of the CsEO and stored at 7°C for 10days. The antibacterial activity of CsEO in minced beef meat was clearly evident and its presence led to a strong inhibitory effect against the pathogens at 7°C. On the other hand, the cytotoxic effects of the essential oil against two tumoral human cell lines HeLa and MCF-7 were examined by MTT assay. The CsEO showed an inhibition of both cell lines with significantly stronger activity against HeLa cells. The IC_{50} values were 210 and 800µg/ml for HeLa and MCF-7 cells, respectively. Overall, results presented here suggest that the EO of C. siliqua possesses antimicrobial and cytotoxic properties, and is therefore a potential source of active ingredients for food and pharmaceutical industry [Hsouna, A.B., Trigui, M., Mansour, R.B., Jarraya, R.M., Damak, M., Jaoua, S.* (Qatar University, College of Arts and Sciences, P.O. Box., 2713 Doha, Qatar), International Journal of Food Microbiology, 2011, 148(1), 66-72].

NPARR 2(3), 2011-0276, Essential oil composition and antibacterial activity of the grapefruit (Citrus paradisi Linn.) peel essential oils obtained by solvent-free microwave extraction: Comparison with hydrodistillation

The chemical composition of the essential oil (EO) obtained by solvent-free microwave extraction (SFME) and hydrodistillation (HD) from the peel of grapefruit (Citrus Paradisi. L) was analysed by gas chromatography/mass spectrometry (GC/MS). Totally, twenty-five components were identified in the EO. Limonene was observed as dominant (91.5-88.6%) for two extraction methods, SFME and HD, respectively. β-Pinene (0.8-1.2%), linalool (1.1-0.7%), α-terpinene (0.7-1.0%) and the other minor...
components were also detected. Disc diffusion method was applied to determine the antibacterial properties of the EO. The results showed that the EO of grapefruit peel had a wide spectrum of antimicrobial activities against Staphylococcus aureus, Enterococcus faecalis, Staphylococcus epidermidis, Escherichia coli, Salmonella typhimurium, Serratia marcescens and Proteus vulgaris, with their inhibition zones ranging from 11 to 53mm [Uysal, B., Sozmen, F., Aktas, O., Oksal, B.S. Kose, E.O. (Department of Chemistry, Akdeniz University, 07058 Antalya, Turkey) International Journal of Food Science and Technology, 2011, 46(7), 1455-1461].

**NPARR 2(3), 2011-0277, Antioxidant activity of Citrus limon essential oil in mouse hippocampus**

*Citrus limon* (L.) Burms (Rutaceae) has been shown in previous studies to have various biological functions (anti-inflammatory, antiallergic, antiviral, antimutagenic, and anticarcinogenic). However, traditional uses in folk medicine suggest that *C. limon* may have an effect on the central nervous system (CNS). Objective: This study investigated the effects of *C. limon* essential oil (EO) on lipid peroxidation level, nitrite content, glutathione reduced (GSH) concentration, and antioxidant enzymes [superoxide dismutase (SOD), catalase, and glutathione peroxidase (GPx)] activities in mice hippocampus. Materials and methods: Swiss mice were treated with the suspension of 0.5% Tween 80, in distilled water used as vehicle (i.p., control group) and with EO in three different doses (0.05, 0.1, or 0.15 g/kg, i.p., EO 50, EO 100, and EO 150 groups, respectively). After the treatments, all groups were observed for 24 h. The enzyme activities as well as the lipid peroxidation, nitrite, and GSH concentrations in mice hippocampus were measured using spectrophotometric methods and the results were compared with values obtained from control group. Results: EO of *C. limon* treatment significantly reduced the lipid peroxidation level and nitrite content but increased the GSH levels and the SOD, catalase, and GPx activities in mice hippocampus. Discussion and conclusion: Our findings strongly support the hypothesis that oxidative stress in hippocampus can occur during neurodegenerative diseases, proving that hippocampal damage induced by the oxidative process plays a crucial role in brain disorders, and also imply that a strong protective effect could be achieved using EO of *C. limon* as an antioxidant [Lopes Campêlo, L.M., Moura Gonçalves, F.C., Feitosa, C.M., De Freitas, R.M (Laboratory of Research in Experimental Neurochemistry, Federal University of Piaui, Teresina, Piaui, Brazil), Pharmaceutical Biology, 2011, 49(7), 709-715]

**NPARR 2(3), 2011-0278, The effects of laurel (Laurus nobilis L.) on development of two mycorrhizal fungi**

Hundreds of aromatic plant species are growing naturally around Mediterranean. Plant essential oils are incorporated in aromatic plant material and follow the litter fall. During litter degradation, the presence of essential oils can affect soil microorganisms. Mycorrhizal fungi have never been investigated so far under the presence of volatile oils. The aim of this study was to explore the effect of aromatic *Laurus nobilis* L. on development of two mycorrhizal species *Glomus deserticola* and *Glomus intraradices*. The response of fungi colonization and host growth were monitored under different concentrations of *L. nobilis* leaves and essential oil. The major compounds of *L. nobilis* essential oil were 1,8-cineole (49.6%), sabine (7.8%), α-pinene (6.0%), eugenole (5.6%), α-terpinyl acetate (5.2%) and β-pinene (5.1%). Both mycorrhizal fungi colonized successfully the host plants whose growth was positively influenced by mycorrhizal fungi. *G. deserticola* presented higher infection level than *G. intraradices*. The addition of *L. nobilis* leaves in the soil resulted in mycorrhiza inhibition. The level of inhibition was positively correlated with the added amount of aromatic leaves in the soil. The essential oil presented a little higher inhibition than the leaves. The presence of this aromatic plant in many different ecosystems could contribute in mycorrhiza inhibition and it is suggested, when it’s possible, reduction of laurel litter before reforestation programs [Hassiotis, C.N.*, Dina, E.I. (Technical University of Larissa, Department Natural Environment and Forestry, 43100 Karditsa, Greece), International Biodeterioration and Biodegradation, 2011, 65(4), 628-634].

**NPARR 2(3), 2011-0279, Use of terpenoids as natural flavouring compounds in food industry.**

Terpenoids represent the oldest known
biomolecules, having been recovered from sediments as old as 2.5 billion years. Among plant secondary metabolites, they are the most abundant and diverse class of natural compounds. The diversity of terpenoids is probably a reflection of their many biological activities in nature, which has made them a widely used resource for traditional and modern human exploitation. They are usually the main constituents of essential oils of most plants offering a wide variety of pleasant scents from flowery to fruity, to woody or balsamic notes. For this reason terpenoids constitute a very important class of compounds for flavour and fragrance industries, in fact, in the US alone, the demand is forecast to grow 3.7 percent per year to $5.3 billion in 2012. The recent patents on production and extraction of terpenoids commonly used as natural flavouring compounds in food industries are reviewed in the present manuscript [Caputi, L., and Aprea, E.* (IASMA Research and Innovation Centre, Fondazione Edmund Mach, Food Quality and Nutrition Area, 38010 S. Michele all'Adige, Italy), Recent Patents on Food, Nutrition & Agriculture, 2011, 3(1), 9-16].

NPARR 2(3), 2011-0280, Geraniol - A review of a commercially important fragrance material

Geraniol is a commercially important terpene alcohol occurring in the essential oils of several aromatic plants. It is one of the most important molecules in the flavour and fragrance industries and is a common ingredient in consumer products produced by these industries. In addition to its pleasant odour, geraniol is known to exhibit insecticidal and repellent properties and used as a natural pest control agent exhibiting low toxicity. Geraniol has been suggested to represent a new class of chemoprevention agents for cancer. Other biological activities such as antimicrobial, anti-oxidant, anti-inflammatory and some vascular effects have also been investigated. The effect of geraniol as a penetration enhancer for transdermal drug delivery has also attracted the attention of researchers and formulation scientists. This review aims to coherently discuss some of the most important applications of geraniol and unites the results obtained from several studies reporting the biological properties of this molecule [Chen, W. and Viljoen, A.M. (Department of Pharmaceutical Sciences, Tshwane University of Technology, Private Bag X680, Pretoria 0001, South Africa), South African Journal of Botany, 2010, 76(4), 643-651].