

Editorial

Non-conventional sources, antioxidative properties, and novel medicinal use of plant derivatives

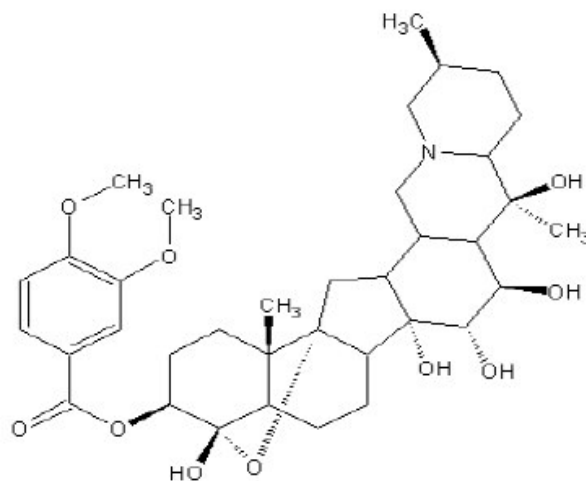
Medicinal plants and their derivatives have properties which make them safer and alternatives to commercial drugs in many countries. The derivatives from the leaf, stem or roots have cellular components of these plants have antioxidant, antimicrobial and many other medicinal properties, which are commercially exploited as herbal medicines. In the issue authors reported the use of medicinal plants, their assessment, safety aspects, and the component analysis of the extracts using HPLC and other biochemical methods. DNA isolation and PCR protocols for RAPD analysis of selected medicinal plants are also reported in this issue.

An ethnobotanical survey was conducted on the medicinal plants of Eastern Cape of South Africa Oyedemi et al. (2009 in this issue). The decoction of the roots leaves and barks of *Strychnos henningsii* and *Leonotis leonorus* of the families *Loganiaceae* and *Lamiaceae* taken orally for a long period (6-12 months), depending on the severity of the ailments, are widely used for the management of diabetes mellitus.

Betti and Lejoly (2009 in this issue) made an ethnobotanical survey was conducted in the Dja region with a total of 63 herbalists prescribing 45 plants and 84 recipes in the treatment of jaundice. These plants are distributed in 44 genera and 31 families. *Annickia chlorantha*, *Harungana madagascariensis*, *Carica papaya*, *Bidens pilosa*, *Cassia alata*, *Coffea canephora*, *Emilia coccinea* had high scoring index for medicinal use. *A. chlorantha* and *H. madagascariensis* are effective against jaundice. About 34.5% of the recipes cited possessed diuretic, purgative or vomitive effect.

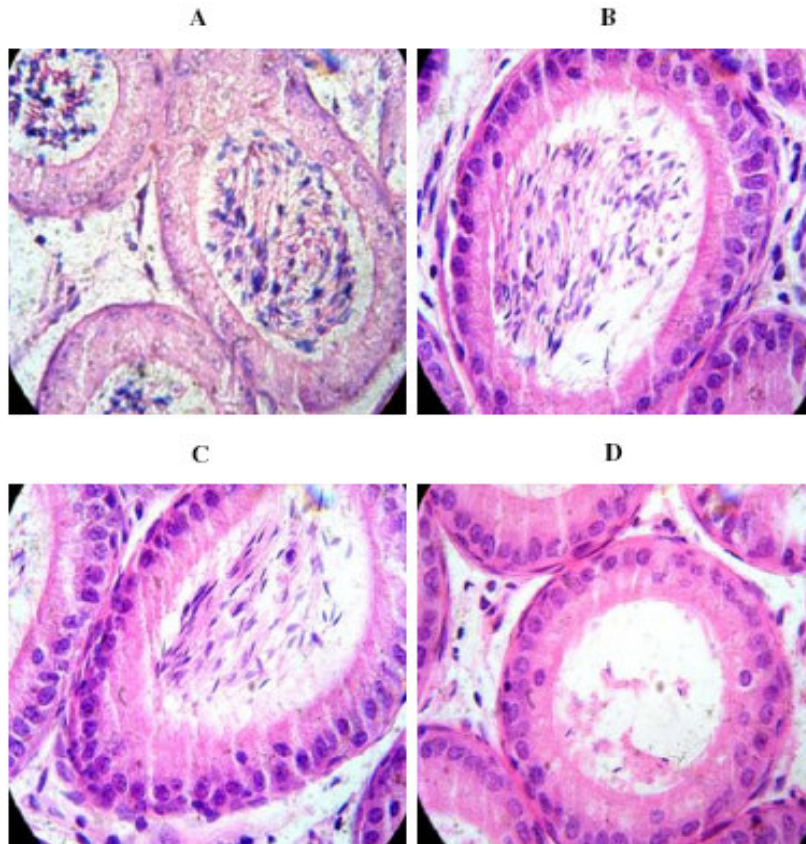
Rhaponticum carthamoides is an endemic medicinal plant of Siberian origin. Biskup and Lojkowska (2009 in this issue) studied the crude extracts obtained with two different extraction methods (sonication and shaking) and three extraction solvents with different polarity (chloroform, methanol and water) and screened their antioxidative activity, cytotoxic and mutagenic activities. All tested extracts were able to reduce molybdenum and inhibit about 85% of linoleic acid peroxidation. However, only water and methanol extracts reduced Fe+3 ions and scavenged DPPH free radical. On the other hand chloroform extracts indicated minor toxicity against all tested cell lines. All extracts were non-mutagenic.

Cholakova et al. (2009 in this issue) reported the influence of veratrum alkaloid - veratroylzygadenine on the healing of allergic contact dermatitis in mice. The alkaloid subsided the swelling of the ears and reducing the density of granulocyte infiltrate in histological and direct immunofluorescence analysis. So, it was recommended that veratroylzygadenine could be used in the suppression of allergic contact dermatitis.



Veratroylzygadenine

The effects of ethanol extract of *Abrus precatorius* seeds on male mice (Balb-C) fertility was assessed by Jahan et al. (2009 in this issue). There was no significant decrease in testicular and epididymal weight. Histological analysis showed disrupted seminiferous tubules, loose germinal epithelium and low counts of leydig cells, germ cells and sperm cells. Thickness of tunica albugenia, seminiferous tubule diameter and germinal epithelial height reduced significantly in treated mice compared to controls. Histomorphology of the epididymus showed a decrease in tubule size, epithelial height and a reduction in sperm number in the tubular lumen. The epididymal corpus segment underwent dysplasia, intraepithelial vacuolation and decreased sperm counts. Plasma testosterone levels decreased significantly @ 60 mg/kg compared to controls. So *A. precatorius* seed extract @ 60 mg/kg tends to suppress spermatogenesis and is liable to cause infertility in male mice.



Plants have served as a natural source of anti-fertility substances. Remya et al. (2009 in this issue) showed anti-fertility potential of ethanol extracts of *Aegle marmelos* (Rutaceae) leaves. The extracts had a considerable effect on the motility of sperm.

Joe et al. (2009 in this issue) studied the antibacterial activity of spices like *Allium sativum* (garlic), *Zingiber officinale* (ginger) and *Piper nigrum* (pepper) extracts has been evaluated against *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Morganella morgani*, *Candida albicans*, *Escherichia coli* and *Proteus vulgaris*. Among the extracts studied garlic extract showed excellent antibacterial activity against *P. vulgaris* and *M. morgani* and the garlic extracts showed excellent antimicrobial activity against almost all pathogens tested. The ginger extract, however, showed only a moderate antimicrobial activity against *P. aureus*, whereas the pepper extract showed the least activity against the test organisms.

The aqueous and ethanol extracts prepared from some lichens species were evaluated for antibacterial activity against six standard strains (*Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Staphylococcus epidermidis*) and two environmental strains (*Aeromonas*) that were isolated from different lakes (Karagöz et al. 2009 in this issue). Ethanol extracts showed better antibacterial activity than that of aqueous extracts. Some lichen extracts have moderate antibacterial effect. The aqueous extract of *Peltigera polydactyla* and the ethanol extract of the *Ramalina farinacea* exhibited potent antibacterial activities.

Nkomo and Kambizi (2009 in this issue) studied methanol and water extracts from *Gunnera perpensa* rhizomes and *Heteromorpha arborescens* roots for their antimicrobial activities. Extracts from both plants were active against the Gram positive bacteria. Both plant extracts showed anti-fungal activity against four isolates except for *Candida albicans*. Further studies may give rise to fungicides that can be employed in therapy.

Tank-raised *Clarias gariepinus* were intramuscularly injected with aqueous extracts of *Lepidagathis alopecuroides* leaves (Obomanu et al. 2009, in this issue). Kidney, liver gill and muscle tissue was analysed for alkaline phosphatase (ALP), alanine transaminase (ALT), aspartate transaminase (AST) and lactate dehydrogenase (LDH). All these enzyme activities were reduced in the muscle of treated fish. Activities of ALP, AST and ALT in the kidney were inhibited but LDH activity was enhanced by leaf extract treatments. These results suggest that these enzymes could be good indicators of *L. alopecuroides* toxicosis in *C. gariepinus*.

Azeke and Ekpo (2009 in this issue) evaluated the effect of garlic and tea on the performance, egg traits and laying parameters of laying hens. Hens were fed with basal diet (layers mash) supplemented with (i) garlic at 1% garlic powder, (ii) 2% garlic powder, (iii) 1% black tea, (iv) 2% black tea and (v) a combination of 2% garlic and 2% tea (making 4% supplementation). Feeding of hens for 4 weeks with test and control diets resulted in non-significant changes in the weights of birds, egg and egg yolk. All the garlic supplemented feeds resulted in significant reductions of total cholesterol, total triglyceride, LDL- and HDL-cholesterol. Except 1% tea supplemented diet, all other tea supplemented diets resulted in significant reductions in the egg yolk concentration of the cholesterol tested. The combination of garlic and tea resulted in significant reductions of total- LDL- and HDL-cholesterol but not total triglycerides. Thus garlic and tea have great potential for low cholesterol egg production.

Herpes simplex virus (HSV) infection is a major opportunistic infection in immunosuppressed persons. The development of acyclovir resistant strains of HSV has further compounded this situation. So there is a need for identification and development of alternative remedy for HSV infections. Behbahani (2009 in this issue) reported anti-HSV activity of methanolic extracts from the leaves of *Hyssopus officinalis*, a medicinal plant from Iran.

Egwaikhede et al. (2009 in this issue) investigated the anti-microbial activity and phytochemical constituents of methanol extract of *Plumeria rubra* (flower and leaf) and *Eucalyptus globules* (leaf). Phytochemical screening of the crude extract revealed the presence of tannins, phlobatannins, saponins, flavonoids, steroids, terpenoids, cardiac glycosides and reducing sugar in the plants investigated. All the crude extract displayed higher inhibitory effects on *Corynebacterium pyogenese* and *Bacillus anthracis*. The infra-red (IR) spectra of the crude extract revealed the presence of different functional group like hydroxyl group (OH), C-H str., alkyl group, C=O stretching for carbonyls, C-O bending for alcohols, ethers, esters, carboxylic acid and anhydrides, C-H bending alkyl and C-H bending for methyl group.

Belewu et al. (2009 in this issue) studied six plants *Vernonia amygdalina*, *Ocimum gratissimum*, *Allium sativum*, *Citrus aurantifolia*, *Khaya senegalensis* and *Zingiber officinale* were analysed for their therapeutic properties. The phytochemical screening revealed the presence tannin, saponin and alkaloids in almost all the samples while flavonoids, polyphenols were found in *K. senegalensis* and *O. gratissimum*. Sterols were absent in all the samples except *O. gratissimum*, *K. senegalensis* and *V. amygdalina*. Flavonoids was found strongly in *K. senegalensis*, *V. amygdalina* but mildly in *O. gratissimum* and *A. sativum*. Conversely, alkaloids were absent in *Z. officinale* and *A. sativum*, The importance of these plants in the pharmaceutical, food and livestock industries are discussed.

Ren et al. (2009 in this issue) analysed the corn silk from China by HPLC method for their bioactive compounds. Two novel flavone glycosides 2-O- α -L-rhamnosyl-6-C-3'-deoxyglucosyl-3-methoxyluteolin and 6,4-dihydroxy-3-methoxyflavone-7-O-glucoside were identified.

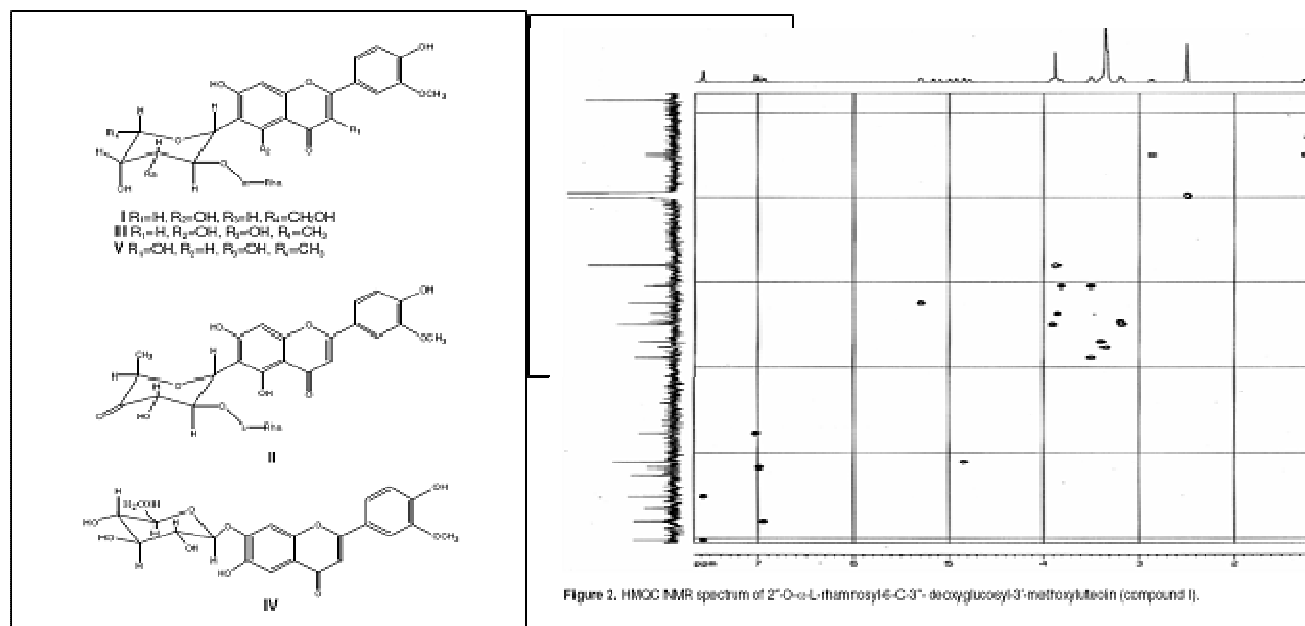


Figure 2. HMOC NMR spectrum of 2'-O- α -L-rhamnosyl-6-C-3'-deoxyglucosyl-3-methoxyluteolin (compound I).

Fourteen medicinal plant species, from Pakistan, used to prepare herbal products Mussafeen and Itreeful ustokhudus were selected by Hussain et al. (2009 in this issue) for assessment of their proximate and micronutrients composition. Mussafeen had highest percentage of fats, ash, proteins, and fibers compared to Itreeful ustokhudus. Itreeful ustokhudus has the highest concentrations of almost all nutrients, that is, Cu, Zn and Cd, while Mussafeen has highest concentrations of Fe, Pb and Ni. However, the concentrations were found well below the threshold levels of the standards mentioned by the World Health Organizations.

Oyster mushroom is colourful and popular edible mushroom. Kim et al. (2009 in this issue) studied the antioxidant and anticancer activities of methanolic extracts oyster mushrooms (OM) dark-grey strain (*Pleurotus ostreatus*) and yellow strain (*Pleurotus cornucopiae*), and pink strain (*Pleurotus salmoneostramineus*). The extract from the yellow strain showed the highest radical scavenging activity, reducing power, ferrous chelating ability, and total phenolic contents. On the other hand, the extracts of dark-grey and pink strains showed higher suppressive effect against growth of human colon cancer cell line HT-29 compared to than that of yellow strain, suggesting that the antioxidant and anticancer activities of OMs varied by colors.

Organic extracts of 7 plant species, used by Moroccan traditional healers against cancer or non-cancer diseases, were studied by Merghoub et al. (2009 in this issue) for their anti-cancerous activities. Extracts from *Inula viscosa* (L.) Ait., *Retama monosperma* (L.) Bois., *Ormenis mixta* (L.) Dumont., *Ormenis eriolepis* Coss., *Rhamnus lycioides* (L.), *Berberis hispanica* Bois and Reut. and *Urginea maritima* (L.) Baker. were tested on the human cervical cancer cell lines SiHa and HeLa, harbouring HPV16 and HPV 18 respectively. The extract from *Inula viscosa* (L.) Ait., *Retama monosperma* (L.) Bois., *Ormenis eriolepis* Coss. exhibited marked cytotoxic effect on the two cell lines, which could be considered as potential sources of anticancer compounds.

Teratogenic effects of cyclophosphamide is studied extensively and is reported to be suppressed by the application of antioxidants and/or by the stimulation of maternal immune system. In a study Najafzadeh and Mahabady (2009 in this issue) studied the prophylactic effects of mesna (Sodium 2-mercaptoethane sulfonate – which decreases hemorrhagic cystitis) and *Echinacea* extract (an antioxidant) on teratogenic effects of cyclophosphamide. Cleft palate incidence was 38.46, 30.77 and 14.28% in fetuses of rats that received only cyclophosphamide, cyclophosphamide with mesna and cyclophosphamide with *Echinacea* extract, respectively. In addition, skeletal anomalies incidence including limbs, vertebra, sternum and scapula defects were decreased by *Echinacea* extract.

The antioxidant and antihepatotoxic activities of the crude ethanolic extract of *Melia azedarach* and *Piper longum* were studied by Samudram et al. (2009 in this issue). The biherbal ethanolic extract showed potent antihepatotoxic activity against carbon tetrachloride – induced acute toxicity in rat liver. The results revealed that biherbal ethanolic extract (BHEE) has notable antioxidant activity on peroxides formation in linoleic acid, free radical-induced protein oxidation, ameliorated liver toxicity by regulating serum enzyme activities such as SGOT, SGPT, ALP, ACP and LDH. This study suggests a hepatoprotective effect of the BHEE through its antioxidant activity.

Lagerstroemia speciosa (L.) Pers. (local name *banaba*) is a traditional herbal medicine in the Philippines. It has hypoglycemic effects in mice models. But there is no report on alloxan-induced diabetic mice. Tanquilut et al. (2009 in this issue) studied the hypoglycemic effects of *L. speciosa* on alloxan-induced diabetic male ICR mice. *L. speciosa* powder and decoction significantly reduced blood and urinary glucose levels of diabetic mice. These mice also had lower body weight and higher feed intake. These results show *L. speciosa* has antihyperglycemic activity.

Two-dimensional electrophoresis was widely used in molecular biology. However, in the screening of many samples, it was required that all gels be in the same condition in SDS-PAGE. But reports on the conditions where two gels can be stained uniformly is lacking. A new apparatus was designed by Haiyan and Baoming (2009 in this issue) that ensures all gels to be stained in the same condition. Also the problems of gel distortion and breaking can be prevented by the new apparatus.

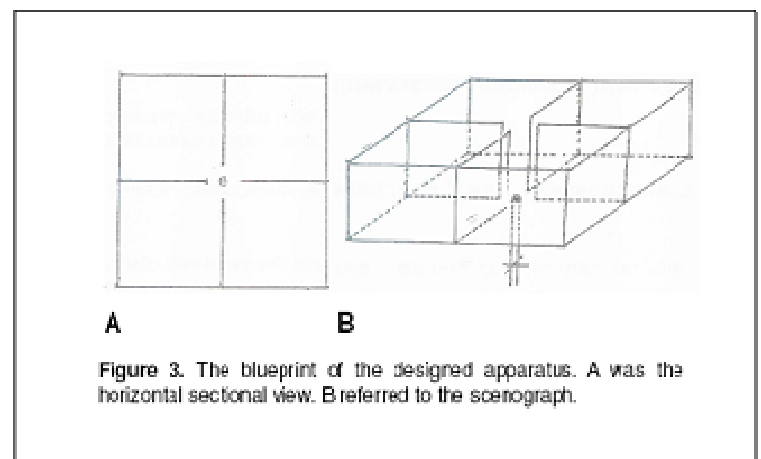
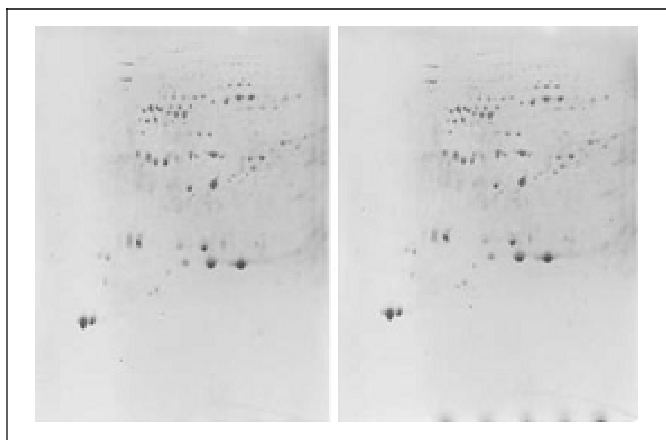


Figure 3. The blueprint of the designed apparatus. A was the horizontal sectional view. B referred to the scenograph.

Shaheen et al. (2009 in this issue) studied the micro morphology of leaf surfaces of seven species of the genus *Abutilon* Mill. (Malvaceae) viz., *A. bidentatum* A. R. rich, *A. fruticosum* Guill. & Perr., *A. (L.) Sweet*, *A. molle* (Wild.) Sweet, *A. muticum* (Del. Ex. DC,) Sweet, *A. pakistanicum* Jafri & Ali and *A. theophrasti* Medic. All the seven species were amphistomatic and amphitrichomic, epidermal cells polygonal. Two types of stomata, anisocytic and diacytic were generally more concentrated on abaxial surface. An indumentum of wide variety of glandular and eglandular trichomes on both surfaces was characteristic of the genus. Seven diverse morphological forms of foliar trichomes were recorded. The trichome complements of each of the seven species studied were unique and thus, can be used as an taxonomic identifier.

The use of phosphate solubilizing bacteria as inoculants increases the P uptake by plants. In a study, Behbahani and Behbahani (2009 in this issue) isolated and characterized of 3 strains of phosphate solubilizing bacteria (PSB) by 16S rDNA sequencing. Three strains namely *Bacillus lentus* strain PS5, *Bacillus Licheniformis* strain PS7 and *Pseudomonas putida* strain PS13 were isolated from the rhizosphere of *Beta vulgaris* and *solanum tuberosom*. Among the three strains, PS5 and PS7 were the most efficient strains in terms of their capabilities to grow and solubilize phosphorus in the presence of 5% NaCl and 42°C. Root colonization was assessed by bioluminescence method. Results showed that these strains could survive in the potato root system under stress conditions.

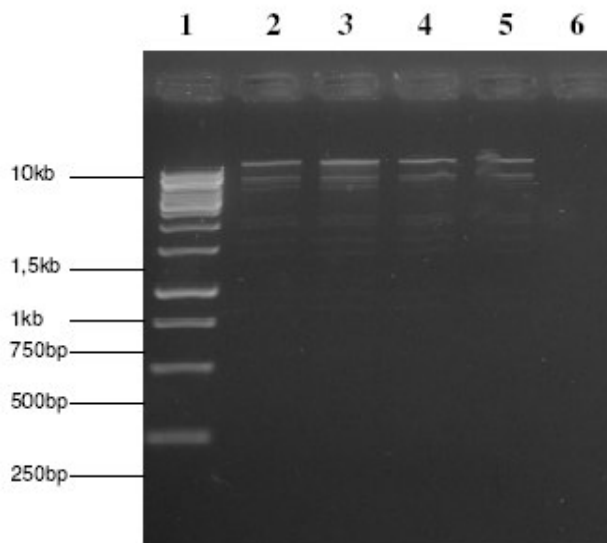


Figure 2. Screening of agarose gel electrophoresis of *Echinacea purpurea* DNA digested with restriction endonuclease (EcoRI/Hind III). Lane 1. 1 kb ladder size standard marker. Lane 2-4. Digested with restriction endonuclease of DNA isolated from *Echinacea* with manual DNA isolation method. Lane 5. Digested with restriction endonuclease of DNA isolated from *Echinacea* with EZ1 Nucleic acid isolation method. Lane 6. Negative control (None DNA).

Vural and Daeri (2009 in this issue) optimized DNA isolation and PCR protocols for RAPD analysis of selected medicinal plants of conservation concern from Turkey. A modified CTAB extraction employing polyvinyl pyrrolidone (PVP) while grinding, successive long-term chloroform-isoamylalcohol extractions, EZ1 nucleic acid isolation protocols are developed (Figure 2). RAPD protocol was optimized based on the use of higher concentration of MgCl₂ (3 mM), lower concentrations of primer (0.5 μM) and *Taq* polymerase (0.2 units), 50 ng of template DNA and an annealing temperature of 37°C, resulted optimal amplification. The authors reported reproducible amplified products in all PCR reactions.

So this issue of JMPR focused almost all aspects of medicinal plants starting from survey, pharmaceutical analysis, efficacy and toxicity tests *in vitro* and *in vivo* in mice models, use of morphological, microscopic, biochemical and molecular biology protocols in the medicinal plants research.

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