

Editorial

Traditional plants to modern medicine and methods for *ex situ* conservation of native medicinal plants

This September issue of JMPR has improved over the earlier ones with an elegant review article and regular papers. The subjects are also interesting to medicinal plant research community as it deals with traditional medicinal plants to pharmacological ingredient isolation, study and development of modern medicine. Two papers attempted to conserve native medicinal plants and develop simple but efficient protocols for their mass propagation.

Tremendous strides in modern medicine is made in the recent past and natural products from traditional medicinal plants have been introduced for the development of drugs. In the review, by Hyun and Kim (2009) describe the recent developments in the potential use of *Kalopanax pictus* as phytotherapeutic agent. *K. pictus*, known as Castor-Aralia or Prickly Castor-oil tree has pharmacological functions including anti-inflammatory, anti-rheumatoid, hepatoprotective, anti-diabetic, anticancer effects, etc. *K. pictus* is used in dietary health supplements and functional foods in East Asia. Since hederagenin glycosides from *K. pictus*, named kalopanaxsaponins A (1) and B (2), were isolated and the structure was determined (Khorlin et al., 1966), a number of chemical constituents such as polyacetylenic compounds, tannin, flavonoid, coumarin glycosides, alkaloid, essential oils and resin have been isolated from this plant. The molecular mechanisms of these components seem to involve the interplay between active components and signaling mediated by phosphorylation events during stress adaptation. It down-regulated the extracellular signaling pathways mediated by extracellular signal-regulated kinase (ERK) 1/2 and phosphoinositide-3-kinase/protein kinase B (PI3K/Akt) and resulted in the inhibition of phorbol-12-myristate-13-acetate (PMA, selective activator of protein kinase C)-induced invasion (Hwang et al., 2008; Park et al., 2009). The pharmacological actions of kalopanaxsaponin A (1) might result from the interaction with signal transduction pathways mediated by protein kinase activations such as MAPKs, I-B kinase (I-k) and Akt. The inhibited activity of those kinases caused the reduction of AP-1 and NF-B DNA-binding activities and resulted in down-regulation of IL-1, TNF-, IFN- γ and MMP-9. It might be possible to develop specific mediators for anti-NF- γ therapy using kalopanaxsaponin A (1). However, the authors caution the clinicians for more definitive studies to demonstrate the safety, quality and efficacy of *K. pictus*.

Lippia multiflora Moldenke, (family Verbenaceae) is used in the Congo as a conventional tea decoction and in Ghana, it is used for the treatment of arterial hypertension. Yaakov et al. (2002) extracted the following major compounds from the leaf extract of the plant: limonene, α -caryophyllene, trans-farnesene, caryophyllene oxide and farnesol. Herbal extract of the plant has a lot of biological activities, including: antimalarial, antimicrobial, anti-inflammatory and other pharmacological effects. *Lippia* oil is reported to be effective against bodylice, headlice and scabies' mites (Oladimeji et al. 2000) and is effective against gram-negative bacteria (Bassole et al., 2003). The plant is over-harvested and there is the need for its sustainability. So, Ameyaw (2009) studied the possibility of using plant growth regulators (PGR) like Naphylacetic acid (NAA) on the propagation of explants like - apical meristem, root and stem cuttings of *Lippia multiflora* Moldenke using different soil media. The germination of the root cuttings was maximum which is attributed to the presence of endogenous phytohormones in the root tips which play a synergistic role in propagating the stocks.

Ayatollahi et al. (2009) from Iran and Pakistan studied the terpenes from the aerial parts of *Euphorbia splendida* Mobayen (Euphorbiaceae) by column chromatography and preparative TLC. Two terpenes, a lupane-type triterpenoid and a diterpene with a tricyclic lathyrane skeleton, were isolated and purified and identified as 3-28-dihydroxylup-20(29)-ene (betulin) and decipinone respectively for the first time from this plant. The structures of the isolated compounds were elucidated on the basis of spectroscopic methods including 1 H and 13 C-NMR, IR, UV and MS.

The search for natural products to cure diseases represents an area of great interest in which plants have been the most important source. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these plants bioactive chemical constituents (i.e. phytochemicals or infochemicals) are alkaloids; tannins, flavonoids, and phenolic compounds (Hill, 1952). Kwada and Tella (2009) determined the infochemicals and the phytochemical from the foliage and stem-bark of *Senna siamea* (Lam.). Alkaloids, anthraquinones, cardiac glycosides, flavonoids, phlobatannin, polyphenols, saponins, steroids, tannins and terpenoids were ten groups of infochemicals studied in the foliage and stem-bark of *S. siamea* (Lam.). The results suggest that this species has potential pharmaceutical, agrochemical and other allied use.

Pinus roxburghii (family Pinaceae, Gymnosperm), is known as “chir” in Pakistan. The needles and stems are rich in vitamin C, tannins, alkaloids and essential oil while its wood is the major source of turpentine oil (Vallejo et al., 1994, Asta et al., 2006). The turpentine is used as a solvent in pharmaceutical preparations, perfume industry, in manufacture of synthetic pine oil, disinfectants, insecticides and denaturants. However, there is little information on antimicrobial activity of pine oils (Hong et al., 2004). In an extensive biochemical and structural study Rehman and Iqbal (2009) studied essential oils of *Pinus roxburghii* stems and analyzed it by GC MS. Seventeen components were identified. Out of these fifty-two were chemically identified. Major component in essential oil was pinene, 3-carene, caryophyllene, p-cymene, Terpinenol, Limonene, Borneol acetate, Caryophyllene oxide, camphene, Terpinyl acetate, Phallenderene, farnesene, o-cymene, Butanoic acid, 3-methyl-, 2-phenylethyl ester, 1-terpinen-4-ol, Farnesyle acetate and terpinene. Antibacterial activity of essential oil from stem was observed against *Staphylococcus aureus* and *Bacillus subtilis* while no activity was observed against *E. coli* and *Enterobacter aerogenes*. Similarly, antifungal activity of *Pinus roxburghii* essential oil was also found to be active against *Aspergillus terreus*, *Aspergillus flavus*, *Aspergillus candidus*, *Aspergillus versicolor*, *Aspergillus niger* and *Trichoderma viride*.

Leaf extracts from *Sida acuta* is antihelminthic and antimicrobial (Sofowora, 1982) and root extracts inhibit embryo implantation or growth as well show antifungal activity. The ethanolic and aqueous extracts of *Sida acuta* contain saponins; tannins, cardiac glycosides, alkaloids and anthraquinones. Ekpo and Etim (2009) from Nigeria studied antimicrobial activity of ethanolic and aqueous extracts of *Sida acuta* on microorganisms from skin infections. The ethanolic extracts were not effective against *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Scopulariopsis candida*, *Aspergillus niger* and *Aspergillus fumigatus*. The aqueous extract was effective for *P. aeruginosa*, *S. aureus*. The extracts were more potent than gentamycin in inhibiting *S. aureus* and *B. subtilis*.

Diabetes is a major health problem worldwide, with over 150 million diabetic patients at present, which is estimated to increase to more than 300 million by the year 2025 (Zimmet, 2000). The aerial parts of the plant *Thymelaea hirsuta* (Family Thymelaeaceae, known as “Methnane” in Morocco) is used as decoction in the treatment of diabetes (Ziyyat et al., 1997) and is used in folk medicine for its Antimelanogenesis (Kawano et al., 2007), and Antioxidant (Djeridane et al., 2005) properties. Amrani et al. (2009) in the present study investigated the effect of oral administration of the aqueous extract of *Thymelaea hirsuta* (*T. hirsuta*) on blood glucose levels in normal, glucose-hyperglycemic and streptozotocin (STZ)-induced diabetic rats. In normal rats, single oral administration of *T. hirsuta* lowered blood glucose levels significantly. It omitted significantly reduced the fasting glucose level in rats with oral glucose (2 g/kg) induced hyperglycemia. In STZ-induced diabetic rats, single oral administration of *T. hirsuta* also produced a significant decrease of blood glucose levels. The aqueous extract of *T. hirsuta* possesses both hypoglycaemic and antidiabetic effects in normoglycaemic and streptozotocin-induced diabetic rats. The antihyperglycemic action may be attributed to the potentiation of pancreatic secretion of insulin from existing cells of islets or to the extrapancreatic mechanisms like enhanced transport of blood glucose to peripheral tissue, increased peripheral utilization of glucose via different enzymatic pathways.

Korarima (*Aframomum corrorima* (Braun) P.C.M. Jansen) Family Zingiberaceae is native to Ethiopia. Seed dormancy is a problem of this plant. Eyob (2009) report the use of different scarification techniques and use of GA3 on enhancing seed germination and seedling vigour. The second part of the study was on micropropagation of highland korarima cultivars viz., Mume, Wondogenet and Mesketo. The effective concentration of hormones for shoot multiplication and rooting in cultivar Mume were determined. Two explant sources, in vitro seedling shoot tips and field grown rhizome buds of cultivar Mume were evaluated in MS medium. Significantly higher shoots number, leaf number and fresh weight per explant was obtained in MS + 0.5 mgL⁻¹ thidiazuron (TDZ) but MS + 0.5 mgL⁻¹ TDZ + 3 mgL⁻¹ 6-benzyladenine (BA) also gave high shoot number per explant only. Indolebutyric acid (IBA) at 1 mgL⁻¹ showed highest rooting.

The leaves of *Euphorbia hirta* are found to contain triterpenoids, sterols, alkaloids, glycosides and tannin (Anozie, 1991) and is used in the treatment for bronchitis, asthma, eczema, laryngeal spasm and cough (in liquid extract or tincture form). Other uses include lactation, as tonic, anthelmintic, anticonvulsant, mild sedative and antimicrobial agent and in the treatment of wounds and tumors. Simultaneous use of two or more antimicrobial agents has certain rationale and is recommended in specifically defined situations (Esimone et al., 2006a; b). Two distinct methods are used for testing antibiotic interactions in vitro are the checkerboard technique and the time killing curve method (Eliopoulos et al., 1988). Nystatin is a tetraene macrolide produced by *Streptomyces noursei*. It is used for candidiasis (Goodman and Gilman, 2001). In this study, Jackson et al. (2009) studied the interaction between nystatin and methanol extract of *E. hirta* leaves has been investigated using Checkerboard method. The study concludes that all groups of the ten studied infochemicals (alkaloids, anthraquinones, flavonoids, saponins, phlobatannins, polyphenols, steroids, terpenoids, phenols and tannins) were present in this species. Thus, *S. siamea* should be considered as a potential source of useful drugs, insecticides and possibly herbicides. These results indicate that some combinations of the extract with nystatin could be synergistic in activity for some ratio combinations and indifferent for some others. However, the authors suggested alternative use of the plant extracts in cosmetics, breweries, and possibly paper and pulping industries, dyes, inks, pesticides and insecticides, agrisilviculture (agroforestry), agriaquasilviculture or agripasturesilviculture.

Malaria is one of the greatest Mosquito manace in the tropical world. There is no effective preventive measures or vaccine for malaria. The best approach should be the interruption of disease transmission by either killing the vector or preventing mosquitoes from biting people. The use of pesticides like DDT and malathion was successful in last 5

decades to control adult mosquitoes. However, this success was short lived due to the development of resistant to many mosquito strains, ecological imbalance and harm to mammals. This has necessitated the continued effort for search and development of environmentally safe, biodegradable and low cost larvicides and adulticides for killing larva and adult mosquitoes respectively from natural sources (ICMR Bulletin, 2003). Natural products are the best option because of their less harmful nature to environment and non-targeted organisms. Several extracts and compounds from different plant families have been evaluated to show new and promising larvicides (Innocent et al., 2008a; b), however very few plant products have been developed for controlling mosquitoes. Out of about 150 species of *Annona*, only 4 species have been studied for larvicidal activities (Das et al., 2007). In the present study, Magadula et al. (2009) from Tanzania investigated the mosquito larvicidal and cytotoxicity activities of 3 *Annona* species. They showed larvicidal properties of *A. senegalensis* for the first time, and suggested its value together with that of *A. squamosa* may prove to be the best natural source of larvicidal agents.

Nkeh-Chungag et al. (2009) studied the analgesic, anti-inflammatory and antiulcer properties of the extract of *Uapaca guineensis* (Euphorbiaceae) from Cameroon in rats and mice using the acetic acid writhing, hot plate as well as pressure-induced pain models. The extract showed reduction of pain induced by all three models of nociception and also had significant anti-inflammatory properties with no non-ulcerative effect on gastric mucosa. This study conforms that the methanolic extract of *U. guineensis* has both analgesic and anti-inflammatory properties and does not corrode gastric mucosa.

Talhouk et al. (2009) report conform the use of water extracts from *Onopordum cynarocephalum* (*Oc*) and *Achillea damascena* (*Ad*) in traditional medicines of Lebanon to treat inflammatory diseases, were evaluated for anti-inflammatory activities employing an *in vitro* model of endotoxin (ET)-induced inflammation in mammary epithelial SCp2 cells and an *in vivo* model of ET-induced paw edema in male rats. The findings show that the *Oc* and *Ad* mode of action contribute towards a better understanding of the claimed anti-inflammatory activities reported in folk medicine literature.

Yibchok-anun et al. (2009) studied the insulin secreting and glucosidase inhibitory activity of *Coscinium fenestratum* (Family Menispermaceae) and postprandial hyperglycemia in normal and diabetic rats. This study report that the *C. fenestratum* ethanolic extract exerted anti-hyperglycemic activity by stimulating insulin secretion and α -glucosidase inhibition.

The papers and review article published have a recommendation in this issue that simply the traditional medicinal plant products need not be used for its availability, economy and the thought that it has no side effect, but necessary pharmacological studies should be conducted with the available modern medical practices to establish the activity and identify, isolate and purify the active ingredients for future use. The indiscriminate use and exploitation of the traditional medicinal plants resulted in the depletion of these natural resources and need immediate attention for conservation and mass propagation for future use.

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