**Bhindi fibres suitable for reinforced paper laminates**

*Bhindi* or Lady's finger (*Hibiscus esculentus* Linn.) is a major agricultural crop in India and is well-known as vegetable. The stem of the harvested plant is mostly wasted or used as fuel in villages. The *bhindi* plant can be exploited for fibre production after the usual harvesting of crop. The fibre is much coarser and weaker than other bast fibres such as jute. If suitable application could be found for this fibre, it can fetch better value for the farmers. *Bhindi* fibre is a cheap bast fibre which has the potential of imparting high flexural rigidity and toughness to a structure. It can be incorporated between the two paper sheets with the aid of an adhesive to impart the desirable mechanical properties to paper structures. Also since the fibre is biodegradable it does not pose environmental problems. Keeping this in view Agrawal and others of Indian Institute of Technology, New Delhi, used *bhindi* fibres for the development of reinforced paper laminate for packaging. Long strand fibres have been extracted from the stem of *bhindi* plant using conventional retting process, carded into sliver and then used for making paper-fibre-paper laminates. The laminates have been prepared by sandwiching 9-41% of fibres between two packaging-grade paper and bonded by hot pressing the sandwich in the presence of starch-based adhesives. The laminates thus prepared show better tearing and bending resistance than the laminates made from pure paper sheets. Laminates with 41 wt% fibres show the increase in tearing resistance by 400% and in bending resistance by 1200%. Tensile properties and peeling resistance have been found to be reasonable and dependent on the amount of adhesive used. The developed paper-fibre laminates are potential candidates for use as a low-cost alternative to high-grade corrugated paper laminates in packaging industry and offer additional value to the farmers of *bhindi* crop. Further, the laminates formed from lower quality paper sheets with 10-20 wt% fibres can also be used as an easy replacement for good quality paper sheet in various other applications. Laminates with low fibre content show both high tensile strength and peeling resistance [Agrawal et al, *Indian J Fibre Text Res*, 2004, 29(1), 49-56].

**Effect of plant extracts on burn pathogens**

Bacterial colonization of burned and devitalized tissue is inevitable and invasive bacterial infection is still one of the major problems in the treatment of burn victims. The *Datura metel* Linn. syn. *Datura alba* Nees and *Celosia argentea* Linn. (Hindi — Safaid murga) are common weeds found throughout India and both are traditionally known for its medicinal uses.

Based on the folklore uses of these plants, antimicrobial activity of the alcohol extract on pathogens specifically microbial species isolated from infected burn wound has been studied. Though antimicrobial activity of *C. argentea* has been previously reported, the activity of these plants against burn pathogens has not been studied so far. Hence, researchers at CHORD Division and Department of Biomaterials, Central Leather Research Institute, Adyar, Chennai evaluated the antibacterial effect of crude alcohol extract of these two herbal plants on burn pathogens and compared the efficiency against conventional antibiotic cream, Silver Sulphadiazine. The leaves of these plants, collected in the month of September at early morning hours were dried in sun shade and about 200 g of dry powdered leaves were extracted with 300 ml of 95% ethanol using soxhlet apparatus for 8-10 hours. The disc-diffusion method showed significant zone of lysis against all the pathogens studied and the results are comparable to the conventional antibiotic cream, Silver Sulphadiazine. On comparing the efficiency of the two extracts, extract of *Datura metel* Linn. exhibited more than 50% increase in antibacterial activity compared to extract of *Celosia argentea* [Gnanamani et al, *J Ethnopharmacol*, 2003, 86(1), 59-61].
Eclipta alba Hassk. — A potential antifungal agent

In traditional system of medicine, Eclipta alba Hassk. (Hindi — Bhangra) is used in the treatment of asthma, jaundice, ulcers and as a hair restorative. In rural areas of Madurai district this plant is used to treat many microbial infections. Researchers at PSG College of Pharmacy, Coimbatore and S B College of Pharmacy, Sivakasi investigated the potential antifungal activity of E. alba. They investigated the in vitro antifungal activity of whole plant against Candida albicans, C. tropicalis and Rhodotorula glutinis. The extracts of E. alba showed high degree of activity against all test fungi. The inhibitory effects of extracts were very similar to those of standard antibiotics (Amphotericin B and Nystatin) used. Hence, E. alba extracts may find a use as broad-spectrum antifungal agents after further extensive investigations [Venkasan & Ravi, Indian J Pharm Sci, 2004, 66 (1), 97-98].

Flaxseed effective in prostate cancer

Under new discoveries, the CNN recently reported that flaxseed, Linum usitatissimum Linn. (Linseed, Hindi — Alsi) is proving to be effective in treating prostate cancer. The study reported in Neurology Journal found that limiting dietary fat to 20 per cent of calories while eating three heaping tablespoons of freshly ground flaxseed every day can significantly slow down prostate cancer growth. They can be mixed with water, any fruit or vegetable juice. They can be added to salads, soups, yoghurt, cereals and even baked goods. Flaxseed and flaxseed oil should be kept refrigerated. Whole flaxseeds must be ground within 24 hours of use, otherwise the ingredients lose their activity.

Flaxseed is a rich, vegetarian source of omega-3 and omega-6 essential fatty acids that are critical in the production of prostaglandins. In the body prostaglandins help regulate fat metabolism, inflammatory response, hormones, as well as the cardiovascular, immune and central nervous systems. It is important to maintain an appropriate balance of omega-3 and omega-6 essential fatty acids in the diet as these two substances work together to promote health. Omega-3 fatty acids help to reduce inflammation while most omega-6 fatty acids tend to promote inflammation. A proper balance of essential fatty acids helps maintain and even improve health, while an inappropriate balance contributes to the development of disease.

In addition to important omega-3 fatty acids, flaxseed also contains a group of chemicals called lignans - plant compounds that, in this case, are believed to bind to testosterone, the male hormone thought to spur the growth of such cancer. The lignans thus impedes testosterone’s action — helping to slow the progression of the cancer. Studies suggest that flaxseed - both the alphalnolinoenic acid (ALA) and the lignans in flaxseed - may play a role in the prevention and/or treatment of not only prostate cancer but also other diseases [Herbal Remedies Natural Health Newsletter, November 2003, Issue 222].

Antibacterial compounds from the seeds of Psoralea corylifolia

Seeds of Psoralea corylifolia Linn. (Hindi — Babchi) of Fabaceae family are effective against leucoderma, leprosy, psoriasis, asthma, as stomachic, anthelmintic, diuretic and diaphoretic. Researchers working at Phytochemistry Research Laboratory, Department of Pharmacy, University of Rajshahi, Rajshahi, Bangladesh and Phytochemistry Research Laboratory, Department of Pharmaceutical Sciences, University of Strathclyde, Glasgow, Scotland, UK reported that compounds psoralidin (1), bakuchicin (2), mixture (1:1) of psoralen (3) and angelicin (4) present in seeds possess significant antibacterial activities against test organisms. Compound 1 showed stronger activity against Gram negative Shigella sonnei and S. flexneri while compounds 3 and 4 exhibited the highest activity against Gram positive Staphylococcus aureus [Khatune et al, Fitoterapia, 2004, 75 (2), 228-230].
Antibacterial activity of oleo-gum-resin of Commiphora mukul

Myrrh, Commiphora mukul Engl. (Burseraceae) is used in traditional medicines for mouthwashes, as dentifrice, ulcers of mouth and pharynx, for foul and indolent ulcers, for wound healing in veterinary practice, as an ingredient of incense and perfume in the holy oil of Jews and the 'Kyphi' of Egyptians for embalming and fumigations. Saeed and Sabir from Department of Pharmacy, University of the Punjab (Allama Iqbal Campus), Lahore, Pakistan studied antibacterial activity of oleo-gum-resin of Myrrh. The essential oil, chloroform extract and seven sesquiterpenoid compounds newly isolated from the oleo-gum-resin of C. mukul, effectively inhibited the growth of Gram positive and Gram negative bacteria, with activity comparable to that of Kanamycin, used as reference. Both essential oil and chloroform extract exhibited the most potent and persistent inhibiting activities against both types of bacteria used. Among the seven isolated compounds, curzerene and furanoeudesma-1,3-diene also manifested the most potent and persistent inhibiting activities, similar to the essential oil and chloroform extract. Lindestrene, curzerenone and furanodien-6-one exhibited an intermediate activity, while 3-methoxy-10-methylfuran-9-ene-6-one and 2-methoxy-4,5-dihydrofuran-6-one displayed the least irritant potentials, compared with the essential oil, chloroform extract and also Kanamycin [Saeed & Sabir, Fitoterapia, 2004, 75(2), 204-208].

Antioxidant properties of Betel

Indian traditional Paan is being used as a post-meal digestive stimulant, astringent, aphrodisiac, nerve tonic, intoxicating agent and for several other purposes in India and is recommended in ancient scriptures of Ayurveda for normal well being. These properties might be due to the antioxidant nature of Paan. Badami and others of JSS College of Pharmacy, Rocklands, Ootacamund screened the extracts of Paan and its individual ingredients for their in vitro antioxidant activity using standard DPPH method. Paan was prepared as per the Indian tradition. Two betel leaves (Piper betle Linn.) were washed with water and smeared with slaked lime paste and then with catechu (Acacia catechu Willd.) paste. The other ingredients, betel nut, cardamon, clove, coconut, fennel, processed cherry, gulkhand, etc. were added and wrapped with the same leaves. 50% Methanol extracts of Paan and its ingredients were screened for antioxidant activity. The Paan extract showed moderate antioxidant activity. However, extracts of catechu, rose powder, betel nut and clove showed potent activity. The betel leaves and fennel showed moderate activity. The antioxidant properties of Paan probably lie with catechu, rose powder, betel nut and clove used in Paan, thus, confirming the common beliefs and traditional uses of Paan in Indian tradition [Badami et al, Indian J Trad Knowledge, 2004, 3(2), 187-191].

Mistletoe bark extracts showed antibacterial activity

Bangladeshi mango mistletoe, Loranthus globosus Roxb. syn. Macroso1en cochinchenesis (Lour.) Van Tiegh. (Loranthaceae), is a parasitic shrub on mango tree and known as Chota Banda in Bangladesh. The water extract of bark is used in the treatment of menstrual abnormalities and to check abortion. A decoction of leaves and bark is given for the management of acute and chronic diarrhoea. Bark is also used in headache and itch. Loranthus spp. is reported to possess antihypertensive effects, antiviral effect, antihypotensive action, antidiabetic property, anti-HIV activity and also used for the treatment of schizophrenia. Researchers at Phytochemistry Research Laboratory, Department of Pharmacy, University of Rajshahi, Rajshahi, Bangladesh and Centre for Phytochemistry, Southern Cross University, Lismore, Australia carried out biological screening of Bangladeshi mango mistletoe bark extracts. The ethyl acetate extract showed highest antibacterial activity against both Gram positive and Gram negative bacteria especially against all tested Shigella strains, followed by chloroform, methanol and petroleum ether extracts. It also exhibited moderate cytotoxicity with a LC50 of 10.83 µg/ml. Further studies are needed to confirm these biological activities, which may also provide a support for some of the uses in ethnomedicine [Islam et al, Fitoterapia, 2004, 75 (3-4), 405-408].
Lepidium latifolium Linn. in prostate hyperplasia

Benign prostate hyperplasia (BHP) is a progressive illness characterized by the enlargement of prostate as a consequence of the proliferation of glandular elements. The depletion of androgens contribution due to castration produces drastic cellular and chemical changes in the prostate causing a tissue atrophy. A later contribution of exogenous androgens lessens the effect of castration, reactivating the prostate growing. At the moment, the pharmacological treatments are lasting to inhibitory substances of estrogens (aromatase inhibitors) or the androgens synthesis (5α-reductase inhibition) or of both (dehydrogenase-17β-hydroxysteroid inhibition). Lepidium latifolium Linn. is a plant traditionally used as anti-scorbutic, stomach tonic, appetizer and diuretic (stone breaker). The active principles of L. latifolium are the flavonoids, which, in recent studies, have demonstrated to have an anti-estrogenic (aromatase inhibitors) and anti-androgen activity (dehydratase-17β-hydroxysteroid inhibition) as well as having an important role in the retardation of the development of hormone-dependent cancer cells. Due to these properties, researchers at Investigation, Development and Innovation Center of Soria Natural S.L., Garay, Soria, Spain and Department of Physiology, Medical School, University of Santiago de Compostela, Santiago de Compostela, Spain investigated the effects of L. latifolium on prostate hyperplasia in an experimental model in rats. Treatment with L. latifolium suspension exerts a significant effect on the prostate size. In fact, a reduction of 28.6% and 27.9% was observed for weight and volume, respectively. The results demonstrated that the integral suspension of L. latifolium showed significant activity against an experimentally induced prostate hyperplasia in rats. Its mechanism of action remains to be clarified. Due the presence of flavonoids, anti-inflammatory, antioxidant, steroid activity, and inhibition of aromatase could be involved. However, further work is needed to confirm this activity, which is promising as an effective treatment against prostatitis [Caballero et al, Fitoterapia, 2004, 75(2), 187-191].

Mimosa pudica root extract used against Indian snake venoms

Leaves and stems of Sensitive plant, Mimosa pudica Linn. (Hindi—Lazwanti, Chui-mui) of Mimosaceae family are used against scorpion sting and root extracts against cobra bite. Researchers at Department of Biochemistry, University of Mysore, Manasagangotri, Mysore carried out studies to evaluate the hyaluronidase activity and proteolytic activity of the root extract of the plant. The aqueous root extract dose dependently inhibited the hyaluronidase and protease activities of Indian snakes (Naja naja, Vipera russelii and Echis carinatus) venom. These results provide the basis for better evaluation of the potential therapeutic value of the studied extract [Girish et al, Fitoterapia, 2004, 75 (3-4), 378-380].
In vitro antibacterial/synergistic activities of Aswagandha extracts

Aswagandha, Withania somnifera (Linn.) Dunal (Indian Ginseng) possesses therapeutic value against a large number of ailments, such as mental diseases, asthma, inflammation, arthritis, rheumatism, tuberculosis, infections, fever, male sexual disorders and a variety of other diseases, including cancer. Even though some studies on antibacterial effects of different extracts and purified compounds from Withania have been done, this property of Indian Ginseng has not been studied in detail. Arora and others at Department of Botanical Sciences, Guru Nanak Dev University, Amritsar studied antibacterial activity of Aswagandha extracts. The methanol, hexane and diethyl ether extracts from both leaves and roots of W. somnifera were evaluated for the antibacterial/synergistic activity by agar plate disc-diffusion assay against Salmonella typhimurium and Escherichia coli. Different concentrations of Tibrim, a combination of Rifampicin and Isoniazid, were tested to find out the minimum inhibitory concentration (MIC), which came out to be 0.1 mg/ml for S. typhimurium and E. coli. From the six extracts tested, only methanol and hexane extracts of both leaves and roots were found to have potent antibacterial activity. A synergistic increase in the antibacterial effect of Tibrim was noticed when MIC of Tibrim was supplemented with these extracts. The antibacterial/synergistic effect of extracts can be attributed to the presence of withaferin A and withanolide D. This investigation supports the idea of using plant metabolites as antimicrobial and synergistic agents, which can help mankind to curb the evolution of drug-resistant strains of microbes [Arora et al, Fitoterapia, 2004, 75 (3-4) 385-388].

Leaves of Memecylon malabaricum possess antimicrobial activity

The decoction of flowers and twigs of Memecylon malabaricum Cogn. (Melastomataceae) is traditionally used for the treatment of various skin diseases including herpes. The petroleum ether, chloroform and methanol extracts of its leaves were tested by Hullatti and Rai of Department of Applied Botany and Biotechnology, University of Mysore, Manasagangotri, Mysore for antimicrobial activity. Methanolic extract showed strong to moderate inhibitory action against both Gram positive (Bacillus subtilis and Salmonella typhi) and Gram negative (Escherichia coli and Pseudomonas aeruginosa) bacteria. It also showed strong inhibitory action on all the tested fungi, viz. Aspergillus spp. and Fusarium oxysporum [Hullatti & Rai, Fitoterapia, 2004, 75 (3-4), 409-411].

Anticonvulsant activity of Mimosa pudica decoction

In many countries, extracts of Mimosa pudica Linn. (Hindi — Lazwanti, Chui-mui) are used in the treatment of headache, migraine, insomnia, diarrhoea, dysentery, fever, piles and fistula. Only few pharmacological studies have been reported on this plant, used in traditional medicine to treat many diseases related to the nervous system. Ngo Bum and others from Novartis Pharma Ltd., Basel, Switzerland and Cameroon conducted studies to evaluate the effect of this plant in this system and particularly its anticonvulsant activity. Male Swiss mice (20–25 g) were used for the study. The decoction of leaves (i.p.1000–4000 mg/kg) protected mice against Pentylentetrazol and Strychnine-induced seizures. It had no effect against Picrotoxin-induced seizures. It also antagonized N-methyl-aspartate-induced turning behaviour. The results of this study confirm the presence of sedative and anticonvulsant properties and could explain its use in African traditional medicine [Ngo Bum et al, Fitoterapia, 2004, 75 (3-4), 309-314].
**Therapeutics**

**Clausena excavata wood possesses immunomodulatory activity**

*Clausena excavata* Burm.f. (Hindi — *Agnijal*), a wild shrub of Rutaceae family, is widely distributed in Southern Asia and is cultivated for its orange flavoured edible fruits. It is used as a folk medicine for treatment of cancer and several disorders in the eastern part of Thailand. It has been claimed to be a helpful folk medicines in the treatment of paralysis, colic, stomach trouble, fever and headache. It is insecticide, tonic and vermifuge. The main constituents of this plant have been revealed as carbazole alkaloids and coumarins. Various biological activities of this plant have been previously investigated. The ethanol extract from its root bark has antibacterial activity with complete inhibitory effect against most of the tested microorganisms. The methanol extract from its stem bark showed an inhibitory effect on rabbit platelet aggregation; chromatographic fractions of this extract showed different and contrasting effects on the activity of the platelets. The aqueous extract from its wood afforded antimutagenic effect to both direct and indirect mutagen in Hepa 1C1C7 murine hepatoma cell line. The acetone extract from its leaves gave several novel furanocoumarins with inhibitory effects on tumor-promotion against 12-O-tetradecanoylphorbol-13-acetate-induced Epstein-Barr virus early antigen activation in Raji cells. An increase of CD4/CD8 ratio in advanced cancer patients taking orally the crude extract from its wood prepared by the Thai folklore method was also demonstrated. Moreover, the crude extracts by aqueous and acetone hot extraction also gave significant *in vitro* phagocytosis and proliferative activity in mouse immune system. In order to prove the immunomodulatory activity of this plant as claimed by many folk doctors in Thailand, Manosroi and others of Chiang Mai University and Naresuan University, Thailand investigated effects on lymphocyte proliferation of various fractions eluted from these extracts. The effects of fractions from hot aqueous extract, acetone extract and the folklore preparation of the plant were studied on mouse splenocyte proliferation. The fractions of hot aqueous and acetone extracts were found to be the most active. The fractions from the crude folklore preparation were less active. In conclusion, the present study suggests that the wood may contain components, which have immunomodulatory activity on mouse immune system. From the overall results the popularity of this plant in folk medicine as remedy for cancer and HIV patients in the eastern part of Thailand is partly explained. Isolation and identification of immunomodulating active compounds, especially from the aqueous extracts, was further investigated [Manosroi et al., *Fitoterapia*, 2004, 75 (3-4), 302-308].

**Anti-inflammatory activity of Indian Almond Tree**

Indian Almond tree, *Terminalia catappa* Linn. (Hindi — *Deshi-badam*) of Combretaceae family is widely distributed on tropical and subtropical beaches. The leaves of this plant have been used as a folk medicine for treating dermatitis and hepatitis in India and Philippines. Fan and others from Institute of Materia Medica, Nanjing University School of Medicine, Nanjing, PR China studied the anti-inflammatory activity of ethanolic extract of leaves using 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced ear edema in acute and chronic models. A bioassay-oriented fractionation procedure showed that the activity concentrates in the chloroform fraction. Ursolic acid and 2α, 3β, 23-trihydroxyurs-12-en-28-oic acid isolated from the chloroform fraction, exhibited strong anti-inflammatory activity. The results suggest that the triterpenic acids are responsible for the anti-inflammatory activity of the leaves. The chloroform fraction of the ethanol extract of the leaves, in topical application, is capable of reducing inflammation in TPA-induced acute and chronic ear edema in mice [Fan et al., *Fitoterapia*, 2004, 75 (3-4), 253-260].

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*Rutaceae* family

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