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IN THE PAGES THAT FOLLOW.....

Registered Office
C. I. C. House,
199, Kew Road,
Colombo 02, Sri Lanka

Factory & Office
P. O. Box : 02,
Malinda,
Kapugoda, Sri Lanka

Tel : 94 11 2409294, 2339046
Fax : 94 11 2409293

e.mail :
info@linknaturalproducts.com

web site :
www.linknaturalproducts.com

EDITORIAL

THE POWER OF SMELL

Mankind's first greatest asset is the capacity for observation. The basic instruments for such observation are the natural senses, mainly the eyes, ears and nose. The sights, sounds and smells comprise the fundamental data on which the brain bases its impressions and responses. This is true in the case of the entire animal kingdom. Babes as well as other mammalian young are able by instinct to recognize their respective maternal smells, which they then learn to associate with proximity to the mother and ensures for them security, warmth, and of course food.

Mankind in their primitive state recognized the invigorating influence of forest odours – the combined aromas of flowers, fruits, leaves and even the rotting debris of the forest bed. Moving through a rain forest one can sample these energizing aromas of nature.

Most outdoor folk are quite familiar with the fresh aroma that the aftermath of the first rainfall brings to a parched countryside. The pleasant aroma of freshly mown grass is familiar to many. The sharp aroma of the wind blowing across a field of *mana* grass or citronella brings feelings of freshness. These are some of the pleasing experiences of a symbiotic lifestyle with nature.

The aroma of fresh flowers, - which give of their best during the pre-dawn hours – has an almost euphoric effect, which stimulates, and impregnates their characteristic impression in the memory compartment of the mind. Jasmines, Roses, and Lavender each gives out a characteristic aroma which the nose detects and helps the mind to log into its memory. Ylang-ylang a flower of the small islands surrounding Madagascar is even more spectacular. It forms a multiple canopy on top of the grotesque-looking branches of the trees and displays its enchanting evanescent aroma.

The spices, which add piquancy to our daily foods, also boast characteristic aromas. The experienced individual and cooks for certain, are able to tell apart their respective aromas. The aromatic chemicals that constitute the essential oils within them are responsible for the characteristic aroma of spices, and other substances in them govern the piquancy.

Olfactory nomenclature however is pitifully inadequate in describing taste (piquancy) as well as smell (aroma).

> *"What's in a name"*, Shakespeare's Juliet mused,
> *"A rose by any other name would smell as sweet"*

Can we determine how a molecule smells on the basis of its chemical formula? No, not yet.

The precise mechanism by which the nose is able to identify smells is yet obscure. Yet modern perfumers are skilled in the art and science that enables them to put together aromatic chemicals, - both natural and synthetic- and design fragrances that respond to human needs. This is the Art of Perfumery. Just as a skilled artist composes a painting with colours of different hues, or a musician composes a melody using different notes, so does a perfumer *compose*, a fragrance using an array of different aromatic chemicals. Yet at the molecular level very little is known.

Just recently, a biophysicist by the name of Luca Turin has proposed a theory which implies that the nose is able to detect particular molecular vibrations. It responds to molecular vibrations like a spectrometer responds to frequency vibrations... The theory also implies that that the receptors of the nose shoot out electrons of different energy levels at the olfactory molecules, and these measure the different patterns of energy absorption. It is a vivid theory and Luca Turin is conducting intensive research to establish his ideas.

However, be that as it may, as in the case of taste, aroma too needs to develop an olfactory nomenclature beyond the realm of mere subjective description. This will have to include the brain-nose combination and take cognizance of the conscious as well as the sub-conscious states. Aromas give rise to physiological as well as psychological responses. This is well established in traditional theories such as Ayurveda. It is also the foundation of the modern concepts of Aromatherapy and Aromachology.

HERBAL MEDICINES FOR THE PEOPLE

Devapriya Nugawela*
Chairman / Managing Director, Link Natural Products

It is often been stated mistakenly, that the people in the developing world prefer traditional medicines because these are cheaper. I strongly believe that the cost is not a major reason. In my opinion, millions of people in the developing world use traditional medicines because,

* They believe in them
* They have faith in the system
* They deal with practitioners with whom they are comfortable.

What is Traditional medicine?

Traditional Medicine has a long history. It is the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in prevention, diagnosis, improvement of treatment of physical and mental illness. The terms complementary/alternative/non-conventional medicines are used interchangeably with traditional medicines in some countries. Traditional Medicine involves the use of medicinal plants, animal parts and minerals; those made from plants, constitute more than 90% of the traditional medications.
Herbal medicines and Herbal Healthcare Products include medicinal plants, herbal materials, herbal preparations and finished herbal products that contain as active ingredients, parts of plants or other plant materials or combinations. Herbal medicines have been used from time immemorial for healthcare. Their use for such a long period has established their safety and effectiveness.
There are three types of Herbal Healthcare Products in the market.

1. Generic herbal pharmaceuticals or finished herbal products manufactured according to traditional pharmacopoeias. These products are normally dispensed or prescribed by practitioners.
e.g. Arishtas, asava, rasayana, choorna, gritha, kalka, guggulu, etc. in ayurveda

2. Products for specific diseases/ailments, developed recently by pharmaceutical companies using traditional medical knowledge and normally prescribed by physicians.
e.g. Herbal bowel regulators, many Chinese preparations

3. Herbal Healthcare Products which are Over-the-counter (OTC) herbal products developed by pharmaceutical companies using traditional medical wisdom and modern technological processes. These products can be health foods, nutraceuticals, dietary supplements, herbal cosmetics, aromatherapy products, etc.
e.g. Samahan, Kesha herbal hair oil, St. John's Wort, products of Ginko biloba.

Regulations and Registration of Herbal Medicines

Regulations and Registration of Herbal Medicine vary from country to country. In most of the developing countries, herbal medicines are well established and the respective governments support them. However, in most of the industrialised countries, these products are regarded as dietary supplements, and no therapeutic claims are allowed. Rules differ among countries.
In the United States, the chances of marketing a herbal product as a drug or to give it medicinal claims are low, because at present the Food and Drug Administration (FDA) does not accept bibliographic evidences of effectiveness, but prefers controlled clinical trials as evidence of efficacy. Therefore, marketing our generic pharmaceuticals in the US is not possible at present. However, regulations are different for other Herbal Healthcare Products. These products are

* Based on a presentation by Dr. Devapriya Nugawela, for the Theme Seminar at the 59th Annual Sessions of Sri Lanka Association for the Advancement of Science, at the Sri Lanka Foundation Institute, Colombo 7, 2004

controlled by the Dietary Supplement Health and Education Act (DSHEA). This Act recognizes that dietary supplements have been shown to be useful in the management of chronic diseases and therefore, help limit long term healthcare costs.

Herbal products and other botanicals, vitamins and minerals now fall under this definition of dietary supplements which are presented in dosage forms such as capsules, tablets, powdered sachets, liquids, etc. and labeled as a dietary supplement. The law provides that, a dietary supplement cannot have therapeutic claims and does not need a pre-market approval by the FDA. A statement on the label of a dietary supplement as recommended for nutrient deficiency, or the documented mechanism of action to maintain a function, as characterized should be included. In addition, however, it must be clearly stated in the label that *the product has not been evaluated by the FDA and that this product is not intended to diagnose, treat, cure or prevent any disease.* Furthermore, the ingredients and plants or parts of the plants and their quality must be clearly listed.

In Germany, the criteria for reviewing herbal medicines were developed by a multidisciplinary committee called Commission E. Instead of examining individual preparations, the commission studied individual medicinal plants and produced two sets of monographs covering over 500 medicinal plants. The Positive set of monographs covers medicinal plants which are safe and efficacious and describes labeling requirements, indications and dosage etc. The Negative set deals with plants where safety is doubtful and reasonable proof of efficacy is not available. *Herbal products which do not pose a direct or indirect risk to health are exempt from the approval requirement (e.g. Herbal teas). To ensure the quality, safety and efficacy of these products, the manufacturers must comply with a monograph of standardized marketing authorisaiton which includes analytical tests and labeling requirements. These are published by the Ministry of Health. These products need not apply for the approval from the Federal Institute of Drugs and Medical Devices.*

Legal status and the registration requirement for herbal products in other European countries are similar to Germany, but tougher. Regulations in Japan are similar to those in the United States. In Australia, herbal products are controlled by a division of the Therapeutic Goods Authority (TGA).

Herbal Pharmaceuticals or Generic Products in Sri Lanka

Manufacturers

Registered with Dept. of Ayurveda	300
Unregistered	Equal or more

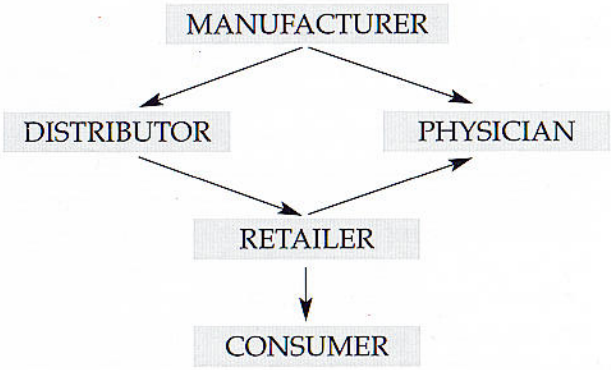
Market value

Organised sector	Rs. 1.2 – 1.5 billion/yr
Unorganised sector	approx. Rs. 1 billion/yr

Exports

Approx. Rs. 50 million / year

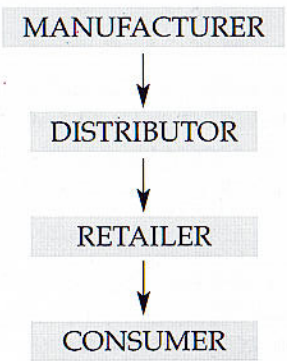
The local distribution network for Generic Herbal Pharmaceutical products can be represented as follows :-



The situation in regard to Herbal Health Care Products (OTC Products) in Sri Lanka is :-

Manufacturers Registered with Dept of Ayurveda	300
Market value	Rs. 1-1.5 billion/yr
Exports	approx. Rs. 200 million

Herbal Health Care Products – Distribution Channel



A SWOT Analyses of the existing situation in Sri Lanka may be represented as follows :

STRENGTHS * Access to time tested Ayurvedic and indigenous know-how * Climatic zones suitable for the cultivation of many of the medicinal plants * Rich biodiversity including many endemic flora * Herbal products are consumer friendly * Government recognition * International recognition for quality products from Sri Lanka * Tourist industry served. * Educated and trainable workforce	WEAKNESSES * Non availability of sufficient raw materials * Lack of current Good Manufacturing Practices (GMP) * Absence of quality standards and registration procedure * Difficulty in obtaining quality packing materials * Absence of state incentives
OPPORTUNITIES * Resurgence of natural products in the world * Preference over synthetic medicines due to their side effects * Lack of cures for chronic ailments in the modern system	THREATS * Marketing of substandard and adulterated products * Products with false therapeutic claims * Lack of sufficient regulations * Non-enforcement of existing regulations * Unregulated, uncontrolled and unethical advertising and promotion

Concluding Observations

To secure good quality raw materials, we need to do the following :-

* Develop good planting material
* Develop good agricultural practices
* Develop good post harvest treatment methods
* Develop suitable storage conditions
* Disseminate the knowledge to farmers and guarantee reasonable prices

Variation of the quality of generic Ayurveda products can be due to,

* Inconsistent formulae
* Use of incorrect raw materials due to wrong identification
* Poor quality raw material
* Inconsistent and poor production processes
* Absence of quality standards for finished products
* Absence of proper packaging

Accordingly, the requisites for a successful herbal health care products industry in Sri Lanka may be summarized as the following.

1. Correct and effective formulations containing only plant materials of well established use, without side effects
2. Identification methods and quality standards for plant materials
3. Development of dosage forms
4 Standard operating procedures (SOPs) for manufacture
5. Specifications and test methods for the finished products
6. Stability studies, and ensurement of a prescribed shelf-life.
7. Production facility with GMP and trained staff
8. Proper packaging and labeling
9. Correct marketing strategy
10. Post market surveillance

Indroducing SWASTHA - *The "Wellness" Series of Link*

Tuley de Silva *
Consultant/Director, Link Natural Products.

Before presenting the properties and uses of our newly formulated Swastha Thriphala, - which will be the first of a new Link Swastha Series of Herbal Wellness Products – may I take you to the initiation of the idea of its development. Link Natural being the leader in the manufacture and presentation of quality herbal products to the market in Sri Lanka, recognized the need for a product that could offer some relief to those leading hectic and stressful lifestyles which are presently unavoidable.

We are referring to here those lifestyles that lead to irregular mealtimes, skipping of meals, lack of exercise and rest, suppression of the natural waste elimination processes, as well as short temper and irritability. Further, bad food habits such as excessive intake of food, heavy and fatty meals, take-away fast foods, and allergic foods are also contributors towards health problems. In other words the demands of present day lifestyles contribute substantially to many of our health problems.

According to the concepts of Ayurveda, proper functioning of the digestive system is a prime contributor towards a healthy long life. This includes: good digestion, effective absorption and assimilation of the nutrients in the food, stimulation of the metabolic and other vital functions of the body, and efficient elimination of waste material. Ayurveda, with its holistic treatment approach, attributes most symptoms of ill-health to weakened functioning of the digestive and metabolic processes. The manifestations are hyperacidity, gastric irritation, flatulence, indigestion, regurgitation, irregularity of bowel function, lack of appetite, fatigue, general debility, irritability, depression and lack of resistance to diseases.

Improper absorption and assimilation of food intake, invariably leads to malfunctioning metabolic and other vital processes in the body, which in turn results in such manifestations as obesity, diabetes, skin diseases and circulatory problems. Incomplete bowel function results in such symptoms as puffiness, abdominal discomfort, headaches, bad breath, and even mental stress. Irregularity of bowel movement and constipation results in the retention of unwanted waste in the intestines and colon, causing, irritation of the mucosa, generation and absorption of toxic substances, and even depression.

Now, modern medical treatment for most of these conditions is on a symptomatic basis, in other words, to relieve these warning signs. But, if these symptoms persist, and are overlooked they could lead to diseases such as: gastric ulcers, other bowel syndromes, hemorrhoids, fissures, fistulae, rectal prolapse, and even colon cancers.
Hence, normalization to enable proper functioning of the digestive processes is essential if we are to prevent ill-health and promote health.

Ayurvedic wisdom from old texts, as well as that drawn from consultations with experienced and reputed Ayurvedic practitioners, were pooled as we went in search of a product that could alleviate and prevent the symptoms and conditions described heretofore, as well as to ensure and promote good health.

The Ayurvedic formulation Thriphala, consisting of the famous three fruits Aralu, Bulu, and Nelli, was selected by Link Natural, as the best choice for development, and to commence the projected new Link Swastha series of herbal drugs. Thriphala, has long been regarded as a cornerstone of Ayurvedic healthcare practice, to promote health, immunity, and longevity by maintaining the proper functioning of the processes of digestion, absorption, and elimination.

Swatha Thriphala now presented by Link Natural may be introduced as an exclusive product developed after over three and a half years of dedicated R & D, conducted by Link Natural's multi-disciplinary team of researchers, consisting of Ayurveda practitioners, scientists, technologists, and consultants. The research goal was to develop a product that conforms to good quality standards, is uniform and in therapeutically effective dosage, and is in line with the official specifications and requirements established for tablets.

Accordingly, Link Swastha Thriphala has been scientifically formulated, and produced using scientifically optimized process protocols, in accordance with a proprietary formula, and designed to deliver a uniform dose, bring about swift action, and is guaranteed to retain its potency for use by the consumer. This formulation caters to the most common needs of the modern, busy and stressful lifestyle of the consumer who by virtue of his or her commitments often lacks the time to attend to healthcare needs, such as good and regular food habits, exercise and rest

Hence this new wellness product, Link Swastha Thriphala, in a convenient tablet for the care recommended to alleviate the symptoms described in the foregoing sections, and maintain a proper functioning of the digestive system. Each tablet of Link Swastha Thriphala is formulated to include the equivalent of 1g of thriphala, so that the pharmacopoeia recommendation of dosage for therapeutic action can be realized with the minimum number of tablets. **Link Swastha Thriphala is the only product in the market in Sri Lanka with the Thriphala formula, that conforms to specifications in the pharmacopoeia for a tablet, viz: uniformity, of weight and dosage, disintegration, hardness, friability and stability.**

It is well documented that regular daily use of thriphala, rejuvenates the body, thus slowing down the onset of the symptoms of ageing, assists in improving liver and pancreatic functions, eyesight, circulation and skin complexion, besides helping to overcome the general symptoms caused by overwork and stress. Regular use will also minimize the complications of high cholesterol, diabetes as well as the symptoms arising from cancer therapy. Therefore Link Swastha Thriphala can securely be recommended for a healthy long life, with no distinction to age. It is a very safe product and can be regularly used with no side effects or complications.

Swastha Thriphala is marketed by Link Natural Products, in three pack sizes, of 30, 60, and 120 tablets. It contains directions for use as a wellness habit and for rejuvenation, relief of digestive disorders, and bringing about bowel regularity. It must be noted that the benefits from Thriphala will become evident only after about two to three weeks regular use.

The company Link Natural Products, it may be mentioned here, has a well managed modern manufacturing facility and a fully equipped R & D facility at its campus in Dompe, The company has been credited with ISO9001:2001 Quality management, and ISO14000:2004 environmental manegent certifications. Swastha Thriphala is the latest addition to the now well known Link Natural Products' range viz *Samahan, Kesha, Sudantha,* and *Gotukola.* The flagship product Link Samahan is exported to many countries including India, USA, Germany, Japan, and Malaysia.

The company was awarded the Presidential Environmental Award for 2004, and the National Science and Technology Award for the production of Standardised Quality healthcare products in 2005.

In a nutshell, Swastha Thriphala is a Healthcare Product that needs to be taken daily, regularly, to promote health, avoid ill-health, and to prevent the ill-effects of hectic and stressful lifestyles, and thereby bestow a healthy long life.

*Based on a key note presentation made by Professor Tuley de Silva at the Waters Edge on September 12th 2006, to mark the launching of the new product Link Thriphala.

EUROPEAN MARKET TRENDS FOR NATIONAL HEALTH AND PERSONAL CARE PRODUCTS

The global demand for herbal medicines has increased dramatically during the last decade. The trade in herbal medicines in Europe is presently estimated at 10 bn and is reported growing by at least 10 % annually (www.cbi.nl).

Various trends contribute towards this increasing demand. Among these trends are:

* Enhanced consumer demand for alternatives to pharmaceuticals and modern synthetic healthcare products
* The entry of comparatively big companies into the herbal medicine scenario, which has generated many over-the-counter (OTC) products, and placed herbal medicines more strongly on the mass market
* Increased advertising budgets and media attention for herbal medicines which have contributed to rapid growth in consumer demand
* Increased emphasis on safety, efficacy and quality, which has resulted in more R&D, a shift towards standardized products and a demand for high quality raw materials
* Acceptance of herbal medicines by national health insurance companies, eg. in Germany

European buyers are requesting agronomically certified raw materials, or value added products, from exporters. There is also a large transfer of natural ingredients from developing countries to the European pharmaceutical industry for purposes of R&D. "Bioprospecting" is an ongoing exercise where pharmaceutical companies themselves, or through sponsored university research are prospecting for new bioactive ingredients for new innovative products.

Leading suppliers of medicinal and aromatic plants and value added products to the EU are reported to be China, India, Morocco, Egypt, Turkey, Kenya, Brazil, Chile, Mexico, Indonesia and Madagascar.

Although EU imports of medicinal plants have decreased, imports of plant-derived alkaloids have increased over the years. This implies that some primary processing is being carried out in the producer countries.

Trends impacting demand for natural personal care and cosmetic products and the demand for natural ingredients are identified as the following

* Increased consumer sophistication and a sway towards things natural
* Changing demographic pattern (aging population)
* Increased demand for OTC products (cosmeceuticals & nutraceuticals)
* The entry of mass and prestige market companies with large advertising budgets

It is recorded that most companies source materials from a number of countries. Some of the products sought after 2001 included: the essential oils of jasmine, vetiver, geranium, other essential oils (spice oils), and essential oils of lemon and lime. Fixed oils such as coconut oil, castor oil and peanut oil were also in demand. Again the most significant supplier countries were China, India, Brazil, Argentina, Morocco, Indonesia and Mexico. The survey records a continued market demand for the following categories of natural products.

* Essential oils: Geranium, jasmine, Ylang-Ylang, citrus, vetiver, patchouli, sandalwood, mint, cedarwood, nutmeg and clove
* Vegetable (fixed) oils and butters: castor, coconut, peanut, sweet almond, cocoa butter, shea butter and illepe butter
* Natural pigment: Natural pigments: indigo, cochineal, carmine, turmeric, marigold and henna
* Plant extracts: *Cassia angustifolia, Centella asiatica and Tamarindus indica* L
* Assorted botanicals: sugars, seeds, spices, herbs, honey, natural gums and resins

-Ayesha

SOURCE :

CBI News Bulletin, p. 13 2005.

RUNNING OUT OF WEAPONS AGAINST GERMS

"We have let our profligate use of antibiotics reshape the evolution of the microbial world"
Marc. Lapp_

Resistance to antibiotics has given rise to many widely different types of bacteria. The rational conclusion appears to be that man has upset the balance of nature (Davies, 1994; Levy, et al., 1985).

At the time Alexander Fleming discovered Penicillin and it was first applied, there were few bacteria that were resistant to it. Fleming himself noted (Brit. J. Exp. Path, 1929) that numerous bacteria had become resistant to the drug, and warned in 1945 of the misuse of Penicillin which could lead to the development of resistant bacteria. By 1950, 50% of *Staphylococcus aureus* bacteria had already become resistant to Penicillin and by 1995 that figure had leaped to 95%. The resistant strains are common worldwide.

"Antibiotic usage has stimulated evolutionary changes that are unparallel in recorded biological history"

Stuart Levy, MD

Plants were used to combat bacterial diseases well before recorded time. Anthropologists have reported the presence of medicinal herbs intentionally placed in the grave of a Neanderthal man over 60 thousand years ago (Buchner, 1999). The recently discovered Iceman of Sud Tyrol also had a complement of medicinal plants on his personal clothing (The Iceman, 1999, A Flickinger & H. Sliner. Tyrol Museum of Archeology). This dates at around 3350-3100 BC.

Recent large scale global research had been stimulated by WHO's 1978 Resolution of Health for All by the year 2000. This declared that sources other than medicines derived from western technology will doubtless have to enter the equation if the WHO goal was to be realized. Recent research in China, India, Europe, Japan as well as North and South America, has amply revealed the wealth in Traditional medicine. Today, only an ignoramus will consider it as "green quackery".

When one considers herbal medicine, its long usage simultaneously in widely different cultures of the globe, modern scientific research results and the inclusion of plant-derived substances in modern medicine, we have an arsenal of future medicines.

Some plant species with recently revealed bioactivity are;

Acacia sp., Aloe spp., *Allium* sp., *Cinnamomum* spp., *Cryptolepis* spp., *Centella asiatica* vars., *Eucalyptus* spp, *Ficus* spp., *Glycyrrhiza* spp., *Artemisia annua, Brucea fararica, Echinaceae* spp., *Curcuma* spp., *Piper* spp., *Lawsonia inermis, Uvaria* spp., *Usnea* spp., *Zingiber officinale.*

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-Annissa

Heritage of Lanka

" The woods are their apothecaries" shops, where with herbs, leaves and the rinds of trees they make all their physic and plaisters with which sometimes they will do noble cures..... A neighbour of mine Chingulay, would undertake to cure a broken leg or arm by application of some herbs that grow in the woods, and that with that speed that the broken bone after it is set should knit by the time one might boyl a pot of rice and three carees, that is about an hour and a half or two hours, and I know a man who told me he was thus cured."

Robert Knox (1681) in
"A Historical relation of Ceylon"

FINN SANDBERG ("The FLYING FINN OF SWEDEN") – DOYEN OF RESEARCHERS ON MEDICINAL PLANTS

by R. O. B. Wijesekera

In the year 1960 a young researcher just introduced to research on the subject of medicinal plants, received a communication from a Professor of Pharmacognosy of the University of Uppsala, in Sweden. He was then renowned for his work on the metabolites from toxic plants used in medicine by primitive tribes and the physiological action of these. His name was Finn Sandberg; and he was passing through Colombo, en route to the IUPAC Symposium on Natural Products to be staged in Australia.

Ocean liners in those days called in at Colombo to refuel and pick up food, so that the passengers had a day out. Finn was keen on meeting those in Colombo who had similar interests. As a result warm lasting friendships were forged from which in the ensuing years Ceylon then as a country and latterly Sri Lanka, was to benefit considerably. This indeed was the beginning of the Sri Lanka connection with Swedish science and the SIDA and SAREC organizations.

Finn became a regular visitor whenever in the days of airways he happened to pass through Colombo. He never failed to break journey, meet with colleagues and discuss medicinal plant research. He was a medical man with pharmacology and pharmacognosy as his main interest. His interaction with Sri Lankan scientists like Senaka Bibile, and the author, resulted in the staging of UNESCO's second International Symposium on Medicinal Plants, in Kandy in 1964 - now designated ASOMPS II. He had been responsible for the first of this series in 1960 in Peshawar. After a lapse of several years he visited Colombo once again in 1976, and this resulted in the staging of what became ASOMPS III. The now acknowledged acronym ASOMPS for Asian Symposium on Medicinal Plants and Spices was coined in 1976, and he was responsible for introducing the subject of spices to this series. Since then Finn Sandberg has been a key force in UNESCO's much valued ASOMPS series, which has been held regularly, for which he received the Einstein Medal from that organization.

Apart from Asia his interest stretched onto four continents including Latin America and Africa.

Prof. Finn Sandberg

He is known and respected in all these as the doyen of Medicinal Plants research. Many Third world students, several from Sri Lanka, learnt from him and researched with him and his colleagues at Uppsala and invariably enjoyed his lavish hospitality there in his splendid home in Bultarbo Estate. Among the many Sri Lankans who worked at Uppsala were A. L. Jayewardene and Lakshmi Arambawela.

This author had a special relationship with him and as a result there is a laboratory at the CISIR (now the ITI), in Colombo, named the "Finn Sandberg Laboratory" dedicated to research on medicinal plants.

In 1970 Finn together with Dr Archalus Tchecknavorian , initiated the UNIDO program on the Industrial Utilization of Medicinal Plants and Essential Oils. In time he generously handed over this task to the present author, who as his successor expanded the program to one of the largest such within the UN system. Finn continued to assist the program, frequently traveling to Africa and Latin America as an expert, and training scientists in Pharmacology and Pharmacognosy and most important in the planning of field trips to gather specimens for research. Finally the program was handed over to another Sri Lankan, in Tuley de Silva.

Finn as an octogenarian now, and not quite in robust health, remains hugely interested in a subject for which he is world renowned as a pioneer and a much respected "third world" collaborator. There are hardly any honours that he has not received in Scandinavia where too he is regarded as a doyen in this research area.

The DIGEST wishes him good health, and many more years of fruitful collaboration with researchers of the third world.

(See also Digest Vol 1 Issue 2)

ANNATTO – A CROP WITH INDUSTRIAL POSSIBILITIES for SRI LANKA.

By R.O.B. Wijesekera.

I. INTRODUCTION. WHAT IS ANNATTO?

"Annatto" is the name of a somewhat little known plant in Sri Lanka which has been domesticated in the island and grows partly in the wild state. It originates in southern America, and is largely cultivated there. The seeds of the fruits of this plant, which has a striking superficial resemblance to the better known "Rambutan", are used to obtain a widely utilized natural colorant, red to deep yellow. The colour in the seeds and seed coat is employed in industry as general food colorant. It is the world's most important natural colorant next to caramel. It is also used as a condiment in the growing countries, particularly in the Latin American and Caribbean regions. In industry Annatto is traded as the seeds in the raw dried form and as value added products in the form of extracts.

There are various names given to this plant which in botanical nomenclature is *Bixa orellana* L. (family Bixaceae). It is a medium to small sized tree, native to the tropical central and South America, but is now widely distributed throughout the tropics. It is also known by its Spanish original name "achiote" or its Portuguese name "urucum". In Sri Lanka the plant is identified by the name "Rata Kaha" or "Rathu Kuppa", in Sinhala, and the Tamil names current in India are "Kangaram" and "Sapira". In English it is called the "Lipstick Tree."

The global production of the dried seeds of this plant is estimated at around 10,000-15000 metric tons, and the world trade at around 7000 tonnes annually. [1-6]. Peru and Kenya, together with Brazil are the major producers and the industrial usage is centered on the USA, EU countries and Japan.

The annatto seeds are valued on account of the pigments which are situated on the seed coat, and which impart a red to yellow colour to food items, in particular, cereals, butter, cheeses and other dairy products.

In recent times annatto extracts are in demand and are extensively employed in the food and nutraceuticals industries.

Annatto is a most adaptable plant and grows very well in parts of Sri Lanka. (See photograph of a sample collected from the region of Malvana, an area famed for its rambuttans.). It is said to thrive best in subtropical conditions. {7]. It is well suited to an agro-forestry system, [2], and may be a good candidate for Sri Lanka particularly as there is currently a shortage of the processed annatto extracts in the world market. Sri Lanka possesses the technological expertise to make standardized extracts such as are now being made in the field of Ayurvedic pharmaceuticals.

Besides its use in the colouring industry, and as a gentle flavoured connoisseurs' spice, much valued in culinary practices, Annatto is also a medicinal plant, and extensively utilized in herbal curative treatment in the Latin American region. [8-11].

A pretty plant appreciated hugely by ornamental plant enthusiasts it is a good candidate for pragmatic as well as aesthetic reasons for cultivation in the country.

II. GLOBAL TRADE & TRENDS

Estimation of the scale of the global trade in annatto and its products is complicated by the fact that the records do not always indicate if the trade is in seeds or the extracts. The extracts are traded according to the estimated content of the active pigments. However the following figures are stated as an indicative guide. [1-7]

Total World Trade = 7000-9000 tonnes.
(Calculated as seed equivalents)

Main Importers: [2]

USA + Canada	2500 tonnes	10% as extracts.
EU countries	2500 tonnes	25% as extracts
Japan.	1500 tonnes	80% as extracts.
Others	1000 tonnes	-------

The growth of the market in extracts is of recent origin and factors contributing to this could be the following:

* The ban on several synthetic competitors
* Instrumental techniques for swift assay of constituents of extracts
* Improved technology for making extracts in producer countries.
* Co-involvement of importer countries in production at the source.

This is now the major trend for a number of reasons such as:-

* The reliability of extracts with respect to quality
* Seeds are liable to bio-deteriorate in shipping.
* Extracts are simpler to handle and constitute smaller volumes.
* Extracts are simpler to use in industry.

Besides the producer nations mentioned there are countries which produce annatto for domestic use such as Brazil, India and China, and among the smaller nations for domestic as well as regional use, are the following: [4-7]
Columbia, Dominican Republic, Ecuador, Jamaica, Costa Rica, & Guatemala and Ivory Coast, and Angola in Africa. Sri Lanka, Thailand and the Philippines also figure as minor growers of Annatto.
However the predominant exporter countries are Peru and Kenya.
The following indicative figures can be quoted [1]

Peru	4000 tonnes as seed equivalent.
Kenya	1500 tonnes as seed equivalent.
Other exporters.	1500 tonnes as seed equivalent

Brazil is a significant producer and consumer as well, but is a net importer. In Peru, production of annatto is export oriented, but heavily dependent on harvesting the wild trees.
Peru exports mainly to the USA which also sources products on a small scale from other Latin American and Caribbean countries. The main importer countries within the EU are the United Kingdom and the Netherlands. The Netherlands re-exports to other EU countries. The main EU source is also Peru. The major consumers of annatto are the UK, and France and they account for 70% of the EU demand. In the EU the main use is for the colouring of dairy produce such as cheeses and butter, and margarine. In almost all of the producer countries annatto is dependent on the small farming communities, and is ideally suited to such developing country practices.

III. CULTIVATION AND HUSBANDRY.

Since the 1980's annatto has gained special interest in the food processing and cosmetics industries. It has been accepted as a safe natural colorant for foods that are consumed as well as for cosmetics that are applied to the skin. It is one of the thirteen basic pigments derived from natural sources that are currently permitted by the FDA of the US as well as by the EU. [1-3]. As such its systematic cultivation, harvesting methodology and post-harvest technology has become important for the exporter countries to gain entry or maintain their positions in the international market. [13-15).
The plant *bixa orelana* has shown itself to be adaptable to a wide range of conditions in the sub-tropical and tropical regions. It appears to thrive best in the climatic framework represented as follows;

* Temperature range ; 20-30 C
* Rainfall : An annual distribution of 1000-2000 mm.
* Sunshine requirement: Open sunny positions needed. No large shade trees. A spell to enable the fruits to ripen.
* Nutritional requirements: Grows in a range of soil types with good drainage.
* No special soil enrichment needed.
* Fits well into agro forestry systems.

In the wild state as in Peru the plant thrives and may be suitable for industrial scale harvesting. However it is best if the benefits of cultivation are applied such as the following:

* Vegetative propagation from selected elite cuttings. Species selection will ensure good quality final raw material. It is a good prospect as a candidate for micro-propagation from selected samples if such is possible.
* Artificial fertilizer is not required for average soils. Weed control is necessary with small plants.
* Pruning is important, in order to produce a canopy to facilitate harvesting and to improve yield of fruit pods by exposure to the sun.
* Regularity in harvesting; the first harvest is recommended after 16-20 months following field planting. Hot dry conditions hasten the need to harvest.

* Following flowering ,the fruits or seed capsules appear in 4-5 weeks and continue to ripen for another 4-8 weeks, going from bright green to deep red through a greenish – yellow. Only ripe capsules should be harvested.
* Seed capsules should be harvested as they begin to split. The cluster of seed capsules should be removed with a siccateurs or sharp knife.

Currently in many producer countries it is a supervised though spontaneously grown crop. The annatto tree is about 2-4m in height. There are two recognized forms viz. One is with green capsules and white flowers, and the other with deep red capsules and pink flowers. The latter type is preferred. The fruits occur as bunches at the end of the branches. They are orange red growing deeper red as they mature. The pod is heart shaped with soft prickles, can be easily slit lengthwise and the seeds are arranged inside in lines. (See author's photo inset)
Peak yields are obtained after 4 to 5 years and then productivity declines. The trees should be replaced after 12 years. Yields of seeds are influenced by several factors such as the following:

* Spacing between the trees and growing practices.
* The genetic factors governing the variety
* Climatic factors
* Rainfall and uniformity

Under average conditions the yields of seeds (dried) should be in the range 900kg-1500kg per hectare per year. Each tree may produce in the range of 0.5 to 4kg per year.
The seeds are removed from the pods by softly beating the dried capsules in a loose jute bag. Care should be taken to avoid damaging the seeds. .

IV. POST-HARVEST TECHNOLOGY

Post-harvest technology also has an important bearing on the yield of the colouring pigments. Once the seeds have been harvested they must be dried as swiftly as possible to a moisture content of 7-10%. Over-drying, results in the loss of pigment and under-drying, may result in mould formation and seed germination.
The methods of drying used are several. Traditional sun-drying will take 3 to 10 days during which there arises the danger of fungus formation if not properly laid out. The seeds should be laid out on dry mats or on a dry concrete floor, and spread out well. They should be turned over regularly and stored so that dew may not collect at night. The process of drying can be better controlled by solar driers, or even artificial driers that are generally used for plant materials. Temperatures should be kept below 60C.
Various machines have been designed to carry out these operations in controlled fashion. The design of suitable machines for capsule breaking, sieving and winnowing in continuous operations will not present many problems to a competent mechanical engineer.
Soon after the cleaning and sorting of the seeds they must be packed so as to avoid contamination and pigment deterioration on storage. Long stage transportation must be carried out in ventilated containers.
The instructions for packaging, generally forms part of the contract between the producer and the purchaser. It is best to pack the dry seeds in bags woven from jute or polythene, and of holding capacity of about 50kg per bag.

V. CHEMISTRY, PROCESS - TECHNOLOGY, AND QUALITY ASSESSMENT.

Annatto extracts are ranked as the second most economically important natural extracts in industrial use. [1-3]. The major colour component is the apocarotenoid, 9'-cis-bixin (I) which accounts for almost 80% of the total annatto pigment. It is estimated [3] that over 2000 seeds are required to produce just a single gram of bixin. The first isolation of the pure pigment bixin is credited to a Frenchman, Boussingault [17]. He was living in Columbia, and, was made a colonel in the army of Simon Bolivar before he returned to his native Paris. [19]. It took over 135 years before the chemical structure of the pigment bixin was finally determined by Weedon, Barber, Hardison and Jackman in 1961 [20], although the nobel laureate Paul Karrer, was aware of its geometric isomerism. It is unusual being a cis carotenoid since the commoner form is the trans. Apart from bixin several other pigments have been identified in annatto extracts, among them six apocarotenoids, eight diapocarotenoids and another carotenoid [21-23]. However these are all in minor proportions. Norbixin, (II) the water-soluble dicarboxilic acid, results when bixin is subjected to alkaline hydrolysis. Most extraction procedures can cause changes in the structure with trans bixin being the more thermodynamically stable form. This explains why alkaline hydrolysis results in a combination of both forms of norbixin.

Bixin and norbixin give a reddish colour while orellin and methyl bixin relatively minor constituents give a yellowish hue.
The leaves of the plant contain terpenoid substances and the dominant constituent is Ishwarane. [18]
There are several industrial products that are derived from Annatto, and they depend for their differences on the method of processing. The Chart 1 displays these products, the processes and the uses.
Chart 2, depicts the process technologies used to obtain the various products starting with the raw dried seeds of the annatto.

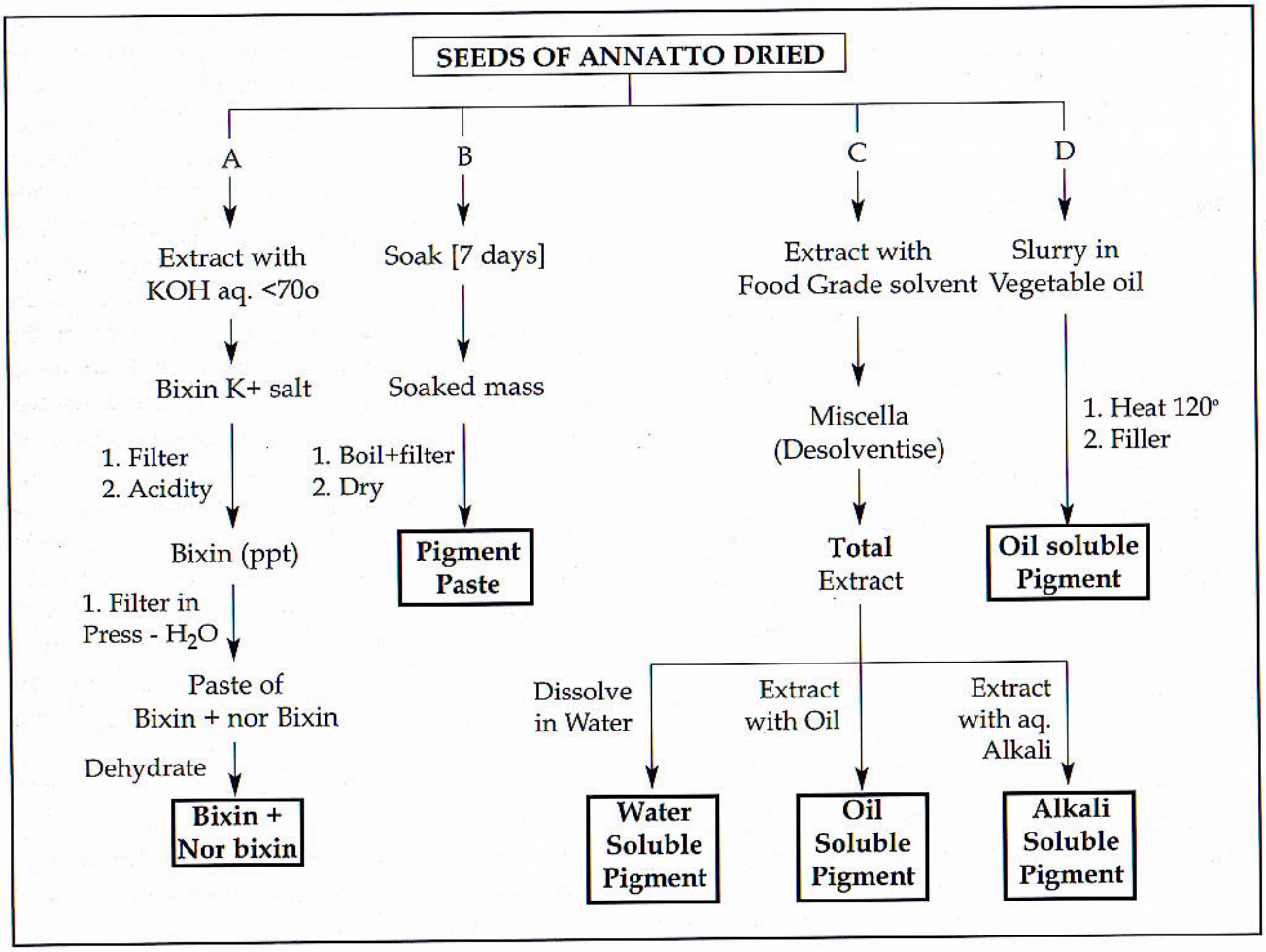
VARIATIONS OF THE TECHNOLOGY FOR EXTRACTION WILL PRODUCE THE SELECTED PRODUCT DEPENDING ON THE INTENDED USE.

CHART 1

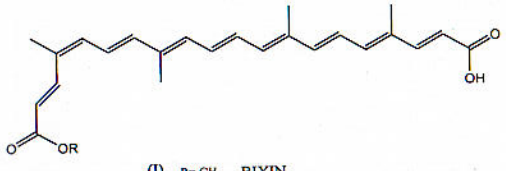
PRODUCT	PROCESS	USES
Water soluble powder	Extraction with KOH/K_2CO_3	Dry mixes. Soups Desserts, (cakes & Confectionery.)
Water soluble liquid.	Extraction with aqueous KOH solution	Cheeses, cereals, drinks.
Oil soluble liquid	Extraction with vegetable Oil	Margarines, butter, salad oils, spreads, spice blends, Pasta, pop corn
Oil suspension Coloring	Extraction with oil Purified pigment emulsified In propylene glycol mono-Glycerides & KOH	--------do---------- Beverages, candies, baked goods, ices, yoghurts.

CHART 2 - TECHNOLOGICAL VARIENTS IN ANNATTO PROCESSING

Four industrially used processes A, B, C and D.



As the total pigments are utilized in the food industry, strict quality assessment is necessary. Besides the above mentioned pigments the extract of Annatto will contain other carotenoids such as: beta carotene, cryptoxanthin, lutein, and zeaxanthin. Analytical methods, based on Thin-layer Chromatography, (TLC), High performance Liquid Chromatography (HPLC), are presently available, and routinely used for the quality assessment of total extracts of Annatto. [3, 23-26, 28].



(I) R= CH_3 BIXIN
(II) R=H NORBIXIN

(III) ISHWARANE

Bixin, (I) which is fat-soluble, is the major product and accounts for around 70-80% of the Total Pigments. This is frequently employed as the yardstick of quality assessment in the trade. Norbixin (II) is the water soluble compound that results from the hydrolysis of bixin. Annatto extract is now included in the list of natural colours by the European Community and the Food and Drug Administration of the USA. The major compound responsible for the aroma that is present in Annatto, is the terpenoid Ishawarane (III). It also the main constituent (54%), of the essential oil of the leaf. [18]

ETHNOMEDICAL USES AND BIOLOGICAL ACTIVITY.

The plant *Bixa orellana* L. and its various parts have found use since antiquity in the medicine of the Latin American and Caribbean regions. The healing properties ethnomedically assigned to the plant, from the seeds and the leaves can be summarized thus: - [9-12]

Main Use:
Antacid
Anti-parasitic
Diuretic
Digestive stimulant
Hypertensive
Enhances blood pressure
Hepatoprotective
Hypercholesterolemia

Subsidiary uses:
ntiinflammatory
Blood cleanser
Febrifuge
wound healing

A decoction of the leaves and the powdered seed are generally used in the ethnomedical therapy. In India too there is evidence of the use of the plant as an herbal remedy within the Ayurvedic system. It is recommended as a remedy for: "the cure of "kapha" and "vata", - headaches, leprosy, blood diseases, biliousness, and vomiting". [27]
Recent findings by Caceras seem to confirm the value of the seeds as a cure for gonorrhea [11] and dysentery, and the leaves are said to be effective as a poultice for the healing of wounds and the prevention of scars. [26].
There is however no evidence of the use of this plant for healing in the systems that currently prevails in Sri Lanka. Recent research has indicated that the extracts from annatto possess a hypoglycemic principle [27, 29] and also Hypotensive activity. [30]. The effectiveness of this plant as used in the early societies in South America merits further investigation.

CULLINARY USES

The annatto was famed in its native South America for adding flavour and glamour to the foods. The practices spread to the Caribbean region where exotic tastes are well received, both by the native population as well as by the traditional tourists. The seeds are usually fried in fat derived from both vegetable or animal sources, and the golden brown oil separated from the seeds by decanting the liquid. This golden brown oil is then used to fry vegetables or meats and fish to render it coloured and flavored at the same time. Mexican cooks use a paste of the seeds stabilized with vinegar, which dissolves in fat, and can be added to marinades and sauces. In south Mexico the spice mixture known as "recado" is enriched for its rich colour with liberal amounts of annatto. In the Caribbean, particularly in Jamaica, Trinidad and Guyana, [31], flavoured yellow rice is made by frying fresh annatto seeds in butter and the rice boiled with this mixture. Deriving from the Spanish influence, annatto has made its way to the Philippines and thence to Thailand where it has entered the culinary practices in this region and thence to Vietnam. Some of the Vietnamese versions of the Beijing Duck utilize annatto. The flavour of annatto is due probably to the terpene Ishwarane [27], which is dominant in the leaves of the plant.

A SUMMING UP

Annatto appears to be a promising candidate for small scale cultivation in Sri Lanka such as is practiced here. There can be many uses for the plant. The medicinal uses can give rise to herbal drugs with much value. The uses as a colorant are dominant, as there is a shortage in the international market scenario. Countries such as Brazil, Kenya, and Peru, which were the traditional suppliers to the international market scenario, have now turned into users. [2]. The same to a lesser extent goes for India and China. [27].

Sri Lanka with its diverse micro-climatic zones could generate quality material. The country possesses the technological expertise to produce extracts, such as are now being produced for medicinal plants and spices. The plant grows well here, as evidenced by the few plants that are seen in a variety of places. There are some in Malvana, and Kurunegala. It could be grown in mass in other places, perhaps the vegetable cultivating areas such as Dambulla, and the harvesting of the pods are seasonal and the logistics not complicated. What has still not been exploited is its use as safe colouring materials for children's toys, pencils paints and suchlike, which may have export possibilities. And the native foods we use in the country could benefit by use of annatto as a flavouring as well as colouring agent. The dangers in the use of the yellow colorants of synthetic origin, and the international ban on these, underscore the promise and potential of Annatto for Sri Lanka.

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The Genesis of : AROMATHERAPY

By VIKRAMA

1. INTRODUCTION – THE HISTORICAL PHASE.

During the times that marked the beginnings of recorded history aromatic plants had been used by mankind to promote a sense of wellbeing and to counter feelings of depression. The burning of incense was one of the earliest of such ritualistic practices. The ancient Egyptians used the oils of cedar wood, clove bud, cinnamon, nutmeg, and also myrrh in embalming. In modern times excavations have revealed the presence of traces of these oils, in the mummified bodies of the Egyptian Pharaohs. The Egyptian physician Imhotep, now regarded as their God of Medicine and Health, is believed to have recommended fragrant oils for bathing, massage and for embalming the dead over six thousand years ago. In China (about the same time) the burning of incense to create harmony and balance was a health-related ritualistic practice. The extraction of the aromatic essential oils from plants by the process of steam distillation was known to the ancient Egyptians, the Persians and to the people of the Indus valley civilization during the period of Mohendra Daro.

Aromatherapy being practised in the time of Gauthama, the Buddha (picture from SLAP)

Down the ages Hippocrates, the "Father of Medicine" practiced aromatic scented fumigation and massage. By such practices he was stated to have rid the City of Athens of the dreaded plague. The Romans had studied the Egyptian and Greek methods and introduced them within the Roman Empire although it is not clearly evident which part of the world in history first practiced the art and technology of distillation to extract essential oils from plants. There is evidence that it was practiced in Persia, in Egypt and in the Indus valley civilization. Dioscorides had described over 500 plant species in his De Materia Medica. However his distillation practices were evidently to obtain floral waters, and not essential oils. The same methodology was evident in the Kannauj region of India, in the production of "attars". Here flowers were distilled with water and the distillate run through a pipe to collect it in a receiver with oil of sandalwood. This is known as the Dag-Bapka Process, and it indicates, that the method of distillation of essential oils was known during early times. There is evidence that distillation was well known to the Persians during the time of the great Armenian scientist Avicenna.He is credited with the invention of the popular coil-in-water condenser used widely now in the field distillation of essential oils. From the eleventh century onwards the processes connected with aromatic oils and perfumes came to Europe. It is revealed that an Abbess called Hildegarde grew Lavender in Germany and made lavender oil. But the thirteenth century saw the birth of the modern essential oils industry in Italy, France and Germany. In the 14th century the plague known as the Black Death, was countered by the use of fragrant oils. The 15th century saw the process of extraction of essential oils by steam distillation as well as by a process known as enfluerage, in wide use. A larger range of oils reached the consumers and studies on the characteristics of the oils commenced. Paracelsus coined the term Essence, from which the term essential oil came to be derived. The sixteenth century saw the birth of modern perfumery, an art which progressed into a cottage industry, and which initially used the many essential oils then available. By the 19th century it was a prosperous modern industry. With the dawn of the age of modern chemistry, and the work of men like John

Simonsen, the chemistry of the aromatic substances that constituted essential oils were revealed. In time this gave rise to synthetic aroma chemicals the cornerstone of the modern perfumery and fragrance industry.

2. THE MODERN PHASE – THE BIRTH OF AROMATHERAPY.

During the early twentieth century the medicinal and disinfectant properties of essential oils were well known. The French chemist Rene Maurice Gattefosse is widely credited with coining the term Aromatherapy. There is an interesting story behind this. It is stated that Gattefosse accidentally burnt his hand and in the fury of his pain dipped his hand into the nearest liquid available to him at the time. This happened to be a jar of Lavender oil, which he had distilled. The burn healed sooner than expected and left hardly a scar. The aftermath was the coining of the term Aromatherapy.

The Austrian biochemist Marguerite Maury was an early practitioner of the newly re-discovered art of Aromatherapy. She used it for both cosmetic as well as curative purposes. During the early twentieth century Maury opened clinics in France, Switzerland and Britain, and won international fame for studies on the use of essential oils in cosmetology, in particular for noting their re-juvenating properties. She is credited with promoting the modern use of essential oils in massage therapy.

A French army surgeon-general Jean Valnet used essential oils as part of a programme of successfully healing specific medical as well as psychiatric problems. Dr Valnet used essential oils to treat soldiers wounded during World War 1.

Today Aromatherapy is a booming healing technology widely practiced in Europe, the USA, and as in old times in Asia and China as well.

The first book on Aromatherapy in the English language was written by the British aromatherapist, Robert B. Tisserand in 1977 and called "The Art of Aromatherapy". Following this there are a range of books and treatises, and proceedings of conferences on Aromatherapy. The series published under the editorship of Karl Schnaubert an American practitioner are most informative. Besides this, there are many clinics and teaching institutions in almost all continents.

3. ESSENTIAL OILS – MODE OF ACTION IN AROMATHERAPY

Aroma therapists believe that the natural essential oils in their purest form act to restore harmony and balance between body and mind. They claim that the oils have a beneficial effect in the manner we think, look, and feel. They promote well-being as well as balance enhancing the state of mind and sensuality. Different combinations drawn from a wide variety of oils that are now available to the therapists are deemed to be beneficial in contending with an equally wide range of ailments, and texts on the art specify the use and ailments. Because essential oils are potent and powerful, minute quantities are sufficient for treatment. They are almost all, potent antibacterials.

The limbic system is a group of deep brain structures that are involved in the sense of smell. The odours are able to trigger memories. They can also influence, control and monitor emotions and patterns of behaviour. It is known that the brain can register aromas, far swifter than it can register the sensation of pain. This explains why inhalation of aromas and fragrances/perfumes tend to transform moods in such dramatic fashion.

The limbic system functions in coordination with other systems of the body such as the central nervous system, the respiratory and circulatory functions, and the immune system.

One hypothesis is that when the essential oils are inhaled they enter the respiratory system, as well as the brain. Within the lungs molecules of the essential oils attach themselves to oxygen molecules and are then carried into the blood stream thereby circulated into every cell in the body. Within the cells it is believed that the essential oil molecules could activate the body's mechanism to heal it, and thus improve health.

Be that as it may, aromatherapy now has a worldwide clientele, and some believe that it should not be regarded as a complementary medicine, but rather as a part of modern therapy itself.

4. AROMATHERAPY IN PRACTICE.

Aromatherapy can now be defined as follows:

Aromatherapy is a practice that is based on the ancient methodology of utilizing essential oils for healing, by "therapeutically" stimulating the nasal / olfactory senses, mental responses, circulatory and respiratory functions.

The term Aromatherapy itself, may convey a limited meaning to the actual practice of the art. It may be viewed as implying that it is limited to healing via the sense of smell and the emotional responses brought about. The practice of the art is in fact far wider. Each essential oil has its characteristic array of constituents, and these are believed to interact with the body chemistry

which then brings upon the effect on the systems within the body. Four main types of activities are identified in aromatherapy:

1. The pharmacological effect related to the chemical changes effected when the oil molecules enter the bloodstream;
2. The physiological effects which are regarded as the manner in which the oil effects the body such as stimulation or sedation;
3. The psychological effect brought about by inhalation.
4. The holistic effect which represents the human body's total response to an essential oil, which include the above responses as well as possibly others.

The following are the prescribed methods of general usage of the combinations of essential oils in aromatherapy:-

AS TEAS OR TISANES

It is reckoned that all teas when drunk have beneficial effects. Green tea, Black tea and the prescribed herbal teas benefit the different systems of the body. Present research has identified polyphenols as a potent class of compounds but aromatherapy contends with the total effect of all constituent compounds. (It must be noted that a tea is prepared by pouring boiling water onto the herbal material and allowing it to steep for some minutes.)

MASSAGES

This is a popular type of application. Aromatherapy practitioners believe that it is particularly effective as the oil is dispersed over a wide surface area of the body. The essential oil component is applied as a 1-3% blend in a neutral carrier such as jojoba oil, or coconut oil. This type of treatment is prevalent in Ayurveda and other traditional systems as well.

AS SKIN OILS AND LOTIONS

The aromas of oils applied to the skin are deemed to influence moods. This is the basis of perfumes, and all of the personal care preparations. The principles of aromatherapy are implicitly the driving force in them all.

WARM/COLD COMPRESSES.

The origins of this treatment are also to be found in the traditional therapies. It was one of the earliest of the methods that came into western medicine, and has been widely employed. Hot and cold compresses are indeed part of almost every type of therapy spread over a wide range of geographic origins, and from medieval to very modern times. The technology has improved but the principle is the same.

FRAGRANT WATERS.

Fragrant waters have been used extensively. In ancient times the waters after distillation of rose, sandalwood, and lavender oils were used in therapy, mostly to treat psychological syndromes. Aromatic waters are known to alter moods such as depression, and tiredness. Sandalwood water is used for bathing in India, in locations such as Kanauj where the oil is distilled in bulk.

HERBAL BATHS

This is another feature which modern aromatherapy has incorporated from the practices of ancient traditional methods. In Sri Lanka too Ayurvedic practice recognizes this. The medicinal or aromatic plants are placed in a "boat" shaped vessel, with water and brought to boil. The patient is placed on top of this steaming vessel and the benevolent, aromatic, vapours are allowed to play upon the body. An herbal bath enables the healing qualities to take effect through the skin as well as via inhalation.

VAPORISERS / DIFFUSERS

This method is a modern type of dispensing. It is particularly suited for enabling the patient to utilize the aromatic ingredient in a portable form. The vaporization or diffusion process enables the molecules of the oil to be released into the atmosphere whence they can be inhaled. A particular usage is in the social and industrial sphere where a community centre is treated, for collective benefit of creating a pleasant conducive atmosphere, or as in the case of an industrial factory for enhancing productivity.

INHALATIONS IN STEAM

This method is as old as medicine itself, and its value in therapy has never been denied. The aromatic plants are dipped in water and boiled till the steam comes over with the volatile material, which is mainly, essential oils. Inhalation of this loosens any nasal blocks, and is a cure for bronchial ailments. The old Ayurvedic system where an entire family will inhale a steaming pot of coriander is still practiced.

DOUCHES.

This too is a modern concept and is recommended by aroma therapists in special instances.

NEAT APPLICATION

This is the method most widely employed by modern day aromatherapy practitioners. A large variety of essential oils are now available in very pure form. Combinations of these are prescribed for a variety of ailments and form the basis of modern aromatherapy practice.

5. CONCLUDING OBSERVATIONS

Aromatherapy is now well established as a potent force in healthcare and a recognized method of complementary medicine. Some opine that it is very much a part of medicine itself. The consumer appeal is there, as it affords a means of joy in living, making one recognize the various scents in the environment and in nature itself. Almost one hundred different essential oils are now listed as used in aromatherapy and doubtless more will join the list in time. It affords not only a means to cure chronic and varied ailments in a simple manner, but poses interesting issues for researchers.
Practitioners of Aromatherapy claim that the essential oils help to restore harmony between body and mind. They beneficially affect the way we think look and feel. They are deemed to promote health and wellbeing as well as balance, enhancing the state of mind and sensuality.
Here is a subject of great interest and utility. It has re-generated a healthcare tool for mankind together with a multi-billion dollar industry based entirely on nature's products.

SOURCES, / FOR FURTHER READING.

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Softly on the evening hour,

Secret herbs their spices shower,

Dark-spiked rosemary and myrrh,

Lean-stalked purple lavender.

From The Sunken Graden, Walter de la Mare, 1873 - 1956.

A RANGE OF LINK AROMATHERAPY PRODUCTS

PEPPER - ITS VIRTUES AS A SPICE, FLAVOUR, AND MEDICINE

by R.O.B.Wijesekera

HISTORICAL OVERVIEW

In olden texts pepper derived from *Piper nigrum* Linn is referred to as the doyenne of spices. There are many reasons for this. One reason is the fact, that the journeys to the east by the first European colonists were motivated, by commercial interests in pepper as a spice. Even today pepper accounts for over a third of the world's total spice trade. Another fact is that pepper and the plants of the family Piperaceae to which it belongs, were among the very first plants to come under cultivation. But much earlier than that, black pepper that is, *Piper nigrum*, as well as long pepper that is *Piper longum* figured in the texts of Ayurveda which dated back to 6000 BC. These texts refer to the use of the two kinds of pepper as remedies for a variety of ailments. [1,2]

A pepper vine laden with berries ready for harvest

The travelers to Asia from Europe have described pepper cultivation in the Malabar Coast. Theophrastus has written of the two kinds of pepper in the 4th century BC.

Dioscorides in the 1st century AD mentions the two peppers as well as white pepper. The two varieties of pepper were among the spices from India on which the Romans levied import duties at Alexandria in around AD 176. Pepper figures in Roman writings of the period up to the fifth century AD. Attila, the Hun is reported to have demanded inter alia 3,000 lbs of pepper as ransom for the city of Rome.

In the sixteenth century the cost of pepper, in Europe, motivated the Portuguese to explore a maritime route to India. Their success enabled them to monopolise the spice trade of the time. Two centuries later in January 1793, the Rajah of Travancore was to enter into an agreement with the Crown of England to supply large quantities of pepper to the Colonial Government in Bombay, in exchange for armaments, and European merchandise, and agreement which came to be known as the "Pepper Contract". [3]

During the interim period of the 18th century the rivalry for the spice trade was between the Portuguese, the Dutch and then the British and French. Later even the United States was to enter the race to barter spices and tea, coffee, flour, and other merchandise.

In general spices, and particularly pepper were so valuable to Europe, because they lent piquancy to their foods, and more because salted meat and fish were standard fare, and spices warded off mal-flavours on long storage.

Pepper still remains a key player in the expanding spice trade and food industries of the present time.

THE PIPER SPECIES IN TRADITIONAL THERAPY

The material medica of Ayurveda, has many references1 to the use of members of the Piper species, notably, *Piper nigrum*, and *Piper longum*, in addressing a variety of ailments. These include fevers of several types and diseases of the gastro- intestinal tract. The species is also used for promoting the secretion of bile, and for neurological and broncho-pulmonary disorders. In Ayurveda, the two peppers together with ginger in equal proportions, form the preparation known as"trikatu", which means "three acrids." The three acrids are deemed to act as "kaphavatta-pitta-harathwam" which means the regulators of the "three doshas" of the human body.

Piper longum or long pepper was considered as a possible treatment for malarial fevers based on its usage in Ayurvedic medicine. In 1886, C.S.Taylor reported the use of pepper for malarial fevers in the British Medical Journal. The efficacy of long pepper i.e. "thippili" in Sinhala, in the treatment of malaria was evaluated by researchers in 1983. It reportedly caused cessation of malarial parasite multiplication and regression of splenomagaly. [2,4]

Pepper is mentioned in the Jamu system the traditional system of the Indonesia.5,6 Pepper finds use in African, Middle-eastern systems, as well as in Chinese medicine. The Chinese Pharmacopoeia, lists it as an anti-epileptic and analgesic agent and is used for formulations to combat malaria. In the Unani system pepper is recommended for cold and cough related ailments. In East Africa it is believed that pepper causes the body to emit a mosquito-repelling odour. [7,8]

The medicinal claims of pepper and its related species have been researched and many of the claims have been established.9,10

The peppers stimulate the skin as well as the tongue thus they are useful in topical applications.

Peppers have been traditionally used as local anaesthetics, and the main constituent piperine is believed to be responsible for this action.

The use of pepper as an anti-epileptic in Chinese Traditional medicine has given rise to a new drug "antiepilepserine", which has been synthesized by Chinese chemists. The chemical structure of antiepilepserine is based on that of piperine. Recent research has also shown that piperine acts to enhance the bioavailability of many other compounds, in a composite plant mixture. [6,7,8]

BOTANICAL AND AGRONOMIC ASPECTS OF THE PEPPERS

The peppers belong to the family PIPERACEAE. [5,9] The black pepper of commerce is the popular spice. Its botanical name is *Piper nigrum* Linn. while the long pepper is identified as *Piper longum*. The popular betle leaf is another member of the family and is identified as *Piper betle*.

The peppers are widely cultivated throughout India, Indonesia, Malaysia, Thailand, Brazil, Vietnam, China, and the oceanic region. In Sri Lanka it is mainly a homestead crop, but is sometimes cultivated in Tea and Coconut estates. Black pepper is a branching vine, a woody climber reaching heights up to ten meters by means of aerial roots, but requires support. Its branches are pointed and its petiolate leaves are alternately arranged. The sessile small white flowers are borne on dense slender spikes each carrying 40-50 blossoms. The berry-like fruits are called pepper corns (3-8mm in size,) and form the much-valued spice. The berries turn yellowish orange as they ripen finally becoming bright red. The aroma is appealing and the taste strong and pungent.

Pepper thrives in regions where there is abundant rainfall and considerable sunshine as well as shade. The vine is propagated by stem cuttings and begins to bear in 4-5 years, lasting for even as much as 40 years.

The berries are harvested 6-8 months after flowering, just prior to ripening (mature green berries). When they are scalded with boiling water (10-12 minutes) they turn black gradually, and after sun-drying yield the black pepper of commerce.

When the ripened berries are immersed in water for 20-30 hours, or are placed in running water for a longer period of time, the outer coating is softened and can be mechanically removed. After drying this becomes the white pepper of commerce and has a decidedly reduced but modified flavour profile. When the immature berries are freeze-dried, or air-dried, and stored in vinegar or brine, the product is known as green pepper in commerce.

Pepper Oleoresin is the solvent extracted product from black pepper and is very much in demand in the food industry. It contains all of the piquant principles of the black pepper spice

Traditional processing of white pepper

White Pepper & Black Pepper

CHART. 1 - PEPPER SPICE - PROCESSING IN COMMERCE.

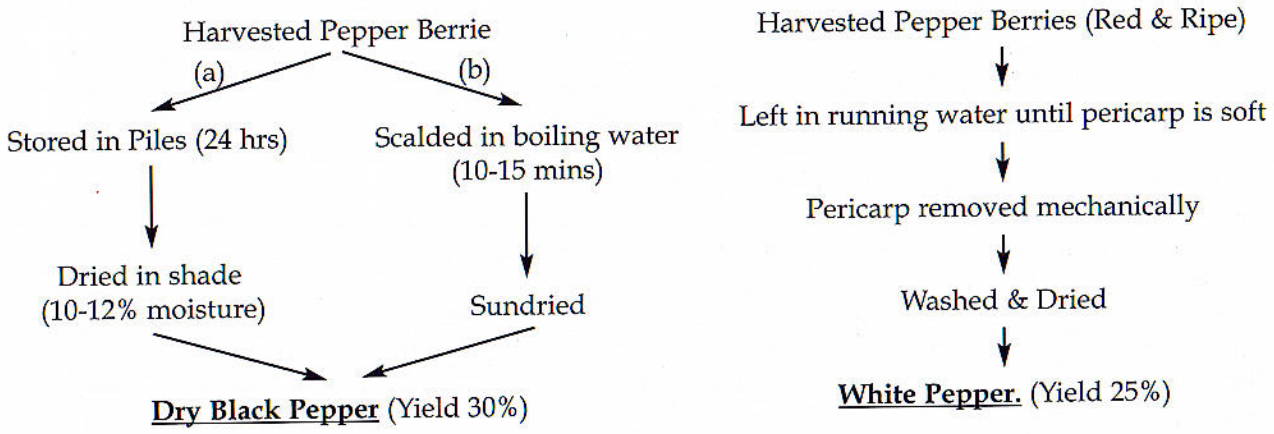
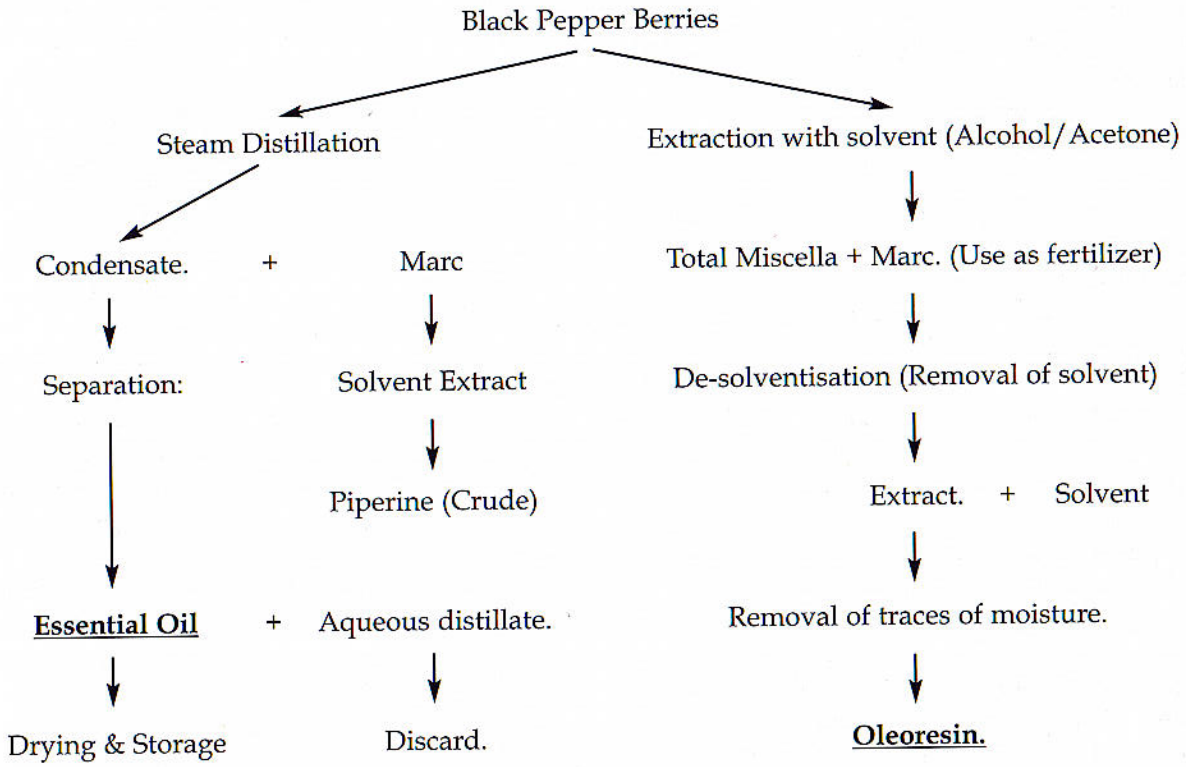


CHART. 2 - PROCESSING OF PEPPER PRODUCTS.



as well as the aroma constituents. The aroma fraction is the Essential Oil of pepper. This is produced when the spice is distilled in steam. The process is called steam distillation. The essential oil which is volatile in steam comes over with the condensate and separates from the water layer on cooling. The essential oil of pepper is also a valuable industrial product and is used in the flavour and fragrance industries. There are many advantages in processing and storing pepper as its main industrial products.

* The products are hygienic
* They can be standardized.
* They contain all the natural ingredients even the antioxidants.

* They are free of enzymes which may alter flavour
* They have a long shelf life if stored well.
* They are far less bulky than the spice itself and is easier stored or transported.
* They are less weight in shipping.
* In storage there is no danger of mold formation.
* In the food industry, use of oleoresins is more convenient as they give no colour disturbances, or "hot spots", or specks, in the meat or fish products into which they are incorporated.

There are also some other features that need recognition.

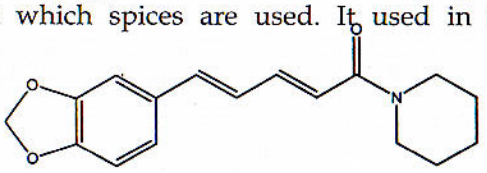
* In industry, oleoresins in standardised form helps to minimise quality variations.
* Both are concentrated versions of the spice, and require accurate measurements in any industrial application.
* They range from liquids to viscous solids and use in the food and flavour industry or the fragrance industry must require skilled personnel.
* In the case of oleoresins the solvent used is crucial to the end-use.

Piper longum or long pepper is not commercially cultivated, but it forms part of the medicinal plant cultivations in home gardens. Some aspects of its cultivation practices have recently been described (Pathirana: LNP Digest Volume 1 Issue 2 :2006). Piper longum remains very much a medicinal plant only.

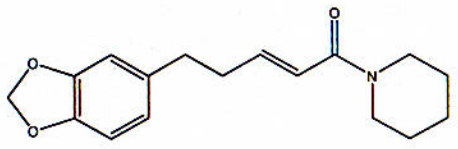
MAJOR CONSTITUENTS OF PEPPER

In commerce Black Pepper is recognized as the "King of Spices". It is the most popular spice in the world. Its pungency is due to the alkaloid Piperine Piperine is also the main chemical constituent of long pepper. There are several other pungent alkaloids too, in black pepper but they are in comparatively minor amounts. These are: 1-piperoylpiperidine, piperettine, piperylene, piperanine, and piperolein A.[9,11,12]
The essential oil of pepper is responsible for its aroma and the spice contains around 1-3% of the essential oil depending on the source, variety and maturity of the raw material. As characteristic of most essential oils this too is complex, and contains over a hundred compounds whose combined aroma constitutes that of the spice. The main constituents are those known as the terpenoids, of which the prominent ones are Alpha- and beta- pinene, alpha-phellandrene, beta-caryophyllene, limonene, and delta-3-carene.

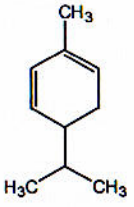
Chart 3
Structures of the Main Chemical constituents of the Piperaceae.



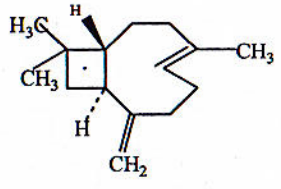
Piperine



Piperanine



a-phellandrene



β-caryophyllene

Black pepper is used in almost all preparations in which spices are used. It used in sauces, gravies processed meat products like sausages, hamburgers, bangers, and processed foods. Black pepper oleoresin is often used preferably in industry. The essential oil of pepper finds major application in the fragrance and flavour industry.
In medicine particularly Ayurvedic medicine, pepper is used as a component of many decoctions and other formulations. One of the most employed members of the pepper family is the long pepper, which-together with black pepper is a constituent of the indigenous "peyawa"

PEPPER AS AN IMPORTANT CULLINARY AGENT

Without any doubt it is as a culinary agent that pepper is popularly identified. It is the major spice incorporated in European, Indian, Chinese, Japanese, Far Eastern, and American cuisine. Black pepper is the most widely employed. It is used, in combination with other spices in almost

every kind of dish to enhance the flavour and piquancy. It is used in flavouring stews, steaks, sauces, fish and vegetable dishes and soups and curries. The north Indian Garam masala, the South Indian Sambar and Rasam, the creole cuisine of New Orleans all use pepper. In Vietnam, black pepper is a major ingredient of their long-simmering soups, and in Cambodia their popular table condiment tik marij, contains black pepper, salt and lime. The Korean kim chi, is another popular preparation where pepper figures prominently.

In Sri Lankan cuisine too, dishes such as the ambul thyal, and various preparations of sea food such as dallo (cuttle fish), so popular in the Galle to Dondra region, and polos curry, use ample amounts of pepper.

Worldwide, Pepper is the popular spice, for the food of the rich as well as the poor.

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RECIPE:

HOW TO MAKE GENUINE GARAM MASALA ?

Garam masala is the popular Indian spice combination and somewhat similar to our Sri lankan version called Badapu Thuna paha. Here is a recipe for making it.

1. Ingredients: *(dried to about 12% moisture content)*

Black Pepper Corns	1/2 cup = 125ml
Cinnamon	5 of 8 cm pieces of bark.
Cardamom seed	1/2 cup = 125 ml.
Clove buds	1/2 cup = 125ml.
Cumin seed	1/2 cup = 125ml.
Coriander seed	1/4 cup = 65ml.

All ingredients must be fresh.

2. Procedure :
   * Combine whole spices and place in a heavy skillet over moderate heat. Toast for 2 minutes until warm and aromatic.
   * Cool and pulverize in an electric blender till fully powdered.
   * Store contents in an airtight container. (Total volume will be about 375-400 ml, ie. About one and a half cups.)

Best use of product will be within 10 weeks if preserved airtight.

BIOACTIVITY OF BETEL LEAVES

L.S.R. Arambawela, L.D.A.M. Arawwawala, D.C.T.R. Dissanayaka
Industrial Technology Institute
Colombo 7

W.D. Ratnasooriya
Faculty of Science
University of Colombo
Colombo 3

Introduction

Piper betle Linn. (Family Piperaceae) is cultivated in Sri Lanka, India, Malaysia, Indonesia, Philippine Islands and East Africa. More than 12 *P. betle* cultivars are reported in Sri Lanka, and except the cultivar called Malabulath, which is not used for chewing, the other cultivars constitute "commercial betel" of Sri Lanka. The leaves of the plant have been used as a cultural symbolism, for chewing and medicinal purposes. It is administered to children for cough, and also for night blindness in adults. The juice of the leaves is used to combat catarrh and diphtheria. The leaves are also applied to purulent ulcers.
Betel has a wide and well-spread domestic market in Sri Lanka, as well as a significant position in the export market since 1974. However, at present the betel industry is facing a severe problem of depressed prices and restricted export

markets. The Department of Export Agriculture analyses show that there is a very high probability of drop in the volume of export in the future. This will result in a market crisis and the profitability of betel cultivation will diminish considerably. To overcome the negative impact on the industry, there was a necessity for R&D work on *P. betle.* Accordingly, the pharmacological activities of betel were investigated and value added products based on the investigations were developed. *P. betle* showed potent antioxidant and antidiabetic activities. Further, commercial betel of Sri Lanka was found to be non-toxic as judged by hematological, biochemical profiles and enzymatic studies.

Antioxidant Activity

The hot water and cold water ethanolic extracts obtained from the leaves of *P .betle* had profound antioxidant activity as judged by two in vitro assays, DPPHo (2,2-diphenyl-1-picrylhydrazyl) scavenging assay and TBARS (thiobarbituric acid reactive substances) assay. The antioxidant potential of a cold ethanolic extract of betel was better than that of synthetic antioxidant, BHT (butylated hydroxy toluene). Interestingly, antioxidant activities of these extracts did not significantly decrease from the initial antioxidant potential (in terms of EC50 values) up to 12 months. However, when these extracts were exposed to elevated temperatures, antioxidant activity of cold ethanolic extract was lesser than that of BHT and possessed the best antioxidant activity among the tested extracts even after exposure to elevated temperatures. In an attempt to introduce betel as a natural antioxidant, the ethanolic extract was incorporated into fats (cake margarine) and oils (coconut oil and palm oil), and the FFA (free fatty acid) levels and PV (peroxide values) were determined periodically. The results showed that FFA levels and PV were significantly lower in cold ethanolic extract treated samples than that of BHT treated samples.

Antidiabetic Activity

The antidiabetic activity of *P. betle* leaves was investigated using normoglycaemic and steptozotocin (STZ)-induced diabetic rats following oral administration of hot water and cold ethanolic extracts. The overall results show that both extracts of *P. betle* leaves possess marked hypoglycaemic activity (when tested in fasted normoglycaemic rats) and antihyperglycaemic activity (by improvement of glucose tolerance teat and by lowering the blood glucose levels in STZ-induced diabetic rats). The hypoglycaemic effect of *P. betle* extracts on fasted normoglycaemic rats

were dose dependant and lasted up to 4 h apart from the lowest dose of hot water extract. Further, hypoglycaemic potential of extracts were comparable to that of tolbutamide, reference hypoglycaemic drug of sulphonylurea type. Results demonstrate the antidiabetic activity of *P. betle* leaves grown in Sri Lanka for the first time and this was a new pharmacological finding as betel leaves were not used as a antidiabetic agent in traditional medicinal systems.

Safety Profile

The safety profile of *P. betle* was assessed using both hot water and cold ethanolic extracts in rats. This dose was several folds higher than the dose, which possessed best antioxidant and antidiabetic activities. The results show that *P.betle* leaves were well tolerated in terms of overt signs, gross morphology and weights of organs, morbidity, mortality, stress or aversive behaviours. There was no toxicity as judged by enzymatic profiles of hepatotoxicity (in terms of serum urea and creatinie levels). An interesting finding in the study was that both extracts significantly increased the weight of the spleen, which suggested lymphoproliferative activity. This is a novel and clinically important finding which indicates the possibility of developing immunomodulatory drugs from Sri Lankan variety of betel leaves.

New Value Added Products

Several value added products from betel have been developed, namely betel toothpaste, mouthwash, betel ointment, instant betel chew, etc. Our results demonstrate the therapeutic potential of Sri Lankan betel as well as its commercial potential to be used as a cost effective safe, natural antioxidant and antidiabetic agent. These findings will be beneficial to betel industry as well as to industrialists in Sri Lanka.

(These studies were funded by Council of Agricultural and Research Policy and National Science Foundation)

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Foundations of Ayurveda.

"The sages of beginning-less time gave a legacy to the Universe. It carried the secret codes of the divine plan. Ayurveda holds these secrets of health so excellent, that in the knowing, the human body may illuminate as a crystal reflecting the infinite RASA is our essential nature and the secret code which guides our choices. It is the beauty of the universe which we reflect. RASA is in every grain of sand and every morsel on which we feed. It keeps our intentions sacred. Deep within our cognate nature we have the memory of all time embedded in us. Our potential to know this beauty of self is as infinite as our timeless memories. It is only through inquiry and knowing of our real nature that we are able to own this energy of luminous joy."

Maya Tawari 1993
In Foreword to Ayurvedic Beauty Care,
by Melanie Sachs.

STANDARD OPERATING PROCEDURES - A TOOL OF GMP

by Shamila Wickramaarachchi

A **Standard Operating Procedure** is a set of written guidelines that document a routine or repetitive activity followed by an organization. SOPs are defined by the International Conference on Harmonization (ICH) as "detailed, written instructions to achieve uniformity of the performance of a specific function." These are concise step-by-step instructions that allow an individual with limited knowledge or experience on the procedure to successfully reproduce the activities. Further SOPs are tools to ensure that Good Manufacturing Practices (GMP) are being followed whenever applicable. Thus World Health Organization (WHO) has already made it mandatory to have the acquired SOP s for any manufacturing facility for grant of GMP certificate.

Time and financial limitations are the disadvantages associated when implementing SOP s. But the long-term advantages outweigh the above-mentioned disadvantages. Compliance to GMP at all times, consistency in the conduct of routine operations, assurance of the quality and integrity of products produced, outlining of the responsibilities of the employee are some advantages that can be mentioned. Ultimately these will result in reduced work effort, along with improved data comparability, creditability and legal defensibility.

The major information that should constitute any SOP include the following :-

* Objective of the SOP
* Procedure to be followed
* Person responsible for performing the activity
* Person responsible for checking/ supervision
* Frequency of the activity

In addition it may contain other information such as :-

* Name of the company
* SOP number
* Revision number
* Reference to earlier document that it supercedes and the department under which it is covered

If the document has to be circulated to other departments or even other companies, then those recipients may be identified in that document. A master copy of all SOP s should be securely kept by management and/or the quality assurance division.

Preparation of SOP s

SOP s should be written by individuals that are knowledgeable in the particular area/activity and familiar with the overall procedures and policies the company has in place. This could be the quality assurance person(s), production manager and/or other operational personnel. Also the SOP s should be written with sufficient detail so that someone with limited experience, such as a new employee with basic understanding can successfully reproduce the procedure unsupervised. Generally SOP s are organized into separate departments based on the specifics of the company. As every operation requires an individual SOP, each department may have many SOP s.

Writing style

When writing SOPs the active voice and present verb tense should be used. The term "you" should not be used but implied. The document should not be wordy, redundant, or over lengthy.

General format of SOP s

1. Title page

May not be applicable to all companies. This can be the title of the SOP on company letterhead or it can contain both information found in the control panel and authorization section.

2. SOP numbering

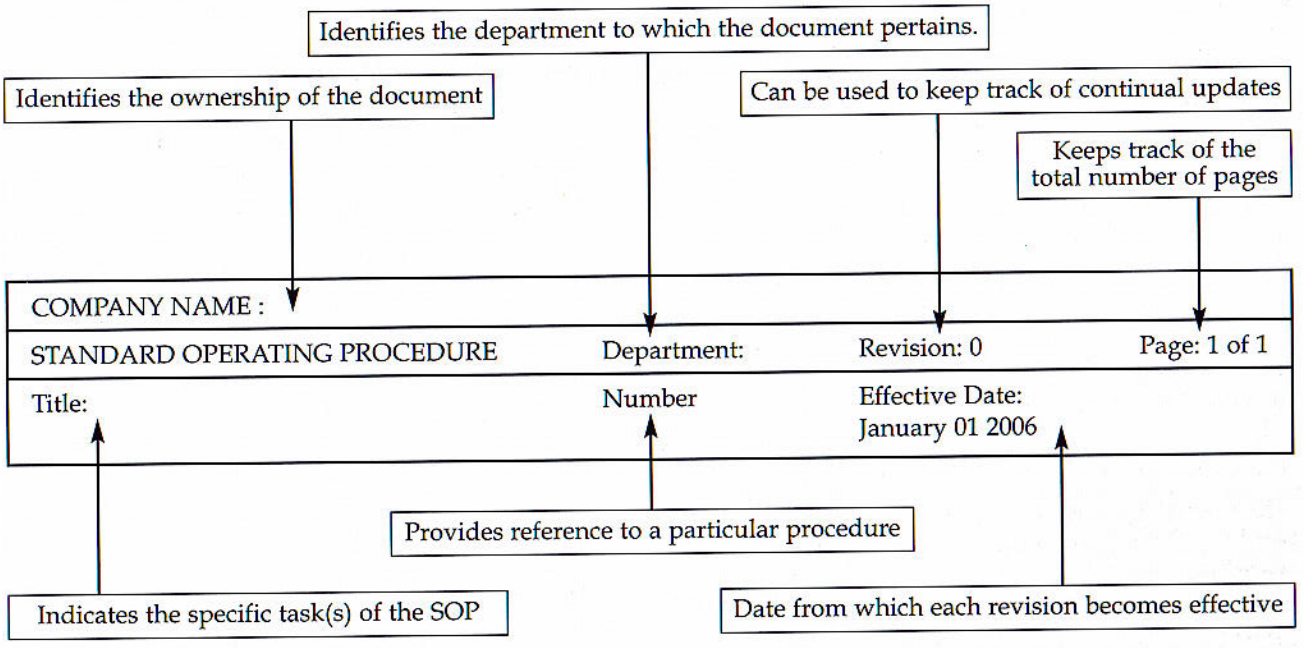
Each SOP should be numbered to facilitate the location of a specific procedure. The first digit(s) in the SOP number could be either a single letter or multiple letters that represent a specific department. The remaining digits should be numeric and assigned sequentially as new SOP s are created and issued.

Eg:	**Department**	**Code**
	Building	BUIL
	Equipment	EQUI
	Operation	OPER

3. Control Panel

An informative and specific control panel for each SOP contains all the elements that anyone can use to control their document. It provides quick reference for locating and defining a specific SOP.

Eg:



4. Body of the SOP

This is the section after the control panel. This is a list of instructions describing the way the procedure, (written in the title of the SOP) should be performed. The instruction should be written in a manner that is simple to follow and easy to understand. Instructions may be listed in point form, numbered sequentially or written in paragraph form.

Possible subsections that could be selected when writing the SOPs could be:

* Purpose
* Objective
* Scope
* Material/Equipment
* Procedure
* Definitions
* Roles and Responsibilities
* Safety Precautions
* References
* Revisions
* Records
* Authorization

Reference sources :

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Continued from pg28

AN EXAMPLE OF A SOP

COMPANY NAME : ABC

STANDARD OPERATING PROCEDURE	**Department:** R&D/QA	**Revision :** 0	Page: 1 of 2
Title: Calibration requirements for laboratory equipment	**Number :** LAB - 003	**Effective Date:** January 01 2006	

1.0 Purpose
To describe a standard calibration procedure and standard calibration sheets for the calibration of all types of laboratory equipment.

2.0 Scope
The performance of calibrations and their results are logged in order to demonstrate compliance with the outlined schedule and to aid in the determination of failure of any laboratory equipment.

3.0 Responsibility
* Routine calibration performed by the departmental staff.
* Twice annual calibration performed by an external contracted third party metrology firm.

4.0 Equipment
As defined on the calibration sheet and equipment specific SOPs.

5.0 Frequency
- o Prior to routine use of equipment by department staff
- o Twice annual calibration by contracted third party according to equipment specific SOP
- o After equipment maintenance or relocation
- o After repair of critical part replacement

6.0 Procedure
6.1 Operate the equipment according to the relevant operating instructions.
6.2 Perform the equipment calibration according to the equipment specific SOP
6.3 Fill the form "Calibration Sheet".
6.4 Evaluate if "SUITABILITY sticker" has been compromised.
6.5 In cases where the SUITABILITY of equipment has not been compromised due to the re-calibration the technician will deface and cross out the suitability sticker and attach a note stating "Performance verification Invalidated Due to Re-calibration"
6.6 Attach "CALIBRATION sticker" : GREEN LABEL to equipment
If calibration results can be accepted according to the limits of the equipment specific SOPs attach "SUITABILITY sticker" :WHITE LABEL to the equipment.
7.0 Recalibration
7.1 If the calibration does not conform, repeat the procedure
7.2 If the second calibration does not conform, clean and check equipment according to the manufacturer's instructions. Then repeat the procedure.
If after the third calibration, the equipment still doesn't conform, replace or repair the non functional part or unit.

8.0 Limits
Calibration instructions must be applied according to the equipment specific SOP

9.0 Documentation
Report calibration results as per the attached Calibration sheet. Refer to the attached calibration sheet as guidance.

10.0 Labelling
10.1 White label : SUITABILITY test label - Stuck on the apparatus after SUITABILITY test
10.2 Green label : CALIBRATION test label - Stuck on the apparatus after CALIBRATION test

WHITE LABEL : SUITABILITY TEST
Analyst
Date
Next Date

GREEN LABEL : CALIBRATION TEST
Analyst
Date
Next Date

AUTHORIZATION :					
Prepared by :	Name	Title	Signature	Date
Reviewed by :	Name	Title	Signature	Date
Approved by :	Name	Title	Signature	Date

KNOWLEDGE ROUND UP - *CULLED FROM LITERATURE*

MANGOSTINE – MORE THAN JUST A FRUIT

Garcinia mangostina L of the family Clusiaceae (Guttiferae) is a tree found in Sri Lanka and other South Asian countries. It is very popular for its delicious fruit.
Research conducted by the Osaka Prefectural Institute of Public Health, Japan, in collaboration with Gifu Pharmaceutical University, Japan and the Institute of Fundamental Studies, Sri Lanka, have shown that _-mangostine, isolated from the stem bark of *Garcinia mangostina* L. was found to be active against vancomycin resistant Enterococci (VRE) and methicillin resistant *Staphylococcus aureas* (MRSA). Further studies have shown partial synergism between _-mangostine and commercially available antibiotics such as ampicillin and minocyclin.

REFERENCE:

Sakagami, Y. et al. (2005). Antibacterial activity of _-mangostine against vancomycin resistant *Enterococci* (VRE) and methicillin resistant *Staphylococcus aureas* (MRSA) and synergism with antibiotics. Phytomedicine, 12,203-208

ANTI-BACTERIAL EFFECTS OF ESSENTIAL OILS.

Essential oils have been employed in the traditional medicine of Mexico, as anti-bacterial agents. The authors have assessed the antibacterial activities of an array of commercially available essential oils, against locally prevalent pathogenic bacteria isolated from pediatric patients who had been severely infected. The oils of *Cinnamomum verum*, (Sri Lankan Cinnamon), *Oreganum Vulgare*, Origano, and *Thymus vulgaris* the condiment Thyme, exhibited the highest and broadest anti-bacterial activity. The controls used were: Ampicillin, Cefotaxine, and Amicacine.
The essential oils were tested in aromatogram – an adaptation of the conventional antibiogram, in accordance with the testing document M100-53 of the Performance Standards for Anti-bacterial Susceptibility, of the National Chamber for Clinical Laboratory Standards (NCCLS), (Washington 1991). The pathogenic bacteria strains tested were all resistant to the selected antibiotics.
The oils of Cinnamon, Thyme, Oregano and also Clove bud were particularly effective.
They were tested against an array of common gram(+) and gram(-) strains, isolated from children suffering serious systemic infections, urinary infections, and infected surgical wounds at the Pediatric Hospital, Centro Medico National Siglo XXI, Mexico City.

Source :

P. Hersch- Matinez et al. Fitoterapia 76,(2005) 453-457

FAMOUS SWISS NATURAL PRODUCTS CHEMIST Dr. ALBERT HOFFMANN IS NOW A CENTENARIAN.

The Swiss Pharmaceutical giant, Sandoz was the institution at which Dr. Albert Hoffmann commenced his researches on plant natural products under the tutelage of Arthur Stoll, whose group was studying medicinal plants. That was in 1929, when Hoffmann only 23 years of age had completed his Doctoral dissertation. Last January 11, he celebrated his hundredth birthday anniversary with his wife Anita, children, grand-children, and great-grand-children in his modest home in Switzerland. Hoffmann commenced his researches with his work on ergot alkaloids. These are the alkaloids that are produced by the ergot fungus that infects grain. At that time they had never been studied and their complexity as well as relative instability presented formidable problems. These were the times that spectroscopic techniques that are prevalent today had not entered the structural organic chemist's armoury.

Ergot alkaloids had been used by midwives in the traditional manner to combat excessive bleeding that so often followed childbirth. Ergotamine was first isolated from ergot in 1918, by Stoll and collaborators, and used to prevent post-partum bleeding.. Accordingly, Sandoz was soon to become a world leader in the supply of ergot alkaloids for pharmaceutical needs, and Hoffmann became a world authority on the

Chemistry of ergot alkaloids. Based on studies on ergot alkaloids he was able to synthesize modified structures that gave rise to many other therapeutic agents, which brought in good returns for his company Sandoz. Then a significant diversion occurred in his research. Ergot alkaloids were extremely potent. The core of these alkaloids was the molecule of Lysergic acid. Hoffmann researched on coupling various organic entities to the molecule of lysergic acid and obtain synthetic derivatives which could serve as therapeutic agents. One such that he made was Lysergic acid diethylamide. This was the 25th molecule in his series and was labeled LSD25. This molecule was to make history. It was studied for its effect on psychiatry. After Albert Hoffmann found its potency it has been tested to treat alcoholics, terminal cancer patients and to rehabilitate convicts. Notably it brought in a social revolution and Hoffmann became the first world authority on psychoactive chemicals. His work is an example that fortune favours the prepared mind, as he constructively designed his synthetic efforts.

Sources:

1. D.Nichols in Chemistry World (2006)/vol.3/no.1, 30-34.
2. A.Hoffmann.(1980). LSD My Problem Child. McGraw-Hill

AROMATHERAPY AND STRESS.

Does AROMATHERAPY MASSAGE reduce job related stress? Results from a randomized control trial. This is the title of a recent publication. The conclusion drawn from the study is as follows: "The purpose of the study was to evaluate the effect of aromatherapy massage on job related stress. A randomized control trial was conducted on 18 nurses from two psychiatric hospitals. They were given aromatherapy massage treatment (AMT) sessions on a once a week basis. The control group was 14 nurses from the same hospitals. The outcome of the treatment was measured by Cooper's Job Stress Questionnaire. The experimental group recorded a significant decrease in stress. The result has according to the researchers significant implications for the treatment of job related stress.

T.M. Hansen, B.Hansen, and G.I.Ringdal (2006). Int. J.Aromather. 16, 89-94.

REVIEW OF RECENT ABSTRACTS

Standardisation and Quality Control of Herbal Drugs

AM Abeysekera, TMSG Tennakoon & T de Silva, J. Natural Remedies, 2005, 5/2, 96-101.

Developing methods for the identification and quantification of plant ingredients in herbal drugs through specific "marker coumpounds," affords a means for the standadisation of Ayurvedic pharmaceuticals. Based on quantification of a mixture of isoshinanalone and epi-isoshinanalone, constituents of *Plumbago indica* L (which is one of the plants used in the Ayurvedic drug "Dasamolarishta"), researchers at Link Natural Products have developed a valuable tool to assess quality in samples of drug preparation

Using the method developed at Link, the researchers found that analyses of five different batches of five different brands (preparations) of Dasamoolarishta, showed a wide variation in the content of the two marker compounds. They conclude that these variations inter alia, reflect the differences in the quality of the crude drug used in the manufacture as well as ingredients in process control.

Red sandal (*Pterocarpus santalinus*). Chemistry, biological activities and uses – a review

S.S. Singh, A. Srivastava, R. Saxena, S.C. Pandey and V. Shrma. J. Med. Aromatic Plant Sci. 27 (2005), 303-308

The red sandalwood tree belongs to the family Fabaceae and is known as Red sanders (English), Rakta chandana (Sanskrit) and Rath handun (Sinhala). It is widely distributed in Andra Pradesh, Tamil Nadu, Karnataka and Kerala in South India.

The biological activities associated with it are several, and include anti-inflammatory, anti-diabetic, anti-oxidant, anti-hyperlipedemic, anti-tumor, anti-bacterial, anti-androgenic and anti-UV effect. In ayurveda it finds uses in several ailments and as an application for inflammation, a popularity that has now been established pharmacologically.

The chemistry of red sandalwood has been studied and a variety of compounds isolated. They include triterpenes, sesquiterpenes, lignans,

isoflavones, coumarins, phenolics and several glycosides. The main compounds are Santalin, Santalins A and Y, Santarubins A & B which are polyphenolic compounds responsible for the pigmentation, and Pterocarpin and Homopterocarpin.
The lignans were found to significantly inhibit tumors, while the anti-androgenic activity has been attributed to the neoflavones.
The review contains the chemical structures of all the isolated compounds.

Further studies on the clinical efficacy of *Solanum xanthocarpum* and *S. trilobatum*

S. Govinden, S. Viswanathan, S. Vijaysekeran and R. Allagappan. Phytotherapy Research, 18 (10), 805-809, 2004

The clinical efficacy of the two herbs in a dose of 300 mg tds for 3 days was investigated in mild to moderate bronchial asthma, with reference to standard bronchodilatory drugs Salbutamol (SB) 4 mg and Deryphyllinic (DP) 200 mg.
The respiratory function was assessed by measuring the peak expiratory flow rate (PEFR) using a mini peak flow meter. Improvement in lung function was assessed by physical examination (rhonchi and crepitation) and symptoms such as cough, breathlessness and sputum.
The herbs produced a progressive improvement in the ventilatory function of asthematic individuals in 3 days. The scores for rhonchi, cough, breathlessness and sputum were decreased. The improvement in PEFR and the reduction in other symptom scores indicated a bronchodialatory effect, a decrease in oedema, and secretions in the airway lume. The response to the herbs were considered to be equivalent to DP but less than SB. No untowed effects were reported.

"Whatever you can do or dream, you can begin it. Boldness has genius, magic and power in it. Begin it now.

J. Goethe.

"NATURE"

"Nature is Life; Life is nature. Those who serve to preserve nature are those who give life to Life."

R. Premadasa,
President of Sri Lanka.

ATTA-UR-RAHMAN HONOURED.

H.E. Professor Atta-ur-Rahman, distinguished organic chemist and one of the foremost experts in Natural Product Chemistry produced by the sub-continent of South Asia has been honoured by the Royal Society of Chemistry, of the U.K. by admission to its Fellowship. Professor Rahman is currently the Federal Minister/Chairman, Higher education Commission of Pakistan, President of the Pakistan Academy of Sciences, Coordinator-General of COMSTECH. He also retains the Directorship of the HEJ Research Institute of Chemistry- International Center for Chemical Sciences. He was also the Federal Minister for Science and Technology and adviser to the Prime Minister of Pakistan. In a career which is phenomenal by any global standards, Atta-ur-Rahman has over 644 publications, stretching a wide array of organic chemistry and Natural Proiduct Chemistry. He was a Ph.D., from Kings College, Cambridge, UK. Besides his publications in original research he has 15 patents, authored and edited over ninety books and 59 chapters in books, published in major presses in Europe and the US. He has supervised 66 PhD students and his range of research cover the following subject areas.

* Bioactive compounds from natural sources.
* New methods of chemical structure elucidation.
* Synthetic transformations of bioactive compounds.
* Biosynthesis of alkaloids.
* NMR spectroscopy

He is Editor or Co-Editor of 15 current international journals. From modest beginnings his leadership and example has seen the HEJ Research Institute develop into one of the best globally recognized international centres of Natural Product Chemistry.
The monumental record of this icon of Chemistry of modern times has been amply recognized by Universities and institutions worldwide. He was awarded the UNESCO Science Prize in 1999. Rahman's efforts in successfully establishing a world class research facility on natural products in a developing country has drawn praise from several Nobel Laureates including, Sir Derek Barton, H.C.Brown, R.R.Ernst, M.Lehn, and R.Noyori.
Due to the efforts of Rahman in promoting Scientific research in Pakistan, the Ministry of Science and Technology annual budget was increased sixty fold from the year 2000; researchers have the chance to earn more than double their earnings, based on the publications in peer reviewed journals; funds have been released for more PhD's to be trained in Pakistan and overseas; a free digital library for all educational institutions has been created; researchers from outside have been attracted to work in Pakistan; the government plans to use science to double GDP by 2020. (Vide: Nature, 427, 379.2004)
Rahman has visited Sri Lanka several times, first in 1977 to attend the Asian Symposium on Essential Oils and Spices (ASOMPS) in Peradeniya and Colombo, and last to attend the Biennial Conference on Science and Technology (BICOST) in 2004. He counts many friends and collaborating colleagues in Sri Lanka. Despite worldwide recognition of his achievement and consequent adulation, and his high position as a Minister, Atta-ur-Rahman remains a modest simple scientist.

The Digest congratulates H.E. Atta-ur-Rahman warmly on his recent award of the coveted FRS, and wishes him continued success. Sri Lankan researchers in Natural Products can justly be proud of this fellow Asian.

The Digest Mail Bag

Letter 1

I read the latest Link Digest. Please send subsequent issues too.
I am enclosing some abstracts of natural products, and shall send some more literature from online journals.

Dr. A. L Jayewardena
1718, Holland Dr. Walnut Creek
CA 94597, USA
anura@itsa.ucsf.edu
ajayewar@sfghsom.ucsf.edu
9 Sept 2005

Letter 2

I came across the Digest in the institute library. It is a very useful one. It gives us a lot of knowledge.
Please send the previous issues and the future issues.

U.R. Priyadarshana
Student
College of Chemical Sciences
Institute of Chemistry,
Colombo

21 March 2006

Letter 3

Thanks very much for sending me the Sept-Oct issue of the Link Natural Products Digest.
In my opinion you have created an excellent publication which will be welcome by both academics and industrialists. I also believe that it will serve to encourage co-operation between these groups and lead to economic and scientific benefits. I shall certainly look forward to receiving future issues.
Thanks again and best wishes.

Prof. Jack Cannon
Emeritus Professor of Chemistry
University of Western Australia
jrgsc@cygnus.uwa.edu.au
23 March 2006

Letter 4

Thank you very much for sending me the Link Natural Products Journal (Vol.1 Issue 2). I read it and appreciate it. It is one of the prosperous journals on medicinal and aromatic plants, and natural products.
Please accept my congratulations.

Taweesak Suntorntanasat
Director
Pharmaceutical and Natural Products Department
Thailand Institute of Scientific and Technological Research
Thailand
Taweesak_tws@yahoo.com
26 March 2006

Letter 5

I came across the Digest sent to the Department of Export Agriculture. I found it very interesting, and very informative for our officers involved in processing of medicinal plants.
My request on behalf of the Department is that this journal be sent regularly to the Library of the Central Research Station of the Department.

S.P. Prematilake
Senior Research Officer
Central Research Station
Department of Export Agriculture, Matale
prematilakesp@yahoo.com
4 April 2006

NOTE TO POTENTIAL CONTRIBUTORS

Link Natural Products Digest

The DIGEST is a popular publication, albeit a scientific one, dedicated to medicinal plants, herbal healthcare and personal care products, essential oils, aromatherapy, herbal therapy and Ayurveda, and related healthcare systems. It is published bi-annually.

The DIGEST welcomes contributions in English in the category of reviews, brief communications, ethno reports in brief, phytomedical and phytochemical communications, book reviews, and reports on safety and
efficacy of phytomedicines.

Potential authors may consult the Editor-in-Chief prior to dispatch of communications, reports and reviews.

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