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EDITORIAL

THE NEED FOR A NATIONAL STRATEGY IN THE HERBAL PRODUCTS INDUSTRY

The Department for International Development of the UK Government (DFID) is implementing a number of recommendations made by the Commission on Intellectual Property Rights (CIPR), an independent body set up in 2001. The recommendations are directed towards ensuring that indigenous people are rewarded for their role in husbanding biodiversity, and identifying the medicinal, nutritional, and other properties of many plant species.

The United Nations Convention on Biodiversity (UNCB), which met in Kuala Lumpur in early 2004, acknowledged that *indigenous people are often at the mercy of "biopirates", who, steal their traditional knowledge of medicinal plants.* The knowledge that indigenous people pass down the generations, generally orally, sometimes in written form, and available to the selected few, is rarely documented scientifically. Accordingly, it does not come within the realm of patent recognition. So, a most noteworthy proposition by the UNCB was that confidential databases of traditional knowledge be set up. The UNCB called on governments to insist that companies show that they have obtained prior informed consent from indigenous communities before exploiting plants or crops for commercial purposes.

Mr. Hillary Benn, the UK Government's Secretary for International Development, has indicated that his government helped to negotiate a satisfactory mandate for an "international regime on access to the knowledge and benefit sharing". This is said to cover, (according to the sources quoted by Tom Dalyall, writing in the *New Scientist* of 22 May 2004), traditional knowledge as well, and recognizes the need for a balance between facilitating access to genetic resources and the sharing of benefits. There are a number of instances of recent drugs successfully developed from indigenous knowledge, where the interests of the country or people hosting that knowledge, have become sacrificial, to the motives of the drug companies who have the means to utilize the knowledge.

The European community too is interested more and more in the production of herbal preparations. Germany and France are the leading markets in Europe covering 39% and 29% respectively of the supply. In Europe the search is

on for potential agents for: Alzheimer's disease, anti-varicose, coughs and colds, circulatory diseases, muscular pains, digestives, sedatives, anti-inflammatory agents and agents to address ailments of the bladder and urinary tract among others. Herbal products are used in their raw state, physician prepared, factory-produced, as OTC's, as food supplements, as flavorings, spices, cosmetics, and also in aromatherapy.

From the Sri Lankan point of view several questions arise. What is the position of the government on this? Was the country represented at the UNCB in Kuala Lumpur and if so what was the feedback? What initiatives do we plan for the future?

For our part, it is clear that the time has come when we could no longer afford the dog-in-the-manger attitude that has dominated national thinking. Clearly we do not have the capability in the appropriate areas of science and technology to go-it-alone in utilizing our indigenous knowledge, for example in Ayurveda. But given the circumstances of our health-care requirements we have to utilize the knowledge of Ayurveda for our own benefit at first. Gradually we have developed within the country some expertise in innovative drug development but this is miniscule. Clearly then we have to seek partnerships in bringing science and technology to intervene, and simultaneously develop our own capability. This is where the UNCB initiative in designing means to negotiate with partners is welcome. Our Ayurvedic holders of knowledge should be welcomed to release their secrets to a national source of guaranteed confidentiality. No longer must they be condemned to end their lives with the knowledge lost, as has happened throughout the years. Our institutions both in the private and public sectors should be advised on the manner of negotiating with prospective developers. Our scientists too should not leap to a small morsel of gain for themselves, while jeopardizing a country's indispensable wealth.

A concerted national strategy needs to be put in place, and followed by all concerned so that modern science and technology can be used to enhance our traditional knowledge and wisdom for the benefit of the nation, and possibly a wider sphere.

LINK NATURAL PRODUCTS THE COMPANY ACTIVITIES IN PROFILE

GENERAL

LINK Natural Products is one of the pioneers in the manufacturing of Ayurvedic Pharmaceuticals, Herbal Health Care Products, Essential Oils and Oleoresins in Sri Lanka, with a history dating back to 1982. The Company is strategically managed by a multidisciplinary team of experienced and competent professionals, with a vision to be a world recognized manufacturer and supplier of Ayurvedic Pharmaceuticals, Herbal Health Care Products, Essential Oils and Oleoresins. Quality and consistency are foremost in the Company's philosophy.

Its mission is to be a world leader in providing safe and effective natural health care products, which are of the highest quality and integrity, through the integration of ancient Ayurvedic wisdom with modern technology, and scientific management systems for the improvement of the health and quality of life of the people.

LINK Natural Products recognizes Quality and Environmental Management as its highest corporate priority, as a key determinant to sustainable development: and proposes to establish policies, programmes and practices as per international standards for conducting operations in an environmentally sound manner. Integrating Quality and Environmental Management policies, programmes and practices, fully into each business process, is considered an essential element of management in all its functions. The Company has given due consideration to technical development, scientific understanding, customer needs and community expectations, while maintaining the statutory and regulatory requirements in recognition of its commitment to the continual improvement of these corporate policies, programmes and environmental performances.

LINK Natural Products has a fully comprehensive integrated manufacturing facility, with a well-trained workforce of over 400, engaged in the manufacture of its entire product range to predefined specifications. The product range of almost 400 products, are marketed and distributed through its own sales network to domestic and international markets.

The Management strongly believes in continual improvement of the manufacturing

process and its products, with the adaptation of the available modern technologies for the industry, and is strongly committed to safety, health and environment of its people and the surroundings. The Company's R&D center is a most modern, well-equipped nerve center that constantly develops and formulates new products. The Company's R&D facility is well supported by its own technically qualified staff, Ayurvedic Specialists, as well as experienced scientific and technological advisors.

SCOPE OF QUALITY MANAGEMENT SYSTEM

The Quality Management System (QMS) of LINK Natural Products is established to ensure that it meets the requirement as per Section 1.1 of the ISO 9001:2000 standard. The QMS demonstrates its ability to consistently provide products, that meet the customers' as well as regulatory requirements. The QMS is a process driven system, integrated to the overall business process. The identified core processes are as follows:

- Customer related process
- Product development
- Purchasing
- Storage and Handling
- Material preparation
- Manufacturing
- Engineering
- Product verification

Two processes supporting the above are the Resource Allocation Process and the Monitoring and Improvement Process together with essential controls of the QMS.

PRODUCTS

LINK Natural Products is engaged in designing, developing, manufacturing, marketing and sale of the following products;

- * Ayurvedic Pharmaceuticals
- * Herbal Healthcare and Cosmetic Products
- * Essential oils, Oleoresins and "Isolates"

During production, the product can be verified throughout the process, from incoming raw material to the final product. Therefore, the QMS of LINK is in conformity with the Validation of Processes for Production and service Provision element (7.5.2) in the ISO 9001:2000 standard.

THE LINK RANGE OF PRODUCTS

LINK Natural Products commenced its operations with the production of spice oils for export (viz. Nutmeg oil, Cardamom oil, Black Pepper oil, Clove bud oil, Cinnamon bark oil and Ginger oil, etc).

The Company then diversified into the production of Generic Ayurvedic Pharmaceuticals in 1984 and by the end of 1989, the Company became the first organization in Sri Lanka to market quality controlled factory-produced Generic Ayurvedic Pharmaceuticals.

Having acquired the necessary professional manpower including scientists, technologists and eminent Ayurvedic practitioners, the Company ventured into developing its own range of herbal health care products in 1995. After four years of research and development, involving a multidisciplinary team, the Company developed its first herbal health care product 'LINK SAMAHAN'.

Other herbal health care products developed by the Company, such as 'LINK KESHA', 'LINK MUSCLEGARD' and 'LINK

SUDANTHA' were launched thereafter at regular intervals. These HHCPs are formulated based on ancient Ayurvedic wisdom, using environmentally preferred modern technologies and authentic raw materials.

The R&D centre and the Laboratory for QA/QC are fully equipped with pilot plants and modern state-of-the-art facilities and equipment, for monitoring raw materials, process controls and the quality of finished products. Production is being carried out in compliance with Good Manufacturing Practices, and in conformity with ISO 9001:2000 Quality Management System and ISO 14001 Environmental Management System.

At any given time, there is a minimum of five HHCPs that are being developed by the R&D division of the Company, in addition to the related basic R&D activities.

LINK Natural Products has expanded its operations overseas with an office in Chennai and distributing agents in the UK, Malaysia, Japan and USA.



REFLECTIONS ON THE SYDNEY MEETING OF THE INTERNATIONAL FEDERATION OF ESSENTIAL OILS AND AROMATIC TRADE (IFEAT)

Fazal Mushin

Business Development Manager

The International Federation of Essential Oils and Aromatic Trade (IFEAT) was held in Sydney, Australia, from 2 - 6 November 2003. The main focus of the Conference was the Essential Oils Industry of Australia, New Zealand and the Asian countries.

The Conference was well attended by about 294 participants and 82 accompanying persons, representing the European and Asian countries, America and Australia. The majority of the participants were from China and India. LINK Natural Products was one of the three Companies that represented Sri Lanka at this Conference

Dr. Devapriya Nugawela, Managing Director of LINK Natural Products, was invited to make a presentation on the Essential Oils Industry of Sri Lanka. This very informative speech was mainly focused on Cinnamon (which draws the largest amount of turnover, compared to the other minor export crops of Sri Lanka) and other spices such as Pepper, Nutmeg, Clove and Cardamom (*Vide page 05 for full text of presentation*).

Another significant presentation titled 'Cinnamon and Cassia - Past, Present and the Future' was made by Dr. Roy A. Johnston of Givaudan Flavour Corporation, USA. It was stressed during this presentation, that although Sri Lanka holds about 90% of the world production of Cinnamon, there has been no initiative to move away from the dependence on Mexico, which is the main buyer of Cinnamon in primary form. A very small quantity of the raw material, compared to the total production of Cinnamon oil, goes to the North American and European markets.

Whilst the consumption has remained more or less the same, production costs have increased over time and industries have been forced to look at reducing the cost of raw materials in order to break-even. This trend has also given way to the deterioration of the quality of some natural oils and a shift towards synthetic oils.

At the discussions that followed, the broad views expressed by most participants referred to the recession in prices in the world market, in the light of the global economic scenario. Buying countries expressed their concern on the increasing competition among suppliers and the deterioration of quality. New laws have been enforced in many

countries to regulate trade and ensure minimum quality to meet the expectations of consumers and relevant authorities.

On the other hand, due to the increase of new entrants into the Essential Oils Industry, especially from India and China, existing market leaders are now forced to concentrate on the developments of new products to counteract the competition and to ensure survival in the long run. Currently, India remains the dominant world supplier and there is not very much that Sri Lanka can do to compete with the Indian Industry. For example, Nutmeg oil is cheaper to be bought from India than be produced locally. However, opportunities for collaborative trade transactions should be exploited and alliances made wherever possible, to work alongside with them.

The strength of Sri Lanka lies in its position with Cinnamon. With the present infrastructure facilities, focus should be on Cinnamon to have an assured supply and a strong base of Leaf Oil as an entry point to unexploited markets. In this context, the local R&D must play a key role in the development of new products, especially in the area of fragrances. With this, Sri Lanka should be able to offer a mix of leading-edge products to the international market.

The forum provided an invaluable opportunity for the LINK officials to interact with most of the key players in the industry and major business partners, mainly from the United States of America. Samples of LINK products presented to them received very encouraging responses. With regard to small-scale entrepreneurs in Australia, the local players such as Bronson & Jacobs Pte Ltd, had little knowledge of the existence of LINK and its strengths. The meeting set the stage to create a positive impression on the international community on the capability and the potential of the local industry. Discussions were held in this regard with representatives of many organizations to establish common understanding for mutual benefit.

Through consistent product quality, LINK products will endeavour to flourish in distant lands; prices, of course, will be market driven. Overall, the conference was an eye opener, as Sri Lanka was able to confirm that great potential lies in the industry of spices and essential oils and that Cinnamon is one of the products with promise.

THE ESSENTIAL OILS INDUSTRY IN SRI LANKA - A BRIEF OVERVIEW

Based on a Presentation made by the Managing Director of Link Natural Products, Dr. Devapriya Nugawela, at IFEAT, 2-6 November 2003, Sydney, Australia.

Sri Lanka, a small Indian Ocean island, has been famed for the quality of its spices since the time of the Romans. Recorded history indicates that the trade in spices commenced with the Romans and Arabs, during the zenith of their respective civilizations. The spices of ancient Ceylon - as it was then known - became an economically important commodity, when, in the beginning of the sixteenth century the Europeans carried to Europe, cinnamon, cloves, pepper, nutmeg, mace and cardamom, and were able to obtain premium prices for them.

A famed historian has said:

If the vagaries of wind and wave brought the Portuguese to our shores, the lure of Cinnamon caused them to stay.

So, it was the Portuguese at first, and, they were soon to be replaced by the Dutch, who battled for spices, - and most of all Cinnamon - had become the most valued currency of the time. The conflicts of this period were fought for the control of the spice trade and Sri Lanka was at the centre of the conflict between the maritime powers of the day. Therefore, it is appropriate that I commence this overview with Cinnamon and cinnamon oil, as this is the spice for which the island has the world monopoly. We produce over 80% of the global supply of the true cinnamon of commerce:

Cinnamon was at that time (about the 16th century) a wild growing crop, with which the Sinhala Kings paid their dues to colonial nations in exchange for favours granted them. However when the Dutch took over the command of the trade from the Portuguese, they placed cinnamon on a crop-wise footing and developed a system of systematic cultivation. They also introduced the technology of distillation and produced essential oils from cinnamon - cinnamon bark and cinnamon leaf - and afterwards from other spices.

So Sri Lanka's heritage of production of essential oils is over 400 years old, and the range of our essential oils remains unchanged, namely cinnamon bark, cinnamon leaf, clove bud, nutmeg, black pepper, cardamom and add to this citronella which originated in Sri Lanka and had been taken over to Java by the Dutch.

Essential oils have been produced in Sri Lanka, continuously since those times. During the decades of 1960-80, essential oils had become the subject of particular interest of our own researchers. As a result, some developments in distillation technology and in particular the application of instrumental analytical techniques in quality assessment.

Today, the range of essential oils commercially produced in the island includes the following: Cinnamon bark oil, leaf oil, Black Pepper oil, Cardamom Oil, Nutmeg Oil, Clove bud Oil and Citronella Oil.

Cinnamon quills and the essential oils of cinnamon are the major export products. Quills are produced by a skilled traditional post-harvest technique, unique to the country, where the inner bark is removed, dried and cured, and coiled. The smaller pieces of genuine material (called quillings) resulting from this practice is usually distilled, together with some of the quills to obtain good quality cinnamon bark oil.

During the past few years, cinnamon as a spice has commanded a high price in the international market. Possibly, this may be due to new health virtues attributed to it as an immune stimulating agent, or even a new flavour trend has been instrumental. However, this has posed some problems. Therefore, exporters of cinnamon spice and the distillers have been plunged into a competitive situation. As a result the distillers have to pay enhanced prices for their raw materials and the cost of production of the essential oils have risen. It has also motivated some undesirable practices. There have been instances where the normal once-a-year harvesting has been converted to twice a year and relatively immature material has been distilled.

Cinnamon leaf oil can be regarded as a byproduct of the cinnamon harvesting - the twigs and leaves are collected, and after a short post-harvest preparation, are distilled in field stills which are situated in the growing area.

An improved supply of cinnamon leaf oil, both in quantity and quality, is produced as a result of recent attention to agro technology, enhanced methods of cultivation, as well as improved distillation technologies.

The marketing cycle of cinnamon oils commence with two sources, namely the smaller distillers and the larger distillers. The route through the commodity exporter is now in the decline.

Besides cinnamon oil, Sri Lanka is also renowned for the particular quality of other spice essential oils. The country possesses several micro-climatic zones, and spice growers have hit upon the most suitable areas for each spice.

Unfortunately, in several of these cases there is too little of it. But as Shakespeare has said: "*Why then can one desire too much of a good thing*"

However, permit me to take a brief look at the situation in regard to some other major essential oils produced and exported from Sri Lanka.

First of all, take Nutmeg oil. The Nutmeg tree is a large and beautiful one which is grown in our home gardens with other spice crops such as cloves, black pepper in the central wet zone. The Nutmeg tree was first introduced to Sri Lanka by the British in 1804. Since then the nutmeg tree has thrived in central wet zone of the country. Nutmeg oil is distilled by three major distillers and the oil has a significant chemical compositional difference as compared with the Indonesian oil. In the Sri Lankan nutmeg oil the Myristicin content is around 3.5-4.0% and the Sabinine level is around 50%. At present Sri Lanka exports around 30-35 metric tons of nutmeg oil per year, and it could be increased to 80-100 metric tons if necessary.

The other major essential oil exported from Sri Lanka is cardamom oil. Sri Lankan cardamom oil has been known for its specific characteristics, once again the micro-climatic factors coming in to play. In general, Sri Lankan cardamom oil has a high content of alpha-terpenyl acetate, when compared to oils from the other geographic regions. Sri Lanka exports around 500-600 kg of cardamom oil per year.

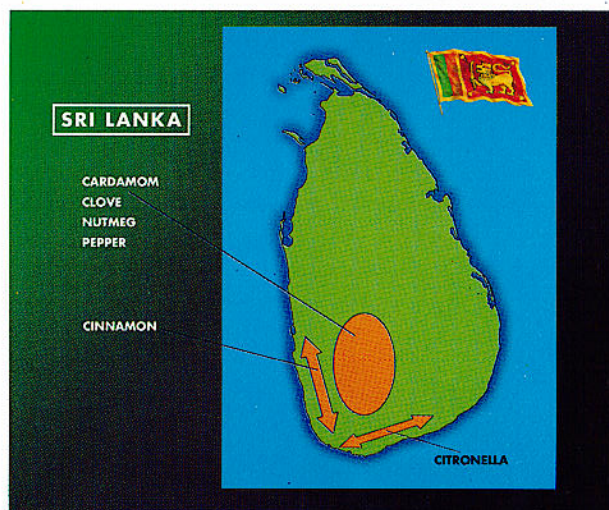
Sri Lanka produces about 7000 metric tons of black pepper. More than 50% of it is exported. The main importer is the oleoresin industry in India. There has been a significant increase in black pepper oil from Sri Lanka over the past few years. Buyers look for Sri Lankan black pepper oil only when there is a shortfall in the market. Sri Lanka exported large quantities of black pepper oil in 1998, '99 and 2000 when there was a shortage of pepper. Now the situation is eased and the demand for Sri Lanka pepper is down. Probably the reason is the price.

Clove too is a home garden crop in Sri Lanka and not cultivated to the extent in say, PEMBA. However, the clove from Sri Lanka enjoys a niche market demand. Harvesting of cloves from the large trees that grow in these home gardens is very much price-dependant, as it is a labour intensive process and the low prices of the commodity deters the harvest. Sri Lanka exports about 2.5-3.0 million tons of clove bud oil a year, but it has the potential to export more.

Besides these spice oils, Sri Lanka was once reputed as a producer of citronella oil. It was indeed the home of the crop when the Dutch were in occupation of the country. The crop was enhanced soon after the independence in 1948, but the recent neglect has taken a heavy toll. Now it is planted on marginal lands and fetches less than marginal returns. This makes it give way to competitive crops and oil production has diminished. The exports have gone down from 90 m tons a year to about 18 m tons a year.

One of the most important factors is that most of the spice crops are cultivated in home gardens or less than 10-15 hectare lands. Some of these spice cultivations are organic certified by international agencies and Sri Lanka produces and exports some quantities of certified organic essential oils.

In summing up it may be stated that essential oils production in Sri Lanka focuses towards the potential niche markets. The etiolate national economic situation that prevailed due to civil conflict shows signs of improvement. This is bound to make the industry more attractive for further investment. Things are indeed looking brighter than a few years back. The industry is looking on the promise of science and technology to improve their knowledge and expand our options.



PROFILES OF LINK PRODUCTS - 2

LINK KESHA - HERBAL HAIR OIL

The Ayurvedic system of medicine, practised for centuries in the subcontinent of India and surrounding regions, subscribes to the concept that nature has most of the ingredients needed for the maintenance of good health and vitality. This old system of healthcare has documented evidence of the use of plants as therapeutic agents.

The care of the head is recognised in Ayurveda as of supreme importance. A healthy head is reckoned to ensure a healthy body. The natural oils and fragrances are known to provide the mild and comfortable care that a sensitive part of the body such as the head requires for the

sustenance of a vibrant and healthy corpus. Regular care of scalp and hair ensures that the respiratory system functions smoothly, and this in turn causes feelings and sensations of well being in any individual. Muscular relaxation of the scalp causes feelings of well being which makes LINK KESHA hair oil act to relieve feelings of tension in the head.

LINK KESHA is a carefully formulated hair oil using medicinal herbs. The herbs used in this formulation are well known in the Ayurvedic system. They have also been the subject of scientific investigations and are devoid of any toxic manifestations, when used externally. The raw material of LINK KESHA is as follows:

1. *Indigofera tinctoria* Linn. (Fabaceae)
[(Sin: Nil Averiya / Tam: Nili) - Leaves]
This is used in Ayurveda as a soothing ingredient to the head, to promote growth of hair, and to control the effects of epilepsy.
2. *Eclipta alba* Hassk. (Asteraceae)
[(Sin: Keekirindiya / Tam: Goruga) - Whole plant]
The leaf juice of the plant is used in the Ayurvedic system in the treatment of catarrh, jaundice and to prevent premature greying and falling of hair.
3. *Alternanthera sessilis* Linn. R.Br.ex.DC. (Amaranthaceae)
[(Sin: Mukunuwenna / Tam: Poannannkannikkirai) - Aerial plant]
This is the common leafy vegetable, a popular constituent in the local everyday meal. It contains high levels of Iron and Protein and has a reputation for nutrition as well as improvement of eyesight.
4. *Adenanthera pavonina* Linn. (Fabaceae)
[(Sin: Madatiya / Tam: Guvivenda) - Leaves]
The leaves of the plant are used and have a reputation for anti-inflammatory action, and relaxing muscular tension. In Ayurveda it is used to prevent scalp irritation and falling of hair.
5. *Phyllanthus emblica* Linn. (Euphorbiaceae)
[(Sin: Nelli / Tam: Nelli) - Fruits]
The fruit is a popular constituent of many Ayurveda oral formulations. Its reputed therapeutic effect is as a diuretic, and an antibacterial agent. The fruit has an abundance of vitamin C. It is used in applications for infections of the eyes and scalp.

The herbal oil LINK KESHA blends the extracts of the plants above, with a purified excipient commonly used in hair oils, in a manner that will benefit the scalp and the hair. Being a long used herbal remedy its efficacy, as well as safety over long periods of use is well established. Besides no toxic manifestations have been recorded by any of the constituent herbs on topical application.

The dream of many balding men (young and as well as not so young) is that a magic substance will be found to restore the hair of their adolescence or youth. Equally, a head of luxuriant hair is a feature every maiden longs for.

Several new hair growth stimulants have enjoyed claims that have not really materialized. However ancient herbal hair oils such as the formula from which LINK KESHA is derived, have helped, when locally applied, to stimulate atrophied hairfollicles into producing hair growth. Some of the essential oils that constitute these herbal hair-care formulas are known to dilate blood vessels, stimulate cell division and in the process encourage the growth of hair. These ideas would not come as a surprise to "Aromatherapists" who regularly use mixtures of essential oils. Unlike synthetic chemicals, essential oils are harmless to the body when used in the appropriate amounts.

The preparation LINK KESHA has the properties to be classified as a stimulant for atrophied hair follicles resulting in hair growth. Genetic considerations of course come into problems of scanty hair as well as balding. But the process of balding as well as a scanty growth of hair can be retarded by the healthy maintenance of cell functions. It is clear that healthy cell functions can also slow the rate of falling hair in women, strengthen and make denser the existing hair, and in cases when the hair follicle is yet productive regenerate a downy hair. Premature balding too can be lessened by regular application of the herbal oils, but results here are far from spectacular, being slow and spread over a long period of time. On the other hand hair which is downy can be restored to health and plenty by regular massage with hair oil containing some of the valuable essential oils that can restore hair follicle to normalcy. Care of the head and hair through the regular application of

herbal preparations with constituents that are known to stimulate cell function, can also result in minimizing diseases such as catarrh, migraine, ordinary headaches, bronchitis and asthma.

The preparation of LINK KESHA has been formulated on the basis of Ayurveda's best traditional preparations, produced with LINK's usual technological thoroughness using authenticated plant material and quality controlled from raw materials, to final products. It has been developed at the LINK Natural Products factory at Dompe. It bears the stamp of LINK's high-class indigenously developed technology, combined with modern scientific quality assessment. LINK KESHA is made specifically for the requirements of the modern sophisticated consumer.

[For profile of LINK SAMAHAN vide Digest Inaugural issue]



Left. An aerial view of the Link Natural Products factory located at Dompe

Right. A section of Link's new facility for large - scale processing of herbal products.



Vide page 09 for full text on Process Engineering at Link Natural Products

LINK'S NEW FACILITY FOR LARGE SCALE PROCESSING OF HERBAL PRODUCTS

B. Sathyanarayana*

A state-of-the-art processing plant assembly was installed at the multi-storied building complex in the Dompe campus of Link Natural Products, in August 2002. The plant assembly has the capability to carry out, both solvent extractions of plant material, as well as to produce essential oils by steam distillation. The major components of the plant machinery were acquired from India, and installed at Dompe. The steam distillation assembly has been largely fabricated by Link at Dompe. In addition, Link has been able to design and fabricate locally an efficient outfit for fractional distillation of essential oils under reduced pressure, to produce selective "isolates".

With this plant assembly Link Natural Products is now capable of meeting global customer requirements and specifications in a variety of products such as essential oils, essential oil isolates, spice oleoresins and herbal extracts. This plant at Dompe is the first and only one of its kind presently in Sri Lanka. It adheres to ISO and GMP standards as well, including global health and safety standards.

The main operations now carried out at Dompe using the new processing complex are the following:

- * Fluidized-bed drying of herbs
- * Distillation of essential oils
- * Extraction of spice oleoresins
- * Production of extracts for HHCP's
- * Fractionation of essential oils
- * Economic recovery of solvents

FLUIDIZED-BED DRYING

Raw material used by Link Natural Products are screened for conformity with Link's quality specifications. The raw material is then dried in the Fluidized-bed dryer to ensure strict control of temperature and time duration parameters within Link's system of Total Quality Management (TQM), prior to being further processed.

DISTILLATION OF ESSENTIAL OIL

The pre-treated raw material is distilled in stainless-steel stills, where temperature and steam-pressure is under careful regulation. The oil/water distillate passes through stainless-steel multi-tubular condensers into Florentine vessels. These have been designed at Link to accommodate oils of various characteristics.

Chilled water is used to increase heat-exchange efficiency. The essential oils are separated, filtered and stored in cooled chambers for maturation, prior to being packed for export.

EXTRACTION OF SPICE OLEORESINS

"Oleoersins", being the solvent-extractable portion of a raw spice, can be said to be more representative of the spice than, say, the corresponding essential oil. Oleoresins include the essential oil as well as the non-volatiles, and such other constituents like fatty acids, waxes, gums, resins and pigments. Oleoresins are extracted with solvents selected in order to conform with the product requirements and/or desired specifications. The solvent extract or miscella, is concentrated by removal of the solvent under controlled conditions to yield the oleoresin which is then exported or used in product development.

PRODUCTION OF EXTRACTS FOR HHCP'S

These are produced in much the same manner as spice oleoresins, except that the solvent used is mainly water. The concentration of the extract is carried out invariably under reduced pressure to ensure greater efficiency and minimal decomposition.

FRACTIONATION OF ESSENTIAL OILS

Essential oils, being multi-component systems, it is not unusual to find customer-companies requesting certain fractions of such oils for their specific uses. Therefore, such fractions as "terpene-free essential oils", and "essential oil terpenes" are sometimes requested. Link's own new fractional distillation outfit is able to deliver such "custom fractionated isolates" on request. The desired fraction is carefully monitored by GLC in the R&D laboratory to ensure its authenticity.

ECONOMIC RECOVERY OF SOLVENTS

This is a "sine-qua-non" in process technology. Not only is it a requirement from economic standpoints, but it ensures against environmental hazards. The treatment of effluent water is one of the main themes in Link's environment-friendly process technology. When solvents are distilled they are always rectified for further use.

Link Natural Products has a decided commitment to maintain environmental standards consistent with a Company with an international stature and reputation. Thus rectification of used solvents, conversion of plant residues into biofertiliser, are built into Link's process operational system.

* B. Sathyanarayana is presently a Consultant of Link Natural Products. He is a Chemical Engineer, with considerable experience in the Pharmaceutical Industry in India.

MARKETING STRATEGIES OF LINK PRODUCTS

Ayurvedic formulations and Herbal Health Care Products of LINK Natural Products are now being used in most of the Asian countries, and are rapidly gaining popularity the world over. The marketing strategies adopted for the different products, vary between the clientele and the product category.

THE LOCAL SCENARIO

The portfolio of the Company includes strategies for marketing of following categories of products for consumers in Sri Lanka

- a. Generic Ayurvedic Products (GAPs)
- b. Fast Moving Consumer Goods (FMCGs)
- c. Specified Brand Products -
Customer-formulated products
- d. Essential Oils and Oleoresins

Marketing Strategy of GAPs

GAPs are mainly produced for the local market, and the Traditional Ayurvedic Practitioners are the end users of these products. Ayurvedic Practitioners are familiarized at regular intervals, with the products made on scientifically simulated process practices that are in accordance with traditional regimes.

The Sri Lanka Ayurvedic Pharmacopoeia (SLAP) is the basis of producing GAPs. Products manufactured according to SLAP are given to Ayurvedic Practitioners directly by the Company, complementary with the process of scientific methodology.

Within this process, the Company produces *kwathas* (polyprescription concentrates) for Ayurvedic Practitioners, that are completely compatible with the traditional product. The Company operates through Expert Advisory Groups in developing the formulations.

Marketing FMCGs

The Company has a well formed network of distributors of FMCGs. The distribution mechanism ensures that the stocks are delivered on schedule to the relevant traders, with uniform margins or discounts being granted unbiased. The whole area of Sri Lanka is divided into 24 territories, and a distributor is appointed for each territory. The basic strategy of the Company is to cover a vast universe of retail traders and at present it enjoys about 60% islandwide coverage.

REFLECTIONS ON THE GLOBAL MARKET

LINK has been in the international trade of Herbal Health Care Products (HHCP) and essential oils for the past twenty years. Whilst the initial emphasis was on essential oils, during the past eight years HHCPs were also focused on. With the introduction of LINK's flagship product SAMAHAN, the infrastructural facilities were modernized, in keeping with the latest technology in manufacturing and quality assurance. With the modernization of the overall manufacturing process, a hi-tech extraction plant for essential oils and oleoresins was also commissioned. (*Vide page 09*)

Exports

SAMAHAN grew from strength to strength and took wings abroad. LINK started its own distribution of SAMAHAN in India, while a sole agency was granted for Malaysia. Other markets such as Germany, UK, Singapore and USA, where LINK works through distributors or agents, have also shown a lot of promise. A purchasing agreement was made with Singapore to facilitate the purchase and export of whole spices. Further, HHCPs gained popularity in regions like Europe, USA and the Far East.

Business Development

With the expansion of operations, there was a dire need of a centralized division, which handled all operations related to export marketing and distribution. Identifying the long and short term functions of export marketing was one of the initial tasks in setting up this facility. The wide area network with all modern telecommunication facilities has given LINK the opportunity of accessing required information and responding to queries both within and outside its premises with minimal time.

In order to centralize the export process activities, all relevant information was documented and made accessible to authorized personnel. All information on purchases of raw materials and sales of essential oils were also centralized. In addition, an Export Policy was drawn up, which serves as a guideline to date.

The Internet proved to be a new area with promise, and with the introduction of the data service Link was able to respond to customer queries within 24 hours. The positioning of Link at key web sites resulted in more inquiries being made on HHCPs and essential oils. Link also aligned with the EDB initiative of an e-commerce portal, and this too has proved to be a good testing ground to facilitate e-commerce and purchases through the world wide web.

The Sales Policy of LINK Natural Products comprises the following:

- * Cost effective own distributors and sales force
- * Constant training of sales personnel, distributors and retailers to improve customer service and productivity, and sales at retail points, supermarkets and pharmacies
- * Competitive profit margins which ensure a winning situation for the trade

THE FUTURE

Considering the present state of affairs and the availability of modern technology, the Company can safely anticipate increased turnover and profits in the years to come. In the long term, innovative products which meet the ever increasing market demand, need to be developed to maintain the leading edge that the Company has enjoyed so far.

Compiled by Asanki Yatigamana, based on discussions held with Wajira Pannilaratne, Marketing Manager, and Fazal Mushin, Business Development Manager of LINK Natural Products.



THE DOROTHY HODGKIN POSTGRADUATE AWARD

In Britain there is a commendable new Private Sector cum Government initiative to encourage students from the developing world to study in the UK. It hopes to bring over 100 Ph.D. students from the developing world under an award scheme to be named after the Nobel Laureate Dame Dorothy Hodgkin nee Crowfoot.

COMMENT BY THE EDITOR

Dame Hodgkin was one of the UK's pioneering chemists who developed the technique of X-ray crystallography to determine the structure of complex organic molecules. She pioneered this technique with the structural elucidation of Vitamin B12 along with the group headed by A.W. Johnson FRS. Subsequently the technique was used in the determination of the structure of the DNA molecule. The initiative is the result of a joint effort by the government and a number of companies, and a 10 million pound fund has been set up for this purpose.

Can our government and ten companies collaborate towards an initiative in similar vein towards encouraging local science?

Source : Chemistry World 1, 2004

AYURVEDA – CONCEPTS AND PRACTICE

Danister L. Perera

*'Being older does not reflect goodness and being newer does not reflect accuracy'
(An Indian proverb)*

Although Ayurveda is believed to have celestial genesis, it has been acclimatized in human experience throughout several millennia. The suffix 'Veda' denotes the meaning the science or systematic knowledge, which is fundamentally based on trial and error. Nevertheless, divine wisdom behind Ayurveda is considered the archetype of its axiomatically accepted framework. Intellectuals, scholars, academics, clinicians of Ayurveda, have made their own theories based on this. Since Ayurveda is adaptable or adoptable in different socio-cultural contexts, it can be called universal. In the presence of modern scientific approaches, evidence-based practice has come to the fore. Most of the ancient of traditional knowledge systems are questioned for their evidence base.

To begin with, an illustrative dialogue from Charaka Samhitha is appropriate. Lord Atreya clarifies and explores his acolyte, Maitreya's professional argument in a logical enunciation. Maitreya questioned the efficacy and effectiveness of therapeutics in the context of outcome-based clinical practice. Lord Atreya responded: *'The conclusion derived by you is not correct, Maitreya. To say that the patients adopting therapeutic measures are dying is not borne out by facts; therapeutic measures can never be ineffective in curable diseases. Similarly, even in such cases where patients are cured without proper medicines, it should be understood that, had there been proper administration of therapeutic measures and process of cure would have been quicker and better; this can be linked to be lifting of a healthy person who has fallen; he can no doubt get up himself but if he is helped and lifted by another person, he would get up sooner without much difficulty. Such is the case with patients stated to have been cured without adequate therapeutic measures. It is not that all patients having resource to therapeutic measures are necessarily cured. The diseases that are curable can be cured only by resource to therapeutic measures. Those that are not curable will certainly not respond to treatment; not even the most able physician is capable of curing moribund patients. Able physicians always proceed with their treatment after proper examination. As an archer having knowledge and practice (of archery) throws arrows with the help of his bow and does not commit*

mistakes in hitting a massive body nearby and thus accomplishes his object; so a physician endowed with his own qualities and other accessories proceeding with certainty cures a curable patient without fail' (C. S. Suthrasthana; ch.x).

This rationalization convincingly accomplished by Lord Atreya, critically appraises the evidence for validity, and effectively tracks down the best evidence. It enunciates that further verification of evidence-based practice is a process of life-long, problem-based learning, which converts information, and knowledge into focused questions for applying the results of clinical practice. Evidence-based medicine is defined as *'an approach to practicing medicine in which the clinician is aware of evidence in support of clinical practice, and the strength of that evidence.'*

This is not a new concept in ayurveda, a system of knowledge which promotes effective professional practice, applying the best evidence every time and evaluating performance of evidence in clinical application. **Ayurveda itself is principally an evidence-based science in terms of oriental epistemology. It has been fostered and nurtured by contemporary subjects such as arts, sciences, philosophies, etc. for strengthening the multidisciplinary approach in practice. The application of modern science and technology to upgrade Ayurvedic knowledge and practice is therefore, most compatible with Ayurvedic concepts.**

Accordingly, in the above dialogue, Atreya has disregarded the theories that are not realistically admitted within the evidence-based practice. Predeterminism, destiny or fate cannot dwell in clinical concepts, which are matured through out professional practice by proficiency. Ayurvedic practitioners are precisely capable of applying clinical know-how to reach the terminal success of a case. That's why in Ayurveda, a physician must learn *Maryada* or therapeutic confines in practice where he decides the curability.

Ayurvedic education is a well-focused professional exercise and results in its practitioners being able to be of maximum service to the society. Physicians are called *Trija* (thrice born) because after normal birth they are born a second time with the beginning of education and thirdly when commencing a professional career. In Ayurveda, various phases of the learning process, up to accreditation, are significantly demarcated.

- *Shruthi* - Information and knowledge gaining through various sources
- *Karmabhyasa* - Continuous practical training for skill development
- *Satatabhyasa* - Continuous Medical Education (CME)
- *Tatparata* - Continuous Process Development (CPD)
- *Naipunyata* - Knowledge Translation and Competence with evidence-based practice

The universally acceptable methodology used in Ayurveda for curing human ailments is apparently based on cause and effect. It is more or less relevant to four criteria which lead to relieve the suffering of mankind.

- * Existence of problem - disease / illness / ailment / dissatisfaction / discomfort
- * Cause of problem - etiological factors of health
- * Absence of problem - health / well-being / happiness / contentment
- * Path to solution - treatment regime / healthy life style / restoration

The proper identification of the existing problem, which causes the suffering, is completely based on examination and inspection. Then it is completed with an accurate diagnosis where customized description of the case is available. The treatment regimen is selected in a personified therapeutic modality with all the clinical experiences of the physician (*kshipra hasta*). These two processes are extensively followed by means of modern sequences like systematic reviews, meta-analysis, practice guidelines, which are recognised as preliminary tools for completion of effective treatment. Ayurveda clearly defines the proper therapeutic (*vishuddha prayoga*) as a measure, which relieves the ailment without side effects of complications.

Clearly, Ayurveda possesses a valuable evidence-based corpus of knowledge. However, methods of knowledge gathering, assessment and formulation of therapeutic agents can receive a massive boost by the application of modern methods of science and biomedical research.

Facts are stubborn things; and whatever may be our wishes, our inclinations, or the dictates of our passions, they cannot alter the state of facts and evidence.

John Adams

* Danister L. Perera is a Consultant of the Sri Lanka Project for the Conservation and Sustainable use of Medicinal Plants

QUOTES

Prof. Graham Roberts quoted by Emme Davis about Oxford's new 60 million-pound laboratory for Chemical Research

'Venture capitalists are not necessarily your friends. It is a great trick to give you not quite enough money, so that you work yourself to death and you need a bit more money. They give you a bit more money, but take more and more of the Company off you. If you start off not knowing that's the way the game is played, you could come unstuck'. And Prof. Roberts adds, 'Work out how much money you need and how long it will take. Double both and you are nearer the truth.'

Source: *Chemistry World* 1, 2004

TRAPPING FOREST FRAGRANCES

Chemists have recently developed a new type of adventure. They believe that plants in the forest in the regal splendour of their natural habitat, produce flowers, which give out the best of natural fragrances. Accordingly researchers trap the space surrounding the flower while it is still in place, near the canopy of the rain forest. This is called bio-trapping the fragrance. The Aroma Traps are placed around the flowers, and mark the sites in the forest so they could return for a second hunt. The entrapped aromas are concentrated under careful conditions and analysed by GLC-MS combination. Chemists then try to replicate the natural aromas. A series of jars of the suspected aroma constituents are synthetically produced, and employed. They are contained in jars through which a stream of nitrogen gas flows. A trained nose of a perfumer makes the final judgment, as to the combination that closely approximates the original. The technique can bring among other things, a fresh quality note to existing natural fragrances - it is claimed. There is also the advantage of the discovery of natural compounds with unique exotic aroma characteristics, which can be synthesized in the laboratory.

GLOSSARY OF SOME AYURVEDIC PRODUCTS - 2

Anjana :

Anjana are medicines that are applied to the eyes (colirim) and may be in the form of sticks, thick liquids (semi solids) or thin liquids. The anjana in these three forms are termed as varti, rasakriya and drava respectively. The varti type of anjana are rubbed in water or other prescribed media and then applied to the eyes.

Satwa :

Satwa are sediment extracts of drugs which are predominantly starchy in nature. The most common type of satwa or starch is the Gudoochi satwa, which is the starch of *Tinospora*.

Bhasma :

Bhasma are equivalent to calx, which are prepared by a process of calcination. Bhasma are made by calcining the given drugs, which may either be organic or inorganic in origin. The materials which are made into bhasma in Ayurveda, vary from minerals to metals, and animals to plant products. Chemically, the bhasmas are oxides or ashes of the drug concerned, in a state of fine division, with a certain proportion of these particles in the colloidal dimensions.

Sindoora :

Sindoora are medicines containing mercury in the form of its red sulfide. The red sulfide of mercury is known in Sanskrit as 'Rasa Sindoora'. In these preparations, the metallic form of mercury is taken and processed with a variety of drugs and heated. The mercury is eventually converted to its sulfide form which is sindoora.

Arka :

Arka are distilled essences, which contain the volatile constituents of the drug used in the preparations, in a medium of water and they are equivalent to the 'aquae' or 'waters' of the Western Pharmacopoeia which are prepared in the same way.

Kshara :

Kshara are ashes of plant drugs or the derivatives of such ashes in the formation of solutions or crystals, all of which have the basic quality of being alkaline. The Kshara are classified into two groups, those that are meant for external application (amorphous state) and those intended for internal administration (liquid state). As Kshara are medicines with caustic and destructive properties, they are applied to destroy warts, keloids, etc. Kshara are administered internally in some gastro-intestinal disorders.

Rasa oushadha :

These are medicines which usually contain mercury (Hg) which is present in a chemically combined state with other ingredients. The term means, mercury medicines which denote that Hg dominates the group of preparation. These are also called khanjiali preparations because Hg is first made to combine with sulfur to form a black sulfide in these preparations.

For Glossary-1, vide Digest Inaugural Issue

INNOVATIONS IN THE HERBAL PRODUCTS INDUSTRY – A POINT OF VIEW

R.O.B. Wijesekera

"The failure to keep up with innovation is really the failure to develop and focus core competitiveness in the direction of change of progress".

In the herbal products industry, there is usually a considerable "Body of Knowledge". The foundation of this Body of Knowledge is the traditional knowledge. This is so for both the Medicinal Plant Industry as well as the Essential Oils Industry. Both these can boast of a considerable Body of Knowledge, based on ancient traditional knowledge.

There is also now a considerable Body of Knowledge (in both these areas), which is based on modern science and technology. Science & Technology enhanced these areas of endeavour around the seventeenth century, with the commencement of related phytopharmaceutical, perfumery and fragrance industries in Europe. Since then, staggering changes marked their progress. New therapeutic agents emerged, beginning with Quinine. Today's anti-malarial Artemisinin and anti-cancer Taxol are evidence of continuing strength. Synthetic Chemistry, a by-product of Natural Products Chemistry, then emerged. It provides today a challenging, competitive alternative to natural products. New modern fragrances such as Vetiver, and formulations based on sandalwood and suchlike, signal the productive influence of science. But another significant feature is the way in which new innovative products are presented to the consumer. We have slow release capsules, injectables, drips and sprays as pharmaceuticals. From other disciplines and other industries have come these innovative ideas. Adaptation of research results from totally unrelated disciplines and industries has proved to be a key to a new kingdom of success in many an industry. These examples are now well documented. The salient feature is significant,

"Fortune favours the prepared mind".

Companies must endeavour to build R&D groups with the innovative approach. An important aspect of that approach is to look at research conducted within industries not necessarily related to the pharmaceutical field. The Herbal Industry has much to learn, acquire and use as a source of innovation the results of research from other industries. The food, rubber, plastics, paper and pulp, leather are some that come to mind because intense R&D work has been carried out within them. Their results may indeed be worth looking into for designing profitable and

innovative new products. The same approach is valid a looking into the traditional sections of the knowledge. Today's tools and materials development, the design of new products, innovative presentations for the consumer presents a formidable research challenge. Given that today, environmental issues and sustainability and powerful driving forces behind R&D and industrial product development, the relationship to the natural is a market incentive. If, for example, new fragrances can be related to a natural odour, it makes it a compelling advantage in consumer marketing.

Techniques are available today to entrap natural fragrances from living flowers, and study their composition. These "Bioactive Techniques" widen beyond bounds the challenges of new product development in herbal-based products.

LINK DIRECTOR / CONSULTANT IS NEW GENERAL - PRESIDENT OF SLAAS



The New General-President of the Sri Lanka Association for the Advancement of Science is Professor Tuley de Silva, currently a Director *cum* Consultant to LINK Natural Products. The SLAAS is the premier non-governmental Scientific Organization in the country being representative of all the scientific disciplines.

The New General-President is a Chartered Chemist. He has served as Professor of Chemistry and Dean of the Faculty of Science of the University of Sri Jayewardenepura. Professor de Silva is also a qualified Pharmacist. He has been President of the Institute of Chemistry, as well as the Pharmaceutical Society of Sri Lanka. He had served as a UNIDO Special Technical Adviser in Vienna, and a consultant to industry. He is former Director of the Bandaranaike Memorial Ayurvedic Research Institute at Nawinna. *The Digest* congratulates the new General-President of SLAAS, and wishes him a successful term of office.

NEW EUROPEAN LEGISLATION ON TRADITIONAL HERBAL MEDICINES

Within Europe, industrially processed herbal products are widely used. This is true of all the member states of the European Union. It is equally true of the eastern countries of Europe that constituted the former USSR. The main uses of these herbal products are for the treatment of the following conditions:

Varicose veins, Coughs and colds, Circulatory disorders, Muscular pain, Digestive ailments, Hypertension and Insomnia, Bladder and Kidney ailments, Liver ailments

If the value of sales are any indication, then France and Germany are the main users of industrially processed herbals. They alone account for over sixty five percent of the herbal market share. In Europe the market for herbals is largely dependent on self-prescriptions. About a quarter of the Over-the-Counter or OTC medicines sold in Europe are herbals. Many herbal preparations are sold as "food supplements", as well as "food flavourings". A considerable quantity of natural herbal constituents is, of course, used in the flavouring as well as the cosmetics industries.

Herbal pharmaceuticals governed by the European Directive are designated as 2001/83/CE. This stipulates that the marketing of any medicinal preparation, be on the basis of specific authorisation granted. Such authorisation is granted on the results of tests for quality, safety and efficacy. There are special conditions specified in the directive that enable the marketing of medicinal products with well-documented data on quality, safety and efficacy. But for those with a history of long usage, but without adequate published data to establish efficacy, authorisation will remain a problem. It seems preposterous to carry out the costly experiments on animals, and prolonged clinical trials on preparations with a longstanding tradition of clinical use. There could be an evaluation of safety and efficacy done by examining this traditional usage itself.

At present there appears to be a wide variation within the member states of the EU in regard to the legal status and the practice of herbal medicines. This has been widely discussed by involved stake-holders in Europe and prompted the new Directive, modifying the Directive 2001/83/EC on Traditional Herbal Medicines.

The main features of the new directive are as follows:

1. Definition of Traditional Herbal Medicinal products:

A Traditional Herbal Medicinal Product is defined as: any medicinal product, exclusively containing as active ingredients one or more herbal substances (ie. All, mainly whole, fragmented or

cut plants, plant parts, algae, fungi, lichens, in an unprocessed, usually in dried form but sometimes fresh, and certain exudates that have not been subject to a specific treatment, or one or more herbal preparations (preparations obtained by subjecting herbal substances to treatments such as extraction, distillation, expression, fractionation, purification, concentration, and fermentation, including comminuted or powdered herbal substances, tinctures, extracts, essential oils, expressed juices and processed exudates) or one or more such herbal substances in combination with one or more such herbal preparations, as long as the following conditions are fulfilled.

The conditions referred to in the Directive refer to aspects such as the following :

- * that the product is exclusively appropriate to traditional herbal medicinal products and is intended and designed for use without medical supervision for either diagnosis or therapy.
 - * be exclusively administered according to specified strength and posology.
 - * it is an oral, external and / or inhalation preparation.
 - * expert and bibliographical evidence of the use of the preparation over a long time.
2. Instructions for registration and authorisation.
 3. Instructions for labeling and advertisement.
 4. The establishment of a Committee for Herbal Medicinal Products as part of the EMEA (ie. Agency for the Evaluation of Medicinal Products to carry out tasks concerning the simplified registration and authorisation of medicinal products and
 5. The establishment of Community Herbal Monographs and lists of Herbal Products and Preparations.

It is claimed that the Directive will offer member countries of the EU and their patients seeking to use Herbal Medicines, a higher level of health protection, while permitting them access to medicines of their choice. Further that it will promote a single market for the category of drugs, and introduce consistent standards and procedures and encouraging cross-border trade.

The EU will also encourage the use of the Monographs of the WHO and the ESCOP (the European Scientific Cooperative on Phytotherapy).

SOURCES

1. Fitoterapia 75 (2004) 107-116
2. Weighell C. European OTC Market Review. In: DIA Euromeeting 2002

THE STORY OF A POPULAR EUROPEAN MEDICINAL PLANT

Matricaria chamomilla Linn

If you are in Europe, and if you have a problem related to an inflammatory condition, the chances are that you will be treated with a herbal extract or a preparation derived from a herb, viz. The flower of Chamomile

Chamomile (= *Matricaria recutita* (L.) = *M. recutita* (L.) Rauschert, Family Compositae) is considered one of the foremost medicinal plants in Europe. The plant is included in the pharmacopoeia of over 25 countries [1]. It is cultivated in Austria, Hungary, Germany, Russia, etc. The essential oil of the flower, which possesses a characteristic blue hue, as well as the flowers and other parts of the plant, possess curative properties [2,3]. The plant has been known in traditional therapy to possess properties that include anti-inflammatory, antiseptic, carminative, healing, sedative and spasmolytic activity.

The two main constituents of the essential oil are Chamazulene and bisabol, the former accounting for the characteristic colour of the oil itself. Altogether, about 120 chemical constituents have been identified in Chamomile. They include terpenoids, flavonoids and others.

Chamomile related preparations are popular in the world market, though in Sri Lanka the drug is hardly known to our medical practitioners. Perhaps, the developments in Europe are not too familiar to our anglo-phillic medical personnel.

Chamomile preparations available in Europe are in many forms. They are found in sachets as a popular herbal beverage like tea, as pomades and creams. The preparations have pharmacological value, as an anti-inflammatory agent, a smooth muscle relaxant, as a uterine tonus and having sedative effects. It is also useful against mucosal and cutaneous infections. In the cosmetic industry, it finds use as a fragrance enhancer and used in hair dyes. It is also a flavouring agent in some alcoholic beverages.

Few physicians in Sri Lanka, if at all any, are aware of the products derived from Chamomile that are so widely used in Europe.

Ayesha

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PLANT POWER

1. Herbal Competitor for VIAGRA?

A recent visitor to the LINK factory at Dompe was from France. He was on a mission prospecting for introducing LINK's guaranteed Herbal Healthcare products, into the French market through his company. Among other things, and having prospected for LINK Herbal Pharmaceuticals and Healthcare products, he asked: "Have you any traditional product that acts like Viagra?" He reckoned that such a thing would be a powerful money-spinner in France. There were none at the moment, but those who had researched on medicinal plants, and knew the considerable contribution made by drugs of plant origin towards modern medicine, were not to be surprised if there were.

Now come the results of some recent investigations in South Africa. Dr. Marion Meyer, Head of the Department of Botany of the University of Pretoria, has told the SAPA News Agency that South African scientists have isolated the active ingredients from the root of a tree, which is chewed traditionally by men in the Northern part of the Republic of South Africa. The root enables penile erections in the manner of VIAGRA – the modern synthetic drug.

The tree is referred to as the 'Violet tree', and the botanical identity has not been revealed. Understandably! Dr. Meyer has claimed that natural product ingredient isolated, acts in the same manner as VIAGRA. It has been tested on smooth muscle samples obtained from hospitals. They had the same effect as VIAGRA, relaxing the muscle to allow blood flow into it. Dr. Mayer had indicated that clinical trials on humans would commence and if successful, he predicted, a new natural product drug would be launched in two or three years.

The 'Violet tree' is found elsewhere in Africa. Could it be the famous 'Violet Jacaranda', or a botanically similar species? The new discovery confirms that 'Plant power has no limit'.

2. Herbal medicines for Sexually Transmitted Diseases and AIDS*

A recent publication in the Journal of Ethnopharmacology highlights current research results, which show many Ayurvedic plant, based therapies that provide an effective approach for controlling sexually transmitted diseases.

AIDS and other STDs are rapidly gaining significant importance at present due to the rapid spread of disease, high cost of treatment and the increased risk of transmission of other diseases. STDs are normally controlled by symptomatic treatment, but these are quite expensive and associated with emergence of drug resistance. Since herbal medicines have been used for the treatment of many infections for a long period of time, authors argue that traditional systems of medicine might be successfully employed in controlling STDs and AIDS. Current research in this area is directed towards identifying plants and their active principles possessing activity against sexually transmitted pathogens with a view to providing an effective cure and prevention of transmission of disease. Herbal medicines provide rational and effective means for the treatment of many diseases that are obstinate or incurable in other systems of medicine. These are rapidly gaining popularity due to often fewer side effects, better patient tolerance, less cost and acceptance due to long history of use.

Some of the STDs for which treatment through herbal drugs are being developed and researched on, include AIDS (Acquired Immunodeficiency Syndrome), genital herpes, genital warts, chlamydial genital infection, trichomoniasis, vaginitis and vulvovaginitis.

Authors identify preparations from many plants being effective in treating STDs. Some of those which are available and important in the local context are given in Table 1.

* Source :

Kavita Vermani, Sanjay Garg (2002). Herbal medicines for sexually transmitted diseases and AIDS.

(*Journal of Ethnopharmacology* 80: 49-66)

Table 1

Species (family)	Common Name / Traditional uses	Active constituents / extracts tested	Mechanism of action
<i>Areca catechu</i> Linn. (Palmae)	Betel nut	Seed extract, procyanidins,	HIV protease inhibition arecatannin B1
<i>Azadiracta indica</i> A. Juss. (Meliaceae)	Neem, margosa; used for antibacterial, antipyretic, and anti-inflammatory properties	Seed and leaf extracts	
<i>Callophyllum inophyllum</i> Linn. (Clusiaceae)	-	Inophyllums, coumarin derivatives	Inhibition of reverse transcription
<i>Callophyllum lanigerum</i> Miq. (Clusiaceae)	-	Inophyllums, coumarin derivatives	Inhibition of <i>in vitro</i> replication of HIV-1 and cytopathic effects in T cell lines CEM-SS and MT-2 cells. Inhibition of reverse transcription, inhibition of DNA and RNA dependent DNA polymerase activities of HIV-1 reverse transcriptase
<i>Camellia sinensis</i> Linn. (Theaceae)	Used as anti-inflammatory agent and choleric (Tea)	Epigallocatechin gallate, epicatechin gallate	Inhibition of reverse transcriptase HIV-1 and HIV-2 and cellular RNA and DNA
<i>Curcuma longa</i> Linn. (Umbelliferae)	Tumeric. Used as a spice, food colourant and for various medicinal long terminal repeat purposes	Curcumin	Inhibition of HIV-1 integrase, inhibition of Tat-mediated transactivation of HIV-1
<i>Eugenia caryophyllata</i> Thun. (Myrtaceae)	Clove; used as antiemetic	Tannins eugenin, casuarictin, tellimagrandin, chromones biflorin and isobiflorin	Inhibition of virus cell fusion, inhibition of syncytium formation
<i>Eugenia jambolona</i> Lam (Rutaceae)		Extract of bark	HIV protease inhibition
<i>Momordica charantia</i> Linn. (Cucurbitaceae)	Karavila. Bitter melon, karela; used for antiviral, antitumor and immunopotentiating purposes and as hypoglycaemic	Antiretroviral protein (MAP 30)	Inhibition of transcription and transactivation, inhibition of viral integrase
<i>Myrsitica fragrans</i> Van Houtt. (Myristaceae)	Nutmeg	Methanol extract of aril	Plaque inhibition assay of HSV-1 in Vero cells
<i>Papaver somniferum</i> Linn. (Papaveraceae)	Poppy, opium	Papaverine	Interference with expression of HIV proteins especially envelope precursor protein gp 120
<i>Psidium guajava</i> L.	Guava, pera	Procyanidin B2	<i>In vitro</i> enzyme reverse transcriptase assay. Inhibition of reverse transcriptase
<i>Punica granatum</i> Linn. (Punicaceae)	Pomegranate, Delung	Punicacortein D, Punicalagin, Punicalin	Inhibition of HIV reverse Transcriptase
<i>Rauwolfia serpentina</i> (Apocyanaceae)	Sarpagandha	Papaverine	-
<i>Terminalia arjuna</i> Wight et Arn. (Combretaceae)	Kumbuk	Extract of stem bark	HIV protease inhibition
<i>T. bellertia</i> Roxb. (Combretaceae)	Bulu	Aqueous and methanol extracts, chebulagic acid, punicalin, punicalagin, and punicacortein	Inhibition of HIV reverse transcriptase, inhibition of viral adsorption to cells
<i>T. chebula</i> Ritz (Combretaceae)	Aralu, myrobalan	Aqueous and methanol extracts, chebulagic acid, punicalin, punicalagin, and punicacortein	Inhibition of HIV reverse transcriptase, inhibition of viral adsorption to cells
<i>Withania somnifera</i> L (Solanaceae)	Ashwagandha	Methanol extract	Plaque inhibition of HSV-1 in Vero cells

MATURATION OF WINES

The age-old tradition is to use barrels made of oak to promote the maturation of liquors – Whisky and wines. The oak is of the species *Quercis*. *Q. robur* or *Q. petraea* is usually used. American oak *Q. alba* is also exported to France and Spain for maturation of wines.

Researchers in Spain have discovered differences in 'Rioja' wines, matured in different oak barrels. B-methyl-gamma-octalactone was not in the original wine, but developed after the wine matured. The cis-isomer smells 'woody' and the trans-isomer 'fruity'. The US oak barrels promoted the cis-isomer and the wines tasted 'woody' which spoils the bouquet¹.

In Sri Lanka, we have used 'Hal milla' vats to mature Arrack, and also Ayurvedic arishtas. It would be interesting to study the maturation process. 'Hal milla' is botanically known as *Berrya ammonilla* (Roxb.).

¹ Source: *J.Agr.Food.Chem*, 2003

MEDICINAL VIRTUES OF CHOCOLATE – RECENT RESEARCH

Theobroma cacao is the botanist's nomenclature for the tree which bears pods from which cocoa beans are obtained. Roasting of the beans gives rise to cocoa, which is the basis of one popular confectionary – chocolate. The cocoa tree is now a cultivated plantation crop in Sri Lanka, and the chocolate produced from our crops have had a deservedly good reputation for its flavour. But how did chocolate come here?

At the beginning, as far back as the Maya civilization the cocoa tree was native to the South American continent. It is reputed to have inspired music and song in praise of a liquid derived from fermentation of the seeds (cocoa beans), contained within its fruit – shaped like a small version of a rubber ball. The liquid was referred to as the "food of the Gods". It was stated that the ancient recipe was a fiery brew sufficiently potent to jolt the drinker to a state of good health. So for centuries, people in the continent followed the Maya and Aztec prescriptions, and consumed "chocolate", the product derived from the beans – for a wide range of ailments.

According to Prof. Louis E. Grivetti of the Department of Nutrition, University of California

at Davis, it was administered or taken to calm the nerves, to lose weight, shrink swollen hemorrhoids, relieve symptoms of tuberculosis and even ease the discomfort of hangovers. Professor Grivetti was speaking at a seminar held in Washington in February 2004, organised by the National Academy of Sciences. The seminar was sponsored by the NIH, the Smithsonian Institution, the University of California, the Fogerty International Centre and the Chocolate Company Mars.

The wide popularity of chocolate, – following the South American "conquest" and its introduction into Europe and South Africa by the colonial process in the mid nineteenth century, outstripped its medicinal uses. But recently, researchers have turned to revisit its reputed medicinal properties.

It is known that raw cocoa contains flavanoids – a group of polyphenolic compounds with protective antioxidants like those in red wine and tea. The antioxidants help reduce blood pressure and improve circulation according to recent studies.

Professor Norman K. Hollenberg, Professor of Medicine at Brigham and Women's Hospital and Harvard Medical School has investigated the Kuna Indians of Sam Blas Islands of Panama in respect of the connection between cocoa consumption and blood pressure. The Indians who consumed locally grown cocoa at every meal had a normal blood pressure profile despite their high-salt diet. Kuna Indians in the city where they drink only commercially ground cocoa had enhanced blood pressure readings. Dr. Hollenberg has also shown that cocoa rich in flavanoids could help increase blood flow in the brain and in the hands and legs. The relevant study involved 27 healthy people aged 18-72. Each consumed a cocoa beverage containing 900 mg of flavanoids daily, for 5 days. Using a finger cuff, blood flow was measured on the first and fifth day. "Significant improvement" in blood flow was observed as well as improved function of the endothelial cells that line the blood vessels.

One problem in evaluating the effect of chocolate in respect of its health benefits is the variation in flavanol content in the many products. Fresh cocoa beans are very much richer in flavanol than processed chocolate products. It would appear that processing of chocolate reduces the available flavanol content while obviously increasing the taste and flavour value.

Dr. Carl L. Keen, Chairman of the Department of Nutrition at the University of California at Davis has been researching on Cocoa flavanoids for some time. The nett result of his endeavours point to the fact that cocoa and chocolate provide significant amounts of heart-healthy flavanols to improve cardiovascular health. The flavanols act by improving vascular endothelial function, and by delaying harmful clotting that could improve circulation in the feet and hands and reduce inflammation. Thus a cocoa product could be developed that would offer an alternative to those who are unable to tolerate regular doses of aspirin.

Yet Dr. H. H. Schultz, Director of Science and Research at MARS - who fund a great deal of research - warns: "Most chocolate currently available is delightful and delicious, but not necessarily good for you. We hope to change that soon". If chocolate is to serve as a purpose directed medication, it will have to be specially formulated for the purpose. This may take more research and time.

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MEDICINAL VIRTUES OF CINNAMON - SIGNIFICANT NEW RESEARCH FINDINGS AND A MILLION DOLLAR ISSUE

Cinnamon (*Cinnamomum verum*) is indeed the major spice grown in Sri Lanka. Its properties as an aromatic spice are well known and documented [1,2]. It is also an important constituent of Ayurvedic decoctions. An old text comments on its therapeutic usage thus: "used as a skin tightner, and a digestive aid in tea form. Taken with milk it makes a good balance after a heavy meal or desert. May be effective for diarrhea, dysentery or general indigestion. It is a superb aromatic and a good anointing oil." The text goes on further: "It has long been known that cinnamon is useful in combating age-old diabetes."

Now modern research has proven this traditional fact. If you are a diabetic it may indeed "spice up" your quality of life.

Researchers at the Human Nutrition Research Centre in Beltsville, Md, USA, under the leadership of Dr. Richard Anderson, have found that Cinnamon bark can lower blood sugar, triglycerides and cholesterol levels, as well as

improve insulin functioning. The research is a collaborative effort between the Beltsville Human Nutrition Research Centre in Maryland, USA, the Post-graduate Medical Institute, Peshawar, Pakistan and the NWFP Agricultural University, Pakistan. The clinical trial was conducted on a total of 60 persons with type-2 diabetes, 30 men and 30 women aged 52.2 ± 6.32 years divided at random into six groups. Groups 1, 2 and 3 consumed 1, 3 or 6 g of cinnamon daily respectively, and groups 4, 5 and 6 were given placebo capsules corresponding to the number of capsules consumed for the three levels of cinnamon. The cinnamon treatment was carried on for 40 days followed by a 20 day washout period.

The results were as follows: After 40 days all three levels of cinnamon, reached the mean fasting serum glucose (18-29%), the triglyceride (23-30%), LDL cholesterol (7-27%) and total cholesterol (12-26%) levels.

No significant changes were noted in the placebo groups. There were also no significant changes in the HDL cholesterol. The authors of the study [3] draw the following conclusions based on this study.

- a. that it demonstrates that the intake of 1, 3 or 6 g of cinnamon per day reduces serum glucose, triglyceride, LDL cholesterol and total cholesterol in people with type 1 diabetes.
- b. that inclusion of cinnamon in the diet of people with type 2 diabetes will reduce risk factors associated with diabetes and cardiovascular diseases.

Responses from the scientific community in regard to the startling revelations of the study were understandably varied. "I do not know anything else that can change glucose, triglyceride and cholesterol levels so much" remarked Dr Anderson who conducted the study.



Dr. Eugene Barrett, an endocrinologist, who is the President of the American Diabetes Association, reserved judgement until more extensive studies on humans confirmed the findings. "It sounds there is something there," he stated. "It is surprising there is such an effect. If the results hold up in additional studies, the impact could be most significant!" added Dr. Barret.

Dr. Don Graves of the University of California, Santa Barbara, and the Sansum Research Institute was in agreement. He is currently studying the effect of cinnamon fed to overweight diabetic laboratory mice. The results are still preliminary and he will 'not leap to conclusions'.

Dr. Anderson's Department, which functions as part of the USDA (United States Department of Agriculture) has applied for patents on the compounds of cinnamon responsible for the reported beneficial effects. The patent covers the tasteless water-soluble extract responsible for the beneficial effects on type 2 diabetes.

[Note: Type 2 diabetes is also known as "Adult Onset Diabetes". It afflicts about 16 million people in the US, increasing their risk of ailments such as heart attacks, kidney failure and blindness. The modern opulent life-style and consequent obesity is a likely factor for the disease.]

The cells of diabetics display a diminished capacity to respond to insulin, and this causes elevation of blood sugar levels. Insulin helps the cells to mop up the glucose. Cinnamon, it appears, makes the cells responsive to insulin thus increasing glucose metabolism - by means of which the sugar is converted to energy.

The study indicates that the constituents of a teaspoon full of cinnamon a day can produce effects comparable to those produced by the drugs known as statins which are now taken by patients on prescription, to lower blood cholesterol levels.

Dr. Lois Jovanovic, Director of the Sansum Diabetic Research Institute, is optimistic. "It really does look like it may help us as we are desperately looking for ways to stare the tide of this epidemic. It is something we can all do without changing much of our habits."

Cinnamon sticks made into "tea" in water is recommended. Other spices such as clove, turmeric, bay leaf and even tea were similarly tested but failed to reveal such spectacular results as cinnamon.



Cinnamon and its chemical composition has been the subject of much research [4,5]. Sri Lankan scientists have extensively researched the aromatic volatile fraction of cinnamon, - its essential oils [4]. They constitute an array of compounds known as TERPENOIDS and another class known as PHENYL PROPANOIDS. To the latter class belong Cinnamaldehyde and Eugenol, the characteristic compounds associated with the flavour of Cinnamon Spice.

The medicinal properties of Cinnamon hitherto documented are confined to the potent antifungal and anti bacterial activities of its essential oil, and the lipolytic activity of the bark. It is also recognized as a treatment for intestinal disorders [6].

Japanese workers have studied the water soluble fraction of cinnamon and have characterized polyphenolic tannins - like compounds whose chemical structures are formidable looking ones.[7].

Now, which are the compounds patented by the US workers which are associated with the beneficial effects of cinnamon? This is the big question. The answer to this, through much research in chemical work and technology may have some implication to Sri Lanka as well. But who will put up the funds to initiate the research? This is the million dollar issue.

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