



AYURVEDA

TOMORROW 

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Karimpuzha Raman, Managing Director
CARE KERALAM, KINFRA Small Industries Park, Nalukettu Road,
KINFRA Park P.O, Koratty- 680 309, Thrissur, Kerala
Tele: 0480 2735837/2735757
Email: md@carekeralam.com



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CARE KERALAM Ltd

KINFRA Small Industries Park, Nalukettu Road, KINFRA PARK PO,
Koratty - 680 309, Thrissur, Kerala - Tel: 0480- 2735837, 2735757

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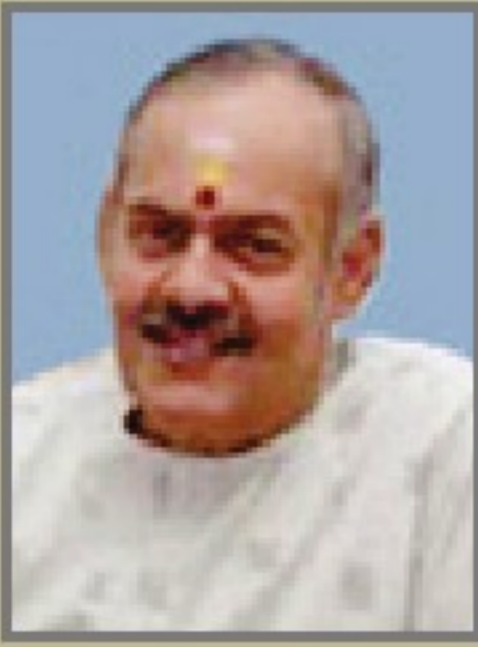
Cover photo

Onam offering from CARE Keralam Ltd

Tablets and soft gel capsules: CARE Keralam is ready to serve you

Photo courtesy: **Ben Raj**

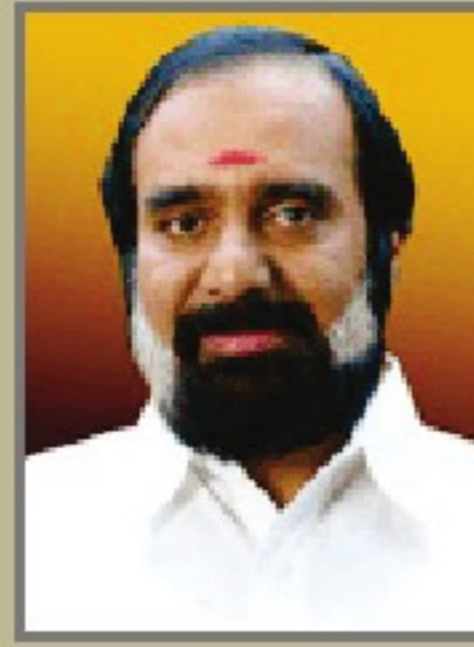
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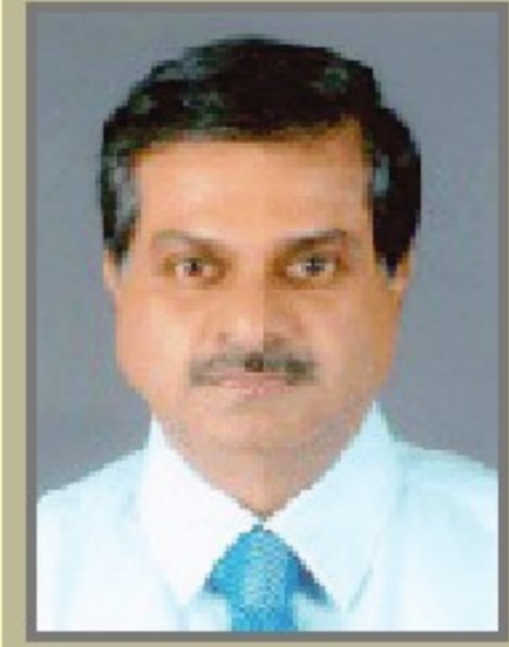
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From the M.D.'s Desk



It had been a profitable year for CARE Keralam Ltd. We were waiting for quite some time to receive approval from Ministry of Environment & Forests, Govt. of India to carry out toxicological studies at our toxicology centre. Following the visit of Mr. Anjani Kumar, Director, AWD, Ministry of Environment & Forests, we have received approval from Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). Closely following this approval, CARE Keralam Ltd has been accorded sanction by Department of Health & Family Welfare, Govt. of Kerala, to carry out toxicity and safety studies on new patent and proprietary products in Ayurveda.

Another significant achievement is the soft gel encapsulation facility of CARE Keralam Ltd becoming operational. The state-of-the-art machine manufactured by Chang Sung Softgel System Ltd., South Korea, has the capacity to produce 120,000 soft gelatin capsules per hour. Manned by a team of dedicated technical personnel, this facility is hoped to serve the Ayurveda and nutraceutical industries of Kerala to encapsulate essential oils, ayurvedic oils, medicated clarified butters, nutritional oils like omega-3 oil, fish oil, lycopene and lutein.

Ever since the Alma Ata Declaration (1978) was adopted by World health Organization, the popularity of Ayurveda is on the increase. In spite of the advances made by Ayurveda, the export of Ayurvedic medicines is still in its infancy. This is because of the absence of documented evidence on the non-toxicity and efficacy of these medicines,

a prerequisite for registration of these products overseas. To fill this lacuna National Innovation Council (NiC) and CARE Keralam Ltd jointly undertook a research project on the standardization of *Nisakatakadi Kashayam*, a popular remedy for diabetes mellitus. This study has resulted in the compilation of a dossier on this formulation. This is the first time that a dossier has been developed for an ayurvedic medicine.

The dossier describes in detail the quality control of the eight ingredients of *Nisakatakadi Kashayam*, methods to analyze the finished product, scaling up of the manufacturing process, toxicology of the product and evidence for its efficacy. This dossier will serve as a model for dossiers of other Ayurvedic products, thus facilitating the registration of Ayurvedic medicines in overseas markets. The dossier is under submission to Govt. of India.

Quite recently, the R&D laboratory of CARE Keralam Ltd has received approval from Department of Scientific & Industrial Research (DSIR), Govt. of India. With this prestigious recognition our R&D efforts and collaboration with national laboratories will now be on a higher plane.

I am thankful to Team CARE Keralam for contributing significantly to the growth of this young organization. Their hard work is the force behind our achievements. May their devotion and sincerity take CARE Keralam Ltd to greater heights!

Karimpuzha Raman
Managing Director

Manufacturing quality products is the onus on all Ayurvedic companies. The task becomes complex, as these products are made of herbal materials collected from a wide range of geographical areas. Altitude, environmental temperature, humidity, stage of harvest and several other factors decide their quality. However, quality control can be ensured to a great extent by adopting a meaningful sourcing policy. This subject is the theme of the special feature *Raw Material Sourcing at CARE Keralam Ltd* by Deepu Varghese, Mariya Paul and Nimisha Sadan of our Purchase Department and Raw Material Laboratory.

Microbial contamination of herbal medicines can be influenced by environmental factors such as temperature, humidity, extent of rainfall during pre-harvesting and post-harvesting periods, handling practices and storage conditions of crude and processed medicinal plant materials. Because of these reasons, there is growing awareness of the microbial load of herbal raw materials. M. M. Seema and Nimitha Murali present some of their views on this subject in the article entitled *Microbiological Aspects of Raw Materials*.

Dr. K.C. Chacko and Simson Jose present a succinct summary of the proceedings of the *Workshop on Preparation of a White Paper on Ayurveda*.

Pharmaceutical creams are an ideal dosage form for delivering medicinal substances to skin. Originally conceived by Claudius Galen (131-201 A.D.), they can be of oil-in-water and water-in-oil types. In *Creams: Ideal Dosage Form for Topical Medicament Delivery* Subodh Surendran provides basic information on the subject.

Why do Plants Produce Numerous Chemical Compounds? This question is raised by Dr. George Jose. The 50,000 distinct chemical compounds synthesized by plants are not primarily meant for humans. Plants use them for different purposes. The article makes interesting reading.

History of Ayurveda is a subject of debate among indologists. While some date it to prehistoric times, others consider 5000 B.C. as the period when it emerged as a distinct entity. Ben Raj of our Business Development Department looks at the history of Ayurveda and its relevance in contemporary India in his contribution entitled *Science of Life: From History to New Age*.

We hope this collection of articles will be appreciated by our esteemed readers.

D. Suresh Kumar Ph.D.

Editor

**Minister for Industries & IT, Sri P.K. Kunhalikutty
Releases the Inaugural Issue of *Ayurveda Tomorrow* on 10-08-2012**



Sri P.K. Kunhalikutty hands over the inaugural issue of *Ayurveda Tomorrow* to Sri B.D. Devassy, M.L.A. of Chalakudy. (L-R) Dr. K. Anil Kumar, Director, Kerala Ayurveda Ltd and Sri Karimpuzha Raman, Managing Director of CARE Kerala Ltd

Science of Life: From History to New Age



Ben Raj

Business Development, CARe Keralam Ltd

Ayurveda, the Indian Science of Life, had originated much before the written texts on it were born. The origin of the term relates to the two Sanskrit words, *Ayush* and *Veda* meaning life and science and in that sense its Karma firmament is much more expansive than mere science and technology of diagnosis and cure as its area of concern is much wider – life itself. References to the key word could be found in *Charaka Samhita* where the combination of *Sarira* (the destructible body), *Indriyas* (micro and macro sensory organs) and *Atma* (the indestructible soul) are the subjects of discussion. The concerns of Ayurveda go beyond the question of curing a disease or disease condition unlike certain other medical systems do. Ayurveda, as its etymology exemplifies, looks at life as a whole and its medical references are based on this foundation.

The science as such is believed to have been in existence since the Vedic times, put approximately at 5000 B.C but that was the time when the knowledge was being passed down through oral lessons, cognition and meditation as its scripting

was yet to be done. The Vedas themselves should have been captured in texts during the time of Vyasa, say by 3000 B.C and this should have applied to the case of Ayurveda also. Indications of the close relationship between the Vedas and Ayurveda had become evident by 1500 B.C.

Rigveda has clear references to Ayurveda with descriptions of the *Tirdoshas* – *Vata*, *Pitta* and *Kapha*, the basics of physiological phenomena as per the Ayurveda – apart from those to various herbs with medicinal value and *Krimi* (pathogens in the modern sense of the term). Clearer pictures of Vedic relation with Ayurveda can be found in *Atharva Veda* with descriptions on *Ashtangaveda*, the eight variations of treatment: *Kaya Chikitsa* (internal medicine), *Shalyatantra* (surgery), *Shalakyathantra* (relating to head and neck), *Agadatantra* (toxicology), *Bhootavidya* (psychology), *Kaumarabrutya* and *Prasuti* (pediatric and gynecology), *Rasayana* (geriatrics and rejuvenation) and *Vajeekarana* (fertility and sex). With the passage of time, two major *Sampradayas* (treatises) developed

in Ayurveda: *Athreya Sampradaya* based on *Charaka Samhita* and *Dhanwantari Sampradaya* based on *Sushruta Samhita*.

Ayurveda practice in India reached its zenith during the Buddhist era, indications of which are available from around 520 B.C. That period saw the development of *Rasasastra* and *Siddha* systems, marked with the prominent use of mercury, sulfur and other metals in combination with herbal formulations in medication. The progress achieved during those times in Ayurvedic formulations and their high degrees of efficacy led to its patronization by several foreign scholars. The establishment of Ayurveda as the healthcare system of the geographical entity as we now know as India happened during 304 BC-298 B.C, the Chandra Gupta Maurya period, earning it the sobriquet of the golden era of Ayurveda.

However, the Buddhist period saw some marked shifts in the preferences with the *Dhanwantari Sampradaya*, focused on surgery, going in for a decline. Emperor Ashoka, hurt in soul by the bloodshed caused by the Kalinga war, lost interest in the *Shalyatantra* and promoted the *Athreya Sampradaya*, the school of physicians. The emperor's disposition and decisions had a huge impact in the evolution of Ayurveda in the sub-continent. By 250 B.C, *Shalyatantra* almost became non-existent and the *Athreya Sampradaya* witnessed rapid growth and spread. It is believed that several texts on Ayurveda were irretrievably lost during the Mughal invasion but *Rasayana* and *Vajeekarana* got prominence and this helped in taking Ayurveda to high levels. That trend

continued till the British set up their colony in the sub-continent. British colonization saw the massive introduction of Western medical practice in India and the many wars, especially the two world wars, of the twentieth century served as the background for the replacement of the Indian system of medicine with the Western medical practice. However, signs have been evident for the past two-three decades for the inevitable return of Ayurveda into prominence, especially in Kerala and some other parts of the country. But there are skeptics who express doubts over how sincerely and devotedly the agents of this resurgence are going about their mission.

A perfect melding of Ayurveda and modernity (to which we have advanced) is a very risky business as far as retention of the purity and genuineness of the system are concerned. Ayurveda had originated in a totally different world and everything in this universe on which it depended and worked upon has undergone indescribable transformation. Everything has changed: the body which is the primary concern of the medical system, the environment from which it acquired everything that was vital, the *Bhutas* (elements, especially air, water and earth and even the Agni in the context of ozone layer depletion), etc. When a medical system that is based on concepts and practices set in the purest of pure environs of history is made to tackle the problems of modernity, it has thus to take into consideration how it could deal with them without losing its content, intent, purity and efficacy.

However, commendable efforts are being made in the field of modernization of



Ayurveda by almost all players in the sector nowadays. Starting with establishments whose very names have over the time become synonymous with Ayurveda in Kerala like the Aryavaidya Salas of Kottakkal and Coimbatore to the several informal, family-based facilities, almost everyone in the field is seriously working to make Ayurveda play an important role in the curing of diseases and looking after the health-wise well-being of the people through researches and development spending immense amounts of money. Modern drug combinations and treatment paths have been found and they are helping in mitigating the health worries of the Malayalee as well as those come here from outside the State and the country in search of cures for fatal diseases without running the risk of being subjects to side-effects. In that sense, Ayurveda has also become an industry, helping the economy of the State grow. These developments have inspired the government to seriously consider the advantages promoting health tourism.

A leading Ayurveda physician, still holding puritan theories of practice of the system, told the author of this article that the Bengali novel, *Arogyaniketan*, written by Tara Shankar Bandopadhyaya is a must read for every Vaidya (“These days they refuse to be called a Vaidya and instead they insist that they be called doctor. I don't know what is so bad about the term Vaidya”). He said, “Understanding the true spirit of Ayurveda is a must for every Vaidya. Jeevan Masai, the protagonist of the novel is the embodiment of the true spirit of India's own life science. And every Vaidya of our times should at least understand why Jeevan Masai was the way

he was.” It is not easy for every Vaidya to be Jeevan Masai, but this author thinks that there is some truth in what the Vaidya said. It is an undisputable fact that many Vaidyas have deviated from the genuine path of Ayurveda in diagnosis and treatment and have developed in themselves a feeling that their system of medicine is on a neck-and-neck race with modern Western medical science.

However, assimilation is not harmful in this world of integration and integration has indeed helped Ayurveda, its practitioners and its efficacy grow in a big way, especially in treating and curing several ailments, especially in the case of lifestyle-induced disorders. A classical example of such a useful and positive integration can be seen in the case of Ayurveda and Yoga, both of which have the same spatial origin. Similarly, many Ayurveda doctors these days depend at least partially on diagnostic methods invented by the Western medical science, starting with stethoscope and sphygmomanometer. Though there are Vaidyas who still refuse to walk that path, it may not harm the Ayurveda system to depend at times on such methods. After all, the mission is to save life, improve health, make the human race healthy.

Then there is the question of levels of efficacy of the Ayurvedic formulations in the changed world where soil, air and environment have undergone dangerous degradation with pollution becoming omnipresent. For example, it must be admitted that the concentration, valency, normality, etc of natural formulations available in the herbs today need not be as

rich and balanced as the herbs the older generation of Vaidyas had collected for their practices. Also, herbs collected in the new age from artificial gardens need not be as pure as the herbs the older generation used to get from forests. This factor becomes extremely important when one thinks of Ayurveda as a subject-specific medical system unlike the Western medical science which views every human body as a replica of a set combination of biochemical materials.

Despite all this, Ayurveda has been able to make long strides of development and growth in the past three- or four decades, thanks to the hundreds of researches that have been going on at various laboratories and hospitals. Developments in the technologies of preparation of formulations and packing have helped useful modernization of Ayurveda in a very big way. It is also easy nowadays to exactly determine in laboratory using modern equipments the structure of medicines which in turn helps

efforts for improving purity and efficacy and avoiding hazards of wrong combinations. Analysis helps the manufacturers to understand their shortcomings and correct any mistakes they might commit due to various reasons. It should be ensured that almost no Ayurvedic formulation is reaching the market or hospital without strict analyses.

It is encouraging for every practitioner of Ayurveda and for a generation that is eager to see its well-being and that of the humans of posterity to find that a new interest has dawned among the people for depending on Ayurveda. This is evidenced in the popularity of the new formulations being introduced rapidly into the market and that of the Ayurvedic hospitals in the public and private sector which see long queues on a daily basis. It proves that the people are thronging to Ayurvedic facilities not just in search of remedies for their ailments but also to ensure *Arogyam*, the state of having no ailments. ■

Packaging chemical linked to cardiovascular disease

It is well known that chemical contaminants in foods cause a plethora of diseases. The latest in this series is a chemical found commonly in food packaging. This compound has been linked to cardiovascular disease (CVD) and peripheral arterial disease (PAD), according to a report published online by the *Archives of Internal Medicine*. The analysis of 1,216 individuals linked perfluoro octanoic acid (PFOA) to the circulatory diseases, according to Anoop Shankar and colleagues from the West Virginia University School of Public Health, Morgantown. The research examined the association between blood levels of PFOA and the presence of CVD and PAD, in a nationally representative group of adults. Merged data from the 1999-2000 and 2003-2004 National Health & Nutrition Examination Survey was used. The study suggests increasing PFOA levels in the blood were positively associated with the presence of CVD and PAD. This association seemed to be independent of age, sex, race, smoking status, body mass index, diabetes mellitus, hypertension and cholesterol levels. Experts demand that the use of PFOA and related chemicals should be limited or eliminated in industry through legislation and regulation.

(Through kind courtesy of www.foodproductiondaily.com (31-Aug-2012 to 07-Sep-2012).

Sri Kodikunnil Suresh Visits CARE Keralam Ltd

Sri Kodikunnil Suresh, Minister of State for Labour and Employment, Govt. of India, visited CARE Keralam Ltd on 23 September, 2013. He was accompanied by Sri K.P. Dhanapalan, M.P., Sri B.D. Devassy M.L.A., Sri Dennis K. Antony, Block Panchayath President and Sri Manesh Sebastian Panchayath President. The minister was received by Sri Karimpuzha Raman, Managing Director of CARE Keralam Ltd and Director Sri Anand Ramaswami. Sri Kodikunnil Suresh visited the various departments of CARE Keralam and expressed his satisfaction about the performance of the young organization. He said that CARE Keralam Ltd is a model institution in Ayurveda research and that every Indian citizen should be proud of this fact. Research is an essential factor for the development of Ayurveda and we have to advance further in this direction. Later he addressed the staff of CARE Keralam Ltd and assured them that as a central minister he will do all that is possible to assist CARE Keralam in its growth.



The minister being received by Sri Karimpuzha Raman



Addressing CARE KERALAM



In the microbiology lab

Why do Plants Produce Numerous Chemical Compounds?

George Jose Ph.D.

Centre of Advanced Studies in Botany,
University of Madras, Chennai-600 005
E.mail: josanice@gmail.com

Plants are laboratories of chemical synthesis. When supplied with the simplest and least expensive starting materials like carbon dioxide, sunlight, water and minerals, they synthesize thousands of chemical compounds of differing molecular structures. Some of the chemical compounds produced by plants for their basic metabolic needs are the same ones found in animal and microbial worlds (amino acids, sugars, nucleic acids, lipids etc). They are products of the primary metabolism or chemical transformations fundamental to the existence of the plant. However, plants differ from other life forms in the great diversity of additional chemical products they produce. About 50,000 distinct chemical compounds have been identified so far in plant kingdom. These are products of secondary metabolism.

These secondary metabolites are produced only in specific types of cells and at specific times. These are broadly classified into various classes like lipids, phenols, tannins, proteins, alkaloids,

glycosides, volatile oils, resins, resin combinations, balsams and mucilages.

These secondary metabolites are produced for specific purposes. Some of them are listed below.

1. As sources of metabolic energy

Plants devote much of their energy in the synthesis of pools of compounds which store the energy of the sun. Each of these stored metabolic products is broken down by specific enzymes when there is a need for energy, as during night, when sunlight is not available. Sugars, acetyl CoA and amino acids which are the basic units of these compounds enter the primary metabolism of the plant and generate ATP.

2. Structural support

The bulk of plant biomass is made up of polysaccharides like cellulose, hemicellulose and pectins. These compounds impart strength to the plant cell wall which gets strengthened further by lignification and solidification, thereby turning the plant into a kind of raised framework on which are hung the photosynthetic tissues like leaves and stems in the most suitable orientation to

trap sunlight and carbon dioxide. Terrestrial plants support the weight of their leaves with this structural support. Aquatic plants do not face this problem and they do not produce support compounds like lignin.

3. Pools of genetic information

The ability to transfer to its progenies the information for production, localization and function of all proteins in the body of an organism decides its survival in an environment. This genetic information mutates over time and this change in genetic information (evolution) is a never-ending process and produces new combinations. Some of these combinations may work in a given environment and others may not. Only those individuals that have a genetic combination that works in the new environment will survive. Others fade away from existence. Therefore, plants have evolved over time several methods of sexual reproduction that facilitates the sharing of genetic information among individuals of a species. Thus combinations of efficient enzymatic reactions are spread throughout a population.

4. Keeping predators at bay

Plants arm themselves with chemical compounds to ward off insect predators, herbivores and pathogenic microorganisms. One way of ensuring effective deterrence is through structural defence, making use of lignification, silicification, callose formation and deposition of wax.

The second approach is to employ

species-specific chemicals that disrupt at least one critical biochemical pathway in the attacking organism. Examples of such compounds are alkaloids, proteins (lectins), saccharides and polysaccharides, flavonoids, terpenoids, cyanide-releasing compounds organic acids and long-chain carbon compounds. Gums and mucilages are highly branched heteropolysaccharides. These substances are difficult to digest for animals. One advantage of producing such indigestible polymers is that the animal will not find the plant much appealing. Like most pharmacologically-active secondary metabolites of plants, tetrahydrocannabinol in *Cannabis sativa* is assumed to be involved in self-defence, perhaps against herbivores.

Pine trees produce oleoresin which is a mixture of turpentine and diterpene resin acids (rosin). This is secreted in response to physical wounding or attack by fungi and insects. Wounded areas on the bark get filled with the oleoresin from which turpentine evaporates, leaving behind the solidified rosin that seals the wound.

5. Attraction and deterrence of pollinators

Constituents of essential oils attract insects for pollination. For example, flowers containing linalool-rich essential oils attract moths in the night. Some species that may bear similarly coloured flowers and which grow in the same area do not produce linalool and do not attract moths. They are pollinated by butterflies and bees during day time. Limonene, geraniol, vanillin and eugenol are also known to attract pollinators.

Pollinators are attracted using brightly coloured flowers. The colour of flowers can be due to carotenoids, phlobaphenes, flavonoids, betacyanins and betaxanthines. Moths are attracted to white to yellow flowers, as they are more visible at night. Birds are generally attracted to red, while bees do not visit red. Some anthocyanins are feeding deterrents and are also believed to offer protection to the plant against UV radiation. When fruits ripen chlorophyll pigments break down and reveal the carotenoid pigments hidden for long. This change in colour attracts animals.

Plants produce many storage forms of lipids such as the ones found in fruits and seeds like avocado, olives, sesame, sunflower and peanuts. Some of them may serve as reward for animals that help in the propagation of these plants. Carotenoid pigments seen on fruits attract animals which help in seed dispersal. Many fruits also produce odoriferous monoterpenes which attract animals, the sugar stored in the fruit serving as reward to them.

6. Allelopathic Action

Some plants disseminate into soils chemicals that are harmful to other plants or prevent others from getting established in their vicinity. Such chemicals are called allelopathic chemicals. A classic example of such a compound is naphthalene glucoside produced by leaves and roots of walnut (*Juglans regia*). This glucoside itself is not allelopathic. It must undergo hydrolysis and oxidation by soil microbes resulting in juglone, which prevents germination of many plants. Other examples include essential oils, phenolic

compounds, alkaloids and steroids.

7. Attraction of Symbionts

Bacteria and fungi are often found to be more efficient in absorption or production of many nutrients required by plants. There are many instances of symbiotic relationship with plants and fungi or bacteria. Many species of the nitrogen-fixing bacterial genus *Brachyrhizobium* associate themselves with roots of host plants and cause the development of root nodules where they reside, absorbing atmospheric nitrogen and storing it as reduced nitrogen in the form of ammonia. The reduced nitrogen is absorbed by the host plant and utilized for synthesizing amino acids. The roots of Soy beans produce large amounts of the flavonoid daidzein, which signals the bacteria to find the roots and establish symbiotic relationship. Such symbiosis with bacteria are found in the deciduous Alder tree (*Alnus rubra*) and some species of grasses. Association with mycorrhizal fungi is seen in the root system of pine tree. All these instances of plant-microbial symbiosis are triggered by specific chemical signals produced by the host plant.

Since time immemorial man has been using plants for prevention and treatment of diseases. This is because, over the centuries he has learnt the various ways in which the secondary metabolites of plants can be put to good use. Ayurveda, Unani, Siddha and all traditional medical systems of the world are practical applications of the secondary metabolites which plants produce for entirely different purposes.

Dignitary from C.S.I.R. Visits CARE Keralam Ltd

Dr. Zakir Thomas, Project Director, Open Source Drug Discovery (OSDD) and Head, Director General's Technical Cell, C.S.I.R., New Delhi visited CARE Keralam Ltd on 23 August, 2013. He was shown around the facility by Sri Karimpuzha Raman. Later he met the staff of CARE Keralam in the conference hall and delivered a motivating speech. He recounted how C.S.I.R. is working with the scientific fraternity of the country in developing a cost-effective medicine for T.B., a medicine for which is not being developed by established pharmaceutical companies, as it is a poor man's disease prevalent in developing nations.

The traditional patent-driven model, valuable in many fields, has failed to drive R&D of drugs for diseases affecting the developing world. The Open Source model, on the other hand, represents a viable alternative model of drug discovery for infectious diseases. It expands resources for research manifold by allowing open access and collaboration among researchers. Towards this end, CSIR has set up a web portal. This portal provides a platform for collaborative research, data on the pathogens, tools for data analysis, and discussion forum for members to share ideas, projects for students to participate in

drug discovery, etc. CSIR has given a clarion call to researchers, scientists, academicians, doctors, software professionals, traditional healers or industry experts to join the battle against infectious diseases by registering at the OSDD website and sharing their ideas. To encourage students and researchers to participate, problems encountered in drug discovery process will be posted as "Challenges" on the OSDD website. Each problem will have a pre-determined set of credit points associated to it. The best solutions, as decided by a committee of peer reviewers, will be commensurately rewarded. OSDD rests on three cardinal principles of Collaborate, Share & Discover. It aims to bring openness and collaborative spirit to the drug discovery process with the objective of keeping drug cost low. The potential drugs will be made generic as soon as they are discovered. This will enable pharmaceutical companies to bring the medicines to the market, and yet keep drug prices competitive

Dr. Zakir Thomas called upon the scientists of CARE Keralam to work on ayurvedic medicines and contribute significantly to the health care of the country, by offering potent remedies for diseases that continue to elude treatment. Only then will the tax realized from citizens be justified.



Dr.Zakir Thomas in the product development Laboratory



In discussion with chemists



Addressing scientists of CARE Keralam

Raw Material Sourcing at CArE Keralam Ltd

Deepu Varghese, Mariya Paul & Nimisha Sadan
Purchase Department & Raw Material Laboratory, CArE Keralam Ltd



Ayurveda, Unani, Siddha and other streams of Indian traditional medicine rely heavily on medicinal plants for manufacturing medicinal formulations. These herbs are mostly collected from the wild. A break-up of medicinal plant resources by the plant parts used is given Table 1

Table 1
Medicinal plant parts (crude drugs) used in manufacture of Ayurvedic medicines

Plant part	Percentage
Whole plant	13.0
Stems and bark	12.6
Leaves	10.9
Wood	1.6
Flowers	6.5
Fruits and seeds	25.8
Galls	0.3
Exudates	2.9
Oil	0.2
Roots	26.2

Collection and sale of crude drugs is a major business activity in India. The total export and internal consumption amounts to 319000 tons. Of this 56,500 metric tons are exported. 177,000 metric tons are consumed by domestic industries and 86,000 metric tons are used within households.

Because of the overexploitation of natural resources many of the medicinal plants are now critically endangered, endangered, vulnerable or near-threatened. Non-availability of herbs encourages adulteration. Bark of *Polyalthia longifolia* is used as adulterant of *Saraca asoka*. *Hemidemus indicus* is adulterated with *Decalepis hamiltonii*. Non-availability of genuine and good quality herbs is a problem facing the Ayurveda

industry. CARE Keralam Ltd has been working hard from its inception to tackle this problem.

Herb trade in India is controlled by *mandis* operating in northern India. For example, *Aswagandha* is traded mostly in Neemuch (Madhya Pradesh), ajwain in Neemuch and Unjha(Gujarat) and *Jeerakam* in Unjha. Good quality *nellika*, *kadukka* and *thannika* come from Chatisgarh and Madhya Pradesh. CARE Keralam sourcing team visits these regions periodically and procures the produce at competitive rates.

Herbs that arrive at CARE Keralam Ltd are subjected to quality checks in the analytical lab. Macroscopy, microscopy and powder microscopy are carried out on randomly chosen samples of the herb. Additionally, tests for foreign matter, total ash, acid insoluble ash, alcohol soluble extractive and water soluble extractive are conducted for assessing the quality of the herbs. Based on the analysis a certificate of analysis (COA) is prepared and whenever a herb is sold, its COA is also supplied to the customer (Figure 1). In fact, CARE Keralam Ltd is the only herb supplier in the country offering a COA along with the herb traded. At present 63 herbs are offered for sale (Table 2).

Figure 1 Sample of a COA from CARE Keralam Ltd

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CARE KERALAM
Confederation for Ayurvedic Renaissance Keralam Ltd

CERTIFICATE OF ANALYSIS

Date: 09/03/2013

- > Sample description : *Phyllanthus emblica* (Nellika)
- > Sample Identification No : CKL/RAW-5
- > Quantity of sample received : 100g
- > Date of sample received : 05/03/2013
- > Dates of Analysis : 06/03/2013

Sl. No.	Parameters	Method/ Instrument	Specifications	Result
1	Microscopy	API	Complies	Passed
2	Macroscopy	API	Complies	Passed
3	Powder microscopy	API	Complies	Passed
4	Foreign matter	API	NMT 3.0%	1.0%
5	Total ash	API	NMT 7.0%	4.5%
6	Acid insoluble ash	API	NMT 2.0%	1.62%
7	Alcohol soluble extractive	API	NLT40.0%	43.56%
8	Water soluble extractive	API	NLT50.0%	58.2%

Comments:
Passes as per API



Analyzed by:



Checked by



Authorized signatory

Note: The test results relate only to the sample tested. The report shall not be reproduced except in full, without the written approval of the laboratory

Herbs that pass the tests are stored in a warehouse that has an area of 25,000 sq. feet. It is the largest herbal warehouse in Kerala. Freshly dried herbs are very storage-sensitive products. Therefore, they are stored at CARE Keralam Ltd under the best storage conditions. The warehouse is airy and cool. It is cleaned and disinfected before products are taken into storage. Windows and ventilators in the building are sealed with wire netting to prevent entry of insects, pests and birds. There are fire prevention measures also. Crude herbs are not stored together with toxic drugs and storage areas have mechanical stacking devices.



Kurunthotti arrives at CARE Keralam Ltd



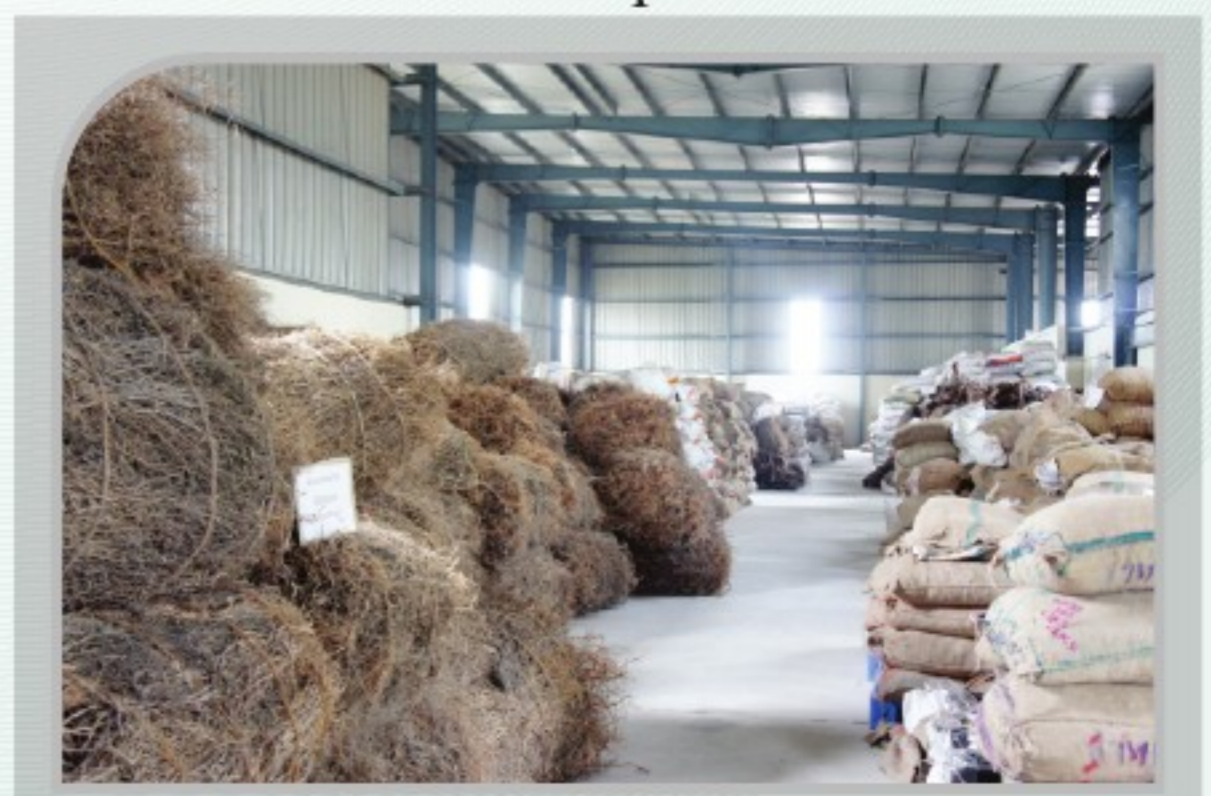
The warehouse



Pharmacognosist at work



Authentic samples of herbs



Herbs stored in the warehouse

Table 2
List of herbs for sale at CARE Keralam Ltd

Sl. No.	Botanical Name				
1	<i>Abies spectabilis</i>	22	<i>Emblica officinalis</i>	43	<i>Premna serratifolia</i>
2	<i>Acacia catechu</i>	23	<i>Ficus benghalensis</i>	44	<i>Pterocarpus marsupium</i>
3	<i>Aconitum ferox</i>	24	<i>Ficus gibbosa</i>	45	<i>Pterocarpus santalinus</i>
4	<i>Aconitum heterophyllum</i>	25	<i>Ficus racemosa</i>	46	<i>Rauwolfia serpentina</i>
5	<i>Acorus calamus</i>	26	<i>Ficus religiosa</i>	47	<i>Rubia cordifolia</i>
6	<i>Aegle marmelos</i>	27	<i>Gmelina arborea</i>	48	<i>Saccharum officinarum</i>
7	<i>Alpinia calcarata</i>	28	<i>Holoptelia integrifolia</i>	49	<i>Salacia reticulata</i>
8	<i>Anethum graveolens</i>	29	<i>Holostemma annulare</i>	50	<i>Saraca asoka</i>
9	<i>Azadirachta indica</i>	30	<i>Hemidesmus indicus</i>	51	<i>Sida acuta</i>
10	<i>Boerhaavia diffusa</i>	31	<i>Hordeum vulgare</i>	52	<i>Sphaeranthus indicus</i>
11	<i>Cassia fistula</i>	32	<i>Inula racemosa</i>	53	<i>Stereospermum colais</i>
12	<i>Cedrus deodara</i>	33	<i>Mesua ferea</i>	54	<i>Terminalia arjuna</i>
13	<i>Citrullus colocynthis</i>	34	<i>Nardostachys jatamansi</i>	55	<i>Terminalia belerica</i>
14	<i>Coccinium fenestratum</i>	35	<i>Nigella sativa</i>	56	<i>Terminalia chebula</i>
15	<i>Commiphora mukul</i>	36	<i>Nilgiriathus ciliatus</i>	57	<i>Trachyspermum ammi</i>
16	<i>Crocus sativus</i>	37	<i>Oroxylum indicum</i>	58	<i>Tribulus terrestris</i>
17	<i>Cuminum cyminum</i>	38	<i>Picrorhiza kurroa</i>	59	<i>Trigonella foenum- graecum</i>
18	<i>Curculigo orchioides</i>	39	<i>Piper longum</i>	60	<i>Vetiveria zizanioides</i>
19	<i>Curcuma longa</i>	40	<i>Pistacia chinensis</i>	61	<i>Vigna radiata</i>
20	<i>Cyperus rotundus</i>	41	<i>Plumbago zeylanica</i>	62	<i>Vitis vinifera</i>
21	<i>Desmostachya bipinnata</i>	42	<i>Psoralea corylifolia</i>	63	<i>Woodfordia fruticosa</i>

Herb trade in India is beset with many problems like involvement of middlemen, inflated prices and adulteration of herbs. CARE Keralam Ltd has adopted a strategy to contain these problems. Buying straight at the source, stocking of buffer quantities and adhering to strict quality control have helped us to deliver high quality Ayurvedic herbs to the industry of Kerala.

For your raw material requirements please contact
Manu N. Nair
Business Development Executive
Mobile: 095-673-56999
E.mail: rawmaterial@carekeralam.com

Sri P.C. Chacko M.P. at CARE Keralam Ltd

Sri P.C. Chacko M.P. is well known to the people of Kerala. After completing his studies in Mar Ivanios College and University College, Trivandrum, he entered active politics through the Kerala Students Union and held the position of Indian Youth Congress State President. In 1980 he was elected to Kerala Legislative Assembly from Piravam constituency and became Minister for Industries in E.K. Nayanar Ministry. He is Chairman of Joint Parliamentary Committee to probe into the alleged scam in the grant of 2G spectrum and telecom license from 1998 to 2009. He is the official spokesperson of All India Congress Committee (AICC).

Sri P.C. Chacko visited CARE Keralam Ltd on 19 October. He was accompanied by Block Panchayath President Sri Dennis K. Antony and several local functionaries of the party. He was received by Mrs. A.K. Jisha, Asst. Manager of KINFRA.

Sri P.C. Chacko visited the analytical laboratory, toxicology laboratory, production department, product development laboratory and raw material store. Later he addressed the staff of CARE Keralam Ltd. He commented that the activities of CARE Keralam are a model for the world, especially as these activities are carried out maintaining the purity of Ayurveda. He called upon the scientists of CARE Keralam to work diligently and generate results that contribute to the research going on at international level. Speaking on strengthening the base of CARE Keralam Ltd, he suggested that the organization should undertake research programmes of national relevance, so that larger quanta of funds can be obtained from national funding agencies. He offered his assistance in this regard.



Sri P.C. Chacko addressing the staff of CARE Keralam Ltd
(L-R) Sri Karimpuzha Raman and Sri Dennis K. Antony

Workshop on Preparation of a White Paper on Ayurveda

Dr. K.C. Chacko & Simson Jose

Administration & Cluster Innovation Centre, CARE Keralam Ltd

A workshop on Preparation of a White Paper on Ayurveda was organized by CARE Keralam Ltd in association with Kerala Development Society (K.D.S), Delhi on 8th May 2013. The workshop was organized as a part of a research project titled 'Research on Innovation Systems and Social Inclusion in Emerging Economies and Beyond- RISSI'. The major objective of RISSI project is to carry out research activities to foster capacity building for improving the knowledge-base on how science, technology and innovation can contribute to reduce poverty and promote inclusive development. The project is sponsored by International Development Research Centre (IDRC), Canada. All the BRICS countries are covered in RISSI project, and Ayurveda in Kerala is selected as a Case of Local Innovation and Production System in Indigenous Medicine (LIPS-IM) from India. Members of Indian study team of this project are Prof. K J Joseph, Centre for Development Studies, Thiruvananthapuram, Prof. Dinesh Abrol, National Institute of Science, Technology and Development Studies, New Delhi and Dr. Harilal Madhavan, Azim Premji University, Bangalore.

The objectives of the workshop were to examine critically the status of Ayurveda system and practices in the state of Kerala, and prepare a white paper highlighting the problems and prospects. The workshop was

attended by a total of 32 participants, including practitioners, manufacturers, researchers, representatives of various associations, director and technical experts of CARE Keralam, members of the study team and representatives of K. D. S. Mr. Karimpuzha Raman, Managing Director, CARE Keralam in his welcome address outlined the context and objectives of the workshop. Dr. Jacob John, Director, Delhi, in his address remarked that the out come of the workshop would help in streamlining the development of Ayurveda in the country. Mr. P.R Krishnakumar, Chairman, CARE Keralam, in his presidential address, recalled that it was for the first time in the history of Kerala that such a well-thought workshop was conducted.



Mr. Karimpuzha Raman welcoming the delegates

Mr. Rajeev Sadanandan, IAS, Principal Secretary, Health and Family Welfare, Government of Kerala, in his inaugural address pointed out that Ayurveda and Homeopathy sectors have not taken initiatives during his tenure of the past two years while several landmarks in

health development programmes have been launched successfully in allopathic sector. He mentioned certain areas that require immediate attention. These are documentation, inter disciplinary research for proving efficacy of all Ayurveda treatments, proper quality control mechanism to ensure quality of products and services and to prevent spurious drugs, legal facilitation for exporting drugs to increase overseas market penetration, scale of manufacture and packaging issues. He asked the participants to identify five areas where interventions are required and to constitute core groups to study the issues and formulate action plan.



Mr. Rajeev Sadanandan IAS
inaugurating the workshop

Three thematic presentations on different aspects of Ayurveda sector were made by representatives of three leading organizations. These are Mr. P.R. Krishnakumar, Chairman, CARE Keralam Ltd, Dr. T.S.Murali and Dr. P.M.Warrier, Arya Vaidya Sala Kottakkal and Dr. D. Ramanathan, Sitaram Ayurveda Pharmacy Ltd. Thrissur.



A section of the audience

Brief presentations on specific issues were made by delegates representing various segments of Ayurveda Sector. These are Mr. Ajay George Varghese Bipha Drug

Laboratories Kottayam, Dr. K.Anilkumar, Kerala Ayurveda Ltd Aluva, Mr. A.V.Anoop, AVA Cholayil Health Centre P. Ltd. Chennai, Dr. A.M.Anvar, Punarnava Ayurveda Hospital Kochi, Dr.Baby Krishnan, General Secretary, Kerala Government Graduate Medical Officers Federation Thiruvananthapuram, Mr. M.C. Balachandradas, Sree Sankara Community for Ayurveda Ltd. Changanassery, Dr. P.V.Balakrishnan, President, Private Ayurveda Medical Practitioners Association, Dr. P.P.Bhaskaran, Secretary, Private Ayurveda Medical Practitioners Association, Dr. M.P Eswara Sarma, Principal, VPSV Ayurveda College Kottakkal, Dr. J. Hareendran Nair, Pankajakasthuri Thiruvananthapuram, Mr.Hari N.Namboothiri, Sreedhareeyam Ayurvedic Medicines Ltd. Koothattukulam, Dr. A. Jayan, Senior Medical Officer, Government Ayurveda Hospital Chandiroor Alappuzha, Mr. C.K. Jinan, Chandrika Soap Bangalore, Mr.Michael Joseph, Nagarjuna Herbal Concentrates Ltd. Thodupuzha, Dr.T.S.Murali, Head R&D, Arya Vaidya Sala Kottakkal, Dr. E. T. Neelakandan Mooss, Vaidyaratnam Oushadha Sala Thaikkattussery Thrissur, Dr. Pradeep Jeothi, Vasudevavilasam Nursing Home, Thiruvananthapuram; Dr. K. Prathapan, Mission Director, State Horticulture Mission Thiruvananthapuram; Dr. S Rajasekharan, Department of Ethnomedicine & Ethnopharmacology T.B.G.R.I. Palode; Dr. C. Ratnakaran, Pro Vice Chancellor, Health University of Kerala, Thrissur; Dr. Rejith Anand, General Secretary Ayurveda Medical Association of India Angamaly; Dr. S. Sajikumar, Managing Director, Dhatri Ayurveda Private Ltd. Kochi; Dr. Sharmad Khan, Secretary Medical Officers Association Thiruvananthapuram; Dr. Sheela Karalam, Oushadhi Thrissur; Dr. K. G. Sreekumar, CEO, Kerala State Medicinal Plant Board, Thrissur; Dr. Thodiyoor Sasikumar, President, Medical Officers Association Thodiyoor, Kollam ; Dr. Vasudevan Namboothiri, Thiruvananthapuram; Dr. G. Vinod Kumar, President, AMAI; Mr. K.P Wilson,

KandankulathyVaidyasala, Mala and Dr. Joy Varghese, Executive Director (Technical), CARE Keralam Ltd.

Major points of discussions and issues raised in the workshop are as follows:

Government of Kerala and other stakeholders should take certain initiatives as Ayurveda is receiving increasing attention nationally and internationally. Expectations from Ayurveda sector are quite high and there is still scope for further development in the field of Ayurveda. Regular consultation process within Ayurveda sector is quite essential for popularizing Ayurveda.

There is a need for academy - industry collaboration in Ayurveda sector.

Contributions of Ayurveda and Yoga in addressing life style deceases and in the field of preventive health care should be popularized nationally and globally.

There is a need for increased research and documentation of innovative findings.

The role of Ayurveda in treatments for various diseases including HIV should be popularized.

There is a need for a proper quality control system in Ayurveda to address various issues in the health sector. These include legal issues involving different countries.

Ayurveda paramedical courses need special attention by improving the syllabus, as Improvement is not taking place at the level of Bachelor of Ayurvedic Medicine and Surgery (BAMS).

Government should include Ayurveda

sector in the formulation of policy of public health.

Hospital waste management under Ayurvedic sector needs special attention and there is a good scope for recycling of effluents.

Kerala has a good potential to be developed as global medical tourism destination for chronic illness. There is a need for setting up an independent university for Ayurveda in Kerala.

Cultivate new medicinal plants and develop formulations.

Identify the best practices in Ayurveda and carry out documentation of the same.

Major recommendations of the workshop are listed below:

Creation of an Ayurvedic Research and Promotional Council of Kerala (ARPCCK) with headquarters in CARE Keralam Ltd.

Initiate standardization of about 10 classical drugs or procedures and develop protocols

Strengthen public health care initiatives in Ayurveda

Integrative health care model incorporating Ayurveda with modern medicine, Homeo, yoga and Siddha.

Carry out basic research activities in Ayurveda with participation of scientists from modern science.

Ensure adequate and proper representation of Ayurveda in official website of Govt. of Kerala.

Set up specialty hospital and health clinics for Ayurveda.

Start clinical research initiatives with models suited for Ayurveda.

Simplify the licensing process in Ayurveda sector.

Introduce an accreditation process for hospitals and nursing, *panchakarma* and yoga centres.

Ensure strong regulatory enforcement to prevent mushrooming of spurious drug manufacturing.

Ensure insurance coverage for Ayurveda treatment.

Provide priority status sector to Ayurveda with adequate annual budgetary provision.

Conduct interdisciplinary researches for proving the efficacy of Ayurvedic medicines and treatments.

Ensure modernization of pharmacy.

Provide energy-saving support to

Ayurveda manufacturers.

Regular revision of syllabus of undergraduate/postgraduate programmes, at least once in two years.

Documentation and retrieval of traditional knowledge and research findings.

Legal facilitation for export promotion.

Sri. P.R. Krishnakumar, in his concluding remarks, conveyed gratitude of the Ayurvedic fraternity to the Principal Secretary for his benevolence in finding time to come over to the workshop and provide insights into various aspects. The workshop concluded with a vote of thanks by Dr. T. Joy Verghese.



Researchers claim that milk drinkers win Nobel Prizes!

A letter published in *Practical Neurology* suggests that nations that consume a lot of milk also tend to produce a lot of Nobel Prize winners. Following the footsteps of a 2012 report linking chocolate consumption with Nobel success, British researchers compared Food and Agriculture Organization (FAO) milk per capita data from 22 countries with information provided by the author of the chocolate theory, Franz Messerli. They discovered that Sweden, which boasts 33 Nobel laureates per 10 million population, also consumes 340 kg of milk each year - the most milk per head in the world. Switzerland, which has an enviable Nobel Prize haul of 32, consumes 300 kg of milk per head per year. China, which consumes just 25 kg of milk per head per year, boasts no Nobel Prize winners. The researchers, from Gloucester Royal Hospital, claim that there is a "plausible biological mechanism" for the correlation – suggesting the proven link between vitamin D-rich milk and improved cognitive behaviour. "So to improve your chances of winning Nobel prizes you should not only eat more chocolate but perhaps drink milk too or strive for synergy with hot chocolate?" says the letter published in *Practical Neurology*!

(Through kind courtesy of www.nutraIngredients.com 15 January, 2013)

Microbiological Aspects of Raw Materials

M.M. Seema & Nimitha Murali

Microbiology Laboratory, CArE Keralam Ltd



Introduction

With the ever increasing use of herbal medicines and the global expansion of the herbal medicines market, safety has become a concern for both health authorities and the public. This is because many precuts have been found to contain contaminants and residues that may cause harm to the consumers. Many of them are natural such as toxic metals, bacteria and fungi. Some arise from past and present use of materials that pollute the environment and in turn medicinal plants. Microbial contamination of herbal medicines can be influenced by environmental factors such as temperature, humidity, extent of rainfall during pre-harvesting and post-harvesting periods, handling practices and storage conditions of crude and processed medicinal plant materials. Because of these reasons, there is currently a global danger to the health and well-being of the people. The World Health Organization, British Pharmacopoeia and the United States Pharmacopoeia have recommended

tolerable microbial limits in non-sterile pharmaceutical products which include 10^7 cfu/ml bacteria and 10^5 cfu/ml fungi. These risks can be reduced by ensuring that there is enough surveillance of herbal medicines so that those with harmful contaminants and residues above recommended limits do not reach the public.

Herbal products are subject to microbiological contamination which pose health hazard to the consumer and also cause product spoilage, aesthetic changes, and possible loss of drug efficacy. In order to minimize the chance of contaminated finished product, it is necessary to control the microbial content of raw materials along with other physical and chemical attributes. Manufacturers should evaluate the microbiological quality of their raw materials and establish appropriate specifications based on the best available scientific information.

Microorganisms that have been found in herbal raw materials include enteric bacteria, potential pathogens, mold, and mycotoxin producing fungi, which can invariably be transferred to the finished drug product. They have been found to contain microorganisms that can

cause product deterioration, direct patient infection or activate immune responses from patient.

Criteria to be considered

The following are to be considered when establishing acceptable levels for raw material microbial content.

- ▶▶ Chemical composition
- ▶▶ Physical nature
- ▶▶ Origin and availability
- ▶▶ Lot uniformity
- ▶▶ Intended use of the product
- ▶▶ Concentration of raw material used in the product
- ▶▶ Manufacturing process
- ▶▶ Raw material history
- ▶▶ Storage conditions
- ▶▶ Water activity

Naturally occurring raw materials contain a high level of microorganisms that pose a contamination risk to the finished product if not reduced or eliminated during processing and it varies depending upon the type and source of the raw material. It may be necessary to treat such materials to reduce microbial levels before use or to purchase already treated materials. The criteria set by the manufacturer for the microbial content of a raw material should take into consideration the release criteria established for each finished product. For example, the absence of *Salmonella* is significant if a raw material is used in an oral product.

A raw material microbial content specification is usually not greater than that for the finished product, especially when it is used at greater than 1% in the

formulation. A raw material with a microbial count greater than that set for the finished product may be acceptable if its use does not compromise the safety and stability of the formulation and its concentration in the finished product is low.

Importance of Microbiology

If raw materials are found to have a microbial load greater than specified, an investigation to identify and eliminate the source of the contamination can assist in implementing preventative measures. It is recommended that a qualified microbiologist or independent microbiology laboratory be engaged to:

- ☞ Design procedures for the examination of specific raw materials,
- ☞ Examine the manufacturer's raw materials for microbial content on a continuing basis,
- ☞ Interpret assay data on a routine basis, and
- ☞ Periodically review and update procedures, when applicable.

Validated microbiological analytical methods should permit the detection of microorganisms and ensure the inactivation of the preservative. The presence of objectionable organisms can be determined by identification of isolates using standard acceptable procedures for *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella* sp.

Microbiology tests to be performed

- Total aerobic microbial count
- Total combined yeasts/molds count
- *Escherichia coli*
- *Salmonella* sp.
- *Staphylococcus aureus*
- *Pseudomonas aeruginosa*

Common Sources of Contamination of Raw Materials

1. Raw materials used in the food industry may be contaminated via soil, water, plants, equipment and utensils, humans, animals and air. In the upper layer of fertile soil, 10^6 - 10^7 bacteria/g are present which helps the plant to absorb the organic material. But those bacteria are not wanted in or on the surface of raw materials.
2. Water is also microbially contaminated. Potable water contains 10^2 bacteria /ml; waste water on the other hand contains 10^8 bacteria/ml. Human beings, animals and even air acts as source of contamination and eventually affect the quality of food.
3. Plants themselves are microbially contaminated and this is determined by the soil they are cultivated in and the water they come in contact with. By treatment of the soil with liquid, manure, plants may be contaminated with fecal microorganisms, including pathogens.
4. Microbes inhabiting contact and environmental sites in food processing are mostly harmful, because microbial communities that

form in critical places contaminate the surfaces and consequently the products made in that particular process.

Common foodborne pathogens such as *Bacillus cereus*, *Staphylococcus aureus*, *L. monocytogenes*, *Mycobacterium paratuberculosis*, *Clostridium perfringens*, *Escherichia coli* O157:H7, *Salmonella typhimurium*, *Campylobacter jejuni*, and *Yersinia enterocolitica* have readily been found to produce biofilms on surfaces. A biofilm consists of microbial cell clusters with a network of internal channels or voids in the extracellular polysaccharide and glycoprotein matrix, which allows nutrients and oxygen to be transported from the bulk liquid to the cells. Once a biofilm has been formed, it can be a source of contamination for foods passing through the same processing line.

A study conducted in Dar es Salaam found liquid and powdered herbal medicines prepared by local herbalists to have high levels of bacterial contamination. The large number of isolated microorganisms from the samples could pose a risk of acquisition of pathogenic microbial agents to those taking these herbal mixtures. (Justin-Temu *et al.* East Cent. Afr. J. Pharm. Sci. 12 2009)

Troubleshooting Microbial Contamination in An Industrial Environment

Regular hygiene monitoring of a plant and equipment, and microbiological sampling of products and raw materials

are of very great importance in detecting potential sources and routes of contamination. Contamination especially in food industry can result to not only human morbidity and mortality but also to business losses. Microbiological troubleshooting is called for when safety and quality systems fails by contamination of products or equipment with microbial pathogens and/or spoilage organisms at unacceptable levels. Microorganisms of concern are often present in small numbers as part of the natural micro flora of raw materials and could not be totally eliminated.

Troubleshooting microbial contamination would be necessary if:

- ✓ Routine microbial monitoring indicates contamination levels exceeds acceptable limits
- ✓ The product or raw materials get contaminated.

Microbial Sampling

If contamination involves the product or raw material, samples of the contaminated material should be sent to a reputable laboratory for analysis. Once the

contaminating organism has been identified, it is then easy to design suitable sampling strategies to trace the source of contamination.

Conclusion:

Considering the remarkable versatility of microbes to survive if not flourish in a surprising range of environments, the risk of contamination of raw materials is very high. In many cases, suppliers provide raw material testing and risk assessments. Specifications and microbiological methods for both raw materials and finished products vary greatly between responses and include a wider range of specified microbial limits than those traditionally specified for cosmetics and drugs. Objectionable microbes include both potential pathogens and those that can compromise product acceptability and functionality. Treatment or rework of raw materials and finished products is practiced by some. The household and institutional products industry should have a sound understanding of the need and significance of microbiological quality.



Creams: Ideal Dosage Form for Topical Medicament Delivery

Subodh Surendran

Senior Technician, Production Department, CArE Keralam Ltd



A cream is a topical preparation usually for application to the skin. Creams may be considered pharmaceutical products as even cosmetic creams are based on techniques developed by pharmacy and unmedicated creams are highly used in a variety of skin conditions (dermatoses).



An ayurvedic cream



Galen

Claudius Galen (131-201 A.D.) prepared the first *unguentum refrigerans* (cold cream), an ointment containing olive oil, rose oil, white wax and a small quantity of water. This was the prototype for other cosmetic ointments introduced by Johann Mesue Jr. in the 13th century. A modern version consisting of almond oil, spermaceti, white wax and rose water

passed into the United States Pharmacopoeia as Rose Water Ointment. Pharmaceutical creams became official with the introduction of the formula for a “Sun Cream” in the National Formulary VIII (1946), a product designed to prevent sunburn but permit tanning.

The two types of creams

Creams are semisolid dosage forms containing one or more drug substances dissolved or dispersed in a suitable base. This term has traditionally been applied to semisolids that possess a relatively fluid consistency formulated as either water-in-oil or oil-in-water emulsions. However, more recently the term has been restricted to products consisting of oil-in-water emulsions or aqueous microcrystalline dispersions of long-chain fatty acids or alcohols that are water washable and more cosmetically and aesthetically acceptable. Creams are used to help sun burns.

Creams are semi-solid emulsions, that is mixtures of oil and water. They are divided into two types: oil-in-water (O/W) creams which are composed of small droplets of oil dispersed in a continuous phase. Vanishing creams are examples. The second type is water-in-oil (W/O) creams which are composed of small droplets of water dispersed in a continuous oily phase. Cold creams fall

into this type. Oil-in-water creams are more comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water. Water-in-oil creams are more difficult to handle but many drugs which are incorporated into creams are hydrophobic and will be released more readily from a water-in-oil cream than an oil-in-water cream. Water-in-oil creams are also more moisturising as they provide an oily barrier which reduces water loss from the stratum corneum, the outermost layer of the skin. Creams cling to surface of application for a reasonable duration. This adhesion is due to plastic rheological behaviour. Creams are made up of four main ingredients – water, oil, emulsifier and thickening agent.

Uses of Creams

Creams are used for a variety of purposes. First of all they provide a barrier to protect the skin. This may be a physical barrier or a chemical barrier as with sunscreens. Creams aid in the retention of moisture (especially water-in-oil creams). Creams have cleansing and emollient properties. They also act as a vehicle for drug substances such as local anaesthetics, anti-inflammatory agents, hormones, antibiotics, antifungals or counter-irritants.

Commercial manufacture of creams

Ingredients, formulation and product viscosity differ widely among the commercially manufactured creams. However, a typical manufacturing process consists of the following operations:

Preparation of the oil phase:

Flake/powder ingredients, sometimes dry blended in advance, are dispersed into mineral oil or silicone oil. Heating may be required to melt some ingredients.

Hydration of aqueous phase

ingredients: Emulsifiers, thickeners and stabilizers are dispersed into water in a separate vessel. Heating may be required to accelerate hydration.

Forming the emulsion: The two phases are blended under vigorous agitation to form the emulsion.

Dispersion of the active ingredient: The active ingredient often makes up only a small proportion of the formulation. This must be efficiently dispersed to maximize yield and product effectiveness.

Some common problems encountered

The following problems are usually encountered in manufacture of creams:

- 1) When added to water, thickening, stabilizing and emulsifying ingredients can form agglomerates which agitators cannot break down.
- 2) Similarly oil phase ingredients can form lumps which require shear to disperse.
- 3) Ingredients must be fully hydrated to obtain the required viscosity and develop yield.
- 4) Partially hydrated materials can build up on the vessel wall, in-tank baffles and parts of the agitator.
- 5) Agitators cannot sufficiently reduce

droplet size to form a stable emulsion.

6) Active ingredients can be temperature sensitive. Cooling of the product before adding the active ingredient further increases processing time.

7) Poor dispersion of the active impairs product effectiveness.

8) Long mixing times and additional equipment may be required to obtain a homogeneous and stable finished product.

These problems can be solved by the use of high shear bottom entry mixers, high shear in-line mixers and high shear batch mixers.



Bottom entry mixer



High shear batch mixer



High shear in-line mixer

Evaluation of creams

The International Conference on harmonization (ICH) Guidance Q6A recommends specifications to ensure that commercialized drug products are safe and effective at release and during shelf

life. They include description, identification, viscosity, particle size, assay, content uniformity, impurities, pH, water content, microbial limits, antimicrobial preservative content, antioxidant preservative content, stability and sterility. Some of them are described below.

Viscosity: Rheological properties like viscosity can influence the drug delivery of the cream. Penetrometry, viscometry and rheometry are used for determining viscosity.

Minimum fill test: This test is performed to compare the weight or volume of product filled into each container with their labelled weight or volume. It helps in assessing the content uniformity of product. A minimum fill test is applied only to those containers that contain not more than 150g or ml of the product. It is performed in two steps. Initially labels from the product containers are removed. Their weights (W_1) are recorded after washing and drying the surface. Next the entire product from each container is removed. The weight of empty containers (W_2) is recorded after cleaning and drying. The difference between total weight (W_1) and empty container weight (W_2) gives the weight of the product. USP recommends that the average net content of 10 containers should not be less than the labelled amount. If the product weight is less than 60g or ml, the net content of any single container should not be less than 90% of the labelled amount. If the product weight is between 60 and 150 g or ml, the net content of any single container should not be less than 95% of the labelled amount. If these limits are not met the test is repeated with an additional 20 containers.

Water content test: The presence of minor quantities of water may alter the microbial, physical and chemical stability of creams. Titrimetric methods are usually adopted to determine the water content in creams. These methods are based on the quantitative reaction between water and anhydrous solution of sulphur and iodine in the presence of a buffer that can react with hydrogen ions. Special titration methods (Karl Fischer) are used in this regard.

Microbial screening: Creams are required to be free from any microbial contamination. Therefore, all topical preparations are screened for the presence of *Staphylococcus aureus* and *Pseudomonasaeruginosa*. In some cases testing for *Escherichia coli*, *Salmonella* sp., and total aerobic microbial counts is recommended by USP.

Conclusion

Creams are an ideal dosage form for delivering medicaments topically. They are less greasy and do not soil cloth. As a result greater interest is being evinced in converting many of the ayurvedic oils to creams. Progress can be achieved in this area by adoption of modern pharmaceutical techniques and judicious selection of ingredients. Natural emulsifiers and thickeners can contribute greatly to the formulation of pharmaceutical creams. ■

Sweet snacks and carbonated drinks linked to colorectal cancer!

Consumption of high-energy snacks and sugar-sweetened colas may be associated with an increased risk of colorectal cancer, says new research. The study is said to be the first of its kind to suggest a link between an increased risk of bowel cancer and consumption of foods that contain plenty of sugar and fat. The Scottish team of researchers found that intake of carbonated soft drinks, cakes, biscuits, chips and desserts had a significant positive association with the risk of developing colorectal cancer in the study group. The research team analyzed data from the 2012 Scottish Colorectal Cancer Study- looking at risk factors including diets, levels of physical activity and smoking in 5000 participants (2062 cancer patients and 2776 controls). More than 170 food items including fruits, vegetables, fish and meat, as well as high-energy snack foods like chocolates, nuts, chips and fruit drinks were included in the analysis.

(Through kind courtesy of www.bakeryand snacks.com 16 July, 2013)

Research publications from CARE Keralam Ltd

D. Suresh Kumar (2012) Phytotherapy of chronic venous insufficiency. **Hygeia Journal for Drugs and Medicines 4 (April), 1-2.**

Ansari M.M., D. Suresh Kumar (2012) Fortification of food and beverages with phytonutrients. **Food and Public Health 2, 241-253.**

Mariya Paul, A. Radha, D. Suresh Kumar (2013) On the high value medicinal plant, *Coleus forskohlii* Briq. **Hygeia Journal for Drugs and Medicines 5 (1), 64-73.**

A. Radha, ManjimaPrabhakaran, Mariya Paul, Sreevalsan A., Jessy Sebastian, Joy Verghese, C.I. Jolly (2013) Pharmacognostical, phytochemical and antimicrobial activity of an Ayurvedic formulation, *Nishakatakadi Kashayam*. **Indian Drugs 50, 26-30.**

P. Yuvaraj, Ann Shine Paul (2013) Investigation of *in vitro* anthelmintic activity of phenolic acid from *Thespesia populnea* (stem bark). **Asian Journal of Biochemical and Pharmaceutical Research 3, 13-16.**

Research grants received

Coconut Development Board, Kochi has granted three research projects to CARE Keralam Ltd. These projects are aimed at developing coconut-based medicines for urolithiasis, diarrhoea and upper respiratory tract infection of children. As part of these studies, a clinical trial division is also being established at CARE Keralam Ltd. A sum of Rs. 52,50,000/- has already been released.

Projects completed

National Innovation Council (NiC) and CARE Keralam Ltd jointly undertook a research project on the standardization of *Nisakatakadi Kashayam*, a popular remedy for diabetes mellitus. This study has resulted in the compilation of a dossier on this formulation. This is the first time that a dossier has been developed for an ayurvedic medicine. The dossier describes in detail the quality control of the eight ingredients of *Nisakatakadi Kashayam*, methods to analyze the finished product, scaling up of the manufacturing process, toxicology of the product and evidence for its efficacy. This dossier will serve as a model for dossiers of other Ayurvedic products, thus facilitating the registration of Ayurvedic medicines in overseas markets. The dossier is under submission to Govt. of India.

Approvals received

CARe KERALAM Ltd receives CPCSEA approval

Dr. Anjani Kumar, Director, AWD, Ministry of Environment & Forests, New Delhi visited CARe Keralam Ltd on 8 August, 2012 and inspected the facilities in the toxicology department. The toxicology department is equipped with individually ventilated cages, auto analyzer, cell counter, lyophilizer, autoclave and equipment for carrying out histopathological studies. Our CPCSEA registration number 1620/PO/c/12/CPCSEA is valid up to 2015.



Mr. Anjani Kumar at the Toxicology Department

Seminars & Workshops Conducted

Workshop on Quality Control and Raw Material Solutions for Ayurvedic Industry

A workshop on quality control and raw material solutions for Ayurvedic industry was held at CARe Keralam Ltd on 10 August, 2012. Mr. Karimpuzha Raman, Managing Director of CARe Keralam Ltd welcomed the gathering. The workshop which focussed on two major issues in contemporary Ayurveda was inaugurated by Sri P.K. Kunhalikutty, Hon'ble

Minister for Industries & IT, Kerala. In his inaugural speech the minister observed that Ayurveda is one major strength of Kerala and that it is imperative to gain international recognition for ayurvedic medicines manufactured in Kerala. He also released *Ayurveda Tomorrow*, the newsletter of CARe Keralam Ltd. Mission of CARe Keralam was explained by CARe Keralam Director, Dr. K. Anil Kumar. He narrated the efforts that were needed to make CARe Keralam Ltd a reality.



The Hon'ble Industry Minister Sri Kunhalikutty inaugurating the workshop (L-R) Dr. N. Vimala, Dr. K. Anil Kumar, Sri B.D. Devassy and Sri Karimpuzha Raman

In his presidential speech Chalakudy M.L.A., Sri B.D. Devassy remarked that it is essential to improve the quality of ayurvedic medicines and curb the manufacture of spurious products. He was also of the opinion that fast escalating price of ayurvedic medicines needs to be controlled. He called upon the State Government to encourage cultivation of medicinal plants, as it improves the living standard of farmers.

A special address was delivered by Dr. N. Vimala, ASU Drugs Controller, Govt. of Kerala. She outlined the programmes initiated by the Drug Control Department to improve the quality of ayurvedic medicines.

Sri T.K. Jose, Chairman of Coconut Development Board, Kochi delivered an inspiring speech on how coconut cultivation can go hand-in hand with cultivation of medicinal herbs. He said that plans are being made to encourage the cultivation of medicinal herbs in coconut plantations.

Two hundred and fifty Ayurveda entrepreneurs participated in the workshop. A few had come from nearby states also. Many experts on Ayurveda delivered presentations on quality control and sourcing of raw materials. They included Dr. T.S. Murali, Chief of R&D, Arya Vaidya Sala, Kottakkal, Dr. C.I. Jolly, Dr. N. Sasidharan of Kerala Forest Research Institute, Peechi, Dr. Smart P. John, Senior Drug Inspector, Govt. of Kerala, Dr. P.Y. John, Ayurveda Drug Inspector, Govt. of Kerala and Mr. Deepu Varghese, Head of Raw Material Sourcing, CARE Keralam Ltd.

Seminar on Ayurveda Drug Manufacturing: Possibilities and Problems

Ayurveda Medical Association of India (AMAI) and CARE Keralam Ltd jointly conducted this seminar on 16 September, 2012 at CARE Keralam auditorium, Koratty. Dr. T.A. Salim, Chairman of AMAI Medicine Manufacturers' Sub-Committee chaired the function. In his welcome address, Dr. Rejith Anand informed that AMAI is planning to form a consortium of ayurvedic physicians who manufacture medicines on a small-scale for dispensing to their patients and physician-turned-entrepreneurs. The seminar was inaugurated by Mr.

Karimpuzha Raman, Managing Director of CARE Keralam Ltd. In his inaugural speech Mr. Raman posed the question why Ayurveda could not grow like the nascent nutraceutical industry of India which boasts an annual turnover of Rs. 5000 Crores. They could achieve that as they adhere to strict quality control in manufacture of the nutraceutical products. He was optimistic that Ayurveda industry of Kerala too can make advances, once it adopts the philosophy of modernization. Dr. Sheela B. Karalam, Special Officer (R&D) of Oushadhi Ltd., Trichur spoke on identification, standardization and storage of raw materials. With the aid of a colourful PowerPoint presentation she demonstrated how the identity of crude herbs can be established scientifically and adulterants detected. This was followed by a talk by Dr. C.I. Jolly on standardization of finished products. Dr. Joy Verghese, Executive Director of CARE Keralam Ltd described the various facilities available at CARE Keralam Ltd for serving the Ayurveda fraternity of Kerala.

The post-lunch interactive session started with a forceful presentation by Dr. Manoj Kaloor on the dangers lurking behind Schedule Z, proposed by national drug regulatory body. This was followed by a lively discussion. Dr. M.D. Ramanathan, Managing Director of Sitaram Ayurvedic Pharmacy, Dr. K. Anil Kumar, Executive Director of Kerala Ayurveda Ltd and Dr. Saji Kumar, Managing Director of Dhathri group unanimously said that time has come for the Ayurveda industry of Kerala to adopt modern methods in manufacture and quality control of their products. This, they said, would not only make Ayurveda

manufacturers more regulatory-compliant, but also improve the quality of the finished products, thereby enhancing the prestige of Ayurveda in the domestic and overseas markets.



Dr. G. Vinod Kumar, President of AMAI speaking on problems faced by the industry



A section of the audience

Drs. V.G. Udaya Kumar, Ram Mohan and K.G. Viswanathan delivered felicitations. Dr. Rejith Anand, presented to Dr. K. Anil Kumar, on behalf of AMAI, a cheque for Rs. 30,000 towards the cost of two shares of CARE Keralam Ltd. Dr. Anil Kumar informed the gathering that as a special gesture, members of AMAI can become shareholders of CARE Keralam Ltd by buying one share, instead of the stipulated two shares per person. Dr. K.V. Syamlal, Managing Editor of *Apta* proposed vote of thanks.

World Diabetes Day 2012

CARE Keralam Ltd observed World Diabetes Day 2012 by holding a seminar on diabetes mellitus at CARE Keralam auditorium on 14 November. The seminar was inaugurated by Sri Manesh Sebastian, President of Koratty Panchayath. In his inaugural speech Sri Sebastian observed that the best way tackle the problem is by creating awareness among the public about the need to maintain some code of conduct in dietetics. Instead of spending huge amounts of money on treatment of diabetes and its complications it is advisable to ward off the disease by eating and behaving properly. The inauguration was followed by three presentations. Dr. P.K.V. Anand, Assistant Professor at Vaidyaratnam Ayurveda College, Ollur, Trichur spoke on the ayurvedic treatment of diabetes. He said that diabetes mellitus or *madhumeha* is only one of the 20 *prameha* or diseases of polyuric nature described in Ayurveda texts. While western medicine treats diabetes mellitus as a disorder related to blood glucose, Ayurveda considers it as a disease having strong bearing to *medas* (adipose tissue). He narrated briefly the ayurvedic style of treating *madhumeha*. He also remarked that medicated clarified butters (*ghrta*) are very effective in diabetes mellitus. Dr. C.I. Jolly explained the various types, symptoms and treatment of diabetes mellitus according to western medicine.



Sri Manesh Sebastian, President of Koratty Panchayath, inaugurating the function On the dais (L-R) Dr. P.K.V. Anand, Dr. Joy Verghese and Dr. C.I. Jolly.

Dr. Joy Verghese described how small Ayurveda entrepreneurs can make use of the product development facilities available at CARE Keralam Ltd. Marketing managers of Nagarjuna Herbal Concentrates Ltd., Vaidyaratnam Oushadhasala, BIPHA Drug Laboratories and Sreedhareeyam Ayurvedic Eye Hospital & Research Centre (P) Ltd presented to the audience their products used in diabetes treatment. After lunch, the participants visited various laboratories of CARE Keralam Ltd.

Industrial training programme is concluded

The six months-long industrial training programme organized by CARE Keralam Ltd concluded on 30 October, 2012. All the four trainees received appointments in leading companies of Kerala.

One-day training in HPTLC

As a part of the training programme initiated by CARE Keralam Ltd a group of five scientists from Synthite Industries Ltd., Kolencherry underwent one-day training in HPTLC on 18 December, 2012. The group consisted of Dr. Prasanth K. Menon, Dr. Debabrata Acharya, Sri Jerry Jacob, Sri Arun Kumar T.C. and Miss Mily Mol Mathew.

Training Workshop on Loan License

Considering the frequent enquiries that CARE Keralam Ltd receives on loan licensing, a one-day workshop on loan license was held at CARE Keralam Ltd on 24 January, 2013. The gathering was welcomed by the Managing Director, Sri Karimpuzha Raman. He explained the

need for holding the workshop and assured the participants of all co-operation in obtaining loan license for contract manufacture at CARE Keralam Ltd. Dr. Joy Verghese, Executive Director explained the applicability of loan license and this was followed by a briefing by Sri Ajay Jagan, Head of Production. Thereafter, the mandatory requirements and procedure for submission of the application were explained in detail by Dr. P.Y. John, Drug Inspector, Govt of Kerala. In the post-lunch session the prospective applicants were assisted in filling up Form 24E, questionnaire and affidavit. The workshop concluded with vote of thanks proposed by Mr. Simson Jose, Executive, Cluster Innovation Centre, CARE Keralam Ltd. 44 participants from 38 Ayurveda companies attended the workshop.

Workshop on animal products in Ayurveda

A one-day workshop on animal products in Ayurveda and other traditional systems was held at Kerala Forest Research Institute, Peechy on 4 February 2013. Forty two delegates representing pharmaceutical industries, medical practitioners, Forest Department, NGOs and scientists participated in the workshop. CARE Keralam was represented by Sri Karimpuzha Raman, Dr. Joy Verghese, Dr. K.C. Chacko and Dr. D. Suresh Kumar. CARE Keralam Ltd presented a proposal to evolve ecofriendly and sustainable methods of procuring raw materials like ivory, antlers of deer, spines of porcupine, civet cat secretion, peacock feather and rhino horn.

Workshop on Flow Cytometry

Flow cytometry is a laser based, biophysical technology employed in cell counting, sorting, biomarker detection and protein engineering, by suspending cells in a stream of fluid and passing them by an electronic detection apparatus. It allows simultaneous multiparametric analysis of the physical and or chemical characteristics of up to thousands of particles per second. The technology has applications in a number of fields, including molecular biology, pathology, immunology, plant biology and marine biology. Considering the growing interest in this technology, CARE Kerala Ltd, Cluster Innovation Centre and Becton Dickinson India Pvt Ltd jointly organized a one-day workshop on 15 February, 2013.



Dr. Badri Narayan explaining the nuances of flow cytometry

The workshop was inaugurated by Sri Karimpuzha Raman and business development manager Mr. Tito P. Thomas welcomed the gathering. Dr. Badri Narayan, Application Scientist of Becton Dickinson delivered a detailed presentation on flow cytometry. He outlined the theoretical foundation of flow cytometry and described its many applications in diagnostics and basic research. Sixty young scientists participated in the workshop. The workshop was followed by a short

aptitude test in which Mr. I. Gowtham (Tropical Botanic Garden, Palode), Mr. R.P. Praveen (Department of Botany, University of Kerala), Miss S.L. Soumya (Department of Botany, University of Kerala) and Mr. M. Manikandan (Sri Krishna Arts & Science College, Coimbatore) scored highest marks and qualified themselves for a four-day, free, hands-on training course on flow cytometry in FACS Academy of Becton Dickinson at Gurgaon. The entire expenses for the travel to Gurgaon and stay would be borne by Becton Dickinson India Pvt Ltd.

Training course on Ayurvedic raw materials and finished products

In response to the growing demand for quality control training sessions, CARE Keralam Ltd and Cluster Innovation Centre jointly conducted a two-day training course on 25 and 26 February, 2013. The course was inaugurated by Sri Karimpuzha Raman, who called upon the participants to lay greater emphasis on quality control in Ayurveda. Dr. K.C. Chacko welcomed the gathering and Mr. Simson Jose of Cluster Innovation Centre spoke about the various aspects of the course. Dr. D. Suresh Kumar and Mr. Tito P. Thomas explained the need for quality assurance in Ayurveda.



Trainees in the analytical laboratory

Mrs. Manjima Prabhakaran delivered a presentation on the microbiological aspects of quality control. The various steps like serial dilution of the test substance (crude herb or finished product), enumeration of total bacterial and fungal counts and detection of specific organisms like *Salmonella*, *E. coli*, *Staphylococcus* and *Pseudomonas* were explained. Thereafter, Mrs. Mariya Paul taught the pharmacognostical methods of identifying crude drugs. The afternoon session was devoted to demonstration of quality control measures like ash value, extractive values etc by Mrs. Radha A.

On 26 February the participants were introduced to HPTLC methods for ascertaining the quality of raw materials and finished products. Mrs. Jessy Sebastian demonstrated the detection of heavy metals using ICP-MS and pesticide analysis with the help of GC-MS. After completion of the course, the participants gathered again and were addressed by Sri Karimpuzha Raman. Some participants spoke about their impressions about the course and thereafter they were presented with certificates of participation. Thirty persons from the Ayurveda industry of southern India participated in the course. There were participants from all the southern states.

Training course on Measurement of Uncertainty

Every measurement carries with it a certain amount of error. Identification of the sources of these errors and their correction is a matter of concern to analysts. Therefore, measurement of

uncertainty is a topic of importance to analysis and quality control. Mr. V. G. Ramesh of TUV Rheinland India Pvt Ltd, Electronics City, Bangalore, conducted a training course on this topic on 13 and 14 July, 2013. The two-day event was attended by 16 scientists of CARE Keralam Ltd.

Training courses & Seminars attended

Mrs. Radha A., Mrs. Manjima Prabhakaran, Mr. Ben Raj and Mr. Simson Jose attended the 25th Kerala Science Congress held at Techno Park, Trivandrum from 28 January to 1 February, 2013.

Dr. P. Yuvaraj and Mr. K.S. Vishnu attended training course on laboratory management system/internal audit as per ISO IEC 17025 2005 from 6 to 9 February, 2013. The training was organized by TUV Rheinland India Pvt Ltd, Electronics City, Bangalore. The training imparted by Mr. V.G. Ramesh and Mrs. Smitha Vijayan dealt with specific requirements for the competence of testing and calibration laboratories. Special emphasis was given to the 25 clauses of NABL standards.

Visitors

Dr. Madhu Divakar, Senior Specialist Pharmacist, Directorate of Pharmaceutical Affairs and Drug Control, Muscat, Oman visited us on 27 October, 2012. He delivered a lecture on the registration of herbal products in Oman.

Dr. Ramanuj Banerjee, Scientist D in Department of Scientific and Industrial Research (DSIR) and Nodal Officer of TUC in southern India visited CARE

Keralam Ltd on 21 March, 2013. He looks after the TePP and CIC activities in the southern states. He reviewed our activities of last year and suggested how we can improve our performance. He explained the various schemes being implemented by DSIR and suggested the best options. A new scheme called PRISM is being developed by DSIR for funding innovative projects. Dr. Banerjee expressed the view that with sufficient funding CARE Keralam Ltd can perform better and set an example for other clusters.

Consultancy provided

Baby massage oil developed for Saroja Extractions, Kasargod

A baby massage oil was developed for M/S Saroja Extractions, Kasargod and the batch manufacturing record was handed over to Sri Visakh, Managing Partner, on 24 September, 2012.

Additions to CARE Keralam facility

Soft gel encapsulation becomes operational at CARE Keralam Ltd

The soft gel encapsulation facility at CARE Keralam Ltd has started functioning. Soft gel capsule is an ideal dosage form for oral delivery of essential oils, ayurvedic oils, medicated clarified butters, nutritional oils like omega-3 oil, fish oil, lycopene and lutein.



CARE Keralam Ltd has installed a state-of-the-art soft gel encapsulation machine in its production department. Manufactured by Chang Sung Softgel System Ltd., South Korea, this machine has the capacity to produce 120,000 soft gelatin capsules per hour. ■

Ayurveda Tomorrow invites for publication articles on Ayurveda in general and Ayurveda renaissance in particular. Please send in your contributions (3-4 pages in Word format) to:

Editor, *Ayurveda Tomorrow*

E.mail: research@carekeralam.com

We also look forward to your valuable views and opinions.

The CARE Keralam Team

Managing Director

Mr. Karimpuzha Raman

Mr. Sreeraj V. - Helper

Mr. Suresh V.N. - Helper

Production Department

Dr. Joy T. Verghese - Executive Director (Tech.)

Mr. Ajay Jagan - Head (Production)

Mr. Subodh Surendran - Senior Technician

Mrs. Simi S. - Trainee

Mr. Jithin C.J. - Trainee

Mr. Sarath Krishnan P. - Helper

Mr. Sajeesh Kumar U. - Helper

Pharmacognosy Laboratory

Mrs. Mariya Paul - Pharmacognosist

Miss Nimisha Sadan - Trainee

Business Development & Clinical Trials

Mr. Tito P. Thomas - Manager

Mr. Ben Raj - Executive- R&D

Mr. Manu N. Nair - Executive-Raw Material

Mr. Prabeesh Mambra - Clinical Trial Associate

Administration

Dr. K. C. Chacko - Administrator

R&D

Dr. D. Suresh Kumar - Head (R&D)

Finance

Mr. K. Sudhakaran - Senior Accounts Executive

Mr. Arun Ravindran - Executive Accounts & HR

Mr. Binu Raphael - Senior Executive Accounts &
Finance

Mr. Jerin Joseph - Trainee

Research Advisor

Dr. C.I. Jolly

Analytical Laboratory

Mrs. Radha A. - Dy. Manager (Technical and R&D)

Mrs. Rose C. Nampadan - Executive

(Sample Reception Desk)

Purchase

Mr. Deepu Varghese - Purchase Manager

Mr. Jinto Thomas - Stores Assistant

Mrs. Jessy Sebastian - Analyst

Dr. P. Ragavendran - Analyst

Mr. K.S. Vishnu - Analyst

Raw Material Store

Mr. Kannan P.M. - Helper

Mrs. Jyothis Manuel - Analyst

Mr. Mohammed Arif - Trainee

Microbiology Laboratory

Mrs. Seema M.M. - Microbiologist

Miss Nimitha Murali - Trainee

Toxicology Laboratory

Dr. P. Yuvaraj - Head (Toxicology)

Miss Ann Shine Paul - Asst. Toxicologist

Mrs. Litty Biju - Animal House Keeper

Cluster Innovation Centre

Mr. Simson Jose - Executive

Maintenance Department

Mr. George P. Veliath - Maintenance Engineer

Mr. Midhun V.R. - Trainee

Mr. Nithin V. - Trainee

Mr. Anoop T.V. - Trainee

System Administration

Mr. Pratheesh K.S. - System Supervisor

Reception

Mrs. Seema Dilraj - Executive

Mr. Tinto Thomas - Helper

House Keeping

Mrs. Reneesha Udayan

Mrs. Karthyayani Amma

Mrs. Ajitha Manoj

Mrs. Rema Sadanandan

Mrs. Nimitha Shibu



Cluster Innovation Centre

(Supported by National Innovation Council, Govt: of India)

The Cluster Innovation Centre (CIC), supported by the National Innovation Council (NIC), of the Govt. of India, promotes innovation leading to entrepreneurship. Activities of CIC include incubation of innovative ideas, skill development & training and establishment of linkages between industry and academia.

For more details,

Simson Jose
CIC Executive & Training Coordinator
Cluster Innovation Centre (CIC),
CARE KERALAM Ltd,
KINFRA Small Industries Park,
Nalukettu Road, KINFRA Park P.O,
Koratty - 680309, Kerala, India.
Email : cic@carekeralam.com
Website : www.carekeralam.com
Phone : 0480 2735837/ 2735737
Mobile : +91 8547969319

ഓണക്കാലം



Heartful Wishes for Happy & Prosperous Onam

ഘൃതങ്ങളും എണ്ണകളും അടക്കമുള്ള എല്ലാ ഓയിൽ ബേയ്സ്ഡ് മരുന്നുകളും സോഫ്റ്റ്ജെൽ ക്യാപ്സുളുകളാക്കി കൊടുക്കുന്ന അതിനുതന്നെ സാങ്കേതികവിദ്യ ഈ ഓണക്കാലം മുതൽ കെയർ കേരളത്തിൽ ആരംഭിച്ചിരിക്കുന്നു.



പരമ്പരാഗത ഗുളികകളെ ടാബ്ലറ്റ് രൂപത്തിൽ ആക്കിക്കൊടുക്കുന്നതിനോടൊപ്പം ഓയിൻമെന്റ്, സിറപ്പ്, പൗഡർ, ഗ്രാനുൾസ് പോലെയുള്ള പുതിയ പ്രൊഡക്റ്റുകളും ഫോർമുലേഷനുകളും തയ്യാറാക്കുവാനും ഞങ്ങൾ സഹായിക്കുന്നു.



CARe KERALAM

Confederation for Ayurvedic Renaissance Keralam Ltd
A joint venture of Ayurvedic Entrepreneurs and KINFRA (Govt. of Kerala)

Supported by AYUSH (Govt. of India)
KINFRA Small Industries Park, Nalukettu Road, Koratty, Trichur- 680 309, Kerala
Tel: +91 480 2735737, Fax: +91 480 2735837
Email: info@carekeralam.com

For more details Contact: 974617999, 9037650466