

Invited commentary

Herbal medicine in India

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The use of herbal drugs has been in practice since the time immemorial when primitive man resorted to plant resources around him to derive remedies from them. Consequently plants have been in use for the treatment of human ailments for thousands of years and are well documented in the literature. In India, out of the three well established systems of medicine, namely; Ayurveda, Unani and Siddha, the first two are based largely on herbal drugs. The Ayurvedic Materia Medica is a rich repository of herbs with a mention of about 2000 plant species (Beigh *et al.*, 2002). A variety of reports have since then appeared on chemical and pharmacological potential and the medicinal value of thousands of plant species (Gupta *et al.*, 2005). *Charaka Samhita* (1000-800 BC) is among the most ancient treatises on Indian medicine, presenting a systematic and detailed account of medicinal plants.

The Unani system of medicine, initiated by Hippocrates (460-377 BC) in Greece, became popular in the Arab world around 800 AD. Many Arab scholars, such as Ali Hussain Ibn Sina (known in the west as Avicenna), Ibn-AI-Baytar (known as Ibn Baithar) and Zakariya Razi (known as Rhazes), significantly contributed to this medical science during 9th to 13th centuries AD. Around the 13th century AD, it came to India *via* the Central Asia and became popular among the masses especially during the Mughal regime (Beigh *et al.*, 2002). It was exposed to modern scientific methodology in the 20th century, when Hakim Ajmal Khan (1868-1927) of Delhi initiated experimentation and engaged, in the 1920's, Dr. Salimuzzaman Siddiqui FRS, an eminent Indian scholar of chemistry of the natural products. Later, Hakim Abdul Hameed (1908-1999), the founder of Hamdard Laboratories (India) in Delhi, promoted R & D and Unani drug manufacture on modern lines, and followed the set protocols of clinical trials for new products. The primary function of the Unani physician is to aid the natural forces of the body. Unani medicine is based on the 'Humoral Theory', which presupposes the presence of four Humors - Dam (blood), Balghum (phlegm), Safra (yellow bile) and Sauda (black bile) - in the body.

In addition to the above well established systems of Indian medicine, ethnomedicine, so much popular in numerous tribal pockets throughout India, is also based primarily on plant species. Nearly 19,000 species of vascular plants, about 11,350 non-vascular green plants and nearly 14,500 fungi are present in India (Jain, 2000). More than 2000 of these species are reportedly used in

ethnomedicine (Anonymous, 2000). With numerous folk claims of ethnomedicine consistently coming up, the number of medicinal plants is on the increase (Anis *et al.*, 2000) and their activity against a variety of diseases stands pharmacologically confirmed. The World Health Organization (WHO) has reported about 4 billion people as relying on herbal medicines, and listed over 21,000 plant names in connection with herbal therapy. However, only about 5,000 higher plant species have been investigated as the potential source of new drugs so far (Beigh *et al.*, 2002).

Many research institutes and universities in India, including the Central Institute for Medicinal and Aromatic Plants (Lucknow), National Botanical Research Institute (Lucknow), Indian Institute of Integrative Medicine (Jammu), Jamia Hamdard (New Delhi), National Research Centre for Medicinal and Aromatic Plants (Anand), National Institute of Unani Medicine (Bangalore) and National Institute of Ayurveda (Jaipur), *inter alia*, have special focus on medicinal plants and are promoting multidisciplinary research in areas like Drugs and pharmaceuticals, Natural products chemistry, Plant sciences and ecology, *etc.* Five independent Central Councils for Research in (i) Ayurvedic Sciences, (ii) Unani Medicine, (iii) Homeopathy, (iv) Yoga and Naturopathy, and (v) Siddha are operative to safeguard the interest and progress of different streams of the Indian system of medicine under the overall patronage of the Ministry of AYUSH, Govt of India. Survey, cultivation, characterization and propagation of medicinal plants, and the pharmacological and clinical trials of single plant drugs and their compound formulations constitute the main agenda of the work plan of these Councils. A National Medicinal Plants Board is also in place to look after the conservation, development and sustainable management of medicinal plants. Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore is one of the registered Public Trust and Charitable Society, which started its activities in 1993 with the main focus on design and development of conservation strategies, in order to conserve threatened species and natural resources being used by the Indian medical heritage. The Ministry of Environment and Forests has designated FRLHT as a National Center of Excellence for medicinal plants and traditional knowledge. Hamdard, Dabur, Himalaya, Rex Remedies, Patanjali, *etc.* are no longer the only representative of herbal pharmaceutical industry in India; innumerable similar industries have sprung up all over the country during the last couple of decades, thus pointing to the growing popularity and a widespread consumption of herbal products.

A major drawback of our herbal formulations relates to their quality control. More than 80% of the raw materials is drawn in bulk from forests or other natural wild sources and generally does not ensure

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a uniform quality. Not only that the collection of these plants scattered in the forests is troublesome and often leads to a high production cost, but it also affects the quality control and many adulterants (unrelated species) often become part of the collection. The market is full of adulterants and substitutes of the genuine drugs. This is bound to have an adverse effect on the efficacy of herbal therapy (Iqbal and Srivastava, 1998). Moreover, collection from the forests cannot cope with the ever-increasing demand of the pharmaceutical and perfumery/cosmetic industries. In order to provide a regular and sustained supply, it is inevitable to domesticate these plants and develop methods for their commercial cultivation (Iqbal, 2013).

Owing to various anthropogenic factors like urbanization of land, over-exploitation of plants, uncontrolled grazing, frequent forest fire and the pollution stress, there is a perceptible decline in the population of many medicinal plants, rendering them as rare and threatened. About one third of the India's nearly 18,000 flowering plants, about 5000 are endemic and some three thousand species are threatened (Jain, 2000). These species are especially vulnerable to environmental stress. Biosynthesis of secondary metabolites in plants, although controlled genetically, is affected greatly by the environmental factors. Quantitative and some time even qualitative change in the active ingredients has been noticed in very many species (Iqbal *et al.*, 2011). A good overview of the study of medicinal plants in relation to their ecology and abiotic stresses is now available in some recently published books such as those of Ahmad *et al.* (2011), Iqbal and Ahmad (2014) and Dhir (2015). The aspects of herbal medicine that need special attention are: germplasm conservation, development of agrotechniques for medicinal plants, chemical assessment of therapeutically important active ingredients of those plants that grow under pollution or at places other than their natural habitat, and re-assessment of doses of herbal drugs in view of the expected changes in their active principles, if at all.

Recently many biotechnological manipulations are discovered for improvement of secondary metabolites in the natural habitats. Among them, plant cell and tissue culture for red labelled endangered plant species, molecular pharmacognosy, reversed pharmacognosy and conservation technology are important. Hence, there is a need to focus towards updated knowledge on medicinal plants as much as possible in order to discover new therapeutic drug molecules. In this 21st century, ethanopharmacology and phytomedicine are gaining wider acceptance and importance, particularly because of the fact that the biomolecules which constitute phytomedicine are synthesised within the living cells. Phytomedical research is an interdisciplinary activity involving botany, taxonomy, pharmacognosy, natural product chemistry, biochemistry, medicinal chemistry, pharmacology, pharmaceutical sciences and molecular biology. The fast-expanding areas of medicinal plants research have given a push to several research journals devoted to herbal drugs, which deal largely with chemistry of the natural products, their pharmacognosy and pharmacology (Iqbal, 2013).

Medicinal plants have a promising future because there are about plenty of medicinal plants around the world. Most of them and their medicinal activities have not yet been investigated. These days, "Alternative Medicine" has become very common in the eastern as well as western societies because of the idea of using the plants for medicinal purpose and to minimize the side effects of synthetic medicines. Moreover, to clarify their role in the treatment

of present-day diseases, and how they can be used to produce or synthesize more effective drugs are the extreme focus. Therefore, it is important for the open access journals to encourage researchers and clinicians to work hard and in harmony in order to discover the main active ingredients from the natural sources.

Journals dealing with medicinal plants in totality, including their botany, ecology, physiology and cultivation, *etc.*, are still few. In the literature, we find a large number of journals devoted to each of the above-mentioned branches of science individually, but only few of them publish articles from multidisciplinary areas. 'Annals of Phytomedicine: An International Journal' is such a multidisciplinary new journal that caters to the needs of scientists from different closely related fields and is thus a significant addition to the list of the wide-range periodicals on medicinal plants. A Journal's standard is gauged by the quality of the papers published in it. It is therefore, important to accept articles only after strict peer review, but that should not discourage those who are novice in the art of manuscript preparation. Sufficiently cautious regarding its general appearance and the quality and range of its contents. Annals of Phytomedicine seems to carry a great promise and potential to serve the cause of phytomedicine, as Iqbal (2013) puts it. It is expected to encourage innovative contributions from active scientists all over the globe. Let us join hand with the editors and their associates in pushing it to new heights of academic excellence and making it a quality international journal.

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Biography

Professor Mohammad Yunus was at Babasaheb Bhimrao Ambedkar (Central) University of Lucknow as Head of Department and Dean, School for Environmental Sciences for a couple of tenures since his joining as Professor on May 2, 1998 by accepting the Post offered to him in honoraria (*i.e.*, without application or interview). Professor Yunus superannuated in August 2012 from his engagement with Ambedkar University.

He served as the Founder Dean of School for Biosciences and Biotechnology, School for Information Science and Technology and School for Home Sciences. Professor Yunus was Registrar of BBA Central University for about fourteen months and also held the responsibility of Controller of Examinations.

With merit of academic record, he joined National Botanical Research Institute (NBRI), Lucknow in May 1977 after completing his Masters (Gold Medalist) and Ph.D. in Botany, as a CSIR Fellow from Aligarh Muslim University. In January 1994, he rose to the position of Principal Scientist through merit advancement. Professor Yunus visited Japan (JEOL and Tokyo Agriculture University in 1979 for training on Electron Microscopy to establish this facility at NBRI. Prior to joining BB Ambedkar University, he was Area Coordinator of Environmental Science Division, Head of Environmental Botany Laboratory. and Coordinator of Environmental Cell at NBRI.

On his journey of research and development, he worked with Professor S. Godzik, Poland under scientist exchange programme; Professor T.A. Mansfield, FRS and Dr. R. Gayle, at the Universities of Lancaster and Sussex at U.K., respectively, under the British Colombo plan and again for six months at University of Lancaster as a Senior Post-Doc Fellow of European Union. He has been awarded an Indo-Russian International Collaborative Project with Professor T.B. Batygina of Komarov Botanical Institute, Russia. He was invited to deliberate on the issue of research trends in Europe and America by the Governing Body of the Journal 'New Phytologist' published from Lancaster, U.K. and Chaired a Session of the International Conference at Poland.

Professor Yunus steered 13 research projects; published *ca.* 152 research papers; seven (7) books, three from Foreign Publishers (*viz.*, John Wiley, U.K.; Kluwer Academics, The Netherlands; and Taylor and Francis, U.K.). He evaluated as 'Peer' nominations for Shanti Swaroop Bhatnagar award.

Professor Yunus established the University Science Instrumentation Centre (USIC) at BBAU as its 'Founder Director'. He also steered University Library as Professor In-Charge for almost a year. He was Coordinator for the XI Plan UGC Team visit and for preparation of the XIth Five Year Plan. He worked as the Acting Vice Chancellor of BBAU several times. He served as a member of different statutory bodies of some central universities, *viz.*, Aligarh Muslim University, Banaras Hindu University, Central University of Bihar, Jamia Milliya Islamia, H.N. Bahuguna Central University and many state universities, and as an expert invitee of various international, national and state level bodies like UGC, MoEF, UPPSC, U.P. Commission for Higher Education, Directorate of Environment, NIDM, UGC NET, Maharashtra SLET; Forest Research Institute, Dehradun and CSIR's Recruitment and Promotion Board. Professor Yunus is the Editor of two scientific Journals, namely; *International Journal of Environmental Botany* of ISEB, Lucknow and *Climate Change and Sustainable Environment* of SCCSE, New Delhi.

With his more than 40 years of academics and administrative pursuits, Professor Yunus has a strong desire to use the scientific advances and knowledge extension for the good of the society at large and for the youth of the country in particular. He resumed the office of the Vice Chancellor of Mohammad Ali Jauhar University, Rampur on September 7th, 2013.