Traditional Medicine

Olayiwola Akerele

Nature’s medicinal bounty: don’t throw it away

Plant-derived drugs have an important place in both traditional and modern medicine. For this reason a special effort to maintain the great diversity of plant species would undoubtedly help to alleviate human suffering in the long term. Proven agroindustrial technologies should be applied to the cultivation and processing of medicinal plants and the manufacture of herbal medicines.

The undoubted medicinal resource represented by plants is under threat: it has been estimated that 60 000 species, nearly a quarter of the world’s total, would become extinct by the middle of the twenty-first century if present trends were to continue. This matter is, of course, intimately linked to the broad question of nature conservation.

Plant-derived drugs

It has been estimated that some 80% of the world’s inhabitants rely chiefly on traditional medicines for their primary health care needs, and it can safely be assumed that a major part of traditional therapy involves the use of plant extracts or their active principles. In many areas, especially in the tropics, an abundance of medicinal plants offers people access to safe and effective products for use in the prevention and treatment of illness through self-medication. Such plants are also useful in modern medicine:

- they are used as sources of direct therapeutic agents;
- they serve as raw materials for the manufacture of more complex semisynthetic compounds;
- the chemical structures derived from plant substances can be used as models for new synthetic products;
- plants can be used as taxonomic markers in the search for new compounds.

The following essential drugs are derived from plants: atropine (anticholinergic),

Until recently Dr Akerele was Programme Manager, Traditional Medicine, World Health Organization, 1211 Geneva 27, Switzerland. His present address is 28, St Michael’s Lane, Borrowdale, Harare, Zimbabwe. This article is based on a paper given by the author to the Fourth World Congress on National Parks and Protected Areas, held in Caracas, Venezuela on 10–21 February 1992.
codeine (antitussic/analgesic), colchicine (antigout), digitoxin/digoxin (cardiotonic), vincristine (antitumour), morphine (analgesic), quinine/artemisinin (anti-malarial), reserpine (antihypertensive), and physostigmine (cholinergic). Until relatively recently, saponin extracts necessary for the manufacture of steroidal drugs were obtained from neotropical yams of the genus Dioscorea. Cocaine derived from Erythroxylon coca provided the chemical structure for the synthesis of procaine and related local anaesthetics.

In developing countries the use of medicinal plants helps to reduce imports of drugs, thus boosting economic self-reliance. Furthermore, local products tend to be more readily accepted than those obtained abroad. Costa Rica recognizes the importance of plants and has set aside 25% of its land as forest preserves. Under a two-year agreement, the country’s National Institute of Biodiversity is to provide a major drugs company with plants and other materials and the opportunity to evaluate them for pharmaceutical and agricultural applications; in return the company will provide research funding and certain start-up expenses, and will pay royalties on the sale of any products developed from the materials supplied. Part of the research funding will directly support the conservation of biological diversity. The local people are thus encouraged to protect this source of wealth.

Some years ago an inventory of medicinal plants was produced on the basis of literature from 91 countries, including the classical texts on Ayurvedic and Unani medicine (1). Over 21 000 species were listed, but there was much replication since botanical verification was not attempted. There were no indications as to the uses of the plants.

A list has been made of plant-derived medicaments of known chemical composition used in primary health care or otherwise recognized as valuable non-prescription drugs (2); at least 119 distinct substances are identified, embracing some 62 therapeutic categories, obtained from 90 species of plant. An attempt is being made to correlate the uses of the plants with the pharmacological activities of the isolated substances. Thus far, 31 of the substances could not be shown to be related to the traditional uses of the plants, from which the chemical substances were derived.

The Napralert database at the University of Illinois documents ethnomedical uses for about 9200 of 33 000 species of monocotyledons, dicotyledons, gymnosperms, pteridophytes, bryophytes and lichens. In China, 5000 of 35 000 species of plant are used as drugs in traditional medicine. Assuming that 14–28% of plants are used as drugs and that there are some 250 000 higher plant species, one arrives at an estimate of between 35 000 and 70 000 species that have been used for medicinal purposes (3).

In 1985 it was estimated that the annual production of traditional plant remedies in China was worth US$ 571 million, and sales of crude plant drugs in the country amounted to $ 1400 million (4). In the USA, 25% of all prescriptions dispensed from community pharmacies between 1959 and 1980 contained plant extracts or active principles prepared from higher plants,
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estimated in 1980 to have cost consumers more than $ 8000 million (5).

A survey of current usage of medicinal plants in selected, mainly industrialized, countries is being undertaken by the World Federation of Proprietary Medicine Manufacturers on behalf of WHO.

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The findings indicate that the number of individuals using medicinal plant remedies is large and increasing, especially among young people. The population studied uses plant-derived medicinal products responsibly for common problems such as insomnia, indigestion, loss of appetite and nervous tension. Yet pharmaceutical firms in industrialized countries have little or no interest in exploring plants as sources of new drugs. Serious consideration is, however, given by scientists to the study and use of plants in China, Germany and Japan, and, to a lesser extent, in India.

Selection and use of medicinal plants

The Alma-Ata Declaration (1978) opened the door for a dialogue between traditional and modern health care, on the understanding that unsafe practices should be eliminated and that only what is both safe and effective should be promoted. To this end, WHO collaborates with Member States in their reviews of national policies, legislation and decisions on the nature and extent of the use of traditional medicine.

Ministries of health are assisted in establishing mechanisms for the introduction of traditional remedies into primary care programmes, assessing safety and efficacy, and ensuring adequate supplies and quality control of raw and processed materials.

Safety should be the overriding criterion in the selection of herbal medicines for use in health services. Screening, chemical analysis, clinical trials and regulatory measures should be undertaken in respect of whole plants, parts of plants, crude extracts and pure phytochemicals. For the latter category of product, the procedures should be identical to those applied to synthetic drugs. In addition to the requirement for descriptive monographs on plant material there is occasionally a need for reference substances.

Interregional workshops have been held on methodologies for the selection and use of traditional remedies in national primary health care programmes (6, 7). They have addressed the safety and efficacy of traditional remedies and covered the related issues of standards, stability, and dosage formulation. WHO collaborating centres in Africa, the Americas, the Eastern Mediterranean, Europe, South-East Asia, and the Western Pacific are involved in this work.

Also concerned with questions of safety have been the workshops deriving from the Fourth and Fifth International Conferences of Drug Regulatory Authorities, held in 1986 and 1989 respectively. These workshops have acknowledged that traditional medicines play an important part in health care, particularly as regards informed self-medication, in many developed and developing countries. It was felt that truly traditional practices were more amenable to influence through education and training than through statutory control. The workshops concentrated on the exploitation
of traditional medicine through over-the-counter sales of labelled products on a commercial basis, and addressed the need for legislation, quality standards, and information. To this end it was proposed that guidelines should be drawn up which could eventually be adapted to the conditions of individual countries.

Conservation

The Chiang Mai Declaration (1988) brought together several groups that had been working independently of each other for the most part, namely health authorities interested in medicinal plants, biologists worried about diminishing biodiversity, and environmentalists concerned with the rapid deterioration of natural resources. There was a widely held view that medicinal plants offered a valuable resource that was largely untapped because of inadequate scientific, technical and commercial infrastructures in developing countries. The conservation of plants can be expected to lead not only to the saving of human lives but also to substantial economic gains for people living where the plants exist, and, indeed, for the rest of the world. Guidelines on the conservation of medicinal plants are being finalized by WHO, the International Union for the Conservation of Nature and Natural Resources, and the World Wide Fund for Nature, and will be widely disseminated to governments and nongovernmental organizations as well as national institutions and United Nations agencies.

The conservation strategy has two principal thrusts: prevention of the disappearance of forests and associated species, and the establishment of botanical gardens. The International Union for the Conservation of Nature and Natural Resources and the World Wide Fund for Nature have led the way in indicating how the strategy applies to plants in general and to medicinal plants in particular. These independent bodies have increased public awareness of the importance of plants to humanity and have pressured governments and industry to devise and carry out conservation policies. A world conservation strategy has been developed which has the following main objectives aimed at the conservation of living resources: the maintenance of essential ecological processes and life-support systems; the preservation of genetic diversity; and the sustainable utilization of species and ecosystems which support millions of rural communities as well as major industries (8).

The first botanical gardens contained medicinal plants and were attached to faculties or schools of medicine as long ago as the sixteenth century (9). Perversely, modern medicine has often acted as if nature could be ignored and the answers to all that ails humanity could be found in the laboratory. Fortunately, such arrogance is gradually melting away, and it is to be hoped that the legacy of genetic diversity can be saved for posterity.

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Botanical gardens, as centres for the scientific study of plants, are basic to conservation and development. While this has long been appreciated in respect of endangered species, it is only recently that a wider responsibility for all plants of potential value has been recognized.
Few developing countries have instituted measures to protect endangered species of medicinal plants. Most medical schools have no place in their curricula for botany and no access to botanical gardens where studies on medicinal plants might be pursued.

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Furthermore, only about 230 of the world’s botanical gardens, of which over 1400 exist, are in the tropics and subtropics, and most of these are in Asia. This situation should receive greater attention if the marriage of traditional and modern medicine is to succeed.

**Agroindustrial development**

WHO’s Traditional Medicine Programme has outlined two basic strategies for the agroindustrial production and use of medicinal plants having standardized pharmacologically active constituents:

- the application of known and effective agroindustrial technologies to the cultivation and processing of medicinal plants and the manufacture of herbal medicines;
- the establishment of large-scale networks for the distribution of seeds and plants.

In many developing countries it may be necessary to place the utilization of medicinal plants in health services on an industrial basis, thus ensuring that adequate funding is available to support technical and scientific activities. Furthermore, governments can look to the local manufacture of pharmacologically active products as a means of working towards self-reliance.

Efforts are in fact being made to bring about the industrial use of medicinal plants, including herbal remedies, and to promote technical cooperation among developing countries in building plant-based pharmaceutical industries (10, 11). Commercial arrangements could be sought whereby local technological skills and capacities would be strengthened. A natural starting point would be the improvement of capacities in data-gathering and statistical analysis with a view to the economic mapping of the medicinal flora and to industrial applications. If the economic potential were great enough, steps could be taken to establish data centres on medicinal plants and plant-derived products at national or regional levels to facilitate the exchange of information. This could be part of a wider information system covering such matters as health, the environment and economic development.

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The proper use of medicinal plants is a necessity, not a luxury. At the Alma-Ata Conference on Primary Health Care, governments were recommended to give high priority to traditional medicine and to make policies and regulations embracing proven traditional remedies. Among the steps that have been taken so far is the identification of locally available plants or plant extracts that could usefully be added to national lists of drugs for use in health systems and could even replace some imported pharmaceutical preparations. Safety is a prime consideration, and is being assured not only through the training of professional and technical staff and the application of standards, specifications and
good manufacturing practices, but also by providing the public with adequate information.

The linking of medicinal plants with agroindustrial development opens up a potentially useful line of action, and the importance of botanical gardens and protected areas should not be overlooked. Botanical gardens can usefully be at the centre of national strategies for the development of medicinal plants. Such gardens provide bases on which technical and administrative infrastructures can be built. Negotiations could be held with the health and other sectors, in order to obtain the support that would allow studies on the transformation of plant materials into safe and effective drugs. Those who are responsible for the development of medicinal gardens should take up this challenge at the national and international levels.

References

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