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FACT FINDING AND PREPARATORY ASSISTANCE TO ASSESS  
THE POTENTIAL AND PREPARE A PLAN OF ACTION  
FOR THE INDUSTRIAL UTILIZATION OF MEDICINAL  
AND AROMATIC PLANTS

MALAWI

Technical report: preparatory assistance mission \*

Prepared for the Government of Malawi  
by the United Nations Industrial Development Organization

Based on the Work of M. K. Raina, Chemical Technologist

Project Manager: T. De Silva  
Chemical Industries Branch

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\* This document has not been edited.

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## ABSTRACT

The objective of this fact-finding and preparatory assistance mission, which started in Malawi from 17 July 1996 to 14 August 1996, was to assess the potential of Medicinal and Aromatic plants of Malawi for industrial utilization. According to my job description (Annex 1), I was expected to assess the following: *current status of cultivation of medicinal and aromatic plants; their industrial utilization, research and production capabilities; their market potential and economic viability; identify appropriate medicinal and aromatic plants for systematic cultivation in consultation with Traditional Medical Council and also recommend suitable type of pilot plant, especially in rural areas; mechanism for establishment of data base on the traditional medicines and the medicinal and aromatic plants and to recommend modalities for a technical assistance project for the establishment of a pilot processing plant and an R&D laboratory.*

Malawi is one of the least developed countries in the world supporting a population of over 10 million, 60 per cent of whom live below poverty line. The Government of Malawi has initiated in 1994 a Poverty Alleviation Programme and one of the core areas is to raise the health status of the population by *improving health related services. Traditional medicines play a major role in the health care of the people of Malawi since modern medicines do not reach 85% of the rural population and where available they cannot afford these.*

Although the country is blessed with rich natural resources, vast forest areas especially in the north of Malawi, and a healthy environment, there is at present no industry processing medicinal and aromatic plants. The traditional doctors depend for their requirements of medicinal plants through collections from wild sources. There are no efforts made to conserve the national wealth and the forest areas get depleted of the useful medicinal plant wealth. No efforts have been made to organize the systematic cultivation of medicinal and aromatic plants for tapping the export potential though some quantities have been exported regularly till 1990 or so which were collected from wild sources.

Having visited 22 institutions and holding discussions with concerned persons (Annex 6), I have assessed the current situation in the country. On the basis of my assessment, I can conclude that there is a great potential in developing plant based industries in Malawi to cater to the requirement of over 30-40,000 Traditional Doctors practicing in the country. Besides, the export potential of these can be successfully tapped.

It is essential that systematic cultivation of selected medicinal and aromatic plant is undertaken to feed this industry on a continuous basis and preserve the environment from depletion or extinction of these useful plants. A pilot plant suitable for processing both medicinal and aromatic plants will be required along with a laboratory to undertake formulation development work with necessary equipments. The analytical procedures and standards can be undertaken at the Chemistry Department of Chancellor College and Laboratories of Malawi Bureau of Standards. Adequate training will have to be given to personnel in various disciplines like standardization, formulation development and analytical development. All these activities have to be coordinated by the Malawi Industrial Research and Technology Development Centre.

## 1. INTRODUCTION

Malawi is a land-locked country bordered by Mozambique in the east, south and south-west, Zambia in the west and Tanzania in the north. The dominant feature of the country is Lake Malawi which covers one-fifth of Malawi's entire surface area. Malawi lies between 9 degrees and 17 degrees south of the equator. It is a long, narrow country which forms part of the Great Rift Valley. Malawi is divided into three regions. The Southern Region which is undulating and densely populated, the well populated Central Region consisting of fertile plains; and the mountainous and sparsely populated Northern Region (Annex 4).

Approximately 85% of Malawi population (estimated over 10 million) lives in the rural areas and is engaged in subsistence farming. Agriculture is the main economic activity with crops such as tobacco, tea, coffee and sugar cane, earning the major part of Malawi's foreign exchange.

Malawi is considered one of the poorest countries of the world with an estimated per capita income of US\$230 in 1994, and around 60 per cent of the population living below the poverty line. As a part of poverty Alleviation Programme launched by the Government of Malawi in 1994. (Document - October 1995) the Health Sector features prominently with an overall objective to raise the health status of Malawians by improving the health related services through primary health care. One of the strategies listed is to recognize the role of traditional healers, which is very popular in the country. Priority programmes listed there are Malaria, HIV/AIDS, TB, STD, Acute Respiratory Infections, Diarrhoeal diseases, Family Planning and Safe Motherhood, and Nutrition. Appropriate steps have been initiated so that the overall objectives of the Poverty Alleviation Programme are met, viz:

- (i) to raise the productivity of the poor,
- (ii) to promote sustainable poverty reduction,
- (iii) to enhance participation of the poor in the socio-economic development process,
- (iv) to increase income and employment opportunities for the poor.

Malawi Industrial Research and Technology Development Centre (MIRTDC) was established by the Government of Malawi in November 1991 as a Trust but became operational in January 1993 with clear objectives of improving Industrial Development in the country. It involves proper identification and implementation of:

- (i) areas of research, development and dissemination of industrial technology,
- (ii) importation and domestic development of industrial technologies appropriate to Malawi environment,
- (iii) introduction and conduct of domestic research and development for the benefit of local manufacturers.

### **Role of Traditional Medicines in Malawi**

Traditional medicines play a major role in the health care of the people of Malawi. Therefore MIRTDC has identified this as a priority area for systematic study and development to enable the local population to benefit from correct usage of traditional medicines with proven safety and efficacy data.

With this background, MIRTDC approached UNIDO for assistance in organizing a fact finding and preparatory assistance mission to assess the potential and prepare a plan of action for the industrial utilization of medicinal and aromatic plants of Malawi.

It is well known that medicinal and aromatic plants contribute a great deal to the health care of people through the use of traditional medicines especially in the developing countries where 80 per cent of the population has no access to modern medicines or even can afford them. Most of the plant - based medicines originated in the developing countries of Africa, Asia and Latin America. The tremendous wealth of medicinal plant resources in the developing countries is still not fully utilized, though some of these have become extinct because of their indiscriminate use and no efforts have been made to organize cultivation of these plants. Many traditional medicines are still prepared and administered by conventional methods, with no proper documentation of their use, and in many cases, no efforts made to standardize these preparations. Now that need has been felt, many developing countries are trying to establish and strengthen their capabilities for industrial utilization of medicinal plants. Therefore promotion of industries based on medicinal and aromatic plants in developing countries is essential not only for the health care but also for development of economic and human resources. By adopting modern processing technologies, the quality of extracts of these medicinal plants improve and their efficacy levels too get upgraded. The standardized extracts, in modern dosage forms ensures consistent quality and stability. Many of these products with backup scientific data on their safety and efficacy can earn valuable foreign exchange for the developing countries. By promoting the industrial utilization of medicinal and aromatic plants, the human resource development also gets a boost since many people - from farmer to highly skilled professional scientist - are required to work in such phytopharmaceutical companies, and selected institutions.

Malawi flora is figured at present at 6000 plant species and the traditional medical practitioner thus uses a wide range/variety of herbal medicines. In Malawi too, the traditional practitioners/herbalists keep the knowledge of medicinal plants and their specific usage a closely guarded secret in their family and are handed down from the elders to their children. Since there is no documentation, the knowledge about their availability is carried in the head of herbalist including their identification methods. Thus, many such useful information remains untapped. While there may be many practitioners who have mastered smaller lists of remedies, only a few attain eminence. Each will have his/her own particular plants whose value he/she has found by experience and such information becomes a guarded secret. The traditional doctor/herbalist dispenses these medicines mostly in form of infusions to be prepared fresh. The reputation of herbalist depends on the patients appreciation of his/her medicine so he/she is credited with having "good medicine" rather than being a "good doctor".

The National Health Services of Malawi are covered by two main hospitals in Blantyre and Lilongwe. In addition there are three large district hospitals, dispensaries, private hospitals and primary health care centres throughout the country. At village level, there are village health committees which work hand in hand with social workers and primary health care workers. Malawi is also combating the most serious and debilitating tropical diseases viz, onchocerciasis (river blindness), trypanosomiasis (sleeping sickness), malaria, schistosomiasis (bilharzia), cholera, dracontiasis (guinea worm infection), measles, meningococcal meningitis and malnutrition through health education in standards of personal hygiene, immunization, good sanitation, good water supplies, oral rehydration therapy and family planning programmes.

These efforts are being supplemented or complemented by the services of traditional healers (TH's). According to WHO, African Regional office, an expert group adopted a definition of a traditional healer as "A person who is recognized by the community in which he/she lives as a competent person to provide health care by using vegetable, animal and mineral substances and certain other methods based on social, cultural and religious background as well as the knowledge, attitudes and beliefs that are prevalent in the community regarding physical, mental and social well-being and their causation of diseases and disability".

In the rural areas, where 85% of the population lives, these TH's have played a role in the treatment of several diseases such as cancer, diabetes, impotence in males, infertility in females, venereal diseases, bilharzia, asthma, epilepsy, gastro-intestinal disorders, mental illnesses etc. Traditional Birth Attendants specialize on diseases of children and act as social workers. It has been established that many people

seek the assistance of TH's particularly in areas where well equipped modern health care delivery services are negligible.

It has also been observed that certain diseases seem to fail to respond to modern drugs in well equipped hospitals of Malawi and thus often patients have been advised to go and seek the assistance of TH's. Some of these referred cases have usually been cured, though such cures are dismissed by trained medical doctors as psychological or placebo cures. However, some medical doctors are realizing now the curative effects of some medicinal plants and are collaborating with TH's on specific disorders. Some TH's are invited to visit patients in hospitals and give treatment.

It is estimated that there are about 35 - 40,000 traditional healers in Malawi. There are two organized associations, viz:

- (i) Herbalist Association of Malawi (about 3,000 members)
- (ii) International Traditional Medicine Council of Malawi (about 2,000 members).

The rest 30 - 35,000 TH's are not in any of these Associations but practice independently.

### **Medicinal and Aromatic Plants of Malawi**

There is a wide diversity of plants in Malawi with multifarious medicinal, aromatic and other useful properties. Although many of these plant species have been identified and recorded at the National Herbarium at Zomba, not enough work has been accomplished in disseminating information about their uses, or even their availability as raw material for the production of traditional medicines.

However, pioneering work has been done by Dr. J.D. Msonthi and other scientists at the Chancellor College Chemistry Department at the University of Malawi, mostly in 1980's before he shifted to Swaziland. He has published a number of research findings on medicinal plants of Malawi in scientific journals. Earlier records of medicinal plants of Malawi have been recorded in the book entitled "*Useful Plants of Malawi*" by Jessie Williamson published by the University of Malawi in 1975. Today this book is an important reference book for any scientist working on medicinal plants. In this book a total number of 122 medicinal plants have been listed along with their local names and uses. There is no reference to any essential oil bearing plant.

An interesting work involving Chewa Medical Botany has been prepared by Brian Morris which lists a large number of medicinal plants of Malawi used by traditional doctors and this useful data have been collected through his ethanobotanical surveys over several years of his extensive tours of Malawi. This work is in manuscript form at present available at the National Herbarium at Zomba (received by them in 1995). This publication also lists various conditions treated by herbalists and plants prescribed for these ailments (small or major) as per disease/disorder. This source of information would be useful in organizing systematic scientific work by future researchers on medicinal plants. The data also include information collected through interviews in Chichewa with herbalists and spirit healers during field excursions in Brachystegia woodlands. The plant species have been identified and deposited at the National Herbarium at Zomba.

## **2. INSTITUTIONS VISITED**

### **Malawi Industrial Research and Technology Development Centre, Blantyre**

Soon after my arrival in Blantyre on 18 July 1996, I had a meeting with Mr. C.W. Guta, Director-General and Mr. K. Kafatia, Principal Research Officer and discussed about the plan of the activities to be undertaken in order to accomplish the various objectives listed in the job description (Annex 1). They also appraised me of the objectives and programmes being undertaken by MIRTDC.

The establishment of MIRTDC is traceable to the early 1980's when scientists, engineers and business community endorsed the need to have an institution dedicated to industrial research and technology development work in Malawi. The consultative committee in 1986-87 identified four core areas towards which industrial research and technology development was to have been focussed namely:

- (i) Industrial raw materials; identification and development,
- (ii) Technology development and adaptation,
- (iii) Product development, and
- (iv) Product quality improvement

The Government of Malawi constituted the MIRTDC in 1991 and the Centre became operational in 1993. During the last three years of its operations, the Centre has successfully organized and coordinated various programmes in the fields of Mechanical Engineering and Chemical Engineering; Appropriate Technology Development and Transfer. Some of these achievements are:

- (i) Salt technology development
- (ii) Designing, fabrication and installation of Heat Exchanger
- (iii) Appropriate technology of Leather hand-tools, Carpentry hand-tools, Multi-fuel bakery oven, etc.
- (iv) Fruit processing cooperatives

Having realized the need for co-ordination efforts required in the field of traditional medicines, so commonly used by the Malawi population, a task force was constituted and steps were taken to organize collection of data on the traditional medicines involving traditional doctors, herbalists, scientists from Chancellor College, University of Malawi, National Herbarium and Botanic Gardens, Zomba and various officials of Ministry of Health. Based on the interaction of these persons, it was decided to initiate steps towards the preparation of a Pharmacopoeia of traditional medicines and a model list of most commonly used medicinal plants in traditional medicines was prepared (Annex 2). This list is composed of 102 plants in their local names along with their usage including the part of plant used as medicine.

In order to meet the concerned officials/institutions, a list of activities was prepared so that appointments with them could be fixed up for proper understanding/evaluation of the subject, (Annex 3).

#### University of Malawi, Zomba

Chancellor College is the major institution of Malawi imparting higher education in various disciplines of Science, Social Science and Fine Arts. The Faculty of Science comprises of Department of Chemistry, Department of Biology, Department of Mathematics and Statistics, and Department of Home Economics.

A meeting was organized wherein Professor E. Fabiano, Principal, Dr. H.N. Kabwazi, Head of Biology Department, Dr. S.S. Chiotha, Research Co-ordinator, Mr. K. Kafatia of MIRTDC and myself participated. From the discussions, I learnt that at present no systematic work is being pursued on any of the local medicinal or aromatic plants. During 1970's and 1980's, a lot of research work was done by Professor J.D. Msonthi on various medicinal plants being used by traditional doctors and herbalists. After he shifted from Malawi to Swaziland no research work on medicinal plants has been pursued at the Chemistry Department. A number of publications based on the work conducted by Professor Msonthi have been published in several reputed journals. Some of these plants are *Sida acuta* and *Boscia solifolia* (oxytotic action) *Xeromphis obovata*, *Elephantorrhiza goetzi*, *Flacourtia indica* and *Neorautania mitis* (Bilharzia). A glucoside nyasoside isolated from *Hypoxis nyasica* has been patented for the treatment of uterine cancer. Many other medicinal plants have been screened and their chemical structures elucidated and their pharmacological properties evaluated viz: *Psorospermum febrifugum*, *Vernonia glabra*,



*Acanthospermum hispidum*, *Diospyros usamberensis*, *Clerodendrum uncinatum*, *Talinium tenuissimum*, *Cassonia spicata*, *Strychnos spinosa*, *Tephrosia vogelli*, *Dolichos maginata*.

During that period, the Herbalist's Association of Malawi was collaborating with research workers at Chancellor College and the National Herbarium in order to standardize some of the plants commonly used by these herbalists. They used to bring plants for correct identification and would discuss results of these on patients and also request help for systematic cultivation. But not much of these issues were pursued, although a small medicinal plants garden has been established by the Herbalists Association at the Biology Departmental Garden.

A systematic study was conducted by Professor Fabiano while he was Head of the Chemistry Department along with Dr. Connelly and Mr. Patel, on three commonly used plants for anti-malarial activity. Extracts of *Cassia abbreviata* and *Senna pertesiana* showed high activity against multi-drug resistant strain of *Plasmodium falciparum* as against *Azanza garckeana*. These results confirmed the presence of biologically active compounds in these plants being used by traditional doctors for the control of Malaria. Professor Fabiano also informed that a plant known as Chamba (anti-malarial plant) was exported to Europe in substantial quantities. Another plant growing wild in Malawi namely *Strophanthus kombe* was also exported to various countries. He emphasized the need for systematic studies on many other plants of Malawi being extensively used by traditional doctors and appreciated the efforts of MIRTDC to coordinate such studies with other organizations like the National Herbarium for correct botanical identity, Chemistry Department for systematic isolation and analysis of compounds and the Department of Pharmacology, College of Medicine for toxicological and pharmacological studies.

I visited the Library of Chancellor College to see the literature available on medicinal and aromatic plants of Malawi. Except for the book on Useful Plants of Malawi and reprints of publications of Professor Msonthi and his co-workers, there was no other literature in this library.

#### Department of Chemistry, Zomba

I had a detailed discussion with Dr. W.R.L. Masamba, Senior Lecturer, who is deeply interested in working on aromatic plants of Malawi. He is in the process of submitting a project proposal to IDRC on some essential oil bearing plants of Malawi. Though there was some work done in the past on some species of Eucalyptus, the oil obtained was not of good quality to compete in the international market. A publication on essential oil (Ninde Oil) distilled from *Aeolanthus gamwelliae* (Labiatae) flowers by Dr. G.R. Ames revealed that 500-1000 lbs. of flowers per acre were obtained which yielded 1-1.5% of oil rich in geraniol content (80%). This oil could be used similar to palmarosa oil. This plant originally from Central Africa was successfully cultivated in Malawi in the early 1970's. But there is no reference of this oil being used elsewhere. An M.Sc. Thesis work of Ms. Mary Merrick under the guidance of Professor Msonthi in 1990 revealed that the student had tried to prepare perfume blends from essential oils of the following plants growing in Malawi.

- (a) *Eucalyptus maidenii*
- (b) *Heteromorpha trifoliata*
- (c) *Hypericum revolutum*
- (d) *Citrus reticulata* and
- (e) *Curuma longa*

No other research work is reported on any essential oil bearing plant of Malawi.

Dr. A. Ndibwami of the same department is very much interested in working on the Malawi's medicinal plants and is currently identifying appropriate plants which are available in substantial quantity and also are commonly used by traditional doctors and herbalists. He has in the past worked on some

plants in Rwanda and wants to continue research on such medicinal plants growing wild in Malawi. He has not yet finalized the list of plants which he hopes to do by end of September 1996.

I visited the Instrumentation Section of Chemistry Department which is well equipped with scientific instruments like HPLC, GC, UV, IR, Atomic Absorption Spectrophotometer etc; all of these being of Perkin-Elmer make and are in good working condition. The GC does not have an integrator and the Department is looking for some assistance in procuring the same which will help the research workers considerably in undertaking analysis of various samples of essential oils speedily and correctly.

Some medicinal plants used by traditional doctors were planted in the Biology Departmental garden in 1980's but due to poor maintenance, the plants did not survive and at present there is hardly any plant left. Efforts are being made to revive this activity since cultivation practices of common medicinal plants need to be standardized before commercial cultivation can be practiced. In this area, the Biology Departmental garden can play an important role, since there is no other organization which can take up systematic studies on cultivation aspects of medicinal plants.

### **College of Medicine, Blantyre**

The College of Medicine was started in 1990 and after 3-4 years for pre-clinical studies students were sent abroad for training. Since last two years all the students get training at Malawi. The College of Medicine is attached to the Queen Elizabeth Central Hospital at Blantyre and some of the departments function in the hospital premises itself. Construction of various buildings and laboratories are in progress.

In order to study the prospects of undertaking systematic toxicity studies and pharmacological activities of some reputed plants/medicines used by traditional doctors, I had a detailed discussion with Professor A.K. Khare, Head of the Medicine Department who is also in charge of the Pharmacology Department. The Animal House is under construction and is sufficient to house about 1000 laboratory animals mostly mice, rats, rabbits and guinea-pigs. The Animal house is expected to be operational by March 1997. There is a provision for breeding laboratory animals in-house and maintaining the breed of the laboratory animals for consistent results. The laboratories for pharmacological evaluations are also expected to be ready by middle of 1997. All necessary equipments and instruments required for systematic pharmacological testing have been identified and these are expected to be ordered shortly so that these are received by the time the laboratories are ready.

Professor Khare informed that many times patients are received in hospitals with adverse reactions/complications after use of traditional medicines mainly because there is no proper dosage regimen given by the doctors. The patients sometimes exceeds dosage which results in some complications. Therefore it is very much desirable that some control on the quality and quantity of these traditional medicines is regulated. Since there is a lot of faith in patients on the use of traditional medicines, many indoor patients also secretly take these medicines along with modern drugs given at the hospital.

The Pharmacology Department can be a useful coordinating laboratory for toxicity studies and other pharmacological evaluation of traditional medicines in the country.

### **Malawi Bureau of Standards, Blantyre**

The Malawi Bureau of Standards was established in 1972 by an Act of Parliament and became operational in 1973. This Bureau is responsible for the preparation and promulgation of national standards with the view of helping local industry to compete effectively on the international markets. The Bureau carries out extensive work in standards of formulations, product testing, quality assurance and expert guidance. Most of the standards prepared are for edible oils, cereals, spices, dairy products, beverages and processed foods. In the field of chemicals and textiles, standards have been prepared for paints, soaps

and detergents, pharmaceuticals and cosmetics, pesticides, fertilizers, and some petroleum products and engineering materials. The Bureau offers testing services to private companies in addition to Government and statutory bodies.

I had a detailed discussion with Mr. P.I.S. Chiligo, Senior Scientific Officer who appraised me of the system they adopt for testing various samples drawn from the market. He also took me round the various laboratories and other documentation they maintain for various products. The Bureau has a staff strength of 120 persons which includes about 50 technical personnel. They have a fairly well maintained instrumentation section comprising of Camags Densitometer and UV Cabinet, Bechman Spectrophotometer, Carbo-erber GC, Perkin-Elmer, Atomic Absorption Spectrophotometer. They undertake analysis of pesticide residues in sunflower seeds and tobacco leaves regularly.

Microbiology laboratory undertakes regular analysis of water samples and food products and Macadamia, Chillies which are exported. It has fairly well trained analysts for undertaking routine analysis of pharmaceutical products.

#### **National Herbarium and Botanic Gardens, Zomba**

This is a premier national institute responsible for maintaining herbarium specimen of all plants, medicinal, aromatic, economic, forest wealth etc. in the country. I had a discussion with Mr. M.L. Mwanyambo, Scientific Officer. They are maintaining 80,000 herbarium specimen and are regularly checking them and fumigating for better preservation. They are regularly consulted by various traditional doctors and herbalists for proper identification of some herbs and medicinal plants being used by them. There have been several instances when villagers approached them for guidance on cultivation practices of some medicinal plants like *Jateorhiza bukobensis* (commonly known as Njoka) for which there was a great export demand. Other plants for which they were approached are *Strophanthus kombe* (Heart problems) and *Terminalia sericea* (anti-malarial).

Currently they are collecting data from traditional doctors and herbalists on the use of medicinal plants under a project entitled "Malawi Medicinal Plants and Biodiversity" sponsored by IDRC - Canada. Their target is 100 doctors to be surveyed and a questionnaire has been prepared wherein the doctors are asked questions on use of medicinal plants for various ailments. So far they have covered 75 and hope to complete the rest by end of September 1996. This will enable them to know which of the medicinal plants are used commonly so that efforts are made to organize cultivation of these thus preventing extinction of these species.

They are maintaining a small library and a manuscript of the book entitled "*Medicinal Plants of Malawi*" by Brian Morris has been given to them for their records last year.

#### **Herbalist's Association of Malawi, Mangochi**

I met the Chairman of this Association Dr. A.A. Siliya at Blantyre and its Treasurer, Dr. Banda at their Headquarters at Mangochi (about 250 kms from Blantyre). This Association has over 3000 members in various districts of Malawi who have been practicing traditional medicine not only in Malawi but in neighbouring countries like Zimbabwe, Mozambique, Tanzania and South Africa. They carry with them sufficient quantities of commonly used medicinal plants from Malawi to be given to patients in these countries.

The herbalists collect the medicinal plants themselves from the adjoining hills and forest regions and usually undertake tours 2-3 times every month in different areas. Some of the common diseases/disorders for which they are consulted are as follows:

- (i) Diarrhoea and stomach problems
- (ii) Malaria
- (iii) STD/AIDS
- (iv) Swellings and stiffness of legs
- (v) Sexual problems like impotence, sterility etc-

The patients are given medicines and regular follow up is maintained to enhance the credibility. The doctors also do not insist on payment for medicines and consultation charges in advance but leave it to the patients' discretion. By this they win the confidence of the patients who generally pay them on subsequent visits. In some cases where they are unable to treat like pneumonia, advanced cancer or diseases which need surgical treatment, the patients are referred to the hospital.

On my insistence herbalists named some of the commonly used medicinal plants of Malawi for which they undertake several extensive tours for collection. Many of these are seasonal and they collect sufficient quantities to meet their requirements for the entire year. These plants are as follows (in local language):

- (i) Muwawani
- (ii) Thombosi Chipata
- (iii) Chiseru
- (iv) Kanthande
- (v) Naphini
- (vi) Jowka
- (vii) Rekotza
- (viii) Chipambere
- (ix) Mlombwa
- (x) Mtsitsi

The Association is keen that organized cultivation is initiated so that the availability of the medicinal plants is ensured. They are also concerned about the depletion of many such plants from forest areas and other places from where they used to collect. Therefore, conservation of these plants has become necessary and the herbalists are deeply concerned. They had tried in the past to collaborate with the scientists of Chancellor College and National Herbarium for systematic scientific studies and steps to organize cultivation. For this a project funded by USAID was in operation during 1985 but subsequently the project could not be pursued, probably due to differences in working approach.

The Association also seems to be interested in proper formulation of the medicinal plants into modern dosage form. Many of these medicines are derived from single plants and few of these have combinations of 2-5 plants. They like the idea of having the products made available to them in modern dosage forms as they have come across many such medicines from other African countries.

#### **International Traditional Medicine Council of Malawi, Blantyre**

This Council has over 2000 members and is the oldest Association having started in 1963 as the African Traditional Medicine Association of Malawi with about 1600 members. In 1974, the name was changed to African International Medicine Healer's Association of Malawi with about 1220 members. Since July 1995, the Association is known as International Traditional Medicine Council of Malawi with over 2000 members. The membership keeps on varying since there are some dropouts due to non-payment of annual membership fees and new members are regularly admitted through interviews and interactions. The Chairman of this Council Tr. Dr. Chipangula is a well known traditional doctor and has been the Chairman of the Council since last 20-25 years. This Council is trying to organize systematic work and has appointed an Executive Director, Mr. Yesetsani Kambewankako who has a lot of experience in working as a

consultant to Chancellor College as well as the National Herbarium. They have associated themselves with MIRTDC on the preparation of the pharmacopoeia of traditional medicines of Malawi. Apart from this, one of its main objectives is to have close links with traditional doctors and help them in carrying out their practice more effectively through assistance in obtaining right quality of medicinal plants which are becoming scarce because of unlimited collection from various regions. The other objectives of the Council are:

- (i) Regulating registration of traditional doctors. A Certificate Course or Diploma in traditional medicine is granted based on interview of the person on knowledge he has on traditional medicines.
- (ii) Organizing training for the promotion of traditional medicines.
- (iii) Regulating trade practices in traditional medicines with neighbouring countries.
- (iv) Promoting preservation of medicinal plants through establishment of medicinal plant gardens wherein trials of organized cultivations would be undertaken. They are planning to undertake other research projects in agronomic practices of medicinal plants.

The Council has Three Regional Network Centres one each in Northern, Central and Southern Malawi. A total number of 24 districts have been identified wherein at each district a medicinal plant garden would be established. This would then be extended to 125 traditional authorities and by then they hope the whole traditional system would be better organized.

The first Medicinal Plant Garden would be operational in Mwanza district, about 90 kms from Blantyre. An area of 25 acres has been acquired for the purpose and the programme is expected to be inaugurated by His Excellency the President of Malawi in September 1996. I visited the site along with the Chairman, Executive Director, and Mr. Kafatia. The area is quite rich in medicinal plants and all important plants growing in the area would not only be preserved but cultivation practices would be standardized and technology transferred to villagers in adjoining areas for commercial cultivation.

As per Tr. Dr. Chipangula, the most common diseases/disorders in Malawi are:

- (i) Cancer of uterus, Bone marrow
- (ii) Diabetes
- (iii) High blood pressure
- (iv) Gonorrhoea and other STD
- (v) Madness (Psychic disorders)
- (vi) Stomach problems
- (vii) Sex problems like impotence/sterility

Some of the commonly used medicinal plants for such diseases are:

- (i) Mpangala
- (ii) Pansy
- (iii) Nsolo
- (iv) Chitedze
- (v) Chiteta
- (vi) Muwale
- (vii) Kankhande
- (viii) Chilungumwamba
- (ix) Chizuzu

- (x) Mpoza
- (xi) Muwawani
- (xii) Nkwle
- (xiii) Mpfungo
- (xiv) Kankhande
- (xv) Bwemba
- (xvi) Kamphate

The Council is keen that the above mentioned plant species are preserved and efforts made to organize cultivation on a regular basis to be supplied to traditional doctors for dispensing to patients. They are also keen to have these plants processed into standardized extracts and modern type of dosage forms like tablets/capsules, prepared especially for single ingredient preparations.

#### **Forestry Research Institute, Zomba**

I had a detailed discussion with Mr. L.A. Sitaubi, Director and Mr. Enos F.F. Nkhono and Ms. Claire Coote on the forest produce of Malawi.

There is no organized work carried out on the minor forest produce like medicinal and aromatic plants, oleogum resins etc. They have only been concentrating on timber yielding trees. There is no control on collection of medicinal and aromatic plants, from any of the forest regions of the country though the authorities are aware that collection of the produce is done regularly by various villagers for selling in the market. A large quantity of pine resin is available from the forest regions and some efforts to organize their systematic collection and utilization has been tried in the past in association with a company, VIPCOR. A study was done for a local company, Royale Chemical Enterprises for resin of the species *Pinus* viz *Pinus elliottii* and *Pinus cassia*. A yield of 1.9 kg to 2.1 kg/tree of gum resin was obtained on a study involving 1,000 trees. The better quality resin was obtained from *Pinus elliottii*. Some caraya gum was also processed for a private company earlier.

#### **Malawi Pharmacies Limited, Limbe**

This is one of the major pharmaceutical companies of Malawi belonging to the Press Corporation of Malawi. It manufactures a few medicines but the major activities are retail and wholesale trade of importing medicines into the country and their distribution. I visited the factory and held discussions with Mr. S.E. Chalira - Factory Manager and Mr. D.D.C. Chiremba - Chemical Analyst in charge of Quality Control.

The manufacturing facilities are small with two tableting machines (16 stn). They manufacture Aspirin, Paracetamol, Aspirin + Caffeine and Antacid preparations. In liquid oral Department they manufacture a Kaolin mixture, Antacid, Paracetamol syrup and a cough mixture. They also manufacture consumer items like lotions, hair conditioners, hair oil, antiseptic solutions etc. The capacities are not fully utilized mainly because of non-availability of raw materials. They employ 60 workers and if need be they employ casual workers. There is no policy at present to undertake manufacturing of traditional medicines based on medicinal plant extracts.

#### **Pharma Chemie Limited, Blantyre**

This company is trading in finished formulations representing several reputed pharmaceutical companies of Europe and India. I met its Managing Director, Mr. Kini and the Manager, Mr. Rodney Phiri and enquired whether they have any interest in manufacturing traditional medicines. They seem to be interested but are not sure of the market potential especially when traditional doctors are dispensing the crude herbal materials themselves. They may set up a manufacturing unit if some incentives are provided by the Government of Malawi.

**Pharmanova Limited, Blantyre**

The manufacturing facilities of the this company are fairly well organized with strict procedures followed both for manufacturing and quality assurance as per good manufacturing practices. It is utilizing its capacities almost 50 - 60% with a range of formulations especially tablets. In capsules - it has only 3 products. It manufactures an oral rehydration product and a body lotion. It has a workers strength of 140 and utilize only one shift. The Managing Director, Mr. M.T. Keoron and Plant Manager, Mr. Msukwa took me round the factory. The Quality Assurance Manager, Mr. Changa showed me the various quality control documents they regularly maintain for their products.

The Managing Director showed a keen interest in diversifying into manufacture of traditional medicines since he believes that there is potential in them. However, they will enter into this field only when they are able to get standardized herbal extracts with proven safety and efficacy levels. They will discuss about this in their next Board meeting.

**B & C Engineers, Blantyre**

This is the largest Engineering Company engaged in fabrication of equipments for various industries. It essentially makes centrifugal fans, storage tanks, conveyors and tea processing plants both in mild steel and stainless steel. It does not have the capacity to fabricate larger plants. Any plant involving high pressure fabrication is not possible. I had a meeting with the Project Engineer, Mr. Kaumba and Engineering Manager, Mr. Mapemba.

**Enterprise Containers Limited, Blantyre**

This is the largest plastic container manufacturing company in Malawi catering to major industries with their requirement of plastic containers both blow moulded and injection moulded. They have a large number of machines and process 80 - 100 tons of basic plastic materials per month. They should be able to supply plastic containers required for packing of traditional medicines in sufficient quantities. I was taken round the factory by the General Manager, Mr. Hendry J. Mafubza.

**Scientific and Technical Services Limited, Blantyre**

It is one of the leading suppliers of chemicals and glassware in the country mainly representing BDH and Pyrex. They maintain an inventory of commonly used laboratory chemicals and glassware. Any special reagent/chemical can be procured within a months time. I had a meeting with the Marketing Manager, Mr. John E. Kahumbe.

**Technilab (CA) Limited, Blantyre**

It is another leading supplier of chemicals and glassware and maintains an inventory of commonly used glassware and chemicals. It stocks the laboratory chemicals of Merck and Saarchem. I had a meeting with the Managing Director, Ms. N. Kindy.

**Royale Chemical Enterprises Limited, Limbe**

This company is manufacturing soaps, detergents, scouring powders on a small scale. It has been using Rosin and Turpentine oil from Malawi, processed from pine trees by VIPCOR. Discussion with the Managing Director Mr. I.A.G. Panjwani revealed that some work was done on the essential oil bearing plants of Malawi in 1980's especially at the Agriculture Research Station at Bvumbwe about 15 kms from Blantyre and tea estates of Thyolo - Mulanje. But the studies were not taken into commercial cultivation.

The plants for which cultivation trials were done are **Eucalyptus citrodora** and other species, lemongrass, geranium, etc. Successful trials of cultivation were also done for cinnamon, cardamon and cloves. A lot of honey is available in the country which could be processed and exported.

#### **VIPCOR Limited, Blantyre**

I had a meeting with Mr. Somanje and Mr. Cedric Makunganya, Project Managers regarding their project at VIPHYA Forest Region on processing of pine gum resin. This organization was set up by the Government of Malawi in 1979 to utilize VIPHYA forest resources in the northern region of Malawi. Out of the total area of 114,000 hectares in VIPHYA forest region, about 53000 hectares are under pine cultivation. The recent survey revealed presence of over one million trees of **Pinus elliottii** and **Pinus cassia**. Over the last five years they have already tapped gum resin ready to be processed in their pilot plant. They had tied up on technical collaboration with Pine-Chem, South Africa, a leading processing company of pine gum resin. The project cost is estimated at about 1 million US\$ for plant and machinery to process 1000 tons of gum resin per annum. There is a lot of demand for both rosin and turpentine locally and also from Zimbabwe, Zambia, South Africa etc. The project is in the final implementation stage. Recently they have faced problems in the technical collaboration with Pine-chem, South Africa and are now looking for technical collaboration of some other company engaged in processing of gum resin.

Their other projects are on paper production in the same region where they have collaboration with a leading Indian paper production company; charcoal from inferior-wood and organic fertilizer from wood waste.

#### **Malawi Export Promotion Council, Blantyre**

In order to ascertain whether any medicinal or aromatic plant was exported from the country, I visited the Council and held discussions with the General Manager, Mr. Julius B.L. Melange and the Deputy General Manager, Mr. George K. Mangochi. While they agreed that certain medicinal plants are taken out of the country, the council had no data since it is not exported officially. About 7 - 8 years back, an organized export of few medicinal plants was done regularly by Universal Agencies for a few years but nothing has been exported since 5 years or so. These plants included **Strophanthus kombe**, **Colombo roots** and **Cinchona bark**. To their knowledge all those were collected from wild sources. The exports used to be worth over a million Kwacha every year. They still get some enquiries especially about some medicinal plants, but no efforts have been made to pursue this area for promotion of exports.

#### **University of Malawi Polytechnic, Blantyre**

On the advice of the Research Coordinator of the University, I visited the Polytechnic and met Mr. Johastone I.M. Kalea - Microbiologist and Mr. Geolfbet E. Matoga - Research Coordinator of Polytechnic who are keenly interested in pursuing research work on some medicinal plants especially having anti-microbial activity. Neem being abundantly available in the country was the main plant for research work. Other than this, there is no activity related to the field of medicinal and aromatic plants at the Polytechnic.

#### **Local Markets**

I visited the local markets of Blantyre and Limbe where the crude drugs are sold in retail by herbalists. There seems to be a good demand from local population for these medicines which are sold as powders or small pieces and patients are advised to boil those before use. At the Blantyre market about 10 such shops were selling crude drugs each worth 10 - 20 US\$ per day. At Limbe market more than 20 -24 retail shops sell such medicines. The main ailments for which those drugs are sold are: stomach ache, yellow fever, headache, sex tonic, sexually transmitted diseases, etc.



A survey of the pharmacy shops selling modern medicines revealed that there were no traditional medicines, even from other countries available, except for some European products like Garlic Pearls, Cod liver oil capsules, herbal toothpaste, etc.

#### **Bvumbwe Agricultural Research Station**

I visited this station and held a meeting with Mr. Nsanjama, the Officer-in-Charge and Mr. Banda, Senior Field Officer in charge of tropical fruits and spices. This Research Station has 289 hectares of land and undertake systematic studies on horticultural crops, fruits and vegetable crops etc. They advise farmers on these crops for optimum yields etc. They have done considerable work in field crops like maize, wheat, tree nuts etc. for improving the yields.

There has not been any attempt to undertake any work on medicinal and aromatic plants except that in early 1980's, some work was done for development of agro-techniques for cultivations of essential oil bearing plants like ninde oil, lavender, lemongrass, geranium etc. This work was not followed subsequently once the European Research Scientist left Malawi. Successful trial cultivations have been done for spice crops like pepper, ginger, turmeric, cardamom, cinnamon and chillies. Except for chillies which are exported, no other spice crops have been taken up for commercial cultivation.

They are however, interested in trial cultivation of medicinal and aromatic plants.

### **3. CONCLUSIONS**

Based on my visits to various institutions related to the field of medicinal and aromatic plants, their use through traditional doctors and other organizations connected with this, the following conclusions are drawn keeping in view the objectives stated in the job description.

#### **Study the Current Status of Cultivation of Medicinal and Aromatic Plants and Production of Herbal Pharmaceuticals and Essential Oils.**

There are no records available anywhere to suggest that there is organized cultivation of any medicinal or aromatic plant. A large number of traditional doctors estimated to be around 40,000 use various medicinal plants collected from wild sources from forests or wastelands in crude drug form or as infusions. Similarly none of the essential oil bearing plants has been taken up for cultivation. Some quantity of eucalyptus oil and gum resin collected from pine trees from northern province on an experimental basis had been used to some extent by local manufactures of soaps and detergents/Royale Chemical Enterprises. There are no pharmaceutical products containing herbal extracts been produced in the country.

#### **Assess the Potential of Medicinal and Aromatic Plants indigenous to Malawi for Industrial Utilization.**

A large number of medicinal plants being used by traditional doctors for the treatment of various diseases are collected from wild sources and there have not been any attempts made so far to organize cultivation of some of these commonly used plants to preserve these for sustenance and environmental protection. Due to deforestation, the situation worsens. There is no reliable figure available as to the total number of medicinal plants growing in Malawi. A list of 122 medicinal plants is given in the book "Useful Plants of Malawi" published in 1975. A recent survey conducted through traditional healers estimates, that about 500 medicinal plants grow wild in Malawi. Two organized Associations of traditional doctors and herbalists have together a memberships of around 5000 whereas the rest of the 35000 traditional doctors are not attached to any of the Associations. Almost 85% of the population is treated by these traditional doctors.

No medicinal or aromatic plant is collected or cultivated on a large scale either for industrial utilization or for export. However, about 7 years back, substantial quantities of *Strophanthus kombe*, *Colombo roots* and *Cinchona bark* were regularly collected from wild sources for export.

Although none of the Aromatic plants are listed anywhere, but a large number of these grow wild. Some eucalyptus species are grown but for timber purposes. Reference is available on successful domestication of Ninde oil (*Aeolanthus gamwelliae*) which has a good export potential but no efforts have been made to cultivate it on a large scale. The other essential oil bearing plants like java citronella, lemon grass, mints, geranium grow wild but no trials for commercial cultivation have been attempted.

**Prepare a priority list of plants for industrial utilization based on raw material availability, market potential and economic viability of their industrial use.**

Since there is no industry using any medicinal or aromatic plant in Malawi, it is only for the use of traditional doctors that efforts should be made to organize systematic cultivation of some of the commonly used medicinal plants. Based on my interaction with the Chairmen of the two Associations, the following plants need to be taken up in the first phase since these are very commonly used. The names have been given in local language and need to be properly identified by the National Herbarium who have records of all the medicinal plants growing in Malawi. The list is given below:

#### **Medicinal Plants**

- (i) Muwawani
- (ii) Thombosi Chipata
- (iii) Chiseru
- (iv) Kankhande
- (v) Naphini
- (vi) Jokwa
- (vii) Rekotza
- (viii) Chipembere
- (ix) Mlombwa
- (x) Mtsitsi
- (xi) Mpangala
- (xii) Pausu
- (xiii) Nsolo
- (xiv) Chitedze
- (xv) Chiteta
- (xvi) Muwale
- (xvii) Chizuzu
- (xviii) Mpoza
- (xix) Mpfungo
- (xx) Chilungumwamba
- (xxi) Kamphete
- (xxii) Bwemba
- (xxiii) Nkole

#### **Aromatic Plants**

- (i) *Aeolanthus gamwelliae* (Ninde Oil)
- (ii) Lemon grass
- (iii) Geranium
- (iv) Java citronella
- (v) Mints

**Assess Industrial and Institutional Infrastructure related to Medicinal and Aromatic plants in the country, and the development of pharmaceuticals based on traditional preparations and essential Oils**

There is no industrial set up which can take up production of traditional medicines based on medicinal plant extracts nor is any technical knowledge of how to produce such products. A good deal of training has to be provided to technically qualified personnel. Similarly there is no infrastructure for processing of the medicinal plants into suitable extracts for use in modern dosage forms. There are no institutions where aromatic plants could be distilled for essential oils. Therefore, a pilot plant suitable for the preparation of standardized extracts and distillation of essential oils is a prime requisite along with trials for cultivation practices for selected medicinal/aromatic plants.

However, in terms of institutional infrastructure, the National Herbarium is well equipped to identify the proper species and Chemistry Department at Chancellor College, University of Malawi for systematic isolation/characterization and preparation of standardized extracts.

A co-ordinated approach is needed to initiate proper identification and utilization of selected medicinal and aromatic plants wherein all the concerned departments have to play important role. The total co-ordination should be provided by MIRTDC.

In order to manufacture these products on a commercial scale in modern dosage forms, the Government of Malawi should provide incentives to industrial houses like Malawi Pharmacies/Pharmanova or any entrepreneurs who are willing to undertake the production of traditional medicines. Since some infrastructure is already available at Malawi Pharmacies/Pharmanova and expertise in the manufacture of such medicines can be provided conveniently. These companies are manufacturing few modern medicines though most of the drugs required by the country are imported in finished form.

The only way to introduce systematic manufacture of traditional medicine is to give subsidy/incentives to entrepreneurs for setting up appropriate plants for use of traditional doctors and for export purposes. This will have to be decided by the Government of Malawi.

**Assess the current research capabilities and status of equipments for natural product based drug development**

Since there is no production of any traditional medicine in modern dosage form, there is no institute who has the expertise or equipments to develop such products. Even for modern drug development there is no infrastructure available, wherein special training could have been given for use of standardized extracts in the formulations. There is no Pharmacy Department and even in the College of Medicine, the Animal House and Pharmacology laboratories are currently under construction. There are no plans for starting Pharmacy Department, at present. Therefore, an organized laboratory need to be set up for the development of such products.

The only laboratories well equipped for testing and instrumentation is Chancellor College Chemistry Department but there is no expertise available for development of plant based formulations.

**Assess the market potential and economic viability of industrial production of plant based products (Capital and Operating Costs)**

As explained above, there is a great potential for production of natural plant based formulations and also essential oils in Malawi but collection from wild sources cannot be bearing for industrial production. Therefore, systematic cultivation of selected medicinal and aromatic plants is an important aspect of development. Without a steady supply of standard quality herbal materials, sustainable development of a

plant based industry cannot be achieved. Collection from wild sources will not only deplete this national resources leading to environmental degradation, but the products manufactured will not be consistent in quality, because of climatic variations in different regions of Malawi.

Selected essential oil bearing plants can be taken up for cultivation and distilled oils exported since there is very limited local requirement for these oils, only in soap/detergent industry.

**Identify suitable areas for cultivation of medicinal and aromatic plants in consultation with the Traditional Medical Council**

The International Traditional Medicine Council of Malawi (ITMCM) has planned to have initially three Regional Medicinal Plant Gardens one in each region, i.e North, Central and South, so that the flora of each region is covered adequately as per their habitat. This will be followed by 24 District Gardens in the entire country. Through this they hope to conserve the medicinal plant wealth of the country. Once the cultivation trials have been completed, the farmers in the region would be involved in mass propagation of the plants as per the requirements to meet the local demand as well as the export market. For this an area of 25 acres has already been acquired by the Council in Mwanza district and this programme is scheduled to be inaugurated by His Excellency, the President of Malawi in September, 1996. Additional suitable areas are being identified in other districts for acquiring so that the programme of cultivation could be extended in these regions as well.

Since the traditional doctors do not use any aromatic oil in their traditional drugs, they have not drawn any plans for cultivation of essential oil bearing plants. However, keeping in view the export potential of essential oils, suitable areas for cultivation of specific aromatic plants will have to be identified by MIRTDC in association with National Herbarium and Chancellor College, Department of Chemistry.

**Recommend the most suitable type of pilot plant and assess the local capacity to fabricate it**

Since no specific area has been identified for cultivation of aromatic plants on a commercial scale, the site of the pilot has to be decided by MIRTDC. It may be more appropriate to have a multipurpose pilot plant which can process the distillation of essential oils as well as process medicinal plants into various extracts by water or organic solvent depending on the nature of the plant material. A flow diagram of the pilot plant is given in Annex 5.

The leading fabricator of Malawi, M/s. B & C Ltd., does not have sufficient expertise to fabricate such equipments where steam jacketed vessels, with vacuum facilities are to be incorporated. In this multipurpose pilot plant, provision has to be made for injecting steam for the distillation of aromatic oils as well as steam jackets to be used for boiling of crude drugs with appropriate solvent and their concentration in reboiler before subjected to vacuum drying or spray drying. The pilot plant has to be fabricated outside Malawi where the expertise is available and is cost effective. This will have to be identified subsequently.

**Report on the Feasibility of Setting up Plant Based Formulation Units in Rural Areas**

There is no expertise available for development of plant based formulations in the country at present and therefore to have any such unit located in rural areas is not feasible. Basic requirement of processing medicinal plant into suitable extract should be given preference and once standardized extracts are produced, the unit dosage form could be taken up by the pharmaceutical company engaged in manufacturing similar products using synthetic drugs.

**Recommend Necessary Mechanisms for Establishing a Data Base on Medicinal Plants and traditional medicines**

There is no institute in Malawi where any specific data on medicinal and aromatic plants is available. Some information is available at the National Herbarium at Zomba and a little at the Library of Chancellor College. Since a lot of data on medicinal and aromatic plants is available on C-D ROMS, may be MIRTDC could be assisted in the procurement of the same and a data base is created at the Centre which can disseminate relevant information to user institutes/organizations.

**Determine the Necessary Framework for Collaboration Efforts Amongst all the Institutions Concerned with Traditional Medicines**

Since there is no single institute involved in systematic evaluation and utilization including processing of medicinal and aromatic plants leading to the development of traditional medicines, it is necessary to involve a few institutes who have necessary expertise. In my opinion, the following institutes will have to be involved with overall coordination by MIRTDC.

**(i) National Herbarium, Zomba**

It should be responsible for proper identification of the medicinal and aromatic plant from local name and also assist in procurement of planting material for commercial cultivations through medicinal plant gardens of ITMCM or other farmers.

**(ii) Department of Chemistry, Chancellor College, Zomba**

The Scientists of the department will characterize the plant constituents of the selected medicinal and aromatic plants to be used for manufacture of traditional medicine.

**(iii) Malawi Bureau of Standards, Blantyre**

It should be made responsible for development of standards for raw herbal materials and their extracts for use by the Quality Control Department of manufacturing company. They will also lay down standards for aromatic oils distilled from selected essential oil bearing plants.

**(iv) Department of Pharmacology, College of Medicine, Blantyre**

It should be responsible for undertaking systematic toxicity and pharmacological studies of the finished formulation (drug) developed by MIRTDC at pilot plant, as per the indications given by traditional doctors.

**(v) International Traditional Medicine Council of Malawi and Herbalist's Association of Malawi**

It should assist in providing their most commonly used medicinal plant for the treatment of common diseases and should also assist in the propagation of these plants and involve farmers in mass cultivation programmes around the Herbal Gardens being promoted by the Council.

**(vi) Malawi Industrial Research and Technology Development Centre**

It should be the overall coordinator for the successful implementation of the project and ensure that all relevant information is available at the Centre. They should also ensure proper maintenance of the pilot plant to which a small development laboratory would be attached for

development of formulations. The data base on medicinal and aromatic plants should also be maintained and regularly updated at the Centre.

## **INSTITUTIONS VISITED AT LILONGWE**

### **World Health Organization, Lilongwe**

I had a meeting with Dr. M.E. Chuwa, WHO Representative in Malawi along with Mr. Kafatia of MIRTDC to ascertain the views of WHO in support of traditional medicines being used by the majority population of Malawi. Dr Chuwa informed that he is concerned about the adverse reactions some of the patients get by using a wrong medicine or overdosage since there is no standardization of these medicines. He also admitted that the local population had a lot of faith, as is prevalent in other African Countries, in the use of traditional medicines and effective measures are needed to make these medicines on scientific lines and in modern dosage forms with proven safety and efficacy levels. He also emphasized that these traditional medicines work provided they are administered in right quantity after proper identification. He appreciated the efforts of UNIDO in sending the fact finding mission and hoped that the recommendations based on this mission are taken up at the earliest so that the population of Malawi will have access to scientifically evaluated traditional medicines in future.

### **Ministry of Health, Lilongwe**

In order to assess the policy of the Ministry of Health towards streamlining the use of traditional medicines in Malawi, I had a meeting with Prof. P. Roma Khonje, Controller, Health Technical Support Services, Mr. Wyun Chalira, Chief Pharmacist, Ministry of Health, Mr. P.S.P Tembo, Registrar, Pharmacy, Medicines and Poisons Board, along with Mr. Kafatia of MIRTDC. Prof. Khonje admitted that a systematic scientific approach is needed to evaluate the traditional medicines being practiced in the country and effective measures are required to produce these medicines in a convenient dosage form. At present there is no law to govern the use of traditional medicines and the Ministry of Health is also concerned about the misuse of some of these medicines resulting in adverse reactions. They appreciated the efforts put in by UNIDO and have assured all support to the recommendations of the fact funding mission after they receive a copy of the same from UNIDO.

During my discussions with Prof. Roma Khonje, Controller, Health Technical Support Services, Ministry of Health, I was assured of all Government support in streamlining the traditional system of medicine in the country. A workshop was organized by the Ministry of Health with the support from WHO in 1994 to analyze various issues, involved in the promotion of use of traditional medicines on scientific lines. Based on the interaction of this workshop, a task force was constituted and several core areas identified viz. cultivation of selected medicinal plants for use of traditional doctors, preparation of pharmacopoeia of traditional medicines, regulation of practice of traditional medicine through the Association of Traditional Doctors etc. A project on the preparation of Pharmacopoeia has already started on selected 102 plants commonly used.

### **UNICEF - Malawi**

Mr. Kafatia and myself met Ms. Natalie D. Hahn, Representative of UNICEF in Malawi, in order to ascertain the programmes they support in the field of traditional medicines in Malawi. Ms. Hahn is very supportive of this system since she has herself seen the use of these medicines in rural areas when the population has no access to modern medicines. UNICEF is currently involved in a systematic study on the AIDS problem in Malawi and are trying to bring together the herbalists and traditional doctors in combating the secondary infections in such patients for which traditional medicines play a major role. She appreciated the work initiated by UNIDO and assured all support to this cause of health care through use of traditional medicines especially in the control of diseases in children in rural areas.

## **UNDP - Malawi**

On the advice of Mr. Bah, Junior Professional Officer, UNIDO, I briefed the Field Officers of UNDP, about 8 of them, working in different areas in Malawi, on the present situation in the use of traditional medicines and what steps should be taken for the systematic use of medicinal and aromatic plants so that the country is benefitted by poverty alleviation, increased involvement of women in rural areas and scientific evaluation of traditional medicines of Malawi. They all appreciated the views expressed and are waiting for the recommendations of UNIDO to see how the programme could be fitted into their plans of action.

While discussing my observations and recommendations with several field officers of UNDP, the areas of cultivation aspects involving rural women, agricultural practices leading to the alleviation of poverty norms were appreciated. These aspects are well within the overall UNDP programme of rural based technology development with active participation of women.

### **South African Druggist Ltd.**

A discussion was held with Ms. Anna Marie Smith, the Production Manager of South African Druggist Ltd. This company started producing penicillin group of antibiotics and some O.T.C. drugs like paracetamol. Ms. Smith stated that the company had no immediate plans for traditional medicines.

## **4. RECOMMENDATIONS**

Malawi's population of over 10 million people mostly depend on the use of traditional medicines based on locally available medicinal plants. These traditional medicines are dispensed by the traditional doctors/herbalists in the form of crude powders/infusions, and are collected from wild sources in the forest regions and wastelands. No efforts have been made to organize cultivation of the commonly used medicinal plants to preserve them and to ensure their sustenance. It is therefore essential that cultivation of these selected medicinal plants be organized and systematically supplied to the traditional doctors/herbalists for their use in patients. Efforts initiated by International Traditional Medicines Council and Herbalist's Association of Malawi should be strengthened to achieve this objective.

Similarly cultivation of some of the aromatic plants must be undertaken on a commercial scale so that the oil could be exported and the country will earn valuable foreign exchange.

There is no Institute at present in Malawi which has the technical expertise or facilities to produce traditional medicines in a standardized modern dosage form. Therefore, a multipurpose pilot plant should be installed in a suitable place to be identified by Malawi Industrial Research and Technology Development Centre wherein both processing of medicinal plants for various extracts and distillation of aromatic plants for essential oil can be organized.

A Process Development Laboratory will be required to undertake systematic development of traditional products in convenient dosage form like tablets, capsules, syrups, ointments etc. This laboratory will also serve as the centre for co-ordination with other institutions like National Herbarium, Chancellor College, Pharmacology/Toxicity Department of College of Medicine and Bureau of Standards to achieve the ultimate objective of production of traditional medicines on modern parameters. This laboratory can act as a starting point for establishment of a systematic Research and Development Centre for Traditional Medicines of Malawi after 5-6 years.

Since there is no expertise available in any of above mentioned areas, appropriate training of local persons in various fields, like cultivation aspects, extraction processes, standardization technologies, formulation development and marketing of the products is required.

In order to manufacture the traditional medicine products, certain incentives must be given to entrepreneurs by the Government to encourage them for diversifying into this field of health care products until the marketing of such medicines is streamlined.

### **ACKNOWLEDGEMENTS**

I would like to express sincere thanks and gratitude to all the persons contacted during the fact-finding mission in Malawi without whose co-operation the task would not have been accomplished.

I am grateful to Mr. C.W. Guta, Director-General and all the members of staff of the Malawi Industrial Research and Technology Development Centre for their help and cooperation.

My sincere thanks go to Mr. Kent Kafatia for his continued help and support and to his Secretary, Ms. Ireen Mtogolo for hospitality and typing the manuscript of this report.



## JOB DESCRIPTION

<b>Post Title:</b>	Chemical Technologist
<b>Duration:</b>	1.0 m/m
<b>Date Required:</b>	ASAP
<b>Duty Station:</b>	Malawi (Blantyre)
<b>Purpose of Project:</b>	Fact-finding and preparatory assistance mission to assess the potential and prepare a plan of action for the industrial utilization of medicinal and aromatic plants.
<b>Duties:</b>	<p>The expert will work in collaboration with the General Manager of the Centre and the counterparts to accomplish the following:</p> <ol style="list-style-type: none"> <li>1) Study the current status of cultivation of medicinal and aromatic plants and production of herbal pharmaceuticals and essential oils.</li> <li>2) Assess the potential of medicinal and aromatic plants indigenous to Malawi for industrial utilization.</li> <li>3) Prepare a priority list of plants for industrial utilization based on raw material availability, market potential and economic viability of their industrial use.</li> <li>4) Assess industrial and institutional infrastructure related to Medicinal and Aromatic Plants in the country, and the development of pharmaceuticals based on traditional preparations and essential oils.</li> <li>5) Assess the current research capabilities and status of equipment, for natural product based drug development.</li> <li>6) Assess the market potential and economic viability of industrial production of plant based products (capital and operating costs).</li> <li>7) Identify suitable areas for the cultivation of medicinal and aromatic plants in consultation with the Traditional Medical Council.</li> <li>8) Recommend the most suitable type of pilot plant and assess the local capacity to fabricate it.</li> <li>9) Report on the feasibility of setting up plant based formulation units in rural areas.</li> <li>10) Recommend necessary mechanisms for establishing a data base on medicinal plants and traditional medicines.</li> <li>11) Determine the necessary framework for collaboration efforts amongst all the institutions concerned with traditional medicine.</li> <li>12) Prepare a comprehensive report containing the findings, conclusions and recommendations and a plan of action and recommend therein the mechanisms and modalities of a technical assistance project including a draft project document containing the inputs in terms of equipment, training, expertise and other infrastructural requirements for the establishment of an industrial production unit and a R &amp; D laboratory for the processing medicinal and aromatic plants.</li> </ol>
<b>Qualifications:</b>	A Pharmacist/Chemical Technologist with at least 10 years experience in industrial utilization of medicinal and aromatic plants and with experience in developing countries
<b>Language:</b>	English

## LIST OF MOST COMMONLY USED MEDICINAL PLANTS

NO	PLANT NAME	USAGE
1	Mlembera	Used as a cure for dysentery. Roots infusion and taken orally 3 times a day, quarter tea cup.
2	Kamoto	Roots infusion is used as a drug to cure Chinzonono. Taken orally three times a day quarter tea cup.
3	Mbilima	Headache cure; leaves are fumigated and inhaled under blanket cover twice a day.
4	Bwazi	For Rheumatism. roots are burned and the powder used for tattooing on the locally affected area.
5	Mpangala	Leaves pounded into a powder that is taken in a porridge to cure heart related diseases.
6	Chipembere	Roots infusion taken twice a day as a cure drug for Epilepsy. Taken quarter Tea Cup.
7	Nyowe	Bark infusion used for toothache
8	Dululu	Roots infusion taken once to twice a day as a cure for Ntchofu. Taken quarter Tea Cup.
9	Palibe Kanthu	Roots infusion taken three times a day as Ntchofu cure
10	Mpoloni	Roots infusion taken frequently as a remedy of opening bowels and against vomiting. Taken quarter Tea Cup.
11	Chizuzu roots mixed with roots of Nsatsi Manga and India tree	cure for Mabomu, using the root infusion
12	Nsatsi, Manga and	
13	India tree	
14	Mpinjipinji	Cook roots together with beans and drink the sauce as a cure against Bilharzia 3 times daily.

15	Jerejere wa Mkazi	Roots infusion taken anally as enema to abortion complications
16	Muwale	Bark infusion mixed with soda and salt boiled together is used to cure ulcers (nsungu)
17	Mkhulansinga	Roots infusions taken orally three times a day is a useful drug for curing Asthma
18	Nyanga ya gwape	Roots infusion taken quarter tea cup and three times a day is a cure for phudzi or mwela disease
19	Kankhande	Roots infusion taken orally three times a day, quarter tea cup cures Mmidi of Mudzi disease
20	Senecio Variegated Flowers	Pressed leaves between fingers produce extracts used to cure shingles within three days
21	Tsitsi Mzukwa	Cure against Chibayo, Pneumonia through massage with leaves and tattooing with roots powder on the effected area.
22	Chitedze chachikulu (with large beans)	Roots infusion used to cure tuberculosis taken three times a day for five to seven days.
23	Kaliza akulu	Roots infusion taken quarter tea cup three times a day is a cure for "likangö lophana."
24	Avocado Pear	Leaves boiled and taken as tea increases level of blood.
25	Minga ya Nungu (animal spike)	inhale burnt tip into the nose cures Nose Bleeding
26	Chipwete	The fruit boiled cures Measles by rubbing onto the skin.
27	Chitimbe	Bark infusion cures Toothache when the infected tooth and the mouth is thoroughly cleaned by it.
28	Mtunda	Root infusion taken orally three times a day cures Chinzonono
29	Mpoza	Root infusion taken three times a day quarter cup of tea cures delayed deliveries for expectant mothers
30	Mwana Mphepo	Roots made into powder form mixed with small anthill enables easy pregnancy and complication free pregnancy.

31	Chigaga	Root infusion used against whooping cough taken three times a day quarter tea cup
32	Kaufiti	Stem with leaves burned and put in a loose porridge, is used to cure madness.
33	Chipembere plus Dzino la Njiri	Burned (roots) and tattooed on affected organs is said to treat poliomyelitis
34	Mdyenkhandwe	Leaves extracts used to cure eye problems
35	Nandolo	Pressed leaves (Kufukiza) put in patient's own urine and used as an ear drop, cures ear infections commonly known as Mphenga.
36	Peach Tree	Roots infusion used to prepare porridge and taken orally, cures problems of (Mchombo)the nab
37	Naphini	Infusion of the root of this tree taken three times a day cures jaundice (Yellow Fever)
38	Pansies	Powdered leaves put in porridge and root infusion for drinking as tea cures sugar disease
39	Msaka nthenda	Root infusion taken three times a day, cures a lot of diseases, general drug.
40	Mpangala	General drug, fruits pounced and oiled against ziwengo
41	Muwawani plus Nkwale	Root infusion of the two trees improves potence amongst men
42	Nkwale	As above (41)
43	Mlombwa and Mtatu	Mlombwa barks infusion plus Mtatu is used in a porridge to stop continuous periods for women
44	Mtatu	As above (43)
45	Nansongole	Roots infusion helps child during teething period
46	Nkalati plus	For healing chronic wound. Infusion of Nkalati used to clean the wound while Mwabvi powder (root) is used to dress the wound
47	Mwabvi	
48	Chiumbu	Roots infusion taken cold three times a day cures opening of bowels

49	Kankhande	Cure for Chinzono, roots infusion taken cold three times a day
50	Mdyakamba	Cure for "Mdidi" roots infusion taken 3 times a day
51	Mwabvi mixed with Chitedze chachikulu	The powdered form of Mwabvi mixed with chitedze with broad beans to wash and dress Leprosy wounds, cures within a short time
52	Plumeria	Latex from the stem and leaves used to cure any swollen skin part
53	Mpoza	Cure for swollen stomach where water has to be pumped periodically. Root infusion, take three times per day, taken quarter tea cup three times/day.
54	Matowo	Leaves prepared into powder is put in wheat flour porridge to cure dysentery, repeat course three times daily
55	Nsatsi	Roots infusion cures Chinzono.
56	Kangaluhe	Roots infusion, cures headache. Powdered root smoked.
57	Kanvabingu	Cure against yellow fever, Jaundice, root infusion taken 3 times daily quarter tea cup.
58	Chitimbe	Cure against swollen feet, Leaves used to massage and root infusion to drink
59	Mlozi	Root infusion is treatment for Mauka
60	Dululu	Roots fried together with an egg and eaten once stops ability to bear Children by women
61	Kafungo	Cures against Madness by bathing and drinking the roots infusion
62	Muwanga	Bark made into powder and added to porridge and meals, it is used as a general body strength using drug
63	Tsamba	Bark infusion taken orally cures "Kutsalira" complications after birth
64	Banana inflorescence	infusion taken three times per day cures heart and related diseases including high blood pressure

65	Msolo	Root infusion taken orally cures heart problems
66	Senecio Sp.	Rubbed leaves the fingers produce an extract that cures shingles when dropped on to the wounds
67	Tsitsi lamanda	Roots infusion used as cure for heart and high blood pressure problems
68	Muwanga	For adding blood
69	Kachere	Strings used as necklace to cure pains of the neck
70	Chipakasa	Leaves made into powder and dressed on middle of the head (Liwombo) to cure infant problems related to head bone building.
71	Kathyothyo	Roots put on to a string around waist to cure Liwombo
72	Muwawani	To cure Chronic stomach pains drink bark infusion three times a day
73	Lemon Tree	Roots infusion used to cure Chinzonono
74	Nthala	Fluid from fruits used to cure Leprosy as a dressing fluid of the sores
75	Kangaluche	Oils from the roots tattooed on to the back cures backache
76	Mwana wa mphepo	"Mwana wa mphepo" root infusion and rubbing the pimple-like sores plus leaves infusion used to cure Measles
77	Therere (Chewe)	Leaves infusion used to cure measles
78	Mladzi	
79	Chilambe	Cure against vomiting or blood using powdered leaves and drinking the infusion
80	Coco Leaves	Leaves powdered to cure Liliwo
81	Chigaga and	
82	Mpoza	Roots infusion used to cure after birth complications
83	Mtombozi and Chilambe	Root infusion is treatment against Chinzonono

84	Mdima	Roots pounced and put in a piece of cloth and solution dropped in the opposite ear cures ear pains
85	Kabvute	Root infusion cures problem of throat muscle movement that may sometimes prevent swallowing of any food
86	Mseta Nyani	Mseta Nyani bark pound together with Chanzi leaves, the infusion boiled and allow the steam to enter the body orally with the body covered.
87	Chanzi	
88	Nthunduwele	Leaves infusion taken as anti poison - the patient vomits
89	Chilungu m'mwamba	Cure against Ceaserian operation cases. The husband massages the woman with the leaves.
90	Tsitsi wa nthungutula	Roots Powder used against snake bite by tattooing the bitten area
91	Chilungu mmwamba	Roots infusion used as cure against swollen teeth and muscles
92	Mvunguti and	Roots barked and the powder used for tattooing cures Rheumatism
93	Bonongwe	
95	Chinsense	
96	Nthudza	
97	Chitedze	
98	Mlombwa	(96 to 99) Roots infusion taken twice to cure pain in or swollen scrotum of the male organ
99	Mdina	Drinking roots infusion passed through hole of hoe handle is used to cure ntchilichili
100	Hammer	Roots infusion taken quarter tea cup is used against asthma
101	Bwemba	Pounded leaves and sieved into a powder and taken in a porridge cures many ailments as a general drug
102	Garlic bulb	Pounded and drink infusion as cure for rabies, drink infusion three times a day

## LIST OF ACTIVITIES

### MALAWI INDUSTRIAL RESEARCH AND TECHNOLOGY DEVELOPMENT CENTRE

## MEMORANDUM

**TO** : Mr Guta/Mr Kafatia

**FROM** : Dr M K Raina  
UNIDO - Consultant

**DATE** : 1996-07-19

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Based on the discussions we had yesterday and today morning and the job description provided by UNIDO, the following assignments/appointments with concerned persons are necessary to accomplish the task.

1. **Meeting with Traditional Doctors/Healers** to ascertain current status; source of information, source of procurement of medicinal plants used by them; processes adopted for dispensing etc.
2. **Visit to University of Malawi**
  - o **Botanic Gardens & Herbarium** - to ascertain availability of medicinal & aromatic plants.
  - o **Agriculture Department** - to find out which crops are regularly cultivated; if any medicinal and aromatic crops are also cultivated; prospects of inter-cropping; regions mostly under cultivation, etc.
  - o **Chemistry Department** - To assess research capabilities; infrastructure, instrumentation available.
3. **Meeting with Forest Department Officials** - To understand system of licenses granted for collection of medicinal and aromatic plants from forests - for domestic consumption or export.

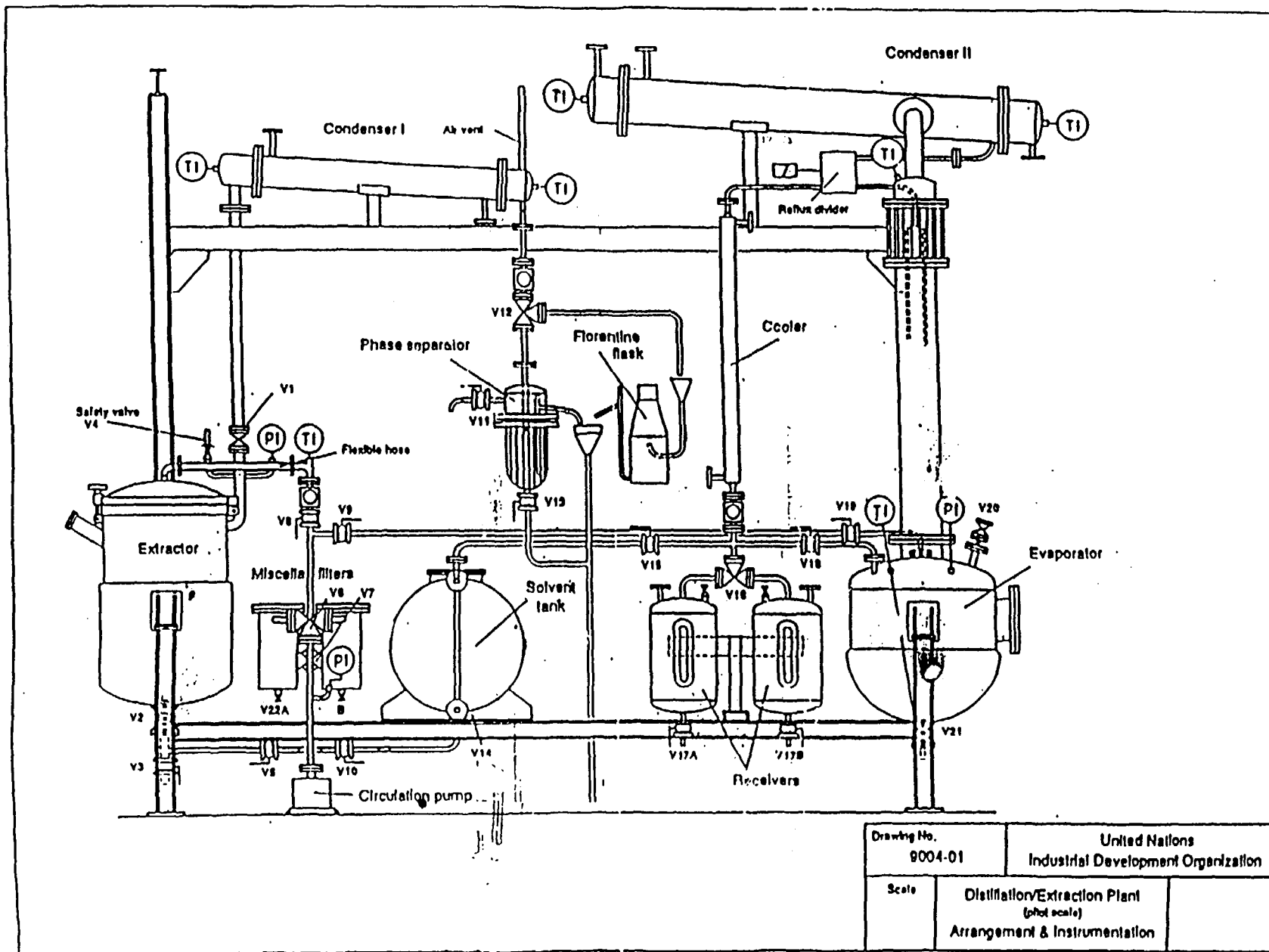


4. **Malawi Bureau of Standards** - for quality control parameters and laboratory testing facilities.
5. **Any Industrial Entrepreneur** involved in manufacture of essential oils; medicines based on plants/extracts; perfumes etc.
6. **Ministry of Health Officials** - To ascertain Government policy, if any, for promotion of Traditional Medicines in the country.
7. **Visit College of Medicine** - To ascertain capacities of undertaking acute toxicity studies and efficacy studies in laboratory animals, clinical trials, if required.
8. Local fabricators of plants and machinery.
9. Suppliers of equipment/instruments; their aftersale services etc.
10. Markets selling crude drugs, medical plants, essential oils etc.

**DR M K RAINA**

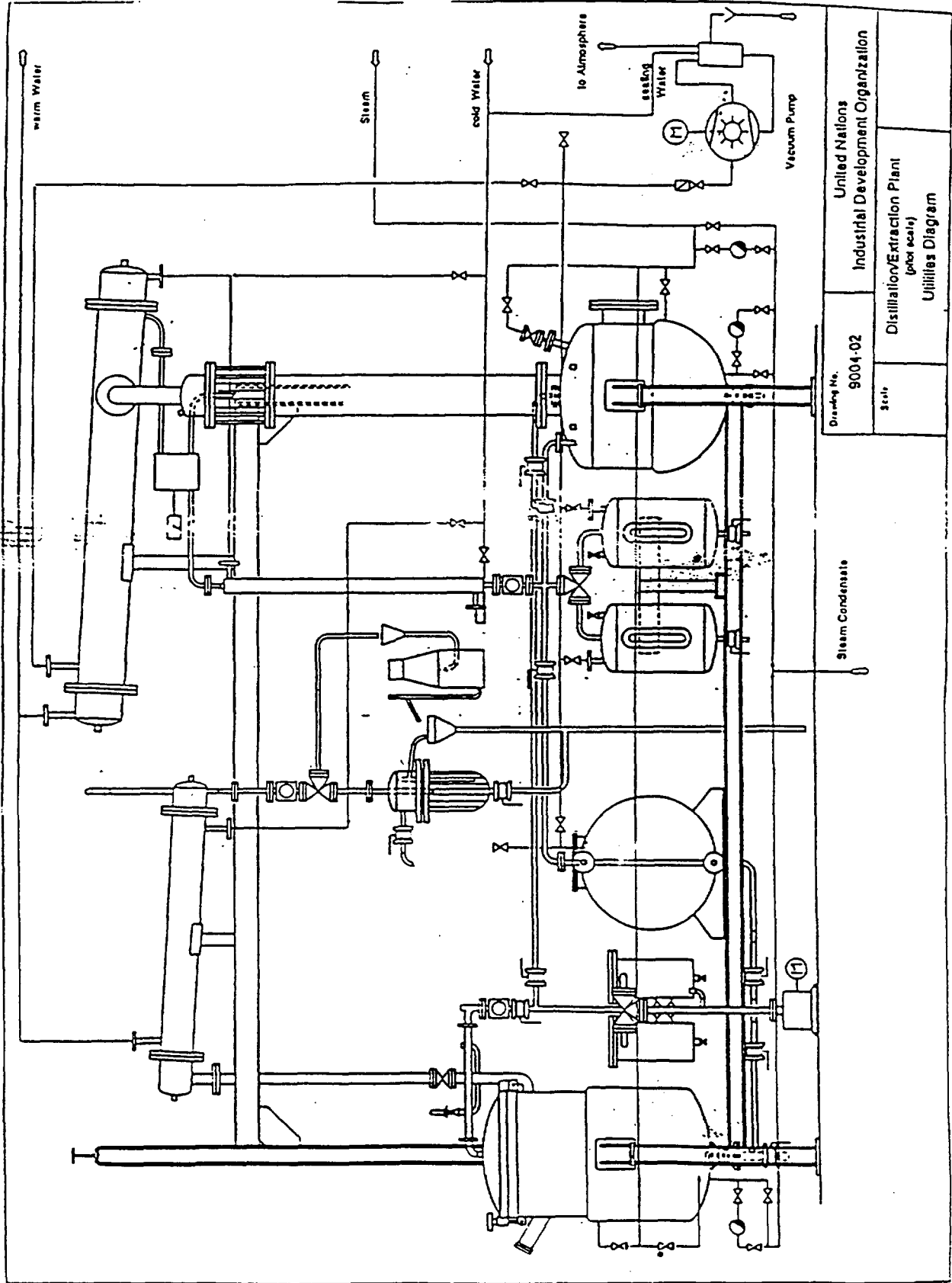


# ARRANGEMENT AND INSTRUMENTATION OF POLYVALENT PILOT PLANT UNIT



Drawing No. 9004-01		United Nations Industrial Development Organization	
Scale	Distillation/Extraction Plant (phot scale)		Arrangement & Instrumentation

UTILITIES DIAGRAM OF PILOT PLANT UNIT



Drawing No.	9004-02	United Nations Industrial Development Organization
Scale		Distillation/Extraction Plant (pilot scale) Utilities Diagram

### PERSONS CONTACTED

1. Malawi Industrial Research and Technology Development Centre, Blantyre
  - Mr. C. W. Guta - Director General
  - Mr. Kent Kafatia - Principal Research Officer
2. Malawi Bureau of Standards, Blantyre
  - Mr. P.I.S. Chiligo - Senior Scientific Officer
3. Herbalist's Association of Malawi, Mangochi
  - Tr. Dr. A A Siliya - Chairman
  - Tr. Dr. Banda - Treasurer
4. International Traditional Medicines Council of Malawi
  - Tr. Dr. Chipangula - Chairman
  - Mr. Yesetsani Kambewankako - Executive Director
5. University of Malawi, Zomba
  - Dr. E. Fabiano - Principal, Chancellor College
  - Dr. H.H.N. Kabwazi - Head of Biology Department
  - Dr. S.S. Chiotha - Research Co-ordinator
  - Dr. W. R. L. Masamba - Senior Lecturer
  - Dr. A. Ndibwani - Senior Lecturer
6. National Herbarium and Botanic Gardens of Malawi
  - Mr. M. L. Mwanyambo - Scientific Officer
7. Forestry Research Institute, Zomba
  - Mr. L. A. Sitaubi - Director
  - Mr. Enos F.F. Nkhono
  - Mrs. Claire Coote - Socio-Economist
8. College of Medicine, Blantyre
  - Professor A.K. Khare - Head of Medicine Department
9. Malawi Export Promotion Council
  - Mr. Julius B L Malange - General Manager
  - Mr. George K Mangochi - Deputy General Manager
  - Mr. Doze I Perekezani - Senior Marketing Officer

10. Malawi Polytechnic, Blantyre
  - Mr. Johnstone I.M. Kalea - Microbiologist
  - Mr. Geoffget E. Matoga - Research Co-ordinator
11. Scientific & Technical Services Ltd.
  - Mr. John E. Kahumbe - Marketing Manager
12. Technilab (CA) Ltd.
  - Mrs. N. Kidy - Managing Director
13. Malawi Pharmacies Ltd.
  - Mr. S.E. Chalira - Factory Manager
  - Mr. D.D.C. Chirambo - Chemical Analyst
14. Pharma Chemie Ltd.
  - Mr. Kini - Managing Director
  - Mr. H. Rodney Phiri - Manager
15. Pharmanova Ltd.
  - Mr. M.T. Keoron - Managing Director
  - Mr. Msukwa - Plant Manager
  - Mr. Changa - Quality Assurance Manager
16. Enterprise Containers Ltd.
  - Mr. Hendy J. Mafubza - General Manager
17. Royale Chemical Enterprises Ltd.
  - I.A.G. Panjwani - Managing Director
18. VIPCOR
  - Mr. Cedric Makungwanya - Project Manager
  - Mr. Somanje - Senior Project Economist
19. UNDP
  - Mr. Abdul Ajjie Bah - Programme Officer
20. Bvumbwe Agricultural Research Station
  - Mr. M.N. Nsanjama - Officer-In-Charge
  - Mr. D.L.N. Banda - Senior Field Officer
21. World Health Organization, Lilongwe
  - Dr. M.E. Chuwa - WHO Representative in Malawi.

22. Ministry of Health, Lilongwe

- Prof. P. Roma Khonje - Controller Health Technical Support Services.
- Mr. Wyun Chalira - Chief Pharmacist.
- Mr. P.S.P Tembo - Registrar, Pharmacy Medicines and Poisons Board.

23. UNICEF - Malawi

- Ms. Natalie D. Hahn - Representative

24. UNDP-Malawi

- Field Officers