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TRAINING COURSE

"PRODUCTION AND QUALITY EVALUATION OF MEDICINAL AND AROMATIC PLANTS"

Hotel Princess, Guatemala City, 9-11 July 2001.

Organized by

The International Center for Science and High Technology (ICS),and
United Nations International Development Organization (UNIDO),

In collaboration with the

National Commission for Utilization of Medicinal Plants (CONAPLAMED)

BACKGROUND

Plant-based medicines are the bases for health care in most of the world since old times. With the development of modern medicine, the use of these therapeutic resources were relegated, but it is still the main resource for primary heath care. The last decades witnessed the growing interest on these therapies, due to the possibilities of increasing the health coverage, but also the pharmaceutical and economic potentials. This interest is manifested by an increase in the demand of herbal products and the need to produce large quantities of plants of good quality.

The Guatemalan situation is a reflection of this. On one side the rich knowledge on the traditional use of native plants, which was enriched by the plants introduced by the Europeans, making that at present times more than 600 plants are being used regularly by the population. On the other side, the detection, validation, production and use of medicinal plants is a well organized movement in the country, leading to the organization of CONAPLAMED in 1984, as a coordinating body. This initial organization is being strengthened by the coordination of the Iberoamerican Network on Phyto-pharmaceutical Products (RIPROFITO) in the framework of the Iberoamerican Program on Science and Technology for Development CYTED since 1996 and the Peace Treaties signed in 1998, in order to make accessible the natural therapies due to the high acceptance by the population.

In 2000 the Senior Officer for Industrial Development of UNIDO, visited Guatemala, and reiterated that Guatemala has potential for the production and industrialization of medicinal plants. As a results from this visit, she presented the idea to ICS to organize a joint training course to help the scaling up of agronomical and industrial production of medicinal and aromatic plants.

JUSTIFICATION

The cultural and biological diversity of Guatemala is a rich legacy and a potential source of development. Most of research and training activities has devoted time to the well known plants from the international knowledge, but very little efforts has been devoted to native plants. In the other hand, much of the work done up to the moment has been the ethnobotanical and pharmacological screening of the activity, but little effort are known about the agrotechnological and phytopharmaceutical activities needed for scaling up production at agronomical and industrial level.

Primary efforts have succeeded in the establishment of some microbotanical gardens of medicinal plants in the framework of community or non governmental organizations, and preliminary studies have been conducted in FAUSAC and ICTA about propagation and conservation of medicinal plants. A pilot plant installed at CII-USAC with UNIDO financing is involved in essential oil research about the scale-up processes

OBJETIVES

The aim of the Course is to consolidate national initiatives and disseminate information among institutions to:

- Promote the sustainable use of medicinal and aromatic plants and generate public interest.
- Encourage cultivation and commercialization of medicinal and aromatic plants in the international market.
- Inform about production and quality control techniques for medicinal plants and derived products.
- Discuss interinstitutional actions to facilitate production and commerce of these products.

STRUCTURE OF THE TRAINING COURSE

The training course was organized in order to optimize the time of participants and lecturers. Five type of activities were designed:

(1) Lectures, which included 14 lectures from national (6) and international (8) experts. All conferences were in English or Spanish with simultaneous translation.

Name	Author	Pages
Contribution of medicinal plants to modern medicine	Vasisht	13
Mercado mundial de las plantas medicinales	Quintero	42
La Medicina tradicional en el manejo de la salud en Guatemala	Villatoro	8
Producción sostenible y cultivo de plantas medicinales	Martínez	7
Factors affecting quality of crude drugs	Vasisht	11
Standardization of herbal medicine	Vasisht	11
Agrotecnología de plantas medicinales y aromáticas en el ICTA	Orellana	7
Plantas medicinales importantes en Guatemala	Girón	6
Factores de éxito en una empresa de plantas medicinales	Quintero	20
Extraction and control of essential oils and active constituents	Vasisht	14
Biodiversidad y plantas medicinales, crecer sin destruir el patrimonio	Quintero	22
GMP de plantas medicinales y productos derivados	Cáceres	5
Aspectos legales de los productos fitoterapéuticos en Guatemala	Duarte	10
Bioprospecting of medicinal plants	Vasisht	11

(2) Group work, which included

Three working groups were organized according to the interests and disciplines of the participants, such as: Agrotechnology, Phytopharmacy and Industrialization. The methodology used was the discussion of related themes under coordination of a Guatemalan specialist, and further conclusions. With a common questionnaire the groups discussed on July 09 from 16:00-18:00 hours and July 10 from 16:30-18:00. Main conclusions are presented below. The complete discussion and conclusions of the working groups is the last Annex.

(3) Technical visits

On July 11, from 07:00-11:00 hours, the participants had a technical visit to the Medicinal Plant Collection and Agroindustry Laboratory at the Experimental Station of the Institute for Science and Agronomical Technology (ICTA) at La Alameda, Chimaltenango. After a presentation of activities and results, and guided tour was done in the collection.

On July 12, from 14:30-18:00 hours, the participants visited the Animal House of the Department of Pharmacology, the Bioassays Laboratory at the Department of Cytohistology, the Natural Products Research Laboratory, and the Instrumental Analysis Unit of the School of Chemistry at the Faculty of Chemical Science and Pharmacy, and the Pilot Plant for Extraction of Medicinal and Aromatic Plants at the Engineering Research Center, Faculty of Engineering, both in the University of San Carlos.

RESULTS

The training course was conducted according to planned. All the lectures, group discussions and technical visits were performed according to schedule.
The participants represented different sectors and the professors different disciplines. The organizers and professors were 11 to attend a group of 24 professionals, from academic-governmental (10), private industrial (9) and non governmental (5) sectors (List of participants in Annex).

The participants indicated their satisfaction about the organization of the course, the written material provided, the useful discussions and visits, and the contacts established among institutions and enterprises for further cooperation.

CONCLUSIONS AND RECOMMENDATIONS

After discussion the following conclusion and recommendations were achieved by the working groups (A: Agrotechnology; B: Phytopharmacy; C: Industrialization)

1. List of medicinal and aromatic plants interesting to the participants

Name	Scientific name	A	B	C
Ajo	*Allium sativum*			■
Albahaca	*Ocimum basilicum*	■	■	
Altamiza	*Tanacetum parthenium*		■	
Árnica	*Árnica montana*		■	
Arrayán	*Myrica cerifera*			■
Calahuala	*Polypodium aurreum*		■	
Chile	*Capsisum spp.*			■
Cola de caballo	*Equisetum giganteum*		■	
Cúrcuma	*Curcuma longa*			■
Equinacea	*Echinanea purpurea*	■		
Hipérico	*Hypericum perforatum*	■	■	
Jengibre	*Zingiber officinale*			■
Manzanilla	*Matricaria recutita*	■	■	■
Maracuyá	*Passiflora edulis*			■
Naranja agria	*Citrus aurantium*			■
Orégano	*Lippia graveolens*	■		
Pericón	*Tagetes lucida*	■		■
Romero	*Rosmarinus officinalis*			■
Rosa de Jamaica	*Hibiscus sabdariffa*		■	
Sábila	*Aloe vera*		■	
Tomillo	*Thymus vulgaris*			■
Valeriana	*Valeriana prionophylla*	■	■	
Zarzaparrilla	*Smilax domingensis*	■	■	

2. Main obstacles to develop medicinal plants in Guatemala.

Obstacles reported by participants	**A**	**B**	**C**
Work done in isolation	■	■	
Lack of validation of native plants	■		
Lack of technical knowledge on agroindustry of plants		■	■
Lack of norms on good manufacturing practices	■		
Lack of market studies on Guatemalan material and products	■	■	
Lack of long-term national policy on medicinal plants	■		
Little or lack of added value to raw material	■	■	
Limited analytical capacity at institutional and enterprise level			
Lack of information of production costs	■		
Lack of intersectorial organization	■		■
Little known benefits from medicinal plant cultivation			■

3. Strategies suggested to develop medicinal plants

Strategies suggested	**A**	**B**	**C**
Better knowledge of the Guatemalan biodiversity	■		
Preparation of a national strategy for medicinal plants	■		
Prepare a data base on the information of medicinal plants	■		
Make national, regional and international market studies	■		
Create a national organization on medicinal plants		■	
Create a training center for producers and users		■	
Prepare specific projects for international cooperation		■	■
Strengthen of analytic capacity of laboratories		■	
Disseminate information using CONAPLAMED contacts		■	■
Search for a convergence point with traditional healers		■	
Organize joint intersectorial research		■	■
Organize interaction between producers and industrialists			■
Organize training activities at different levels			■

4. Advantages and disadvantages of monoculture vrs. policulture

Advantages	**Disadvantages**
Polyculture	
Less susceptible to plagues	Difficulty in satisfaying demand
The production is ecologic	Costs could be higher
Better yield of active principles	It needs more knowledge from the producer
Safer production with less health risks	
Monoculture	
More production of individual plants	The production is not organic
Specialized production	Investment in biocides
	Risky investment

5. How should be stimulated the agronomical scale-up of medicinal plants?

Activities to be promoted	A	B	C
Planning the production between producers and industry	■		
Technification of productive sector in scale-up processes	■		■
Negotiation of a fair price for producers and industry	■		
Organization of training workshops	■	■	
Follow up to projects already presented to UNIDO	■	■	
Organize a national inventory on medicinal plants producers		■	
Increase research on agrotechnology of native plants		■	
Determine the quality of the medicinal plants produced		■	
Make feasibility studies on production and transformation		■	
Training on good agronomical practices		■	■
Market analysis of prioritary plants (native and introduced)		■	■
Fiscal incentives to producers and industry			■

6. Which is the importance of medicinal plants gardens and nurseries

Importance of medicinal plants gardens	A	B	C
Support to interested institutions and agroproduction	■		
Source of knowledge, research and genetic material	■		■
Starting point for conservation and production	■		
Generation of information on agrotechnology of plants	■	■	■
Production of standard materia medica as control			■
Transfer of technology from academic to productive sectors			■
Training of rural and professional personnel			■
Source of raw material for primary health care		■	

7. How can ICTA Experimental Station could help in this task?

Expected activities from ICTA	A	B	C
Improvement of technological process	■		
Training personnel from rural and enterprise levels	■	■	■
Becoming a multidisciplinary training center	■		
Domestication of native interesting plants	■	■	
Publishing the information generated	■	■	
Coordinating activity among different sectors		■	
Providing certified seeds and plants		■	
Investigate the parameters for organic cropping		■	■
Generate information on interesting plants			■

8. Strategies to develop a successful enterprise on medicinal plants

Strategies suggested	A	B	C
Increase coordination among producers and industry	■	■	■
Define and coordinate the agroindustrial chain	■	■	
Promote the creation of producers associations	■		
Apply the principle of complement instead of competition	■		
Communicate often among interested sectors	■	■	■
Implement and regulate GAP and GMP for the sector	■		
Phytotherapy should be used in primary health care		■	
Formulate a realistic project with multiple participation		■	■
Develop added value products for local industry		■	■
Search for unique product from the Guatemalan biodiversity			■
Market analysis for potential products from Guatemala			■
Stimulate specialization among producers and transformers			■
Investigate variables involved in scale-up of medicinal plants			■
Use students and resources of the universities to do research			■

9. Which are the main obstacles to scale-up medicinal plants production?

Obstacles to scale-up	A	B	C
Not enough technology, labor and land for these production	■	■	
Little investment in research and development	■	■	
Lack of knowledge of the resource and the productive chain	■	■	■
Rural productive structures are in small scale	■		
Heterogeneous quality of Guatemalan plants and products		■	■
Lack of fair market of medicinal plants	■		
Few trained personnel and enterprises		■	■
Little offer of good quality medicinal and aromatic plants			■
Lack of formal contacts between farmers and industry			■
Little prescription by the medical sector			■

10. How could your enterprise be helped for development of this industry?

Help wanted	A	B	C
Creating incentives to the industry	■		
Motivating to research on application of biodiversity	■		
Supporting ongoing projects and follow-up of presented ones		■	■
Conducting workshops and training courses		■	■
Organizing the planned provision of plants with producers		■	
More activities for training and information exchange		■	
Prepare multidisciplinary and intersectorial projects		■	
Strenghthening national health laboratories			■

IMMEDIATE FOLLOW-UP

As a result of group discussions, immediate follow-up activities are:

1. Continuation of activities in coordination with CONAPLAMED, RIPROFITO and other sectors to continue the multidisciplinary work done in previous years.
2. Follow up of projects presented to UNIDO and prepare new ones.
3. Define the list of plants that are offered and could be produced and process.
4. International market study of main plants and products from Guatemala.
5. Develop pilot level of production of organically grown medicinal and aromatic plants.
6. Organization of an International Course to be held in Guatemala in June 2002.
7. Finally, it must be mentioned that according to the participants, the phytotherapeutical products should be used mainly for primarily health care, and only those plants with enough production should be transformed into an industrial product.

LIST OF ANNEXES

Programme

List of participants

Presentations