NA-257

17 Pharmacopea - books on traditional medicine

Training Workshop on Planning Research Proposals in Traditional Medicine

Organized by

The NSF Working Committee on Traditional Medicine

Programme

Venue : *NSF Auditorium*
Date : *Monday, 04th March 2002*
Time : *9.15 a.m. to 4.15 p.m.*

9.15	-	Welcome Address - Prof. Ranjan Ramasamy, Chairman, NSF	
9.20	-	Objectives	- Dr S Sritharan, Chairman, Working Committee on Traditional Medicine
9.30	-	How to develop a Research Protocol	- *Prof. Tuley de Silva*, Consultant, Link Natural Products Ltd.
9.50	-	How to do a literature search	- *Prof M I Thabrew*, Dept of Bio-Chemistry University of Kelaniya
10.15	-	**TEA**	
10.30	-	Facilities available at NSF and other institutions for literature search	- *Mrs D. Talagala*, Director Information, NSF
10.50	-	How to plan a) clinical research b) ethical implications	- *Dr(Mrs) B.M.R. Fernandopulle*, Dept of Pharmacology, University of Colombo
11.10	-	How to carry out research, a chemists point of view	- *Prof. Ratnayake Bandara* Dept of Chemistry, University of Peradeniya
11.30	-	**Discussion (1 hour)**	
12.30	-	**LUNCH**	
1.30	-	Important areas requiring research in Traditional medicine/ how a chemist could help in research	- *Dr Lakshmi Arambewela*, Manager, Natural Products Division, ITI
1.50	-	Common problems that arise in preparation of proposals and carrying out research	*Prof. Ajith Abeysekera*, Director, BMARI
2.10	-	Planning the budget	- *Mrs C.G. Yapa*, Assistant Director (SA), NSF
2.30	-	**Final discussion (1 hour)**	
3.30	-	Vote of thanks	- *Mr A.W.J. Karunasinghe*, Assistant Director (SA), NSF
3.45	-	**TEA**	

J. of ethnopharmacology. NA.
hypoglycemia blds.

HOW TO DO A LITERATURE SEARCH

Prof. M.I.Thabrew

Information about plants or herbal products used in traditional medicine or any other related topic, can be obtained by (a) **interviewing** traditional medical practitioners and other experts in the field and (b) by **carrying out a search of published literature**. Information about published literature is found in **printed media** as well as in **electronic media**. A literature search would not only provide information about the plant/s, herbal product , pharmacological activity etc., but would also help to obtain information about the most appropriate methodologies to be used in the proposed investigation.

Information from printed media

From Personal libraries, local / institutional libraries, check catalogues for :

- **Books on Medicinal Plants**, to obtain information about a specific plant or plants in a herbal formulation. Search using the local name, common name or scientific name of the plant/s (e.g. Karela, bitter gourd or bitter melon, *Momordica charantia*).
- **Monographs** on the specific plant of interest. Search using plant name, disease or pharmacological activity (e.g. *Momordica charantia,* Diabetes, Hypoglycaemic plants) or author's name (if known).
- **Pharmacopoeia or other books on herbal remedies, traditional medicines** e.t.c. Search using local or scientific name of plant/s or name of a herbal formulation (e.g. Wel dehi Ċhoornaya), or disease condition.
- **Journals on plant research.** Search the journals for articles on (a) the particular plant or herbal product of interest or (b) the pharmacological effect/ disease for which it is being investigated (e.g. hypoglycaemic effect, anti-inflammatory effect, diabetes, arthritis). Information can be obtained about the composition and traditional uses of plant-based remedies.
- **Published Abstracts** (e.g. Chemical Abstracts, Biological Abstracts, Index Medicus). Search using scientific name of the plant/s or name of a particular author (if known).

- **Research Reports/ Dissertations/ Thesis / Proceedings or Abstracts of Annual Sessions of Societies or Associations (e.g. SLAAS, SLMA).**

Information from electronic media

Information may be (a) on-line or (b) in disc form (C.D's).

On – line information

- Access different search engines (e.g. Yahoo, Google) via the internet (Google – *www.google.com*, is the best).
- Search Websites (e.g. PubMed- www4.ncbi.nlm.nih.gov/pubmed/), APINMAP – www.pchrd.dost.gov.ph/apinmap/, Medicinal Plant Information Center, Mahidol University – www.mahidol.ac.th/mahidol/py/headpypi.htm) within these search engines that have access to data bases (e.g. Medline ,Healthgate, Infotrieve, BioMed Net, PHARM database, NAPRALERT etc.) that publish information about the following areas:

  Health, Medicinal / Aromatic plants, Herbal teas, Herbal remedies,Natural products, Alternative medicines, Drugs, Medicine, Disease information e.t.c.

Search for information on the particular plant/s , herbal product, pharmacological activity, or disease of interest.

- Access via PubMed specific journals that publish information on plants or specific disease conditions and search for articles related to the plant/s or topic under investigation. May also search by Author's name.

Information in CD form

Several data bases such as Medline, Asian chemical abstracts, Biological abstracts Current Contents, Life Sciences Collection etc. are available in CD form. These are available in certain libraries and could be searched by using the scientific name of the plant / s, disease condition under investigation or the author (if known).

Dr(Mrs) Rohini Fernandopulle

TRADITIONAL MEDICINE REVISITED : THE IMPORTANCE OF SCIENTIFIC DATA

The evaluation of traditional therapy in the treatment of disease has historically been a haphazard process. Claims for the clinical value are often based on clinical impressions. Unfortunately such impressions can be wrong as they are based on the reasoning that any clinical response following therapy is entirely due to it. Such impressions should therefore always be verified by well designed and properly conducted clinical trials which follow the principles of scientific experimentation.

Factors which may influence the course of a disease and therefore the outcome include

- Natural remission of disease – several diseases show spontaneous cure
- Bias – expectation of the patient or doctor may influence the results, most when results are based on subjective rather than objective measurements
- Placebo effect – response in unrelated to the physiological or pharmacological action of the drug.

Controlled clinical trials aims to establish the therapeutic value of a drug or procedure by comparing it with a placebo and / or with alternative drugs used for its potential indications. Sir Austin Bradford Hill was the prime motivator for the development of controlled clinical trials. The Randomised Control Clinical Trial (RCT) is considered the gold standard for the evaluation of the efficacy of any therapeutic or diagnostic intervention. For the demonstration of efficacy of allopathic medicines most Drug Regulatory Authorities will need at least two well - designed, well conducted, RCTs with consistent results. Implementation of a RCT relies largely on a well designed, well structured and completed protocol, produced by the collaborative efforts of a clinician, clinical pharmacologist and a medical statistician.

ESSENTIAL FEATURES OF A CONTROLLED CLINICAL TRIAL PROTOCOL INCLUDE

General information

- Title of the project
- The clinic / department where the trial will take place

Justification and objectives

- The aim of the trial
- The reason for it been carried out
- Literature review

Ethical considerations

- Description of how patients will be informed and consent will be obtained.
- Approval from a Ethical Review Committee

General time schedule

- The start, investigation period and termination of the trial

Trial design

- Description of the trial design
- Description of the randomisation method
- Technique of blinding

Selection of patients

- Specification of the study subject - patients / healthy volunteers including age sex ethnic groups etc
- Use of adequate number of patients – sample size and duration of follow up
- Clear statement of diagnostic criteria
- Clear statement of inclusion and exclusion criteria
- Withdrawal from the trial

Treatment

- Clear account of the intervention to be used in and justification of the doses to be used
- Description of the treatment to control group
- Route of administration, frequency of administration, duration of treatment
- Reporting of side effects
- Method of checking for compliance
- Rules for the use of concomitant medications

Assessment of efficacy

- Define clearly baseline assessments to be made before treatment
- Specification of the effect parameters to be used
- Description of how effects are measured and recorded (sometimes both objective and subjective data maybe needed).
- Description of special analysis and / or tests to be carried out
- Frequency of evaluation, times and periods of effect recording

Adverse effects

- Methods of recording adverse effects
- Provisions for dealing with complications

Evaluation and statistics

- Specify how the response is to be evaluated
- Methods of calculation of effect
- Quality control of methods : specificity and sensitivity of the tests to be used
- A description of the statistical methods to be used - significance levels should be stated when writing the protocol. Chi – square or T test. Best to do a Intentional – to- treat analysis with all subjects analysed. The alternative is to analyse only those who comply with the treatment.

Termination of trial

- Rules for termination

EXPLANATIONS

A clearly defined research question and justification for experimentation

To study the hypoglycaemic effects of *Momordica charantia* in diabetic patients.
To study the hypoglycaemic effects of *Momordica charantia* in non insulin dependent diabetic patients.
To study the hypoglycaemic effects of *Momordica charantia* in uncomplicated non insulin dependent diabetic patients

Design of controlled clinical trials

- Control – placebo/ standard drug / historical or concurrent controls
- Open / double blind / single blind
- Parallel (comparison between patients) / Cross over (each patient acts as his or her control)

Proper selection of patients

Step 1 define the target population : that is the large groups of people to which the results will be applicable This helps to formulate a specific set of inclusion criteria that identifies the demographic and clinical characteristics of subjects well suited to the research question and a set of exclusion criteria that will help to control errors
Step 2 : identify a accessible population that will represent the target population (referred to as the source population) because it is not practical to study the entire population
e.g. patients attending the diabetic clinic of the
Step 3 : sampling frame to get the actual study population - all patients who come to the clinic between 1st January and 31st June 2002
every second patient or every 5th patient. More sophisticated methods – stratified random sampling / cluster sampling

Sample size

It is one of the most important parts of planning a study. There are methods available for calculating the sample size required to detect a difference between the effects of treatment if it really exists. on the basis of the statistically significant level required and a reasonable difference between the effects of the two treatments which would be regarded as clinically useful.

Randomisation

When the study sample is selected, measure baseline variables and randomise the patients into two (or more) groups. Randomisation

- eliminates selection bias and prevents distribution of one type of patient to a particular group
- tries to ensure that age, sex and other baseline characteristics that could interfere with the outcome are equally distributed between the treatment and control groups.
- is also necessary for the application of statistical tests in the analysis of results. A pre-requisite for statistical analysis is that there should be no bias in allocation to treatment and control groups. Such tests are based on the assumption that the sample is a random one and chance is allowed to have full play in the allocation of patients to each treatment group.

Maldistribution that do occur as a result of chance are automatically included in the statistical tests.

Randomisation only tries to ensure comparability of the two groups. Data must be examined after completion of the trial to see whether randomisation has ensured the similarity of the groups with regard to patient as well as disease characteristics.

Different methods of randomisation

- tossing a coin (clumsy and time consuming)
- random allocation tables (start at an arbitrary point)
- computerised methods
- random treatment assignments can be placed in a set of sealed envelopes by someone who is not involved in opening the envelopes

Blinding

Blinding treatment and evaluation is essential to prevent bias influencing the result. It is the best solution to the problem of systematic error that is introduced either consciously or subconsciously into the experiment by the patient and / or the investigator

Whenever possible the investigator should design the intervention in such a way that neither the study subjects or the investigators have any knowledge of the treatment assigned. To eliminate bias the treatment should also be concealed from the person measuring the outcome. -

Double blind trial . The control drug must be identical to test preparation in appearance colour and taste. If this is not possible the person measuring the results must not be aware of the treatment (single blinded)

The way forward

- Recognition of the need for evidence of efficacy
- Good Clinical Research
- Formulation of Reasonable Regulatory Requirements

Rohini Fernandopulle MBBS, PhD
Senior Lecturer, Pharmacology
Faculty of Medicine
Colombo
1/3/2002

Important areas requiring research in Traditional medicine /How a chemist could help in research

Lakshmi Arambewela
Industrial Technology Institute
363, Bauddhaloka Mawatha, Colombo 7

There is a growing global demand for medicinal plants and their products and a threat to these resources caused by continual conversion of natural ecosystems to other uses. Therefore there is a need for sustainable use of these resources and to implement quality control of phytomedicines.

Some important areas requiring research in Traditional medicine are listed below-

Ethnopharmacology
Ethnobotany
Conservation and sustainable use of medicinal plants
Propagation and cultivation of medicinal plants
Micro propagation techniques and other biotechnological applications for medicinal plants
Post harvest practices
Quality control of raw materials and finished products.
Pharmacogonostic, pharmacological and toxicological studies
Search for new compounds which could be used in pharmaceutical, food and cosmetic industries and in agriculture.
Economics of supply and marketing

A chemist could play a major role in quality control of raw materials and standardization of finished products. These can be carried out at international level according to ' Quality control methods for medicinal plants ' published by World Health Organization.

Chemists can prepare monographs for raw materials and phytotherapeutic preparations for registration purposes.

The search for new compounds/ active fractions which could be used in pharmaceutical, food and cosmetic industries too is a chemist's role. This involves extraction, separation and isolation of active principles/ fractions from medicinal plants , structural elucidation of isolated compounds using spectroscopic techniques, testing of their efficacy, standardization and formulation of finished products with these compounds/ fractions for the market.

Planning the Budget

Geethika Yapa
National Science Foundation

As you all know, the estimated budget is a very important component of a research proposal. The budget should be realistic, reasonable and at the same time sufficient to cover the cost of the intended research project.

The components of the estimated budget for research proposals submitted to the NSF.

Summary of Budget	1st year	2nd year	3rd year	Total
(1) Personnel (i) Research Student (ii) Technical Assistant (iii) Other				
(2) Equipment				
(3) Consumables				
(4) Travel & Subsistence				
(5) Miscellaneous				
(6) Total				

Personnel (Research Student)
Only graduates can be recruited as Research Students and they are expected to work full time on the project.

There are 3 categories for the allowance of Research Students.

1 - Graduates with a class and registered for Postgraduate degree – Rs. 10,000/pm
2 - Graduates without a class and registered for PG degree - Rs. 8,000/- pm
3 - Graduates not registered for PG degree - Rs. 7,000/- pm

If the project is of 3 years duration and funds are requested for the Research Student for 3 years the NSF expects the RS to register for PG degree.

Personnel -Technical Assistants.

Here there are 2 categories for the allowance of TAs.

- with G.C.E. (A/L) passes in 3 subjects – Rs. 4000/m
- without the above qualification - Rs. 3500/m

The above rates are if the TA is working full time on the project. If an applicant needs the services of a TA on part time basis, that is a few days per month, then the rate is calculated at Rs 4000/30 or 3500/30 per day

Personnel – Labour

Applicants who need the services of labourers are advised to recruit labourers on a casual basis.

The current rate is Rs. 131 + 104.76 = Rs. 235.76/day
Interim allowance

Payments are made subject to a maximum of 21 days per month.

Equipment

An applicant can request funds for scientific equipment needed to carry out the project. Before requesting such funds applicants have to see whether this equipment is already available in his Department / Institution and whether it's services can be obtained for the project. Only if this equipment is not readily available or cannot be used by the applicant for some reason, should funds for purchase of such equipment be requested.

It is preferable if the applicant can attach a proforma invoice for the equipment, when requesting funds.

If the applicant wishes to import an equipment then he has to quote the price in foreign currency giving the rupee equivalent. You calculate at current exchange rate + 20% to allow for any fluctuations in price.

NSF does not provide funds for computers for routine data entry and analysis. The applicants' institution is expected to provide such facilities. If, however, a computer is needed for specialized work (For example Theoritical chemistry projects) then the NSF will consider a well justified request.

Consumables

Here, an applicant can request funds for expendable items. For eg: chemicals, glassware, laboratory animals,culture media etc

Here also as far as possible give details of the items and the expected cost.

Travel and Subsistence

For field visits connected to the project it is preferable to use public transport. When this is not possible, funds can be requested for such visits be it for sample collection or to make some observations etc. And it is important to include a proper travel plan with details of field visits. no. of visits and places to be visited when submitting the application. It is not possible to predict the field visits hundred percent but try to be as accurate as possible.

The current rates of payment, these are the rates approved by the government, are

Fuel cost - Rs. 6.25/km or Rs. 10.00/mile for Institutional vehicles
Rs. 7.50/km for Hired vehicles
Rs. 1.25/km for motor cycles

When budgeting for field visits, the subsistence and overtime costs of the personnel who go on the field visit have to be taken into account. The current government approved rates are:

Annual Salary	Rs. 42,720/= and less –	Rs. 150/- per day
„	Rs. 42,721/= to 66,300/-	Rs. 180/- „
„	Rs. 66,301/= to 118,439/-	Rs. 230/- „
„	Rs. 118,440/= and above –	Rs. 280/- „

Overtime payments for Drivers are calculated at:

$$\text{Rs.} \quad \frac{\text{Consolidated salary}}{30 \times 8} \times 1\tfrac{1}{2} \quad \text{per hour}$$

Miscellaneous

Under this vote researchers can request funds for items such as stationary, postage, computer diskettes etc.

Also if the Research Student hopes to register for post graduate degree, then the registration fee can also be included under the miscellaneous vote. Here the RS has to first pay the fees and get reimbursement from the NSF.

There is no ceiling for the budget of research proposals submitted for consideration to the NSF but applicants have to be logical and at the same time reasonable when requesting funds.

Procedure followed for submission of applications

Newspaper advertisement calling for applications

↓

Receipt of Applications

↓

Initial Screening by the respective Scientific Officer

- *whether it conforms to the NSF format*
- *are all requested details given in the application*
- *is the application forwarded through the proper channels*
- *through Head of Dept./*Dean/*VC/Head of Institution*
  (to assure that infrastructure facilities will be provided by the institution)

↓

Refer to Working Committee for Evaluation

- *a) comments of the Committee are sent to the applicant for revision improvement of the project proposal*
- *b) discussion with the applicant with a view to clarify issues related to proposed work*
- *c) recommendation to the Board for approval of the funds*

A legal agreement

-A legal agreement has to be signed between NSF and Grantee at the time of award.

Transfer of Funds

- Funds generally transferred to the Grantee's Institution (University/Research Institute Account)or sometimes keep at NSF to disburse funds from here

Monitoring of projects

- Half yearly progress reports (according to NSF format) and financial reports
- Progress Review Seminars
- Site visits by W/C
- At end of the period – a final report (According to NSF format) this is evaluated by a referee nominated by the Working Committee)
- Publications in Journals- Local or International Journals (refereed if possible) e.g. JNSF

Rewards for quality research

- the purpose is to bestow on researchers the recognition they deserve for the contribution
- for research work of outstanding research during the period concerned

- NSF Merit Awards – (biennially)
- TWAS/NSF Award for Young Scientists

PRIORITY AREAS OF RESEARCH FOR TRADITIONAL MEDICINE

a) Identification of plants with a potential for use as curatives, preventives and promotives in health care and those that could be used for the treatment of chronic and deadly diseases prevalent today.

b) Research on fundamentals of Ayurveda with a view to validate them in terms of modern scientific knowledge.

c) Research Dravya Guna and the other areas of specialization in Ayurveda.

d) Research on Rasa preparations with a view to usage of modern methods.

e) Research into ancient texts and ola manuscripts for collation, critical review and publications.

f) Studies on raw material availability for such products and the development of systematic cultivation packages including post harvest technology and conservation.

g) Development of methods for identification, and domestication of authentic medicinal plants used in Ayurveda.

h) Development of processes for the production of standardized quality Ayurveda drugs including modern dosage forms.

i) Development of standards and specifications for the quality control of raw materials, processes and finished products.

j) Research on stability studies, shelf life and storage of Ayurveda drugs.

k) Clinical evaluation of Ayurvedic products and treatment regimen.

l) Studies on the chemistry, bioactivity and safety of Ayurveda products including toxicity studies.

m) Research on dietetics and practices used in Ayurveda.

n) Regular updating of the Ayurveda Pharmacopoeia.

o) Development of new formulations and drug combinations.

p) Studies on the use and adoption of modern diagnostic tests, devices and equipment in Ayurveda Practice.

It was decided that no order of priority for areas in the list and an equal weightage is given to each area.

PREPARATION OF A RESEARCH PROPOSAL ?

Tuley De Silva

Why FUND RESEARCH ?

Encourage and support research (aim of maintaining and improving human health)

Train skilled people

Advance and disseminate knowledge and technology (aim of meeting national needs in terms of health, quality of life and economic competitiveness)

Promote public awareness with medical research and significance of its potential impact on the field

EXPLORATORY RESEARCH

- preliminary work on untested and novel ideas;
- ventures into emerging research ideas;
- application of new expertise or new approaches to "established" research topics;
- scientific validation of conventional/traditional medicines/uses
- work likely to catalyze rapid and innovative advances.

Project PROPOSAL

The main body of the proposal should be

prepared with the care and thoroughness

a clear statement of the work to be undertaken with

objectives of the proposed work and expected significance;
relation to longer-term goals of the project; and
relation to the present state of knowledge in the field

A. PROJECT TITLE

Clear indication of the project activity
unambiguous
distinct/ explicit

B. INTRODUCTION

Background information
Review of Previous work
Purpose

C. **PROJECT DESCRIPTION** (including Results from previous grant Support)

Problem to be addressed
Merits of the proposed project
Project strategy
Scientific significance of the proposed work
Description of experimental methods and procedures
Suitability of the methods to be employed
Expected end results of the project
Expected benefits in terms of improvement of human health
Possible broader impact of findings/ proposed activities

how the project results will enrich knowledge by advancing discovery and understanding

plans for disseminating data and results to enhance scientific and technological activities

potential benefits of the proposed activity to society at large

Target beneficiaries

Training of scientific personnel
Commercial exploitation

D. OBJECTIVES

E. OUTPUTS

F. BROAD DESIGN OF ACTIVITIES /ACTIVITIES

g. INPUTS - BUDGET

Institutional

Grant

For items/services and amounts considered necessary to perform the proposed work

- ❖ budget for each year
- ❖ cumulative budget for the full term of support requested
- ❖ justify the amounts requested in each category

a. Salaries and Wages

b. Equipment

c. Materials and supplies

d. Publication/ Documentation/Dissemination costs

e. Travel in relation to the proposed activities specified and itemized by destination and cost

f. Other eg Books, computer services , Spectra, attendance at meetings and conferences etc.

g. Subcontracts

h. Facilities and Administrative Costs

H. WORK PLAN (tentative)

I. BIODATA of the investigator/s and the grantee organization

a. Qualifications/ Résumé of investigators

A list of the individual's undergraduate and graduate education and postdoctoral training

b. Appointments

academic/professional appointments beginning with the current appointment

c. Publications

(i) up to 5 publications/patents most closely related to the proposed project; and

(ii) up to 5 other significant publications/patents, whether or not related to the proposed project.

J. PROGRESS MONITORING /REVIEWS

Indicators with time schedule
Program milestones with target dates

K. REPORTING

L. EVALUATION PLAN

M. REFERENCES CITED

Bibliographic citations for source materials given in the proposal

names of all authors
article and journal title, book title,
volume number, page numbers, and year of publication
If the document is available electronically, the website address

GROUP PROPOSALS

A group proposal is one submitted by 3 or more investigators whose activities are combined into one administrative unit proposal

overall project description
individual project descriptions

Ethical and Other Implications in case of any use of animals or humans

Commercial exploitation -

If the proposed research generates commercially exploitable results, arrangements the host institution will make to take forward the commercial exploitation of intellectual property arising from the research?

Dissemination of Research Results -

publication in peer reviewed journals
indicate how any results arising from the research will be transferred to users (eg. industry, Health Ministry)

PROJECT: Development of specifications for standardising Ayurvedic medicines

OBJECTIVES: Quality control of five ayurvedic medicines

OUTPUTS

Output 1 - Identified number of markers for Dasamula arishta

ACTIVITIES

1. Preparation of a standard dasamula arishta
2. Preparation of solvent extractives of arishta
3. TLC studies to identify specific markers for major components
4. HPLC studies to identify specific markers for major components

Output 2 - TLC and HPLC finger prints for Dasamula arishta

ACTIVITIES

1. Selection of proper solvent systems for fingerprinting extractives
2. Development of reproducible and specific TLC and HPLC fingerprints for the arishta

Output 3 - Quality control of Dasamula arishta using fingerprints

ACTIVITIES

1. Collection of commercial samples of Dasamula Arishta
2. Preparation of solvent extractives
3. Comparison with standard fingerprints

INPUTS

INDICATORS FOR MONITORING

Developed markers for five medicines - fifth month

Developed fingerprints for five medicines - eighth month

Quality controlled five medicines - 11th month

Annex 3

TENTATIVE WORK PLAN

ACTIVITIES	Month: After start of project											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
D.1.1.1 Partitioning of Solvent Lab.	*****											
11.01 Chief Technical Adviser	*****					*****		*****				*****
11.02 Expert on fine chemical and special reagents						**********						
11.03 Expert on biochemical reagents						**********						
11.04 Expert on Biological Reference Substances							**********					
11.50 Short term consultants									*********			
D.1.2.1 Fellowships 31.01-31.04				**********								
D.1.2.1 Fellowships 31.05-31.08					**********							
D.1.2.2 Seminars/Workshops												
Packaging and storage facilities						**		**		**		
								*****				
D.1.1.8 Marketing Units									*****			
D.1.1.2 Equipment and Chemicals												
Requisition	*****											
Ordering		*****										
Delivery			**********									
Receiving				**********								
Commissioning						**********						
D.1.1.7 Introduction of New Technologies							**********					
D.1.1.9 Production										**********		
Technical Reports	.											
PPER						.		.	.	.	.	
Tripartite Review Meeting												.