F. No. 11019/29/2008 – NMPB
NATIONAL MEDICINAL PLANTS BOARD
DEPARTMENT OF AYUSH
MINISTRY OF HEALTH & FAMILY WELFARE
GOVERNMENT OF INDIA

CALL FOR PROPOSALS

To boost the domestic use and exports in herbal sector, NMPB has identified the following focus areas of research, Proposals are invited from R&D organizations of repute both in Public and Private sector/ Universities, R&D organizations in private sector will be eligible for financial support upto 50% of the project cost. Past experience in the proposed area of research activity would be essential.

Thrust areas for research and development during 11th plan

1. Collection, compilation and documentation (digitization) of published scientific information on various aspects of selected Indian Medicinal Plants and ASU products and preparations of comprehensive monographs thereof and CTDs.
2. "Identification of substitutes / adulterants for traded medicinal plants for their subsequent inclusion in the Ayurvedic Pharmacopoeia of India".
3. Finding substitutes for RET listed medicinal plants and finding use of sustainable plant parts like leaves, fruits etc in place of barks, roots, heart wood etc.
4. Research aimed at improving the technologies and lowering cost of production of extracts, phytochemicals, natural colors, flavors and fragrances by using latest technologies.
5. Bio-Activity Guided Fractionation – for linking the phyto-constituents with the desired biological activities, with an aim to achieve standardization of herbal substances with biologically active marker compounds.
6. Development of HPLC methods for known phyto-constituents (preferably the bio-actives / marker compounds) and validation of these methods as per international norms.
7. For medicinal plants in which commercially pursued phyto-constituents are known, study of seasonal variations, study of phyto-chemical variations within available genotypes, chemotypes, ecotypes etc., development of post harvest treatments, search for elite quality germplasm and development of quality planting material for mass scale propagation.
8. Development of agro-economics (including agro-economics) for Indian medicinal plants with an aim to work out the "fair price" to growers.
9. Development of effective and safe methods to reduce mibrobial load of crude herbal raw material.

The explanatory details of the above activities are available on NMPB's website.

HOW TO APPLY

Ten copies of the proposal highlighting objectives, current status of research in the relevant field, lead available, methodology, expected outcomes and linkages with the other groups alongwith budgetary requirements may be sent by post to NMPB **alongwith a softcopy at the email address info-nmpb@nic.in**. The format for submitting the proposal is available on NMPB's website. The proposal should also contain a brief biodata of all concerned scientists including relevant publication in peer – reviewed journals during last 3 years.

Though projects from individual institutions will be entertained for certain targeted activities, network multi-institutional projects tackling the problem with an end to end approach would be preferred.

For details visit **www.nmpb.nic.in** or write to Dr. N. Padma Kumar, Research Officer, National Medicinal Plants Board, Department of AYUSH, Ministry of Health & Family Welfare, Government of India, Chandralok Building, 36 – Janpath, New Delhi – 110 001. Any additional information may be addressed at 011-23730652, E-mail: info-nmpb@nic.in.

The proposal should reach NMPB within one month of publication of this notice in the Newspaper.

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Explanatory notes on the thrust areas identified for R&D support

The Medicinal Plants Board, under its "Central Sector Scheme of Conservation, Development and Sustainable management of medicinal plants" provides financial assistance to government, semi-Govt. and private, R&D institutions, universities, colleges and private R&D industries to support research and developmental activities in thrust areas identified by the Board. The thrust areas identified for support alongwith explanatory notes are given below. The primary objective is to undertake research in areas which will cover the last mile in transfer of technology so as to bring direct benefits to the AYUSH and herbal sectors both at domestic level and on the export front. The projects should also aim to deliver specific & quantifiable benefits to the stake holders of the herbal sector. The proposals received by the Board are put through a rigorous scrutiny, first at the level of committee consisting of domain experts and thereafter by an apex Committee under the Chairpersonship of Secretary (AYUSH), involving representatives of concerned subject matter Ministries/ Departments including the Department of Scientific and Industrial Research, Department of Bio-Technology and ICAR as members.

The institutions/ investigators intending to seek assistance from NMPB for R&D related activities are, therefore, advised to carry out a rigorous due diligence which should involve detailed investigation into present level of knowledge in the relevant discipline, identification of medicinal plants which P.I. wishes to investigate and, thereafter, develop proposals with clear objectives, methodology, outcomes supported with detailed justifications of the budget proposed.

1. Collection, compilation and documentation (digitization) of published scientific information on various aspects of selected Indian Medicinal Plants for preparations of comprehensive monographs thereof and CTDs. Scientific data on Indian medicinal plants is scattered and widespread. The documentation will cover in addition to any other information- history of use, all reported safety and toxicity data, pharmacological and efficacy data including any human studies done, from research publication, MD/Ph.D thesis of Ayurveda and M.Pharm/PhD thesis form Pharmacy colleges, regulatory information form any country, dosages and doses, genotoxicity data then it will be really useful. The objective is to encourage systematic compilation of published scientific research on various aspects. It is hoped that in the process of this review / compilation, the researchers will be able to identify areas of strength and weakness in the published domain and thereby identify gaps in knowledge, areas of further research and also hopefully resolve to some extent the controversies that may exist. The overall intention is to promote rational use of Indian medicinal plants through documentation and digitization. NMPB would like to consider publishing some of the outstanding compilations with due credit to the principle investigators of such projects. Access to

such a data base should then be made available to all like any other data bases on subscription basis, with pass words etc.

2. "Identification of substitutes / adulterants for traded medicinal plants for their subsequent inclusion in the Ayurvedic Pharmacopoeia of India". For this purpose the PI should carefully select those species whose specific end use is known. Appropriate in-vitro and in-vivo models should be adequately standardized for comparison of the desired pharmacological activity / activities. The proposed substitutes / adulterants should be taxonomically characterized prior to biological activity. Ayurvedic properties of the selected substances should be characterized (Ras, Guna, Virya, Vipaka, etc) and only after a satisfactory demonstration of the presence / lack of pharmacological activity should a plant material be labeled as a substitute / adulterant. For look a like substances which lack the desired pharmacological activity (adulterants) molecular, phytochemical and pharmacognostic parameters should be studied to determine the key distinguishing characters. Preference should be given to developing simple morphological correlates which can be used by common men to distinguish substances at the field level itself. For plants whose Ayurvedic properties and the pharmacological activity are comparable (substitutes), the comparison of morphological, molecular, phytochemical and pharmacognostic parameters is irrelevant since substitution is meant to be intentional.

3. Finding substitutes for RET listed medicinal plants and finding use of sustainable plant parts like leaves, fruits etc in place of barks, roots, heart wood etc. For RET species as a first attempt cultivable plants having similar Ayurvedic and pharmacological profiles should be selected. Similarity in chemical constituents should be attempted only for those plants where specific phytocompounds are pursued commercially. These project proposals should have a distinct component of pharmacological comparisons based on which alone an alternate plant / plant part can be declared as a substitute.

4. Research aimed at improving the technologies and lowering cost of production of extracts, phytochemicals, natural colors, flavors and fragrances by using latest technologies. India is facing a stiff competition from its neighboring countries which have a similar bio-resources / bio-diversity. Export opportunities of products based on Indian medicinal plants are often lost on account price price competitiveness even though the quality may be at par or even superior to competing products. NMPB has been receiving several requests from Indian Herbal industries to fund research of the kind which can lower the cost of production of plant material (cost effective agro-technologies) and the cost of processing the plant material. Research which can create unique marketing advantages, superior product attributes, development / adoption of new technologies, etc is very much needed. For higher degree of value addition and better coverage of market opportunities the problems faced at the industrial level need to be understood and resolved. Project proposals which have been conceived based on assessment of practical difficulties would be given preference.

5. Bio-Activity Guided Fractionation – for linking the phyto-constituents with the desired biological activities, with an aim to achieve standardization of herbal substances with biologically active marker compounds. For standardization of Indian medicinal plants, one of the biggest challenges has been the lack of knowledge of active principles for any

specific biological activity. The process which facilitates this identification of actives / linking of particular compounds with specific pharmacological activity is called bio-activity guided fractionation. This process typically involves use of in-vitro bio-assays, relevant to a desired bio-activity, as fractionation monitors, for guiding the isolation scheme. Initially successive crude extracts are prepared with solvents of increasing polarity and a panel / battery of in-vitro assays are used to identify the responding bio-assays and their respectively responding successive extracts. The inactive extracts are discarded and the active extracts are fractionated using semi-preparative or preparative chromatographic techniques (Column chromatography, prep TLC, CCTLC, VLC, prep HPLC etc). Again the bio-activity is tested in the separated fractions and inactive fractions are discarded. The active fractions are similarly fractionated into sub-fractions and by a process of elimination (guided by bio-assays) pure compounds are isolated, purified and characterized to determine their molecular structure and molecular weights. Thus their identities are established after which these compounds can be declared as the "active principles" for that particular pharmacological activity.

The applicants of such projects should demonstrate expertise in both phytochemical techniques (particularly preparative scale isolation) and in-vitro pharmacology (bio-assays). Bio-activity guided fractionation is normally not attempted using in-vivo pharmacological methods since in-vivo methods generally require gram quantities of the test substances. The PI's should carefully select only those disease areas where relevant bio-assays are available / can be developed. Preference should be given to those plants which have a good export demand or potential. The PI's will be required to demonstrate adequate level of standardization of their fractionation monitors / bio-assays, using suitable "Assay Performance Measures" (APM's), prior to proceeding with fractionation.

NMPB will maintain a control record of projects funded in this area in order to ensure avoidance of duplication. Interested applicants can write to NMPB with their project outline to check whether a project has already been funded similar to what they wish to apply for. While doing such projects focus may also be added to develop "reproducible techniques" for isolation and characterization of the compounds, so that they can be scaled up for preparing National reference substances [RS].

6. Development of HPLC methods for known phyto-constituents (preferably the bio-actives / marker compounds) and validation of these methods as per international norms. The pharmacopoeias of several countries have now started developing quality assessment monographs on Indian medicinal plants. Indian Pharmacopoeia 2007 also covers 32 popular medicinal plants. There are however more than 800 medicinal plants traded in commerce. Many of these have a good potential for export as crude herbs, their extracts, oleo-resins, essential oils and finished herbal products. There is a need to develop meaningful quality assessment parameters for such plants. In most countries quality assessment involves precise quantification of important phyto-constituents which are considered as marker compounds / bio-markers / active principles etc. HPLC, HPTLC and GC based methods are preferred over the conventional gravimetric, titrimetric or colorimetric methods. Additionally these methods need to be validated as per international norms which involve assessment of specificity, linearity, accuracy, limit of quantitation, rugedness and measurement of uncertainity. It is hoped

that such projects, upon completion, will supplement the efforts of Ayurvedic Pharmacopoeia Committee and Indian Pharmacopoeia Commission in developing monographs for the Ayurvedic Pharmacopoeia of India and the India Pharmacopoeia respectively. The applicants in this area should have the basic chromatographic infrastructure and some past experience of method development. The plants should be carefully selected keeping in mind the export potential, knowledge and availability of marker / active compounds and the reproducibility of the data generated.

7. For medicinal plants **in which commercially pursued phyto-constituents are known**, study of seasonal variations, study of phyto-chemical variations within available genotypes, chemotypes, ecotypes etc., development of post harvest treatments, search for elite quality germplasm and development of quality planting material for mass scale propagation. NMPB regularly receives proposals aimed at studying variations and finding elite varieties / elite quality planting material. Several such projects have been funded in the past but the outcome of most of these projects has not been satisfactory. Most researchers have only focused on the bio-mass of the medicinal plants without giving sufficient emphasis on the secondary metabolites which are known to be responsible for the medicinal properties of these plants. Henceforth, this type of research will be funded only for those medicinal plants which have a clear phytochemical basis of quality assessment. For example a project which aims at determining elite quality plant material or planting material of Saraca ashoka will be funded only if the project clearly justifies the phytochemical basis of quality assessment as in the absence of this NMPB receives data on elite quality based on morphological characters and bio-mass only. However similar work on Andrographis paniculata can be encouraged as the quality / elite nature of a given specimen can be determined by estimating the level of andrographolide in the samples.

8. Development of agro-techniques (including agro-economics) for Indian medicinal plants with an aim to work out the "fair price" to growers. In spite of continuous efforts of several years, cultivation of medicinal plants has not picked up to the extent that it could have. One of the main reasons for this appears to be the lack of clear agro-economics. The farmers often complain that the buyers are not offering remunerative prices for their produce while the buyers / user industries complain that the cost of several cultivated plant material is too high making their business economically unviable. With an aim to prevent any exploitation of the situation by either the growers or the buyers, NMPB has planned to fund projects aimed at documenting "fair prices" for the cultivated plant material. It is clear that for mass scale cultivation to happen, co-operation of both growers and buyers is essential. It is hoped that fair and transparent assessment of the cost of cultivation will also encourage financial institutions to extend financial support to growers apart from preventing their exploitation and simultaneously the buyers will also develop confidence that they are not being cheated.

9. Development of effective and safe methods to reduce mibrobial load of crude herbal raw material:

   Heavy microbial contamination in crude herbal raw material poses a big hurdle in producing quality products specially Chunas. Storage also contributes to menace. Currently ETO and Gammaradiation techniques are usually employed at commercial level. Gamma radiation has been approved by Ayurvedic Pharmacopoia Committee also

basis scientific studies. However, certain countries do not allow it. There is, therefore, a need to develop effective, safe, inexpensive and commercially applicable techniques to achieve the same. Interested parties may apply for projects in this area of high importance.

National Medicinal Plants Board

Department of AYUSH

Proforma For Submission Of Project Proposals On Research And

Development, Quality and Standardization

(To be filled by the applicant)

PART I: GENERAL INFORMATION

1. Name of the Institute/University/Organisation submitting the Project Proposal :
.....……

.....……...…….
.....…….....…….....…..…
…….....……....……....

2. State: ..... 3. Status of the Organization:
.....

4. Registration No. (In case of NGOs /Companies) :
.....

(The NGOs and R&D companies will be required to submit their Articles of Association, Memorandum of Association and Annual reports)

5. Name and designation of the Executive Authority of the Institute/University forwarding the application : .....

.....

.....……..

6. Project Title :.....

.....

.....

.....

7. Category of the Project (Please tick) :.R&D/ Programme Support

8. Specific Area:

9. Duration : ..... Years..... Months

10. Total Cost (Rs.) .....

11. Is the project Single Institutional or Multiple-Institutional (S/M) ? :

12. If the project is multi-institutional/ Network mode, please furnish the following :

Name of Project Coordinator and participating institutes with complete address and responsible person : .....

Affiliation : .....

Address : .....

.....

.....

13. Scope of application indicating anticipated product and processes

14. Project Summary (Not to exceed one page. Please use separate sheet).

PART II: PARTICULARS OF INVESTIGATORS

(*One or more co-investigators are preferred in every project. Inclusion of co-investigator(s) is mandatory for all the project*)

15. Principal Investigator:

Name:.....

Date of Birth: ..... Sex (M/F): ....

Designation:.....

Department:.....

Institute/University:.....

Address:.....

.....PIN:.....

Telephone: ..... Fax:.....E-mail:.....

Number of research projects (alongwith details) being handled at present:.....

15.1 Co-Investigator: (same details as for the Project Investigator)

15.2 Co-Investigator: (Same details as for the Project Investigator)

PART III : TECHNICAL DETAILS OF PROJECT

(Under the following heads on separate sheets)

16. Introduction (not to exceed 2 pages or 1000 words)

16.1 Origin of the proposal

16.2 (a) Rationale of the study supported by cited literature (b) Hypothesis (c) Key questions.

16.5 Current status of research and development in the subject (both international and national status)

16.6 The relevance and expected outcome of the proposed study

16.7 Preliminary work done so far

17. Specific objectives (should be written in bulleted form, a short paragraph indicating the methods to be followed for achieving the objective and verifiable indicators of progress should follow each specific objective)

18. Work Plan: should not exceed 3-4 pages (the section can be divided according to the specific aims and under each specific aim, the following should be stated clearly as sub headings)

18.1 Work plan (methodology/experimental design to accomplish the stated aim)

18.2 Connectivity of the participating institutions and investigators (in case of multi-institutional projects only)

18.3 Alternate strategies (if the proposed experimental design or method does not work what is the alternate strategy)

19. Timeframe: (Please provide quantifiable outputs)

Period of study	Achievable targets
6 Months	
12 Month	
18 Months	
24 Months	
30 Months	
36 Months	

PART IV: BUDGET PARTICULARS

Budget (In Rupees)

A. Non-Recurring (e.g. equipments, accessories, etc.)

S. No.	Item	Year 1	Year 2	Year 3	Total

Sub-Total (A)

B. Recurring

B.1 Manpower

S. No.	Position No.	Consolidated Emolument	Year 1	Year 2	Year 3	Total

Sub-Total (B.1) =

B.2 **Consumables**

S. No.	Item	Quantity	Year 1	Year 2	Year 3	Total

Sub-Total (B.2) =

Other items	Consolidated Emolument	Year 1	Year 2	Year 3	Total
B.3 Travel					
B.4 Contingency					
B.5 Overhead **(If applicable)**					1
Sub-total of B (B.1+B.2+B.3+B.4+B.5)					
Grand Total (A + B)					

Note : Please give justification for each head and sub-head separately mentioned in the above table.

Financial Year : April - March

In case of multi-institutional project, the budget estimate to be given separately for each institution.

C. Budget –component-wise – contributed by the organization (only in case of private R&D institute/ Industry) and that being sought from NMPB

PART V : EXISTING FACILITIES

Resources and additional information

1. Laboratory:

    a. Manpower

    b. Equipments

2. Other resources such as clinical material, animal house facility, glass house. Experimental garden, pilot plant facility etc.

PART VI: DECLARATION/CERTIFICATION

It is certified that

a) The research work proposed in the scheme/project does not in any way duplicate the work already done or being carried out elsewhere on the subject.

b) The same project proposal has not been submitted to any other agency nor shall be submitted for financial support.

c) The emoluments for the manpower proposed are those admissible as per the approved emoluments of NMPB.

d) If the project involves the utilisation of genetically engineered organisms, we agree to submit an application through our Institutional Biosafety Committee. We also declare

that while conducting experiments, the Biosafety Guidelines of the Concerned departments would be following in toto.

e) If the project involves field trials/experiments/exchange of specimens, etc. we will ensure that ethical clearances would be taken from concerned ethical Committees/Competent authorities and the same would be conveyed to NMPB before implementing the project.

f) It is agreed that any research outcome or intellectual property right(s) on the invention(s) arising out of the project shall be in accordance with the decision of NMPB, Department of AYUSH.

g) The institute/university agrees that the equipment, other basic facilities and such other administrative facilities will be extended to investigator(s) throughout the duration of the project.

h) The Institute/organisation assumes to undertake the financial and other management responsibilities of the project.

i) The organization shall abide by all the 'Terms and Conditions' of the grant stipulated in the operational guidelines of the scheme of NMPB, Department of AYUSH, Government of India.

j) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the Department of AYUSH or its authorized representatives.

k) Project shall be open for evaluation of physical progress and utilization of funds at the discretion of Department of AYUSH.

l) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.

m) Department of AYUSH shall have the right to recover the grant or take legal action against the organization for any default or deviation from the terms and conditions of sanction of grant.

n) No financial assistance/grant has been sought and or obtained from any Central of State Govt. organization.

Signature of Principal Investigator :

Date :

Signature of Co-Investigator
Date :

Signature of Co-Investigator
Date :

Signature of Project Coordinator
(applicable only for multi-institutional projects)
with seal

Date :

Signature of Executive Authority of Institute/University

Date :

PART VII: PROFORMA FOR BIOGRAPHICAL SKETCH OF INVESTIGATORS

Provide the following information for the key personnel in the order listed on PART II. Follow this format for each person. **DO NOT EXCEED THREE PAGES**

Name : .....…….....
Designation :…….....

Department/Institute/University : .....

Date of Birth : ..... Sex (M/F) ..... SC/ST : .....

Education (Post-Graduation onwards & Professional Career)

Sl No.	Institution Place	Degree Awarded	Year	Field of Study

Position and Honors

Position and Employment (Starting with the most recent employment)

Sl No.	Institution Place	Position	From (Date)	To (date)

Honors/Awards

Professional Experience and Training relevant to the Project

B. Publications (Numbers only) .....

Books : ..... Research Papers, Reports : .....General articles :.....

Patents : .....Others (Please specify) :.....

Selected peer-reviewed publications (Ten best publications in chronological order)

Research Support
Ongoing Research Projects

Sl No.	Title of Project	Funding Agency	Amount	Date of sanction and Duration

Completed Research Projects (State only major projects of last 3 years)

Sl No.	Title of Project	Funding Agency	Amount	Date of completion

Place : **Signature of Investigator**
Date :