DATABASE OF SUMMARIES OF FINAL TECHNICAL REPORT

Submitted to:

जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

MINISTRY OF ENVIRONMENT & FORESTS
Government of India,
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REPRODUCTIVE BIOLOGY AND GENETIC DIVERSITY OF THREE ECONOMICALLY USEFUL FOREST TREE SPECIES OF WESTERN GHATS

PI: Prof A. K. Bhatnagar
Environmental Biology Laboratory
Department of Botany
University of Delhi
Delhi – 110007

Budget: 24,26,544/- (Sanctioned)

Infrastructure created: 9,68,400/-

Date: 1/12/2002 to 31/3/2006

Extension: 1/12/205 to 31/3/2006

Output:

- *B lanzan*, *V indica* and *T chebula* were bisexual and entomophilous, where anthesis was followed by another dehiscence.
- *Garinia indica* was a gynodioecious tree in which anther dehiscence occurred 15-20 minutes prior to anthesis.
- In vitro pollen germination was highest in 15% sucrose solution but for *V indica* it was 10%.
- In each species, stigma was most receptive at the time of anther dehiscence.
- The fruits and seeds of *G indica* and *V indica* collected from Yellapur and Kozhikode respectively were richer in protein and carbohydrate content.

Objectives:

Investigation of:

- Phenology and reproductive biology of tree species namely *Buchanania lauzan, Garcinia indica*, *Vateria indica* and *Terminalia chebula*.
- Pollination mechanism, including agents, pollen viability and pollen tube growth.
- Seed biology, including seed dormancy, viability, germination, soil seed bank, stress tolerance phenomena, seedling recruitment, seedling growth and seed dispersal mechanism.
- Breeding system and incompatibility mechanism
- Genetic diversity in morphologies anatomical, reproductive and economic traits.

STUDY ON MUTUALISM BETWEEN Cullenia exarillata AND VERTEBRATE COMMUNITY IN THE TROPICAL RAINFOREST ECOSYSTEM OF SILENT VALLEY, KERALA

PI: Dr. T.S. Nayar
Division of Conservation Biology
Tropical Botanic Garden and Research Institute,
Palode
Thiruvananthapuram-695562, Kerala

Date: 10.08.1999 to 9.02.2004

Extension: 1 year 6 months

Budget: 11,89,008/-

Objectives:

- To investigate the vertebrate dependency on *Cullenia* for resource supply and dependency of *Cullenia* on vertebrates for seed dispersal and pollination in Silent Valley
- To study dispersal mechanism and survival strategies of *Cullenia*
- To study adaptation pattern of dependent vertebrates for receiving the reward of food, nectar and pollen and degree of co-evolution, if any, with respect to *Cullenia*
- To investigate the role of *Cullenia* in sustaining vertebrate life and role of vertebrates in establishing *Cullenia* as a dominant species in the ecosystem

Patents developed:

Outputs:

The study has produced information on the mutualism between *Cullenia exarillata* and vertebrate community:

- All vertebrates taking rewards from *Cullenia* do pollinate flowers but not all disperse the seeds
- There are no specific groups adapted to either pollinate the flowers or disperse the seeds
- No vertebrate has any specific co-evolved characteristics for pollination or seed dispersal
- *Cullenia* can survive even if a particular vertebrate species is eliminated but not vice versa, specially the Lion tailed macaque and Nilgiri langur who have only a narrow range of food species in the ecosystem

Target sector: Researchers, Conservation personnel

Cost effectiveness:

Infrastructure created: Permanent equipment worth 3,34,615/-

Capacity building: 1 PhD

Knowledge creation:

UTILISATION OF IMPORTANT FOREST PRODUCES FROM EASTERN AND WESTERN GHATS AS NATURAL FOOD ADDITIVES

PI: Dr. L. Jagan Mohan Rao,
Scientist
Plantation Products, Spices and Flavour Technology Department
Central Food Technological Research Institute
Mysore – 570 020

Date: 30.1.2003 to 29.7.2006

Extension: 6 months

Budget: 461000/-

Infrastructure created: Nil

Objectives:

- To undertake the systemic chemical examination of the roots of the selected plant species viz., *Decalepis hamiltonii* and *Hemidesmus indicus*
- Systemic studies on the active conserves/ constituents for application as food additives.
- Process development for the production of the volatile oils and isolates from the selected plant materials.

Outputs/Achievements:

- Isolation methods of total volatiles of roots of *D. hamiloni* and *H. indicus* have bee optimized at laboratory level as well as pilot plant levels and determination of chemical composition.
- Comparison of chemical composition of volatiles of roots of both species with reference to the biogenesis, sensory and flavour characteristics.
- Process for the isolation of major volatile compound viz., 2-hydroxy-4 methoxybenzaldehyde (HMB, an isomer of vanillin) were optimized.

Knowledge creation: 5 papers/presentation

Capacity building: none

Patents:

- A process for 2-hydroxy-4-methoxy benzaldehyde, a natural food flavourant from the Swallow roots (*Decalepis hamiltonii* Wight Arn.)
- A process for preparation of antioxidant conseve from the roots of Indian sarsaparilla (*Hemidesmus indicus* R.Br.*)*
- Stabilized flavourant from swallow roots (*Decalepis hamiltonii* Wight Arn.)
- A process for the radical scavenging conserve from the roots of *Decalepis hamiltonii* Wight Arn
- A process for the isolation of essential oil from the roots of Indian sarsaparilla (*Hemidesmus indicus* R.Br.*)*
- A process for flaovoured tea using a natural flavourant, 2-hydroxy,4-methoxy benzaldehyde (HMB)

BIOSYSTEMATIC STUDIES ON THE EULOPHID PARASITOIDS (HYMENOPTERA: EULOPHIDAE) OF KERALA STATE, INCLUDING SOUTH WESTERN GHATS

PI: Dr. T. C. Narendran
Systemic entomology laboratory,
Department of Zoology,
University of Calicut,
Tengipalam, Kerala – 673635

Date: 17.9.2002 to 17.9.2005

Extension: none

Budget: 12,08,204/- (sanctioned) ; 10,88,675/- (received)

Infrastructure created: 3,00,000/-

Objectives:

- To make an inventory (both genera and Species) of the Eulophid fauna exists in Kerala, including Southern Western Ghats.
- To describe new taxa and redescribed little known taxa of Eulophidae.
- To prepare workable dichotomous keys for the identification of species and Genera of Eulophidae.
- To gather information on the habitat, host etc of Eulophidae.
- To identify and assess as far as possible the potential of species of Eulophidae to serve as biological control agents of pests of crop plants.

Outputs:

- An inventory of Eulophid fauna, which includes 58 genera and 310 species in addition to the newly inducted 8 genera, 1 sub species and 31 species.
- 7 genera were recorded for the first time from Oriental region. 8 genera were reported new from India in which 3 are second reports from Oriental Region itself.
- Description of new taxa: 8 genera, 1 sub genus and 31 species were identified and described along with their comparative study with related genera and species.
- Identification of species which can as biocontrol agents for pests of crops and other economically important plants. For example: *Pediobius foveolatus* Crawford on *Epilachna* beetles infested on Brinjal.

Capacity building:

SRF: 2
JRF:
TA:
FA: 1
Phd: 1
M.Phil: 1

Application- Target sector: Researchers in Systematics and biodiversity
Students of entomology
Agricultural & biological control workers

Linkages: ATREE, Bangalore

Knowledge creation: 16 papers/presentations

TREATMENT AND UTILISATION OF LIQUID AND SOLID WASTE MATERIAL GENERATED IN CHROME TANNERIES, NATIONAL FERTILISER AND STEEL PLANTS

PI: Prof A. K. Jain
Department of Chemistry
Indian Institute of Technology
Roorkee -247667

Budget: 8,74,753/-

Date: 12.8.1998 to 31.3.2002

Extension: 8 months

Objectives:

- To develop selective membrane ion sensors for determining toxic heavy metals.
- To use solid waste from fertililizer and steel plants as low cost adsorbents for pollutants

Outputs:

- Two ion sensors based on PVC membranes employing pyrimidine derivatives as electroactive phase have been developed and found selective to Hg
- Wastes viz. blast furnace slag, dust and sludge from steel plant and carbon slurry from fertilizer plant have been used as adsorbents after processing. It has been found that carbonaceous adsorbent prepared has good capacity for two important organic pollutants viz. phenols and dyes and a comparison of the results on this adsorbent with standard activated charcoal sample shows that the prepared adsorbent is about 50-90% as efficient as standard activated carbons in the removal of organics.

Knowledge creation: 3 papers

Capacity building: 2 PhD

Cost effectiveness:

Patents developed:

Infrastructure developed: Nil

RECYCLING OF CHROMIUM FROM METAL FINISHING WASTE WATERS USING ELCTROCHEMICAL ION EXCHANGE

PI: Dr. C. Ahmed Basha
Central Electrochemical Research Institute
Karaikudi- 630006
Tamil Nadu

Date: 1.08.2002 to 31.07.2005

Extension: none

Budget: 5.3383 lacs

Infrastructure: amount not given

Objectives:

Main objective is to develop and characteristic new environmental technology combining ion-exchange resin and IEX membrane for physical removal and concentration of dissolved chromate for direct return to plating bath.

Outputs:

An electrochemical ion exchange reactor was fabricated for Cr (VI) removal using stainless steel as cathode and RuO_2/Ti as anode. This method combines ion exchange and electro dialysis and is used for the removal and concentration of chromate ions from effluent.
The process has been proved to be both robust and reliable.

Knowledge creation: 5 papers published/presented

Capacity building:

3 M. Tech
1 B. Tech

Application-target sector: Industries using Chrome, State pollution control board

SEED TECHNOLOGY OF FOREST TREES – POST HARVEST HANDLING & EX-SITES STORAGE

PI: Dr. S. C. Naithani
Seed Biology lab
School of Life Sciences
Pt. Ravushankar Shukla University
Raipur – 492101, Chattisgarh

Date: July 01, 2001 – Dec. 30, 2004

Extension:

Budget: 1179396/-

Objective:

- To improve the sustainable forest management and conservation of tree diversity through adequate conservation and handling technology of forest tree genetic resources.
- To generate the database on recalcitrant/intermediate storage behavior of tropical tree seeds for long term management of broad genepool in seed banks
- To develop and optimize effective and low input techniques for seed handling, ex-situ storage for short, medium and long term storage and monitoring germinability of the seed stock, for a umber of socio-economically valuable tropical forest tree species.

Outputs:

Sample yet effective technology have been proposed to improve & synchronize the germination that's the foremost & highly desirable attribute in the production & maintenance of economically viable nursery

Application – Target sector Agriculture & Agroforestry sector

Cost effectiveness:

Infrastructure created: 200000/-

Capacity Built:

Knowledge creation: Research paper – 2

MANAGEMENT OF MAJOR INSECT PESTS OF RICE AGROECOSYSTEM WITH ECO-FRIENDLY NEEM BASED FORMULATIONS

PI: G.S. Dhaliwal
Professor of Ecology
Department of Entomology
Punjab agricultural University
Ludhiana - 141004
Keyword/s

Date: 1.10.1998- 31.3.2002

Extension: 1.10.2001 to 31.3.2002

Patents developed:

Budget: 11,80,790/-

Objectives:

- To study the types of effects such as toxic, antifeeding , growth regulating and sterilizing produced by neem formulations on insect pests in laboratory and screenhouse.
- To evaluate different neem based formulations for dose-efficacy and economic relationships.
- To stud the bioactivity of these formulations against natural enemy complex of rice agro-ecosystem in the laboratory as well as in the field.

Outputs:

The study was to evaluate the high potency azadirachin-rich neem formulations for their effect on major insect pests of rice and their natural enemies, so that the pesticide load in rice ecosystem could be reduced.

Application – Target sector: Rice Agriculture

Cost effectiveness:

Infrastructure created: 1,10,000/-

Capacity Built: No Phd

Knowledge creation: 12 papers

ENVIRONMENTAL IMPACT OF LONG-TERM COAL MINING IN ASSAM WITH PARTICULAR REFERENCE TO HEAVY METAL POLLUTION OF WATER BODIES

PI: Dr. Krishna G Bhattacharya
Professor, Department of Chemistry
Gauhati University, Guwahati – 781014, Assam

Budget: 19,21,133/-

Date: 1.7.2001 to 3.6.2004

Objectives:

- To collect water samples from different sources of water in the coalfield area like rivers, ponds, wells, tube wells and streams.
- To analyze the collected water samples with respect to general water quality parameters with particular emphasis on possible inputs from waste generated during the mining activities.
- To collect soil samples from paddy fields and other areas in the coalfields and bed sediments from water bodies likely to have received effluents from the coalfields.
- To analyse the soil samples with respect to various physico-chemical parameters particularly with respect to heavy metal inputs.
- To arrive at conclusions fro the analysis of the data about the extent of damage, if any, done to the water bodies, sediments and soil by continuous, long term coal mining activities with particular reference to the accumulation of heavy metals and also to undertake chemical speciation studies.

Outputs:

The study will add to the database of major coal producing sites in the country.
The results of this study should be helpful in devising means for mitigating the critical problem of acid mine drainage in coalfields.

The key findings are:

- The water (both surface and ground water) is contaminated with acidic runoff from the mines giving rise to very low pH in water at many locations. The stream water has also very low pH at several locations.
- The water sis having high ionic concentration due to the presence of carbonate, chloride, sulphate. Alkali and alkaline earth metals, iron, etc.
- The high acidity of the water has led to a high concentration of heavy metals As, Pb, Cd, Cr, Mn, Hg, Ni, Co, etc.
- The soil and the sediment from the area are also highly contaminated and show accumulation of the heavy metals

Infrastructure created: 15,00,000/-

Knowledge creation: 7 papers

Cost effectiveness:

Extension: none

Patents developed:

Capacity building: 1 PhD

RECLAMATION OF POLLUTED SOILS OF TAMIL NADU AND USING MYCORRHIZAL FUNGI AND THEIR APPLICATION OF AFFORESTATION

PI: Dr. N. Raman
Centre for Advanced Studies in Botany
University of Madras
Guindy campus
Chennai

Date: 9.12.1994- 8.12.1997

Extension:

Budget: 1204076/-

Objective:

- Study of mycorrhizal status of Tannery effluent polluted in Tamil Nadu
- Isolation and identification of mycorrhizal fungi from tannery effluent polluted soils of North Arcot district of Tamil Nadu.
- Analysis of the effluent polluted oils
- Selection of suitable tree species for effluent polluted soils
- Selection of effluent tolerant mycorrhizal symbiont and mass multiplication
- Using efficient mycorrhizal fungi to reclaim he effluent polluted soils with potential tree species.

Outputs:

To study the status of mycorrhiza in effluent polluted soils of Tamil Nadu by isolating VAM fungi fro heavy metal polluted soils, mass multiplication and reclamation of polluted soil with potential tree species inoculated with mycorrhizal fungi.

Application – Target sector: Tannery industries & State Pollution Control Board

Cost effectiveness:

Infrastructure created: 513145/-

Capacity Built: 1 PhD

Knowledge creation: 2 papers

FIELD TRAIL FOR PREPARING COMMON MASONRY BRIDES UTILIZING LAKWA OIL FIELD

PI: Dr. Pinaki Sengupta
Scientist E(II)
Regional Research Laboratory
Jorhat-785006
Assam

Date: 01.09.2003 to 28.02.2005

Budget: 3,84,100/- (Sanctioned)

Infrastructure: NIL

Objective:

Field trial of the process for preparing common masonry bricks, developed at RRL, Jorhat, at commercial brick field

Capacity building: No PhD

Knowledge creation: 2

Patents: NIL

Cost Effectiveness:

Application: Target Sector

1. State Pollution Control Board
2. Brick Kiln owners
3. ONGCL

Output:

The field trial of bricks prepared by partial replacement of raw material used in making masonry bricks by the sludge were successful.

The advantages of this technology:

- Disposal of hazardous oil field ETP sludge through economic way.
- Died green bricks (sludge-mixed bricks) are not destroyed by rain water infestation.
- Additional profit of Rs. 16,500/- per 1 lakh brick utilizing sludge over normal water mixed brick.
- Fuel saving: 35 ± 5% wrt normal brick
- Fire time saving: 40 ± 10% wrt normal brick

UPGRADING THE QUALITY OF EFFLUENTS (WITH SPECIAL REFERENCE TO HEAVY METALS) BY UTILIZATION OF WASTE MATERIAL

PI: Dr. R.K Srivastava
Deptt of Botany & environetal Science
Govt. Autnomous Science College
Jabalpur -482001
Keyword:

Date: 1.3.1998 to 28.2.2001

Extension: none

Patents developed: Nil

Budget: 13,34,306/-

Objectives:

- Removal of heavy metals from industrial effluents synthetically made effluents using different waste materials
- To find out the optimum quantity of different waste materal for removal of heavy metals
- To estimate the heavy metal removal efficiency of saw dust of different plant species
- To evaluate removal efficiency of a waste material, for different combinations of heavy metal waste water
- To evaluate removal efficiency of a waste material, for different combinations of heavy metal waste water.

Outputs:

The results are highly encouraging. Almost all the waste material (adsorbents) are efficient in removing heavy metal pollutants from the waste water. All these waste materials are locally and easily available without any extra expenditure.

By the development of this technology, there are manifold advantages:

- Minimization of solid waste
- Elimination as well s best possible utilization of fast growing weeds
- A simple and low cost technology for pollution control.

Application – Target sector: Industries discharging heavy metal effluent

Cost effectiveness:

Infrastructure created: 5,30,000/

Capacity Built: 3 Phd

Knowledge creation: 7 Publications

BIODIVERSITY & EFFICACY OF LOCALLY AVAILABLE PLANT/OBNOXIOUS WEEDS AGAINST INSECT-PESTS DISEASES OF OIL SEED CROPS IN HP

PI: Dr. Ajai Srivastava
Scientist (Entomology)
CSK Himachal Pradesh Krishi Vishwavidyalaya
Shivalik Agricultural Research & Extension Centre,
Kangra-176001

Date: 22-9-2001 to 31-12-2004

Extension: 4 months

Budget: 9,50,209/-

Objectives:

- Survey of different localities of Himachal Pradesh to know about the biodiversity of abnoxious weeds as well as certain other plants.
- Standardization of extraction methods and formulations of the botanicals will be worked out in consultation with the experts in the field.
- Testing of botanicals I laboratory conditions as well as on spatial populations of pest in the field keeping in view its cost –effectiveness.

Outputs:

Antifeedant/ Repellant formulation from Eupatorium leaf extract has been developed at Shivalik Agricultural Research & Extension Centre of Himachal Pradesh Krishi Vishvavidyalaya Palampur which not only adds value to wild plant abundantly available in Himalayan waste land Int. also offers a natural insect pesticide to farming community. It's bio-efficacy is better & very bio-degradable the plant based formulation has no harmful residual hazard when applied in the field or under storage condition for the control of various insects-pests.

Application – Target sector:

- National Research Development Co. New Delhi
- Margo International
- IARI Scientists
- Rothamsted, UK
- Krishi Vigyan Kendra

Cost effectiveness:

Patents developed: 5

Infrastructure created: 311989/-

Capacity Built: 1 Research fellow, Training

Knowledge creation: List of Publication in, Journals – 8

Training programme – 5

PLANT GALL ECOLOGY IN SCRUB FOREST ECOSYSTEM

PI: Dr. Amerjyothy
Department of Botany
Presidency College
Chennai-600 005

Date: 1.6.2001 to 1.6.2004

Budget: 8,51,834/-

Extension: nil

Infrastructure created: nil

Objectives:

- Exploring the major scrub-thickets of South India and recording of all new and little known galls.
- Identification of the gall –bearing plants and gall-inducing insects.
- Recording the data pertaining to habit, habitat, phenology and economic uses of the host plant, observations on frequency, distribution and severity of the galls.
- Anatomical features of the galls and the extent of deviation of the structure from the corresponding normal organs.
- Critical analysis of morphogenetic and histogenetic phenomena involved during development of the galls.
- Screening the chemical compounds of the galls for pharmacological and biological applications.
- Ecology of the galls and its role in the scrub forest ecosystem.
- Economic aspects of damage of the host-plants due to galling.
- Galls of economic utility.

Outputs:

The study created a database of 324 galls occurring on plants belonging to 185 species, 131 genera and 58 families.

- Out of 324 galls recorded from 59 forests, 177 galls were found to be recorded for the first time.
- About 40% of the galls found are assigned to be endemic to scrub forests of South India.
- It was found that, the gall insects are preferential not only in their choice of the plant species; they are also highly specific to the plant organs and tissues. The lamina or leaf-blade is the most favored organ for galling.

Knowledge creation: 11 papers/ presentation

Capacity building: 1 PhD

EFFECT OF FOREST FIRE ON FLORISTIC & SPECIES DIVERSITY OF CHIRPINE FORESTS OF MID-HILLS OF HIMACHAL PRADESH

PI: Dr. Vidya Thakur
Department of Tree Improvement and Genetic Resources
University of Horticulture & Forestry
Nauni, Solan -173230

Date: 1 Sep 2001 – 31 Aug 2004

Extension:

Budget: 491220/-

Objectives:

- To assess present state of species diversity, composition, dominance and richness in chirpine forests of mid-hills with reference to effect of fire.
- To assess regeneration trend of chirpine in fire affected areas and
- To evaluate impact of fire and management practices on chirpine forests.

Outputs:

The project studied the impact of forest fires on floristic and species diversity of chirpine forests. It formed the base to access the role of forest fire ecology in sustainable forest management.

Application – Target sector: Forest departments

Cost effectiveness:

Infrastructure created: 20000/-

Capacity Built: JRF -2

Knowledge creation: Research papers = 3

FIELD STUDIES ON THE FORAGING ECOLOGY OF THE PAINTED STORK (*MYCTERIA LEUCOCEPHALA)* IN RELATION TO THE TROPHIC DYNAMICS OF CHOSEN FRESH WATER WETLANDS

PI: Dr. A.J. Urfi
Reader and Head
Department of Environmental Biology
University of Delhi

Date: 01.05.2003 to 30.04.2006

Extension: nil

Budget: 13,62,700/-

Objectives:

- To understand the role of aquatic birds in the structure and dynamics of food webs in fresh water wetlands by focusing on the nesting pattern and food resource availability of Painted Stork.
- To examine whether the Painted Stork exercises prey size selectivity, and if it differs in the pre-breeding and post-breeding phases.
- To examine the linkages between foraging behaviour and nesting pattern.
- To conduct a thorough literature review on the biology of the Painted Stork with respect to the diet, foraging habits and nesting pattern on a sub-continental basis.

Patents developed:

Outputs:

- Flock sizes were observed to be bigger in non-breeding season due to lesser availability of foraging sites.
- Correlation was observed between flock size and foraging pattern.
- Site preference with respect to vegetation cover of water was observed.
- Differences in prey size taken with respect to age of chick and breeding and non-breeding seasons were recorded.
- Site preference with respect to pH and DO of water was observed.
- Association with other water birds was recorded.
- Clutch sizes were observed to have decreased as compared to data from 1960s. Also early nesters were found to have bigger clutch sizes as compared to late nesters.
- Predation by other birds was observed to be the prime cause of egg loss.
- Positive correlation was observed between monsoon arrival date and Painted Stork arrival date, and also between monsoon rainfall and number of nests.
- Strong tendency towards positive assortative pairing was observed

Target sector: Researchers, Conservation personnel, Ecologists

Cost effectiveness:

Infrastructure created: Permanent equipment worth 2,30,584/-

Capacity building: 2 PhD

Knowledge creation: 5 publications

STUDIES ON THE DIVERSITY OF ALEYRODID (ALEGRODIDARE: HOMOPTERA) FAUNA OF SOUTH WESTERN GHATS

PI: Dr. R. Sundararaj, Scientist-D
Biodegradation Division
Institute of Wood Science & Technology
(Indian Council of Forestry Resource & Education)
18th Cross, PO Malleswaram, Bangalore-560 003

Date: 01.11.2000 to 31.10.2002

Budget: 2,98,138/-

Infrastructure created: 39780 /-

Objective:

The study aims to provide a database of Aleyrodid fauna of South Western ghats.

Outputs:

This is the 1st intensive survey for the aleyrodid fauna of Western Ghats of South India.

- A total of 164 species under 43 genera of the family Aleyrodidae were collected & identified to species level; of which 50 species are found new to science. In addition 7 already known species were re-described & illustrated
- 3 species of whiteflies 50 far known from other countries have been noticed to occur in India for the 1st time
- The study also necessitated the erection of 2 new genera to accommodate those species & differed in their structural features from the characteristic features of all known genera.
- 3 species of whiteflies were synchronised & 3 new combinations were proposed.
- Intra-specific variation was observed for the 1st time & the earlier observation of polymorphism in one species was confirmed.
- It also resulted in identification of new host for many already known species.

Knowledge creation: 5 papers published/presented

Capacity Building: 1 PhD

Patents developed:

Cost Effectiveness:

DIVERSITY OF MEIOBENTHIC FAUNA OF COASTAL LINE OF TAMILNADU

PI: K. Altaf
Department of Zoology
The new College
Chennai-600014

Date: 3.10.2002 – 2.10.2005

Extension: Nil

Budget: 1254716/-

Objectives:

Study aims to carry out investigations carried out under diversity, density, biology and ecological aspects of meio fauna in three stations of Chennai coast over a period of three years.

- To study the diversity of meiobenthic fauna in Pulicat, Royapuram and Marina beach stations of east coast of India.
- To study the ecology of meiofuana from Pulicat to Marina beach.
- To assess the impact of pollution on meiofauna.

Outputs/Achievements:

- One hundred and five species of meiofauna belonging to different phylogenic groups is reported from Pulicat, Royapuram and Marina Stations.
- Granulometry and physicochemical parameters showed similar range in all the stations and heavy metals such as Copper, Chromium, Cadmium, Lead and Zinc content was mostly below detection level.
- Nemertines, Gastrotrichs, Sipunculans, Thermosbaenacean, Cumacean, Halacarids, Collembolans, Gastropods and Holothurians are reported from Chennai coast for the first time.
- Biology of *Leptastacus euryhalinus* and *Cylindropsyllus* sp. Is reported and their potential as live feed is indicated.
- Meiofauna showed considerable decrease in the density due to the impact of tsunami nevertheless recolonization was evident in about a week time.

Application – Target sector: Researchers, Scientists

Cost effectiveness:

Infrastructure created: 2,75,000/-

Patents Developed:

Capacity Built: 2 PhD

Knowledge creation: 5 papers

DYNAMICS OF THE ORTHOPTERAN COMMUNITY OF TAMIL NADU: A STUDY IN BIODIVERSITY

PI: Dr. M.C. Muralirangan
G. S. Gill Research Institute
Guru Nanak College
Chennai- 600042

Date: 01.12.2000 to 30.11.2003

Extension: nil

Budget: 1261320/- (sanctioned)

Objectives:

- Distribution and assessment of orthopteran species diversity in grassland, cropland, wasteland and forest ecosystems of Tamil Nadu along latitudinal, altitudinal and humidity gradients, taking into consideration
    - Colored morphs in varied ecological niches;
    - Analysis of habitat and host-related chromosomal diversity
    - Haemolymph – isozyme and haemocyte profiles in the following genera Oxya (Acrididae), Conocephalus (Tettigoniidae) and Euscyrtus (Grylidae)
- Trophic diversity through analysis of feeding behavior and host selection strategies and feeding guilds.
- Impact of anthropogenic landscape change on Orthopteran diversity
    - Effect of cropping system
    - Effect of insecticides/pesticides
- Biodiversity conservation priorities of Orthoptera through assessment of economic value of species information and contingent evaluation from environmental perspective.

Outputs:

- One of the major outputs is systematic inventory of Orthopteran fauna of Tamil Nadu. This provides an insight into the complex of factors affecting their distribution, diversity and among others, the interaction between biotic and abiotic agents.
- Studies on the chromosomal and haemolymph isoenzyme diversity of orthopteroid complex has also been attempted.
- The project has also provided an economic value for the orthopteran species using contingent evaluation protocol.

Application- target sector: Researchers,

Cost effectiveness:

Key words:

Capacity building: 1 PhD

Infrastructure created: 90,000/-

Patents:

Knowledge creation: 5 papers

BIOIVERSITY AND GROUNDWATER –SURFACE AWTER ECOTONE (HYPORHEIC HABITAT) OF MOUNTAIN FLUVIAL ECOSYSTEM OF GARHWAL HIMALAYA

PI: Dr. Ramesh C. Sharma
Department of Environmental Sciences
H.N.B. Garhwal University, Post Box -67
Srinagar - Garhwal, 246174
E.mail: drrameshcsharma@yahoo.com

Date: 5.9.1998 to 4.9.2002

Budget:

Sanctioned: 10,73,783/-

Received:

Objective:

The present study was aimed at obtaining the following information:

- Analysis of various physico-chemical and environmental variables (size of gravel and sand, temperature, conductivity, turbidity, total dissolved solids, pH, dissolved oxygen, free carbon dioxide, total alkalinity, nitrates, phosphates, biochemical oxygen demand, etc.) of hyporheic biotope of Alaknanda.
- Abundance and diversity of organisms dwellings hyporheic zone of the hill stream Alaknanda.
- Identification of natural and anthropogenic factors influencing aquatic biodiversity of the river Alaknanda
- Conservation and management of hyporheic biodiversity of hill streams of Garhwal Himalaya.

Outputs:

The present study aims to fill up the gap in the human knowledge on the hyporheic biodiversity of Indian waters in addition to its applied value. This study will also be instrumental for the management of this vulnerable biotope of hill streams of Garhwal Himalayas. Thus, the present work has an academic as well as applied value.
Some of the key findings are as under:

- Ambient temperature at the river Alknanda was recorded to be minimum in January ($13^{o}C$) and maximum in June ($27^{o}C$). Seasonally, it fluctuate from $15.8^{o}C$ (winter) to $27^{o}C$ (summer). Water temperature of hyporheic zone was higher than the temperature of surface water. It increased with the increase in depth.
- Conductivity of hyporheic zone was higher than that of surface water and was found to increase with the increase in depth.
- Turbidity of hyporheic zone was lower than surface water and was found to decrease with increasing depth. Seasonally, it was minimum in winter and maximum in monsoon seasons.
- The total dissolved solids concentration of hyporheic zone was higher than that of the surface water. It was recorded to be minimum in the month of December and maximum in August and respectively at different depths. Seasonally, it was maximum in monsoon season at all the three hyporheic depths of the river Alaknanda during the course of study.
- pH of hyporheic zone was lower than surface water. It was observed to be minimum in the month of July and maximum in January. Seasonally, it was minimum in monsoon and

maximum in winter season at all the three hyporheic depth of the river Alaknanda during the course of study.

- Dissolved oxygen of hyporheic zone was lower than surface water. It was found to decrease with increasing depth.
- Free carbon dioxide of the hyporheic zone was observed to increase with the increase in depth. It was observed to be minimum in the month of November and December.
- Total Alkaninity of hyporheic zone of the river Alaknanda was less than surface water and it showed a slight decrease with increasing depth.
- In the hyporheic zone, nitrates decreased with increasing depth.
- In the hyporheic zone, phosphates increased with increasing depth.
- Biochemical oxygen demand increased with the increase in hyporheic depth.
- Water temperature was positively correlated to total dissolved solids.
- Microzoobenthos of hyporheic biotope were represented to 17 genera and 14 genera at the depth of 15 cm, they included 19 genera and 16 genera. However at the depth of 50cm, they were represented by 19 genera at and 16 genera at and were absent from.
- Hyporheic macrozoobenthos showed a significant positive correlation with conductivity, dissolved oxygen and total alkalinity. However, they showed a significant negative correlation with nitrates and biochemical oxygen demand.

Application – Target sector: Researchers, Water resources department

Cost effectiveness:

Infrastructure created: 2,30,000/-

Capacity Built: 1 PhD

Knowledge creation: 2 papers published

ECOLOGY OF INTER-TIDAL ZONE OF THE OPEN SAURASHTRA COAST, GUJRAT

PI: Dr. R Sen Gupta
Gujarat Ecology society
Synergy House, Subhanpura, Vadodara -390023
Gujarat

Date: 01.04.2003 to 31.03.2005

Extension: none

Budget: 10,16,248/- (sanctioned)

Objectives:

- Survey of the Saurashtra coast intertidal zone from Dwarka to Bhavnagar and identify areas with rich marine biodiversity.
- Detailed ecological studies including physico-chemical parameters on the shore and in the surf zone.
- Study on the benthic flora and fauna inter-relationship
- Documentation and mapping on the findings for future reference and comparisons between the existing and the pre-earthquake ecology
- Socio-economic of the sites for drawing management plans.
- Outline of a broad Environmental management Plan for the coastal stretch from Dwarka to Bhavnagar.

***Outputs*:**

The present study collected data covering hydrography, phytoplankton, zooplankton, benthic macrofauna, macroflora from the intertidal region between Dwarka and Bhavnagar. Some of the key findings are:

a. The primary productivity as phytoplankton cell count and its species diversity was maximum at Mul Dwarka and minimum at Alang during March 2004.
b. A total of 78 species of phytoplankton were recorded the study.
c. The micronutrients NO_3 – N and S_1O_4-Si registered elevated values at the stations located on the coast of the Gulf of Khambat compared to the stations on the open coast of the Arabian Sea during both the years.
d. Around 33 species of macro algae were found with decreasing abundance from Dwarka to Gopnath with increasing suspended matter in water.
e. Zoo plantation study indicated that *Foraminiferans* were the dominant group at all stations.

Keywords:

Patents: None

Application-target sector: Environmental planners, researchers

Knowledge creation: 1 paper published

Capacity building: no phd

Infrastructure created: 1,03,334/-

Cost effectiveness:

DOCUMENTATION OF TRADITIONAL KNOWLEDGE OF MEDICINAL PLANTS HELD BT BHOTIAS OF DHARCHULA IN UTTARANCHAL STATE: POTENTIAL FOR DEVELOPMENT OF NEW DRUGS

PI: Dr. K.K. Aggarwal
University School of Biotechnology
Guru Gobind Singh Indraprastha University
Kashmere gate, Delhi - 110006

Date: 5.4.2004 to 4.4.2006

Extension: Nil

Budget: 7,10,160/-

Infrastructure created: 1,90,000/-

Objectives:

- To explore Dharchula ranges rich in medicinal plants;
- To visit Bhotia villages and interact with local people;
- To document knowledge held by the local inhabitants about traditionally used medicinal plants.

Outputs:

- The ethnobotanical studies of Dharchula range revealed that over 54 species form the basis of traditional health care system of Bhotia community.
- Out of the 54 species, more than 50% of the species fall under threatened category.
- The new information has been documented for 10 species. The economic potential of the plant resources of the region is very high and the probability of discovering a new drug or product of industrial value is very high.

Knowledge creation: 3 papers

Capacity building: 1 PhD

Cost effectiveness:

BIODIVERSITY CONSERVATION, EVALUATION AND CHARACTERIZATION OF INDUSTRIAL LEGUMES AND GRASSES ADAPTED TO ARID ECOSYSTEM

PI: Prof. M. L. Saini
Department of Plant Breeding
CCS Haryana Agricultural University, Hisar -125004

Date: 1.06.2003 to 31.05.2005

Extension: None

Budget: 15,80,390/-

Infrastructure: not given

Objectives:

- Survey, collection, maintenance and evaluation of arid legumes and grasses of industrial use.
- Establishment of in situ gene bank of arid legumes and grasses at CCS Haryana Agricultural University, Regional Research Station, Bawal, Distt. Rewari (Haryana)
- Characterization, clustering and cataloging of different species of arid legumes and grasses of industrial use.

Outputs:

Knowledge creation: 8 papers published/presented

Capacity building: not given

Application –target sector:

ANALYSIS OF MICROBIAL COMMUNITIES IN HEAVY METAL CONTAMINATED SOILS AROUND MINE SITES IN ORISSA

PI: Dr. Nibha Gupta
Regional Plant Resource Centre,
Bhubaneshwar-751015

Date: 6.5.2004 to 31.3.2006

Extension: none

Budget: 5,23,440/-

Infrastructure created: 75,000/-

Objectives:

- Isolation of microorganisms from different mine sites of Orissa.
- Evaluation of microbial isolates for their mineral solubilization properties.
- Identification and characterization of microbial isolates.
- Optimization of cultural conditions to improve solubilization.

Outputs/Achievements:

- Development of culture collection: 60 Streptomyces isolates, 88 isolates of Mn Bacteria and 28 isolates of Iron bacteria, 69 fungi.
- 16 fungal strains were obtained that endowed with the iron ore solubilization potential.
- The 60 different isolates of Streptomyces may be explored further for the search of antifungal antibiotics.
- 7 strains of fungi were endowed with metal resistant properties.

Capacity building: none

Knowledge creation: 12 papers published

CONSERVATION OF CHEER PHEASANT IN GARHWAL HIMALAYA: CURRENT STATUS, DISTRIBUTION, HABITAT ECOLOGY AND BEHAVIOUR

PI: Dr. M.S. Bisht
Department of Zoology
HNB Garhwal University Campus
Pauri (Garhwal) – 246001
Uttaranchal

Date: 9.08.2000 to 8.08.2004

Extension: 1 year

Budget: 6,84,250 /-

Objectives:

- To provide information on current status and distribution of threatened Cheer pheasant in Garhwal Himalaya, Uttaranchal.
- To collect baseline data on habitat characteristics and habitat use pattern in time and space.
- Qualitative and quantitative estimation of the dietary elements of Cheer pheasant.
- To provide information on the nesting ecology, breeding success and other factors associated with survival of Cheer pheasant in wild.
- Identification of the ecological, behavioural and anthropogenic factors that limit reproductive success and distribution.
- To provide information on morphological diversity between sub-populations.

Patents developed: Nil

Outputs:

- Information on status and distribution of Cheer pheasant in two districts (Pauri and Chamoli) of Garhwal Himalaya was collected.
- Baseline data was generated on the habitat characteristics and habitat use pattern with respect to vegetation and land characteristics (slope, direction, etc.)
- Data was collected on feeding habits and diet with respect to seasonal variations.
- Breeding behaviour of one pair of pheasants was monitored intensively for a year. Nesting ecology and breeding success of population was recorded along with the limiting factors.
- Morphological diversity between sub-populations were studied with respect to barbule structure of feathers.

Target sector: Researchers, conservation personnel

Cost effectiveness:

Infrastructure created: Permanent equipment worth 97,975/-

Capacity building:

Knowledge creation: 1 PhD

FUNGAL ENDOPHYTES OF MEDICINAL PLANTS IN TAMIL NADU FORESTS

PI: Prof. J. Muthumary
Centre for Advanced Studies in Botany
University of Madras
Gurindy Campus – Chennai – 600 025

Date: 16.02.2004 to 15.02.2007

Extension: Nil

Budget: 13,50,000/-

Infrastructure created: Nil

Objectives:

To study the endophytic fungal population from selected medicinal plants from forest ecosystem in Tamil Nadu

Outputs/Achievements:

1. Around 350 isolates belonging to 10 plant species were isolated.

2. These fungi are a repository of several useful bio-compounds like antibiotics, chemotherapeutic agents and agrochemicals that are highly effective, and possess low toxicity.

3. Several useful bio-compounds such as taxol, extracellular enzymes, crytocandin and cryptocin – antimyotic agent, ambuic acid – antifungal agent, preussomerin D-antibiotic agent, cytonic acids – antiviral agent, pestacin & isopestacin – antifungal & antioxidant, naphthalene – insect repellant, cyclosporin – immunosuppressant, subglutinol, A & B – immuno – suppressant, cytochalasin – anticancer agent and torreyanic acid – anticancer agent are obtained from endophytic agent.

Knowledge creation: 2 papers

Capacity building:

PhD: 1
JRF: 2

MUTUALISM IN WHITEFLY – ANT INTERACTION IN THE WESTERN GHATS OF TAMIL NADU

PI: Dr. R. W. Alxander Jesudasan
Department of Zoology
Madras Christian College
Thambaram East, Chennai- 600 059

Date: 1.9.2002 to 31.08.2005

Extension: None

Budget: 11,00498.50/-

Infrastructrue Created: 1,00,000/-

Objectives:

1. To study the nature of mutualistic interactions such as time budget, resource partitioning, social interaction, intra-and inter-specific communications between whitefly and ants.
2. To study the impact of association of ants on parasitisation and predation in whiteflies.
3. To analyze the chemical components present in leave of host plants of whiteflies, honeydew and wax exuded by whitefly nymphs.

Outputs:

The study provides valuable information on ants associated with whitefly:-

1. 21 species of whitefly – attended ant species were identified.
2. Whitefly-ant association was noticed on younger leave than on moderate and older leaves of 12 species of host plants.
3. Ethological observations such as antennal grooming, mandible palpating activities were recorded in large and small sized ants white feeding on whitefly honeydew.
4. Inter-specific communication was noticed between the ants viz., *Tapinoma melanocephalum* and *Myrmicaria brunnea*, *Camponotus taylori* and *Merinolus biocolor*.
5. Intra-specific communication was noticed in *Tetraponera rufonigra*, *Crematogastor* sp., *Oecophylla smaragdina*, *Monomorium* sp. And *Camponotus* sp.

Capacity Building: Nil

Knowledge Creation: (1 paper)

INSECT FAUNAL DIVERSITY OF BUXA TIGER RESERVE JALPAIGURI, WB

PI: Dr. D.Raychaudhri
Professor
Department of Zoology
University of Calcutta
Kolkata - 700019

Date: 5.12.2001-4.12.2004

Budget: 11,64,674/-

Objectives: Assessment of:

- The insects, composition, richness, biogeography, adaptive features of taxa.
- The insects- habitat types.
- Insects- seasons

Outputs:

This study provides a baseline data on the insects of Buxa Tiger Reserve their composition, richness, diversity, biogeography, seasonal diversity, adaptive features and habitat specificity. It reports on the insect biodiversity, composition and distribution of the insect fauna.

A total of 465 species under 307 genera belonging to 82 families of 11 orders have been collected and reported.

Of these 2 species are new to science, 13 new to India, 51 new to West Bengal, 22 new to the district Jalpaiguri, and 19 new to the study area.

Application (practical usefulness)-Target sector: Researchers, forest officials

Patents developed: Nil

Cost effectiveness:

Infrastructure created: 3,45,000/-

Capacity built: 2 Phd

Knowledge creation: 3 papers

COMPARATIVE STUDIES OF MICROBIAL DIVERSITY AND SOIL BIOLOGICAL PROCESSES DURING LEAF LITTER DECOMPOSITION IN NATURAL OAK FOREST AND PLANTATIONS OF MANIPUR, NORTH EAST INDIA

PI: Dr. R.R. Pandey
Department of Life sciences
Manipur University, Imphal -795003

Date: 6.1.2003 to 5.10.2006

Extension, if any: None

Budget: 941960/-

Infrastructure: 3,61,800/-

Objectives:

- Assessment of litterfall, decomposition rate of *Quercus serrata* leaf litter, CO2 evolution and soil micro- environmental conditions at regular level.
- Analysis of nutrient status (N, P, K, and Organic carbon) of surface soil; resource components (Cellulose, Hemicellulose and Lignin) and nutrient contents (N, P&K) of leaf litter at different stages of decomposition.
- Estimation of quantitative nature of microbial population (fungi, bacteria and actinomycetes) from decomposing leaf litter and underlying surface soil and determination of qualitative nature of microfungi from litter and soils during the study period.
- Assessment of decomposing ability of dominant fungal colonizers of oak leaf litter with reference to their role in lignin and cellulose decomposition.
- Understand the impact of management practices on the decomposition process at plantation site.

Outputs:

The study provides valuable information on decomposition process of tropical and subtropical oak plant residues in natural oak forest and managed oak plantations in North East India.

The various parameters studies include pattern of litterfall, leaf litter decomposition, changes in organic – chemical and nutrient dynamics, microbial population and fungal diversity during the decomposition process.

The assessment of decomposing ability of dominating fungal colonisers of oak leaf litter with reference to their functional role in lignin and cellulose decomposition was also investigated in pure culture test.

Capacity Building: 1 PhD

Knowledge creation: 2 papers

Application –target sector: Researchers

CONSERVATION THROUGH MICROPROPAGATION AND RESTORATION OF ENDEMIC, ENDANGERED AND ECONOMICALLY USEFUL PLANTS OF THE KOLLI HILLS IN THE EASTERN GHATS OF TAMIL NADU

PI: Dr. S. John Britto S.J
St. Joseph's College (Autonomous)
Tiruchirapalli- 620002
Tamil Nadu

Date: 5.6.2004 to 4.6.2007

Extension: None

Budget: 1774560/-
Infrastructure: nil

Objectives:

- To survey the important sites of different habitats and find out the present availability of plant
- To collect the elite members of the endemic/endangered plants from the area.
- To maintain the mother plant –multiplication by vegetation means or by seed germination. Explants will be obtained from this population.
- To develop protocols for micropropagation of *Pueraria phaseoloides*, *Salacia reticulata*, *Cayratia pedata*, *Canavalia mollis*, *Merremia turpethum*, *Plectranthus barbatus*, *Strychnos colbrina*, *Celatrus paniculatus*, *Moringa concanensis*, *Psedarthria viscida*, *Caesalpnia bonduc* and *Emilia zeylanica*.

Outputs:

The project has developed protocols for in vitro propagation of all 12 endemic/endangered plants.

Knowledge creation: 1 paper published

Capacity building:

PhD: 2

ECOLOGY OF SELECTED INSECTIVOROUS BIRDS IN AN AGRO-ENVIRONMENT

PI: Dr. S. Ashokan
Reader- wildlife biology and Zoology
A.V.C College (Autonomous)
Mannampandal -609305

Date: 4.2.2004 to 3.02.2007

Extension: none

Budget: 10,76,160/-

Infrastructure: 2,80,000/-

Objectives:

- To study habitat-wise and season-wise fluctuations of five selected insectivorous birds viz., Black drongo, Indian Roller, Bee-Eater, white breasted Kingfisher and common mYna l agricultural lands, river banks and social forests of Nagapattinam District.
- To investigate the food and feeding habits of these birds.
- T investigate the foraging habits and niche separation among these birds and the factors associated with them
- To analyze the time activity budget of these birds.
- To understand the breeding ecology of the above birds.

Outputs:

The study encompasses the seasonal variation in the population densities of five selected insectivorous birds viz., Black drongo, Indian Roller, Bee-Eater, white breasted Kingfisher and common Myna, including information on their foraging behaviour and breeding habits in respect to nest characteristics.
The feasibility of using these birds as bio-control agents in agro ecosystem was also studied.

Knowledge Creation: 1 paper

Capacity Building:

PhD: 0
JRF: 1
FA: 1

Application-target sector: Agriculturists, Ornithologists

FLORISTIC DIVERSITY UNDER PREVAILING STATE OF PLANT INVASION AND EXTRACTION REGIME IN FORESTS OF SOUTH WEST BENGAL

PI: Dr. Tapan Kumar Mishra
Reader & HOD, Deptt of Botany
Rajan.L.Khan Women's College, Midnapore
West Bengal

Date: 02.02.2003 to 01.05.2006

Extension, if any: none

Budget: 6,05,594/-

Infrastructure created: 10,000/-

Objectives:

- The diversity of angiosperm flora in the forests of southwest Bengal and identify the exotic invader species of the region.
- Threat posed by exotic invader plant species in natural forest community of the region.
- Extraction load on the forest community in view of the changed management status and its impact on the natural forest habitat.
- Regeneration pattern of some species with declining population and also the invaders;
- Suggest some management strategies which may be valuable in controlling the menace of declining plant diversity.

Outputs:

The major findings of the study are:

- There are in total 511 plant species found during random survey, which include 123 trees, 123 shrubs and 265 herbs.
- The region has 34 shrubs and 61 herbs i.e. in total 95 alien species (exotic naturalized species) included within the total number of species noted earlier.
- There are in total 49 alien species found in protected forests during the study in the whole region, which include 15 shrubs and 34 herbs.
- Considering all the aspects 5 species namely *Eupatorim odoratum*, *Lantana camara*, *Cassia obtusifolia*, *Mimosa pudica* and *Evolvulus nummularis* have been identified as alien invasives which need immediate attention for management.

Capacity building: no PhD

RA: 1
FA: 1

Knowledge creation: no papers published

ADAPTIVE RESEARCH ON IMPROVEMENT OF NATURAL GRASSLANDS IN DISTRICT SIRMOUR OF HIMACHAL PRADESH

PI: Dr.Vipan Kalia
Senior Plant Breeder
CSK Himachal Pradesh Krishi Vishvavidyalaya
Hill Agricultural Research & Extension Centre
Dhaulakuan -173001

Budget: 663395/-

Date: September 2002 to September 2005

Extension: none

Infrastructure created: 40,000-

Capacity building: none

Knowledge creation: 4 papers

Objectives:

- To evaluate the performance of improved vis-a-vis natural grasslands and undertaking adaptive research on various aspects of improving natural grasslands.
- To generate information about the local grasses adapted to the area and type of grasslands available in the area.
- To promote awareness among farmers about the better management and maintenance of natural grasslands.

Outputs/Achievements:

The study came up with following findings:

- Wild growth of shrubs and weeds like *Lantana camara, Parthenium*, *Euphoria*,etc in grasslands of low hills and lantana, P*arthenium, Rumax* spp, *Artemesia, Chenopodium* sp. In mid and high hills have adversely affected the productivity of natural grasslands in the area of study.
- Napier Bajra Hybrid (NB-37) can be successfully introduced through root slips and act as a good soil builder.
- High percentage of seed germination must be ensured when forage is introduced through seed. Out of various scaring treatments tried, rubbing in folds of ordinary sand paper leading to mechanical scarification two to five minutes gave high speed germination and seedling vigor.
- Introduction of improved grasses was found to result in higher fresh fodder yield and dry matter yield.
- Introduction of forage legumes at experimental sites resulted in increase in crude protein content.
- In mid and high hills it is primarily *Themeda-Arundinella* type of grasslands while in lower hills it is *Dichanthium-Cenchrus-Laisurus* type of grass cover.

A STUDY ON FLORISTIC DIVERSITY OF BHADRA WILDLIFE SANCTURAY, KARNATAKA

PI: Dr. Y.L. Krishnamurthy
Deptt of PG studies and Research in Applied Botany
Kuvempu University, Jnana Sahyadri
Shankaraghatta -577451, Shimoga distt
Karnataka

Date: 19.8.2003 to 18.8.2006

Extension: none

Budget: 7,10,800/-

Infrastructure: 80,000/-

Objectives:

- Studies on floristic diversity of the sanctuary
- Study on the vegetation structure composition in small permanent plots
- Database of plant species distributed in the sanctuary
- Study on the phenology of vegetation at population level

Outputs:

- A database of plants has been documented. A record of 401 species, 286 genera belonging to 101 families has been collated.
- A total of 175 tree species consisting of 86 decidous and 89 evergreen tree species were enumerated and documented from the project.
- About 14 species were endangered while 54 and 104 species were endemic and rare with 229 plant species are very common.

Capacity building:

SRF: 2
PhD: 2

Knowledge creation: 8 papers/presentation

Application- target sector: Researchers