

LIST OF PROJECTS COMPLETED UNDER EASTERN AND WESTERN GHATS RESEARCH PROGRAMME (E&WGRP)

2008-2009

S.No	Title of the Project	Name of Principal Investigator (PI) & Institute	Total Outlay & Duration	Research Finding in Brief
1.	Ex-situ conservation and rehabilitation of selected threatened medicinal plants of South Western Ghats	Dr. S. Ignacimuthu, Entomology Research Instt. Loyoylla College	6,78,000 3 years	Tissue culture protocol is prepared for medicinal plant and good number of plants are produced. They are successfully transplanted in natural habitat and botanic garden.
2.	Ecology and behavior of forest owls in the Western Ghats and de3veloping a habitat model for their conservation	Dr. E.S. Jayson, Kerala Forest Research Institute, Thrissur, Kerala-680 653	16,45,200 3 years	Distribution, status and habitat use of forest owls were studied in southern Western Ghats. Thirteen species were recorded from southern Western Ghats of Kerala and Tamil Nadu. A new report of a short eared owl, a migrant species, was recorded from Peechi Vazhani Wildlife sanctuary. Ceylon Bay owl and endemic species, was reported from Idukki and Neyyar wildlife sanctuaries. Distribution pattern of the species has been correlated with vegetation types, topography, disturbance level and protection status. Expansion of plantations into natural forests, and mining activity for granite are putting pressure on owl populations in some areas. Suitable sites for conservation of different owls are suggested.
3.	Bench Scale Production & Applications of Activated Carbon from Coconut Pith Waste	Dr. J.L. Gumaste, Scientist, Ant Department, Regional Research Laboratory, Bhubaneshwar-751 013	12,67,536 3 years	A series of experiments have been conducted on thermal pyrolysis of coconut pith in CO ₂ , N ₂ and vacuum in temperature range of 300-600 ^o c for 2-4 hours. The products yield is 30-45%. Characterization and purification studies were carried out. The product was compared with commercial grade activated charcoal. Activated charcoal obtained by processing the pith waste in phosphoric acid and heat treatment at in carbonaceous atmosphere for 1-2 hours is comparable to commercial grade activated charcoal. By products such as tar oil can also be obtained. Experiments conducted showed that the activated charcoal from coconut pith waste has similar or better decolorizing properties. The technology developed has the potential to check the problem of coconut pith waste.

4.	Fungal Diversity in Western Ghats of Karnataka	Dr. Ch. Ramesh, Reader at PG Department in Botany, Karnataka University, Dharwad- 580 003	12,40,560 3 years	Higher fungi occurring in western Ghats of Karnataka, collected from stem, leaf and dead wood, have been studied. 36 species of Ascomycetes and 115 species of Basidiomycetes have been identified. The species are nicely described and their colour photographs and line diagrams are included. Terrestrial ecology of the fungi has been investigated. The colonization is competitive. Anamorphism is an important factor. Factors influencing the colonization and subsequent behaviour have been enumerated. The fungi have been cultivated in the laboratory. Enzymatic activity of the fungi has also been assessed.
5.	Chromolaena odorata invasion to Western Ghats: causes, consequences and management	Dr. Inderjit Singh, Centre for Environmental Management of Degraded Ecosystems, School of Environmental Studies, University of Delhi, Delhi-110 007.	13,52,160 3 years	The work was conducted at an area in Thrissur (Kerala) in Western Ghats heavily infested with <u>Chromolaena Odorata</u> . The invasion is encouraged by light and directly and indirectly by allelopathy. <u>Chromolaena</u> accumulates high amount of soil fungi creating a feedback inhibition of the native species. Chromolaena root leachates increase <i>Fusarium</i> spore density suggesting a biochemical basis. Results of an ongoing biological control programme were observed and it was found that these were not encouraging.
6.	Study on the Impact of developmental activities on the quality of surface and ground water resources in Konaseema area of Andhra Pradesh	Prof. N. Someswara Rao, Deptt. of Inorganic & Analytical Chemistry, Andhra University. Visakhapatnam- 530 003	11,00,627 3 years	The study provides exhaustive details about the environmental scenario of the impact of development agricultural activities on surface water, ground drinking water resources, impact of intense agricultural activities from drinking water quality with special reference to pesticides residues in Konaseema area and ambient indoor air quality in East Godavari district in Andhra Pradesh. The study suggests measures such that drinking water quality improves and the people can be healthy and happy. The study also provides people working in agricultural lands (fields) drink canal water or well or bore well water in the agricultural fields directly. Such people are most vulnerable to the pesticide residues, other water quality parameters. With the increasing awareness on quality of water and the related health effects, middle class and rich people are using some gadgets to treat the water before drinking.

7.	Exploration of tribal botanical knowledge for sustainable socio-economic development and conservation of biodiversity of Agasthiar Hills, Western Ghats, India through Women self help groups	Dr. A. John De Britto, Reader in Botany, St. Xavier's College3, Palayamkottai, Tamil Nadu- 627 002	8,08,500 3 years	Tribal botanical knowledge of the Agasthiar Hills has been documented and evaluated. Medicinal practices of tribes and conservation problems have been also documented. Rare germplasm has been identified and tissue culture studies on two species was taken up. Training and awareness programmes were organized. Concrete efforts have been made to improve the socio-economic status of the Kani tribals such as establishment of women self help group and marketing facility, supply of nursery plants to self help group, distribution of solar light and community certificates by District Collector etc.
8.	Ecology of Indian Grey Hornbill (<i>Ocyerops bitorquatus</i>) with special reference to its role in seed dispersal in Southern Eastern Ghats.	Dr. P. Balasubramanian, Salim Ali Centre for Ornithology & Natural History, (SACON), Anaikatty, Coimbatore- 641 108 Tamil Nadu	6,15,400 3 years	Ecological importance of Indian Grey Hornbill has been investigated in southern eastern Ghats (Tamil Nadu). Twenty one fruiting plant species were tagged for phenological studies. The species of which fruits/seeds are consumed are provided. The hornbill utilized 41 plant species belonging to 22 families. Fig is very important for survival of hornbill. Experiments showed that hornbill also help in germination of the seeds, including seeds of sandalwood. Awareness Camps have been organized in collaboration with Forest Department for conservation measures for the hornbill.
9.	Studies on the ectomycorrhizal fungal diversity in different forest types and their association with endemic, indigenous and exotic species in the Western Ghats forests of Thiruvananthapuram	Dr. K.B. Vrinda, Division of Microbiology, Tropical Botanic Garden and Research Institute, Palode, Kerala- 695562	7,86,140 3 years	The study was conducted in three different forest types of Western Ghats in Thiruvananthapuram district of Kerala. Collections were made in six monsoon seasons. More than 160 collections of fungi were obtained. Four orders, 8 families and 35 taxa have been identified. Edibility of the species was tested in respect of two undescribed species.

2009-2010

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1.	Chemical loading into reservoirs: Investigation from selected watersheds of	Dr. M.N. Muraleedharan Nair, CSD. Centre for Earth Sciences	10,29,250 3 years	The water quality of the four reservoirs under study conforms to Class II water standards, stipulated by CPCB. There is no anoxic condition present in the surface

	Periyar river in Western Ghats, Kerala	Studies, P.B.No.7250, Akkulam, Thiruvananthapura m- 695031		strata of the reservoirs, except Mullaperiyar show nutrient enrichment and this may be attributed to the agro- based activities and settlement in the catchment. Total Coliforms and Decal Coliforms are observed in all the four reservoirs. Residual pesticides are absent in the water samples of Mullaperiyar reservoir, but trace amount of organochlorine pesticides are present in the water samples from Mattupetty, Kallarkutty and Bhoothathankettu reservoirs. The sediments in the Mattupetty and Kallarkutty reservoirs are at moderate contamination levels with respect to Zinc and Copper. Lead concentrations are within the Lowest Effect Level. Chromium and Nickel content in the four reservoir sediments exceeded the Severe Effect Level indicating severe health hazards. Residual pesticides were absent in the sediments of Mullaperiyar reservoir. But the sediments from Mattupetty, Kallarkutty and Bhoothathankettu reservoir show elevated levels of BHC and metabolites.
2.	Bioecology of spiders in Western ghats of Kerala	Dr. P.A. Sabastian, Department of Zoology, Sacred Heart College, Thevara, Cochin-682 013 KeralaF	15,35,710 3 years	The study has documented 173 species of spiders belonging to 85 genera of 25 families from Western Ghats of Kerala. Six new species have been described which are new records for India. Six species recorded from the area are endemic to Kerala and 29 species are endemic to Indo-Srilankan region. Three of the species are listed as threatened in the IUCN Red Data book. The spider populations vary with the area and season, the higher abundance being in post-monsoon. A pilot study conducted on agricultural ecosystems in adjoining area of Western Ghats has led to recording of 117 species of spiders belonging to 60 genera of 19 families.
3.	A Study on the Herpetofaunal Communities of the Upper Vaigai Plateau Western Ghats, India	Dr. S. Bhupathy, Salim Ali Centre for Ornithology & Natural History (SACON), Anaikatty, Coimbatore- 641 108 Tamil Nadu.	10,36,900 3 years	The work was conducted in the Upper vaigai Plateau and its environs. Herpetofauna were sampled with standard methods along three belt transects on seasonal basis (2006-2008). A total of 34 species of amphibians and 72 of reptiles were observed during the study. Range extensions of Anamalai spring lizard and Malabar false Tree frog were recorded. The density of the species has been estimated in different locations. The richness of the amphibians and reptiles has

				been co-related with the environmental variables pertaining to soil, water, flora, forest type and litter cover. Checklists of mammals, birds, butterflies and trees have been made.
4.	Herbivorous Arthropod fauna associated with some ferns of Western Ghats of Southern India	Dr. R.W. Alexander Jesusasan, Department of Zoology, Madras Christian College, Chennai- 600 059	10,60,400 3 years	In Palini hills and Tirunelveli hills of Western Ghats 73 species of ferns were identified of which 35 species were associated with herbivorous arthropods. Dominant insect herbivores have been identified. Some of these herbivores were investigated in the lab. Maximum damage was caused in the pre-monsoon period. Parasitoids such as species of <u>Macromesus</u> and <u>Goniozus</u> were observed parasitizing the Lepidopteron pests but their populations were low. The insects that infect ferns and their natural enemies have been documented with the high quality photographs and a comprehensive checklist.
5.	Need for Conserving forest canopies- Assessing the diversity of canopy insects in the western Ghats	Dr. Y.B. Srinivasa, Institute of Wood Science and Technology, 18 th Cross Malleswaram, Bangalore- 560 003	7,68,000 3 years	The aim of the project was to quantitatively estimate diversity of different insect groups from canopies of a rainforest using replicable sampling methods that can be used for long-term monitoring. Questions on the need for conserving these ecological units also needed to be answered. Three sampling methods – yellow pin traps, light traps and arboreal pitfall traps were suitably modified. Insects along lower branches could be trapped, but it was impossible to access higher foliage. 1357 individuals belonging to 10 insect orders were sampled during the period, except during monsoon samples. Beetle samples were largest. The PI has reported that the forest trees are too high and upper canopies are not accessible.
6.	Taxonomy Studies on family Noctuoidea: Lepidoptera from Western Ghats of India.	Dr. Jagbir Singh, Department of Zoology, Punjabi University, Patiala - 147 002	12,83,170 3 years	In nine collection cum survey tours to Western ghats, 4000 specimens of 201 species referable to 114 genera of 14 sub families of Noctuidae were collected and documented. Detailed observations have been made on morphological characters such as wing variation and male and female genitalia. Six new species have been recorded for India. New distributional records have been made and various taxa have been revalidated. High quality photographs and diagrams are included.

				Genitalia structures have also been photographed.
7.	Ecology of Co-existing owls, spotted owl (<i>Athene brama</i>) and Barn owl (<i>Tyto alba</i>) in Madurai District, Tamil Nadu.	Dr. R. Santhana Krishna Deptt. of Zoology, Saraswathi Narayanan College, Madurai- 625 022.	12,82,800 3 years	Ecology of co-existing species of owls, spotted owl and Barn owl, has been investigated in Madurai district of Tamil Nadu. Population density of these owls in different habitats was studied. Maximum density was spotted in Agricultural habitat and natural trees were the most preferred sites. Invertebrates, particularly the Coeloptera insects were the main prey. Barn owls were seen in a variety of places, but man-made structures were preferred. Food and feeding habit and roosting and nesting behavior of the owls have been documented. Barn owl is mainly a rodent eater. Since the feeding behavior of the two species is different, the two can co-exist. Their nesting sites are also different. Threats to the species have been identified.
8.	Studies on the biodiversity of hyphomycetes in dry deciduous forest soils and litters of semi-arid tropical areas of the Puttaparthi Mandal, Ananthapur district,	Dr. B.S. Vijaykumar, Sri Sathya Sai Institute of Higher Learning, Prasanthinilayam- 515 134, Andhra Pradesh.	6,15,250 3 years	The diversity of Hyphomycetes (fungi) in dry deciduous forest soils and litters has been identified in deciduous forest soils and litters of semi-arid tropical area of Anantapur district of Andhra Pradesh. A total of 120 species belonging to 27 genera have been identified. Species of <u>Alternaria</u> , <u>Aspergillus</u> and <u>Fusarium</u> were the dominant hyphomycetes that play crucial role in biodegradation and recycling of organic matter. The mycoflora associated with different kinds of leaf litter has been documented. <u>Asprgittues niger</u> and <u>Trichodrma viride</u> isolated from soil are potent species as sources of cellulose engyme. <u>Drechslera puttaparthii</u> sp.nova demonstrated ability to produce herbicidal and anti-fungal agents.
9.	Establishment of in-vitro gene bank <i>Nothopodytes foetida</i> (Wt.) Sleumer-threatened species of Western Ghats.	Dr. D.H. Tejavathi, Prof. of Botany, Bangalore University, Bangalore-560056.	9,84,538 3 years	The main objectives of this project were mainly to study per cent germination of seed, to analyse the cause of seed dormancy and to develop protocols for mass multiplication. Mature seeds were collected from four different regions of Western Ghats of <u>Nothapodytes foetia</u> , a threatened species considered effective in treatment of cancer and HIV. Seed germination studies were carried out. Germinating seeds on paper <u>bridges</u> in test tubes proved best and application of GA ₃ reduced with time of germination. Seeds

				<p>from Ooty had low phenotics and showed maximum rate of germination. Embryos and shoot apices from cultured young seedling were encapsulated in sodium alginate and stored at 5-20° C. The highlights of the finding achieved in the project are Effective protocol is developed for shoot proliferation from the embryo culture, Effective reproducible protocol is developed for organogenesis through callus cultures for the First time, Somatic embryogenesis from callus cultures is standardized, Production of synseeds of embryos and shoot apices is optimized for the First time, Best treatments for maximum percent of seed germination are identified and Causes for seed coat imposing dormancy is analyzed for the First time, Camptothecin contents of cultures and seeds were qualitatively and quantitatively analyzed by HPLC.</p>
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2010-2011

S.No	Title of the Project	Name of Principal Investigator (PI) & Institute	Total Outlay & Duration	Research Finding in Brief
1.	Assessing the economic loss due to feeding habits of the frugivorous bats in the orchard regions of Ahmednagar District	Dr. D.S. Joshi, Ahmednagar College , Ahmednagar- 414 001, Maharashtra	7,00,350 3 years	Population structure of frugivorous bats in fire orchards in Ahmadnagar district was investigated. Foraging behavior was studied. It begins with sun set and ends with sunrise, and is not effected by light intensity, temperature or relative humidity. The three species are pests and the orchards suffered a loss of 30-70%. This loss can be reduced by use of fishing nets. These bats deserve conservation because these are involved in pollination of jamun, tamrind, kapok and bhokor trees. They also help in dispersal of fruits of banana, mango, jamun etc.
2.	Investigations on the fungi and insects associated with fruits and seeds of selected endemic trees of Western Ghats	Dr. H.C. Nagaveni, Wood Biodegradation Division, Institute of Wood Science & Technology, 18 th Cross, Malleshwaram, Bangalore- 560	14,79,069 3 years	A rich diversity of fungi and insects which affect the fruits and seeds of some endemic trees of Western Ghats has been documented. As many as 222 fungal isolates of 85 species were associated. A total of 22 species of insects were found. Life cycle of several infecting insects and fungi have been investigated. The damage caused by the pathogens and pests was

		003.		assessed and control measures have been recommended. Two new species of fungi and two new species of insects have been recorded.
3.	Utilization of alternative timber species for catamarans to conserve traditional tree species of Eastern ghats	Dr. Pankaj K. Aggarwal, Institute of Wood Sciences & Technology (IWST), P.O. Malleshwaram, Bangalore	7,00,350 3 years	Untried but potential tree species, <i>T. nudiflora</i> , <i>Mesopsis eminii</i> and <i>A. lebbecek</i> have been investigated for use for making catamarans as the traditional species are now scarce. Deterioration at sea, deterioration, bio-resistance and other features have been studied. Performance of each has been assessed with or without treatment. Leaching of metals has been evaluated in seawater. Prototype testing of catamarans of the three species (in addition made of <i>Bombax ceiba</i>) have been made and provided to 39 fishermen.
4.	Development of Bioinoculants for some tree legumes useful in revegetation of mine area	Dr. Nibha gupta, Regional Plant Resource Centre, Bhubaneswar	13,35,528 3 years	Soil microbes that can keep leguminous trees grow in mine areas have been selected and characterized. A composition of microbes has been suggested for rehabilitation of the degraded mined over areas. These microbes help in stabilizing the minerals and matching nutrients available for the trees.
5.	Distribution, abundance and conservation status of the Slender Loris in the Western and Eastern Ghats, India	Dr. Sindhu Radha Krishna, National Institute of Advanced Studies, IISC Campus, Bangalore- 560 012	7,60,150 3 years	Ecology, habitat parameters, poaching pressure and diversity of slender lorries, a near threatened species, have been investigated in Eastern and Western Ghats. Results reveal that similar pattern affects distribution of the species in Kerala, Tamil Nadu, Goa and Maharashtra. Mysore slender Loris is more flexible than Malabar slender lorries, but the former is more unreliable to unstable environment and human pressures.
6.	Investigation on tree ring analysis of certain species in Western Ghats monitor climate changes and its relevance to wood quality	Dr. Vijendra Rao, Wood properties and User Division, Institute of Wood Sciences and Technology, P.O. Malleshwaram, Bangalore- 560 003.	18,02,700 3 years	Vessel morphology parameters like vessel density, vessel diameter and vessel element length for 36 discs of teak from Karnataka and Maharashtra were correlated with climate. Analysis of tree rings in <i>Tectona grandis</i> and <i>Myristica</i> spp. (a mangrove) was carried out and the ring data correlated with meteorological data. Teak has been found to have good potential to know rainfall patterns, mostly the drought years. The low rainfall years found by tree-ring-chronologies of teak from Madikeri Mundagod of Karnataka and Chandrapur of Maharashtra matched with most of the

				drought years in India. The characteristics of soil climate and tree anatomy which are related to quality of timber have also been studied.
7.	Ex-situ conservation of some of the RED DATA listed plants of Eastern and Western Ghats of Tamil Nadu through in-vitro methods.	Dr. M.V. Rao, Department of Plan Science, Bharathidasan University, Tiruchirapali, Tamil Nadu- 620 024.	13,48,043 3 years	Phenology, reproductive biology and tissue culture studies have been undertaken on two red listed plant species, <i>Acanthephippium tricolor</i> and <i>Dendrobium aequum</i> to develop methods for ex-situ conservation. The report indicates that micropropagation can be effective for conservation of the species.
8.	Diversity of Micro-fungi in leaf litter of different forests of Western Ghats	Dr. T.S. Suryanarayanan, Ramakrishna Mission Vivekananda college, Mylapore, Chennai- 600 004	14,61,190 3 years	A total of 24,793 litter fungal isolates belonging to 130 (approx.) different species were identified from the 36 host plants studied for their diversity in leaf litter fungi of four different forests of Western Ghats. The litter fungi, appear to have an array of degradative enzymes out of eighty fungi tested for extracellular enzymes, more than 75% produced cellulose, lipase and pectinase enzymes, 45% produced tyrosinase, and 65% produced amylase, pectate transeliminase and protease. There is some specialization among fungal groups at the tissue level. It appears that foliar endophytes are mostly Coelomycetes and leaf litter fungi are mostly Hyphomycetes. The litter fungal species diversity of Dry deciduous and Dry Thorn forest was slightly higher than that of Evergreen forest. Litter fungi as an ecological group are rich in secondary metabolites that are bioactive. It is concluded that the litter fungi as an ecological group represent better the fungal species diversity of a tropical forest than the endophytes. This work will help optimizing the accuracy of prediction of global fungal diversity.
9.	Studies of the biosystematics of parasitic wasps of Eupelmaidae (Hymenoptera) of Kerala including Southern Western Ghats	Dr. T.C. Narendran, Department of Zoology, University of Calicut- 673 635F, Kerala	12,79,786 3 years	The project was sanctioned to make an inventory of the genera species of Eupelmidae fauna existing in Kerala including the adjoining parts of Southern Ghats. During the project period 48 additional species and 4 genera were reported. Among these 30 species are new to science. This taxonomic investigation in the Southern Western Ghats unraveled several endemic species of interesting and economically important eupelmids. Only 26 Eupelmidae species in 8

				genera were known before undertaking this investigation. The complete check-list for all eupelmid species found in Southern Western Ghats were prepared, that can be used as a reference material for further study in taxonomy, biocontrol, agriculture and biodiversity. The bio-geographic distribution data of the Eupelmids prepared and the need to conserve them is emphasized.
10.	Role of insect predators in the regulation of biodiversity of forest ecosystem	Dr. Dunston P. Ambrose St. Xavier's College, Palayamkottai Tamil Nadu-627 002	12,51,300 3 years	The project was awarded with the objectives to study predatory potential of chosen predators with biocontrol potential. Tree trophic and bio trophic between the host plant – host insect predators and in at chosen predators in the regulation of forest biodiversity. The main findings of the project are: i. Insect pests of teak such as <i>T. grandis</i> <i>H. purea</i> and <i>E. machaeralis</i> and diverse insect pests and reduviid predators from <i>P glabra</i> , <i>A. pennata</i> , <i>G. rottleriformis</i> , <i>T. indica</i> and <i>T. arjuna</i> from Courtallam Tropical Rainforest and insect pests and predators from <i>Zizyphus sp.</i> , <i>P. ororata</i> , <i>G. umbetifra</i> , <i>F. indica</i> , <i>L. Camera</i> and <i>W. tinctoria</i> from Papanasam Tropical Rainforest were first time observed, recoded and collected. ii) The biocontrol potential of reduviine reduviid <i>A. quinquespinosa</i> , <i>R. fuscipes</i> , <i>R. marginatus</i> , <i>R. longifrons</i> , <i>R. kumarii</i> , <i>I armpies</i> , <i>M. nodipes</i> and <i>S. indagator</i> and <i>C. obscurus</i> against forest insects pests were established by studies on host and stage preferences, functional and numerical responses and searching behaviour. iii) The results on biology and life table parameters of assassin bugs reveal that they could be mass reared and released into forest ecosystem for biological control.
11.	Behavioral ecology of the lesser Dog faced fruit Bat <i>Cynopterus brachyotis</i>	Dr. Sripathi Kandula, Department of Animal Behaviour & Physiology, Madurai Kamraj University, Madurai.	12,54,430 3 years	The aim of this study was to study the behavioural ecology of the lesser dog-faced fruit bat <i>Cynopterus brachyotis</i> in southern Western Ghats. <i>Cynopterus brachyotis</i> occurred only at higher altitudes (800-1500 m or more) of southern Western Ghats and prefer to stay in higher elevations. The day roots of <i>Cynopterus brachyotis</i> at an altitude above 1000 metre in Sirumalai hill range Yercaud have been located. From our radio-

				<p>telemetry observation, the male and female bats used 5 & 6 different foraging areas respectively and the male bats foraged ca.4 to 4.5 km and the female bats foraged ca. 5 to 6 km. Males generally preferred to forage at shorter distances from the day roost whereas the females commutes to longer distance and they had more than one foraging areas. These results suggest that some type of territoriality is associated with shelter, which appears to be the basis of social organization in <i>Cynopterus brachyotis</i>. This is an excellent piece of work.</p>
12.	Biodiversity in Piper and Garcinia and Western Ghats	Dr. P.A. Mathew, Indian Institute of Spices Research, Marikunna P.O. Calicut, Kerala-673 012	15,64,000 3 years	<p>In Piper spp. maximum, distribution was seen in <i>P. nigrum</i> in the area from an altitude of 50 m MSL to 1000 m MSL. A unique discovery is the presence of myristicine in the wild <i>P. nigrum</i> populations of Karwar (Karnataka). <i>P. habnium</i> – a threatened species is available only in Thenmala and need protection. In <i>Garcinia</i> the predominant species located throughout the survey area of <i>G. gummigutta</i>; Analysis of pH, organic carbon, soil colour of texture indicated that only pH and organic carbon are related to the environment. It was found that HCA estimation using HPLC method is the best in <i>Garcinia</i>. Lycopene is not useful as GIS marker in <i>Geracinia</i>. ISSR amplication with 128 pohymorphic markers and scoring indicated wide variation in genetic distance among Piper species and reflected a high level of pohyprophim at the DNA level. The diversity of chlorophyll and carotene is wide in a narrow geographical range and are not useful in GIS mapping.</p>
13.	Ecology of Plant Galls in the Shola Forests of Eastern and Western Ghats of Tamil Nadu	Dr. S. Amerjothy, Deptt. of Plant Biology and Plant Biotechnology, Presidecny6 College, Chennai-600 005	8,33,175 3 years	<p>The progress of the project was evaluated as satisfactory. 11 forest areas were explored during a period of two years. During this period, about 127 galls were recorded among which 27 galls turned to be new records. The gall bearing plant species were 104 belonging to 72 genera and 50 families. Among the species recorded, two belong to pteridophytes and one Gymnosperm. The survey provided many exciting results and many of the results were of high contributory values in the area of plant galls and gall insects ecology, pharmaceutical values, industrial applications and academic</p>

				<p>vistas. The floristic composition of shoal forests is highly complex and their vegetational profile is also very high. Because of highly conducive ecological factors, the shola forests harbour dense and rich plant species on which quite a large number of phytophagous insects, especially gall inciting organisms, rely for their food and shelter.</p>
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