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Pachmarhi Biosphere Reserve



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**A Lead / Coordinating Institution of Pachmarhi Biosphere
Reserve**

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Preface

Areas rich in biodiversity and encompassing unique and representative ecosystem are identified and designated as Biosphere Reserve by Government of India, so as to facilitate the conservation of India's immense biological diversity and unique landscapes. The emphasis of the programme is on providing support for research, monitoring and education related to local, national and international issues.

So far 13 Biosphere Reserves have been established all over the country in various biogeographical regions. In Madhya Pradesh, Pachmarhi area has been notified as Biosphere Reserve in 1999. Environmental Planning and Coordination Organisation has been identified as Nodal Agency on behalf of Govt of Madhya Pradesh for implementation of Management Action Plan of Pachmarhi BR. The Ministry of Environment and Forests, Govt of India has also identified EPCO as Lead/ Coordinating Institution of Pachmarhi BR for collection, synthesis and dissemination of research based information, interaction with regional research organisations for development of suitable research projects, interaction with BR managers to assess research needs, publication of compendium of upto date information etc.

In order to fulfill objectives, informations have been collected from published sources. In this volume attempts have been made for incorporating ongoing management activities, summary of research projects, ongoing research projects, news items, bibliography, available research papers/books, reports in EPCO.

It is hoped that information will be helpful to researchers, managers, local inhabitants, planners, administrators, scientists, NGOs, CBD etc. I request to our all readers specially researchers/scientists to provide us a copy of their research papers/project reports/ books on Pachmarhi Biosphere Reserve so that we may incorporate the summary / abstracts of these for disseminating these to larger users through our subsequent publications. This would also result in creation of data bank in EPCO. These would also help to identify the main issues, to find out the gaps, to avoid duplication and also to devise appropriate applied research projects for the management action plan of Pachmarhi BR, which would ultimately be helpful in conservation of biodiversity of the area and socio-economic upliftment of the people residing in area.

Financial assistance from the Ministry of Environment & Forests, New Delhi is highly acknowledged.

I commend Dr. R.P. Singh, Project Coordinator and his team members who worked hard to bring out this publication.

The comments / suggestions for improvement of BRIS publication is welcomed.

Date:- April, 2002

Swadeep Singh
Executive Director

Pachmarhi Biosphere Reserve - General Information

1.02

Schemes Sanctioned for Management Action Plan during 2000-2001

The State government of Madhya Pradesh has designated Environmental Planning & coordination Organization (EPCO) as Nodal Agency for Implementation of Management Action Plan of Pachmarhi Biosphere Reserve. The Executive Director, EPCO is the Ex-officio Director of Pachmarhi BR, while the Field Director Satpura Tiger Reserve is Ex-officio Field Director, Pachmarhi BR.

Under Management Action Plan (MAP), Government of India has sanctioned funds for following projects in the year 2000-2001. These in brief are as follows:

S.No.	Name of the Project	Financial target (Rsinlakhs)
1.0	Habitat Improvement	
1.1	Lantana Eradication at Pachmarhi Plateau	5.00
1.2	Catchment Area Treatment Works	5.00
1.3	Desilting and Dredging of existing water holes in forest area	2.00
1.4	Water and Soil conservation at Mahadeo Hills cave	5.00
2.0	Ecotourism	
2.1	Nature Trails and Trekking Routes	1.40
2.2	Interpretation Centre including Research Centre	6.00
3.0	Ecodevelopment	
3.1	Eco-development in Revenue	7.30
3.2	Pilot Project for Fuel Wood and Fodder in degraded area	2.00
4.0	<i>In-Situ and Ex-situ Conservation of Plant Species</i>	
4.1	<i>In-Situ</i> Conservation of GenePool Reserve Areas	0.80
4.2	<i>Ex-Situ</i> Conservation and Demonstration with Emphasis on Medicinal palnts	1.20
5.0	Promotion of Non - Conventional Energy and Composting	
5.1	Promotion of Bio-gas Plants	2.00
5.2	Utilization of Biomass for Production of Farm Yard Manure	1.20
5.3	Promotion of Smokeless Chulha	1.00
6.0	Promotion of Activities for Inresaing Crop of Production	
6.1	Micro-irrigation Works	3.00
6.2	Integrated Pest Management	1.00
7.0	Socio-economic Upliftment	
7.1	Conservation of Indigenous species of Fruits Plants	2.00
7.2	Promotion and Training for Honey Bee Collection	2.00
7.3	Distruibution of Vegetable Seed packets	0.50
7.4	Creation of Rainwater Storage Ponds and Fisheries Development	2.00

7.5	Promotion of Stall Feeding	1.00
7.6	Animal Health Care, Immunization and Improvemnet of Poultry	1.00
7.7	Genetical Improvements Livestock	2.00
7.8	Micro-credits Revolving Funds	3.00
8.0	Social Welfare activities	
8.1	Organization of Human Health Camps	2.50
8.2	Providing Drinking Water Facilities	2.00
9.0	Awareness, Education and Training	
9.1	Awareness Campaign for General Public for Biodiversity Conservation	2.00
9.2	Organization of Nature Camp for School Children	1.00
9.3	Technical Training / Workshop for Implementating Agencies	0.70
10.0	Identification and Preparation of Conservation Plan Heritage Sites	
10.1	Natural Heritage Sites	1.00
10.2	Manmade Heritage Sites/ Places	0.50
11.0	Purchase of Equipments for Awareness	2.00
	Total	69.10

These management action plans are prepared based on the feedback given by various online Departments of Implementaing agencies, NGO's, local people, planner administrators etc. and sent to Government of India, Ministry of Environment and Forests after due approval of the Field Level Implementing committee constituted under the Chairmanship of Commissioner, Hoshangabad and State level Coordination Committee constituted under Chairmanship of Principal Secretary, Department of Housing and Environment, Govt. of Madhya Pradesh. The suggestions /feedback on various aspects would be greatly welcomed.

Ongoing Research Projects related to Pachmarhi Biopshere

2.0

Development of Indicators (Ecological, Economic and Social in Institutional terms) for Sustainable Management of Forest Ecosystem in Buffer Zone of Pachmarhi Biosphere Reserve

Dr. R. K Pandey

Senior Scientist, Ecology & Biodiversity Division
State Forest Research Institute, Polypather, Jabalpur (MP)

Objectives: Considering the theme of the project development of indicators for sustainable forest management of forest ecosystem within the buffer zone and transition areas of Pachmarhi Biosphere Reserve, the following objectives are considered for identifications of indicators:

- Assessment of structure and function of forest ecosystem in the study area.
- Biological diversity sustained in the study site.
- Assessment of utilisable resources and dependency (earning sources) on Forest of local inhabitants (villagers)
- Social organisation and their occupational pattern of people residing in the project site.

Population Dynamic of some Endangered Species (Mammalian Rodent Species) around Falls in the Pachmarhi Biosphere Reserve

Dr. Vinoy Kumar Shrivastava

Reader, Deptt of Biosciences, Barkatullah University, Bhopal

Objectives: The main objective of this study is to observe the habit and habitat, population dynamic, determination of home range and territory and effect of human interference (due to tourism, hunting by tribal, water pollution created by tourism) on the various endangered mammalian rodent species. Besides this, captive breeding will also be done to increase the population of endangered mammalian rodent species by natural and artificial treatment i.e., hormonal treatment. The utility of the project will be to save and increase the population of endangered mammalian species in Pachmarhi Biosphere Reserve.

Conservation Strategy for Sustenance of Threatened Bioresources of Pachmarhi Forest Division (M.P.)

Dr. Ashok K. Jain
Professor, School of Studies in Botany, Jiwaji University, Gwalior

Objective: The main objective of the study is:

- To make extensive survey of various forests areas of Pachmarhi.
- To collect information regarding multifarious uses of plants for various purposes
- To find out the rare, threatened and endangered plant species of the region.
- To study conservation practices of plants by local people or tribals.
- To propagate rare and threatened plants with low reproductive capacities through standard techniques.
- To study the herbivore pattern amongst different animal species and its impact on rate of survival of plants.
- To study the biotic and natural factors affecting the survival of threatened species.
- To prepare the computer simulations of the species diversity model.

Analysis of Landuse Changes in and around Pachmarhi Biosphere Reserve using Remote Sensing and GIS Technique

Dr. S. Khan, Dr. R. K. Singh & Alok Choudhary
Remote Sensing Application Centre, Council of Science & Technology, Kisan Bhawan, Arera Hills, Bhopal

Objectives: The main objective of the project is to study the temporal changes in Biosphere Reserve area within a span of 10 years (1990–2000) through remote sensing techniques and develop methodology to monitor changes in landuse /land cover of the area as a result of management practices in the study area.

Documentation of Indigenous Knowledge of Inhabitants Living in Pachmarhi Biosphere Reserve

Dr R P Singh and Dr. S. N Chaudhary*

Senior Research Officer, Environmental Planning & Coordination Organisation (EPCO), Paryavaran Parishar, E-5 Arera Colony, Bhopal

* Reader, Department of Sociology, Barkatullah University, Bhopal.

Objectives: More specifically the study will be conducted to achieve the following Research objectives;

- To trace traditional knowledge of villagers (mostly tribals in the study area) pertaining to various land and water based natural resources such as agricultural and forestry activities, fishing, touring and so on.
- To find out the level of their traditional knowledge pertaining to socio-economic and cultural institutions and practices.
- To search their traditional techniques to overcome or cope with crisis pertaining to health, natural calamities, birth death.
- To discuss the mechanisms employed by the villagers to legitimise their traditional knowledge
- To explain the inhibiting/facilitating factors experienced by the tribals to conserve, monopolise and manipulate the traditional knowledge.
- To identify the techniques that they use to update traditional knowledge, and continue it form generation to generation.
- To know their views and opinions in order to strengthen their traditional knowledge, store it and make it available to others for developmental purpose.
- To make the traditional knowledge economically more viable from the point of view of improvement in quality of life of the locals.

Zoning atlas for Environmental Management Plan of Pachmarhi Biosphere Reserve

Dr. R.P.Singh

Senior Research Officer, Environmental Planning & Coordination Organisation (EPCO), Paryavaran Parisar, E-5 Arera Colony, Bhopal

Objectives:- The specific objectives areas follows :-

- To evaluate present status of the area through preparation of thematic maps and mapping of characteristics of the area for identifying the critical zones.
- To understand the relationship between local people, forest, wildlife and assessment of demand and supply like fuel wood, fodder etc.
- To inventorise flora, fauna, natural resources of the area, present status of tourism and its supportive

activities in area and assess their socio-economic and environmental impacts including identifying the unsuitable landuses, the inadequacies of infrastructural facilities for housing, water supply, transport, garbage etc. areas of overuse, areas needing relocation/rehabilitation etc.

- Assessment of environmental fragile / sensitivity of the area vis-a vis development need.
- To prepare an Environmental Management Plan for conservation of biodiversity of the area including:
 - (i) Preservation and protection of environmentally fragile area, ecological area, Biodiversity, tribal areas, cultural /scenic/religious /heritage sites.
 - (ii) Environmental quality improvement through appropriate landuse planning measure and regulating tourism activity.
 - (iii) Appropriate technologies for treatment and disposal of sewage, garbage etc. suiting to the conditions of area.

Books /Reports-Summary

Wildlife Sanctuaries of Satpura- Maikal

S.K Tiwari

Pachmarhi Sanctuary

Pachmarhi sanctuary derives its name from Pachmarhi town, the only hill station of Madhya Pradesh. It was created out of Bori's sanctuary in the year 1977 by an order of the Government of Madhya Pradesh No. 15/22/76/X (8) dated 1-6-77.

The sanctuary lies on the northern slopes of the Satpura. It consists of mostly Gondwana series of rocks chiefly composed of sandstones and shales. The formation is divided into upper and lower Gondwana series on the basis of fossil contents. The soil consists of sandy loam and towards north at some places the soil is clayey. Bagra conglomerate produces soils, which are shallow but fairly suitable for forest growth. Sandy soils support purely non-teak forest. Clay supports Saja-Khair communities with stunted growth.

All the small rivers and Nallas flow northward to drain into Denwa. The principal river which maintains perennial flow of water is Denwa. The river forms the southeastern and eastern boundary of the Sanctuary and then cuts through the northern half of it. The big Nallas which flow through the sanctuary are Bainganga nala, Gidh, Nayan, Ghogra, Panari, Ganfakuwar, Sirjhont etc

The climate of the sanctuary is generally temperate throughout the region, and no portion of the sanctuary experiences extremes of climate and there is no report of any damage to the wildlife due to extreme climate. The rainy season is continuous and uninterrupted on mountaneous tract around Pachmarhi. Here forest region is covered by deciduous and mixed type of vegetation with or without bamboo. The existing forests are classified under 3 main types:

- (i) **Southern Tropical Dry Deciduous forests:** It comprises of most characteristic tree of this area, *Tectona grandis*, which is mostly associated with Dhawra and Saja is dominant. Other than this Bija, Tinsa, Dhaora, Salai, Haldu, Palas, Kullu, Acharkasai, bel, Kari, Semal are dominant. In this forest where the human interference is less, canopy is fairly complete and the trees are sufficiently large tall and well grown to yield saw in timber.
- (ii) **Southern dry mixed deciduous forests:** This type differs from the previous one mainly floristically. Bamboos are usually absent. Grass is conspicuous till it is grazed down and burnt. Most characteristic tree is *Anogeissus latifolia* while *Terminalia alata* is a very typical associate. *Chloroxylon sweitenia*, *Hardwickia binata*, *Boswellia serrat*, *Soymida febrifuga* are very widespread and useful indication as they are absent from the moist deciduous forest.
- (iii) **Central Indian Sub Tropical Hill Forest:** This sub type is limited in extent and covers not more than 15 sq km in Pachmarhi. The fairly extensive plateau lying at somewhat over 1000 m carry this subtropical vegetation. In this vegetation there is predominance of *Syzygium cummini* including *Strobilanthes*, *Ixora*, *Indigofera* and often climbers like *Bauhinia* and *Clematis*.

Bamboo occurs only in few compartments on the northwestern part of the sanctuary. *Dendrocalamus strictus* is the only species.

Bori Sanctuary

Bori sanctuary is the oldest reserve forest in India. It has the sound heritage of systematic forest management and wildlife conservation since the good old days. The sanctuary has been declared as a wildlife sanctuary under the Wildlife Protection Act, 1972 for the first time in 1975 and subsequently in 1977 by Govt. of MP notification No.15/22/76/X(8) dated 1-6-1977 and then Satpura national park was created, out of Bori and Pachmarhi Sanctuary vide Govt. of MP notification No.15/12/80-X(2) dated 13-10-1981.

It has great potential for the development of wildlife. The sanctuary extends over an area of 485.72 sq.km. It comprises of practically whole of Bori forest range and part of Sukhlawa range. The tawa dam which is newly constructed, lies just on junction of Tawa and Denwa rivers. The sanctuary enjoys the privilege of being situated over the oldest reserve forests of India.

The main rivers that flow through the sanctuary are Tawa, Malini, Koti, Sonbhadra & Bori. Besides, these many other Nalas drain into these rivers. These Nalas and rivers do not retain water through out summer but in isolated pools, water is retained at summer but in isolated pools. Water is retained at different places, which serve as water holes for the animals during peak summers. Some artificial water holes have also been created to overcome the scarcity of water during the peak season. There is no marshes or wetland in both Pachmarhi as well as Bori region due to good drainage, which is as a result of good attitudes. The soil is sufficiently deep along the riverbanks, fairly deep and well drained on the initial gently slopes. The rocks on the ridges are commonly exposed but flat tops as in Bori reserve often carry sufficiently deep soil. Bori enjoys a moderate climate. Forest tracts in the interior enjoys more equable temperature than the cultivated plains. Summers are hottest in leafless teak forest than in mixed forests.

As per Champion and Seth classification the area of the Bori Sanctuary comes under south Indian moist deciduous forest, which can further be differentiated into moist teak bearing forest and slightly moist teak forests eastern part of half of the sanctuary comes under moist teak bearing forest. *Tectona grandis* is the most characteristic species for its economic importance and is of excellent development wherever the soil permit. It is generally associated with *Terminalia pterocarpus* and *Lagerstromia* species. *Adina*, *Dalbergia latifolia* and *Xylia xylocarpa* also present. Bamboo appears at the dry end. Most important species found under slightly moist teak forests are teak, Salai, Moyon, Aonla, Lendia, Tendu, Kari, Kasai, Bija, Achar, Palas, Bel, etc. Other than this a mixture of species of Tinsa, Saja, Dhaorma, Haldu, Kaim and Mokha are also found.

Present Status of Wildlife

Present status of wildlife, both at Pachmarhi as well as Bori, is as follows:

The main animals found are hyena, wild dog, wolf, fox, wild cat, jackal sloth bear, wild boar, gaur, sambhar, cheetal, barking deer, chinkaras, pythons, Indian giant squirrel, and flying squirrel. Poaching, hunting, illicit and uncontrolled felling and epidemic are the decimating factors for the wildlife

management. Villagers living near the jungle kill the Sambhar, barking deer, cheetal with the help of dogs. As soon as the dog catches the animals, villagers reach at the point and kill the animal.

Habitat available in the sanctuary are extensively utilised by the fauna. The quality of richness and size of the territory is proportional to the strength of the male tiger. Habitat preference is distinctly shown by herbivorous animals. The Indian Gaurs, which is a very important animal of this sanctuary, shows a distinct seasonal habitat preference. They resort to local migration within the sanctuary area due to change in food and water availability. Bird life is also varied specially in the area adjoining cultivation in the Bori region. Peafowl, grey jungle fowl, green pigeon, peacock are common in the forests while grey partridges, several kinds of quail and other water birds are seen in the cultivated area along the edge of Narmada plains. Fish of various kinds and also crabs are found in large numbers in the streams and rivers. In deeper holes even upto a great height crocodiles are reported to be seen in Sonbhadra river. In Pachmarhi region, green pigeon, blue rock pigeon various doves parakuts, peacocks, racket tailed drongo, golden orioles, the barbets, king fisher, indian roller, night jar, red vented bulbul, red jungle fowl, golden backed wood pecker scarlet minivet crested serpent, eagle etc are found.

Socio- economic Analysis

Pachmarhi Sanctuary: It is situated on the south of Narmada plains and spread over the Denwa tract and Pachmarhi Hills. There are 44 villages inside the Sanctuary. Mostly the villages are poor but on the northern side the villages are rich due to cultivation. Huts are made up of timber and bamboo. They sell the wood from the Sanctuary as fuel wood and meet their demands. Main crops are jawar, gram, maize and beans. On the northern portion of the sanctuary 10,000 cattle graze around the forestland which exerts great pressure on the sanctuary.

Bori Sanctuary: It has 17 villages and mostly poor aboriginals i.e, Gond Korkus –thrive. They live in ched huts, have little cultivation and have very few cattle. Their main source of livelihood is derived from forest working. Their main crop is jawar, gram, maize and beans. They catch fishes by laying fish traps or by poisoning the water with bark leaves, roots and Fruits of some local species. They also trap Cheetal, Sambhar and kill them for meat. There are no health centres in the Sanctuary area and no regular transport is available through the Sanctuary.

(Source: Wildlife Sanctuaries of Madhya Pradesh – State of Biodiversity Infringement. APH Publishers, New Delhi1, 1997)

Orchids of Pachmarhi and their Distribution

V.P. Singh * & Ashok Kaul**

This is one of the largest families of the flowering plants containing 450 genera and 10,000-15,000 species. The family is cosmopolitan being distributed almost throughout the world. It is very well represented in the tropics, but is rare in Arctic regions. In India there are nearly 1,600 species representing this family found on Himalayas and other hills.

Most of the orchids are either terrestrial or epiphytic in nature. The axis of the plants may be either monopodial or sympodial. The terrestrial forms are all sympodial and usually possess a slender stem having one or two or more green leaves, terminating in

one or several flowered inflorescence such as Bulbophyllum and Dendrobium (they have a main stem or Pseudobulb, which is produced annually and matures at the end of each growing season, often culminating with flowering). The epiphytic forms may have either monopodial or sympodial growth. The extremely light seeds and the xerophytic habit of large number of Orchids make them fit for epiphytic mode of life.

Over 30,000 different orchid species are found in our planet and over 100,000 hybrid strains have been artificially propagated. Over 75 % of world's known orchid species occur in the tropics. Most of the tropical orchids are epiphytes, growing in trees, some grow on rocks but in Pachmarhi many are terrestrial. Depending on the genus orchids can take from twelve months to twelve years from germination to flowering. On an average, most orchids flower around four years from germination after starting out in life as green bulbs, known as protocorns.

Pachmarhi orchid can be grouped in two:

- I Epiphytic orchids
- II Terrestrial orchids

I Epiphytic plant: These are further divided into two major groups

- (i) Pseudobulbs
- (ii) Non pseudobulbs

S.No.	Pseudobulbs	S.No.	Non Pseudobulb
1.	Dendrobium	1.	Rhynchosstylis
2.	Liparis	2.	Aerides
		3.	Vanda

II Terrestrial Plants: These are further divided three major groups

- (i) Lip spurred anther –2
- (ii) Lip spurred Anther -1
- (iii) Lip spurred Pollinia –4, Pollania-2

S.No	Lip spurred Anther- 2	Lip spurred Anther -1	Lip spurred Pollinia – 4, Pollania-2
1.	Plantanthera	Eulophia	Malaxus
2.	Peristylus	Geodorm	Nervillia
3.	Habenaria		Gooyera

The name of the Epiphytic and Terrestrial species and their distribution are as follows:

Epiphytic Species

Name of the Genus/species	Distribution

Dendrobium Swartz:	
(i) <i>D. crepidatum</i> Lindl	common in all places of Pachmarhi
(ii) <i>D. herbaceum</i> Lindl	Dhupgarh , Richgarh, Panarpani, Bari -Aam
(iii) <i>D. gamblei</i> King and Prantl	Mahadeo, Chauragarh
Liparis Rich	
(i) <i>L. rostrata</i> Reichb	Mahadeo, Richgarh, Bari-Aam
(ii) <i>L. atropurpurea</i> Lindl	On Pachmarhi Hill Slopes
Rhynchostyles Blume	
<i>R. retusa</i> Blume	Bori-Aam, Mahadeo, and Jamboodweep
Aerides Lour	
(i) <i>A. multiflora</i> Roxb.	Vicinity 2000ft. On forest trees
(ii) <i>A. odoratum</i> Lour	This species found above 1000 m
Vanda R	
(i) <i>V. testacea</i>	Every where from lower hill, Matkuli to top (Dhupgarh)
(ii) <i>V. roxburghii</i>	In all parts of Pachmarhi
(iii) <i>V. cristata</i> Lindl.	Outer Ranges of Pachmarhi

Terrestrial Species

Name of the Genus/species	Distribution
Platanthera Rich	
<i>P. Susannae</i> (L) Lindl. syn.- <i>Orchis sussanae</i> , <i>Habenaria susannae</i>	In forest undergrowth and hill slopes
Peristylus Bl.	
(i) <i>P. stocksii</i>	Grassland, hill slope area
(ii) <i>P. constrictus</i>	In marshy places of Pachamrhi
(iii) <i>P. goodgeroides</i> (D.Don) Lindl.	On hill slopes under marshy places
Habenaria Willd	
(i) <i>H. graveobns</i>	On hill sopes in forest under growth
(ii) <i>H. grandifloriformis</i>	In all marshy places of Pachmarhi
(iii) <i>H. edgeowrthii</i>	All marshy places of Pachmarhi
Eulopia R. Br	
(i) <i>E. explanata</i>	In marshy and shady places or hill slopes.
(ii) <i>E. herbacea</i>	In shady of marshy places
(iii) <i>E. nuda</i>	In all Marshy places
Geodorum Jacks	
(i) <i>G. densiflorum</i> Jacks	In marshy and shady places
(ii) <i>Malaxis solaud</i> Ex. Sw	
(iii) <i>M. acuminata</i>	In marshy and shady places

(iv) <i>M. mackinnonii</i> (Duthie) Ames.	Rare on hill slopes
(v) <i>M. versicolor</i>	In marshy places at higher altitudes
<i>Nervilia</i> Cormon Ex. Goud	
(i) <i>N. aragoana</i>	In forest under growth
(ii) <i>N. prianiana</i>	Rare, in shady places
<i>Goodyera</i> R. Br	
(i) <i>G. procera</i> Hook	Rare, at higher altitudes in shady places
(ii) <i>G. Repens</i> R.Br	In shady places

(Source: Biodiversity and Vegetation of Pachmarhi Hills, Published by Scientific Publishers, New Delhi, 2002)

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*Ashok Kaul: Head, Department of Botany, Madhav Autonomous Mahavidyalaya, Ujjain.

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Research Papers -Abstract/ Summary

Polymorphism in *Asterelia wallichiana* (Lehm. Et lindeneb.) Grolle from India

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Asterella wallichiana is a widely distributed taxon in India extending from plains to hills. The present study revealed that *A. wallichiana* is highly polymorphic and the main point, which is to be marked, is that this species is influenced by the diverse ecological factors. This is the only dioecious species of *Asterella* known from the country. *A. wallichiana* normally grows on rock surface, banks of rivers, walls of old buildings and temples and shows extraordinary power of regeneration. Specimens collected from some representative localities of the country show morphological variations in epidermal pores, ventral scales, spores and elaters that have been recognized, from time to time, as characteristics of different species. These variations are supposed to be influenced by diverse ecological conditions.

All the plants, which are collected from different localities, are dioecious plants with terminal archegoniophore and sessile antheridial disc with slight difference in size. It appears that even plants from one area may show morphological variations but the total overall variability often tends towards a diffuse pattern with some characteristics getting more or less stabilized in one or the other area.

(Source: J.Indian. Bot. Soc.361-366, 1983)

Integrated Landuse Strategy for Conservation: The Satpura Case

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The area of Satpura hill ranges is a part of the Deccan Biogeographic zone of India. The entire area lies in the catchment of the Narmada river and forms the watersheds of its important regional tributaries viz. Tawa, Denwa, Nagdwari, Malini, Koti, Bori and Sonbhadra. The cluster of three protected areas, Satpura National Park (524 sq. km), the Bori Wildlife Sanctuary (486 sq km) and the Pachmarhi Wildlife Sanctuary (417sq km) forming a compact unit of 1427 sq km in the Satpura hill ranges within the Hoshangabad district of Madhya Pradesh is a unique area of high natural and derived land resource values. The salient natural values are conservation of soil, water-regime, biodiversity and endangered species.

The steep, broken terrain and the fragile Gondwana sandstones dominating the upper reaches which receive a markedly high rainfall impose a vital management parameter of soil and water regime conservation.

The occurrence of two major communities of teak and Sal with an identifiable ecotonal zone within this protected area unit is a unique floral feature.

The Satpura situation indicates eight chief category values (i) commercial timber,(ii) small timber, firewood and rearing of the domestic livestock, (iii) agriculture, (iv) irrigation, (v) fisheries, (vi) cultural, (vii) educational, (viii) tourism. The lack of coordination and conflicting pursuit of disparate interests have affected both the natural and derived values in this forestregion harbouring 3 Protected Areas (PA's).

A balanced approach involving the environmental and socioeconomic concerns and the strategies outlined are capable of leading to sound management of the PA's as well as to the development of a functional ecodevelopment package for the villages in the area. It is essentially a multi-agency task and the various agencies involved need to coordinate their activities.

Ancient rock paintings are an important cultural resource which alongwith the rare flora and wildlife are affected by poorly organised and controlled educational and tourism activities. These resource values are being viewed from disparate management stand points by different agencies working for their own set of priorities, strategies and management goals. The overall picture is one of compartmentalisation. The process vitiates the overall landuse ethic, the compatibility and sustainability being the main victims. Such examples are by no means uncommon in tropical ecosystem burdened with multifarious demands on different resources managed by different agencies. Typifying the Satpura case, this paper attempts to evolve an integrated approach that while allowing sustainable utilisation of the different resources will also be able to safeguard the vital environment concerns.

(Source: Tropical Eco. Ecol. and Managment, P. 207 – 214, 1992)

Response of Growth to Soil Moisture: A Laboratory and Field Investigation of *Riccia discolor* L.etL

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A minor variation in the availability of water and the chemical nature of the substratum for bryophyte vegetation controls the distribution of associations within each subformation. Bryophytes lack root systems and generally their conducting systems are not well developed. Metabolic activity of most of the dry habitat species is closely linked to the water regime. Different species of liverworts differ considerably in their moisture requirement. The present paper deals with the growth moisture pattern under controlled conditions at different moisture levels of *R. discolor* and an attempt was made to correlate this with field moisture conditions.

The experiments reveal that soil moisture percentage is a limiting factor in growth performance. *Riccia discolor* survives at a range from 10 % to 100 % soil moisture but best growth performance is significantly more at 40% soil moisture. The thalli become narrow when levels are greater than 40% and the thalli showed poor growth performance when the level go below 40%. The present results provide clear evidence that *R. discolor* has a wide range of moisture tolerance, distribution, temperature and humidity tolerance. Higher moisture percentages in both experimental and field conditions depressed growths. The relative humidity of temperature variations are also considered to be controlling factors in growth in the field.

(Source: J. Bryol., 1984 13,269 - 318)

Effect of Gibberellic Acid on Regeneration of *Marchantia nepalensis* Lehm.et Lindenbg

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The present study deals with the effect of gibberellic acid on regeneration of *Marchantia nepalensis* thalli under room conditions. Freshly collected thalli were cut transversely and longitudinally and were grown in 0.5, 5 and 50 ppm gibberellic acid and the observation was noted after 24 days. It has been observed that in both the conditions of thalli i.e. in transverse and longitudinal section, the growth of the branches in terms of fresh weight, number of branches as well as average area per branch varies distinctly under different concentration of gibberellic acid. In case of logitudinally cut thalli, the average area per branch was maximum 45.5mm in 0.5 ppm solution and average fresh wt. of branch was maximum 17.0 mg in 0.5 ppm solutions In transversely cut thalli average number of branches were found maximum in 5 ppm solution, average area per branch was maximum 15.6 mm in 50 ppm solution and average fresh weight was maximum 5 mg in 0.5ppm solution.

Apart from this, on the thallus without cut i.e. the control where maximum number of branches were formed in 5 ppm solution, average area of a branch was maximum in 0.5 ppm solution and average fresh weight per branch was maximum in both 0.5 ppm and 5 ppm solution.

(Source: Rev.Bryol.Lichenol.1977, 43,3:347 - 352)

Effect of Velocity of Stream Flow on *Riccia fluitans*

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This paper deals with the effect of velocity of stream flow on *Riccia fluitans*. The study conducted during August 1980 shows maximum drift. Stream velocity was measured at four sites where there was abundant growth of *R. fluitans*. Two slow and two fast water flow sites were selected for the drift studies. In the slow stream, the average total length of thallus was 20.14 cm, average breadth was 1.93 cm and average sporophyte number on abrasion – free branches was 5. In the fast stream, the average sporophyte number was 3. In both fast and slow streams, the basal part of the thallus was without sporophytes. To compare the effects of slow and fast streams on these plants, a student 't' test was used with 30 slow and 30 fast water collection. The t value of 7.71, with 58 degree of freedom, is significant at 1.0 % level. Tvalue 7.71 is highly significant and from this one can conclude that there is a high correlation between the velocity of water and plant growth and sporophyte development. The stream water has an abrasive effect on *R.fluitans* thallus and sporophyte number.

In both the slow and fast streams basal portion of the thalli without sporophyte due to abrasion while the tip of thalli branches produced sporophyte. It is noticed that the tip of the branches produced is free from abrasive material while the bases are protected by the overlying moss mat. The sporophytic thalli are not a result of a single season of abrasion, it might be the cumulative result of several years.

Bryophytes reproduced by regeneration and even the bits of *R. fluitans*, if the thalli are torn from the plant, could act as propagules to distribute the plant to other areas of the streams.

(Source: Yushania 3(1): 17-18, Mar.1986)

Influence of Moisture Regions on the Growth of *Plagiochsama appendiculatum* L . ETL

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Liverworts neither have special conducting systems nor adequate protection against excessive water losses and they undergo severe drying but recover immediately after few showers. Liverworts differ fundamentally from vascular plants in their water relations. In natural habitat it is difficult to maintain constant moisture around rhizoids of a transpiring thallus. To observe the growth pattern under controlled conditions at different moisture levels of substrate and *Plagiochasma appendiculatum* was selected for the study.

The present study reveals that the growth of the liverwort depends upon the soil moisture. At higher moisture level *P. appendiculatum* flourishes better than at low moisture level where the growth performance was very poor. Survival of thalli at low moisture level indicates that it can survive under xeric conditions and this reveals adaptations of plant. The thallus grown in high moisture level became more productive but the same grown at low moisture levels deficit in production. Restriction of water supply is likely to affect both production and thallus expansion. The biomass to a great extent is limited by the amount of water available to them and establish the complex interaction of water and plant productivity. Thallus expansion and accumulation of dry weight seems especially sensitive to water potential.

The thallii of *P. appendiculatum* is highly adapted in many ways to conditions of water stress and they are also adapted to repeated changes between activation during favourable and inactivation during unfavourable periods. Plants limit their metabolic activity to moist and humid periods only. In natural conditions *P. appendiculatum* rapidly dries during summer seasons from the places where soil sustain sufficient moisture. Thus available growth and supply of proper moisture is required to sustain normal growth and development.

(Source: Acta Botanica Indica 9: 186-193, 1981)

Culture Studies on Spore Germination of Two Liverworts

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The wide distribution of *P. appendiculatum* and *R. hemisphaerica* indicates that their populations have been adjusted to adaphic factors at the places of their occurrence / establishment. Minerals are one of the major factors of soil, which play an important role during spore germination and successful establishment of the sporeling and to a mature gametophyte.

In the present study percentage of germination in *P. appendiculatum* increased in liquid culture medium containing calcium. On the other hand *R. hemisphaerica* showed increased germination in the presence of magnesium. Further conclusion may be drawn that individual minerals in liquid culture medium showed

different effect on germination percentage. The range of tolerance and optimum requirements of the mineral concentration were also different.

(Source: Yushania Vol. 4.(No.4.)1987)

A Contribution to the Flora of Bori Reserve Forests, Hoshangabad District, Madhya Pradesh

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The study of vegetation have been carried out in the forests around Bunglapura, Churna, Dhain and Bori villages. The vegetation of Bori Reserve forests is typically of a dry deciduous type. Around Bunglapura, due to land reclamation virgin forests are vanishing from a large area. The dominant tree species of the forests are *Anogeissus latifolia*, *Tectona grandis*, *Terminalia spp.*, *Adina cordifolia*, *Aegle marmelos*, *Mitragyna parvifolia*, *Manilkara hexandra*, *Ficus spp.*, *Lagerstroemia parviflora*, *Chloroxylum swietenia*, *Buchanania lanzan*, *Soymida febrifuga*, *Cassia fistula*, *Pongamia pinnata*, *Dalbergia sissoo*, *Diospyros melanoxylon*, *Syzygium cumini* and *Grewia tiliaefolia*.

Madhuca indica is a common and an abundant tree found around Churna but it is not met within the forests around Bori region. Some undergrowth vegetation includes characteristic shrubs of *Helecteris isora*, *Grewia hirsuta*, *G. rothii*, *Celastris paniculata*, *Zizyphus spp.*, *Moghania semialata*, *Mimosa himalaya* etc. Grass species found are of different members of gramineae, such as *Apluda mutica*, *Chloris dolichostachya*, *C. virgata*, *Dichanthium annulatum*, *Digoitaria adscendens*, *Heteropogon contortus*, *Iseilema laxum*, *Pennisetum pedicellatum*, *Panicum milidre*, etc. Some species such as *Alysicarpus hamosus*, *Crotolaria diffusum* etc belonging to papilionaceae are also found.

Some common herbaceous plants included *Cleome viscosa*, *Polygala clinensis*, *P. elongata*, *Vernonia cinera*, *Plumbago zeylanica*, *Achyranthes aspera*, *Euphorbia hirta*, *E. parviflora*, *Curcuma amada*.

Some climbers are also seen entangled by undergrowth vegetation e.g. *Passiflora foetida*, *Bryonopsis laciniosa*, *Momordica dioica*, *Ipomoea muricata*, and *Dioscoria anguina*, *D. bulbifera*, *D. petaphylla*, *Smilax zeylanica*.

Around Churna an interesting collection of five species of *Ophioglossum* are found, out of which *Ophioglossum polyphyllum*, *O. costatum*, *O. gramineum* and *O. nudicaulle* are found especially in the open moist ground.

Isoetes coromandelina is found in abundance in ponds around Bunglapura. Tuberous orchid, *Peristylis lawii* is quite commonly found in Sandy loam soil around Churna. Epiphytic orchids like *Vanda tessellata* and *Aerides odoratum* and parasites such as *Viscum nepalensis* *Scurrula philippensis* are common on deciduous trees.

(Source: Bull.Bot.Surv.India. Vol5, Nos. 3 & 4 pp: 281-299, 1963)

Forest and Tribal: Ethnobotanical Observations on Wild Medicinal Plants used by Bharia Tribes of Patalkot in Tamia Forests of Madhya Pradesh

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The aboriginal tribe of Patakot valley are dependent on numerous wild plants growing in their vicinity with medicinal values. In this study, ethnobotanical observations have been made on several plants of the Bharia tribes for curing various diseases/ailments. A total of 48 species were observed to be used for different diseases. There are some species, which are, used during snakebite and scorpion stings. The tribal knowledge on plants growing around them is dispensible for the development as well as for the management of the indigenou medicinal system in the country. The knowledge by tribes regarding ethnopharmacology, the identification of medicinal plants, cure of specific ailments, arrow poisons etc. in remote areas need special emphasis and attention for their development.

The present study reveals that tribal people of Patakot region are dependent on wild palnts to cure, various ailments. The common diseases observed in this area are malaria fever, jaundice, leprosy, paralysis, snake bites, scorpion stings, cough, cuts & wounds and aesthmatic problems. It is also observed that many plants are used for curing more than one diseases though their mode of application is different for different diseases.

(**Source** : Journal of Tropical Forestry, July-Sept., 1993, Vol.9, 111)

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(l k: uoHkkjr 13 uoEj 2001)

vx dc YxusokYk gA

oSkfud] jhMj vkj Dydz us ,d vuk[kh 'k#vkr dh gA vc tYn gh tAxYk'a ea Yxus okY' vx dh Ofo"; ok.kh dh; Wj e,MYk'a ds tfj, l Oo g' tk, xhA bl sl Oo cukus ea vLVfYk; k ds oSkfud th tku l s Ykxs gq gA bl fn'kk ea eYkouZ ea e'uk'k fo' ofo |kYk; ds LdWk v,Q eF'fefVdYk l kba st ds ukbdV jhVj vq uskuYk l Wj Q,j ,Ve,LOfjd fj l pZ d'YgKM' ds dYkdZ tAxYk vx l s l a/kr ,d e,MYk rS kj djus ds fYk, dke dj jgs gA Okjr ea Oh tAxYk'a ea Yxus okYk vx l s fui Vus ds fYk, oSkfud d'f'k'a rst gA bl ds fYk, fjeV l fl x rduhd dk bLrækYk fd; k tk jgk gA

xqtjkr ea fxfj ou ea 1999 ea Ykxh O; kud vx ds ckn bl fn'kk ea d'f'k'a vq rst gA 1662-6 oxZ fdYk'ehVj {«k ea QY' fxfj ou ea 450 QWk'a dh Átkfr; kA 32 nqk: i 'kq'a dh Átkfr; kA 26 l jhl i tarv'a dh Átkfr; kA 300 if{k; a dh Átkfr; ka vq 2000 nW js tho&tarv'a dh Átkfr; ka ikbz tkrh gA 1999 ea ; gka Ykxh vx ea djhc 30 Áfr'kr ou l ank u"V g' x; h Fkha bl snqkrs gq Lid , lYkhdsku l Wj ¼ l , l l h½ ds oSkfud M, jfo tk/ko us tAxYk vx l s fuoVus ds fYk, vPNh igYk dh gA mlg'aus i j s xqtjkr ds tAxYk'a d' 38 bYkka'a ea cka/k gA bu ea l s 23 {«k'a dh igpku vfr [krjukd {«k vq ' "k dh l kkl; {«k ds : i ea igpku dh x; h gA bl h vk/kkj ij fofOé bYkka'a ea vx ds [krj'a d' de djus ds fYk, fjeV l fl x l s YkkaV Ykxk, x; s gA bu l s YkkaV'a ds tfj, feYk rLohj'a d' O'x'fYkd l puk Á.kkYk ds tfj, l ij ba't dj vx Yxus okYk ; k bl ds Áfr fo' "k : i l s l onu'khYk txg'a dh igpku dj Yk tkrh gA

jhMj vq DYkdZ ds 'k/k mu l ehdj.k'a ij vk/kfjr gS t' vx d' Omelkus okYk gok ds rki eku] xfr] fn'kk vkfn dh O; k[; k djrs gA bl ea vYkx&vYkx txg'a ij gok ds <x ea vrj dh xf.krh; O; k[; k Oh 'kkfeYk dh xbZ gA bl ds vYkkok e9 e dh Ofo"; ok.kh vq {«k fo' "k l s l a/kr O'x'fYkd vkadM'a dk bLrækYk fd; k x; k gA

tAxYk ea Yxus okYk vx ds ckjs ea gea igY' l s i rk g'xkA nkokuYk ds ckjs ea Ofo"; ok.kh djus okYk dh; Wj rS kj fd; k tk jgk gA

nkokuYk ; kuh tAxYk'a ea Yxus okYk vx dh Ofo"; ok.kh djus ea budh egROI wZ Ofiedk g'rh gA fo' "k'a us nkokuYk dh Ofo"; ok.kh djus l a/kr l Okouk'a d' vq i Ddk cukus ds fYk, vLVfYk; k ds mlkj {«k ea , d l q l ku ok; q {«k ea Á; "x ds fYk, tku cu» dj vx Ykxkba mlg'aus baYkM dEjs ds tfj, vx Yxus vq ml ds QYkus dh i jh AfØ; k d' fj d,MZ fd; k] l kfk gh mlg'aus vud vkadMs Oh tek fd; A jhMj bu vkadM'a dk fo' Y' "k.k djus ea Ykxs gq gA bl fo' Y' "k.k l s fudY' urht'a ds vk/kkj ij gh tAxYk'a ea Yxus okYk vx ds ckjs ea Ofo"; ok.kh djus okYk dh; Wj & e,MYk cuk; k tk, xhA bl fn'kk ea vc rd dh Áxfr l s oSkfud mRl kfr gS Y'fdu os vOh bl s, dne 'kq vkrh l QYrk gh crkrs gA

mlg'aus bl vfO; ku ea viuh 'k#vkrh l QYrk dh rYkuk djrs gq dgk fd ; g os h gh gS tS h fd e9 e dh Ofo"; ok.kh ds {«k ea 1950 ds n'kd dh fLFkr Fkha vLVfYk; k ds mlkj {«k ea jhMj us v/; ; u ds fYk, t' vx Ykxk] og pjl vq de gj&Ojs tehu bYkks ea

Ykxkbz xbz fu; fkr vx nhA bl n'ku b'kjM d'js ea fjd, MZ vk dM'ia dk fMftVYk Q, eZ ea v'g Fk&Mk; uskuYk : i ea l'ij d'j; Wj ds tfj, fo'Y'k.k fd; k x; kA 'kfä'kkYkh l'ij d'j; Wj v'g b'kjM d'j'ä ds bLr'ekYk l's t'xYk'ä ea Ykxus okYkh vx dh ÄNfr d' l'e>us ea oSkfud'ä d' cM'ä enn feYkh g'Ä

bl l'ädk ea d'äl; Wj e, MYk ds tfj, vYk&vYk e'g e ds fgl kc l's vx ds Äfr l'önu'khYk v'rfjä b'ku dh igpku djus v'g mlga [kRe djus ea vPNh enn feY'xhA jhMj v'g DYkdZ dk l'iu k gSfd ftl r'jg vkt eN'v'kj'ä d' eNYkh idM'us ds fYk, tkus l's igYkq l'ee dk i'jk gYk irk g'rk g'Ä ml h r'jg vx l's fiVus okYk'ä d' Öh vi us bYkcds ea Ykxus okYkh vkt ds ckjs ea T; knk l's T; knk tkudkj h g' r'kfd mlga bl l's fuiVus ea enn feY' v'g vfnokfl v'ä l'g'us okYk upl ku de l's de fd; k tk l'dÄ

(Ik: nfud 12 Qjoh 2002)

vx earclg g' jgh dj'M'adh t'öd [kn

ou ,oa i ; kbj.k fo'kk us [k'tchu djus ds ckn fd; k jgL; "n?kkVu ftY" ds ou {"k'ä ea Äfro"l'z Ykxus okYkh vx l's dj'M'ia : i ; "ä dh t'öd [kn jk[k ea r'cnhYk g' jgh g'Ä p'icd ; g gkfu ÄR; {k : i l's utj ug' vkrh gSY'fdu vÄR; {k : i l's cM'ä i'äkus ij gkfu l's b'äkj ug' fd; k tk l'drÄ

; g jgL; kn?kkVu ftys ds ofj"B ou ,oa i ; kbj.k fo'kk , l , p xgk us vi us l'ö'k.k ds ckn fd; k g'Ä ml'gkaus l'ö'k.k ds ckn fu"d'l'z fudkyk fd ; fn ou foHkkx }kjk ouka ea vx yxus dh ?kVukva ij v'ätk yxk fn; k tkos rks dj'kM'ä dh t'öd [kn u"V gkaus l's cpk'bz tk l'drh g'Ä Jh xgk us 'uoHkkj'r' l's , d Öv' ea crk; k fd ftY" ea d'Yk 4050 oxZ fdYk'ehVj ou {"k g'ä t' ftY" dh d'Yk Ö'ie dk 40-15 Äfr'kr g'Ä bl ea l'ku ou YkxÖx 2800 oxZ fdYk'ehVj ea ÖY" g'Ä l'eLr ftYk ou fu; äk.k dh n'V l's rhu {"k; ou eM'Yk'ä ,oa 16 jät'ä ea cka/k x; k g'Ä bu l'Öh jät'ä ea gj l'Yk Ö'h'k.k vx Ykxrh gSftl l's vÄR; {k : i l's gkfu g' jgh g'Ä

ef; fclh

, d ekg esftY" ds ou {"k l's 81 dj'M'adh t'öd [kn cus'chA Jh xgk us crk; k fd muds }kjk l'Öh 16 jät'ä ea Qjoh ds v'ire l'lrkg ea ou'ä ea i r>M+l's fxjs v'g ?kkl cx'g ds l'v'kus l's g'p'z ToYku'khYk l'kexh d' fu/kk'z'r fcd; s x; s eki ea , d'k dj r'Yk x; kA ftl ea ; g Kkr g'v'k fd Äfr oxZ ehVj ea 200 xte l'v'kh l'kexh Äl'r g' jgh g'Ä ; fn ; g l'kexh t'Yk dj u"V ug' g'rh g'sr" 10 xte ml'ke fdLe dh t'öd [kn Äl'r g' l'drh g'Ä

Jh xgk us vi us Ä; "x ds mi jkr nok fd; k fd Qjoh ekg ds v'r rd ftY" ds ou {"k l's djhc 81 dj'M+ : i ; "ä dh t'öd [kn feYk l'drh gS t' vx ea t'Ykdj u"V g' tkrh g'Ä

Jh xgk usftY" ds okfl ; "a , oa ou fo0kx l s Áfro"lz t f0d [kkn ds : i ea g" jgh gkfu d" j" dus dh vi hYk dh gA

(Ik: uoHkkjr 5 vi&y 2002)

taxk dh vxk dlcra

mUkj oueMYk ds [kj bz ifj{"«k dh dhV d<@Yk tkxhj ds taxk ea jfookj d" Ykxh vxk ij gkd '"/k dltæ ds deþkfj ; "a usfdl h rjg dkcwik fyk; k] ugE r" Ykk[k'a : i ; s dk upl ku g" l drk FkA

Áklr tkudkj dh ds vuq kj mä taxk ea vxk Ykxh ns[krs gh gjS".k tMh&cwh 'k"/k dltæ ds M,- v'eAdk'k xq vi us deþkfj ; "a ds l kfk vxk cþkus l f0; g" x; A crk; k x; k gSfd tc M,- xq dN deþkfj ; "a ds l kfk tMh&cwV ; "a dh ns[kj s[k dj jgs F] r0h mlga taxk ea gkfk Mkcj uked LFkku ij /k/k o vxk dh Yki Va fn [k bz nhA l kfk gh os rRdkYk deþkfj ; "a d" l kfk Y"dj vxk ij dkcwik us taxk dh v"j pY" x; A dN nj ea mlga us vxk ij dkcw Oh ik fyk; kA vxk cþkrs l e; M, xq dk gkfk Oh >Ykl x; kA ukxfjd'a dk dguk gSfd ; fn vxk ij rRdkYk fu; ak.k ugE fd; k tkrk r" Ykk[k'a : i ; s dh YkdMh rFkk v@k/kh; egRo ds iM&i" tYkdj jk[k g" l drs F'A

(Ik: uoHkkjr 5 vi&y 2002)

Áfrck ds cktm Ykxk bz tk jgh gSujokbz ea vxk

xtekpYk'a ea bu fnu"ajch dh QI Yk ds dVus dk fl Ykfl Ykk tkjh gA fdl ku vi uk vukt vc eAM; "a ea Hktus Ykxk gS ogE fdl ku ["r"ad" vxYkh [kj hQ e" e dh QI Yk ds fyk, rS kj djus ds mIs ; l s tV x; k gA

bl grq{"«k dk fdl kuk vker" ij ["r"adh l Qk bz ds fyk, vxk dk l gkjk Y"rk gA dVkbz ds ckn cp tkrk gA fupYkk fgLI k] ft l s xteh.k 0k"kk ea ujokbz dgk tkrk gS d" l ekir djus ds fyk, og ["r"aea vxk Ykxk nrk gA tc l s ["r"adh dVkbz ij Eij kxr gkFk'a l s de gkoLVj l s T; knk g"us Ykxh gS r0h l s ["r"aea vxk Ykxkus dh Áf0; k T; knk g"us Ykxh gA mYY" [kuh; cr ; g gSfd gkoLVj QI Yk dk Áijh fgLI k gh dkVrk gS fupYkk 0kx ["r ea gh N"m+nrk gA ft l dh l Qk bz fdl ku" a ds Vst [khj gA og ml s vxk Ykxkj gh l xerk l s gvK l drk gA N"kd l nkek Ál kn us crk; k fd fdl ku xg" ds i" ds fupY" fgLI s d" bl fyk, Oh tYkk nrk gS D; "id ml s vxYkh QI Yk t" fd o"kkzdkYk ea l ; kchu dh g"rh gA]bl l e; ["r"ea ck/kd u cusA ; g xg" dh i" t"rk bz ds n"ku v"tkj" a ea mYk> tkrsgA v" fdl ku d" blga fudkYkus ea tga T; knk nj Ykxrh gS ogE VDVj vkfn ea Oh rYk T; knk [kpz g"rk gA N"k oKkfud" a us Áfrck ds cktm N"k {"«k ea c+ jgh bl Áf0; k d" ["r" a ds fyk, gkfudkj d crk; k gA mudk ekuuk gSfd QI Yk ds cps fgLI s d" tYkk nsus l s ["r" a

dh mojk 'kfä ÁOkfor g" jgh gS l okfuofük Nf"k okkfud ds ih frokjh us crk; k fd xgudh
Ql Yk ds tYkk, tkus okY" fgLl s ea ukbV"tu cgr T; knk ek«kk ea l fpr jgrk gš t" fd
[r"ä ds fYk, YkkÖnk; d gÅ ijUrq tYkus l sog u"V g" tkrk gS v9 felh ea dkcu rRo dh
ek«kk c<+tkrh gÅ mudk dguk Fkk fd ; fn fdl ku bl cps Ökx d" u tYkk, v9 os k gh
jgus ns r" [r dh mojk 'kfä c<+l drh gÅ

(**Ik**: uoHkkjr 5 vi&y 2002, fNnokMk)

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