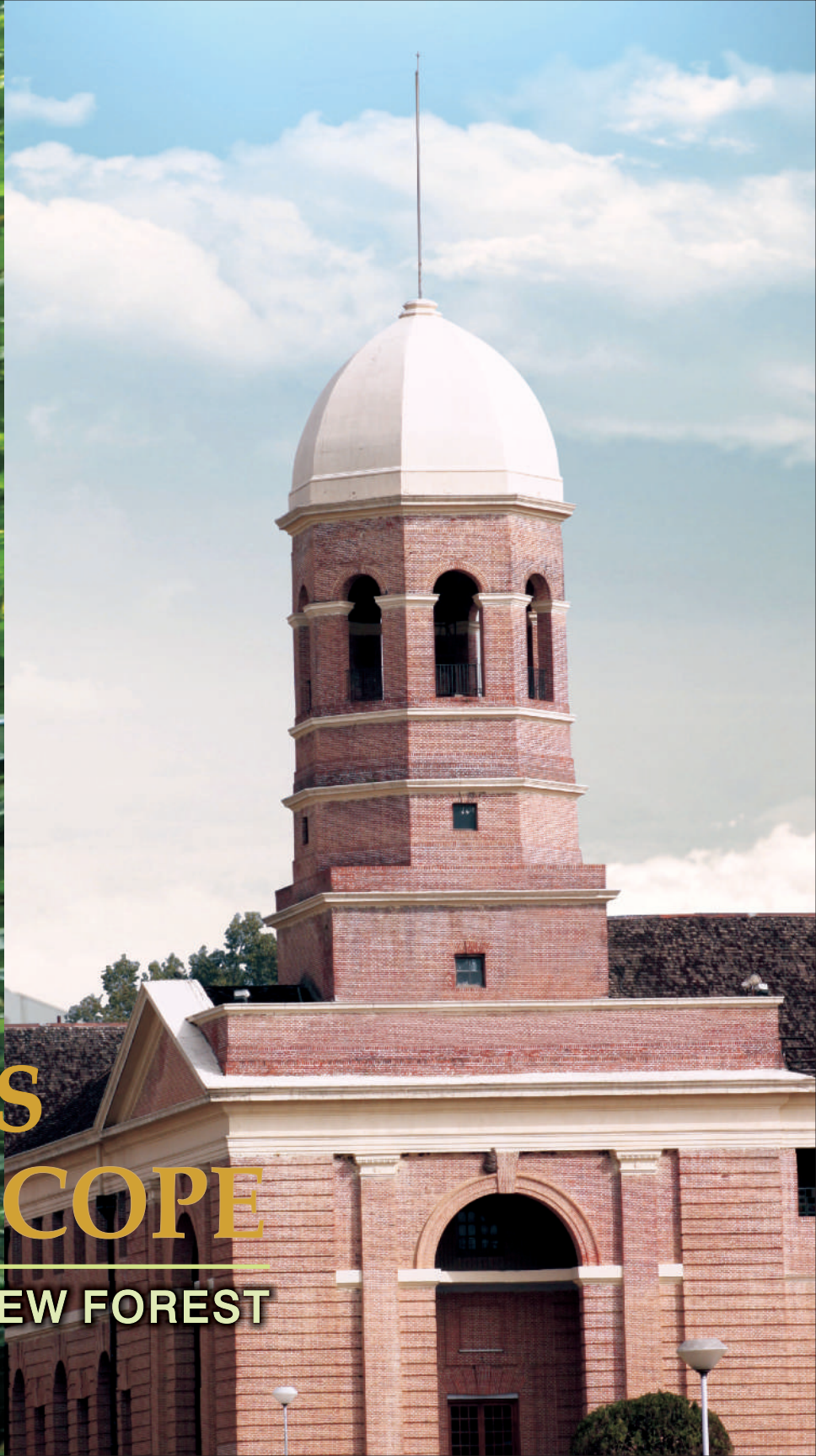




NATURE'S KALEIDOSCOPE

BIODIVERSITY OF THE NEW FOREST
DEHRADUN



FOREST RESEARCH INSTITUTE
(INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION)
DEHRADUN





सत्यमेव जयते



वन महानिदेशक एवं विशेष सचिव
भारत सरकार

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
इन्दिरा पर्यावरण भवन, जोरबाघ रोड़, नई दिल्ली – 110 003

Director General of Forest & Special Secretary
Government of India

Ministry of Environment, Forest and Climate Change
Indira Paryavaran Bhawan, Jorbagh Road, New Delhi – 110 003



सिद्धान्त दास, भा.व.से.
Siddhanta Das, IFS

MESSAGE

Biodiversity forms the cornerstone of ecosystem functions and services that support the livelihoods of millions. India is one of the mega-diverse countries, which despite having only 2.4 per cent of the world's land area accounts for 7 to 8 per cent of the recorded species, comprising of 45,500 floral and 91,000 faunal species. India has wide ranging ecosystems and habitats spread over forests, grasslands, wetlands, deserts, and coastal zone due to diverse edaphic, climatic and topographic factors. Recognising the crucial role of forests in maintaining ecological balance, providing ecosystem services, and livelihood opportunities, the National Forest Policy envisages maintaining 33 per cent of country's geographical area under forest and tree cover.

India has been persevering in its efforts to conserve its biodiversity and ecosystems. The country also has a tradition of conservation and sustainable use of its biodiversity. India's major strength in in-situ conservation lies in its impressive protected area network, which comprises of 102 National Parks, 527 Wildlife Sanctuaries, 57 Conservation Reserves and 4 Community Reserves covering approximately 5 per cent of the total geographical area of the country.

Indian Council of Forestry Research and Education (ICFRE), the apex body in the field of forestry research is located in Dehradun, the Forestry Capital of India. Forest Research Institute (FRI), an institution under ICFRE, located at 'New Forest' in the sylvan surroundings of the Doon Valley has been a signature landmark of the city. Besides ICFRE and FRI, Indira Gandhi National Forest Academy (IGNFA), Central Academy for State Forest Service (CASFOS) and Forest Survey of India (FSI) are also inside the New Forest estate. New Forest, rich in biodiversity of indigenous and exotic floral and faunal species, has always been an enigma for professionals, scientists, conservationists, wildlife photographers, students and tourists.

I am happy that ICFRE has taken the initiative to prepare a coffee table book on Biodiversity of the New Forest. I am confident that the book will be a source of valuable information for conservationists, young researchers, forestry professionals, nature-lovers and students. I wish to place on record my appreciation for Dr. Suresh Gairola, Director General, ICFRE and his team for bringing out this book.

Date : 8 March 2019


(Siddhanta Das)





सत्यमेव जयते



महानिदेशक

भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्

(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार की एक स्वायत्त परिषद्)
डाकघर न्यूफॉरेस्ट, देहरादून – 248 006 (उत्तराखण्ड)

Director General

Indian Council of Forestry Research and Education

(An Autonomous Body of Ministry of Environment, Forest & Climate Change, Govt. of India)

P.O. New Forest, Dehradun - 248 006 (Uttarakhand)



FOREWORD

डॉ. सुरेश गैरोला, भा.व.से.

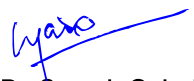
Dr. Suresh Gairola, IFS

Indian Council of Forestry Research and Education and its famous Forest Research Institute are nestled in the picturesque Doon valley with the Himalayan mountains in the backdrop. The area is known as New Forest and forest is created mostly through experimental plantations of trees from around the world. Connectivity to forested and riverine landscape on the north and north-east has allowed unhindered exchange of flora and fauna between the New Forest and the native forest community. Urban/peri-urban landscape on its remaining sides which is criss-crossed by avenue plantations and studded with scattered arboreal plantations and tea gardens, provides it continuity with the Shiwalik range. The environment of the forestry institutions within the New Forest has contributed to the development of a unique ecosystem here. Trees inhabiting snowy mountains to sandy beaches can be seen growing within a walking distance. Moderate climate, deep fertile soil and ample moisture have favoured the survival, growth, development and regeneration of most of the species introduced here. Many other floral forms comprising grasses, ferns, mosses, algae, fungi, lichens, etc. have slowly crept in on their own. Though record is not available on introduction of fauna in the New Forest, the rich phytodiversity has resulted in a diverse array of butterflies, moths, birds, reptiles, amphibians and mammals, etc.

The New Forest Estate is well known for its biodiversity and more than 2100 floral and faunal species are reported. This coffee table book is an interesting compilation of spectacular photographs exhibiting the diversity of life forms present in the New Forest. I feel extremely happy to present this coffee table book to the readers and hope that it would provide them an insight into the colourful world of flora and fauna in New Forest. With curiosity about nature aroused, I am sure, readers would be inspired to contribute towards environmental conservation by planting trees and protecting all life forms.

So come on, let us walk through the biodiversity of the New Forest Estate!

Date : 11 March 2019


(Dr. Suresh Gairola)





सत्यमेव जयते



निदेशक, वन अनुसंधान संस्थान

भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्

(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार की एक स्वायत्त परिषद्)
डाकघर न्यूफॉरेस्ट, देहरादून - 248 006 (उत्तराखण्ड)

Director, **Forest Research Institute**

Indian Council of Forestry Research and Education

(An Autonomous Body of Ministry of Environment, Forest & Climate Change, Govt. of India)
P.O. New Forest, Dehradun - 248 006 (Uttarakhand)



PREFACE

अरुण सिंह रावत, भा.व.से.

Arun Singh Rawat, IFS

Forest Research Institute is set in a lush green estate spread over an area of 450 hectares nestled in the lap of Doon Valley, with the outer Himalaya forming its back drop. Its unique settings and surroundings provide an excellent habitat and niche for many trees, shrubs, herbs, climbers, mammals, birds, insects, fungi, etc. New Forest houses botanical garden, arboretum, bambusetum, conservatories of exotic, rare and spectacular plants, field germplasm banks of medicinal and aromatic plants and commercially important tree species, avenue plantations of ornamental tree species, nurseries, multiplication areas, etc. The experimental trials, species introduction programmes of exotics and indigenous species, which have consistently been part of the research programme of the institute from colonial times to the present have tremendous contributions in enriching the biodiversity of the new forest estate. There are 267 tree species in the New Forest of which about 50% are exotics, botanical garden has specialist plant collections of cacti and succulent plants, herbs, plants from different regions, with special collections from tropical and alpine ecosystems, besides other exotic plants.

Education programmes can help the public to develop greater environmental awareness by understanding the meaning and importance of ideas like conservation and sustainability. The different species including bamboos provide a great opportunity to curious researchers to study their growth, phenology, floral and seed biology, with a view to conserving them through *ex-situ* and *in-situ* measures and multiplying their germplasm for conservation and dissemination. Species have potential for planting in urban, industrial, rural areas and other environmentally significant sites. These all are amply represented in this coffee table book. The avifauna of the campus which live up the New Forest with their melodious calls and activities are also featured in the book. Insects are important creatures that run the world with their unnoticed behaviour and activities as pollinators, dispersal agents, honey makers, silk producers, biodegradation agents and part of food chain. It is imperative to document them and vouch for saving their habitat; the task has been beautifully done.

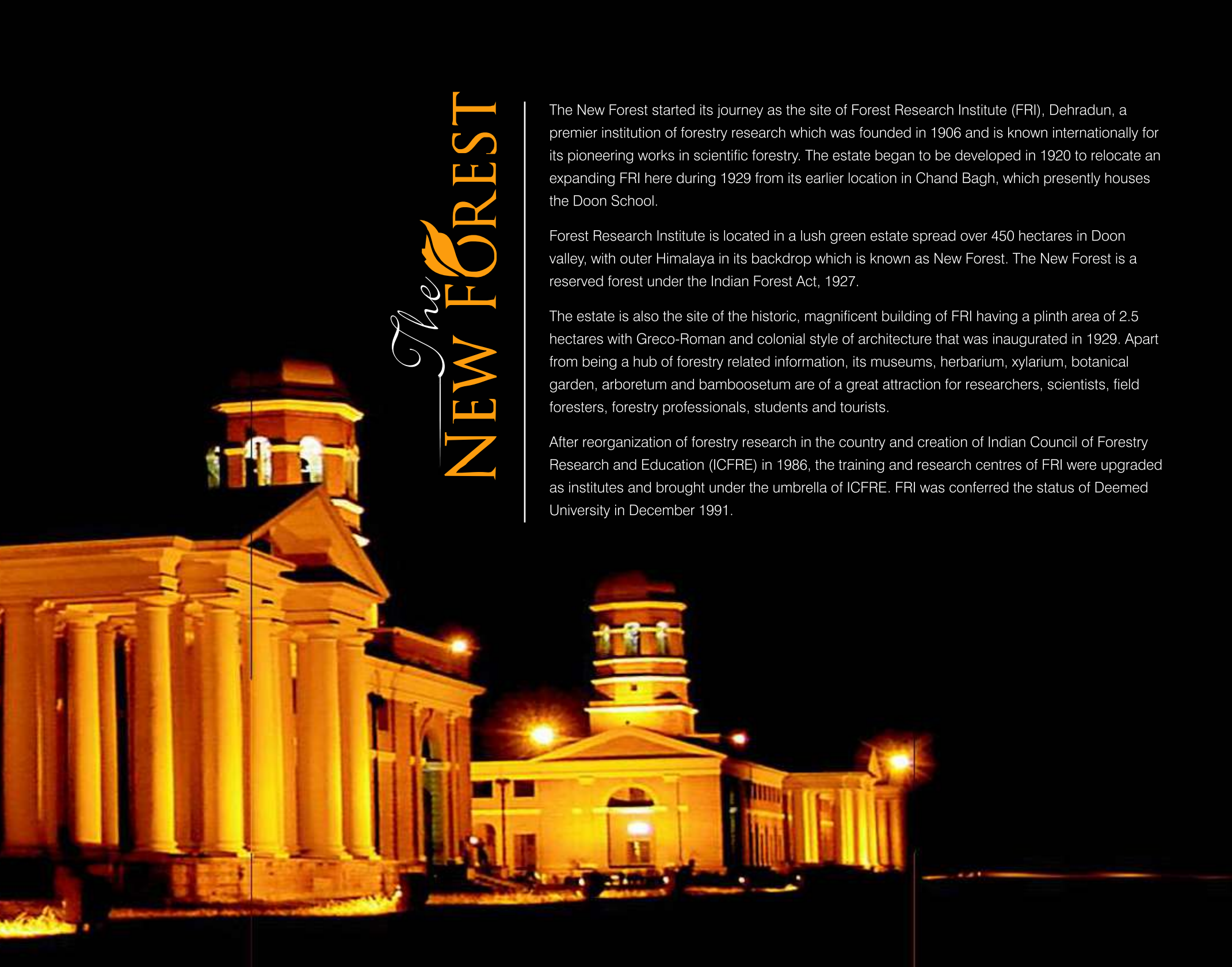
ICFRE's initiative to bring out a coffee table book on Biodiversity of New Forest documenting its trees, shrubs, herbs, climbers, bamboo species, mammals, birds, insects, etc. through photographs and brief description on them will be an invaluable publication for forestry scientists, researchers, professionals, students and visitors as such. This will evoke great interest and educate them on the plethora of the diverse species they live and work amongst.

I congratulate each and every member of the team and contributors who have put in great effort in record time for bringing out this magnificent and much-awaited book.

Arun Singh Rawat

Date : 11 March 2019





The NEW FOREST

The New Forest started its journey as the site of Forest Research Institute (FRI), Dehradun, a premier institution of forestry research which was founded in 1906 and is known internationally for its pioneering works in scientific forestry. The estate began to be developed in 1920 to relocate an expanding FRI here during 1929 from its earlier location in Chand Bagh, which presently houses the Doon School.

Forest Research Institute is located in a lush green estate spread over 450 hectares in Doon valley, with outer Himalaya in its backdrop which is known as New Forest. The New Forest is a reserved forest under the Indian Forest Act, 1927.

The estate is also the site of the historic, magnificent building of FRI having a plinth area of 2.5 hectares with Greco-Roman and colonial style of architecture that was inaugurated in 1929. Apart from being a hub of forestry related information, its museums, herbarium, xylarium, botanical garden, arboretum and bamboosetum are of a great attraction for researchers, scientists, field foresters, forestry professionals, students and tourists.

After reorganization of forestry research in the country and creation of Indian Council of Forestry Research and Education (ICFRE) in 1986, the training and research centres of FRI were upgraded as institutes and brought under the umbrella of ICFRE. FRI was conferred the status of Deemed University in December 1991.



THE NEW FOREST DEHRADUN

LEGEND



Boundary

PLACES

- | | |
|-----------------------|----------------------|
| 1. Tons River | 6. CASFOS |
| 2. FRI Main Building | 7. NFLIC |
| 3. IGNFA | 8. Botanical Garden |
| 4. FSI | 9. Arboretum |
| 5. ICFRE Headquarters | 10. Bambosetum |
| | 11. Champion's Block |

Source : Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





CHAKRATA ROAD



001



003



045



129



139



145



contents

Disclaimer

No part of this publication shall be stored or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without prior permission of the publisher.

Copyright: © FRI, 2019



About the Biodiversity of the New Forest	001
Trees	003
Birds	045
Reptiles	079
Herbs, Shrubs and Climbers	085
Bamboo and Grasses	115

Fungal Flora	129
Mammals	139
Butterflies	145
Insects	159
Other Flora and Fauna	173
Places of Interest : Biodiversity in the New Forest	179

Published by

Forest Research Institute
(Indian Council of Forestry Research and Education)
P.O. New Forest
Dehradun – 248006
www.fri.icfre.gov.in

Realization by

print vision, dehradun | www.printvisionindia.com





Bio diversity *of* The New Forest

ABOUT...

Forest Research Institute (FRI) is located in sylvan surroundings of the Doon Valley, the campus area of FRI is called New Forest. Owing to its location in Sub-tropical climate of Doon Valley, with many seasonal variations over the year, New Forest is the home to a large amount of biodiversity including some endangered species of flora and fauna. The floral diversity of New Forest comprises of 267 species of trees, 216 species of shrubs, 447 species of herbs, 83 species of grasses, 41 species of climbers, 32 varieties of bamboos and 185 species of fungi. Among faunal diversity 23 species of mammals, 327 species of birds, 152 species of butterflies, 473 species of moths, 28 species of dragonflies and damselflies, 734 species of other insects, 54 species of spiders, 38 species of herpatofauna. Besides this, other species of lower plants and other invertebrates are also present.



East Indian Almond / Hollock | *Terminalia myriocarpa*
Large evergreen tree. Location in New Forest: Hari Singh Road



Trees



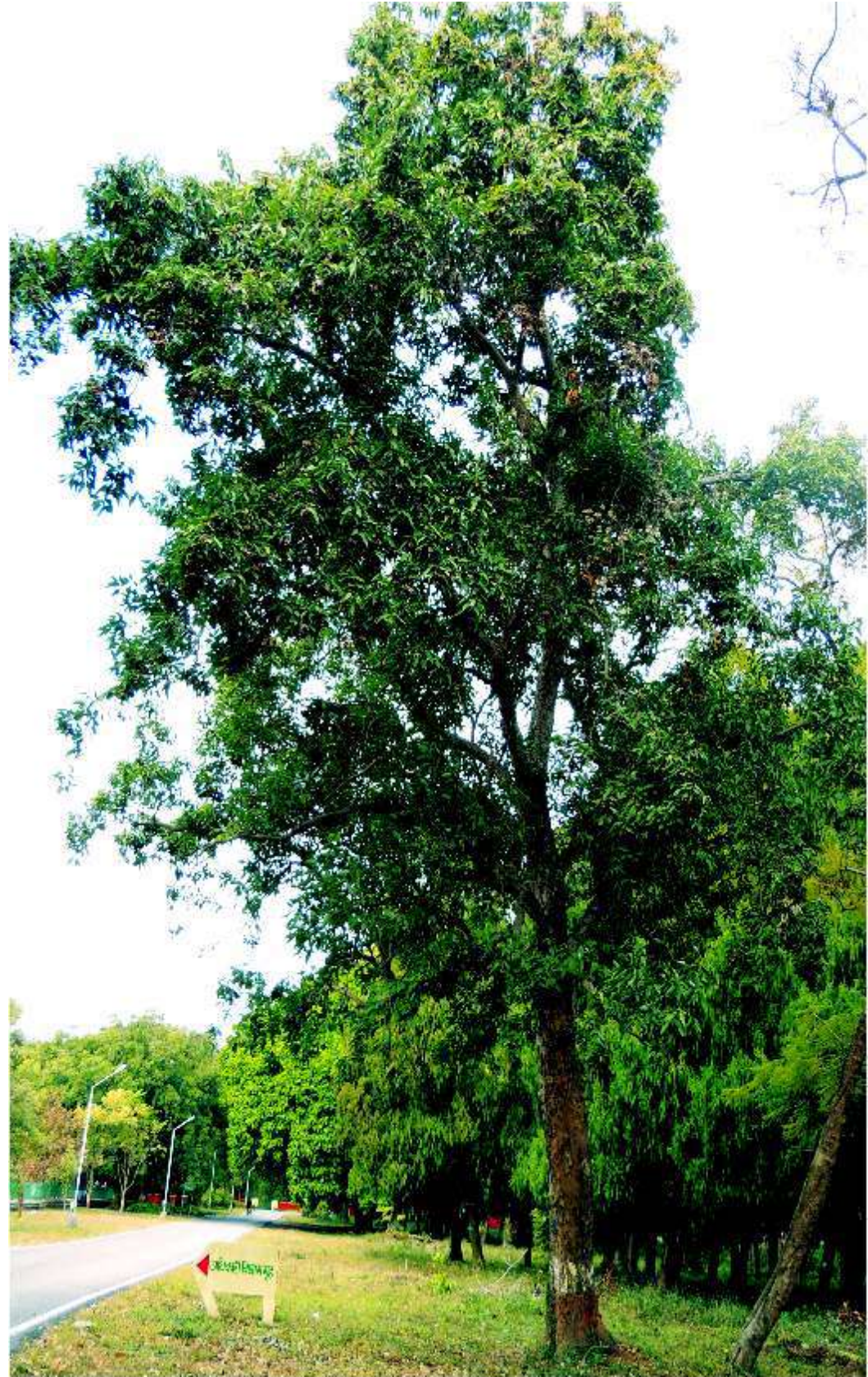
New Forest has number of tree species from diverse countries and habitats. Sizable part of tree flora of New Forest is exotic mainly from Australia, Brazil, Africa, Myanmar, China, Indonesia and Japan etc. Most of the splendid trees were introduced during 1924-26. A total of 267 tree species belonging to 107 genera of 67 families are present in the New Forest. Out of this, Angiosperms (flowering plants) is represented by 256 species belonging 95 genera of 61 families. Monocotyledon has only one family and 4 genus and 4 species. Gymnosperms is represented by 6 families, 8 genera and 11 species. Some of the spectacular trees are *Agathis robusta* (Australia), *Cupania anacardioides* (Australia), *Dipterocarpus turbinatus* (Myanmar), *Enterolobium contortisiliquum* (Brazil), *Flindersia australis* (Australia), *Joanesia princeps* (Brazil), *Koelreuteria paniculata* (China), *Liquidambar formosana* (Taiwan), *Taxodium mucronatum* (Mexico) and *Gingo biloba* etc.

Himalayan Maple

Acer oblongum (Sapindaceae)

Distributed in lower Himalaya from Kashmir to Arunachal Pradesh. Handsome deciduous tree with winged fruit. Suitable for plywood and plyboards.

Location in New Forest: Botanical Garden and Arboretum



Coral Wood, Red Bead Tree

Adenanthera microsperma (Fabaceae)

Distributed throughout India. Large handsome, unarmed, deciduous tree. Fruit flat and curved with red seeds. Planted in gardens as an ornamental tree.

Location in New Forest: In front of Rose wood Hostel and Arboretum





Haldu

Haldiana cordifolia (Rubiaceae)

Distributed throughout India. Large deciduous tree with buttressed stem. Heartwood yellow in colour. Wood used for flooring and paneling.

Location in New Forest: Hill Road





Eastern Himalayan Horse Chestnut

Aesculus assamica (Hippocastanaceae)

Distributed in North-eastern region of India. Large deciduous handsome tree with a hemispherical crown. Fruit are large and leathery. Bark used as fish poison and wood used for making toys.

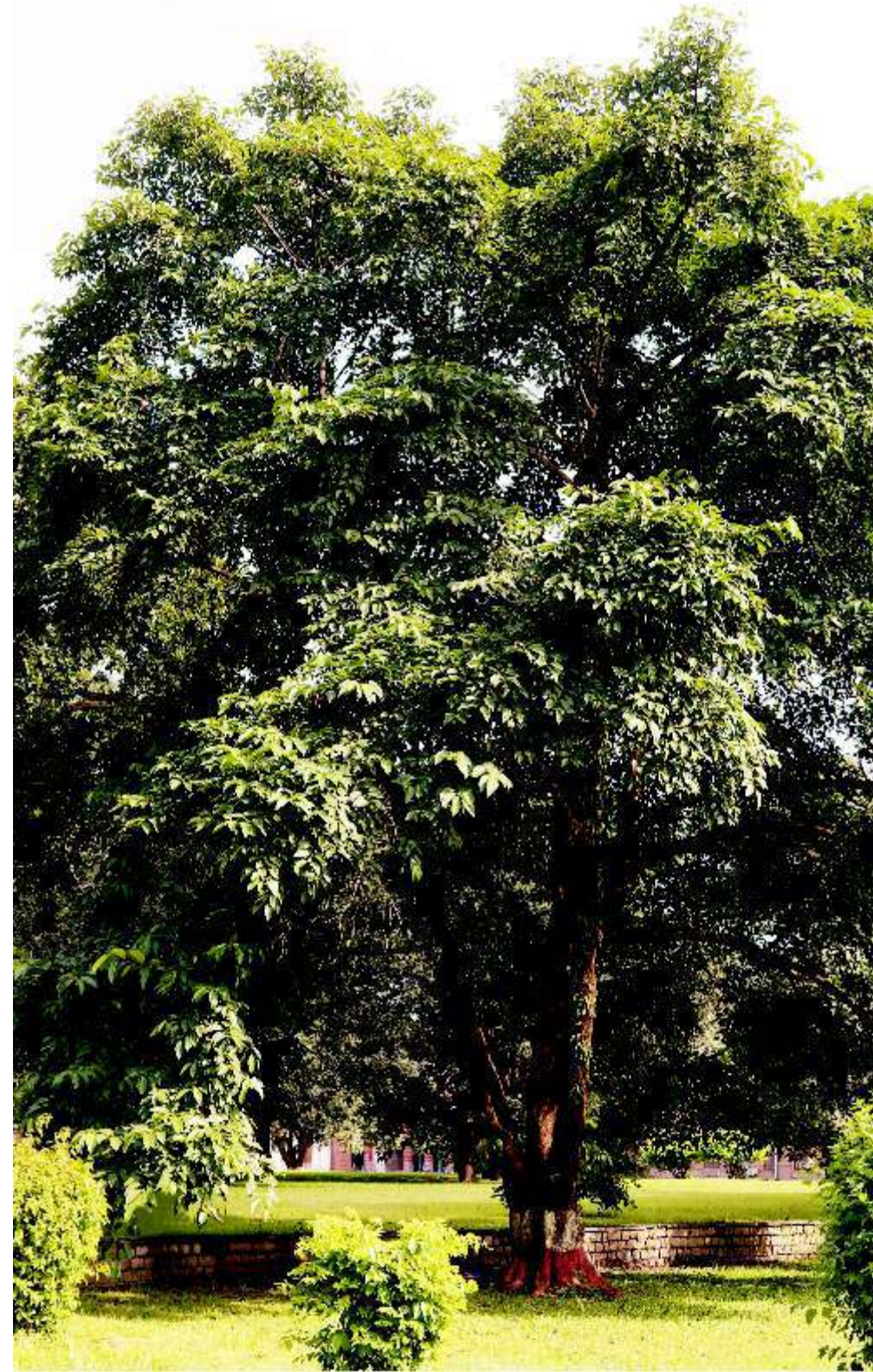
Location in New Forest: Botanical Garden

Kadam

Neolamarckia cadamba (Rubiaceae)

Distributed in Sub-Himalayan tracts from Nepal eastwards and Western Ghats. Large, deciduous handsome tree with globose fruit. Wood used for plywood and tea boxes.

Location in New Forest: Near Mango Grove and Champion Block





Pithraj Tree

Aphanamixis polystachya

The tree is native to India. Leaves are large and shiny. The oil obtained from the seed is used for illumination, making soap and as a lubricating oil. Wood is used for construction and ship-making, and is suitable for furniture.

Location in New Forest: Arboretum and Botanical Garden



Flame of the Forest, Dhak, Palas

Butea monosperma (Fabaceae)

Distributed throughout India, Sri Lanka and Myanmar. Medium sized deciduous tree with bright orange flowers. Leaves used for making plates and cups. Flowers yield a brilliant yellow colouring dye.

Location in New Forest: Rose Wood Hostel and Arboretum

Variegated Bauhinia, Kachnar

Bauhinia variegata (Fabaceae)

Distributed in Sub-himalayan tracts, dry forests of eastern, central and south India and Myanmar. Medium sized deciduous tree with bilobed leaves. Flower buds used as vegetable and wood used for agriculture implements.

Location in New Forest: In front of Union Bank of India, FRI Branch





Bottle brush

Callistemon viminalis (Myrtaceae)

Native of Australia and is widely grown as ornamental tree in tropical and subtropical parts of the world. Genus is derived from two Greek words Kallos 'Beauty' and stemon 'stemen', the true beauty of the flowers lies in the stamens.

Location in New Forest: Botanical Garden and Schlich Road





Indian Laburnum, Amaltas

Cassia fistula (Fabaceae)

Distributed throughout deciduous forests of India and Sri Lanka. A moderate sized handsome tree with beautiful yellow flowers and long cylindrical pods. Root bark is used as a medicine. Planted as avenue tree.

Location in New Forest: Chaturvedi Road



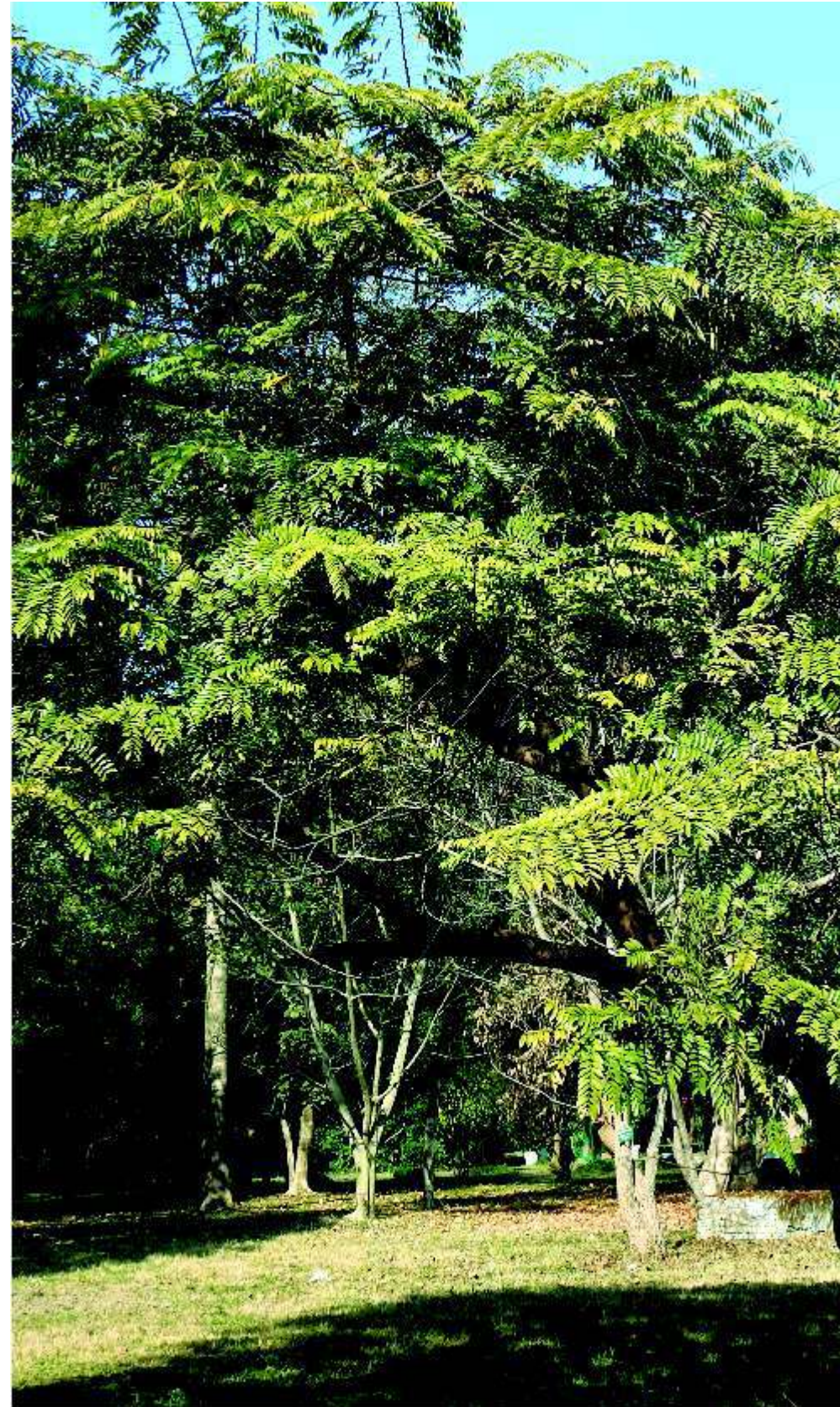


Pink Mohur, Pink & White Shower

Cassia javanica (Fabaceae)

Javanica means 'of Java'. Native of Indonesia and Malaysia. Medium sized handsome tree with splendid pinkish flower. It is grown in most part of India and in tropical countries as ornamental/avenue tree.

Location in New Forest: Botanical Garden and in front of Main Building







Peacock Flower, Gulmohar

Delonix regia (Fabaceae)

Native of Madagascar. Large handsome tree with gorgeous red flower. Planted as avenue tree.

Location in New Forest: Arboretum and Pearson Road





Elephant Apple, Chalta

Dillenia indica (Dilleniaceae)

Distributed in Northeast India, Peninsular India and Myanmar. Erect evergreen tree with spreading dome shaped crown and large globose fruit. Fruit used as jams, jellies pickles and vegetable.

Location in New Forest: Arboretum and Botanical Garden



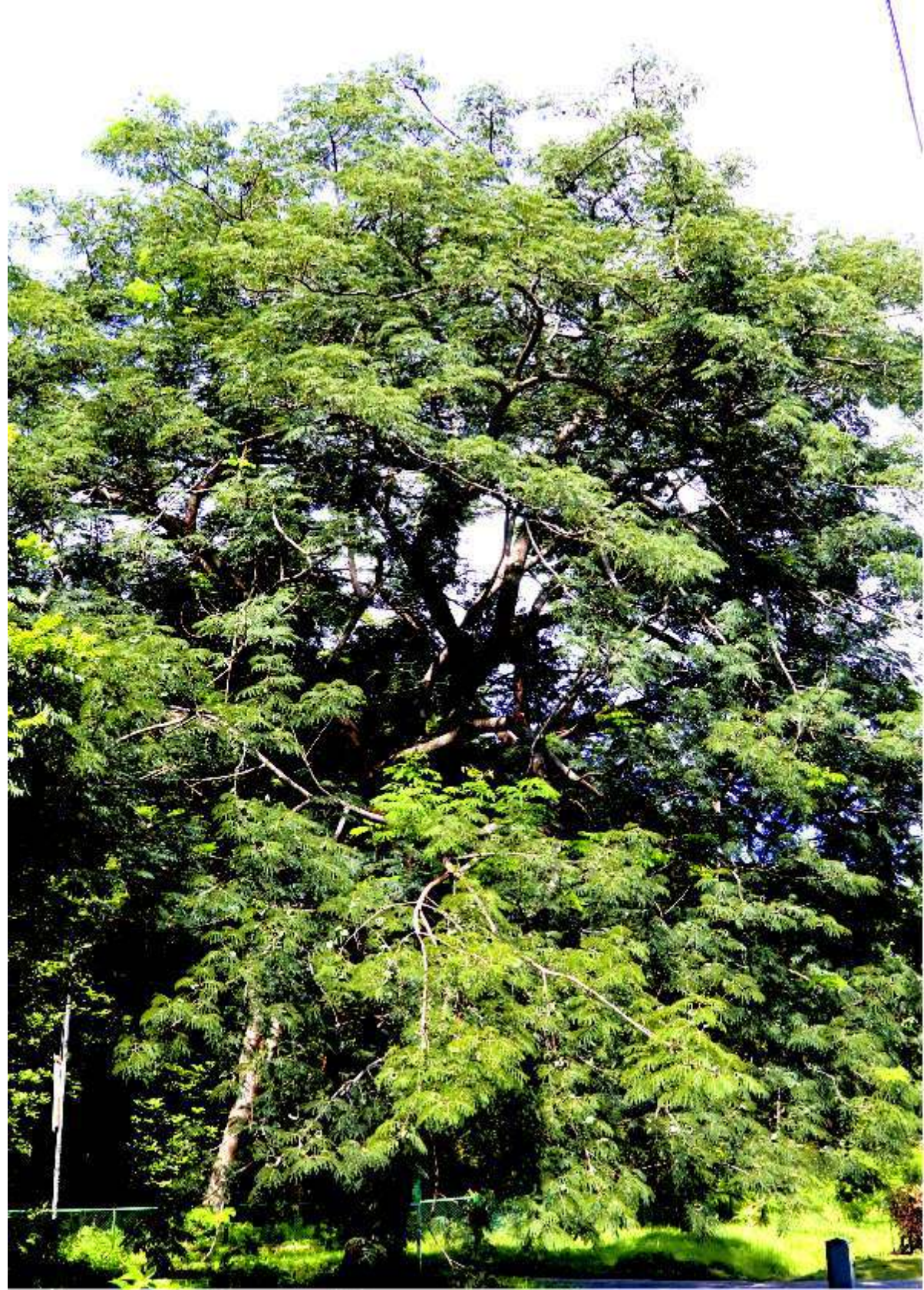


Ear Pod Tree

Enterolobium contortisiliquum (Mimosaceae)

Native of Brazil. Large tree with broad spreading crown and ear shape like fruit. Grown as an avenue tree. Gum called 'Goma de Caro', is obtained from the tree.

Location in New Forest: Botanical Garden and Arboretum



Bodhi Tree, Sacred fig, Peepal

Ficus religiosa (Moraceae)

Native to Bengal and Myanmar. Bodhi tree is considered to have a religious significance in three major religions that originated on the Indian subcontinent, Buddhism, Hinduism and Jainism. Gautama Buddha is believed to have attained enlightenment under peepal tree. Hindu and Jain ascetics also consider the tree to be sacred and often meditate under them.

Location in New Forest: Chaturvedi Road, FRIDU





Jacaranda, Neeli Gulmohar

Jacaranda mimosaefolia (Bignoniaceae)

Native of Argentina. Medium sized tree with beautiful purple or blue flowers and ovate or sub-orbicular flat fruits. Cultivated as avenue tree.

Location in New Forest: Rao Road

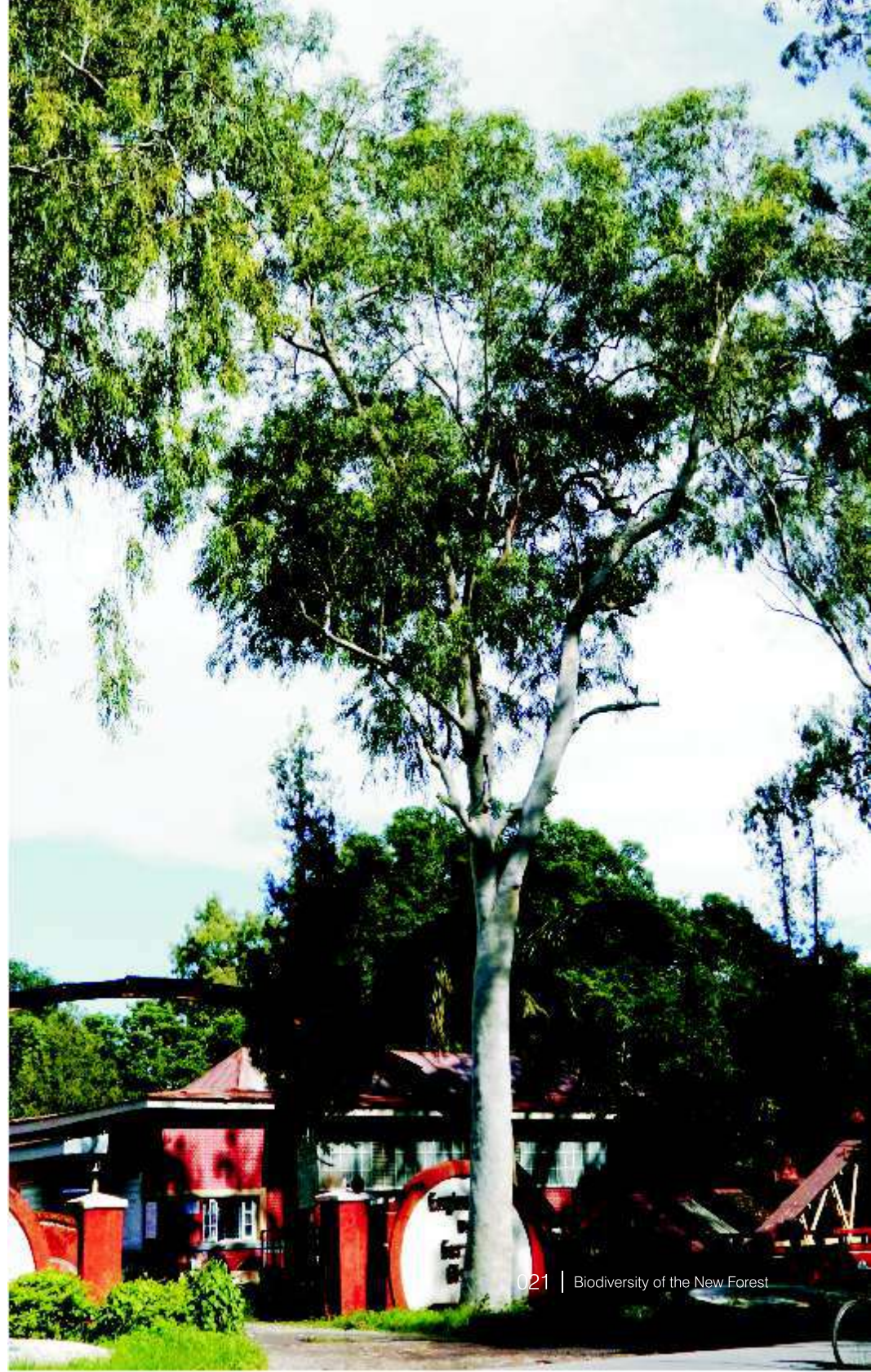


Lemon Scented Gum, Safeda (Eucalyptus)

Corymbia citriodora (Myrtaceae)

Native to Australia. Safeda refers to the white and smooth bark of the tree. Oil from the lemon eucalyptus tree is used in perfumery, and a refined form of this oil is used in insect repellents, especially against mosquitoes. It was first introduced to India in the Nandi hills of Karnataka by Tippu Sultan. Widely planted in Nilgiri hills in south India.

Location in New Forest: Trevor Road



Paper Mulberry

Broussonetia papyrifera (Moraceae)

Native of China. Fast growing moderate-sized tree with polymorphic leaves and globose female fruit. Easily regenerated through coppicing. Wood is used for making paper and pulp.

Location in New Forest: In front of Rose wood hostel





Benjamin Fig

Ficus benamina var. *comosa* (Moraceae)

Distributed in Northern India, Myanmar, Sumatra. Large handsome tree with drooping branches. Wood suitable for match-boxes. Grown as avenue tree.

Location in New Forest: Botanical Garden and Central Academy for State Forest Services

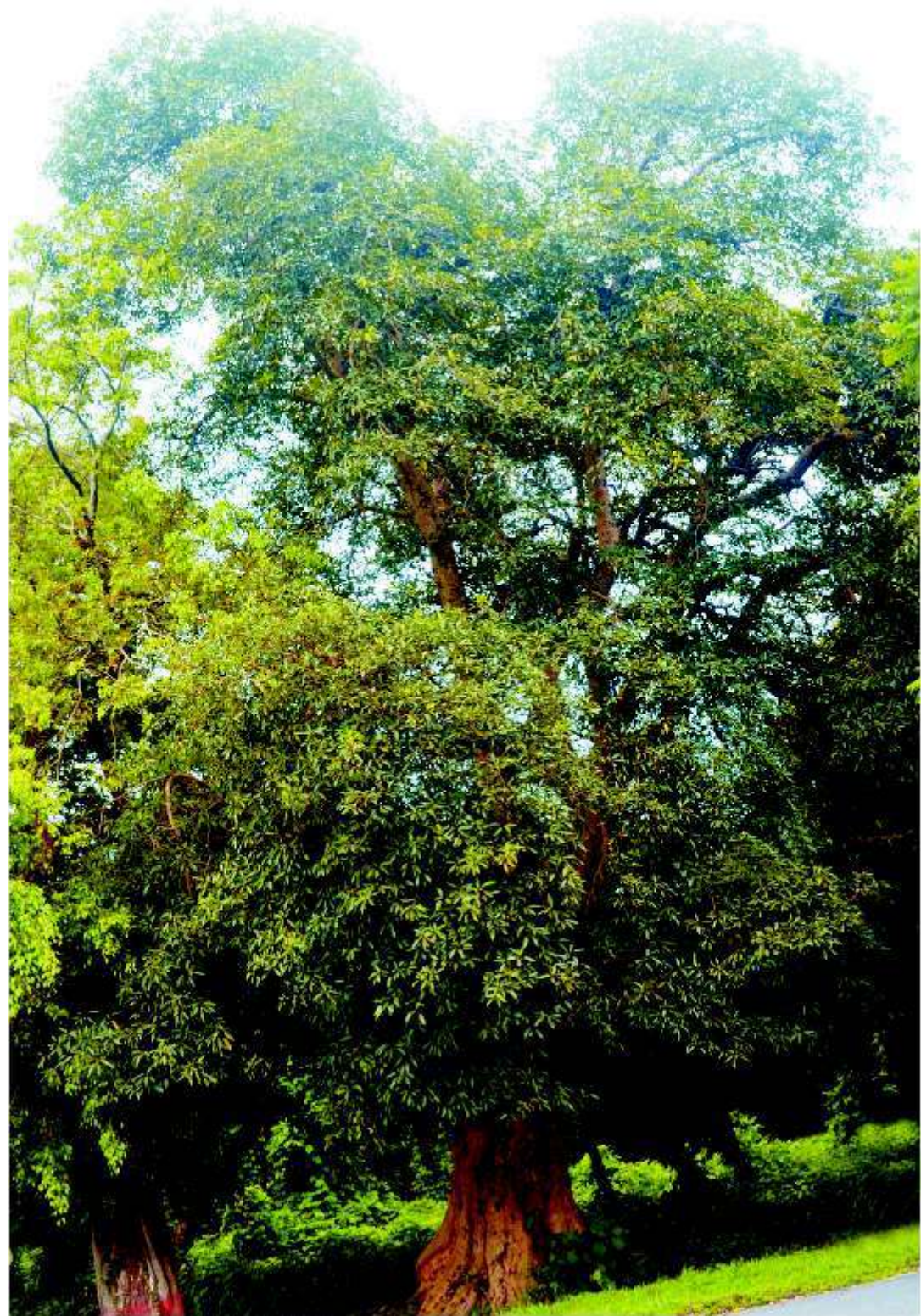


Gular, Cluster Fig

Ficus racemosa (Moraceae)

Distributed throughout India and Sri Lanka. A deciduous tree with pear-shaped fruit. Fruits are edible.

Location in New Forest: Botanical Garden, Chaturvedi Road and Trevor Road



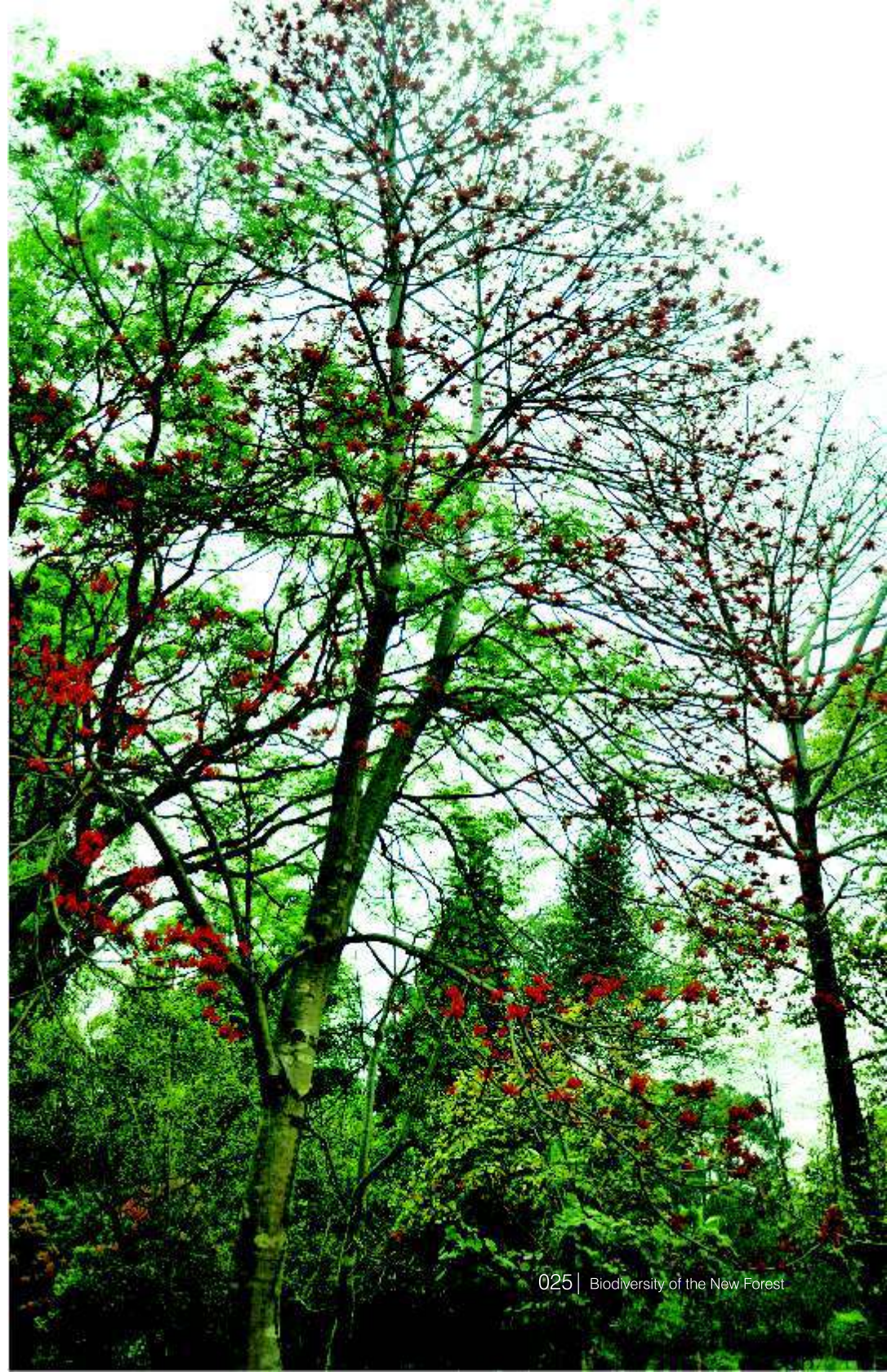


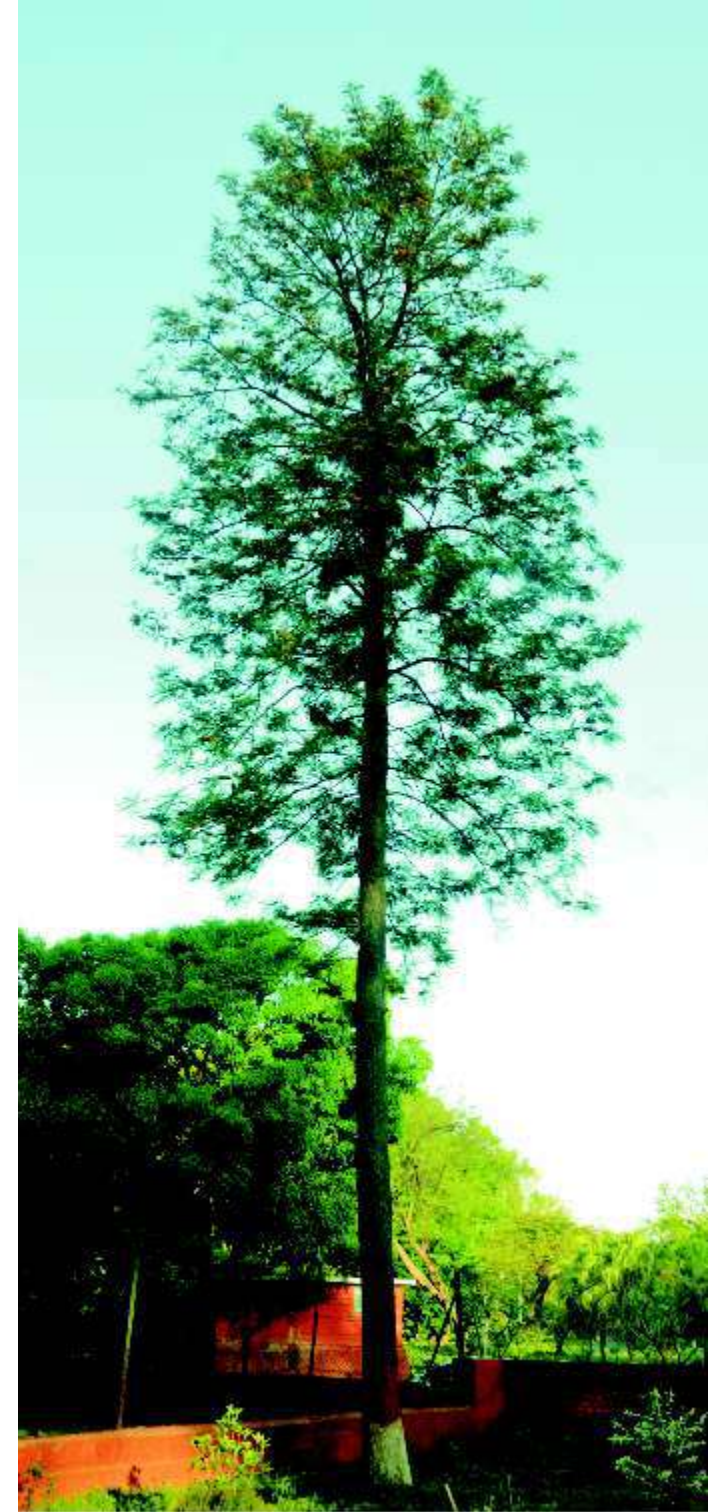
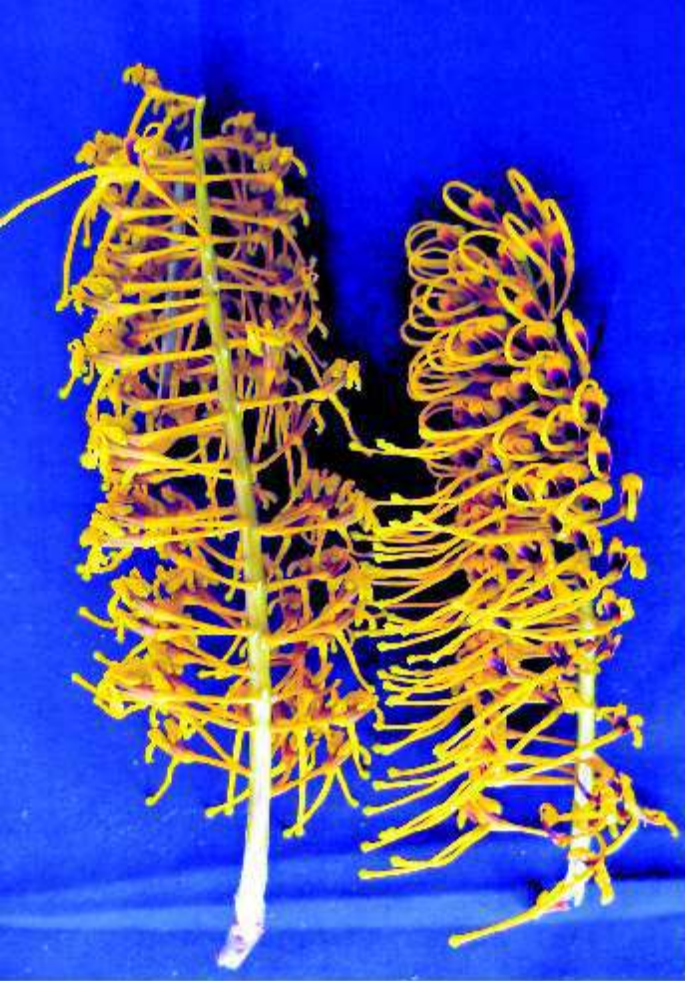
The Coloured Sterculia

Firmiana colorata (Sterculiaceae)

Distributed in India, Myanmar, Sri Lanka and Bangladesh. Large tree with beautiful red flowers. Wood suitable for pulp and paper. Twigs and leaves used as fodder. Grown as ornamental tree in garden.

Location in New Forest: Botanical Garden





Silver Oak, Australian Silk Oak

Grevillea robusta (Proteaceae)

Native of Australia. Evergreen handsome tree with yellow flowers. Wood used for ornamental, paneling, parquet, floors, furniture, toys, veneering and plywood.

Location in New Forest: Trevor road, Hospital Road, Directorate of Forest Education and Laurie Road

Sausage Tree, Balam Khira

Kigelia africana (Bignoniaceae)

Native of Rhodesia. Tree with long hanging sausage like fruits. Planted as ornamental tree. Fruits used for dressing syphilitic sores.

Location in New Forest: Howard Road (in front of Officers Rest House)





Tulip Tree, Yellow Poplar

Liriodendron tulipifera (Magnoliaceae)

Native of North America. A large deciduous tree with maple like leaves and majestic yellow flowers. Cultivated in gardens as ornamental.

Location in New Forest: Botanical Garden



Pride of India, Queen Crape Myrtle, Jarul

Lagerstroemia speciosa (Lythraceae)

Native to tropical southern Asia. A very showy, large, deciduous tree with globular crown. Flowers are large and violet to purple in colour on long panicle. Fruits are spherical in shape and split open at maturity. Used for decoration as dry fruit.

Location in New Forest: Trevor Road and Laurie Road





Champa, Golden Champa

Magnolia champaca (Magnoliaceae)

Native to the eastern Himalaya. A large tree with fragrant pale yellow flowers. Perfume is extracted from the flower. Timber is used in furniture making, construction, and cabinetry. Planted also throughout subtropical part of the country as an ornamental tree.

Location in New Forest: Canning Road and Botanical Garden





Maida Lakri

Litsea monopetala (Lauraceae)

Distributed in Plains of Uttar Pradesh and Sub-Himalayan forests. Medium sized evergreen tree. Leaves used as feed for Muga silkworm.

Location in New Forest: Botanical Garden and Trevor Road





Mahua, Butter Tree

Madhuca longifolia (Sapotaceae)

Distributed in India and Sri Lanka. Large tree with creamy flowers. Flowers are used for making alcoholic drink. Seeds are source of Mahua oil.

Location in New Forest: Botanical Garden, Arboretum, ICFRE Headquarter





Rohini, Kamala Tree

Mallotus philippensis (Euphorbiaceae)

Distributed throughout India as an understorey in Sal forest. Leaves used as fodder and bidi wrappers. Bark contain tannin. The red powder from fruit constitute the Kamala dye of commerce.

Location in New Forest: Botanical Garden and Canning Road

Mango, Aam

Mangifera indica (Anacardiaceae)

Distributed subtropical parts of the country. The name is derived from Malayalam and Tamil word of fruit - 'Manga' or 'Mangai'. The fruit is edible with varieties and cultivar. Bark is used for uterine hemorrhage, seed used in Asthma. The tree is consider sacred by Hindus.

Location in New Forest: All over the campus



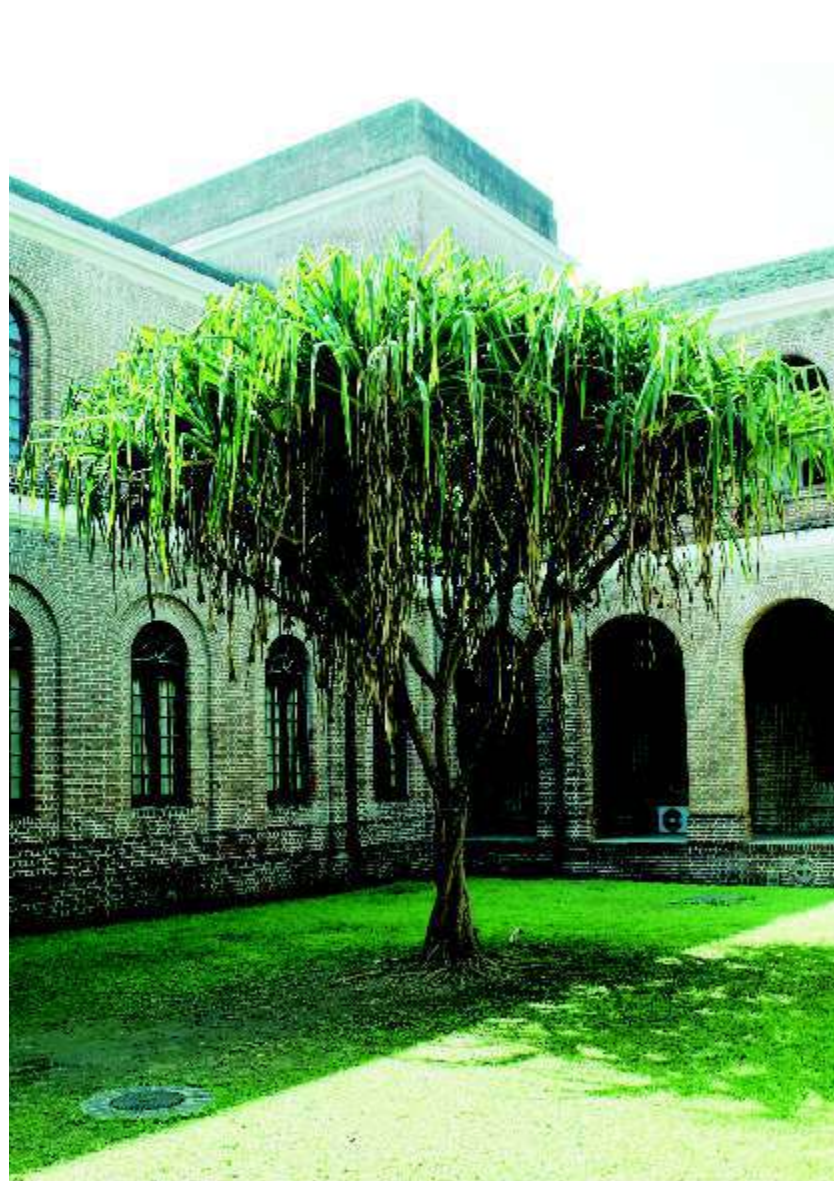


Laurel Magnolia, Lily Tree

Magnolia grandiflora (Magnoliaceae)

Native of America. Handsome evergreen, pyramidal shaped tree with beautiful scented creamy flowers. Cultivated in gardens as an ornamental tree.

Location in New Forest: Botanical Garden



Himalayan Screw Pine, Kevda

Pandanus furcatus (Pandanaceae)

Distributed in northeast India. A sparingly bifurcated branched tree with large dark green crowded leaves at the apex of the stem. Leaves used for making mats. Young leaves from upper parts are used as antidote for poisoning.

Location in New Forest: Botanical Garden and Main Building



Fountain Palm

Livistona chinensis (Arecaceae)

Common popular palm planted in parks and gardens throughout the country. Leaves are large and deeply incised.

Location in New Forest:
Botanical Garden



Harsingar, Tree of Sorrow

Nyctanthes arbor-tristis (Oleaceae)

Distributed in subtropical parts of India. A small deciduous tree with whitish orange, sweet scented flowers. The orange dye from flowers uses to dye silk and cotton. Leaves bitter acrid, anodyne antibacterial febrifuge, expectorant, seed useful in baldness and scurvy.

Location in New Forest: Botanical Garden and Officers Club





African Wattle, Weeping Wattle
Peltophorum africanum (Fabaceae)

Native to tropical Africa. A large tree with blackish bark and conspicuous longitudinal cracks. Flowers are beautiful bright yellow on erect raceme. Planted throughout India as avenue tree in gardens.

Location in New Forest: Botanical Garden and CASFOS





Sal

Shorea robusta (Dipterocarpaceae)

Distributed throughout tropical and subtropical part of the country. Robusta refers to the stout and strong trunk of the tree. The wood is used for railway sleeper and building construction. Seeds yield edible fat- Sal butter used in chocolate industry.

Location in New Forest: Botanical Garden and Compartment No. 1





Buddha Coconut

Pterygota alata (Sterculiaceae)

Distributed in Northeast India and Southeast Asia. Splendid huge tree with straight bole. Fruit are large, obliquely round and woody. Wood used for tea boxes and other packing cases.

Location in New Forest: Golf Course and Botanical Garden



Chir Pine

Pinus roxburghii (Pinaceae)

Native to Himalaya. Distributed throughout Himalayan region.
Five needle pine with beautiful cone used for decorative purpose. The stem yields resin of commercial importance.

Location in New Forest: Botanical garden and Champion block.



Cooks Araucaria, New Caledonia Pine

Araucaria columnaris (Araucariaceae)

Native of New Caledonia and Polynesia. Large conifer tree with columnar of cone shaped crown. Wood used for general carpentry work. Planted as an ornamental tree in subtropical and temperate parts of the country.

Location in New Forest: Botanical Garden





Kashmir Cypress

Cupressus cashmeriana (Cupressaceae)

Native to the eastern Himalaya. The foliage grows in pendulous sprays of blue-green, on very slender, flattened shoots. Planted as an ornamental tree in subtropical and temperate parts of the country.

Location in New Forest: Mason Road





Sago Palm

Cycas revoluta (Cycadaceae)

Native to Southern Japan. Grown as an ornamental.

Location in New Forest: Botanical Garden





Birds



New Forest has long history of bird watching since 1949. Over the years many new wildlife enthusiasts have now taken up bird watching and photography in the FRI Estate. Birds walks and nature walks on the World Environment Day, Wildlife Week and Uttarakhand Bird Festival are regular yearly feature in New Forest. The FRI Estate has also been designated as part of the 'Important Birding Area' Network of the country. The checklist of the birds of New Forest today stands at about 327 species recorded around the year (residents, passage, summer and winter migrants) belonging to both Himalayan and continental avifauna.



Plum-headed parakeet | *Psittacula cyanocephala*

A common resident parakeet with plum-red head, yellow beak and white-tipped blue-green tail, females have a grey head.



Slaty-headed parakeet | *Psittacula himalayana*

A winter migrant parakeet with slaty-head and yellow tail, males have a maroon shoulder patch, which is absent in female.



Alexandrine Parakeet | *Psittacula eupatria*

A resident parakeet, with maroon shoulder patch and large bill, the males have a rose ring and a black chin patch, which is absent in females.



Rose-ringed Parakeet | *Psittacula krameri*

This common resident parakeet looks similar to the Alexandrine Parakeet, only smaller in size, no shoulder patch and a smaller beak.



Himalayan vulture | *Gyps himalayensis*

Large bird with pale buffish body and dark flight and tail feathers, occasionally sighted in the new forest campus.



Black Bulbul | *Hypsipetes leucocephalus*

A winter visitor Himalayan bird, can be generally seen in large groups feeding on fruits of *Melia* species in the campus.



Red-vented bulbul | *Pycnonotus cafer*

A very common, audacious and quarrelsome resident bird, often keep in pairs and loose folks. The bird can be identified by a red vent and white tipped tail.



Himalayan Bulbul | *Pycnonotus striatus*

This crested bulbul with white cheeks and yellow vent, is resident bird. The birds in folks can be found relishing on variety of berries and fruits growing in the new forest.



Asian barred owlet | *Glaucidium cuculoides*

A common resident, inhabiting undisturbed sylvan localities, can be identified by barred buffs and round head. This owl is mainly diurnal.



Spotted owlet | *Athene brama* (Right Top)

A small owlet, common around residential areas and open laws of new forest, it is mainly nocturnal.



Barn Owl | *Tyto alba*

A beautiful golden-buff and grey owl with a white heart shaped face and black eyes. The owl is common in open lawn around FRI building.



Greater Coucal | *Centropus sinensis*

This black and chestnut winged bird is **popular** for walking sedately on ground or skulks in the bushes, feeding on insects, small reptiles intrepidly.



Pied Cuckoo | *Clamator jacobins*

The black and white crested bird is commonly referred as 'chatak' in Hindi and Sanskrit literature and associated with advent of rain.



Asian Koel | *Eudynamys scolopaceus*

This summer migrant stands apart for its mating call often associated with ripening of mangoes. The male is jet black in colour while the female is brown and barred with white.



Ultramarine Flycatcher | *Ficedula superciliaris*

A beautiful winter visitor to the campus. Male has deep blue upper parts, and white under parts whereas female has greyish brown upper parts and whitish under parts.

Grey-headed Canary Flycatcher | *Culicicapa ceylonensis*

The name of the bird is derived from its appearance, a grey head and yellow body. The bird sing in a high-pitched interrogative tone.



Verditer Flycatcher | *Eumyias thalassinus*

This beautiful bird is a resident of this campus. It is named after its unique shade of copper-sulphate blue.



Asian Paradise Flycatcher | *Terpsiphone paradise*



A beautiful bird with black head and crest, with white/rufous upper parts. The males have and long tail-streamers.



Rufous-gorgeted Flycatcher | *Ficedula strophziata*

Another Himalayan beauty that visits the New Forest every winter. It has a distinct orange patch in the centre of grey breast.

Slaty-blue Flycatcher | *Ficedula tricolor*

This little bird is winter visitor to New Forest. It feeds on ground and perches in the bushes close to ground. Male has dark blue upper parts and female is dull rufous in colour.



Red-breasted Flycatcher | *Ficedula parva*

Another little winter visitor, identified by its red throat and upper breast against the creamy white underpart and a grey head in males. The females are greyish-brown in colour.





Red-billed Blue magpie | *Urocissa erythrorhyncha*

This brightly coloured resident bird with turquoise blue upper parts, black head, white underparts and red bills travels in pairs or groups in the woods of New Forest.

Grey tree pie | *Dendrocitta formosae*

A dull coloured tree pie with black face, grey crown dull brown mantle and black wings, is a resident bird of New Forest. The birds travel in groups and have an inquisitive nature.



Black-chinned Babbler | *Stachyridopsis chrysaea*

This small babbler with black chin and lores is a resident insectivore, found in undergrowth. The bird makes pleasant bell-like calls.



Rusty-cheeked scimitar babbler | *Pomatorhinus erythrogenys*

A brownish resident bird species with rufous, forehead cheek and breasts. This shy but noisy bird dwells in the undergrowth and shrubs.

Puff-throated Babbler | *Pellorneum ruficeps*

This resident elusive bird dwell the forest undergrowth and shrubs in new forest, the bird have a rufous chestnut crown, and heavily streaked white underparts.





Black Drongo | *Dicrurus macrocercus*

The bird is dressed in glossy black plumage from beak to tail. Commonly known as 'kotwal' it is one plucky bird.



Common Kestrel | *Falco tinnunculus*

This member of falcon family is a winter visitor in new forest. The bird preys upon small mammals and reptiles, mice are the favourite.



Crested serpent eagle | *Spilornis cheela*

It is a medium sized bird of prey and a resident bird of the campus. Difficult to spot due to heavy tree cover. Sexes are alike.



Shikra | *Accipiter badius*

The bird of prey with grey upper part and white underparts with orange-brown stripes, is a resident of New Forest.



Orange-headed thrush | *Zosterops lateralis*

This colourful bird, visits New Forest during summer. The bird has an orange head and blue grey mantle, dwells in damp and shady areas.



White-chested laughingthrush | *Garrulax leucolophus*

This resident large bird of New Forest has a white crest face and neck with dark olive brown wings and tail. The call of the bird sounds like a burst of laughter.



Black-throated Thrush | *Turdus atrogularis*

As the name suggest the male have a black throat and breasts the female has a buffish throat. This winter visitor can be commonly seen in the lawns of New Forest.



Blue whistling thrush | *Myophonus caeruleus*

This dark blue-black bird is a resident of New Forest. The bird has a melodic, rambling and whistling song.



Scaly thrush | *Zoothera dauma*

A winter visitor from high altitudes to the campus. A very shy bird that feeds on insects, earthworms and berries on the ground.



Chestnut-bellied Rockthrush | *Monticola rufiventris*

A winter visitor Sexually dimorphic bird, male has very distinct chestnut coloured underparts and blue upperparts, female is olive brown in colour with heavy scaling on underparts.



Crimson Sunbird | *Aethopyga siparaja*

One of the most colourful nectar-feeders with typically long curved beak for sipping nectar is resident bird and pride of New Forest.



Purple Sunbird | *Cinnyris asiaticus*

A resident sunbird of New Forest. A common nectar feeder, in its breeding plumage the male have metallic purple colour the female on the other hand is olive green upper part and yellow underparts.



Fire-tailed Sunbird | *Aethopyga ignicauda*

It is a winter visitor to the campus in its non-breeding plumage. It feeds on nectar with its typical long-curved beak.



Oriental White-eye | *Zosterops palpebrosus*

Now called Indian White-eye is a very attractive little bird with typical white ring around their eyes. It's a common resident bird of the campus.



Ruby throat | *Calliope pectoralis*

This small passerine bird is winter migrant to the New Forest. The bird was name after the bright scarlet patch on the chin of the male, which looks like ruby.



Blue-throated blue flycatcher | *Cyornis rubeculoides*

It is a beautiful summer visitor to the campus. It's a small bird with distinct blue throat and orange breast in male.



Richard's Pipit | *Anthus richardi*

This medium sized passerine is a winter visitor, generally seen in the open lawns of New Forest.



Small Minivet | *Pericrocotus peregrinus*

This small arboreal colourful bird is resident of New Forest. the male has dark grey upperpart and paleorange under parts.



White-throated Kingfisher | *Halcyon smyrnensis*

One of the tree dwelling kingfisher, and resident bird, feeds on small reptiles, amphibians, insects and sometimes even the smaller birds.



Crested Kingfisher | *Megaceryle leucogaster*

Large bird with a prominent crest, the upper and under part have white spots on black and grey feathers. The bird is resident of the New Forest.



Grey-capped Pygmy Woodpecker | *Dendrocopos canicapillus*

A very small sized woodpecker and a common resident of New Forest.



Lesser Flameback | *Dinopium benghalense*

Lesser Flameback is a medium-sized woodpecker and a common resident bird. In females forecrown is black spotted with white but hindcrown is red.



Grey-headed Woodpecker | *Picus canus*

A medium sized resident woodpecker of New Forest. The adult male has red forehead and forecrown (black in female).



Common Kingfisher | *Alcedo hercules*

The species is smallest of the three, with paler greenish blue upperpart and orange underparts.



Lesser Yellownape Woodpecker | *Picus chlorolophus*

A medium sized resident of New Forest, males have large yellow napes and red moustachial (absent in female) and red line above eye.



Kalij Pheasant | *Lophura leucomelanos*

A beautiful pheasant with red face, blue black upper part and white rump and underparts, is a resident of the New Forest dwelling the dense undergrowth.



Red Jungle Fowl | *Gallus sonneratii*

One of the most abundant pheasant in New Forest. The male has bright coloured plumage while the females are dull grey in colour.



Chestnut-bellied Nuthatch | *Sitta castanea*

A small resident bird of the campus. It is a restless climber and clings to bark while climbing, sometimes hammering with beak like a woodpecker.



Wall Creeper | *Tichodroma muraria*

This Himalayan bird is a winter visitor, a solitary wallcreeper can be seen feeding the insects from the red-brick walls of famous FRI building.



Velvet-fronted Nuthatch | *Sitta frontalis*

A resident bird of FRI campus, strikingly beautiful with violet-blue upperparts, black forehead, red bill. It feeds on insects in the bark of trees.



White-rumped Shama | *Copsychus malabaricus*

A songbird with rich, melodious voice is a resident bird of the campus, but sighting is not common. Male has glossy blue-black upperparts and breast and characteristic white rump.

Sirkeer malkoha or Sirkeer cuckoo | *Taccocua lescenaultii*

A resident of the campus this elusive bird is not common sighting, the sandy grey-brown plumage provide camouflage to the bird. But the yellow tipped red beak stands apart.



White-capped Redstart | *Chaimarrornis leucocephalus*

A resident bird, the male has a white cap a rufous tail and under parts. Commonly found around the flowing water.



Oriental Magpies Robin | *Copsychus saularis*

The commonest of the resident birds, this black and white robin is an agile tireless singer with varied whistling songs.

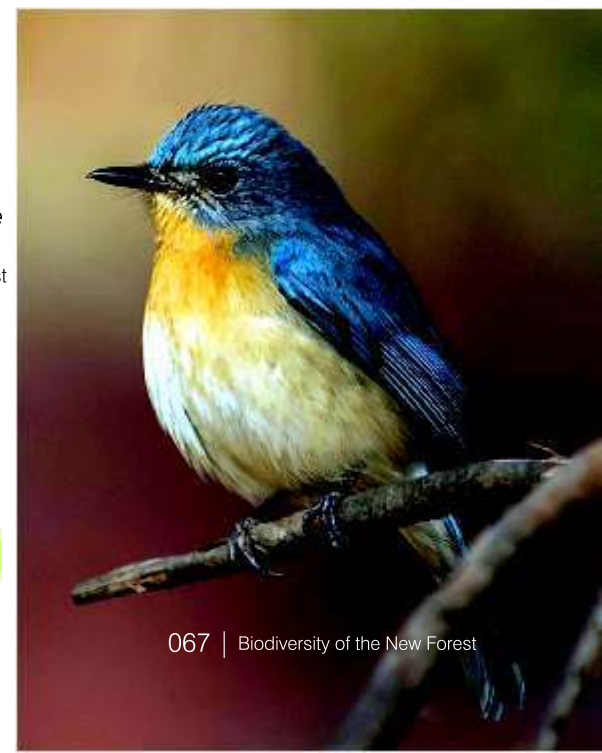


Plumbeous Water Redstart | *Rhyacornis fuliginosa*

A resident of New Forest male is slaty blue while the female have a black and white tail and white spotting on grey underparts.

Tickell's Blue Flycatcher | *Cyornis tickelliae*

A small winter visitor to the New forest, the bird has blue head and upper parts with conspicuous orange neck breast and white underparts.





Peacock | *Pavo cristatus*

The national bird has been occasionally reported from the premises of the New Forest, the male has beautiful plumage.



Maroon Oriole | *Oriolustrallii*

A beautiful maroon and black coloured bird is the resident bird of the campus. Female is darker with black-spotted white belly.



Rufous-bellied Niltava | *Niltava sundara*

An attractive winter visitor with striking rufous underparts, dark blue upperparts, brilliant blue crown and neck patch in adult male.



Small Niltava | *Niltava macgrigoriae*

A tiny winter visitor. Adult male is dark blue with brilliant blue forehead and neck patch whereas female is dusky brown.



Green Bee-eater | *Merops orientalis*

This agile green bird feeds on insects, often catching them during flights.



Orange-bellied Leafbird | *Chloropsis hardwickii*



Blue-bearded Bee-eater | *Nyctornis athertoni*

It is a resident large sized bee-eater with distinctive blue coloured beard, a large sickle shaped bill and square ended tail.



Yellow-bellied Fantail Flycatcher | *Rhipidura hypoxantha*



This Himalayan beauty visits the campus every winter in pair. It is brightly coloured bird with an orange belly, a green back, blue tail, black throat.



A regular winter visitor of New Forest, this bird with yellow coloured belly and dark face mask is an agile bird, characteristically spreading its tail like a fan.



White-throated fantail Flycatcher | *Rhipidura albicollis*

A common resident of the campus. It's a very restless bird that keeps flitting from one bush to another. It has a dark fan-shaped tail.



Brown crane | *Amauornis akool*

The bird is olive brown in colour bird is found in the thick cover close to fresh water. It is one of the rare birds to sight.



Small Buttonquail | *Turnix sylvaticus*

This small summer visitor, with bold black spotting on rufous coat. The bird dwells in scrub and grass.



Redwattled lapwing | *Vanellus indicus*

A common resident bird. The bird lays its egg on open ground and launch an attack on anyone daring to get near the nest.



White-breasted Waterhen | *Amauornis phoenicurus*

A bird dwelling in the undergrowth around the waterbodies in New Forest, the adult has grey upper parts and white underparts.



Rufous Sibia | *Malacias capistratus*

A resident bird of New Forest, with a black head and cinnamon colour nape and underparts, the flight wings are grey and black. The call of the bird is like flute.



Brahminy Starling | *Sturnia pagodarum*

The medium size bird of off-rufouscolor, black crest and grey flight wings, one of the common bird but sighting is rare.



Emerald Dove | *Chalcophaps indica*

It is a beautiful emerald green winged bird. Emerald dove is a resident bird of the campus. It is mostly seen in low flight rather than on a perch.



Spotted Dove | *Stigmatopelia chinensis*

A beautiful resident common bird with brownish pink head and lowerbody, with extensive black and white spotted patches on the sides of neck.



Blue-capped rock thrush | *Monticola cinclorhyncha*

A beautiful uncommon summer visitor to the campus. Shows sexual dimorphism. The male has a blue head, chin and throat and a white patch on the wing that is visible during flight.



Oriental pied Hornbill | *Anthracoceros albirostris*

This majestic bird is a resident bird of the campus. Hornbills are generally monogamous and make their nest in big tree cavities.

Cattle egret | *Bubulcus ibis*

Common resident of the New forest, can be sighted in the open grasslands. The bird preys upon small insects and reptiles



Coppersmith Barbet | *Megalaima haemacephala*

This small barbet is resident of New forest, it has a yellow face, crimson forehead red and throat flanked by yellow feathers. Rest of the body is green in colour.

Indian Grey hornbill | *Ocyeros birostris*

A resident of New Forest, it is smaller than Oriental pied hornbills and has a uniform greyish colour. Similar to other hornbills it has a prominent casque on the beak.



Lineated Barbet | *Megalaima lineata*

A resident of New Forest the bird is large has a brown head and breast with bold white streaking, the other part of body is green. Barbet chisel their nest in tree trunks.





House sparrow | *Passers domesticus*

A small resident birds common near the residential areas. The male has grey crown and chestnut coloured sides and nape, and a black throat and upper breast. The females are sandy coloured.



Red Avadavat | *Amandava amandava*

The red avadavat is a resident bird of New forest campus, however the sighting is not common, and the male in its breeding plumage is red in colour with irregular white spotting.



Common Myna | *Acridotheres tristis*

It is the most common myna around human habitation. This omnivorous species of bird can be found in open woodland of New Forest.



Grey breasted Prinia | *Prinia hodgsonii*

A very small resident bird of New forest the upper body is grey in colour and lower body is white, the breast has buff grey colour. The female is similar to male.



Scaly-breasted Munia | *Lonchura punctulata*

Scaly-breasted Munia or spotted munia is a resident bird of FRI campus. Sexes are alike.



Common stone chat | *Saxicola torquatus*

A small sparrow sized winter visitor and breeding migrant to New Forest, the species can be spotted along the fringes of lawns of New forest.



Buff-barred Warbler | *Phylloscopus pulcher*

A small agile resident bird with yellow rump and double yellowish wing bars. White supercilium and crown stripe, yellow belly and white tail.



Common tailor bird | *Orthotomus sutorius*

A very small resident bird with rufous crown green upper body and white underparts is a skilful tailor. The birds stitches leaves to make its nest.



Monitor Lizard | *Varanus bengalensis*

One of the largest lizard in the estate this harmless reptile thrives on small vertebrates reptiles and eggs.

Reptiles



Reptiles are one of the most elusive creatures and strike fear in the mind of common people. Often out fear we fail to admire the beauty of these sleek, colourful elusive creatures. Snakes, lizards and skinks are common reptiles in New Forest. *Indotyphlops brahminus* (Brahminy Blind Skink), *Amphiesma stolatum* (Buff Striped Keelback), *Boiga forsteni* (Frosten's cat snake), *Dendrelaphis tristis* (Bronzeback Tree Snake) are the common snake found In the New Forest, only three snakes, *Naja naja* (Spectacled Cobra), *Bungarus caeruleus* (Common Krait) and *Dabola russelli* (Russell's Viper) are poisonous. Among Lizards, the common species are *Hemidactylus flaviviridis* (Yellow Bellied House Gecko), *Hemidactylus brookii* (Brook's House Gecko), *Calotes versicolor* (Indian Garden Lizard), *Asymplepharus himalayanus* (Himalayan Rock Skink).

Indian cobra | *Naja naja*

Also known as the spectacled cobra, the snake is part of 'Big four' species that cause most snake bites in India.



Black-headed snake | *Tantilla planiceps*

A harmless secretive snake feeding on insects, beetles and spiders etc.



A photograph of an Indian wolf snake (Lycodon aulicus) on a forest floor. The snake has a dark body with a prominent yellow and black checkered pattern. It is coiled on the ground, which is covered with dark, moist soil, small rocks, and some green moss. The background is blurred, showing more of the forest floor.

Indian wolf snake | *Lycodon aulicus*
Commonly known as the Indian wolf snake.
Often mistaken for poisonous krait, this snake is non-venomous.



Twin-spotted wolf snake | *Lycodon jara*

It is commonly known as the twin-spotted wolf snake. This non-venomous snake is endemic to Asia.



Rat Snake | *Ptyas mucosa*

One of the most common snake, found in the FRI Estate, it grows upto 8 feet in length. It feed on rodents, reptiles, birds and amphibians.



Rosy Rain Lily | *Zephyranthes rosea* (Liliaceae)

Native to Peru and Colombia. Herb with gorgeous pink flower. Bloom after heavy rain.



Herbs, Shrubs & Climbers

HERBS: Herbaceous flora plays a vital role in the ecosystem functioning and sustainability. Herbs are important source of medicinal, fodder, dye, etc. and have been exploited by human being since time immemorial. Owing to the diversity of woody species and climatic condition of the area, herbaceous flora of New Forest has vast variety of species. There are about 447 species of herbs belonging to 254 genera and 76 families. Some of the exotic herbs found in the New Forest are *Alternanthera philoxeroides*, *Alternanthera paronychioides*, *Alternanthera pungens*, *Acanthospermum australe*, *Argemone mexicana*, *Argemone ochroleuca*, *Asclepias curassavicum*, *Zephyranthes rosea* and *Zephyranthes citrina*. Medicinal herbs found in the New Forest are *Abrus precatorius*, *Bacopa monnieri*, *Boerhavia diffusa*, *Canscora decussta*, *Centella asiatica*, *Centrantheruman thelminticum*, *Cleome viscosa*, *Costus speciosus*, *Desmodium gangeticum* etc.

SHRUBS: New Forest has large number of indigenous and exotic shrubs of economic and aesthetic importance. These shrubs are playing an important role in enhancing both a landscape's aesthetic and diversity of the New Forest. There are about 216 species of shrubs planted in different parts of the New Forest. Some of the spectacular and important shrubs are *Abroma augusta*, *Artabotrys hexapetalus*, *Bauhinia galpinii*, *Mahonian apaulensis*, *Rauvolfia verticillata*, *Rhododendron mucronulatum*, *Uvariah amiltonii* and *Zanthoxylum armatum* etc.



CLIMBERS: These are known as lianas, have tremendous economic and aesthetic values. There are about 41 species or varieties of lianas in the New Forest. Out of this, variety of lianas are planted for their ornamental scenic beauty such as *Aristolochia littoralis*, *Bauhinia scandens*, *Combretum indicum*, *Caesalpinia bonduc*, *Chonemorpha fragrans*, *Combretum decandrum*, *Dolichandra unguis-cati*, *Gouania leptostachya*, *Hiptage benghalensis*, *Pyrostegia venusta*, *Passiflora coccinea*, *Schefflera venulosa*, *Trachelospermum jasminoides*, *Thunbergia grandiflora* and *Wisteria sinensis*. Apart from their aesthetic value, many lianas have economic values viz. *Argyreia nervosa*, *Bauhinia vahlii*, *Smilax ovalifoli*, *Tinospora sinensis* etc.



Brahmi | *Bacopa monnieri*
(Plantaginaceae)

Distributed Throughout India, Australia, Europe, Africa, Asia, and North and South America. Herb of marshy area. Used as tonic for improving memory power.

Location in New Forest: NWFP Garden



Dancing Girl Ginger
Globba racemosa (Zingiberaceae)

Distributed throughout India. Herb with bright yellow showy flowers. Grows in shaded and moist places. Excellent potted indoor plant.

Location in New Forest: Bambusetum

Kasni, Chikori | *Cichorium intybus* (Asteraceae)

Native to Europe. Perennial herb with bright blue flowers. Roots used in ayurvedic medicine for diabetes, liver disorder, hypertension.

Location in New Forest: Central Nursery



Flame Lily, Kalikari | *Gloriosa superba* (Liliaceae)

Native to Africa. Splendid lily with bright red to orange flower. Planted in Garden as ornamental Herb.

Location in New Forest: Botanical Garden



Rosy Rain Lily | *Zephyranthes rosea*
(Liliaceae)

Native to Peru and Colombia. Herb with gorgeous pink flower. Bloom after heavy rain. Widely cultivated as ornamentals in tropical regions worldwide.

Location in New Forest: Botanical Garden

Autumn Zephyr Lily | *Zephyranthes candida*
(Liliaceae)

This white lily blooms after monsoons, hence named autumn Zephyrlily.

Location in New Forest: Near Forest Range Office



Thunder-bolt Lily | *Zephyranthes citrina*
(Liliaceae)

This yellow lily remain inconspicuous throughout the year but with the advent of rains the bright yellow flowers grow gregariously in the lawns of New Forest.

Location in New Forest: Lawns of New Forest



Football Lily | *Scadoxus multiflorus*
(Amaryllidaceae)

Native of tropical Africa. Beautiful flowering bulbous plant with spectacular flower head. Grown as ornamental in Garden.

Location in New Forest: Botanical Garden



Shikakai | *Acacia concinna* (Mimosaceae)

Distributed throughout Asia. A climbing shrub, well-known for the natural shampoo derived from its fruit. Bark also contains saponins and used as a detergent.

Location in New Forest: Near Forest Range Office



Tung plant, Chinese wood-oil-plant | *Vernicia fordii*
(Euphorbiaceae)

Native to southern China, Myanmar and Vietnam. A large shrub with heart shaped leaves, red conspicuous glands at the base of the leaf. Fruits hard, woody pear-shaped. It is source of valued tung oil used as an ingredient of paint, varnish, and caulk.

Location in New Forest: Arboretum





Harit Champa | *Artabotrys hexapetalus*
(Annonaceae)

Distributed throughout and tropical Asia. Beautiful shrub with greenish fragrant flowers. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden



African Winter Sweet | *Acokanthera oblongifolia*
(Apocynaceae)

Native to Mozambique and South Africa. Evergreen shrub with fragrant flowers. Highly poisonous plant. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden



Shell Ginger or Butterfly Ginger | *Alpinia zerumbet*
(Zingiberaceae)

Native to East Asia. Plant with large dark green leaves. Flowers are white with tipped in pink tip. Planted as an ornamental in garden.

Location in New Forest: Botanical Garden





Philippine Violet or Nili Jhinti | *Barleria cristata*
(Acanthaceae)

Distributed in India, Southeast Asia and Myanmar. Shrub with leaves dark green on the upper surface and pale green on the lower surface. Flowers are funnel-shaped in violet or pink color. Used in catarrhal infections.

Location in New Forest: NWFP Garden

Yellow Bauhinia | *Bauhinia tomentosa*
(Caesalpiniaceae)

Large shrub with drooping slender branches. Leaves deeply divided and flowers with beautiful yellow petals and dark maroon patch at the base. Planted as an ornamental.

Location in New Forest: Botanical Garden



Dwarf White Bauhinia | *Bauhinia acuminata*
(Caesalpiniaceae)

Distributed in tropical southeastern Asia. Shrub with bilobed leaves. Flowers are fragrant, showy white. Cultivated throughout India as an ornamental plant.

Location in New Forest: Botanical Garden



Red Bauhinia | *Bauhinia galpinii*
(Caesalpiniaceae)

Native of South Africa. Shrub with butterfly shaped leaves and handsome brick red to orangey orchid-like flowers. Planted as an ornamental in garden.

Location in New Forest: Botanical Garden





Daruhaldi | *Berberis asiatica*
(Berberidaceae)

Distributed in subtropical to temperate Himalaya. Prickly shrub with rigid evergreen leaves. Flowers pale yellow and fruit are edible. Roots are used in ophthalmia.

Location in New Forest: NWFP Garden



Aak, Madar | *Calotropis gigantea* (Apocynaceae)

Distributed throughout India and south east Asia. One of the species of the Nakshatras Vatika.

Location in New Forest: NWFP Garden



Bharangi | *Clerodendrum indicum*
(Verbenaceae)

Distributed throughout India. Shrub with drooping white tubular flowers. Roots used in Asthma and Cough.

Location in New Forest: Near Laurie Road



Damaru, Cockspur Thorn | *Maclura cochinchinensis*
(Moraceae)

Distributed throughout India, Bangladesh, Sri Lanka and Myanmar. Thorny large climbing shrub with small custard apple like edible fruit.

Location in New Forest: Champion Block



Annatto, Sinduri | *Bixa orellana*
(Bixaceae)

Native to tropical region of the Americas. Shrub with pink flowers. Red prickly fruit. Orange dye obtained from seeds.

Location in New Forest: NWFP Garden



Crepe Ginger, Keu | *Costus speciosus* (Zingiberaceae)

Distributed in southeast Asia. Beautiful pure white Flowers. Root used in as tonic and anthelmintics.

Location in New Forest: Botanical Garden





Kath Karanj | *Caesalpinia bonduc* (Caesalpiniaceae)

Distributed throughout India. Large prickly climber. Fruits covered with stiff prickles.

Location in New Forest: Rao Road



Monkey Ladders | *Bauhinia scandens*
(Caesalpinaceae)

Distributed to Northeast India and Myanmar. Large, woody climber, form the snake-like twists in its stem. Leaves look like camels foot.

Location in New Forest: Botanical Garden





Calico Flower, Dutchman's Pipe | *Aristolochia littoralis*
(Aristolochiaceae)

Native to South America, naturalized in Australia and southern United State. Unique heart-shaped flowers have s-shaped tube that flared at the mouth, resembles a 19th century Dutch pipe. Widely cultivated as an ornamental.

Location in New Forest: Premises of Plant Tissue Culture Lab



Maljhan | *Bauhinia vahlii* (Caesalpiniaceae)

Distributed throughout the Himalaya.
A woody climber, leaves are used for thatching and plate making.

Location in New Forest: Beyond Bungalow No. 9



Malkangni | *Celastrus paniculatus*
(Celastraceae)

Distributed throughout India and southeast Asia.
Woody climber with bright red seeds. Leaves and
seeds used in country medicine.

Location in New Forest: NWFP Garden and
Arboretum





Frangipani Vine | *Chonemorpha fragrans*
(Apocynaceae)

Distributed throughout India. A large climbing shrub with milky juice and white fragrant flower. Paste of leaves is useful in bone injuries.

Location in New Forest: Botanical Garden



Kalsi Climber | *Combretum album*
(Combretaceae)

Distributed throughout greater parts of India, Myanmar. Large evergreen woody climber with creamy flowering bracts.

Location in New Forest: Beyond Bungalow No. 9





Shower Orchid | *Congea tomentosa*
(Verbenaceae)

Distributed in Northeast India and Southeast Asia. Medium size evergreen climber. Bracts showy, pink. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden





Nilmani Lata, Queen's Wreath | *Petrea volubilis*
(Verbenaceae)

Native to Central America. Climber with drooping long delicate violet-purple star shaped flowers. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden



Golden Shower Trumpet | *Pyrostegia venusta*
(Bignonaceae)

Native to South America. Climber with beautiful orange flowers. Planted throughout India as an ornamental.

Location in New Forest: Botanical Garden



Multiflora Rose | *Rosa multiflora*
(Rosaceae)

Native to eastern Asia and cultivated across the world. Scrambling climber with pink fragrant flower. Widely cultivated in gardens across the country.

Location in New Forest: FRI Estate



Star Jasmine | *Trachelospermum jasminoides*
(Apocynaceae)

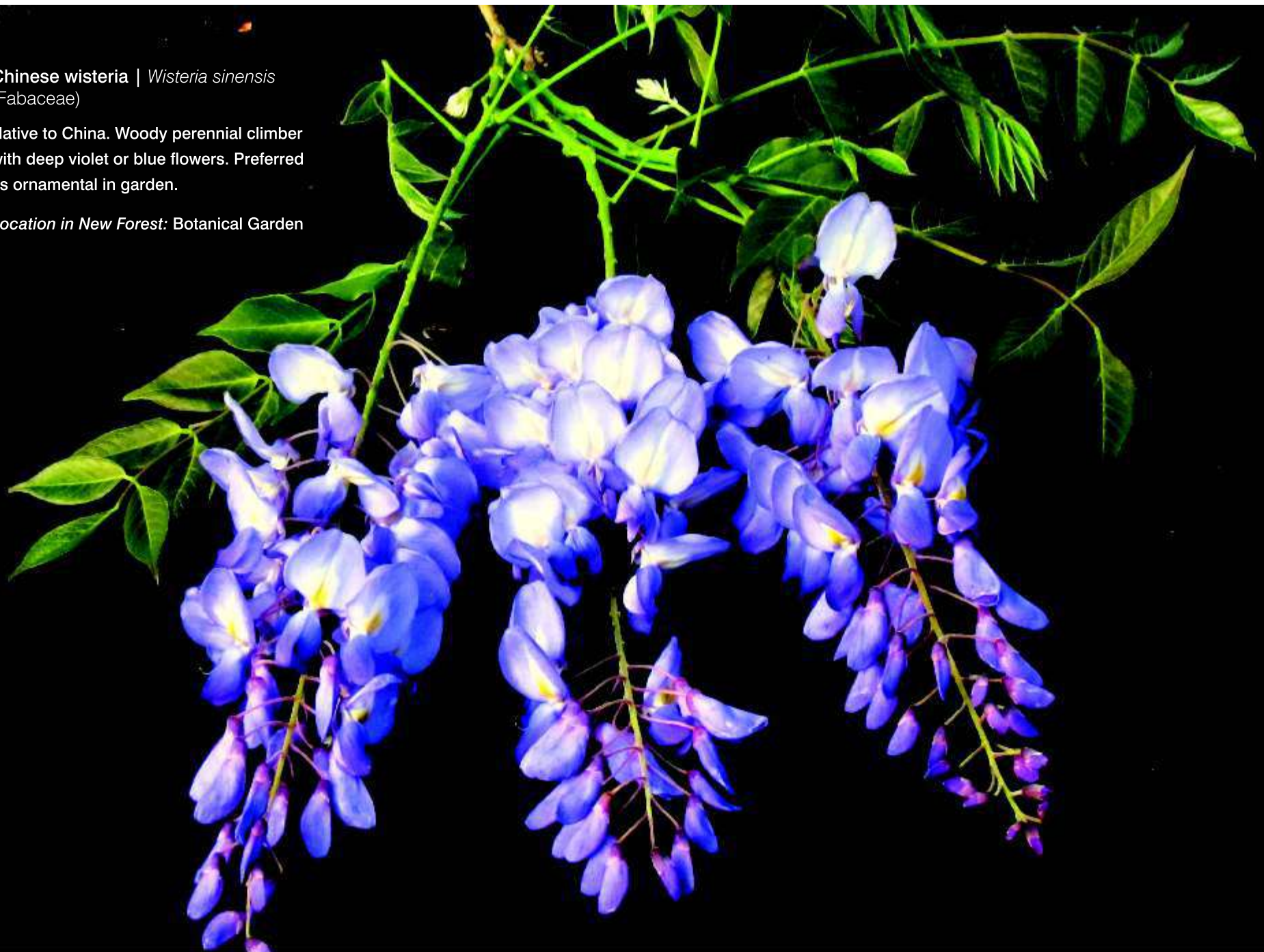
Native to eastern and southeastern Asia. Evergreen climber with glossy green foliage and small fragrant star shaped flowers. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden

Chinese wisteria | *Wisteria sinensis*
(Fabaceae)

Native to China. Woody perennial climber with deep violet or blue flowers. Preferred as ornamental in garden.

Location in New Forest: Botanical Garden



Eastern Uvaria | *Uvaria hamiltonii*
(Annonaceae)

Distributed throughout India, Nepal and Myanmar.
Woody climbing shrub with very showy, brick red
flowers. Planted in garden as an ornamental.

Location in New Forest: Botanical Garden



Giloy | *Tinospora sinensis*
(Menispermaceae)

Distributed in Sub-Himalayan track.
Woody climber with beautiful red fruits.
Stem is in various ayurvedic preparation.

Location in New Forest: NWFP Garden





Elephant Creeper | *Argyreia nervosa*
(Convolvulaceae)

Native to the Indian subcontinent and introduced to various areas worldwide. A perennial climbing vine with large heart shaped leaves which look like elephant ears. Flowers are trumpet-shaped purplish in colour.

Location in New Forest: Botanical Garden, Ribben Road





Common Bamboo | *Bambusa vulgaris*

Cultivated throughout World use in construction, pulp and paper.

Bamboo & Grasses



Bamboo, poor man's timber has recently enjoyed great appreciation for intensive research and extension activities. This renewable green gold with its versatile uses has found its prime association with rural and tribal livelihood. The Bambusetum of Forest Research Institute has over 32 varieties and species of bamboos. It was established in 1932 and is situated in the Compartment No. 3 covering an area of 4 ha. This live repository has of subtropical and tropical native and exotic species of forestry, ornamental, bio-aesthetic and economic value. Species belongs to various parts of India, Bangladesh, Myanmar, China, Japan, Malaysia, Indonesia, Thailand and South America. Some of the species of Bambusetum are *Bambusa balcooa*, *B. bambos.*, *B. multiplex*, *B. nutans*, *B. tulda*, *B. vulgaris*, *Dendrocalamus asper*, *D. strictus*, *D. calostachyus*, *D. longispathus*, *D. membranaceus*, *Gigantochloa atrovioleacea*, *Melocalamus maclellandii*, *Melocanna baccifera*, *Phyllostachys aurea*, *Schizostachyum pergracile*, *Sinarundinaria falcata* and *Thyrsostachys oliveri* etc.



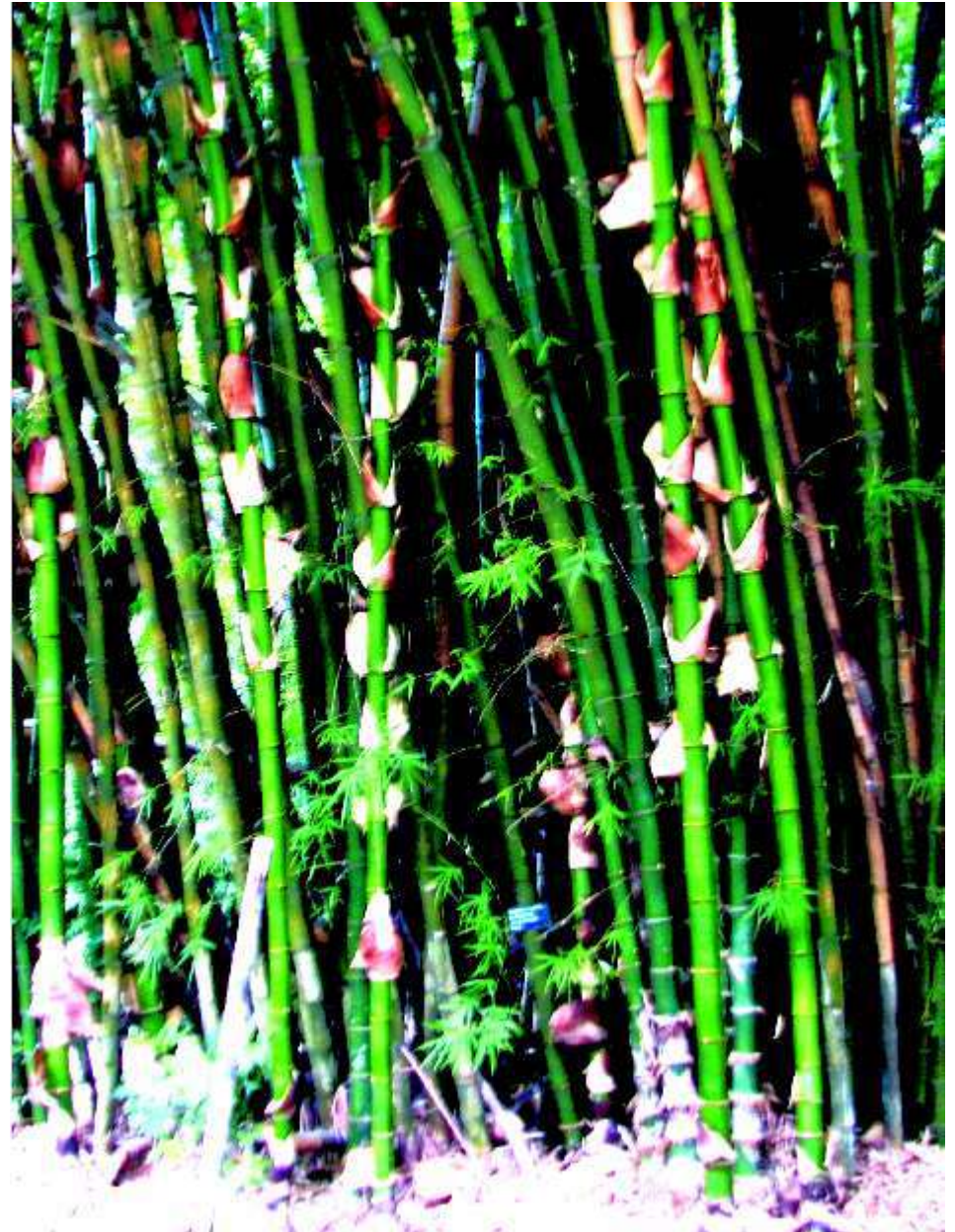
Yellow Bamboo | *Bambusa vulgaris* var. *striata* (Bambusoideae)

Cultivated throughout India as an ornamental bamboo.

Location in New Forest : Bamboosetum, Range Office and Botanical Garden



Betua Bans, Burmese Bamboo | *Bambusa polymorpha* (Bambusoideae)
 Native to Myanmar. Medium sized bamboo. Planted as ornamental. Used for incense sticks.
Location in New Forest : Bamboosetum



Common Bamboo | *Bambusa vulgaris* (Bambusoideae)
 Cultivated throughout world. Used in construction, pulp and paper.
Location in New Forest : Bamboosetum





Pitcher Bamboo, Budha Belly Bamboo

Bambusa vulgaris f. *waminii* (Bambusoideae)

Native to Myanmar. Planted in garden as an ornamental bamboo.

Location in New Forest : Bamboosetum



Tinwa Bamboo

Cephalostachyum pergracile (Bambusoideae)

Distributed in North-East, Andhra and Central India, Eastern Ghat and Myanmar. Planted as an ornamental.

Location in New Forest : Bamboosetum





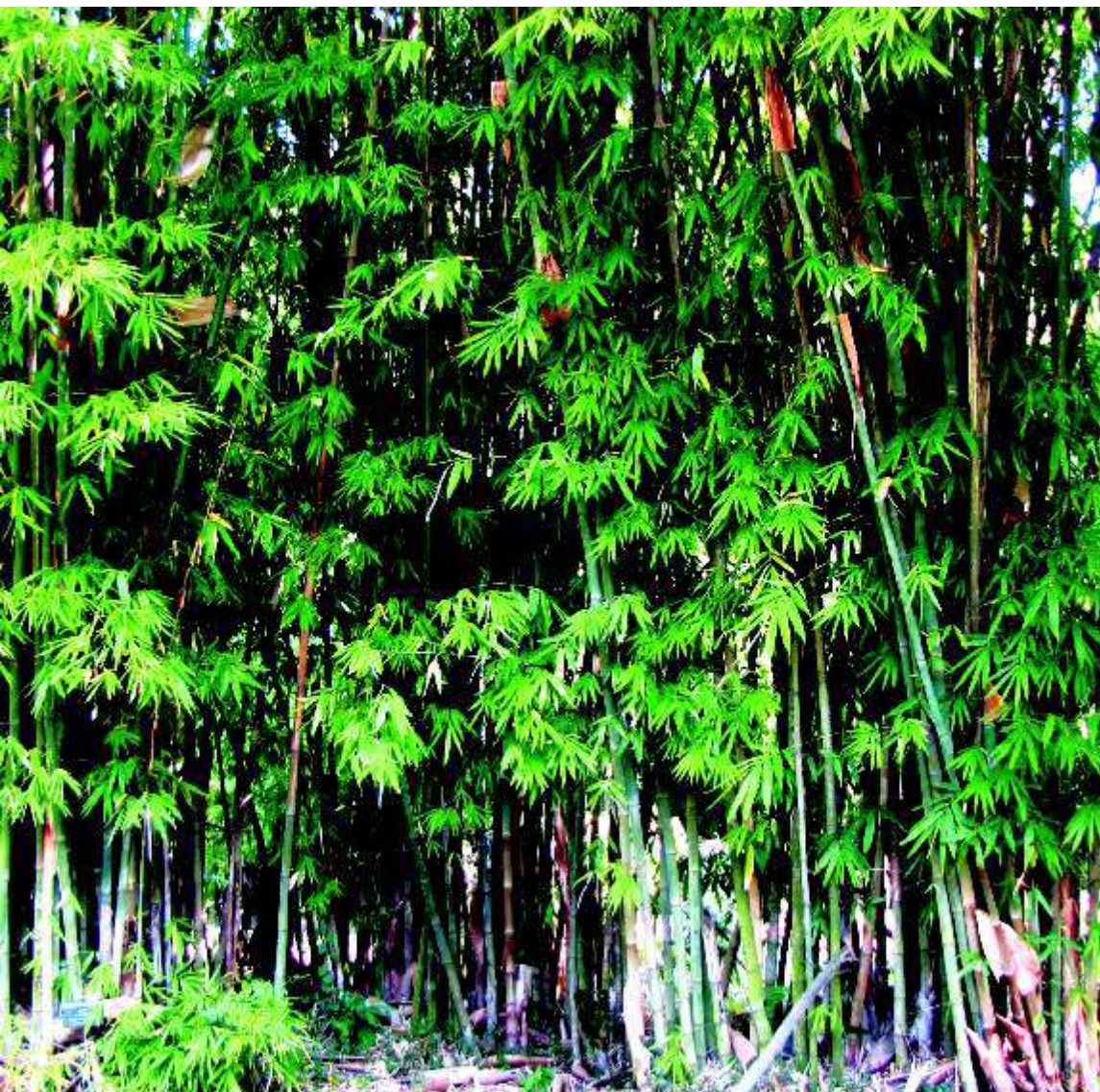
Giant Bamboo, Dragon Bamboo

Dendrocalamus giganteus (Bambusoideae)

Native to Myanmar. Large and tallest bamboo.

Grown as an ornamental.

Location in New Forest : Bamboosetum



Long- sheath Bamboo, Rupai | *Dendrocalamus longispathus* (Bambusoideae)

Distributed in India (Meghalaya, Mizoram, and Tripura),
Bangladesh and Myanmar. Used for basket making.

Location in New Forest : Bamboosetum

Som Deva Bans | *Dendrocalamus somdevei* (Bambusoideae)

Cultivated to Northwest Himalaya. Excellent winter fodder.

Location in New Forest : Bamboosetum





Java Black Bamboo, Black asper | *Gigantochloa atrovioleacea* (Bambusoideae)

Native to Indonesia. Grown as and ornamental.

Location in New Forest : Bamboosetum



Johnson Grass | *Sorghum halepense* (Poaceae)

Native to Mediterranean region. Widespread in India.

Location in New Forest : CASFOS

Kutela, Chiktu | *Setaria intermedia* (Poaceae)

Distributed throughout India,

Location in New Forest : Lawns of FRI



Cotton-candy Grass | *Saccharum rufipilum* (Poaceae)

Distributed in North-West and Eastern Himalaya.

Location in New Forest : In front of Main Building

Lesser Canary Grass | *Phalaris minor* (Poaceae)

Globally distributed.

Location in New Forest : Lawns of FRI





Crowfoot Grass, Makra

Dactyloctenium aegyptium (Poaceae)

Distributed throughout India and southeast Asia.

Location in New Forest : Throughout the FRI Estate



Black Speargrass

Heteropogon contortus (Poaceae)

Distributed throughout India and southeast Asia.

Location in New Forest : Around National Forest Library and Information Center



Running Mountain Grass

Oplismenus compositus (Poaceae)

Distributed throughout Himalaya.

Location in New Forest : Trevor Road and FRI Lawns



Dallis Grass, Caterpillar Grass

Paspalum dilatatum (Poaceae)

Native to Brazil and introduced and naturalized in India

Location in New Forest : Throughout the FRI Estate



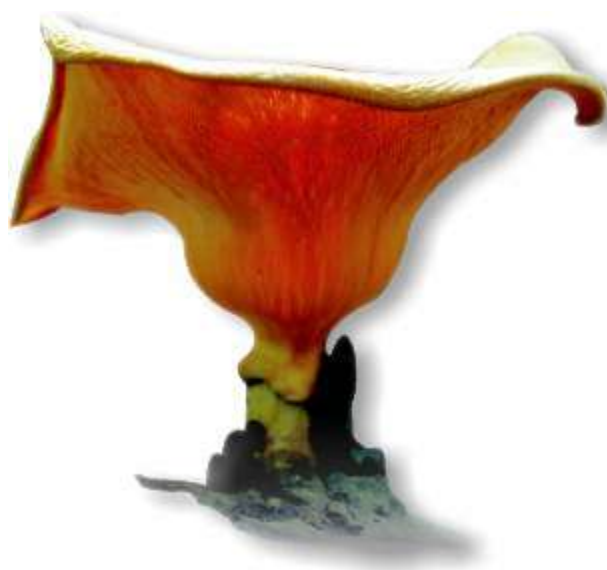
Caprinellus disseminatus

Commonly found on decaying tree stumps.



Fungal Flora

Fungi is a important part of any ecosystem, they facilitate nutrient recycling in ecosystem through decomposition. All fungi are not decomposers, some of them cause disease in plant and animals. These microscopic organism is visible in their reproductive stage, through their fruiting bodies. Fungal flora of New Forest consists of 185 species belonging to 101 genera in 44 families. Largest families are Polyporaceae with 54 species followed by Hymenochaetaceae with 122 species and Agaricaceae with 16 species. *Phellinus*, *Rigidoporus*, *Ganoderma*, *Daedalea*, *Trametes* and *Podoscypha* are dominant genera. Most of the mushrooms are poisonous, some edible mushroom found in New Forest estate are *Agaricus* sp., *Laetiporus sulphureus*, *Morchella esculenta* and *Termitomyces microcarpus*





Auricularia nigricans

Saprobic on decaying hardwood sticks and logs.

Location in New Forest : Near Range Office



***Agaricus* sp.**

Saprobic, growing alone or gregariously in meadows, fields, lawns, and grassy areas.

Location in New Forest : Lawns of FRI

Daedalea sprucei

Parasitic on living sal, figs, amaltas, laurel Causes heart rot.

Location in New Forest : Near Botany Division





Coprinellus disseminatus

A saprophytic fungi growing in hundreds by the base of stumps.
Location in New Forest : Throughout the FRI Estate



Tapinella panuoides

Solitary to clustered mushrooms growing on wood logs mid to late winter.
Location in New Forest : Near Officers Club



Calvatia rubroflava

Saprobic fungi growing under tree canopies.
Location in New Forest : Throughout the FRI Estate



Auricularia auricula

Saprobic on decaying hardwood and conifer sticks and logs; Commonly known as 'Wood Ear'.
Location in New Forest : Near Range Office

Earliella scabrosa

On multiple hardwood, common on logs and wood in service, causing white stringy rot.
Location in New Forest : Near Range Office





Phellinus gilvus

Root and wound parasite on hardwoods like shisham, rosewood, babul, khair etc., causing white rot.

Location in New Forest : Near Officers Club

Laetiporus sulphureus

Edible parasitic fungi on *Adnetha microsperma*, *Toona ciliata*, and *Quercus* sp. commonly known as chicken of the woods.

Location in New Forest : Near Officers Club





Phallus indusiatus
A Saprobiic 'stinkhorns' growing on bamboo litter.
Location in New Forest : Bamboosetum



Fomitopsis rubida

A wound parasite, causing heart rot in *Castanea sativa* and *Eucalyptus citriodora*.
Location in New Forest : Trevor Road

Inonotus glomeratus

A wound parasite on *Jacaranda mimosifolia*, causing yellowish white rot
Location in New Forest : Rao Road



Ganoderma lucidum

A serious root parasite on many broad leaf species, entering the host plants through root to root contact. Affected trees are liable to wind-throw. Fructifications develop at the base of the trees at ground level or on roots. The fungus causes white rot and attacks both sapwood and heartwood.

Location in New Forest : Troup Road



Lenzites elegans

On dead wood of Sal, Acacia and other hardwoods causing white stringy rot.

Location in New Forest : Hill Road



***Phellinus* sp.**

A fungi with velvety wavy shell shaped fruiting body is often found on the trunk of hard woods.

Location in New Forest : Troup Road





Morchella esculenta

Commonly known as yellow morel. This is an edible mushroom.

Location in New Forest : Golf course Road



Phellinus caryophylli

Location in New Forest : Pearson Road

A serious parasite causing sap and heart rot in multiple hardwoods.



Trametes pubescens

Location in New Forest : Rao Road



Pycnoporus sanguineus

On dead hard & soft woods, throughout India in tropical and sub-temperate regions, causing white and stringy rot.

Location in New Forest : Chaturvedi Road



Podoscypa petaloides

Saprobic, common on peepal, mango and other trees.

Location in New Forest : Hill Road



As saprophyte growing in clusters on logs causing white rot.



Serpula similis The species mainly grows on bamboos and conifers causing brown rot.
Location in New Forest : Rao Road



Schizophyllum commune It resembles tightly packed corals.
Location in New Forest : Officers Club



Termitomyces microcarpus
An edible species growing in clusters on termite nests.
Location in New Forest : Lawns of FRI



Hygrocybe miniata
A typical waxcap mushroom of grasslands.
Location in New Forest : Lawns of FRI



Common Leopard | *Panthera pardus*

A Resident in New Forest is nocturnal in habit & globally threatened.



Mammals

Mammals are considered as the dominant animals in the ecosystem. They have an important role in the food web of almost every ecosystem as grazers and predators depending upon their feeding habit and their trophic level. About 23 species of mammals are reported from New Forest. The most common resident species are Rhesus Macaque and Indian Five Striped Palm Squirrel. Some resident / migrants like Himalayan Yellow Throated Marten, Himalayan Palm Civet (rare), Common Langur and Flying Fox Bat.

New Forest is designated as a "Reserve Forest" and is habitat for the globally threatened common leopard *Panthera pardus* that is classified as a 'vulnerable' species as per IUCN Red List of threatened animals. Whereas, the Jungle Cat is occasionally encountered along the forest edges at dusk while the Leopard Cat is nocturnal and permanent resident and was occasionally seen in the New Forest up till the 1970's, is now very rare. Other common mammals found here are the Common Palm Civet, Small Indian Pipistrelle Bat, Grey Mongoose, Indian Hare, House Rat and Common Asian House Shrew, Golden Jackal and Wildboar. There are also confirmed records of Indian Pangolin, Indian Crested Porcupine and Barking Deer.





Rhesus Macaque | *Macaca mulata*

A number of troops occur all over the FRI Estate feeding on fruits and vegetables.

Common Langur | *Semnopithecus entellus*

Resident Migrant in New Forest in forested habitats.



Himalayan Yellow-throated Marten | *Martus flavigula*
This small carnivore is occasional during winter season.





Indian Hare | *Lepus nigricolis*

Nocturnal rodent found all over the FRI Estate in open fields and forest edges.



Wild Boar | *Sus scrofa*

Commonly occurring omnivore in the FRI Estate.



Golden Jackal | *Canis aureus*

A wild scavenger feeds primarily on garbage, poultry, fallen, fruits and small wildlife.



Common Silverline | *Spindasis vulcanus vulcanus* Fabricius
Commonly found amongst the bushes & flowers of New Forest.



Butterflies



New Forest Estate provides a rich mosaic of habitats, natural mixed deciduous sal forests, old pine, teak and bamboo plantations, botanical garden, open fields, orchards, avenue plantations, etc. each having numerous nectar and larval food plants which attract over 152 species of butterflies that can be seen flying around the year. The peak season for observing butterflies in the New Forest is mainly the pre-monsoon season (April-May) and the post-monsoon (October-November) season, when butterflies are both high in number of species as well as individuals. Spring and autumn broods occur and many species of butterflies exhibit these two distinct forms, the 'wet season form' and 'dry season form'. Such variations are a result of varying environmental factors and help the species in camouflaging itself. This feature is mostly seen in the families Nymphalidae and Pieridae i.e. Common Evening Brown, Peacock Pansy, most of the Bush Browns and Rings, the wet season form bears a number of eye spots on the underside besides the streaking, and is also dark on the upper side. While in the dry season form the wings are more angular, eyespots are completely absent or are reduced to minute dots. Many species have evolved to protect themselves by means of camouflaging. When they close their wings, the underside is visible and is usually dull, with its shape, colour and pattern suited for camouflaging i.e. the Orange Oak Leaf resembles a dead and dry leaf. Many species of butterflies have poisonous or toxic chemicals that they have accumulated from their larval food plants. These butterflies are usually brightly coloured (orange, red, yellow, black) so that predators know they have to avoid them e.g. Common Rose besides other danaiids like crows and tigers.



Orange Oakleaf | *Kallima inachus huegeli*

Outer wing pattern resembles a dead leaf that protects itself from predators, prefers fallen & ripened fruits for nectaring during rainy season.

Common Jezebel | *Delias eucharis*

Frequents on different flowering plants for nectar but breeds on *Loranthus* sp.



Common Map | *Cyrestis thyodamas ganescha*

Commonly found in wet patches of New Forest, this butterfly breeds on figs.



Common Guava Blue | *Deudorix isocrates*

Occurs close to its food plants, guava & pomogrenate



Common Emigrant | *Catopsilia pomona*

Observed migrating from plains into New Forest during spring season & summer.



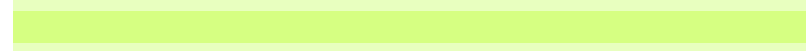
Indian Red Admiral | *Vanessa indica*

Larvae feed on nettles, whereas the adults are found nectaring on flowers.



Large Oak Blue | *Arhopala amantes*

A typical butterfly of mixed sal forest.





Common Nawab | *Charaxes athamas*

Males perch high on the canopy or tree tops, they guard their territory and drive away other competitors for mates.



Orchid Tit | *Chliaria othona*

Breeds on flowers of *Rhychostylis retusa*, the foxtail orchid during pre-monsoon.



Red Pierrot | *Talica nyseus*

A species from south India that has recently established in foothills of northern India, and it breeds on the ornamental *Kalanchoe* plant.



Striped Blue Crow | *Euploea mulciber*
Poisonous butterfly that breeds on *Nerium oleander*.



Indian Tortoise Shell | *Aglaia caschmirensis*
A winter migrant to New Forest from adjoining hills.



Orange Awlet | *Burara jaina*
Active during dusk and seen on wild flowers.



Lemon Pansy | *Junonia almana*
A common butterfly found along the forest edges.



Common Hedge Blue | *Acytolepis puspa*
Common in forested habitats.



Dark Evening Brown | *Melanitis phedima*

It is a brown butterfly found flying at dusk.



Common Five-ring | *Ypthima baldus*

Very common butterfly in grass along the forest edges.



Grey Pansy | *Junonia atlites atlites* Linnaeus

Occurs close to water and grassland habitat.



Commander | *Moduza procris*

Prefers sunshine also comes to damp patches along the roadside.



Common Indian Crow | *Euploea core*

It is a common glossy black butterfly found in India.



Common Five-ring | *Ypthima baldus*
A small butterfly dwelling the grasses meadows.



Tawny Coster | *Acraea terpsicore*
It plays dead when caught and exudes a bad smell.



Common Rose | *Pachliopta aristolochiae*

It is a distasteful butterfly to most predators.



Himalayan Common Five-ring | *Ypthima baldus*



Common Silverline | *Spindasis vulcanus*
Commonly found amongst the bushes and flowers.



Common Wanderer | *Pareronia hippa*
Common butterfly of Himalaya, prefers open woodland.



Common small butterfly in middles of New Forests.



Indian Oak Blue | *Arhopala atrax*

Common in sal forest and forest edges. Breeds on sal seedlings.



Common Gull | *Cepora nerissa*

Common on flowers and wet mud. Breeds on *Capparis* sp. and *Crataeva* sp.



Common Baron | *Euthalia aconthea garuda*
Prefers to feed on over ripened and fallen fruits.



Common Blue Bottle | *Graphium teredon*
The butterfly is named after the turquoise-blue triangle on its wing.



Common Castor | *Ariadne merione*
The male butterfly has triangular black patch underside the forewing.

Great Eggfly | *Hypolimnast bolina*
This butterfly has been enlisted in
schedule I of Indian Wild Life Protection Act.





Nymphs of *Gonocerus* sp.
(Hemiptera: Coreidae) hatching from eggs



Insects



Insect diversity is the most varied and abundant of all the organisms on this planet and plays an important role by creating the biological foundation in all the terrestrial ecosystems. They cycle nutrients, pollinate plants, disperse seeds, maintain soil structure and fertility, control populations of other organisms, and provide a major food source for other organisms. Virtually any depiction of a food web in a terrestrial or fresh water ecosystem will show insects as a key component, although food web architectures in these two ecosystems are quite different. In India, approximately 60,000-70,000 species of insects are described which is about 6.3% of world insect species. It is estimated that a minimum of 4 to 6 lakhs or more Indian species are yet to be discovered.

The New Forest area is very rich in insect diversity. As per record of specimens deposited in National Forest Insect Collection (NFIC), Forest Research Institute, 734 species of insects (282 of beetles; 56 of flies; 84 of sap sucking bugs; 193 of ants; bees and wasps; 7 of termites; 22 of mantids; 2 of ant lions; 85 of grasshoppers, katydids and crickets; and 3 of thrips), apart from butterflies and moths, are known from the area.



Chrysomelid beetle | *Corynodes pyrophorus*

Commonly known as leaf beetles, the group include over 37,000 species in the world.



Field cricket | *Gryllus bimaculatus*

found common in the decomposing leaf litter and organic matter. Male crickets produce several distinctive chirps by rubbing the two outer wings together. Chirps are made to attract females and to warn off other males.



Pied paddy skimmer | *Neurothemis tullia*

A common dragonfly found in India, breeds in marshes and vegetated ponds.



Nymphalid Caterpillar

Feeding on *Pyrus phasia* leaves, wild himalayan pear.



Fulvous forest skimmer | *Neurothemis fulvia*

A common species of dragon fly found in Asia. The males are scarlet red while females are dull brown in colour.



Flower chafers or flower scarabs | *Clintaria* sp.

Species are diurnal and visit flowers for pollens, nectar or feed on petals. They are good pollinators.



Tulsi lace bug | *Cochlochila bullita*

A destructive pest of Tulsi, suck sap from underside of leaf.



Pentatomid shield bug | *Priassus spiniger*

They are also called stink bugs because of the smelly exudate the bug produce on disturbing.



Rufous-legged Grasshopper | *Xenocatantops humilis*
The species is generally inhabitant of forest.



Flesh fly | *Sarcophaga* sp.
It is ovoviparous, opportunistically depositing hatched or hatching maggots instead of eggs on carrion, dung, decaying material, or open wounds of mammals, hence their common name.



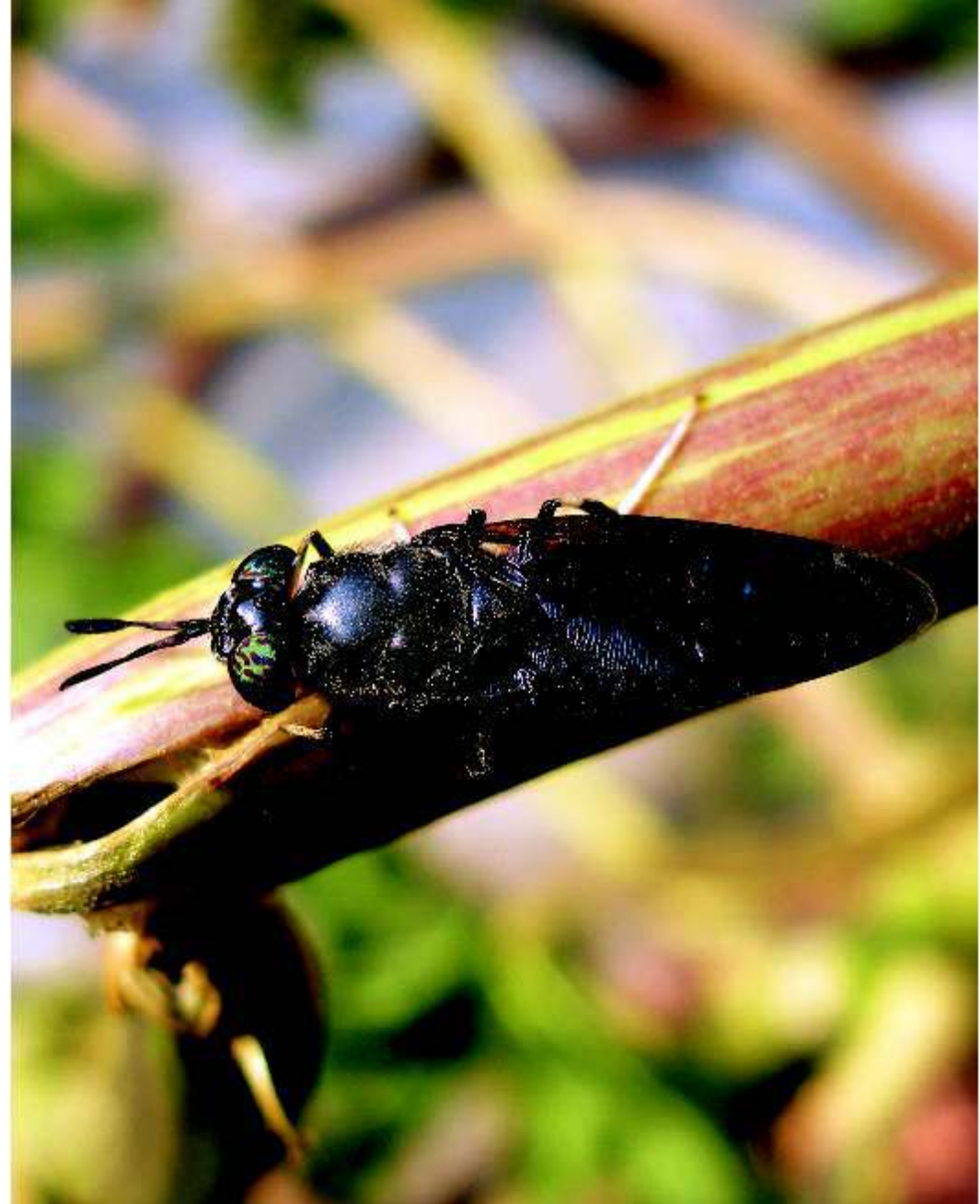
Kapok Bug | *Odontopus nigricornis*

It is phytophagous, sometime exhibits cannibalism and occasionally and moreover feed on wasps, large ants and dead decayed animals.



Stink bug | *Dalpada sp.*

They are pest of many agricultural and forestry species.
They produce strong stink when handled or disturbed.



Black soldier fly | *Hermetia illucens*

They are decomposers of organic matter of animal and plant origins. Their larvae are effective manure re-cyclers, they can withstand high temperatures of 60-65° C produced in the decomposing organic matters.



Common crow butterfly | *Euploea core*
Caterpillar feeding on leaves of *Nerium* sp.



Long horn grasshopper | *Conocephalus melaenus*
They are pest of many agricultural and forestry species.



Caterpillar of Zygaenidae
A colourful caterpillar of forester or burnet moth.



Golden cricket wasp | *Liris aurulentus*

Makes nest in pre-existing cavities in the soil and provision them with crickets. Lays eggs on paralysed provisioned crickets and their young ones complete their life cycle by feeding on them.



Common bush cricket | *Mecopoda elongata*

Male produces loud mating calls at night during the months of Aug. to Dec.



Lily moth | *Polytela gloriosae*

Larvae feeding on Zephranthes sp., pink lily, leaves.



Nymph | *Letana megalstridula*
Commonly called bush cricket.



Common crow butterfly | *Chrysalis of Euploea core*

Caterpillars feed on different species of milk weeds.



Crane flies | *Diptera: Tipulidae*

They are large mosquito like insects. Adults are commonly called as mosquito hawks or daddy longlegs. Larvae are commonly called leather backs are important part of soil ecosystem, because they process organic material and increase microbial activity.



Nymph of long horn grasshopper

Conocephalus melaenus

To attain adult stage insects undergo process of metamorphosis. The picture represents one of the moulting stages.



Aonla | *Phyllanthus emblica* L.

A large tree of family *Phyllanthaceae*. It bears edible fruits having medicinal value.



Other Flora & Fauna

Categorisation of biodiversity of the New Forest in limited taxa is not possible. The lower plants like algae, mosses, ferns and fauna like termites, spiders, amphibians, molluscs, annelids etc. have not been described so far in this book.

There are about nine species of bryophytes and mosses, (*Asterella mussooriensis*, *Cyathodium cavernarum*, *Riccia billardieri*, *Marchantia paleacea*, *Brachythecium plumosum*, *Barbula indica*, *Fissidens bryoides*, *Philonotis mollis* and *Notothylas kashyapii*) recorded in New Forest. There are variety of ferns in the campus, a few of the most common ferns are *Adiantum capillus-veneris*, *Adiantum incisum*, *Athyrium pectinatum*, *Dryopteris stenolepis*, *Pteris biaurita*, *Tectaria coadunata* etc. In the water bodies of New Forest, species of *Spirogyra*, *Chlorella*, *Cladophora*, *Oscillatoria*, *Nostoc* and *Batrachospermum* etc. are found. There are 54 species of spiders out of which 4 are endemic to India. The most common spider found is *Nephila pilipis* (Giant wood spider), while *Thomisus projectus*, *Uloborus krishnae*, *Thomisus lobosus*, and *Dendrolycosa gitae*, are endemic to India. *Coptoter mesheimi*, *Stylotermes bengalensis*, *Odontotermes giriensis* and *Microtermes unicolor* among the 41 species of termites, recorded from the New Forest. There are 11 species of frogs, common tree frog (*Polypedates maculatus*), Indian Bull Frog (*Hoplobatrachus tigerinus*) are common. Similarly there are many other taxa which are still being explored. The sylvan abode of New forest provides refuge to the local elements of biological diversity in the urban set-up of Dehradun.



Foxtail Orchid | *Rhynchostylis retusa*

Distributed subtropical Himalaya. Splendid epiphytic orchid, grows on tree trunks. Flowers violet pink, closely packed in long pendulous spike.

Location of New Forest: Arboretum



Many Flowered Fox Brush Orchid | *Aerides multiflora* (Orchidaceae)

Distributed in Eastern Himalayas and South-East Asia. Beautiful, fragrant, foxtail orchid with strap-shaped leaves. Flowers in a pendulous spike, pink, waxy and fragrant.

Location of New Forest: Arboretum



Checkered orchid | *Vanda tessellata* (Orchidaceae)

Distributed to sub-tropical parts of the country. A medium to large sized epiphytic orchid whitish flower with brownish checkered lines on the inner surface.

Location of New Forest: Schilch Road



Lichen moth | *Cyana bianca*

Its small caterpillars are common in rainy season. They prepare a basket like structure from their long body hairs and pupate at the center of this structure.



White Tussock moth | *Euproctis* sp.

Its caterpillars have long sulphur yellow body hairs with 2-3 black spots on the body.



Slug caterpillar | *Limacodidae larva*

Spines on the body are dangerous and painful.



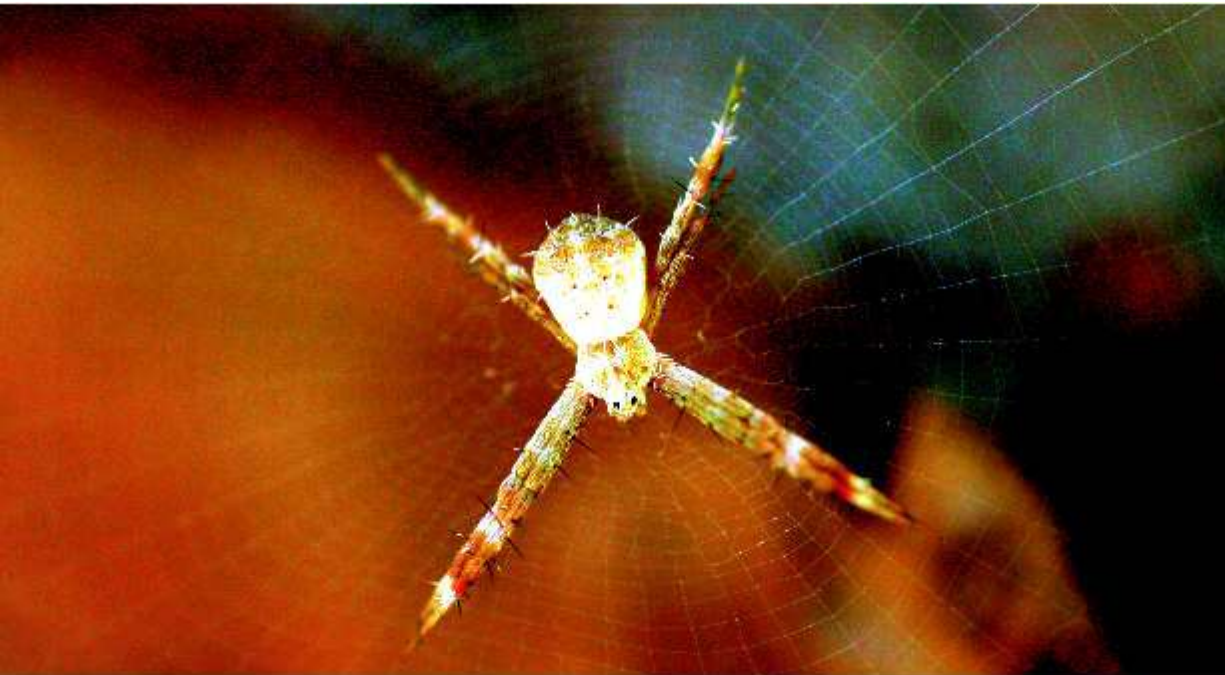
Plant hopper | *Ricania fenestrata*

Commonly called plant hoppers are sap suckers.



Giant Wood Spider | *Nephila pilipes*

Its golden silk orb-weaver silk is stronger than steel and much more tough and flexible. It is also used for in surgery as it does not provoke the human immune system.



St Andrew's Cross Spider | *Argiope* sp

Commonly found in forests and grassland.



Giant Cross Spider | *Argiope anasuja*

It is commonly found in forests. Also known as signature spider due to zig-zag weave on the web.



Places of Interest:
Biodiversity in the New Forest



ARBORETUM

The Arboretum laid out in 1925 covers, an area of about 30 hectare. It is divided into 12 compartments. The trees are grown mostly in group plantings, except for a few trees of mango and ficus. The trees, shrubs, climbers and bamboos species available in the live collection were introduced from different nooks and corners of the world.

BAMBUSETUM

The Bambusetum of New Forest was established in 1932. It has an area of 4 hectare with 32 species. It serves as a repository for the purpose of research and education on bamboo species both indigenous and exotics.



BOTANICAL GARDEN

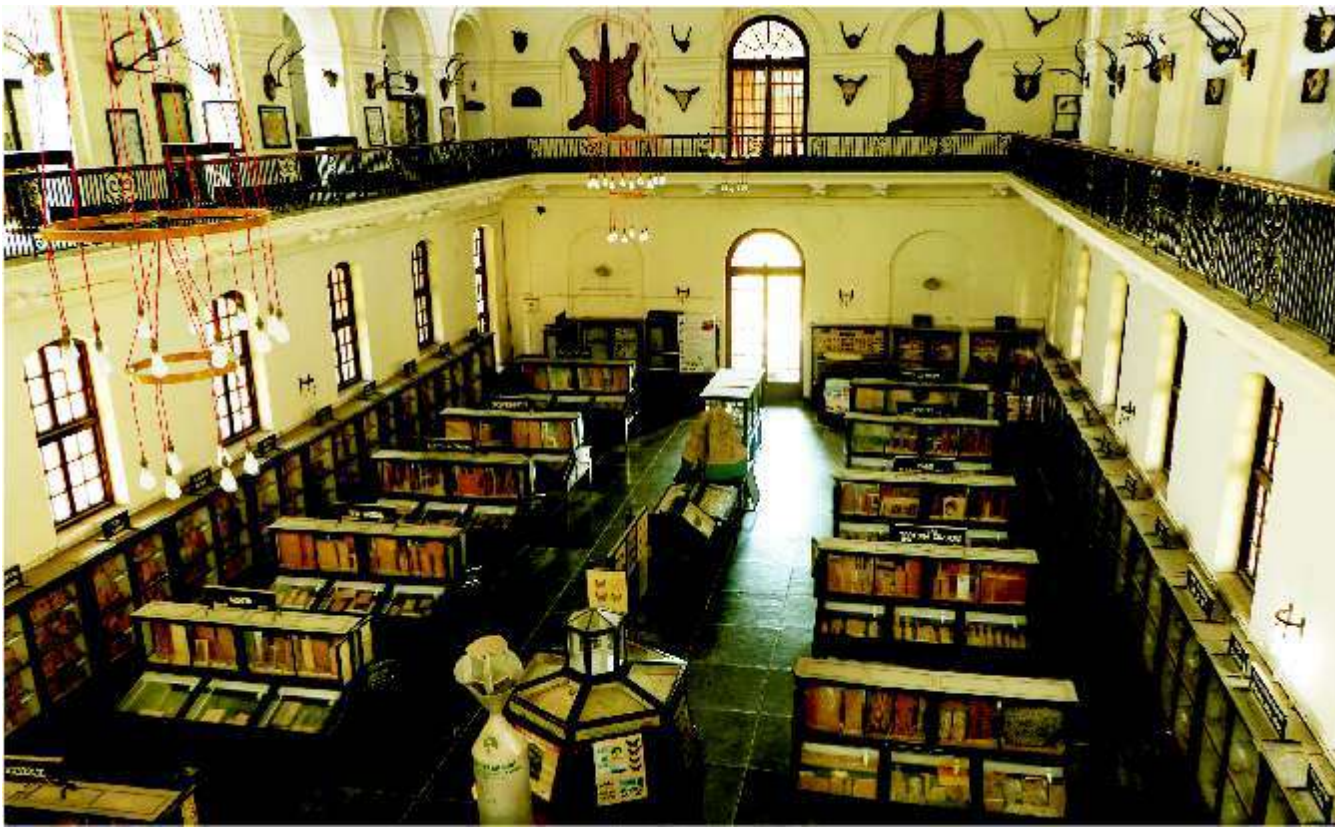
The Botanical Garden covering an area of 10 ha. was started in 1925. It enjoys the reputation of being classed as one of the 500 principal botanical gardens of the world. It houses some of the rare plant species. It has one of the richest live collections of indigenous and exotic species of ornamental plants and others species of economic importance particularly trees in the country. It has a collection of over 400 species distributed among 200 genera and 100 families. It provides planting materials to different institutions for research, education and introduction in different landscape. About 50 percent of the species of Botanical Garden are exotics introduced from various countries. Some of the spectacular

exotic in the garden are *Agathis robusta* (Australia), *Cupania anacardioides* (Australia), *Enterolobium contortisiliquum* (Brazil), *Koelreuteria apiculata* (China), *Liquidambar formosana* (Taiwan), *Liriodendron tulipifera* (North America), *Tipuana tipu* (Bolivia), *Joanesia princeps* (Brazil), *Acacia confusa* (Philippines), *Cassia javanica* (Indonesia), *Petrea volubilis* (Mexico), *Spathodea campanulata* (Uganda), *Tabebuia rosea* (West Indies) etc. Rare and threatened plants in the garden are represented by *Sophora mollis*, *Gleditsia assamica*, *Eucalyptus deglupta* and *Ginkgo biloba*, etc.



TIMBER MUSEUM

The timber museum has exhibits of the best known and most common woods of 126 commercially important species. The museum gives the visitors an insight on the characteristics of wood. The lower halves of the planks have been left in the natural state while the upper halves are oiled with linseed oil to enhance the feature of the timber. Hanging above the planks, there are photographs of the trees whose planks are displayed alongwith small maps indicating their distribution in India.



ENTOMOLOGY MUSEUM

Excellent displays of more than 3,000 of forest-insect-pest-damaged wood samples, 18,000 identified forest insect species collected over a century, 2847 exhibits, representing the damage caused by insect pests to seeds, seedlings, standing trees, felled timbers, bamboos and also finished products. These exhibits, models, charts and photographs have been painstakingly collected over the last more than nine decades.



SILVICULTURE MUSEUM

The Silviculture Museum has dioramas depicting forests of tropical and temperate regions, silviculture systems, practices for sustainable forest management, models of forest nursery, social forestry, forest fire surveillance system and forest operations; tools for forest mensuration and working; along with specimens of seeds, roots, barks and rocks. Concepts of silviculture, threats to forest, evolution of forestry and accomplishments are beautifully described through posters.

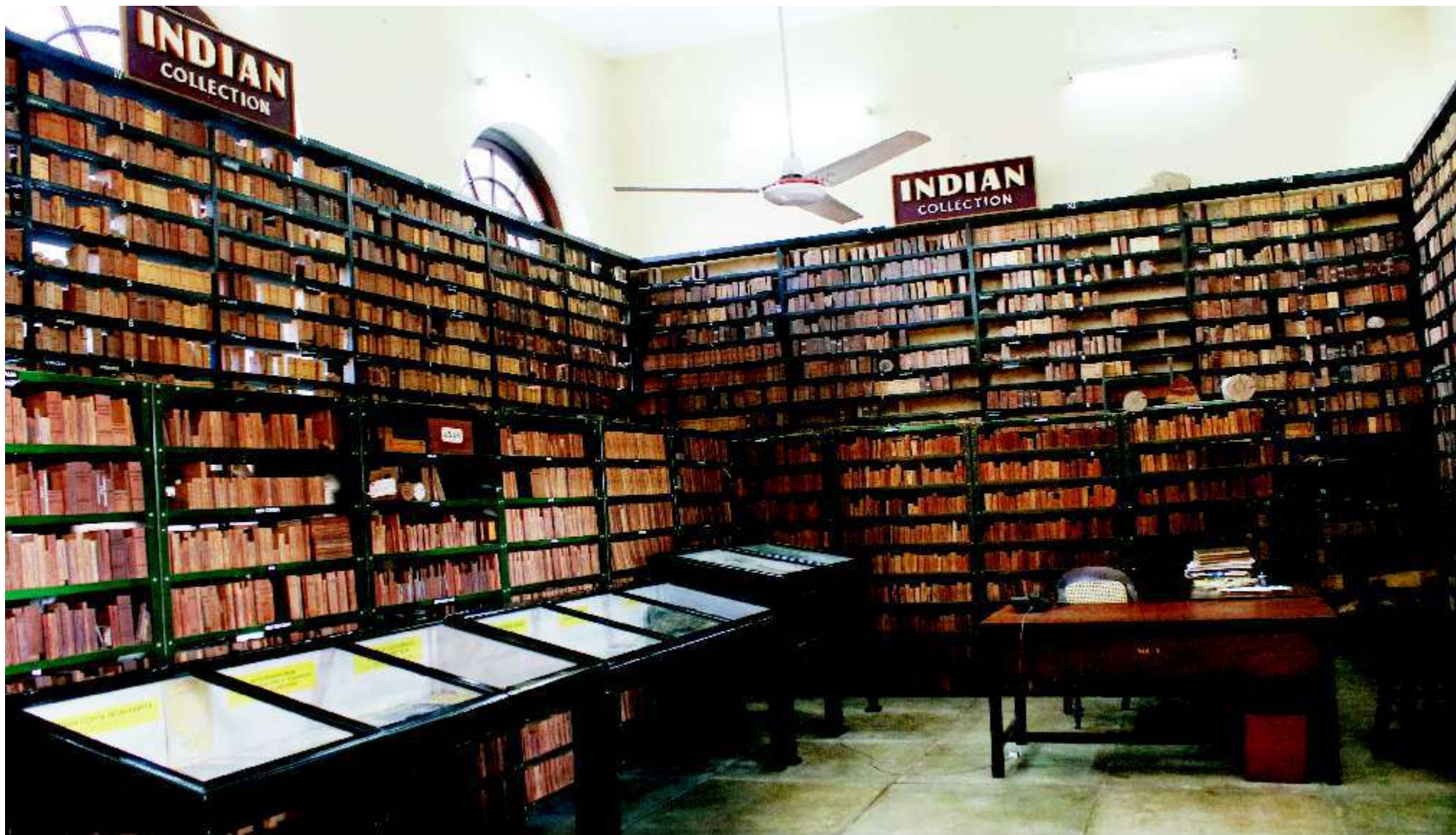


NON-WOOD FOREST PRODUCTS MUSEUM

Excellent displays of about 2000 non-wood forest products classified on the basis of their usage into distinct categories viz., drugs/ medicinal plants, edibles, aromatics, gums & resins, tans & dyes, fibre and flosses, bamboo & canes and their products including handicraft items, lac, katha and miscellaneous items collected over a century ago and most of which are being used even today in various regions of the country.

XYLARIUM

The establishment of the xylarium was initiated by J.S. Gamble in 1878. Collection of authentic wood samples from India and abroad, collection of unique woods of India depicting wood biodiversity, and collection of wood cross sectional discs depicting variation in sapwood and heartwood colour is a unique feature of the xylarium.





DD HERBARIUM

The Herbarium of the Forest Research Institute internationally known as DD Herbarium (Dehra Dun Herbarium) and was established in 1908. It is the second largest Herbarium in the country after BSI's Central National Herbarium (CNH), Howrah. The DD Herbarium contains about 3,30,000 authenticated specimens and 1300 valuable type specimens. The oldest specimen (*Rosa clinophylla*) of the DD Herbarium is more than 200 years old (Year: 1807) collected from Guwahati. Besides collections from the Indian region, Herbarium contains specimens from all over the world. Herbarium has invaluable collection of renowned botanists such as J. D. Hooker, D. Brandis, J. F. Duthie, J. S. Gamble, A. E. Osmaston, H. H. Haines, R. N. Parker, C. E. Parkinson, N. L. Bor, U. N. Kanjilal, M. B. Raizada, K. C. Sahni, etc.



PATHOLOGY MUSEUM

The museum has collection of sporophores, disease affected plant parts, models, posters showing disease etiology, testing technique, etc.

Fungarium houses nearly 12000 specimens of forest diseases and fungi including edible and medicinal fungi. It is the third repository in the world.

NATIONAL FOREST INSECT COLLECTION

This unique collection has pride of holding about 3,00,000 insect specimens representing 24 orders, 121 super families, 281 families, 2,289 genera and about 18,000 species. There are about 1900 type specimens in the collection. It caters to the insect identification needs of researchers of biodiversity, bioecology and insect management.



Committee Members

- | | |
|---|--|
| • Sh. Arun Singh Rawat, Director, FRI: Chairperson | • Dr. Santan Bartwal, Scientist F, Genetics and Tree Propagation Division, FRI |
| • Smt. Arti Chaudhary, Head, Silviculture and Forest Management Division, FRI | • Dr. Anup Chandra, Scientist E, Forest Botany Division, FRI |
| • Dr. Dinesh Kumar, Scientist G, Silviculture and Forest Management Division, FRI | • Dr. H.B. Naithani, Taxonomist/ Consultant, FRI |
| • Dr. Amit Pandey, Scientist G, Forest Pathology Discipline, FRI | • Sh. Raman Nautiyal, Head, Forestry Statistics Division, ICFRE |
| • Dr. Sudhir Singh, Scientist G, Entomology Discipline, FRI | • Dr. Sanjay Singh, Scientist D, BCC Division, ICFRE |
| • Dr. A.P. Singh, Scientist F, Entomology Discipline, FRI | • Dr. R.S. Rawat, Scientist In-charge, BCC Division, ICFRE: Member Secretary |

Photo Credits

- | | | | |
|----------------------------|---|--------------------------------|--|
| 1. Amit Pandey | 186 | 13. Manoj Kumar | 130, 131, 132, 133, 134, 135, 136, 137 |
| 2. Amit Verma | xiii | 14. Praveen Kumar Verma | 5, 7, 16, 20, 22, 25, 26, 27, 28, 29, 31, 37, 41, 84, 86, 87, 89, 90, 91, 92, 93, 94, 95, 97, 98, 100, 101, 102, 106, 109, 113 |
| 3. Ankush Choudhary | 46, 59 | 15. Raka P. Singh | 8 |
| 4. Anup Chandra | 6, 8, 30, 34, 39, 92, 93, 94, 99, 104, 105, 114, 116, 118, 119, 120, 121, 122, 123, 185 | 16. Ranjana Negi | 124, 125, 126, 127 |
| 5. Anil, Arya Photo Studio | 178, 179 | 17. R.S. Rawat | 22, 115, 140 |
| 6. Arun Pratap Singh | 45, 46, 47, 50, 51, 52, 53, 55, 56, 58, 60, 61, 62, 63, 64, 65, 67, 70, 71, 72, 75, 76, 77, 78, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156 | 18. Sanjay Singh | xiv, 10, 12, 13, 15, 16, 17, 19, 20, 21, 24, 26, 31, 33, 35, 37, 38, 40, 41, 49, 72, 85, 88, 89, 96, 155, 172, 173, 176 |
| 7. Charan J. S. | iv, 2, 3, 15, 24, 36, 114, 180 | 19. Santan Barthwal | 54, 60, 68, 77, 137, 154, 156 |
| 8. Digvijay Singh Rathod | 3, 4, 5, 8, 9, 11, 21, 32, 40, 41, 42 | 20. Silviculture & Forest Mgmt | 12, 13, 14, 19, 28, 34, 154, 180 |
| 9. Ekagrata Singh | 183 | 21. Sipu Kumar | 46, 50, 51, 55, 56, 57, 58, 59, 62, 64, 65, 66, 72, 73, 74, 75, 76, 77, 79, 80, 81, 82, 83, 154 |
| 10. H. B. Naithani | 6, 10, 14, 17, 18, 21, 26, 27, 34, 40, 43, 86, 88, 96, 97, 103, 107, 108, 110, 111, 112, 115, 117, 120, 122, 139, 142, 174, 175 | 22. Sudhir Singh | vi, 1, 32, 83, 128, 136, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 176, 177, 186 |
| 11. Jyoti Ahlawat | 44, 48, 49, 52, 53, 54, 58, 59, 60, 61, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 77 | 23. Sugandha | 4, 5, 18, 23, 24, 27, 35, 38 |
| 12. Kshitij Malhotra | 128, 130, 131 | 24. Tilak Raj Kakkar | vi, viii, x, 18, 19, 21, 33, 34, 182, 184 |



FOREST RESEARCH INSTITUTE

(Indian Council of Forestry Research and Education, Dehradun)

P.O. New Forest, Dehradun - 248006 (Uttarakhand)

www.fri.icfre.gov.in