Annual Report 2017-18

TROPICAL FOREST RESEARCH INSTITUTE
(Indian Council of Forestry Research and Education)
P.O. RFRC, Mandla Road
Jabalpur – 482021 (M.P.)

Overview

- Leaf roller *Sylepta derogata* on *Hibiscus tiliaceus* was recorded from Mangrove Forests of Odisha.
- Biopesticides Ivermectin (0.03%) and Spinosad (0.003%) were found to be the most effective against teak defoliator and skeletonizer, Khamer defoliator and *Ailanthus* web worm.
- Predator *Canthecona furcellata* reduced the infestation by 20-30% against the larvae of teak defoliator, skeletonizer and sissoo defoliator.
- Chlorpyrifos (0.05%) + Ridomil (0.02%) + mulching + Chaubatia paste was found to be the most effective against *Plecoptera reflexa* and canker disease in *sissoo*.
- Distributed species specific bacterial bio-fertilizers and AM fungi to M.P. Forest Department and Corporation for application in nurseries.
- 5 new records and 3 new host records of fungi were identified in central Indian states.
- Two new species of forest fungi were discovered from TFRI campus.
- Established plant –water relationship with respect to annual weather fluctuations in 5 forest tree species.
- Compared carbon stock in 4 ha plantation raised by TFRI at RSP with plantations raised by Odisha SFD.
- 12 new CPTs of *Tectona grandis* were selected and seeds were collected from M.P.
- *Sapindus mukrossi* extractive was found effective in removal of chemical residues of pesticides from vegetables**.**
- The quantum of gum yield was found maximum in summer tapping season (April-May) in multiple slant cuts by Guggul blazer.
- Maturation indicators for identification of collection time of *Lannea coromandelica* and *Ougeinia oojeinensis* seeds were identified.
- Water harvesting structure constructed at Bundelkhand rose water table by about 1 m from 2005-10 to 2011-16.
- 28 training programmes were organized by the institute and participated in Kisan Melas and Trade Fairs.

Summary of projects

Projects	Completed projects	Ongoing projects	New projects initiated during the year
Plan	1	15	5
Externally Aided	11	7	2
Total	**12**	**22**	**7**

Contents

1. Introduction

Tropical Forest Research Institute (TFRI), Jabalpur (M.P.) provides research support to State Forest Departments and other stakeholders in central India covering the states of Madhya Pradesh, Chhattisgarh, Maharashtra and Odisha. The Institute came into existence in April 1988, although its origin goes back to 1973 when a Regional Centre of FRI, Dehradun was established at Jabalpur to provide research support to the problems of forest management in central India. It has an area of 109 ha and maintains a constant liaison with state forest departments, NGOs working in the field of forestry and allied areas, universities imparting education in forestry and forest based industries. The institute has a satellite research centre, namely Centre for Forestry Research and Human Resource Development (CFRHRD) at Chhindwara (M.P.), to carry out research in the areas of forestry sector and imparting trainings on human resource leading to poverty alleviation through self employment.

Centre for Forestry Research & Human Resource Development (CFRHRD), Chhindwara came into existence on 30 March 1995. The mandate of the centre is to take up forestry research in the specialized areas like biodiversity conservation, non-wood forest products, forest protection, silviculture and tree improvement. In addition to this, the centre has also been assigned to develop human resource in forestry sector by imparting vocational trainings leading to poverty alleviation through self employment in central India.

MoUs signed:

1. MOU signed between TFRI, Jabalpur and Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur to promote collaborative research.
2. MOU signed between TFRI Jabalpur and Adani Maharashtra Power Limited to establish Flyash Research Park at Gondia, Maharashtra.

Visit of dignitaries:

1. HoFF and PCCF Madhya Pradesh Forest Department, Dr. Animesh Shukla, IFS visited TFRI, Jabalpur on 17 July 2017.
2. Dr. Ram Prasad, IFS (Retd.) and Shri. S. Khanduri, IFS, (Retd.), visited CFRHRD, Chhindwara as review committee members on 15.9.2017 and 16.9.2017 during the review of centre vide letter no. 2-8/2016/ICFRE/Admin./Budget, dt. 28.8.2017.
3. Dr. Anandi Subramanian, Senior Advisor, MOEF&CC, Govt. of India, New Delhi visited institute on 19 February 2018.
4. Shri Gyanesh Bharti, Joint Secretary, MOEF&CC, Govt. of India, New Delhi visited institute on 20 January 2018.

New initiatives:

I. Following AICRPs were prepared and submitted to ICFRE, Dehradun:

(a) Conservation and sustainable management of wild edible fruiting species.

(b) Sustainable development of NTFPs through conservation and value addition.

(c) Genetic Improvement and value addition of *Madhuca longifolia*.

(d) Development of package of practices of *Gmelina arborea* Roxb. (Khamer) in selected agroclimatic regions of India.

II. Seminar series for PhD and research scholars was initiated.

Recruitment and promotions during the year:

- Recruitment made during 2017-18 - Nil
- Initial induction/adjustment made during -2017-18 under Technical Service Rule 2013:

  Category-I - 09

  Category- II - 34

  Category-III - 16
- Promotion made during 2017-18 under Technical Service Rule 2013:

  Category-I - 04 promotions

  Category-II - 07 promotions
- Promotion made during 2017-18 under Group 'C' posts:

  \- 04 promotions

All India Coordinated Research Projects

Project title: All India Coordinated Research Project on Improvement of Teak for Higher Productivity in Central/Peninsular India.

Funding Agency: Indian Council of Forestry Research and Education

(a) Selection of plus trees, raising their progeny trials and establishing germplasm bank

Seeds were collected from M.P., Chhattisgarh and Odisha and progenies of 24 CPTs were raised. In addition to this, 12 new CPTs were selected in Chhindwara, Betul, Dewas, Hoshangabad, Jhabua and Khandwa and seeds were collected which are under treatment for germination and raising their progeny.

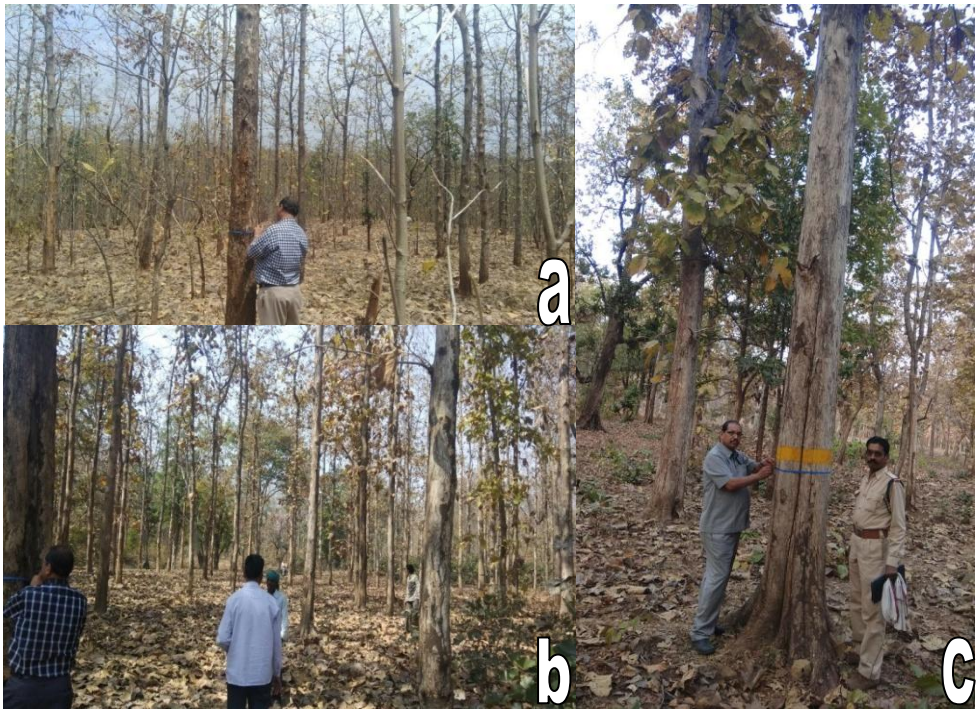


Fig. 1: Selection of CPTs in Chhindwara (a & b) and (c) Dewas

(b) Development of management practices of teak seed production areas, seedling seed orchards and clonal seed orchards

Morphometric data on height, GBH, crown diameter, spacing, flowering, fruiting, fertilizer application and other management practices were recorded from 14 Seed Production Areas (SPA), 11 Clonal Seed Orchards (CSO) and 8 Seedling Seed Orchards (SSO) located in M.P., Chhattisgarh and Maharashtra. Some of the selected SPAs had low seed productivity due to their age and closed canopy, while others produced a good quantity of seeds. Asynchrony in flowering was noticed among clones, thus low to moderate seed production recorded in CSOs and SSOs. Flowering and fruiting status of 40 clones of CSO established during 2016-17 and 2017-18 in TFRI campus show asynchrony in flowering among clones and low production of seeds in 35 clones. Maximum seed diameter (7.43 mm) was recorded in clone ORANR-5, whereas 100 seed weight (40.71g) was recorded maximum in clone ST-48. Effect of N,P,K fertilizers was assessed on flowering and fruiting in CSO at TFRI and found that treatment of urea @ 100kg/ha + SSP @ 20 kg/ha marginally increases flowering however, no significant increase in flowering and fruiting was recorded. Analysis of soil samples collected from surveyed fields reveals low level of Nitrogen, Phosphorus and Potash in 70%, 25% and 54% samples respectively.

Fig. 2: Seedling seed orchard at Katni (M.P.)

Fig. 3: Clonal seed orchard at Erikpal (CG)

Fig. 4: Seed production area at Pali (CG) **Fig. 5:** Teak seed orchard at Chandrapur (MS)

(c) Studies on population structure, linkage disequilibrium and marker-trait association mapping of Indian teak

Genetic diversity and population structure of teak (*Tectona grandis* L.f.) from central India is being investigated and the possibility of marker-trait relationship using genome-wide association mapping is also being assessed in this project. Samples of leaf, wood core and soil along with morphometric data and geocordinates were collected from thirteen teak dominating zones of central India, which include seven from Madhya Pradesh, two from Maharashtra, two from Chhattisgarh and two from Odisha. Measured wood density, fibre length and breadth of 20 fibres/tree and 20 trees/zone. Genomic DNA from the selected thirteen zones (260 trees) was isolated, quantified and preserved. Genotyping of 13 zones was completed using 20 microsatellite (SSR) primers. Statistical analysis revealed that there is significant variation among the sampled teak populations for girth, tree height, clear bole height, wood fibre length, fibre breadth and basic wood density. Coefficient of variation for morphological traits was higher compared to the wood quality traits. Moderate estimates of heritability coupled with genetic advance were recorded for tree height; clear bole height and girth at breast height. For fibre

length, breadth and wood density these estimates were found at lower side. This infers towards more stringent selection for wood traits compared to morphological traits for improvement.

2. Research Highlights

2.1 Ecosystem Conservation and Management

2.1.1 Overview

2.1.1.1Projects under the Theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	4	1
Externally Aided	2	2	2

2.1.2 Climate Change

Carbon sequestration through afforestation at Rourkela Steel Plant, Odisha

Four hectare plantation comprising 12 tree species having higher carbon sequestration potential raised at Rourkela Steel Plant (RSP) by TFRI, stocked 28.69 t carbon in the form of above and below ground biomass after 2 years of its plantation, maximum being in *Peltophorum pterocarpum* (peela gulmohar) (19.51 kg per sapling), followed by *Melia azedarach* (bakain) (18.54 kg per sapling) and *Anthocephalus cadamba* (kadamb) (18.32 kg per sapling). Measured atmospheric CO_2 at 15 locations of RSP in different seasons and found that CO_2 concentration in the morning (4 AM$\pm$ 1-1/2 hrs.) was higher than evening (4 PM$\pm$ 1-1/2 hrs). Conducted 2 days training programme on 'Carbon sequestration through afforestation' at RSP on 8-9 November 2017 for 30 officers of SAIL from Durgapur, Bhilai, Bokaro, Burnpur, Ranchi, Rourkela and Odisha state forest department. This project will help to understand carbon stock and annual sequestration in vegetation, soil, litter and necromass in plantations raised at RSP.

Fig. 6.: Plantation raised by TFRI at RSP

Fig. 7: Training on Carbon Sequestration for SAIL officers conducted at RSP on 8-9 November 2017

Understanding plant –water relations to annual weather fluctuations in five deciduous tree species

This project was conceptualized and intended to understand how tree species respond to fluctuating weather conditions. Five important tree species such as *Tectona grandis* (sagon), *Madhuca indica* (mahua), *Sterculia urens* (kullu), *Anogeissus latifolia* (dhawda) and *Buchanania lanzan* (chironji) were selected inside the campus of Tropical Forest Research Institute, Jabalpur and observed factors such as sap flux (water intake) with the help of sap flow sensors. Transpiration rate (water loss) of the selected tree species was measured using handheld photosynthesis system. Collected data on weather parameters, such as rainfall, temperature and air moisture through a Global Navigational Satellite System (GNSS) installed in the campus. Also studied associated factors related to soil such as infiltration, percolation, and water availability to plants. This project will be important to understand and establish relationship between plant characteristics, weather parameters and hydrology.

Fig. 8.: Recording sap flow in *Tectona grandis* (Teak) at TFRI, Jabalpur

Fig. 9: Recording sap flow in *Sterculia urens* (Kullu) at TFRI, Jabalpur

Impact of forest cover change on stream flows of the Narmada River Basin using Macroscale Hydrological Model

Forests occupy 32.35 % of the total geographical area in the Narmada river basin. In the upper reaches of basin the forests are tropical, moist, deciduous type, whereas in the middle and lower basins, the vegetation is tropical dry and deciduous type. Bamboo is common in both upper and middle basin reaches, especially in the district of Mandla. The forests along the Narmada in Maharashtra and Gujarat belong to southern dry deciduous types. The total cover of Very Dense Forest (VDF) in the basin is 3175.70 km^2 whereas Moderate Dense Forest (MDF) accounts for 14158.60 km^2. A considerable area of 13137.00 km^2 falls under the category of

open Forest and 944.00 km^2 is scrub. River flow discharge shows an overall increase during the decade 1991–2000, compared to that of 1981-90 and 2001-10.

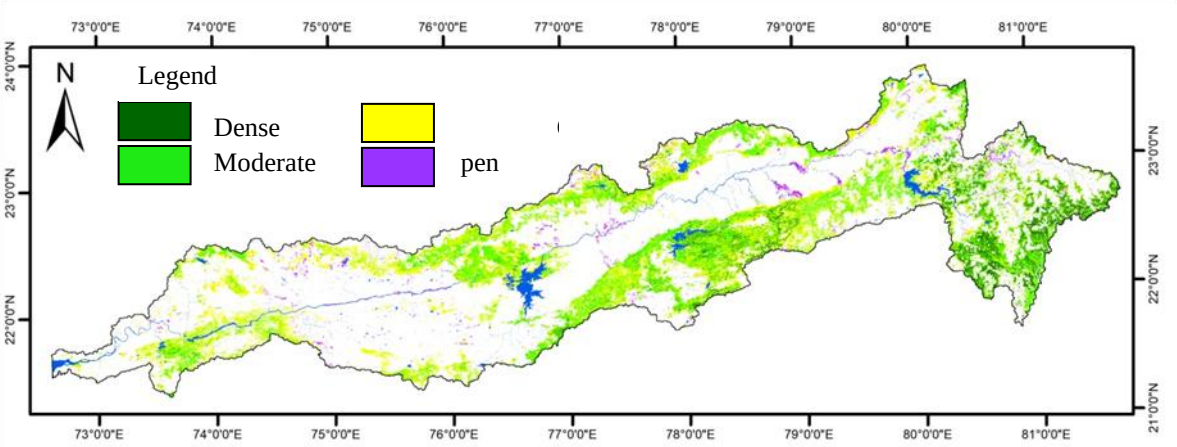


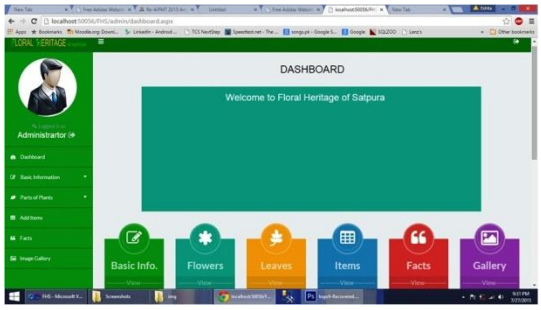
Fig. 10: Forest cover map of Narmada basin

2.1.3 Ecology & Environment: Nil

2.1.4 Biodiversity

Preparation of user-friendly data-base of phytodiversity in Satpura plateau agro-climatic zone of Madhya Pradesh

Compiled flora of Satpura agro-climatic zone of Madhya Pradesh using primary and secondary sources and as a result, a total of 1468 plant species have been documented with details such as species name, family, synonyms and habitat. The taxonomic features such as leaf type, arrangement, fruit type, flower colour and its arrangement were also included.



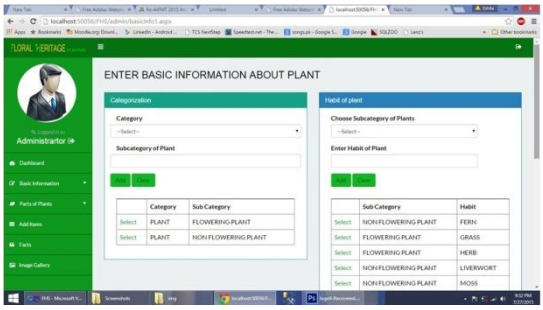


Fig. 11: A screenshot of the main page of database **Fig. 12**: A screenshot of the inner features

Ecological assessment of floral diversity in MPCA of Chhattisgarh with special emphasis on species of medicinal importance and conservation priority

Ecological assessment was carried out in 7 Medicinal Plant Conservation Areas viz., Pahad Jamali (Katghora Division), Duditnagar (Korba Division), Kelo (Dharamjaigarh Division), Churanai (Sarguja Division), Navadih (Sarguja Division), Sidavand (North Kondagaon Division) and Keregaon (Dhamtari Division) of Chhattisgarh. A total of 59 tree species; 18 shrubs and lianas and 113 herbaceous species were enumerated. A virtual herbarium

for 100 important medicinal plants from these MPCA's has been prepared. The results will be useful for Chhattisgarh State Forest Department in medicinal plants conservation.

Fig. 13: *Gloriosa superba* - an important medicinal plant

Fig. 14: Sample virtual herbarium of *Barleria cristata*

Biodiversity, Regeneration history feedback of forest communities in response to canopy openings under selection cum improvement (SCI) felling system and life

Phyto-sociology and population structure from the identified coupes were carried out by laying permanent quadrats before felling operation. Effect of canopy species composition on the regeneration and species assemblage under teak forest reveals that the species diversity in the canopy facilitates the diversity of the flora under the canopy. But this kind of habitat heterogeneity leads to lower density of the individuals and becomes a limitation for teak regeneration.

Fig. 15: Carrying out regeneration studies in a teak forest before felling under SCI system

Fig. 16: Carrying out regeneration studies in a teak forest after felling under SCI system

Documentation of insect fauna and flora of mangrove ecosystems in Odisha

For documentation of flora and insect fauna, Bhitarkanika and Dangmal Forest Blocks of Kanika Forest Range and West Orasahi Forest Block of Rajnagar Forest Range, Dangmal, Kantika, Kalibhanjadia, Kantiakhai and Kanchira Forest Blocks of Kanika Range and Magarkandha, East Orasahi, Sunei Rupei and Angari Forest Blocks of Rajnagar Range, Bhitarkanika National Park located in Mangrove Forest (Wildlife) Division, Rajnagar,

Kendrapara, Odisha were surveyed.10 species of true mangroves, 7 species of mangrove associates and one species of back mangrove were documented. Among the documented insect fauna, 25 species were of butterflies, 7 species of moths, 2 species of dragonflies, 1 species of beetle, damsel fly, honey bee, ant, grasshopper and stick insect.

Fig. 17: Larvae of defoliator *Sylepta derogata* Fabricius (Lepidoptera: Pyralidae: Pyraustinae)

Study of sal regeneration status in borer affected areas

Mandla and Dindori forest divisions (unprotected areas) were identified for laying out quadrats. Regeneration was recorded in three categories-(a) saplings (established regeneration) plants below 22 cm girth at breast height with a height of 2 m and above, (b) seedlings (un-established regeneration) plants below 2 m of height excluding the recruits and (c) recruits - plants having two leaves stage.

Fig. 18: Regeneration of *Shorea robusta* (sal) in borer affected unprotected area; Comp. 828, Beat-Jagatpur, Range- East Karenjia, Forest Division, Dindori

Studies on the diversity of some beneficial insects in forest ecosystem in Madhya Pradesh

Beneficial insects recorded in moist, semi-moist forest areas were – Tasar Silkworm *Antherea mylitta* on *Terminalia tomentosa* (saja); Ruddy Marsh Skimmer dragonfly *Crocothemis servilia* near water bodies and grassylands; Ladybird beetle *Coccinella* spp. in grasses; Red Ant/Weaver Ant *Oecophylla* spp. on *Mangifera indica* (mango), *Artocarpus heterophyllus* (jack

fruit)*;* Braconid wasp *Apanteles* spp. cocoons on *Tectona grandis* (sagon)*;* Predatory bug *Canthecona furcellata* on *Shorea robusta* (sal); Combs of Honey bee *Apis* spp. on *Tectona grandis, Bombax ceiba* (semal), *Ficus religiosa* (pipal), *Albizia lebbeck* (kala siris) and *Terminalia arjuna* (arjun); Lac insect *Kerria lacca* on *Butea monosperma* (palash) and *Trichogramma raoi*. Number of individuals of 9 beneficial insects were counted and calculated to estimate the population.

Fig. 19: Predatory bug, *Canthecona furcellata* in Sal forest ecosystem

Fig. 20: Red ants, *Oecophyalla smaragdina* on host plant *Madhuca indica* (mahua)

Documentation of biodiversity of forest fungi of central India

Forest fungi were collected from forest areas of Madhya Pradesh, Chhattisgarh, Maharashtra and Odisha. Total 210 fungi were collected out of them 113 fungi were identified. 36 documents of fungi were prepared. 5 new records of fungi were identified from India namely, *Amanita bisporigera, Boletellus chrysenteroides, Lepiota ignivolvata, Macrocybe crassa* and *Tricholoma equestre*. In addition to these 3 new host records of fungi were also identified. Two new species of fungi (*Cercospora spigeliae* and *Cheilymenia jabalpurens*) were reported.

Biodiversity of Satpura agro-climatic region with special reference to dependencies of tribals

Survey was conducted seasonally in selected sites of Satpura plateau. Total 74 insect species belonging to 28 families of the three orders Lepidoptera (14), Coleoptera (10) and Hymenoptera (04) were collected, identified and preserved in insect boxes. Insects of six different species viz., *Polistes Carolina* Linn**.**(Tataiya), *Trombidium grandissimum* Koch (Bir Bahuti), *Oelophylla smaragdina* Fab**.** (Lal chiti), *Apis dorsata* Fab. (Madhu makkhi), *Hieroglyphs banian* Fab. (Chidda) and *Microtermes obesi* Holmgren (Dimak) are being utilized by traditional Vaidrajs of tribal pockets of Satpura plateau for treatment of various diseases and as food by tribal people. These insects were identified and documented. Total 14 fungal species were collected. Out of these, *Termatomyces* sp., *Sparassis crispa* and *Agaricus campestris* were edible. Data on available NTFPs (Harra, Baheda, Chironji, Aonla, Mahua, Bhilwa) in the selected sites was collected.

Fig. 21: Market survey of aonla, bhilwa, Baheda and mahua at Betul

Fig. 22: Market survey of aonla and chironji at Chhindwara

2.1.5 Forest Botany

2.1.6 Tribals and Traditional Knowledge System

2.2 Forest Productivity

2.2.1 Overview

2.2.1.1Projects under the theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	1	4	1
Externally Aided	3	0	-

2.2.2 Silviculture

Standardization of plantation techniques for major forest plant species in Madhya Pradesh

This project is undertaken with an objective to standardize the plantation techniques of *T. grandis* (teak), *D. latifolia* (shisham), *G. arborea* (khamer), *T. bellerica* (bahera), *A. procera* (safed siris), *D. strictus* (lathi bans), *T. arjuna* (arjun) and *D. sissoo* (sissoo) with respect to three different pit sizes, spacing and irrigated/non irrigated conditions. Optimum spacing of 2m x 2m could be suggested for most of the species except *D. strictus* and *D. latifolia.* All the species attained relatively higher height under irrigated condition when compared to the plants under non-irrigated conditions. Under irrigated conditions *A. procera, D. strictus, D.sissoo*, and *T. bellerica* attained a significantly higher average height than the non-irrigated counterpart. In general out of the selected species, highest average height was recorded for *D. strictus*, followed by *D. sissoo*. The findings of this project will be useful for selection of suitable species for large scale plantations.

Studies on maturation and viability of seeds of five important tropical species: *Adina cordifolia, Mitragyna parviflora, Lannea coromandelica, Ougeinia oojeinensis* and *Anogeissus acuminata* for effective collection and seed storage

Maturation indicators for the determination of best collection time of seeds of *Lannea coromandelica* and *Ougeinia oojeinensis* were identified. Seeds of *Adina cordifolia* and *Mitragyna parviflora* can germinate in 15-35°C and 20-35° respectively. Seeds of both species cannot germinate in white light. Sowing on surface of clayey or mixed type of soil was found best for germination of *Adina cordifolia* and *Mitragyna parviflora* seeds. *Lannea coromandelica, Adina cordifolia, Mitragyna parviflora* and *Ougeinia oojeinensis* seeds are considered as orthodox on the basis of desiccation and freezing sensitivity test. Seeds of *Lannea coromandelica* and *Ougeinia oojeinensis* were stored at different temperature and sampling of seeds is continued at intervals to test their viability.

Study on ecophysiology of seed germination and seedling survival for restoration of natural regeneration of two threatened species of central India

Effects of different temperatures, light conditions, soil type and sowing depth on germination of seeds of *Dalbergia latifolia* were assessed. The range of temperature for germination is 20°-35°C. Germination is not affected by different light conditions. Seeds can germinate in clayey, sandy and mixed type of soil. The best sowing depth is surface to 1 cm in sandy soil and 1-2 cm in clayey/mixed soil. Study of germination phenology of *Dalbergia latifolia* is continued. The ratio of flowering and fruiting of different trees was 0 to 0.2%. Seeds of *Litsea glutinosa* were collected and pre-treatments were applied for better germination. Hot water treatment was found best for germination of this species. Studies on different factors on dormancy of *Litsea glutinosa* seeds are continued.

Assessment of impact of constructed water harvesting structures on soil moisture/ vegetation in Bundelkhand using Remote Sensing & GIS techniques

The study was proposed to quantify changes in vegetation, surface water body and ground water level due to construction of water harvesting structures under Bundelkhand Special Package (2011-16) in the six districts of Madhya Pradesh *i.e*. Chhatarpur, Datia, Damoh, Sagar, Tikamgarh and Panna. Geographic coordinates of water harvesting structures were collected. Assessment of effect on groundwater level in pre-monsoon (May) and post-monsoon (November) periods was done using groundwater observation well data collected from North Central Region, Central Ground Water Board, Bhopal for Bundelkhand region of M.P. Change detection was done during pre-development (years 2005-10) and post-development (years 2011-16) duration.

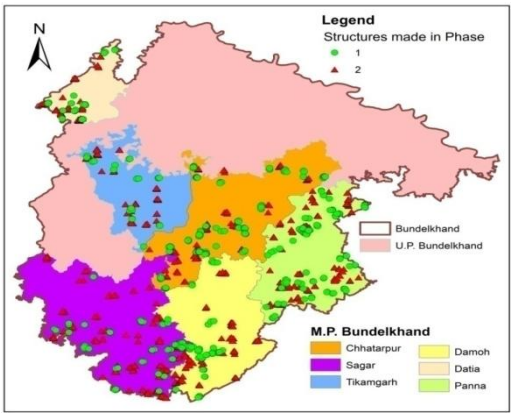
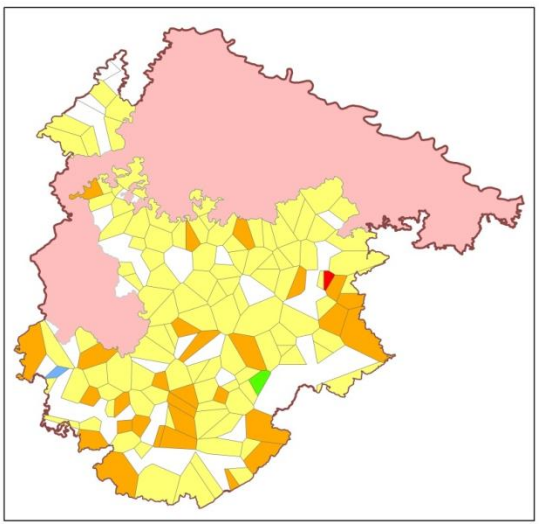


Fig. 23: Location of constructed water harvesting structures in Bundelkhand region of Madhya Pradesh during Bundelkhand special package.



Legends
Average rise in water level(m)
-2 - 0
0 - 5
5 – 10
10 – 15
15 – 20
20 – 25
35 – 38
Gaps in data

Fig. 24: Average rise in water level during the months May to November in the years 2005-10.

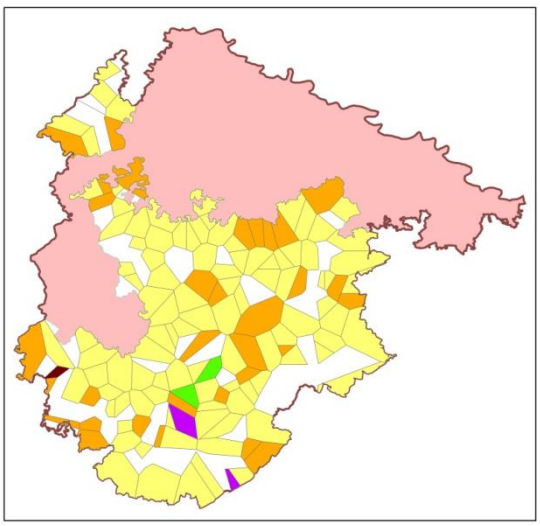


Fig. 25: Average rise in water level during the months May to November in years 2011-16.

Developing a predictive fire model on forests of Maharashtra with relation to various factors and to delineate suitable strategies

Grid-wise (size 0.25°× 0.25°) numbers of fire incidences were reported for the period of twelve years (2004-2016) in Maharashtra. Out of total 503grids, 277 were found to be affected due to forest fire and a total of 17187 forest fire incidences occurred during the period. Maximum number of forest fire incidences were reported in March (8684), followed by April (5186) and February (1819).

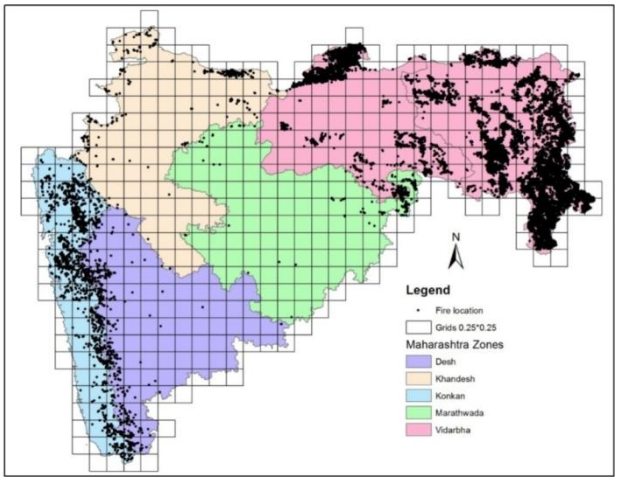


Fig. 26: Location of fire incidences overlaid on geographical regions of Maharashtra

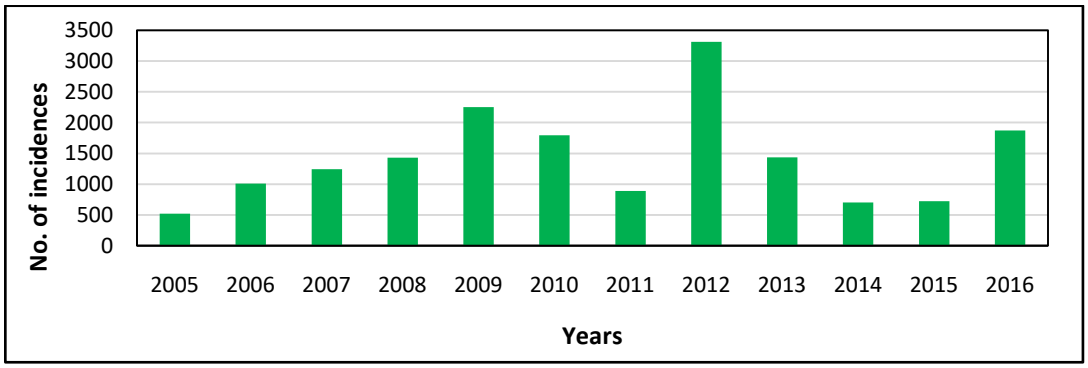


Fig. 27: Year wise variation of forest fire incidences

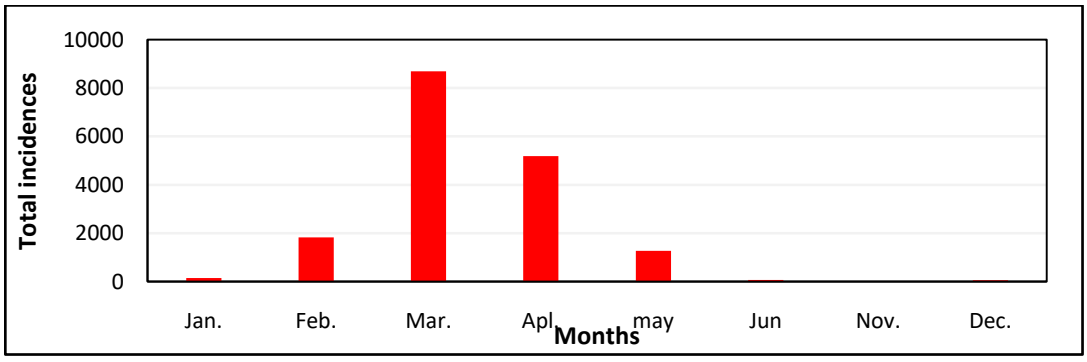


Fig. 28: Monthly variation of forest fire incidences.

Integrated approach for development of standard nursery techniques and value added products of some socio-economically important species of Madhya Pradesh

Seeds of *Terminalia chebula* (harra), *Terminalia bellerica* (beheda), *Madhuca indica* (mahua) and *Semecarpus anacardium* (bhilwa) werecollected from Delakhari, Amarwada and Tamia blocks of Chhindwara district and experiments on pre-treatment of seeds and application of organic and inorganic fertilizers on seedlings were conducted at CFRHRD nursery. 7% incidence of unidentified brownish larva defoliating the seedlings of *Terminalia bellerica* was recorded. Fusarium and aspergillus species were isolated in potting mixture and it was drenched with Bavistin fungicide @ 0.2 percent solution control. Raw materials of selected species viz. *Terminalia chebula* fruits and leaves, *Terminalia bellerica* fruits and leaves, *Semecarpus anacardium* fruits and leaves and *Madhuca indica* leaves were collected from locally available sources. Samples were dried and further processed in powdered form. Value added product, herbal gel was prepared from *S. anacardium.*

2.2.3 Social Forestry, Agro-forestry/Farm Forestry

Development of *Gmelina arborea* based agroforestry system in Madhya Pradesh.

Base line data was collected from the farmers who are engaged in betel leaf farming in Sihora and Katni districts of Madhya Pradesh. Farmers' fields of adjoining villages viz., Tewar, Majitha, Devri and Chargawa of Jabalpur district were surveyed to select the existing plantations of *Gmelina arborea* as an On Farm Research (OFR) trial. Established Gmelina based agroforestry system at TFRI by intercropping of *Curcuma longa* (haldi), *Zingiber officinalis* (adrak), *Asparagus racemosus* (satawar) and *Piper betel* (paan) under existing five year old *G. arborea* plantation. The growth parameters (height, girth and canopy) of *G. arborea* were recorded and it was found that the maximum height (582.79 cm), girth (26.94 cm) and canopy (251cm) was observed in intercrop as compared to sole crop (432.85 cm, 19.33 cm and 160 cm respectively). Nitrogen content was found to be low (180 to 250kg/ha) and phosphorus as deficient in the soil (3.05 – 9.5 kg/ha) collected from site.

Fig. 29: Plantation of *Curcuma longa* under *Gmelina arborea* at TFRI, Jabalpur (M.P.)

Fig. 30: Severe attack of stem borer *Indarbela quadrinotata* on *G. arborea*

Empowering tribal communities through lac cultivation in M.P.

Lac cultivation was popularised through training and demonstration to eight women SHGs of Mandla and Jabalpur districts belonging to villages Tikariya, Devri, Sohad, Bahmnoda, Ranipur, Narai, Chokhda and Chhattarpur. The farmers of the selected sites were sensitized and motivated for lac cultivation and trained in the different cultural operations like selection of host trees, traditional v/s improved method of cultivation and maintenance of the crop and lac processing. Published one booklet and one brochure on lac cultivation.

Fig.31: Release of booklet on Lac cultivation.

Fig.32: Demonstration of processing of Lac products to the Jagori Sangeet SHGs,Pipadahi village,Jabalpur district during training programme held at TFRI, Jabalpur (M.P.).

Fig. 33: Finished product made during training programme held at TFRI, Jabalpur (M.P.).

Fig. 34: Demonstration of processing of Lac products to the Jamuna SHGs of Tikariya village, Mandla district during training programme held at TFRI, Jabalpur (M.P.).

Fig.35: Demonstration of processing of Lac products to the Jagori SHGs of Tikariya village, Mandla district during training programme held at TFRI, Jabalpur (M.P.).

Fig. 36: Demonstration of processing of Lac products to the Arti SHGs of Mehgawa village, Jabalpur district during training programme held at TFRI, Jabalpur (M.P.).

Fig. 37: Class room lecture delivered by Dr. Nanita Berry, Course Director of the training on 'Lakh ki kheti dwara atirikt Aay' held from 12- 14, September, 2017 at TFRI

Fig. 38: Training and demonstration at Lac based processing and training centre at Balaghat, Madhya Pradesh on 14 September, 2017.

Study on indigenous knowledge and documentation of extent of utilization of herbs in folk medicines prevalent in tribal pockets of Madhya Pradesh.

Information was documented from vaidrajs and traditional healers, after field survey in different clusters of Chhattarpur, Satna, Jabalpur, Seoni, Hoshangabad and Chhindwara districts. Ethno-medicinal survey was conducted in selected tribal pockets of Panna, Sehore and Bhopal. Identified local indigenous community/village community belonging to Saur, Raj Gond, Gond, Khirwar, Bhariya, Pardhi, Korku, Kol and Mawasi tribes. Information on use of plant parts like roots, rhizomes, leaves, bark, flowers, fruits, gum, panchang of local flora in forest and fringe areas of local community was recorded. Ethno-medicines were identified in different clusters of the study area, documented and their uses were recorded from traditional healers.

2.2.4 Forest Soils & Land Reclamation: Nil

2.2.5 Watershed Management: Nil

2.3 Genetic Improvement

2.3.1 Overview

2.3.1.1Projects under the theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	3	1
Externally Aided	2	3	-

2.3.2 Conservation of Forest Genetic Resources

Population dynamics, structure and genetic diversity of *P. marsupium* in the tropical forests of Madhya Pradesh

The project aims to develop the conservation strategy for vulnerable *Pterocarpus marsupium* (Bija saal) by investigating the genetic diversity, status of natural regeneration and factors affecting regeneration and establishment. Base line data for the distribution of Bija saal was collected from the working plans of different forest divisions of Madhya Pradesh. Morphometric data along with leaf samples were collected from each of the seven selected representative sites for assessment of variation and diversity. Successful completion of the project will be helpful in planning and implementation of conservation strategies for *P. marsupium.*

Germplasm collection and ex situ conservation of *Pterocarpus marsupium* Roxb.

The progeny and seed source trials established in Naya Raipur, Chhattisgarh and Chhindwara are being maintained. Another progeny trail established at TFRI, Jabalpur comprising 10 families is also being maintained. In seed source trial at Raipur, maximum height (98.87 cm) and girth (18.79 mm) was recorded in Ansa followed by Ambikapur locality with height (84.55 cm) and girth (14.14 mm). Progeny of tree number 1 from Bilaspur has been recorded with maximum height (104.4 cm) and girth (16.62mm) followed by Balod tree number 6 (90.2 cm height, 15.85 mm girth).

Fig. 39: Progeny trial of *Pterocarpus marsupium* established in the campus of TFRI, Jabalpur

2.3.3 Tree Improvement

Evaluation of progeny trials of *Tectona grandis* and production of improved planting stock tolerant to defoliator and leaf skeletonizer

Progeny trials established at Moiyanala (Mandla, Madhya Pradesh), Behrai, (Seoni, Madhya Pradesh) and Lohara (Chandrapur, Maharashtra) were surveyed. Morphological parameters, *viz*. total height (m), clean bole height (m) and girth at breast height (cm) of the trees were recorded. Trees present in all the three progeny trials were assessed for damage caused by teak leaf defoliator *Hyblea puera* and leaf skeletonizer *Eutectona machaeralis*. Ocular assessment of the severity of damage was done by rating infested leaves visually on the basis of percentage of infected leaves. Preliminary observations indicated maximum damage in C-59 family at Moiyanalla. *In vitro* shoot cultures were established and maintained on MS medium supplemented with 2.22µM BA and 1.16µM kinetin. Two-way factorial randomized experiments were conducted on MS medium supplemented with different concentrations of BA, zeatin and other cytokinins. Maximum number of shoots and longest shoots were obtained on treatment of 2.22 µM Zeatin and 0.55 µM BA. The project will help to select clones of teak which are tolerant to defoliator and leaf skeletonizer and produce planting stock from them.

Fig. 40: Progeny trials of *Tectona grandis* at (a) Moiyanala, (b) Seoni, (c) Chandrapur

Fig. 41: *In vitro* shoots of *Tectona grandis* on MS medium supplemented with 2.22 µM BA and 1.16µM Kinetin

Bamboo genetic evaluation, improvement and propagation

Germplasm bank established in the Silviculture nursery of the institute was maintained. 6000 number of plants of four species viz, *Bambusa tulda*, *Bambusa vulgaris*, *Dendrocalamus strictus* and *Bambusa bamboos* were produced out of which 2000 plants were sold.

Fig. 42: Production of *Bambusa tulda* using cuttings of different girth class.

2.3.4 Vegetative Propagation

Commercial production of quality planting material of bamboo species

300 plants of *B. tulda* and 400 plants of *B. nutans* and 250 plants of *B. balcooa* have been produced. *In vitro* cultures of *Bambusa nutans*, *Bambusa tulda*, *B. vulgaris* var. Green, and *Bambusa balcooa* are being maintained.

Fig. 43: (a) Rooting in juvenile rhizomatous cutting in *B.balcooa* **(b)** Rooting in mini cutting of *B. vulgaris*

Studies on improving adventitious rooting in *Dalbergia latifolia* Roxb. and field performance of its rooted plantlets

Dalbergia latifolia is a 'difficult to root' species. Plant growth regulators viz. IAA, IBA, NAA, α- Naphthol, β-Naphthol, Boric Acid, Ascorbic Acid and Thiamine were tested for their efficacy in adventitious rooting during different seasons. Cuttings collected from progenies of 10

trees and planted during the month of April performed better than planted during other months. Adventitious rooting of 15% to 22% was achieved with treatment of 800ppm IAA and 50ppm Boric Acid. No rooting was recorded during the months of October, November and December. Endogenous Indole-3-acetic acid (IAA) was estimated during different months in progenies of selected trees. IAA varies from 7.02µg g^{-1} fresh weight to 18.28µg g^{-1} fresh weight during different months.

Fig. 44: Sprouted cuttings of *Dalbergia latifolia* **Fig. 45:** Rooted cuttings of *Dalbergia latifolia*

2.3.5 Biotechnology

Development of tissue culture protocols for important forestry species, viz., *Buchanania lanzan, Madhuca indica* and *Tamarindus indica*.

In vitro culture establishment and shoot multiplication in *Buchanania lanzan* (chironji), *Madhuca indica* (mahua) and *Tamarindus indica* (tamarind) was achieved. Buds from these three species were monthly inoculated on MS medium supplemented with 3 mg l^{-1} BA. Sprouting was obtained in *B. lanzan* and *T. indica* in the months of December-January and in *Madhuca indica* in the months of May-June. In *Tamarindus indica*, the effect of culture medium was found to have significant effect on number of nodes and maximum number of nodes (5.06) and maximum shoot length (2.79cm) was obtained on B_5 medium. *In vitro* shoot cultures were maintained on MS medium supplemented with 3mg l^{-1} BA for *Madhuca indica*, MS medium supplemented with 1mg l^{-1} Kinetin for *Tamarindus indica* and MS medium supplemented with 3mg l^{-1} BA and 0.5mg l^{-1} NAA for *Buchanania lanzan.* Maximum *in vitro* rooting (85.41%) was obtained on full strength of MS medium supplemented with 2 mg l^{-1} IBA in *Tamarindus indica*. Around 2-3 roots were formed per shoot and these plantlets were hardened in soilrite. The project aims to develop tissue culture protocols for the three important NTFP species.

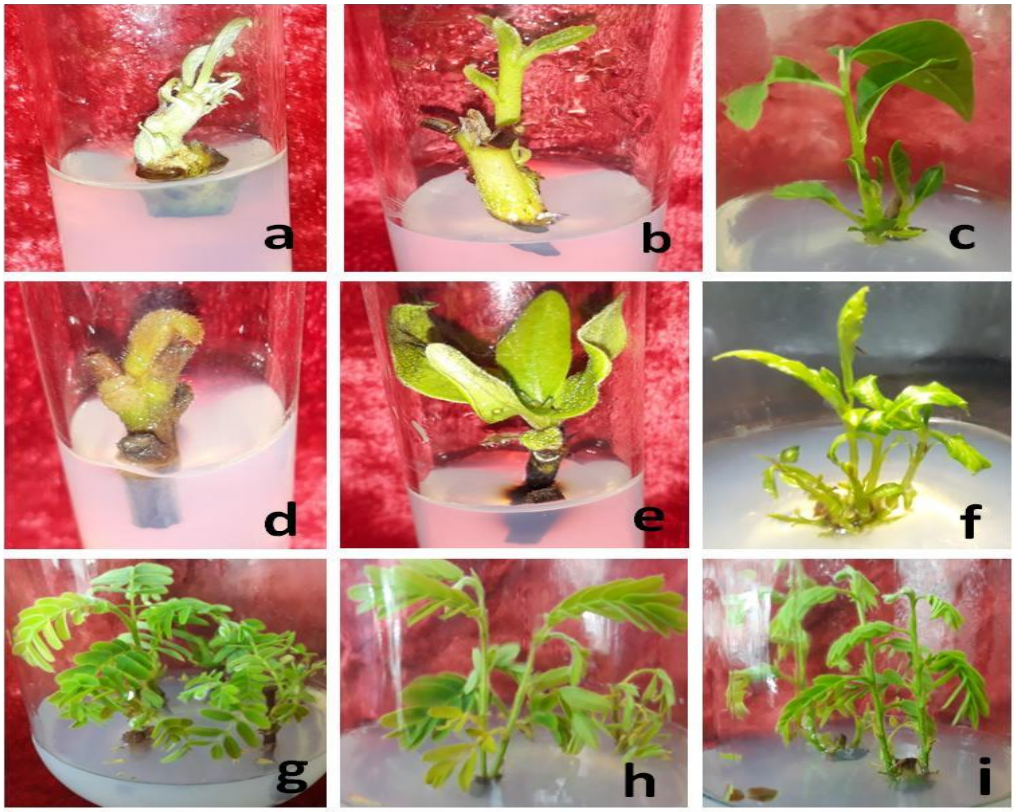


Fig. 46: *In vitro* shoot cultures- (a-c) *Madhuca indica,* (d-f) *Buchanania lanzan,* (g-i) *Tamarindus indica.*

Assessment of genetic structure, linkage disequilibrium and marker-wood trait association in CPTs of teak (Tectona grandis L.f.) maintained at National Teak Germplasm Bank, Chandrapur (M.S.), using molecular markers. (IFP-TFRI Collaborative Project)

Genotyping of 216 CPTs was carried out with 28 screened SSR primers. Percent polymorphic loci ranged from 92.86% to 100%. Analysis of molecular variance revealed that major portion of variation exists among plus trees within populations. Bayesian model based STRUCTURE analysis detected two clusters (K = 2) indicating existence of two genetic pools in assemblage of teak plus trees maintained at NTGB. Successful completion of the project will provide the status of diversity and better management NTGB.

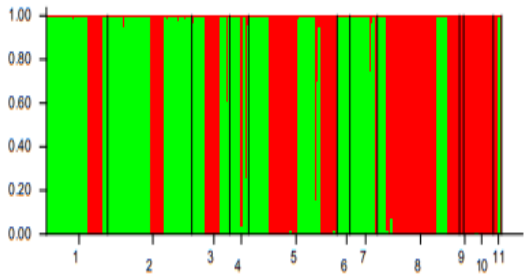


Fig. 47: Population structure estimation in plus trees of teak maintained at NTGB, Chandrapur, Maharashtra. (a) *Delta* K calculated by the Evanno et al. (2005) method. Maximum value is

observed at K = 2. (b) Bar chart for the proportion of the member coefficient of each population for best k.

2.4 Forest Management:

2.4.1 Overview

2.4.1.1 Projects under the theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	-	-
Externally Aided	-	1	-

2.4.2 Sustainable Forest Management (SFM)

2.4.3 Forest Economics

2.4.4 Forest Biometrics

2.4.5 Participatory Forest Management

2.4.6 Policy and Legal Issues

Assessing the impact of pruning of *Diospyros melanoxylon* bushes on its yield, quality and natural regeneration of tree species in Maharashtra

In Gondia and Gadchiroli forest divisions of Maharashtra, selected sites and laid quadrats of 0.1 ha size each in State Forest Department (SFD) and Community Forest Rights (CFR) controlled forests. SFD controlled had pruned bushes and CFR controlled had non-pruned poles of tendu. Healthy leaves in pruned bushes contributed 5 times more of total harvested leaves than non-pruned poles. Gall infested, diseased and defoliated leaves were observed more in non-pruned tendu poles. Tendu leaves were chemically analysed for phenols, ascorbic acid and proline and correlated with the resistance against gall attack. Trace elements in tendu leaves were estimated using Inductively Coupled Plasma Emission Spectrometer. The results of this project are of immense importance to State Forest Departments for enhancing quality and productivity of tendu leaves.

Fig. 48: Control fire experiment conducted at Gondia

Fig. 49: Gall infested tendu leaves

2.4.7 Information and Communication Technology (ICT)

2.5 Wood Products:Nil

2.5.1 Overview

2.5.1.1 Projects under the theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	-	-
Externally Aided	-	-	-

2.5.2 Wood and other Ligno cellulosic Composites

2.5.3 Wood Processing

2.5.4 Value Addition and Utilization

2.5.5 Wood Chemistry

2.5.6 Pulp and paper

2.6 Non-wood and Forest Products (NWFPs)

2.6.1 Overview

2.6.1.1Projects under the theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	1	1
Externally Aided	1	-	-

2.6.2 Resource Development of NWFPs: Nil

2.6.3 Sustainable Harvesting and Management

Standardization of non-destructive harvesting practices of *Commiphora wightii* (Guggal) gum oleogum resin in Madhya Pradesh

Experiments were laid out at Piprai (Morena) and Kankura (Bhind) to standardize non destructive harvesting technique of *Commiphora wightii* (Guggul) for collection of oleo-gum resin. The quantum of gum yield showed an increasing trend with increase in girth sizes (10-20, 21-30, 31-40cm) and maximum yield was observed in summer tapping season (April-May) in multiple slant cuts by Guggul blazer. The average oleo-gum resin production ranged 10.32 to 109.92 g/plant belonging to different girth sizes. Variation in Guggulsterone E&Z was assessed

in oleo-gum resin samples with the help of High Performance Thin Layer Chromatography (HPTLC). The quantity of total Guggulsterone increased in the month of May (0.58%), containing Guggulsterone E- 0.048% and Guggulsterons Z- 0.52 %. The tapped plants were monitored for casualties and adverse effect of tapping. Plants respond very well to natural healing of injured portion.

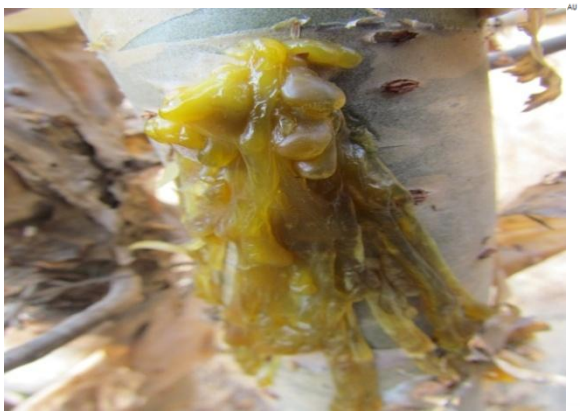


Fig.50: Oozing of Guggul oleo-gum

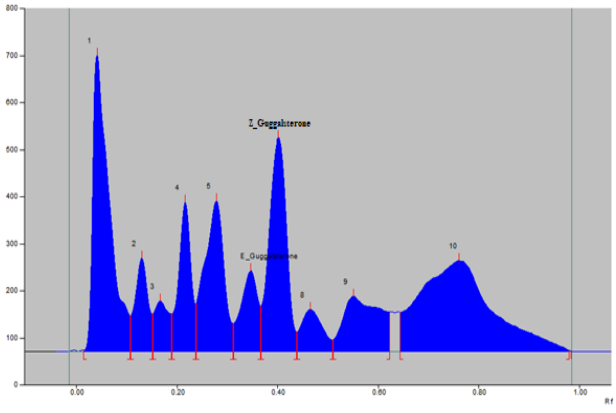


Fig.51: HPTLC Fingerprint profile of *C. wightii* resin showing Guggulsterone-E&Z

2.6.4 Chemistry of NWFPs, Value Addition and Utilization

Evaluation of phytochemicals from forest species-*Terminalia bellerica, Sapindus laurifolius, Acacia concinna, A. auriculiformis,* and *Ziziphus mauritiana* for removal of chemical residues from edible produce

Potential of plant extractives in removal of chemical residues from edible produce was evaluated. Brinjal and Okra samples were treated with commercial pesticides formulations i.e. Tricel (20% a.i. chlorpyriphos) and Profex (4% a.i. cypermethrin) and different dilutions *i.e.* 5, 10 and 15% of *S. mukrissi* and *Zizipus maurtiana* for different periods and extracted in suitable solvents following standard protocol. Extracts were analyzed chromatographically using Thin Layer Chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC) techniques for detection. The optimized mobile phase was a mixture of Toluene: Methanol: Hexane (8:1:1, v/v/v) for chlorpyriphos. The residue of chlorpyriphos was found below detectable limit in *Sapindus mukrossi* treated samples. Similarly *Z. maurtiana* treated samples showed the presence of 0.45-1.1mg pesticide residue in different treatments.

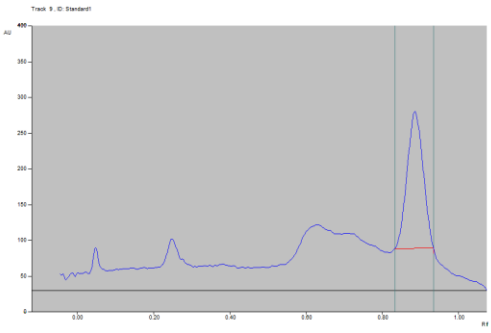


Fig.52: HPTLC Chromatograph of Tricel (Chlorpyriphos)

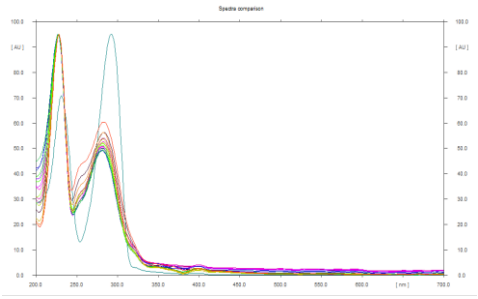


Fig.53: HPTLC Spectra of different treatments

Development of fast food products enriched with *Moringa oleifera* (Drumstick) leaves and skill upgradation training to rural women

Commonly consumed traditional salty food products and vermicelli were prepared by incorporating *M. oleifera* leaves. Six developed food products were analyzed for their sensory evaluation test. Sensory evaluation tests for the developed food products viz., biscuits, noodles and urad papad enriched with *M. oleifera* leaves powder was conducted and feedback was obtained from 40 participants on nine point hedonic scale and sensory evaluation sheet. Viability tests of developed products during storage period were conducted for biscuits, noodles and urad papads as well as control samples of all three products. One workshop cum awareness program on "Nutritional benefits of *M. oleifera* leaves and prospects for its value addition" was organized for stakeholders of Chhindwara. This study will help in income generation and overcoming malnutrition of the stakeholders.

2.6.5 Biofuels and Bioenergy: Nil

2.7 Forest Protection

2.7.1 Overview

2.7.1.1Projects under the Theme

Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	-	3	1
Externally Aided	3	1	-

2.7.2 Insects pests, diseases and control

Establishing Arachnarium at TFRI, Jabalpur, M.P.

The Arachnarium, spider rearing laboratory and Display Unit is completed and made functional where breeding of giant wood spider, *Nephila pilipes* was conducted and oviposition site and egg-mass was detected for the first time. 12 species of spiders were reared in the breeding unit and spiderlings were released in the spider garden. The species were: *Nilus*

phipsoni, *Leucauge decorate*, *Argiope pulchella*, *Stegodyphus sarasinorum*, *Zosis sp. Tetragnatha mandibulata*, *Telamonia dimediatus*,*Nephila pilipes*, *Thomisus sp.* and *Hersilia sp.*,*Pisaura sp.* and *Araneus mitificus*. Noteworthy to mention are 6 spiders which are state record of MP. These are *Palpimanus sp.*, *Cyrtarachne ixiodes* (Asian Morph) *Pasilobus cotegeharus*, *Latrodectus hasselti* (Deadly poisonous), *Nilus albocinctus* and *Makdiops sp.* Two leaflets entitled "Arachnarium at TFRI (in English) and TFRI ka Makdalay (in Hindi) were published and distributed to the stakeholders.

Determining bio-control efficacy of spiders against insect pests of rice agro-forestry system

The project highlights the biological control of insect pests of paddy utilizing predatory spiders by developing a suitable model for ecologically based pest management. So far 28 species of spiders were collected and identified from the existing plots of rice fields. The colony of social spider (*Stegodyphus sarasinorum*) were reared in the Arachnarium of TFRI and 2 such colonies are established and transported in experimental site, which are to be utilized as mother colony for experimental work. This project is being executed in collaboration with JNKVV, Jabalpur.

Fig. 54: Giant wood-spider *Nephila pilipes* for rice-pest control

Fig. 55: Social Spider *Stegodyphus sarasinorum*, and its egg-sac

Distribution, field biology and integrated pest management of major white grub species infesting teak seedlings in Madhya Pradesh.

Incidence of teak seedling mortality due to white grub was recorded from 26 different teak forest nurseries under 09 ACZ of M.P. Beetles of white grubs were collected and identified. Density and occurrence of immature and mature grub stages and host range of adult beetles within the nursery area and in surroundings, and activity period of the major species were recorded through periodical surveys, investigation on location and species specific field biology of the major white grub species vis-à-vis climatic and edaphic parameters. *Galleria mellonella* was reared regularly in laboratory for maintaining the culture of entomopathogenic nematodes (EPNs) for field experiment during the season. Field experiment was laid out in Saraswahi, Darauli, Research & Extension Circle, Jabalpur and Kanchangaon Forest Nursery, Mohagaon

Project Division, Mandla (MPFDC) by introducing EPNs in nursery beds on management of beetles and white grubs and the related observations were recorded. Experiments were repeated in above described nurseries with major attack as envisaged.

Field evaluation of biopesticides, Ivermectin and Spinosad against major insect larval defoliators

Biopesticides Ivermectin (0.03%) and Spinosad (0.003%) were found to be the most effective against teak defoliator, *Hyblaea puera* Cramer, teak skeletonizer, *Eutectona machaeralis* Walker, Khamer defoliator, *Hapalia aureolalis* and *Ailanthus* web worm, *Atteva fabriciella*. Both pesticides showed persistency 4-5 days.

Development of delivery system for field application of *Canthecona furecellata*as biological control agent against major insect pests.

Released predator *Canthecona furecellata* against teak defoliator *Hyblaea puera*; skeletonizer *Eutectona machaeralis*; sissoo defoliator *Plecoptera reflexa* and chick pea pod borer *Heliothis armigera*in plantations of teak, sissoo and chick-pea at Niwas, Mandla, and Maharajpur, TFRI Campus, Jabalpur and Gauraiyaghat, M.P. Observations were recorded on the mortality/reduction of larvae in experimental areas. About 20-30% reduction of the larvae were recorded.

Fig. 56: Predatory bug, *Canthecona furcellata* feeding on larvae of teak defoliator *Hyblaea puera*.

Development of integrated insect pest and disease control system for *Albizia* and *Dalbergia* in plantations of Madhya Pradesh and Maharashtra

Observations were recorded on damage caused by insect pests / diseases of *Albizia lebbeck, A. procera* and *Dalbergia* sissoo in plantations at selected localities in Madhya Pradesh and

Maharashtra. Calendar of insect pest/disease was prepared. Insect pests - bark eating caterpillar *Indarbela quadrinotata;* termites, *Odontotermes* spp.; defoliator *Plecoptera reflexa;* semilooper *Ascotis* spp. and pathogens - *Alternaeria* spp.; *Stigmina* spp. *Cladosporium* spp. *BipolarisCholetotrichum* spp. on *D. sissoo* ; *Alternaeria* spp. on *A. lebbeck* and *A. procera* were recorded and about 15-25% incidence was recorded. Field experiments on integrated pest management (IPM) of insect pests/diseases of *D. sissoo* and *A. lebbeck* were laid out in TFRI campus Jabalpur. Treatment of chlorpyriphos 0.05% + ridomil 0.2% + mulching + chaubatia paste was found to be the most effective against the insect pest/diseases of *D. sissoo*. Treatment of monocrotophos 0.05% was found to be the most effective against pod /seed borer, *B. bilineatopygus* and minimum damage in seeds of *A. lebbeck* was noted on this treatment.

Fig. 57: *Dalbergia sissoo* damaged by bark eating caterpillar *Indarbela quadrinotata*

Fig. 58: Canker disease on *Albizia lebbeck*

Taxonomic study of Tettigoniidae (Orthoptera) of India (Under All India Co-ordinated project on Taxonomy) (AICOPTAX)

306 insect specimens belonging to the family Tettigoniidae from more than 138 sites representing four habitat types such as grasslands, agriculture land, forest and plantations in different agro climatic zones of Madhya Pradesh, Chhattisgarh, Rajasthan, Gujarat and Maharashtra were collected and processed as per the standard entomological procedure and preserved for identification.

Fig. 59: Showing Tettigoniidae in grassland at Hoshangabad, M. P.

Fig. 60: Showing Tettigoniidae collection in grassland at Mandla, M.P.

2.7.3 Mycorrhizae, rhizobia and other useful microbes

Formulation of biofertilizers consortium and their distribution to forest department

Packets of bio-fertilizers were supplied for application in nurseries of 11 research and extension circles including 661 packets of *Rhizobium*, 668 of *Azatobacter*, 308 of *Azospirillum*, 544 of PSB and 24 bags of VAM fungi. In addition AM fungi were also distributed to MP Forest Development Corporation (11 nurseries) for application in bamboos.

2.7.4 Weeds and Invasive species:Nil

2.7.5 Forest Fire and Grazing

3. Education Vistas/Activities

3.1 FRI University (Applicable for FRI, Dehradun only)

3.2 Trainings Organized: Topics must be indicated in text while providing information in the table given below:

Note: Please indicate in numerals i.e. 1, 2, 3…n only. Please do not write one week, six months etc.

Sl. No.	No. of Trainings	Duration (in days)	No. of participants
1.	28	92	856

Sl. No	Name of Training Programmes
1	Training-cum-Workshop organized for IFS officers on 'Carbon Sequestration through Wood and Bamboo Products' at TFRI
2	Training on .Carbon Sequestration through Afforestation at Rourkela Steel Plant, Odisha' for SAIL officers
3	Training on .Carbon Sequestration for the officers of Maharashtra State Forest Department at Nagpur
4	Training Programme for M.Sc. Forestry Management IV Semester students, GuruGhasidasUniversity, Bilaspur
5	Training cum Awareness Programme on "Biodiversity Conservation and Environmental Awareness"
6	Sustainable Harvesting, processing and Value addition of NTFPs
7	Training cum Awareness Programme on "Environmental Awareness and Biodiversity Conservation"
8	कुशल भारत हेत कौशल विकास योजनान्तर्गत वनों की उत्पादकता वृद्धिहेतुजैव कीटनाशकों एवं जैव उर्वरकों का प्रयोग पर प्रशिक्षण कार्यक्रम
9	Training organized by CFRHRD, Chhindwara on "Insect pests in forest nurseries and plantations and their control measures"
10	कुशल भारत हेत कौशल विकास योजनान्तर्गत लाख की खेती द्वारा अतिरिक्त आय पर प्रशिक्षण कार्यक्रम
11	Training –cum-Awareness programme organized by CFRHRD, Chhindwara on Biodiversity Conservation and Environmental Awareness " and celebrated World Ozone Day 2017
12	Training organized by CFRHRD, Chhindwara on NWFP harvesting, processing & value addition/Food from forest
13	कुशल भारत हेत कौशल विकास योजनान्तर्गत सौर ऊर्जा द्वारा अकाष्ठ वन उत्पादों का मूल्य संवर्धन पर प्रशिक्षण कार्यक्रम
14	कुशल भारत हेत कौशल विकास योजनान्तर्गत बाँस आधारित हस्तशिल्प उत्पादों से अतिरिक्त आय पर प्रशिक्षण कार्यक्रम
15	Institutional training organized for B.Sc. VII semester forestry students from GGU University
16-19	Cultivation of lac and its management (04 no.)
20	Training –cum-Awareness programme on "Biodiversity Conservation and Environmental Awareness" was conducted by CFRHRD Chhindwara
21	Agroforestry systems and its management
22	Training cum workshop on "Nutritional benefits of *Moringa oleifera* leaves and prospects for its value addition" was organized by the CFRHRD, Chhindwara
23-27	Training on Plant Biotechnology techniques (05 no.)
28	Training on Instrumentation

One Week winter course on **Agroforestry and its management** was organized by the Agroforestry Division from 8 - 12 January, 2018 at Tropical Forest Research Institute, Jabalpur (M.P.) for the Graduate students of Sam Higgonbottom University of Agriculture Technology and Sciences, Allahabad District (U.P.).

Fig. 61: Dr. M. Rajkumar, Scientist 'C' explaining during his lecture session under the winter course of Agroforestry and its management held from 8 to 13 January, 2018 at TFRI, Jabalpur (M.P.)

Fig. 62: Shri Dheeraj Gupta, Scientist 'C' delivering his lecture during the technical session under the winter course of Agroforestry and its management held from 8 to 13 January, 2018 at TFRI, Jabalpur (M.P.)

Fig.63: Field visit to the medicinal plant nursery at TFRI campus.

Fig. 64: Dr. Nanita Berry, Scientist 'E' delivering lecture during training progrmme

3.3 Visit Abroad: Nil

3.4 Participation in Seminars/Symposia/Workshops/Trainings

Participation in Seminars

Sl. No.	No of Seminars/Symposia/Workshops/Trainings	Total events	Duration (in days)	No. of participants
	10/-/2/9	**21**	**25/-/2/74**	**19/-/2/15**

S. No.	Participation in seminars	Duration in days	No. of participants
1.	Dr. N. Roychoudhury, Scientist G; Dr. Avinash Jain, Scientist F and Dr. Rajiv Rai, Scientist F attended XIX Commonwealth Forestry Conference-2017 on Forests for prosperity and posterity at FRI Dehradun during 3-7 April 2017.	05	03
2.	Dr. Avinash Jain, Scientist F attended	02	01

	National Seminar on Climate Change held at EPCO, Bhopal 21-25 March 2018.		
3.	National Seminar on Climate Change and Role of Communities for Adaptation and Mitigation held at SFRI, Jabalpur on 18-19 September 2017.	02	02
4.	Conference of Society for Conservation Biology 2018 held at AMITY university, Noida on 19-20 March 2018.	02	01
5.	National Seminar on Climate Change and Role of Communities for Adaptation and Mitigation at State Forest Research Institute, Jabalpur.	02	02
6.	XVI AZARA International Conference on Applied Zoological Research for Sustainable Agriculture & Food Security, at Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Banaras	02	01
7.	National Conference on Biodiversity-Conservation and Management for Sustainable Development at University Institute of Vocational Studies and Skill Development, Rani Durgavati University, Jabalpur.	02	03
8.	National Seminar on Environment Conservation: Issues and Strategies at Govt. M.H. College of Home Science for Women, Jabalpur.	02	02
9.	'National symposium on Plant Biotechnology: Recent trends in Plant propagation, Genetic improvement & Industrial Applications', organized by Arid Forest Research Institute, Jodhpur, Rajasthan, from 16-18 February, 2018	03	02
10.	National Seminar on Environmental Conservation: Issues and Strategies on 17-18 March, 2018 at Govt. M.H. Home Science College, Jabalpur	02	01
11.	National Seminar on “Bamboo Cultivation and products development : Present status and green future prospects” organized by Rani Durgavati University, Jabalpur (MP)	01	01
12.	Shri. N.D. Khobragade, Scientist –C attended workshop cum meeting on monitoring of NTPC Ltd. Accelerated Afforestation Programme of plantation of 10 Million trees in seven states (MP & MS) at TFRI, Jabalpur.	01	01
13.	Dr. Avinash Jain, Scientist F attended Inception Workshop on “Monitoring of	01	01

	NTPC Accelerated Afforestation programme of 10 million trees in seven states" held on 18 April 2017 at ICFRE, Dehradun.		
14.	Dr. Pramod Kumar, Scientist-B attended training on Statistical methods in forestry research at ICFRE, Dehradun	05	01
15.	Dr. Fatima Shirin, Scientist-F, Dr. Yogeshwar Mishra, Scientist-F and Dr. Naseer Mohammad, Scientist-C have attended Introductory training in Molecular Biology techniques at IFGTB, Coimbatore	05	03
16.	Dr. M. Kundu, Scientist - F and Dr. R. Sett, Scientist-D has attended Advanced training in Statistics at ICFRE, Dehradun	05	02
17.	Smt Neelu Singh, Scientist-F Dr. Vishakha Kumbhare, Scientist-D and Dr. Hariom Saxena, Scientist-C participated in the one week training on "Instrumentation-Data analysis and Interpretation-LCMS and NMR" sponsored by ICFRE, Dehradun as a part of HRD training programme for scientists	05	03
18.	Dr. Mamta Purohit, has attended Advanced Techno Management Programme at ASCI, Hyderabad	30	01
19.	Dr. Vishakha Kumbhare, Scientist –D participated in the Entrepreneurship development training programme based on *Aloe vera* products organized by Mahatma Gandhi Institute for Rural Industrialization, Wardha.	04	01
20.	Dr. Vishakha Kumbhare, Scientist –D participated in the two weeks training on "General Management Programme for Women Scientist" sponsored by Department of Science and Technology, New Delhi.	10	01
21.	Shri N.D. Khobragade Scientist –D and Mrs Mamta Meshram Scientist –B, participated in the one week training on Natural Resource and Environment Management" sponsored by Department of Science and Technology, New Delhi.	05	02
22.	Smt. Shalini Bhowate, Scientist –B participated in the one week training on "Biodiversity Conservation for Women Scientists" sponsored by Department of Science and Technology, New Delhi.	05	01

4. Extension Panorama/Activities

- National Forest Library and Information Centre (NFLIC) (Applicable for FRI, Dehradun only)
- Environmental Information system (ENVIS) (Applicable for FRI, Dehradun & IFGTB, Coimbatore only)

4.1 Report on Van Vigyan Kendras (VVKs) and Demo Village (DV)

3 Technical bulletins and 10 pamphlets were printed and distributed among stakeholders.

4.2 Technologies transferred : Nil

4.3 Research Publications: Please provide information in the tables given below:

Research articles published by the Institute

Sl. No.	Number of research articles published in scientific journals and books/ proceedings		
	National Journal	Foreign Journal	Chapter in Books / proceedings
	36	8	Nil

Research articles presented in seminars/conferences/workshops and abstracts and popular articles published by the Institute

Sl. No	Number of articles presented in seminar/conferences/workshops and abstracts and popular articles published		
	Article presented	Abstract published	Popular articles
	10	18	18

Books and booklets, brochures/pamphlets published by the institute

Sl. No	Number of books and booklet, brochures/pamphlets published	
	Books	Booklets/Brochures/Bulletins/Pamphlets
1.	-	A. Technical Bulletins- 5, i. Maida Chhal (*Litsea glutinosa* Lour) Status and Conservation ii. Model Guidelines for management of white grubs in forest nurseries iii. Status of *Dalbergia latifolia* (Rose wood, Kala shisham), an important vulnerable tree in central India iv. Clonal propagation of *Bambusa vulgaris* var. green through mini cuttings v. Insect Pests of *Gmelina arborea* (Linn.) and their control B. Brochure-1 i. Half Decade of Research (2012-2017) C. Pamphlets-11

4.4 Seminar/Symposia/Workshops Organized

Sl. No	No. of Seminars/Symposia/ Workshops/ meetings organized	No. of days	No. of participants
1.	Monitoring of NTPC Ltd. Accelerated Afforestation Programme of Plantation of 10 Million Trees – In Seven States (M.P. and Maharashtra) on 21 June 2017	01	25
2.	Eco-friendly Management of teak defoliator and leaf skeletonizer	01	66
3.	Nursery and Plantation Management Development of high biological and economic yielding varieties of *Rauvolfia serpentina* Benth.	01	55
4.	Promotion of Biofertilizers in forestry	01	49
5.	Environmental and Economical function of Agroforestry	01	51

4.5 Consultancies

Sl. No	Title	User agency
1	Monitoring of NTPC Ltd. Accelerated Afforestation Programme of Plantation of 10 Million Trees – In Seven States (M.P. and Maharashtra)	NTPC
2	Implementable forestry research for ash utilization promotion and development of research park at APML, Gondia	Adani Maharashtra Power Ltd
3	Controlling fugitive dust emission through biological reclamation of flyash lagoons in Shri Singaji Thermal Power Project (SSTPP), Khandwa (M.P.)	M.P. Power Generating Co. Ltd.
4	Use of ash pond decant water for agriculture purpose around NTPC Ramagundam Super Thermal Power Station	NTPC Ramagundam
5	Wildlife Conservation plan for Malachua Open Cast Mine	SECL
6	Wildlife Conservation plan for Dipka Expansion Project	SECL
7	Preparationof Environmental Management Plan and Reclamation and Rehabilitation of three iron ore mining leases of BIOM, South Bastar, Chhattisgarh	NMDC Ltd.
8	Report on "Management and maintenance practices of clonal seed orchard of *Tectona grandis* at Erikpal Bastar" was prepared and submitted to Chhattisgarh Forest Department.	Chhattisgarh Forest Department
9	Report on 10 Years calendar for management and maintenance of seedling seed orchard of *Tectona grandis* at Dodrepal Bastar" was prepared and submitted to Chhattisgarh Forest Department.	Chhattisgarh Forest Department

4.6 Technical Services

1. Clonal fidelity testing services were provided to Chhattisgarh Forest Department for Eucalyptus and bamboos plants and revenue of approximately 16.00 lakh was generated for the institute/council.
2. Dr. P.B. Meshram, Scientist-G/Head Forest Entomology Division attended enquiry on insect pest (Saw toothed grain beetle) on Mahua flowers in storage conditions in Godowns of forest department and submitted advisory notes to the Chief Conservator of Forests, Forest Circle Shahdol, M.P. in Dec. 2017.

4.7 Activities of Rajbhasha

संघ की राजभाषा नीति का अनुपालन सुनिश्चित करने हेतु वर्ष 2017-18 के दौरान उष्णकटिबंधीय वन अनुसंधान संस्थान (टी.एफ.आर.आई.), जबलपुर द्वारा निम्नलिखित गतिविधियां संचालित की गई जिसें राजभाषा अधिनियम 1963 की धारा 3(3) के तहत आने वाले दस्तावेज द्विभाषी रूप अर्थात् राजभाषा हिन्दी एवं अंग्रेजी में एक साथ जारी कर संघ की राजभाषा नीति का शतप्रतिशत अनुपालन सुनिश्चित किया, हिन्दी में प्राप्त पत्रों के उत्तर हिन्दी में ही दिये गए एवं हिन्दी पत्राचार के लक्ष्य को प्राप्त किया गया जो 'क' क्षेत्र के लिए राजभाषा विभाग द्वारा निर्धारित किया गया है।

निदेशक महोदय की अध्यक्षता में राजभाषा कार्यान्वयन समिति की बैठके प्रति तिमाही में आयोजित की गई एवं बैठकों के कार्यवृत्त आई.सी.एफ.आर.ई., मुख्यालय एवं अन्य संबंधित कार्यालयों को सूचना एवं अपेक्षित कार्रवाई हेतु प्रेषित किये गये।

दिनांक 14 सितम्बर, 2017 को हिन्दी दिवस एवं दिनांक 15 सितम्बर से 29 सितम्बर तक हिन्दी पखवाड़ा समारोह, सौहार्दपूर्ण वातावरण में मनाया गया। इस दौरान, 14 सितम्बर, हिन्दी दिवस के अवसर पर, राजभाषा विभाग द्वारा जारी माननीय गृह मंत्रीजी, भारत के संदेश का संस्थान के प्रशासनिक भवन के प्रांगण आयोजित सभा में वाचन किया गया।

दिनांक 15 सितम्बर से 29 सितम्बर तक संस्थान में पदस्थ पदाधिकारियों के लिए हिन्दी की विविध प्रतियोगिताएं आयोजित की गई एवं सफल प्रतिभागियों को हिन्दी पखवाड़ा समापन समारोह में मंच पर आमंत्रित अधिकारियों के करकमलों द्वारा पुरस्कार प्रदान किए गये।

भा.वा.अ.शि.प., देहरादून के अधीन 'क' क्षेत्र में स्थित संस्थानों में राजभाषा हिन्दी के प्रयोग में उत्कृष्ट प्रदर्शन के लिए महानिदेशक महोदय ने वर्ष 2016-17 का भा.वा.अ.शि.प. राजभाषा पुरस्कार' प्रमाण पत्र एवं शील्ड उष्णकटिबंधीय वन अनुसंधान संस्थान, जबलपुर (म.प्र.) को प्रदान किया है।

The following Rajbhasha activities were conducted by the Tropical Forest Research Institute (TFRI), Jabalpur during the year of 2017-18 in order to ensure the compliance of the official language policy of the Union. The documents which comes under section 3(3) of the Official Language Act, 1963 were issued in diglot form viz., in Hindi and in English simultaneously and ensured the compliance of the Official Language Policy of the Union. Letters received in Hindi were answered in Hindi itself, and the target of the Hindi correspondence which has been prescribed for ' A ' Region by the department of Official Language was achieved.

The Meetings of the Official Language Implementation Committee were convened during each quarter under the chairmanship of the Director and the minutes of the meetings were sent to ICFRE head quarter as well as respective offices for their information and requisite action.

The Hindi Day was celebrated on 14th September, 2017 in a cordial atmosphere, and the Hindi fortnight celebration was celebrated from 15th September 2017 to 29th September, 2017. During this period, the message of the Hon'ble Home Minister, Government of India, issued by the Department of Official Language has been read out in a programme which was organized on 14th September, 2017 in front of administrative building of this institute.

The Hindi fortnight celebration held from 15th September to 29th September, 2017 and various competitions were conducted in Hindi for the officials of this institute and prizes were awarded to the winners of the respective competition on the valedictory function.

The Director General, ICFRE, Dehradun has awarded the Official Language Award, Certificate and Shield to Tropical Forest Research Institute, Jabalpur (M.P.) which comes under ICFRE, and situated in 'A' region for outstanding performance in Official Language Implementation work for the year 2016-17.

Fig. 65: टी.एफ.आर.आई. के निदेशक की अध्यक्षता में राजभाषा कार्यान्वयन समिति की बैठक का आयोजन।

Fig. 66: हिन्दी दिवस के अवसर पर राजभाषा विभाग द्वारा जारी माननीय गृह मंत्रीजी का संदेश वाचन समारोह।

Fig. 67: हिन्दी पखवाड़े के दौरान टी.एफ.आर.आई. में आयोजित हिन्दी प्रतियोगिता।

Fig. 68: हिन्दी प्रतियोगिता के विजेता को समारोह के अध्यक्ष डॉ.एन. कुलकर्णी, वैज्ञानिक-जी के करकमलों से पुरस्कार वितरण।

Fig. 69: हिन्दी प्रतियोगिता के विजेता को मंचासीन डॉ. पी. बी. मेश्राम, वैज्ञानिक-जी के करकमलों से पुरस्कार वितरण।

Fig. 70: हिन्दी प्रतियोगिता के विजेता को मंचासीन श्री ए. के. शर्मा, अवर सचिव के करकमलों से पुरस्कार वितरण।

All official correspondence is being dealt in Hindi as far as possible. All computers in the centre have been provided with Hindi font. All seals and name plates are in bilingual as per the Govt. of India's direction.

- On behalf of Director, CFRHRD, Chhindwara, Dr. Vishakha Kumbhare, Scientist –D, CFRHRD, Chhindwara attended the district level meeting conducted by "हिंदी राजभाषा कार्यान्वयन समिति, छिंदवाडा" on 03.07.2017 held at Income Tax Department office campus and submitted the quarterly status report of the activities of the centre conducted in Hindi during the period April to June 2017.

- During the month of August 2017, Hindi language was used as a medium for drafting 42 nos. of different letters by the employees for office related works.
- During the month of September 2017, office related works were conducted in Hindi language for 58 nos. of different letters.
- During the month of October 2017, office related works were conducted in Hindi language for 10 nos. of different letters.
- During the month of November 2017, office related works were conducted in Hindi language for 10 nos. of different letters.
- During the month of December 2017, office related works were conducted in Hindi language which includes 53 nos. of different letters replied, office orders and notings done.
- During the month of January 2018, office related works were conducted in Hindi language which includes 40 nos. of different letters replied, office orders and notings done.
- During the month of February 2018, office related works were conducted in Hindi language which includes 57 nos. of different letters replied, office orders and noting done.

4.8 Awards and Honours:

भा.वा.अ.शि.प., देहरादून के अधीन 'क' क्षेत्र में स्थित संस्थानों में राजभाषा हिन्दी के प्रयोग में उत्कृष्ट प्रदर्शन के लिए महानिदेशक महोदय भा.वा.अ.शि.प., देहरादून ने वर्ष 2016-17 का भा.वा.अ.शि.प. राजभाषा पुरस्कार' प्रमाण पत्र एवं शील्ड उष्णकटिबंधीय वन अनुसंधान संस्थान, जबलपुर (म.प्र.) को प्रदान किया है।

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4.9 Special Activities (Such as Van Mahotsava, Forestry Day and Other occasions)

- Van Mahotsava was celebrated on 2 July 2017 by the institute.

Fig.71 & 72: Plantation activities at the campus on the occasion Van Mahotsav by the staff and personnel of TFRI and ITBP

The institute participated in 9th Agrovision at Nagpur during 10-13 November, 2017, International Herbal Mela organized by The Madhya Pradesh State Minor Forest Produce Federation at Bhopal from 14th-20th Dec., 2017 and Swarojgar Mela organized by Swami Vivekanand Carrier guidance cell of MP Higher Education Department at Govt. Science College, Jabalpur on 15 March 2018. The institutional activities were displayed and explained to all the visitors on stall.

Fig 73 & 74: A View of TFRI stall during International herbal mela organized by Madhya Pradesh State Minor Forest Produce Federation at Bhopal

Fig. 75 - 77: A view of TFRI stalls during Swarojgar Mela organized by Swami Vivekanand Carrier guidance cell of MP Higher Education Department at Govt. Science College, Jabalpur on 15 March 2018.

International Biodiversity day (22 May 2017), World Environment Day (5 June 2017), International Yoga Day (21 June 2017) Independence Day (15 August 2017), Sadbhawna Pakhwara (20 Aug.-5Sept. 2017), Hindi Diwas (14 Sept. 2017) and Republic Day 26 Jan. 2018), and were celebrated at TFRI, Jabalpur and CFRHRD Chhindwara during 2017-18. Swathchata Abhiyaan was conducted every month. Apart from this Under "Prakriti, Paryavaran and Hum" cleaning programme on the bank of Narmada River organized by TFRI, Jabalpur at Jamtara-Khiraini ghat on 16/02/2018 etc.

Fig 78 & 79: Essay and quiz competition on the occasion of International Biodiversity day (22 May 2017)

Fig 80-81: A view of "Nature Walk" organized by TFRI actively participated by the staff of MP forest department of other sectors of local community

- Under the “Prakriti Paryavaran aur Hum” initiative, the activity “Swachh Bharat-Harit Bharat-Plant a Tree” was conducted on 15.9.17 and Green Pledge was taken by all Scientists and staff of the centre. During the occasion and visit of review committee members, saplings were planted by dignitaries Dr. Ram Prasad, IFS, Retd., Shri. S. Khanduri, IFS, Retd. and other staff members of the centre.
- Under the nationwide campaign on Swachhata Hi Seva (Cleanliness is Service), “Swachhata/Safai Abhiyaan” was conducted by the centre on 29.9.2017 at office premises. All scientists and staff of the centre extended their services during the event.
- “Wildlife Conservation week” was celebrated by the centre on 2nd and 3rd October 2017. During the Wildlife Conservation week celebration from 01.10.2017 to 07.10.2017 organized by South Forest Division, Chhindwara, two days programme on “Bird Watching Campaign and Nature Awareness” was conducted at CFRHRD campus from 2.10.2017 to 3.10.2017 for

school students. During the period, 90 students from various schools viz. Nirmal Public School, Shikarpur and Balaji Public School, Chhindwara visited the centre alongwith their teachers and participated in the programme.

- Students of Class XI and XII standard (Biology) from Jai Gurudev International School, Chhindwara visited the centre on 9.10.17. During the period, field and lab visits was conducted for the students as part of their educational visit to CFRHRD, Chhindwara.
- Students of B.Sc (Agriculture) of Jawaharlal Nehru Krishi VishwaVidyalaya (JNKVV), Jabalpur visited the centre on 12.10.17. During the period field visit was conducted at medicinal plants garden and existing plantations of the centre for exposure on local plant diversity, their botanical and vernacular names and medicinal and other industrial uses.
- Students, Principal and teachers of Danielson College, Chhindwara visited the centre on 16.10.17. During the period field visit was conducted at medicinal plants garden and existing plantations of the centre for exposure on local plant diversity, their botanical and vernacular names and medicinal and other industrial uses.

5. Administration and Information Technology

Introduction

5.1 Information Technology

The institute has 100 MBPS NKN link provided under the National Knowledge Network (NKN) scheme of NIC project. The NKN comprises an ultra-high speed CORE (multiples of 10 Gbps), complimented with a distribution layer at appropriate speeds to support Overlay, Dedicated and Virtual Networks. The institute has a 100 MBPS fast Ethernet fiber optic backbone LAN, which is used for Internet access and other online activity. Video Conferencing facility also been used throughout the year. Under IFRIS project, various modules including Personal Information Management System (PIMS), Research Information System (RIMS), Payroll Management System (PMS) have been in operation successfully. The web site of the institute (http://tfri.icfre.org) and its satellite centre CFRHRD, Chhindwara (http://cfrhrd.icfre.org) are frequently updated to showcase various activities of the institute. Web pages have been updated for the institute's online open access e-magazine 'Van Sangyan' (ISSN 2395 - 468X) linked with institute's web site on regular basis and issues have been uploaded on monthly basis over it for easy access to the users. Reports have been generated for all the activities undertaken at the institutes level - conferences/seminars/workshops/trainings/visits of dignitaries/visits etc. are uploaded on institute's web site and also sent to the headquarter for uploading over ICFRE web site. The pages earlier generated for Achanakmar-Amarkantak Biosphere Reserve and institute's bi-annual journal 'Indian Journal of Tropical Biodiversity

(IJTB)' have been updated with latest information on regular basis. The contents of the IJTB along with abstracts have been uploaded over web site for access by the users. All the circulars, notifications, office orders, proceedings of monthly seminars and other documents have been regularly uploaded over the Online Office Records (Order /MoM / Agenda etc) System for wider circulation.

5.2 Administration: A brief note on general administration activities along with information on the following**:**

5.2.1. Sevottam: Activities relating to the Citizens/Clients Charter as detailed below has to be included in the Annual Report.

5.2.1.1 Action taken to formulate the Charter for the Department and its subordinate formation:

Provision for Annual Review of the Charter after approval is as:

- The Services provided by the Institute as per the charter will be reviewed annually.
- The timely redressal of public grievances is being monitored by the Public Grievance Officer.
- Steps are initiated to take remedial measures for quick disposal of complaints.

5.2.1.2 Action taken to implement the Charter

Action will be taken for implementing the Charter, after its finalization.

5.2.1.3 Details of Training Programmes, Workshops, etc. held for proper implementation of Charter

5.2.1.4 Details of publicity efforts made and awareness campaigns organized on Charter for the Citizen/Clients

5.2.1.5 Details if internal and external evaluation of implementation of Charter in the Organization and assessment of the level of satisfaction among Citizen/Clients

Evaluation of implementation of Charter will be initiated, after finalization.

5.3 Welfare measures for the SC/ST/Backward/minority communities:

Free trainings cum awareness programmes were conducted by CFRHRD for tribals/SCs/STs/ backward/minority communities dependent on NTFP collection for their livelihoods regarding biodiversity conservation, environmental awareness, collection, processing and sustainable harvesting of NTFPs.

The interests of the above section are being safeguarded and as per the guidelines of Govt. of India a Liaison Officer is in position who monitors the promotion/recruitment as per the roaster.

6. Annexures

1. RTI

वर्ष 2017-18 के दौरान टी.एफ.आर.आई., जबलपुर में आरटीआई के 3 मामले अभिप्राप्त हुए थे जिन सभी का अनुबंधित समयावधि के भीतर निपटान किया गया।

In TFRI, Jabalpur, 3 cases with regard to RTI were received during the year 2017-18 and all three were disposed within stipulated time period.

Names and Addresses of Public Information Officers and Appellate Authorities under the Right to Information Act 2005 in the Institute

Headquarter / Institute	Appellate Authority	Public Information Officer	Subject matter(s) allocated
Tropical Forest Research Institute, Jabalpur	Director, TFRI, Jabalpur	Shri Vijay Kamble, Hindi Officer, TFRI, Jabalpur	As per provision and guidelines provided under RTI Act, 2005.
Centre for Forestry Research & Human Resource Development, Chhindwara	Head, CFRHRD, Chhindwara	Head, CFRHRD, Chhindwara	As per provision and guidelines provided under RTI Act, 2005

2. Information on vigilance cases - Nil

3. Information on audit objections – Nil

4. Email and Postal addresses

Director
TROPICAL FOREST RESEARCH INSTITUTE
(*Indian Council of Forestry Research & Education*)
P.O. – R.F.R.C, Mandla Road, Jabalpur – 482021 (M.P), India
Phones: 0761 – 4044002, 2840483(O)
Fax: 0761 – 4044002, 2840484
e-mail – dir_tfri@icfre.org

Head,
Centre for Forestry Research & Human Resource Development
(Indian Council of Forestry Research & Education)
Poama, P.O- Kundalikala, Parasia Road, CHHINDWARA - 480 001 (M.P)
Phones: 07162 – 292061 (O)
e-mail: head_cfrhrd@icfre.org/dir_cfrhrd@rediffmail.com

5. Intellectual Property

5.1 Patents Granted

5.2 Others

List of Abbreviations

ACZ – Agro Climatic Zone

AICRP – All India Coordinated Research Project

AM- Arbuscular Mycorrhiza

APML- Adani Power Maharashtra Limited

BA- Benzyl Adenine

CFRHRD-Centre for Forestry Research & Human Resource Development

CPT- Candidate Plus Tree

CSO - Clonal Seed Orchard

DNA- Deoxyribonucleic acid

EPN- Entomopathogenic Nematode

FRI- Forest Research Institute

GBH- Girth at Breast Height

GIS- Geographical Information System

GNSS - Global Navigation Satellite System

HoFF – Head of Forest Force

HPTLC – High Performance Thin Layer Chrometography

IAA- Indole Acetic Acid

IBA - Indole Butyric Acid

ICFRE – Indian Council of Forestry Research and Education

IFRIS – Integrated Forest Resource Information System

IFS – Indian Forest Service

JNKVV- Jawaharlal Nehru Krishi Vishwavidyalaya

MDF - Moderate Dense Forest

MP- Madhya Pradesh

MOU – Memorandum of Understanding

MOEF&CC- Ministry of Environment, Forests and Climate Change

MPCA- Medicinal Plant Conservation Area

MPFDC - Madhya Pradesh Forest Development Corporation

MS- Maharashtra

MS- Murshige and Skoog

NAA – Napthyl Acetic Acid

NTFP- Non-Timber Forest Produce

NTGB-National Teak Germ Plasm Bank

NTPC – National Thermal Power Corporation

NWFP –Non-Wood Forest Produce

OFR – On Farm Research

PCCF- Principal Chief Conservator of Forests

PMS – Payroll Management system

PSB- Phosphate Solubilizing Bacteria

RFRC - Regional Forest Research Centre

RIMS – Research Information System

RSP - Rourkela Steel Plant

RTI – Right to Information

SAIL – Steel Authority of India Limited

SC - Schedule Caste

SCI – Selection Cum Improvement

SFD – State Forest Department

SPA- Seed Production Area

SSO - Seedling Seed Orchard

SSR – Simple Sequence Repeat

ST – Schedule Tribe

TFRI- Tropical Forest Research Institute

VAM- Vesicular Arbuscular Mycorrhizae

VDF – Very Dense Forest