# 1. Introduction

Agroforestry has been a way of life in India. Our social, religious and cultural ethics have been closely linked with the planting and protection of various trees. Tree biodiversity has been preserved in many areas because of its role in farming and other land use systems. However, with increase in demographic pressure resulting in degradation of resource base and vast gap between demand and supply of woody produces, agroforestry has once again been identified as the most appropriate land use option. Accordingly, the Indian Council of Agricultural Research (ICAR) has initiated a network project for organized research in agroforestry in 1983. To strengthen and coordinate the agroforestry research the National Research Centre for Agroforestry was established on 8<sup>th</sup> May, 1988 at Jhansi (U.P.). After 26 years of successful research and development activities on agroforestry, from 1<sup>st</sup> December, 2014 ICAR elevated the status of the National Research Centre for Agroforestry Research Institute (ICAR-CAFRI).

Institute is actively involved in designing and conducting research and development programmes on agroforestry models suitable for different edapho-climatic conditions of India through its research institute at Jhansi and 37 AICRPAF centres throughout India representing different agro-climatic conditions. Initially, the activities have broadly been grouped as Agrisilviculture, Agrihorticulture & Silvipasture, Tree Improvement & Silviculture and Human Resource Development & On Farm Research. Looking to the importance of the agroforestry research programmes have been reoriented under System Research, Natural Resource & Environment Management, Tree Improvement, Post-Harvest & Value Addition and HRD, Technology Transfer & Refinement.

Research programmes were reoriented by IRC after through discussions in 2012. New name for different programmes (Systems Research; Natural Resource & Environment Management; Tree Improvement, Post-Harvest & Value Addition and HRD, Technology Transfer & Refinement) were adopted and ongoing projects were rearranged, accordingly.

Institute in its national agroforestry mandate, has spent more than thirty years to systematize the science of agroforestry and has developed tools and methods to conduct agroforestry research. India has developed robust agroforestry science, innovations and practices that are attracting global interest. The basic, applied and strategic research in different spheres of agroforestry are targeted through institutional and externally funded adhoc and network projects.

**MISSION:** To improve quality of life of rural people through integration of perennials on agriculture landscape for economic, environmental and social benefits.

**VISION:** Integration of woody perennials in the farming system to improve land productivity through conservation of soils, nutrients and biodiversity to augment natural resource conservation, restoration of ecological balance, alleviation of poverty and to mitigate risks of weather vagaries.

#### MANDATE

• Develop sustainable agroforestry practices for farms, marginal land and wastelands in different agroclimatic zones of India.

- Coordinate network research for identifying agroforestry technologies for interregion.
- Training in agroforestry research for ecosystem analysis.
- Transfer of agroforestry technology in various agro climatic zones.

#### **OBJECTIVES**

- Enhancing productivity, profitability and livelihood through agroforestry interventions in different agro-climatic zones in India.
- Improvement of trees and biofuel species.
- Agroforestry documentation & repository of information.
- HRD and field demonstrations.

# **2. INFRASTRUCTURE**

**Total Area:** 114.932 ha. (Research Farm area: 83.864 ha; Rocky, unutilized, Ponds etc.: 24.532 ha; 5.44ha- Roads and Office premises: 1.096 ha)

**ISO 9001:2015:** ICAR-CAFRI has been accredited ISO 9001-2015 certificate for its management standards.

**Laboratories:** Six: Plant Physiology; Soil Analytical; Plant Protection; Tissue Culture & Biotechnology; Horticulture and Agroforestry.

Library: The library has 4549 books including Hindi books and subscribes 15 Indian Journals.

**Other Facilities:** Agroforestry Technology Information Centre (ATIC), Canteen, Agriculture Knowledge Management Unit, Photography Unit, Conference Hall, Committee Hall, Training Hall, Shed House, Mist Chamber etc.

**AICRP on Agroforestry:** AICRPAF was initiated in 1983. A new Centre at IFGTB (ICFRE) Coimbatore was approved in 2012. The total is now 37 Centers (11 in ICAR Institutes, 01 in ICFRE and 25 in SAUs), covering all the major agro-ecological zones of the country.



3.On Going Projects (2018-19)				
S. No.	Project Code	Title of the Project	Leader	Associates
	(A)SYSTEM RES	EARCH PROGRAMME		
1	NRMACAFRISI L 201000200085	Nutrient management in ber based agri-horti. system	Sudhir Kumar	Anil Kumar, Rajendra Prasad, Inder Dev & Veeresh Kumar*
2	NRMACAFRISI L201600100099	Performance of pomegranate integrated with lemon grass under organic regime	Sudhir Kumar	Rajendra Prasad & Veeresh Kumar*
3	NRMACAFRISI L201600200100	Structural and Functional Analysis of Short Rotation Tree Based Agroforestry System	Naresh Kumar	A K Handa, Asha Ram, Inder Dev, Dhiraj Kumar, Kamini (ICAR-IGFRI, Jhansi) & Mahendra Singh
4	NRMACAFRISI L201600300101 (B)NATURAL RI	Studies on soil biodiversity & nutrient dynamics in different agroforestry & mono- cropping system	Veeresh Kumar*	Anil Kumar, Dhiraj Kumar, Naresh Kumar, Mahendra Singh & N. Manjunath (ICAR- IGFRI, Jhansi) NT PROGRAMME
1	NRMACAFRISI L 200800200078	Studies on arbuscular mycorrhizal fungi of important MPT's	Anil Kumar	Rajendra Prasad & Naresh Kumar
2	NRMACAFRISI L 201100200088	Multi-Source Inventory Methods for Quantifying Carbon Stocks through Generalized Volume/ Biomass Equations for Prominent Agroforestry Species in India	R H Rizvi	A K Handa
3	NRMACAFRISI L 201300100091	Agroforestry based conservation agriculture for sustainable landuse and improved productivity	Inder Dev	Asha Ram, Ramesh Singh, Dhiraj Kumar, K B Sridhar, Naresh Kumar, Veeresh Kumar*, Mahendra Singh & Lal Chand
4	NRMACAFRISI L201600400102	Agroforestry based Integrated Farming System for small and marginal farmers in semi-arid region	Ram Newaj	Asha Ram, Sudhir Kumar, Naresh Kumar, Ramesh Singh, Dhiraj Kumar, Veeresh Kumar* & Mahendra Singh
5	NRMACAFRISI L201600500103	Impact of watershed and agroforestry interventions on hydrology and nutrient loss at Garhkundar-Dabar watershed in Bundelkhand region of Central India	Ramesh Singh	Dhiraj Kumar
6	NRMACAFRISI L201600700104	Relevance of soil and water conservation measures in enhancing productivity and sustainability of silvipastoral system in semi-arid conditions	Asha Ram	Ramesh Singh, Naresh Kumar, Dhiraj Kumar & Inder Dev

<b>—</b>				
7	NRMACAFRISI	Horizontal and vertical	Dhiraj	Ram Newaj, Rajendra
	L201600800105	distribution of fine roots of	Kumar	Prasad & Asha Ram
		tree and nutrients content in		
		well established Aonle and		
		Well-established Aolita and		
		Hardwickia binata based		
		agroforestry system		
8	NRMACAFRISI	Effect of Abuscular	Anil Kumar	Sudhir Kumar, Naresh
	L201600800106	mychorizal inoculation on		Kumar. Dhiraj Kumar
		productivity of agroforestry		&
		evetame		Inder Dev
				liidei Dev
-	(C) Tree Improve	ment, Post-Harvest & Value Ad	Idition Program	ime
1	NRMACAFRISI	Comparative studies on	Badre Alam	A K Handa
	L200700400071	seedling and clonal plants of		
		Pongamia pinnata with		
		special reference to their		
		adaptability to rainfed dry		
		agroclimate		
2	NDMACAEDICI	Evaluation and	V D · · ·	A K Handa
2	NKMACAFRISI	Evaluation and	K Rajarajan	A K Handa,
	L201500100092	characterisation of different		A K Singh, (IGFRI) &
		Leucaena germplasm at		Maneet Rana (IGFRI)
		CAFRI		
3	NPMACAEPISI	TROS based Agroforestry	K B Swidhon	Inder Dev
3	INKMACAPKISI	Thos based Agronolesury	K D Sriuliar	liidel Dev
	L2016009107	models		
4	NRMACAFRISI	Mass propagation of	K B Sridhar	Lal Chand
	L20160010108	Industrial trees viz Eucalyptus		
	£20100010100	tereticornis Casuarina		
		iumahuhuiana Mia Malia		
		jungnunniana Milq. Mella		
		dubia and Populus deltoides		
		using micro and mini clonal		
		cuttings		
5	NRMACAFRISI	Integrated development of	Naresh	Lal Chand
	L201701100112	Jatropha and Karani	Kumar	
		F		
6	NPMACAEPISI	Eurotional genomics for early	<b>V</b> Dejersion	A Padhakrishnan K B
0	INNIACAPRISI	Functional genomics for early	к кајагајан	A Kauliakiisillall, K D
	L201801100114	drought tolerance in		Sridhar & Lai Chand
		Pongamia pinnata genotypes		
	(D) HRD, Techno	logy Transfer & Refinement Pr	ogramme	
1	NRMACAFRISI	Socio-economic, energetic	<b>R P Dwivedi</b>	R K Tewari, Ramesh
	L201500200093	and environmental impact		Singh R H Rizvi &
	1201200200075	assessment of watershed and		Mahendra Singh
		assessment of watershed and		Waltendia Shigh
		agiololestry litterventions at		
		Garnkundar-Dabar watershed		
		in Tikamgarh district of		
		Madhya Pradesh		
2	NRMACAFRISI	Economic evaluation of	Mahendra	R P Dwivedi, Inder
	L201500300094	poplar and Eucalyptus based	Singh	Dev.
		agroforestry systems	~8	R H Rizvi K R Sridhar
		provolont in Indo Concetio		& Dhiroi Kumor
		prevalent in indo-Gangatic		& Dillaj Kulla
		Plains, India		
	Projects conclude	d during IRC-2018	1	
1	NRMACAFRISI	Evaluation of shade tolerance	Badre Alam	Ram Newaj
	L	of crop species for		~
	200700100068	agroforestry systems		
2	NRMACAFRISI	Genetics and breeding of	Narech	K Rajarajan
2		Lationha area	1 1 al Coll	ix. Najarajali
1	L200400100034	<i>Juropha</i> species	numar	

## Externally Funded Projects

S. No.	Project Code	Title of the Project	Leader	Associates	Funding
1	NRMACAFRISO P200800100075	Harvest and post- harvest processing and value addition of natural resins, gums and gum resins	Rajendra Prasad	A K Handa, Ramesh Singh & Badre Alam	ICAR, IINR&G Ranchi
2	NRMACAFRISO L201500700096	National Mission for Sustaining the Himalayan Ecosystems (NMSHE- Taskforce 6 for Himalayan Agriculture)	A K Handa	Inder Dev, Badre Alam, Mahendra Singh & Asha Ram	DST, New Delhi
3	NRMACAFRISO L20110030087	Assessment of carbon sequestration potential of agroforestry systems (NICRA)	Ram Newaj	Rajendra Prasad, A K Handa, Badre Alam & R H Rizvi	ICAR Network Project
4	NRMACAFRISO L201601100110	Development of Nursery of TBOs for Quality Planting Material Production	K B Sridhar	Naresh Kumar, Lal Chand & K Rajarajan	NMOOP MM-III Project
5	NRMACAFRISO L201700100111	Studies on Pollination Dynamics, Pod yield and oil content in <i>Pongamia pinnata</i>	Veeresh Kumar*		SERB- DST Project
6	NRMACAFRISO L201800100112	Mapping and Estimation of Area under Poplar based Agroforestry Systems in Indo- Gangetic Plains of India	R H Rizvi	A K Handa & K B Sridhar	ICAR- ICRAF Work Plan

# Inter Institutional and International Collaborative Project

S.	Project Code	Title of the Project	Leader	Associates	Funding
No.					Agency
1		Water requirement of	J B Singh,	Ramesh	Inter-
		grass based	IGFRI,	Singh,	Institutional
		intercropping system in	Jhansi	Mahendra	(IGFRI-
		semi-arid area		Prasad,	Jhansi)
				Amit Kumar	
				& Singh-	
				IGFRI, Jhansi	
2	NRMACAFRI	Enhancing	Ramesh	R K Tewari,	ICRISAT,
	SOP201100100	Groundwater Recharge	Singh	Inder Dev,	Hyderabad
	085	and Water Use	0	R H Rizvi ,	-
		Efficiency in SAT		R P Dwivedi,	
		Region through		K B Sridhar,	
		Watershed		Dhiraj Kumar	
		Interventions-Parasai-		&	
		Sindh Watershed, Jhansi		Mahender	

			Singh	
3	 FarmerFIRSTprogramme(FFP):ScalingupandintegrationintegrationoffoddertechnologiesinexistingfarmingsystemsustainablelivestockproductivityinBundelkhand	Purshotta m Sharma	Sunil Seth, S K Mahanta, Harsh Vardhan Singh, Mukesh Choudhary & <b>R P Dwivedi</b>	Inter- Institutional (IGFRI- Jhansi)
4	 Studies on pollination dynamics in berseem	Sanjay Kumar	Tejveer Singh & Veeresh Kumar*	Inter- Institutional (IGFRI- Jhansi)

•Associated upto 12<sup>th</sup> February, 2019

#### 4. SALIENT RESEARCH ACHIEVEMENTS

In ber based agri-horti system, the observations recorded on different characters (plant growth, pruned material and fruit) of ber were influenced significantly except canopy spread, stone weight, pulp/stone ratio and TSS. The study revealed that in most of the cases treatment  $T_1$  (Ber with 100% RDF) showed its superiority but at par with treatments  $T_7$  (Ber with 75% RDF + Trichoderma) and  $T_8$  (Ber with 75% RDF + Trichoderma + Black gram – Barley). Under these system, barley sown in *rabi*, 2017 and harvested during March, 2018. The observations revealed that treatments  $T_{10}$  (pure crop) and  $T_6$  (Ber with 75% RDF + VAM + Blackgram – Barley) recorded highest seed yield of 2395 and 2362 kg/ ha and was significantly higher as compared to other treatments. Black gram was grown in *kharif*, 2018 and observations revealed that the treatments  $T_{10}$  (pure crop) and  $T_6$  (Ber with 75% RDF + VAM + Black gram – Barley) recorded highest seed yield of 2395 and 2362 kg/ ha and was significantly higher as compared to other treatments. Black gram was grown in *kharif*, 2018 and observations revealed that the treatments  $T_{10}$  (pure crop) and  $T_6$  (Ber with 75% RDF + VAM + Black gram - Barley) recorded highest seed yield of 391 and 376 kg /ha and was significantly higher w.r.t. other treatments.

The experiment planned and executed in the field by planting lemongrass (vari. Krishna) in between the pomegranate plants at the spacing of 50x40cm. The experiment was designed in CRBD with two cultivars of pomegranate (V<sub>1</sub>- Ganesh & V<sub>2</sub>- Bhagwa), four levels of fertilizer (T<sub>1</sub>- Vermi-compost 30Kg/plant, T<sub>2</sub>- FYM 30Kg/plant, T<sub>3</sub>- T<sub>1</sub> + T<sub>2</sub>/plant and T<sub>4</sub>- Recommended doses of chemical fertilizers/plant) along with control (T<sub>5</sub>) of pure lemongrass. During July-August 2018 due to increase in tussock size, lemongrass spacing converted to 100x80cm by removing one tussock from between the two tussocks. Growth and fruit yield of pomegranate, lemongrass foliage and oil yield was recorded. In pomegranate, height ranged from 1.93 m (T<sub>3</sub>V<sub>2</sub>) to 2.76 m (T<sub>4</sub>V<sub>1</sub>), collar diameter from 5.48 cm (T<sub>2</sub>V<sub>2</sub>) to 7.77 cm (T<sub>1</sub>V<sub>1</sub>), East-West spread from 1.03 m (T<sub>2</sub>V<sub>2</sub>) to 1.54 m (T<sub>4</sub>V<sub>1</sub>) and North-South spread ranged from 1.02 m (T<sub>2</sub>V<sub>2</sub>) to 1.56 m (T<sub>4</sub>V<sub>1</sub>). However, fruit yield was ranged from 4.33 (T<sub>1</sub>V<sub>2</sub>) to 6.34 (T<sub>2</sub>V<sub>1</sub>). The cumulative yield from two cuts of lemongrass yielded 8.16 (T<sub>2</sub>V<sub>2</sub>) to 15.39 (T<sub>5</sub>) t/ha green leaves having oil 64.69 T<sub>3</sub>V<sub>2</sub> to 173.48 (T<sub>5</sub>) kg oil/ha on fresh weight basis.

The project entitled "Agroforestry based Conservation Agriculture for Sustainable Land use and Improved Productivity" consisted of three experiments *viz*. Bael based agroforestry system, Teak based agroforestry system and Bael + Teak based agroforestry system with 04 main plot treatments i.e., min. tillage-blackgram-mustard (CS-1); min. tillage-greengram-barley (CS-2); CT-blackgrammustard (CS-1) and CT-greengram-barley (CS-2) and 03 subplot treatments (with crop residue; without crop residue and with Leucaena (K-636) residue and are being conducted in split plot design. In Bael based conservation agriculture (CA) system, during *rabi* 2017-18, the seed yield of mustard varied from 806.3 kg /ha under minimum tillage (MT) to 815.4 kg /ha in conventional tillage (CT). The grain yield of barley ranged from 1406.6 kg /ha (CT) and 1393.5 kg /ha (MT) though were non-significant. During *kharif* 2018, the seed yield of blackgram recorded as 335.0 kg /ha (MT) and 342.0 kg /ha (CT). The seed yield of greengram was 379.3 kg /ha in MT plots and 387.5 kg /ha in CT plots.

In Teak based CA system, during *rabi* 2017-18, the seed yield of mustard varied from 720.5 kg /ha (MT) and 726.9 kg /ha (CT). The grain yield of barley recorded 1242.7 kg /ha in MT and 1257.6 kg /ha in CT main plot system. During *kharif*, 2018, the seed yield of blackgram varied from 312.6 kg /ha in MT to 315.8 kg /ha in CT plots, though non-significant. Seed yield of greengram was recorded as 365.0 kg /ha (MT) and 375.0 kg /ha (CT), though non-significant.

In Bael + Teak based CA system, during *rabi* 2017-18, the seed yield of mustard recorded 787.8 kg /ha in CT plots and 778.9 kg /ha in MT plots. Further, the grain yield of barley ranged from 1316.8 kg /ha in CT to 1327.3 kg /ha in MT main plot treatments. During *kharif* 2018, the seed yield of blackgram varied from 277.3 kg /ha in MT to 282.7 kg /ha in CT. Similarly, seed yield of greengram ranged from 390.0 kg /ha in MT to 396.0 kg /ha in CT though were non-significant. Among the residue treatments, crop residue retention had performed better as compared to other treatments in almost all of the experiments.

Further, the growth parameters (DBH and height) of both teak and bael were found to be nonsignificant though, maximum height and DBH of bael recorded 2.54 m and 47.69 mm, respectively. However, in case of teak, the corresponding values were 4.18 m and 57.16 mm

In Agroforestry based Integrated Farming System (AF-IFS) survival in guava is about 99% and collar diameter ranges from 1.0 to 5.0 cm. Most of the Guava plant started bearing after a year of planting and during this year fruit yield varied from 1.0 to 8.0 kg per plant with 5 to 20 fruits per plant. There were 45 papaya plant (var. Pusa dwarf) under fruiting and they yielded about 10 to 15 kg fruit per plant. Most of the plants were died due to heavy rain during 2018. Gap filling of papaya plants was done after making raised bed with var. Arka Surya and Arka Prabhat in month of September, 2018. Survival in mango and teak was reduced after a year of plantation and efforts are being made to refill the gap through in-situ grafting of mango.

During *rabi*, 2017-18, pea was grown in 0.9 ha area, in which the yield of green pod was very poor. Winter maize was also tried in 0.10 has area and performance of winter maize was excellent and it produced about 3500 green cobs, which was sold in ` 17500 @`5/cob. During summer, bhindi, pumpkin and bottle gourd was grown as intercrop with maize in 0.25 ha and it gave ` 9540 as net income with B:C ratio of 1.54.

Differential responses in clonal plants and seedlings of *Pongamia pinnata* in field have been observed with reference to their adaptability. Clonal plants maintained better physiological efficiency during dry hot season indicating its better adaptive potential than seedling plants.

A trend of thermotolerance dynamics of *Azadirachta indica* (Neem) and *Albizia procera* (Safed siras) has been observed in temporal and seasonal scale and it requires for further confirmation for thermotolerance indices like CTD and CCI.

The value for carbon sequestered by poplar plantations in Yamunanagar district was estimated on the basis of area under agroforestry and different age of poplar plantations. This was taken as 5, 10, 20, 30 and 35 percent for 3, 4, 5, 6 and 7 years old plantations, respectively on the basis of field survey conducted in the study area. The total carbon stock and  $CO_2$  sequestered from poplar would be about 1.36 million t and 4.99 million t CO2 e for total poplar plantation in Yamunanagar. The total value of  $\cdot$  1663 million was estimated for carbon sequestered by poplar plantation in the district during 7 year of life cycle and `238 million in a year. It implies that the payment of ecosystem services (regulating) in terms of carbon sequestered by poplar plantation is substantial and it encourages farmers to adoption agroforestry in big way.

At ICAR-CAFRI, Jhansi, the main aim of ICAR Network Project "Harvesting, Processing and Value Addition of Natural Resins and Gums" is to develop agroforestry models including gumand resin-yielding trees for livelihood security and horizontal dissemination of technologies. During year under report, maintained and managed agroforestry models established at research farm and recorded data on growth of tree, gum exudation and yield of intercrops (mustard and moong). Total biomass study (above- and below-ground) revealed that three years old Acacia senegal accumulates 27.36 kg biomass per tree with root: shoot ratio of 0.139. The observations on cation exchange capacity (CEC) of roots revealed that the fresh root CEC of A. senegal was more than that of wheat (intercrop), which poses strong competition for nutrient cations in tree rhizosphere zone. Natural gum exudation from A. senegal ranged from 16.52-37.63 g/tree whereas, Acacia nilotica ranged from 3.64-28.3 g/tree. Gum tapping techniques with use of gum inducer (ethephon) in Anogeissus pendula was standardized. The ITK information on gum tapping and their uses was collected by surveying tribal dominated areas in Tikamgarh (two villages) and Jhansi districts (one village). During the rainy season of 2018, four bio-fence models were developed at Institute research farm, wherein A. senegal along with Carissa carandas were planted in single and double rows. Besides, frequent visits were made to villages to motivate the farmers for planting agroforestry models on their farms. About 3000 seedlings of A. senegal (gum-arabic) and 1000 seedling of fruit plants were distributed to farmers for planting on their fields.

Quantification of Carbon Sequestration potential (CSP) in agroforestry system has been completed in 17-States (Karnataka, Odisha, Bihar, Andhra Pradesh, Maharashtra, Himachal Pradesh, Tamil Nadu. Madhya Pradesh, Uttar Pradesh, Punjab, Haryana, West Bengal, Chhattisgarh, Rajasthan, Gujarat, Telangana and Jharkhand) covering 58 districts. Carbon Sequestration potential in agroforestry system existing on farmers' field varied from 0.11 to 0.82 tons C per hectare per year in these states. The maximum CSP of agroforestry system is observed in Maharashtra followed by Andhra Pradesh and Himachal Pradesh.

The assessment of carbon sequestration potential (CSP) was undertaken in two districts (East Godavari and Vizianagaram) of Andhra Pradesh. Tree density under agroforestry existing on farmers' fields in two districts of Andhra Pradesh (East Godavari and Vizianagarm) varied from 44.22 to 47.32 tree /ha. In these districts, fast growing trees are more than medium growing trees. The population of slow growing trees are very less. Overall, the tree population in agroforestry system in different states is about 17.8 trees /ha. The maximum tree density (41 trees/ha) is recorded in Maharashtra followed by Andhra Pradesh and Himachal Pradesh.

Mapping of agroforestry area in 12 agro-climatic Zone has already been completed. Total area under agroforestry in 12 zone was estimated to be 23.25 million ha of total geographical area (267.66 million ha). During year under report, mapping was done in agro-climatic zone (11). Agroforestry area in zone 11 is 2.36 million ha of total geographical area 20.21 million ha.

Developed clonal propagation techniques in *Bambusa vulgaris* for mass production of seedlings and established Clonal Mother Garden. Indoor and outdoor Standardization of mini cutting protocol in selected industrial trees was carried out. Standardized propagation protocol for *Eucalyptus tereticornis, Casuarina junghuhniana, Melia dubia* and *Populus deltoids.* Seedlings of different trees were distributed to farmers for planting. Promoted *Melia dubia, Casuarina jungunina* and *Santalum album* plantations for the first time in Bundelkhand region of Central India.

Flowering phenology of *Pongamia pinnata* indicated that the flower appeared to be adapted for cross-pollination. Anthesis was between 0800 and 1000 h, with a peak between 0800 to 0830 h. Pollen germination was noticed throughout the day but maximum pollen germination was at the time of anthesis (96.15%) and continued up to 1200 h (92.21%) and after 1200hr germination percentage

was reduced. Stigma was receptive for eight hours after anthesis. A total of 13 different flower visitors have been recorded.

In Indo-Gangetic region, Poplar species based agroforestry systems are prevalent in Punjab, Haryana, western Uttar Pradesh, Uttarakhand and Bihar. Mapping and estimation of area under some sample districts were selected from Punjab, Haryana, Uttar Pradesh, Uttarakhand and Bihar where Poplar is dominant. For district level, mapping of Poplar area has been done using LISS-4 data. Poplar based agroforestry systems accounted for more than 50 percent of total agroforestry area in Rupnagar and Hoshiarpur districts. In Yamunanagar district of Haryana, Poplar area was estimated to be 12169.66 ha (9.71%). This poplar area accounted for about 74.7 percent of total agroforestry area in the district. In western Uttar Pradesh, Poplar area was found maximum in Saharanpur district (25911.23 ha), which is 7.17 percent followed by Bijnor district (12840.53 ha). Poplar mapping at state level was also done with Sentinel-2A data using the methodology described above. Estimated area under Poplar species was found to be 0.276 million ha (5.63%) with a reasonably good accuracy of 81 percent. Similarly, area under Poplar species in Haryana state was estimated, which come out to be 0.205 million ha (4.66%) with an accuracy of 85.2 percent. In case of Yamunanagar district of Haryana, where Poplar based agroforestry is very predominant, density varies from 540 to 1560 trees /ha. DBH was found in the range of 13.96-22.71 cm. Estimated stem and aboveground biomass come out to be 103.05-213.48 kg/tree and 118.55–268.67 kg/tree, respectively.

The survival of the teak and mahagoni after two year of transplanting were observed to be 91 and 82%, respectively in silvipastoral system in semi-arid conditions. After two year of planting, maximum height and collar diameter of teak and mahagoni were recorded in treatment having teak+ mahagoni+ pasture+ contour staggered trenches. Second cut of pasture was taken in September, 2018. It was found that height of *Cenchrus ciliaris* and *S. seabrana* varied between 127 cm to 152 cm and 80 cm and 102 cm, respectively. Similar trends were observed in other growth parameters of *C. ciliaris* and *S. seabrana*. Soil moisture dynamics in different treatments were studied at 15 days interval and it was found that highest soil moisture content was recorded in T7- Teak + Mahagoni + Pasture + Contour Staggered Trenches (CST). After first rainy season, the contour staggered trenches (CST) and half-moon basin (HMB) trapped soil sediments at the rate of 38.30 t / ha and 7.644 t/ha, respectively. The corresponding values for second rainy season were 15.25 and 3.19 t /ha.

In *Hardwickia binata* based AFS, during summer season, the fine root biomass (FRB) varied from 21. 5 g/m<sup>2</sup> in 75-90 cm soil depth to 89 g/m<sup>2</sup> in 45-60 cm at 0.5 m distance from tree base. Similarly, at 3m distance from tree base, it varied from 8.8 g/m<sup>2</sup> at 75-90 cm depth to 50 g/m<sup>2</sup> at 30-45 cm depth. In aonla based AFS, FRB varied from 1.57 g/m<sup>2</sup> at 75-90 cm depth to 15.4 g/m<sup>2</sup> at 30-45 cm depth at 0.5 m distance from tree base. Contrary to this, at 3m distance from tree base, FRB ranged from 0.3 g/m<sup>2</sup> at 15-30 cm depth to 5.6 g/m<sup>2</sup> at 30-45 cm depth.

During winter season, in *Hardwickia binata* based AFS, at 0.5 m distance from tree base, FRB varied from 30.8 g/m<sup>2</sup> at 60-75 cm depth to 110 g/m<sup>2</sup> at 15-30 cm soil depth. At 3m distance from tree base, FRB ranged from 34.8 g/m<sup>2</sup> at 45-60 cm depth to 93.75 g/m<sup>2</sup> at 15-30 cm depth. However, in aonla based AFS, FRB showed 0.48 g/m<sup>2</sup> at 60-75 cm depth to 47.7 g/m<sup>2</sup> at 30-45 cm depth at a distance of 0.5 m from tree base. At 3m distance, it varied from 0.33 g/m<sup>2</sup> at 30-45 cm depth to 38.17 g/m<sup>2</sup> at 15-30 cm depth, respectively. There are around 50-60% of the fine root biomass belongs to 0-45 cm soil depth in both the agroforestry system studied.

# 5. SCIENTIFIC, OFFICERS AND OTHER STAFF MEMBERS OF ICAR-CAFRI, JHANSI AND THEIR DUTIES

S. No.	Name	Designation	Duties
	Scientific		
1	Dr. R. K. Tewari	Pr. Scientist &	Conduct the research as given in ongoing
		Programme Leader	projects and monitoring all activities of Social
		(HRD, Technology	Science, watershed management. OIC
		Transfer & Refinement).	(Technical Cell).
2	Dr. Ram Newaj	Pr. Scientist &	Conduct the research as given in ongoing
		Programme Leader	projects and monitoring all activities of the
		(Natural Resource and	programme.
		Environment	
		Management)	
3	Dr. A. K. Handa	Pr. Scientist &	Conduct the research as given in ongoing
		Programme Leader (Tree	projects, Looking all the activities of AICRP
		Improvement, Post-	on Agroforestry & Chairman of IPR Unit and
		Harvest & Value	monitoring all activities of the programme.
		Addition)	
4	Dr. Rajendra	Pr. Scientist (Soil	Conduct the research as given in ongoing
	Prasad	Science)	projects.
5	Dr. Ajit	Pr. Scientist (Agril.	Conduct the research as given in ongoing
		Statistics)	projects.
6	Dr. Sudhir Kumar	Pr. Scientist	Conduct the research as given in ongoing
		(Horticulture)	projects.
7	Dr. R. P. Dwivedi	Pr. Scientist (Agril.	Conduct the research as given in ongoing
		Extension)	projects.
8	Dr. Inder Dev	Pr. Scientist (Agronomy)	Conduct the research as given in ongoing
			projects, Head of Office and Chairman Farm
			Management Committee.
9	Dr. Badre Alam	Pr. Scientist (Plant	Conduct the research as given in ongoing
		Physiology)	projects and Act as CPIO.
10	Dr. (Er.) Ramesh	Pr. Scientist (SWE)	Conduct the research as given in ongoing
	Singh		projects and OIC (Security).
11	Dr. R. H. Rizvi	Pr. Scientist (Computer	Conduct the research as given in ongoing
		Application)	projects and OIC (ARIS Cell).
12	Dr. Mahendra	Sr. Scientist (Agriculture	Conduct the research as given in ongoing
	Singh	Economics)	projects.
13	Dr. Naresh Kumar	Sr. Scientist	Conduct the research as given in ongoing
14		(Agrotorestry)	projects.
14	Dr. K. B. Sridhar	Scientist (Forestry)	Conduct the research as given in ongoing
1.5			projects.
15	Shri K. Rajarajan	Scientist (Genetics &	Conduct the research as given in ongoing
1(		Plant Breeding)	projects.
10	Dr. Chavan	Scientist (Forestry)	Conduct the research as given in ongoing
17	Sangram Bhanudas		projects.
17	Dr. Asna Kam	Scientist (Agronomy)	Conduct the research as given in ongoing
10		$\mathbf{C}$ -invariant $(\mathbf{E}_{\mathbf{r}}, \mathbf{t}_{\mathbf{r}})$	projects.
18	Sn. A K Uthappa	Scientist (Forestry) (on	Conduct the research as given in ongoing

		Study Leave)	projects.
19	Dr. Dhiraj Kumar	Scientist (Soil Science)	Conduct the research as given in ongoing
	U U		projects.
20	Sh. Lal Chand	Scientist (Fruit Science)	Conduct the research as given in ongoing
			projects.
21	Sh. Hirdayesh	Scientist (Genetics &	Conduct the research as given in ongoing
	Anuragi	Plant Breeding)	projects.
22	Sh. Sukumar Taria,	Scientist (Plant	Conduct the research as given in ongoing
	Scientist (Plant	Physiology)	projects.
	Physiology)		
23	Sh. R. Vishnu	Scientist	Conduct the research as given in ongoing
		(Agroforestry)	projects.
24	Ms. Alka Bharti	Scientist (Agril	Conduct the research as given in ongoing
		Biotechnology)	projects.
25	Y N Venkatesh	Scientist (Agril.	Conduct the research as given in ongoing
		Entomology)	projects.
26	<b>Technical</b>	Chief Technical Off	Drovide summer to recent and OIC (I 1
20	SIITI B. Singh	(Form Monoger)	Flowide support to research and OIC (Legal
27	Dr. Doioou Timori	(Farm Manager)	Cell). Managa all the activities related to DME Cell
21	Dr. C. K. Poinoi	Chief Technical Officer	Manage an the activities felated to PME Cell.
20	DI. C. K. Dajpai	Ciller recillicat Officer	related to farm and campus development
29	Dr. A. Datta	Assistant Chief T.O.	Manage all the activities related to estate and
			provide support to tree breeding research.
30	Shri Sunil Kumar	Assistant Chief T.O.	Provide support to agronomical research.
31	Shri Rajendra	Assistant Chief T.O.	Provide support to watershed experiments and
	Singh		outreach programmes. DDO & OIC
			(Rajbhasha)
32	Shri Rajesh	Sr. Technical Officer	In-charge of Photography Unit and
	Srivastava	(Art & Photo)	Conference and Auditorium Halls. Facilitate
			all the activities related his unit.
33	Shri R. K. Singh	Sr. Technical Officer	Support the activities of Watershed
			experiments and soil water conservation
			experiments and look after security
24	Chriff D.C. Vaday	Tashrical Officer	Surgement of the Centre.
34	Shri S.P.S. Yadav	Technical Officer	support the activities of watershed
35	Shri Ram Bahadur	Technical Officer	Support the activities related to estate
36	Sh Ajay Kumar	Technical Officer (on	Provide support to agroforestry research
50	Pandev	Study Leave)	Trovide support to ugroforestry research.
37	Km. Shelia	Technical Assistant	Manage all the activities related to Library.
0.	Tamrkar		
38	Shri Het Ram	T-3 (Driver)	Act as a Tata Sumo Jeep Driver.
39	Shri Kashi Ram	T-3 (Driver)	Act as Bus Driver.
40	Shri Prince	T-2 (Mechanic)	Maintenance of tractors and farm implements.
	Administrative		· •
41	Sh. J. L. Sharma	AO	Head of Office and In-Charge store section
			and manage all the administrative activities
42	Shri S. B. Sharma	AF&AO	Auditing all the files related to finance matter
			and manage financial budget.
43	Shri Birendra	AAO	OIC (Vehicle) and manage all the activities of

	Singh Tomar		administrative as well as store section.
44	Shri A. K. Chaturvedi	PS to Director	Manage all the activities of Director's.
45	Shri Hoob Lal	РА	Typing of documents given by scientists and administrative section.
46	Shri Om Prakash	РА	Typing of documents given by scientists and and also doing all the work of Hindi Cell.
47	Shri. Mahendra Kumar	Assistant	Dealing all the matters related to establishment and recruitment.
48	Shri Jai Janardan Singh	Assistant	Dealing all the matters related to DDO Section
49	Shri. Deepak Vij	Stenographer (Grade-III)	Typing of documents given by scientist and technical and dealing all the matter related to establishment section.
50	Shri Tridev Chaturvedi	Stenographer (Grade-III)	Typing of documents given by Stores Section.
51	Shri. Vir Singh Pal	Sr. Clerk	Dealing all the matters related to Stores Section
52	Smt. Kaushalya Devi	Jr. Clerk	Dealing all the matters related to Audit Section.

## 6. STAFF WELFARE ACTIVITIES

For the welfare of the staff various committees have been constituted like Institute Joint Staff Council (IJSC), Women Cell, SC/ST Cell and PIO Cell.

#### **INSTITUTE JOINT STAFF COUNCIL**

The Director has constituted new Institute Joint Staff Council (IJSC) for the period 2019-21 at the Institute.

#### SC/ST Cell

The SC/ST Cell has been constituted to (i) Ensure compliance of office orders of reservation issued from time to time in favour of SC/ST employees and (ii) assist the Liaison Officer to discharge his duties effectively.

#### Women Cell

As per the guidelines of the ICAR, New Delhi, and norms laid down by the Hon' ble Supreme Court, a Women Cell has been constituted at the Institute.

#### Constitution of ITMU, MIIC & ITMC Cell

ICAR-CAFRI has constituted Intellectual Property Right (IPR) Cell, Institute Technology Management Unit (ITMU), Market Intelligence & Information Cell (MIIC) and Institute Technology Management Committee (ITMC) to give cutting edge to technologies and assess market trends at local, regional, national as well as international level.

7.	Budget (2018-19)	
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			(`in Lakhs
S. No.	Head	Budget	Expenditure
1.	ICAR-CAFRI, Jhansi		
	a. Capital (grant for creation of Capital Assets)	60.47	60.45
	b. Establishment Expenses (Grant in Aid-Salaries)	874.59	874.57
	c. Grant in Aid-General. Pension Benefits	48.00	47.03
	d. General	215.64	213.97
	Total	1198.70	1196.02
	Plan Schemes		
2.	All India Coordinated Research Project on	1566.92	1566.32
	Agroforestry(AICRAF)		
3.	Harvest and post-harvest processing and value	16.00	15.83
	addition of natural resins, gums and gum resins		
	(HPVA; ICAR, New Delhi)		
4.	Assessment of carbon sequestration potential of	34.78	31.16
	agroforestry systems (NICRA, ICAR, New Delhi)		
5.	IP&TM	4.50	3.86
6.	Externally Funded Projects		
	Mapping and Estimation of Area under Poplar based	7.64	7.34
	Agroforestry Systems in Indo- Gangetic Plains of		
	India (ICAR- ICRAF Workplan)		
	Doubling farmers' income in Bundelkhand, UP	32.51	1.82
	(ICRISAT)		
	Establishment of Teak and Aonla based	4.81	0.38
	Agroforestry System in Datia district on agricultural		
	land (Consultancy project of Bundelkhand Agro)		
	Establishment of Hi Tech Nurserv for the	28.01	5.83
	Production of Ouality Planting Material (U.P.		
	Agroforestry Mission)		
	National Mission for Sustaining the Himalayan	14.96	5.86
	Ecosystems (NMSHE- Taskforce 6 for Himalayan		
	Agriculture)(DST)		
	Development of Nursery of TBOs for Quality	5.80	5.76
	Planting Material Production (NMOOP MM-III)		
	Studies on Pollination Dynamics Pod vield and oil	13.04	5 19
	content in <i>Pongamia pinnata</i> (SERB-DST)	10101	0117
	Resource Generation	Target	Achievement
		19.70	22.19
	Expenditure as incurred on Swachhata Action Plan		6.74
	SC SP Fund	1	5.7 1
	Capital	20.00	1 37
	General	20.00	12.65
	- Ovnorun	1	14.00

# 8. Other Information Important Meetings / Activities

#### **Participation in International Training**

Dr. Asha Ram, Scientist (Agronomy), Dr. Dhiraj Kumar, Scientist (Soil Science) and Dr. Veeresh Kumar, Scientist (Entomology) participated in 5 days International Training on *"Introduction course in meta-analysis"* at the World Agroforestry Centre (ICRAF) in Bogor, Indonesia during August 27-31, 2018. The Agriculture for Food Security 2030 - AgriFoSe2030 programme, a Swedish initiative conducted the training for 30 young Asian researchers.

#### Tree plantation and vermicomposting activities at military station Talbehat

As per request of army commander of Talbehat Military station, team of CAFRI scientists (Dr. Anil Kumar, Dr. Rajendra Prasad, Dr. Sudhir Kumar, Dr. Inder Dev, Dr. K.B. Sridhar, Dr. Asha Ram and Sh. Lal Chand) visited Talbehat Military station during July, 2018. Presentations were made on nursery raising, vermicomposting, pit filling techniques, packages of practices for trees and benefits of agroforestry to the army officers and soldiers. The scientists also visited whole military area for identification of suitable sites for plantation. The two members of the team (Dr. Asha Ram and Sh. Lal Chand) suggested management practices in mango and aonla orchards during their subsequent visits.

#### **Foundation Day**

ICAR- CAFRI, Jhansi celebrated its 30<sup>th</sup> Foundation Day on 8<sup>th</sup> May, 2018. Dr. Alka Bhargava, Joint Secretary, National Agroforestry & Bamboo Mission (NABM), Department of Agriculture and Cooperation, Ministry of Agriculture and Farmers Welfare, Govt. of India, Krishi Bhawan, New Delhi was the Chief Guest of the function.

## Farmer's Workshop

A Farmers' Workshop entitled "Bundelkhand Main Bans Ke Kheti Ke Sambhavna" was also organized. The workshop was organized in collaboration with World Agroforestry Centre, South Asia Regional Office, New Delhi, ISAF, Jhansi and ICAR-CAFRI, Jhansi. About 120 farmers from U.P. & M.P. participated in the workshop. Three progressive farmers were honoured for adopting Bamboo based Agroforestry technologies and setting example for other farmers in the Bundelkhand region.

## **ICAR-ICRAF Work Plan**

Under ICAR-ICRAF work plan ICRAF-Odisha staff (5<sup>th</sup> -7<sup>th</sup> September, 2018) and officials from AgriFose2030 (Sweden) and ICRAF, New Delhi (18<sup>th</sup> & 19<sup>th</sup> September, 2018) visited the Institute.

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## World Soil Day

World Soil Day cum Farmers' workshop on 05.12.2018 was organized at ATIC conference hall of the institute. The chief guest of the programme was Smt. M. Arun Mozhi, IAS Joint Magistrate, Jhansi. On the occasion, an exhibition on importance of soil health cards and agroforestry technologies were also organized. The programme was attended by 265 participants of which 110 farmers from 7 districts of Bundelkhand (Jhansi, Jalaun, Lalitpur, Mahoba, Hamirpur, Banda and Chitrakut), 55 students of RLBCAU, Jhansi and all staff members of CAFRI, Jhansi, NGOs people, ICAR institutes and state line departments.

Date & Place	Training Programme	No. of Farmers
Six three days training at ICAR-CAFRI, Jhansi	Livelihood Security through Agroforestry, organic farming and watershed interventions for farmers and field functionaries of Bundelkhand region under PMKS Y-Watershed Development, State Level Nodal Agency, Govt. of U.P., Lucknow	180 farmers
15-17 May, 2018	Ber Pruning	20 farmers
Village-Hastinapur, Block-		
Babina, District-Jhansi (U.P.)		
23 to 24 July, 2018	Ber Budding	39 farmers
Village-Hastinapur,		
Ganeshgarh District-Jhansi		
(U.P.)		
25 July, 2018	Ber Budding	27 farmers
Village- Shivrampur, Dabar		
District-Tikamgarh (M.).		

#### **Farmers Training Programme**

Kisan Mela, Kisan Diwas, Krishak Gosthi, Krishak Karyashala and Van Mahotsav Organized:

- CAFRI, Jhansi (U.P.) 08.05.2018, Kisan Mela and Krishak Karyashala Foundation day.
- Van Mahostav evam vriksharopan village-Ishagarh, block-Babina, district-Jhansi on 06.07.2018 (26 farmers).
- Van Mahostav evam Krishivaniki pradarshani ICAR-CAFRI, Jhansi on 24.08.2018 (Scientific, Technical, Administrative and Supporting staff of CAFRI, Jhansi).
- CAFRI, Jhansi, Vishwa Mrada Diwas evam Krishak Karyashala (World Soil Day and Farmers' Workshop) on 05.12.2018.
- Kisan Diwas at Village-Hastinapur Block-Baragaon, District-Jhansi (U.P.) on 23.12.2018 (Sunday) on the occasion of Birth day of Former Prime Minister Late Sh Chaudhary Charan Singh. The programme was organized in collaboration with ICAR-IISWC Regional Centre Datia.

Dete	Due que mune	Diagon	
Date	Programme	Places	
27 February, 2018	Unnati Krishi Mela	ICAR-IGFRI, Jhansi (U.P.)	
5-6 March, 2018	Rajya Stariya Kisan Mela	NDUAT, Kumarganj, Faizabad	
		(U.P.)	
16-18 March, 2018	Krishi Unnati Mela	ICAR-IARI, New Delhi	
8 May, 2018	Kisan Mela and Krishak	ICAR-CAFRI, Jhansi (U.P.)	
	Karyashala Foundation day		
24 August, 2018	Van Mahotsav day	ICAR-CAFRI, Jhansi (U.P.)	
10 October, 2018	Divisional Rabi Productivity	Bundelkhand University	
	Gosthi	Auditorium, Jhansi	
26-28 October, 2018	Krishi Kumbh	ICAR-IISR, Lucknow	
01 November, 2018	Krishi Takniki Pradarshani	ICAR-IGFRI, Jhansi	
	evam Kisan Mela		
05 December, 2018	World Soil Day and Farmers'	ICAR-CAFRI, Jhansi	
	Workshop		
23 December, 2018	Kisan Diwas on the occasion of	Village-Hastinapur Block-	
	Birth day of Former Prime	Baragaon, District-Jhansi (U.P.)	
	Minister Late Sh Chaudhary		
	Charan Singh in collaboration		
	with ICAR-IISWC Regional		
	Centre Datia (M.P.)		

#### **Exhibitions Organized**

#### MGMG programme

During August 2018, a total No. of 1930 saplings of different species viz. Kumat, Karonda, Lemon, Guava, Bamboo and Teak were palanted under MGMG programme at different cluster of villages in Bundelkhand region. The details of plantation done in different clusters is as under.

- Kumat (400), Karonda (25), Lemon (100) and Guava (25) were palanted at Parasai, Chhatpur, Bachhauni villages.
- Bamboo (200), Kumat (600), Citrus (100) and Karonda (20) were planted at Garhkundar, Dabar, Sakuli, Shivrampur villages.
- Kumat (30), Bamboo (10), Citrus (10) and Karonda (10) were planted at Domagor, Dhikoli, Nayakhera villages.
- Bamboo (280) was planted at Hastinapur, Karari, Rund Karari villages.
- Teak (20) and bamboo (100) were planted at Ganesh Garh, Dev Garh, Ramgarh villages.

## Swachh Bharat Abhiyan

- On eve of Mahatma Gandhi Birth Anniversary (2<sup>nd</sup> October) awareness programmes were organized. A debate on Swachh Bharat Abhiyan was also organized in which all the staff members participated.
- Various awareness programmes on cleanliness were organized during 17<sup>th</sup> to 30<sup>th</sup> October, 2018. During this period, awareness campaign in eight villages were organized besides various activities eg. Slogan, eloquance competitions etc. at the Institute.
- A fortnight long *Swachhata Pakhwada* (16-31 December, 2018) was organized at ICAR-CAFRI, Jhansi. Cleanliness drive programmes have also been organized in the

Institute campus as well as in different villages. The events were widely covered in various newspaper.

# Expectation of public authority from the public for enhancing its effectiveness and efficiency;

During farmers fairs generally conducted at village levels, maximum farmers should take part in the fairs and tell their problems. So research should be conducted in solving the problems upto their expectations.

#### Arrangements and method made for seeking public participation/ contribution Mechanism available for monitoring the services delivery and employee of the organization.

Farmers fairs are conducted at village levels regularly besides at the centre. A special cell has been established to interact with farmers and public. Regular messages are sent through All India Radio Station and Door Darshan. Director is accessible easily to interact with outside persons to solve their problems .

# Mechanism available for monitoring the services delivery and employee of the organization.

S.	Name / Title	Rules
INO.	D 1 1 1	
1	Purchasing procedure	Following Government of India Manuals
		and circulars as well as ICAR, New Delhi
		circulars
2	Recruitment	-do-
3	Promotion of Scientific staff	-do-
4	Promotion of non-scientific	-do-
	staff	
5	Other financial rules	-do-
6	From where one can get a copy	Director's cell, and Administrative Unit
	of rules, regulation,	Telephone No. 0510-2730214
	instructions, manuals and	Fax. No. 0510-2730264
	records	dirnrcaf@icar.org.in
7	Fee charged	Rs. 2/per page

Regular meetings are held to review the progress given to various officers and staff members. Director remain the chairman of almost all the meetings

Whether there is any provision to seek consultation/participation of public or its representatives for formulations of policies? If there is, please provide details of such policy

S. No.	Subject	Is mandatory to ensure public participation	Arrangement for seeking public participation
1.	Research projects	Mandatory. finalized in presence of public representatives	Calling in IMC and RAC meetings

VIII:

*Appellete Authority* Dr. Anil Kumar, Director(A) Phone (O): 0510-2730213 Extn. 226, 0510-2730214 Fax: 0510-2730364

Public Information	Asstt. Public	
Officer	Information Officer	Transparency Officer
Dr. Rama Kant Tewari, Principal Scientist (Research Related Matters) Phone (O): 0510-2730213 Extn. 246, 0510-2730214	Sh. R.K. Singh , Asstt. Cheif Technical Officer Phone (O): 0510-2730213 Extn. 257, 0510-2730214 Fax: 0510-2730364	Dr. R.H. Rizvi, Senior Scientist Phone (O): 0510-2730213 Extn. 203, 0510-2730214 Fax: 0510-2730364
Fax: 0510-2730364		
Shri J.L. Sharma,		
Administrative Officer (For		
Administrative Matters)		
Phone (O): 0510-2730213		
Extn. 207, 0510-2730214		
Fax: 0510-2730364		

IX. Following Secretariat manual to take decisions for various maters

X. Followed the procedure la id down by Government of India

XI. By sending the letters to individuals, attach on website, publish in Centre News Letters, attach one on notice board.

XII. Head quarter i.e. ICAR, New Delhi. In some cases state authorities

XIV. Director of the Centre and Director General of ICAR, New Del hi

XVI .Given above

# XVII .Given above

XXI. Given in ongoing projects list

XXII. Given above

# XXIII. Reply is give within 15 days of date of receipt of letter