PROCEEDINGS OF XXII[®] RESEARCH ADVISORY GROUP (RAG) MEETING [15 September 2021]







हिमारूयन वन अनुसंधान संस्थान HIMALAYAN FOREST RESEARCH INSTITUTE (भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद) (Indian Council of Forestry Research & Education)

(पर्यावरण एवं वन मंत्रालय, भारत सरकार की एक स्वायत्त परिषद) (An Autonomous body under the Ministry of Environment, Forests & Climate Change, Government of India)

कोनिफर कैम्पस, पंथाघाटी, शिमत्व-1710 13 (हिमाचरू प्रदेश) Conifer Campus, Panthaghati, SHIMLA-171 013 (Himachal Pradesh)

BACKGROUND

Management of natural resources aims at arresting the decline of forest degradation vis-à-vis improving the ecosystem services. The integration of 17 Sustainable Development Goals (SDGs) recognizes that action in one area affects the outcomes in other and the development must balance social, economic and environmental sustainability. Involvement of different stakeholders for management of natural resources and institutional support to integrate scientific endeavours becomes mandatory. *Indian Council of Forestry Research & Education* (ICFRE) has formulated **National Forestry Research Plan (NFRP) 2020-30** with structural changes in its **Research Advisory Group (RAG)** and **Research Policy Committee (RPC)** at **Institute** and **Council** level with focus on innovativeness and objectivity in its research proposals linked with quantifiable output and outreach programmes.

Himalayan Forest Research Institute (HFRI), Shimla is also making all out efforts in conceptualizing demand driven proposals duly vetted by the members of its Research Advisory Group (RAG), involving different stakeholders for strengthening *forestry research* within the mandated thrust areas and themes. The two stage deliberation of the experts (Institute and Council) on the research proposals is expected to help the Forest Departments of the State and Union territories in sustainable management of their natural resources.

ROLE OF RESEARCH ADVISORY GROUP (RAG)

The RAG is an institute-based research Project Evaluation Committee to evaluate the research projects for their fitness to carry out high quality research within the overall mandate of the institute and ICFRE. RAG is mandated to give direction and bring innovations in the proposed research proposals by the institute. Its role is critically important, particularly to consider and advise on regional research requirements of the mandated State and Union Territories of the institute, review the progress of ongoing projects, evaluate, prioritize and recommend new research proposal to **Research Policy Committee (RPC)**.

FUNCTIONS OF RESEARCH ADVISORY GROUP (RAG)

The main functions of **RAG** are to:

- provide direction in *forestry research* of the Institute within overall framework of research priorities set by *ICFRE*
- technically evaluate project proposals for their high quality within the overall mandate of the institute and recommend only those projects for Research Policy Committee of *ICFRE* which are found suitable to be funded from ICFRE plan funds

- critically examine the monitoring parameters and deliverables that can be achieved during and at the end of the project to ensure effective monitoring and evaluation
- > recommend the proposed standalone projects to be included in the AICRPs
- > propose the projects to be taken up under funding from other sources
- > approve modifications proposed by the institute in the ongoing projects
- carry out any other function related with forestry research assigned by the institute from time to time

COMPOSITION OF RESEARCH ADVISORY GROUP (RAG)

On the recommendations of Director, Himalayan Forest Research Institute, Shimla, the following **Research Advisory Group (RAG)** for the Institute involving different stakeholders has been approved by the Director General, *ICFRE*.

S.	Name	Designation	Address								
No.											
A.	Chairman-Director of t	he Institute									
1.	Dr. S.S. Samant	Director	Director, Himalayan Forest Research Institute, Conifer Campus, Panthaghati, Shimla – 171 013, H. P. Phone: 0177-2626778 (O) 98163 16318 (M) Email: <u>dir hfri@icfre.org</u>								
В.	Head of the Research Wing of the Forest Departments of Concerned States or their Representatives										
B-1.	Himachal Pradesh										
1.	Dr. Sanjay Sood, IFS	APCCF	Himachal Pradesh Forest								
		(Research &	Department, Karnodi, Sunder Nagar,								
		Training)	District Mandi (H.P.)								
			Phone: 01907-264113 (0)								
			94180-00240 (M)								
			Email: <u>rt.apccf@gmail.com;</u>								
			sanjaysoodifs@gmail.com								
B-2.	Jammu & Kashmir Unio	on Territory									
1.	Sh. Asaf Mahmood, IFS	Director	The Director, State Forest Research								
			Institute, SFRI Complex, Sonwar,								
			Near Woodland School, Srinagar								
			(J&K UT)								
			Phone: 0194-2465213,								
			2468820(0)								
			99069-09051								
		•-	Email: <u>directorsfri123@gmail.com</u>								
B-3 .	Leh Ladakh Union Terr	itory									

LIST OF MEMBERS OF RESEARCH ADVISORY GROUP (RAG)

1.	Sh. Preetpal Singh,	CCF	Chief Conservator of Forest,			
	IFS		Leh Autonomous Hill Development			
			Council (LAHDC), Leh, Ladakh UT			
			Email: ccfladakh@gmail.com			
C.	ADG (Research Plannin	ig)/ DG ICFRE'	s Representative			
1.	Dr. Vimal Kothiyal	ADG (RP)	ADG (RP) & Scientist-G, ICFRE,			
			Dehradun, U.K.			
			Phone: 0135-2753290 (0)			
			094129-88641(M)			
			Email: adg rp@icfre.org			
D.	02 Senior Scientists of	the Institute				
1.	Sh. Jagdish Singh	Scientist-F &	Extension Division, HFRI, Conifer			
		Head	Campus, Panthaghati,			
			Shimla-171 013, H.P.			
			Phone: 0177-2816106 (0)			
			94180-71421 (M)			
			Email: jaggy1964@gmail.com			
2.	Dr. Ashwani Tapwal	Scientist-F &	Forest Protection Division			
		Head	HFRI, Conifer Campus, Panthaghati,			
			Shimla $- 171013$, H.P.			
			Phone: 01/7-2816114 (0)			
			94180-65960 (M)			
F			Email: <u>ashwanitapwal@gmail.com</u>			
Е. 1	Sh. Dinoch Daul LIDES		Le Eutongian Division			
1.	SII. DIIIESII Paul, HPFS	DCF	EXTENSION DIVISION HEDI Conifor Compus, Donthoghoti			
			Shimla $= 171.013$ H P			
			Shimla – 171 013, H. P. Phone: 0177-2816112 (0)			
			Phone: 0177-2816112 (0) 94184-85282 (M)			
			Fmail: dnaul@icfre.org			
F.	01 representative of t	he Universitie	s Imparting Education in Forestry			
	and Allied Subjects at t	he Level of Dea	an or Head of the Department			
1.	Dr. Sanjeev Thakur	Dean	College of Forestry, University of			
	-		Horticulture and Forestry,			
			Nauni, Solan – 173 230 (H.P.).			
			Phone: 94181-50975 (M)			
			Email: <u>sanjeevtigr@yspuniversity.ac.in</u>			
G.	01 Representatives fro	m a Funding O	rganization			
1.	Dr. J.L.N. Sastry	Chief	Chief Executive Officer,			
		Executive	National Medicinal Plants Board,			
		Officer	Ministry of AYUSH, Govt. of India,			
			Room No. 309, 3rd Floor, B-Block,			
			AYUSH Bhawan, GPO Complex, INA,			
			New Delhi -110023			
			Phone: 011-23721822 (0)			
			Email: infor-nmpb@nic.in			
H.	02 Representatives of I	Forest Based II	ndustries			
1.	Sh. Surinder Mohan	Proprietor	Natural Biotech Products			
	Gupta		V. P. O. Baggi, Government High			

			School. Mandi (H.P.)-175 027
			Phone: 094181-00334,
			70185-61716 (M)
			Email: sur000ender@gmail.com
2.	Sh. Rajesh Kumar	Proprietor	C/o R.K. Aromatic Village Arphi, P.O.
	Guleria,	-	Bhangrotu, Tehsil Ball, Distt.– Mandi
			-175 021 (H.P.)
			Phone: 94180-76064 (M)
			70189-16016 (Phone)
			Email: <u>rkaromatics64@gmail.com</u>
I.	01 Eminent Forester O	utside ICFRE	
1.	Sh. Sushil Kapta, IFS	Director	Director, Census Operation and
			Citizen Himachal Pradesh, Shimla
			Phone: 94180-77725 (M)
			Email: <u>skapta99@gmail.com</u>
-			
J.	01 Eminent Scientist O	utside ICFRE	
1.	Prof. (Retd.) I.N.	Professor	Sai Sadan, Panthaghati,
	Гакпапра	Emeritus	Shimla-171 009, H. P.
			Phone: 98162-64141 (M)
			0177-2621229 ®
			Email: tejnath@yahoo.com
K .	01 Representative of ICA	R/CSIR/NMP	B
1.	Dr. Sanjay Uniyal	Senior	Division of Environment
		Principal	Technology, Institute of Himalayan
		Scientist and	Bio-resource Technology (IHBT)
		Head	P. Box No. 06, Palampur -176061
			Distt. – Kangra, H.P.
			Phone: 91-1894-233339
	04 D		Email: <u>suniyar@inot.res.in</u>
L.	01 Representative of Si	ister Research	Organizations
1	Dr KS Kanwal	Scientist-D	Scientist In-charge
1.	Dr. R.S. Kanwai,	Sciencist D	GB Pant National Institute of
			Himalayan Environment Himachal
			Regional Centre Mohal Kullu Distt
			Kullu 175 126 H P
			Phone: 01902-225329 (0).
			96502-00833 (M)
			Email: kskanwal03@gmail.com
М.	01 Representative of	Progressive F	armer/Prominent NGO/JFM/Local
	Government/Grass Roo	ot Level Organ	ization
1.	Sh. Pankaj Dogra	Progressive	S/o Rajinder Singh Dogra
		Farmer	88/1 Daholi, Post Office Maraog,
			Tehsil Chopal,
			Distt. Shimla -171211, HP
			Phone: 98054-67423 (M)
			Email:dograpankaj1881@gmail.com
N.	06 Subject Matter Exp	erts from Out	side ICFRE Institutes Covering the

	Subject Areas of the Ins	stitutes							
1.	Dr. Mohar Singh	Principal	National Bureau of Plant Genetic						
	Thakur	Scientist &	Resources, Phagli,						
		Scientist	Shimla – 171 005 (HP)						
		Incharge	Phone: 88940-09386 (M)						
		0	Email: mohar.singh2@icar.gov.in						
2.	Dr. D.P. Sharma	Retired	Near City Hospital, Raigarh Road,						
		Professor	Solan. HP						
		from UHF.	Phone: 98169-34851(M)						
		Nauni	Email :deepeesharma811@gmail.com						
3.	Prof. Arvind Kumar	Dean	Planning & Teachers' Matter						
0.	Bhatt	2000	Himachal Pradesh University						
	Dilate		Summer Hill SHIMLA-171 005 H P						
			Phone: 94184-50009 (M)						
			0177-2833507 2830499 (0)						
			Email: bhtarvind@vahoo.com						
4.	Prof. S.P. Bhardwai	Professor	House 8. IAS Colony, Panthighati,						
	(Retired)	(Retired)	Shimla – 171 013, H. P.						
	(nom ou)	(nothou)	Phone: 94180-64600 (M)						
			Email: hhardwaispdr@gmail.com						
5.	Dr. Meenu Sood	Professor	Department of Forest Products.						
		and Head	College of Forestry, University of						
			Horticulture and Forestry, Nauni.						
			SOLAN-173 230. H.P.						
			SOLAN-173 230, H.P. Phone: 94184-82622 (M)						
			Email: hodfpu@vspuniversity.ac.in:						
			meenusood09@gmail.com						
6.	Dr. Lal Singh	Director	Himalayan Research Group (HRG)						
	5		Umesh Bhawan, Chhota Shimla, H.P.						
			Phone: 98160-26820						
			2626802 (0)						
			Email: lalhrg@gmail.com						
0.	Member Secretary								
1.	Dr. Sandeep Sharma	Scientist-G	Group Coordinator Research,						
	-		Himalayan Forest Research Institute						
			(HFRI), Conifer Campus,						
			Panthaghati, Shimla – 171 013, H. P.						
			Phone: 0177-2626801 (0)						
			94181-29759 (M)						
			Email: groupco_hfri@icfre.org						
			sharmas@icfre.org						

The following Hon'ble member of Research Advisory Group (RAG) was unable to attend the meeting due to unavoidable circumstances:

1. Sh. Sushil Kapta, IFS,

Director, Census Operation and Citizen, Himachal Pradesh, SHIMLA, H. P.

PROGRAMME OF THE RAG MEETING (Offline and Online)

Date:

15 September, 2021 Conference Hall, Himalayan Forest Research Institute Conifer Campus, Panthaghati, SHIMLA-171 013 (H.P.) Venue:

09.00 AM - 09.30AM	Reception & Registration of the RAG Members								
	INAUGURAL	SESSION							
09.30 AM - 10.00	Welcome Address and Bri Achievements of HFRI	ef Presentation about RAG meeting and R&D							
	Dr. Sandeep Sharma	GCR, HFRI, Shimla							
	Inaugural Address								
	Dr. S.S. Samant	Director, HFRI, Shimla							
	Brief Remarks about RAG								
	Dr. Vimal Kothiyal	Assistant Director General (Research & Planning)							
	INAUGURAL TEA:	10.00 AM to 10.20 AM							
	SESSIO	IN I							
10.20 AM - 12.00 NOON	Presentation of the New Research Proposals proposed to be initiated from April, 2022 onwards by the Scientists of Institute, subject to their final approval by Research Policy Committee (RPC)								
	1. Study on mycorrhizal relationship of <i>Juniperus polycarpos</i> C. Koch and impact of mycorrhizal inoculations on its performance under nursery and field conditions								
	-Dr. Ashwani Tapwal, Scientist-F								
	2. Insect pests incidences on Poplar and Willow in Ladakh U.T. and their								
	- Dr. Pawan Kumar, Scientist-E								
	3. Testing of selected superior strains of <i>Picrorhiza kurroa</i> Royle ex Benth and <i>Valeriana jatamansi</i> Jones through multilocation trials to release their new varieties								
		-Dr. Balkrishna Tiwari, Scientist-B							
	4. Studies on regulation an in <i>Pinus gerardiana</i> Wall	nd management of cone induction and seed yield . ex D. Don							
		-Dr. Balkrishna Tiwari, Scientist-B							
	5. Identification of superio	or genotypes of <i>Olea ferruginea</i> Royle bearing							
	its propagation techniqu	es							
	- F - F - G	-Sh. Pravin Rawat, Scientist-B							
	SESSIO	N II							
12.00 PM - 01.30 PM	Presentation of Research Ongoing Research Project	h Activities/Highlights and Review of the ts being implemented by various research							
	divisions and their extension	ion/changes, if any							
	Division of Forest Ecolog	gy & Climate Change: (01)							
	 Division of Forest Protect Division of Constics & T 	ction: (04) ree Improvement: (01- Change Request)							
	 Division of Silviculture a 	and Forest Management: (02)							
01.30 PM - 02.00 M	Concluding remarks by RA	AG Members and Chairman							
2.00PM - 02.15PM	Vote of Thanks:	Dr. Sandeep Sharma, GCR, HFRI, Shimla							
	LUNCH	: 02.15 PM onwards							

INAUGURAL SESSION

Himalayan Forest Research Institute (HFRI), Shimla organized **XXII Research Advisory Group (RAG)** Meeting on **15 September 2021** in the Conference Hall of the Institute. Representatives from universities, forest departments of Himachal Pradesh, Union Territories of J&K and Ladakh, Members of NGOs and progressive farmers attended meeting as RAG members. The meeting was chaired by Dr. S. S. Samant, Director, Himalayan Forest Research Institute Shimla. The meeting held **online as well as offline** due to prevailing **COVID-19** pandemic conditions in which of the total twenty five members, seven members joined the meeting online through Google Meet, sixteen members were present in the Conference Hall of the Institute and one member could not attend the meeting due to some unavoidable circumstances.

Initiating the proceedings of the Meeting, Dr. Sandeep Sharma, Group

Coordinator Research and **Member Secretary**, **RAG** formally welcomed the Chairman, Hon'ble Members of **RAG**, representative of Director General, ICFRE, Dehradun, Dr. Vimal Kothiyal, Assistant Director General (Research Planning), ICFRE, Dehradun and Scientists & Officers of HFRI. The Member Secretary apprised the house that the **XXII Research Advisory Group (RAG)** of the institute has been constituted by Director,



HFRI, Shimla as per the guidelines of **National Forestry Research Plan 2020-2030** and approved by Director General, ICFRE, Dehradun. The RAG which includes renowned Scientists, Academicians, Forest Officers, Representatives of Forest Based Industries, Non-Governmental Organization and Progressive Farmers, examines, prioritizes and recommends the New Research Proposals prepared by the Scientists of this institute, for their final approval by the **Research Policy Committee (RPC)** and reviews the progress of ongoing projects.

Further, he added that the main aim of this Meeting was to give proper direction to the new project proposals so that they become more logical and meaningful results are achieved at the end. He stressed upon the discussion part so that maximum crux can be extracted from RAG members for the benefits of the Institute. GCR gave a detailed presentation about the Institute and apprised all about the mandate, priority areas, achievements of the institute and ongoing research and extension activities. He told that Institute is regularly organizing PRAKRITI, Amrit Mohotsav programmes and celebration of different days. He also briefed about AICRP projects and stressed for possible areas of collaboration with universities and other organizations for more fruitful results of these projects at the end. GCR also informed the Members about the preparation of Detailed Project Report (DPR) on rejuvenation of Indus Basin (Jhelum, Chenab, Ravi, Beas and Sutlej Rivers) through forestry interventions task being undertaken by the Institute. He stressed upon the possible areas of collaboration with Universities and other Organizations in AICRP projects for more fruitful results of these projects at the end. He further urged RAG members to review the projects critically so that at the end they could become more beneficial to society and communities. After this brief introduction, he invited Dr. S.S. Samant, Director & Chairman-RAG to inaugurate the 22nd Meeting of RAG.

Dr. S.S. Samant, Director, HFRI and Chairman, RAG welcomed all the Hon'ble

RAG members. **Dr. Samant** also welcomed **Dr. Vimal Kothiyal**, ADG (RP), who was nominated by the Director General, ICFRE for attending the Meeting through Video Conferencing from ICFRE Headquarters. Most of the RAG Members were present physically in the Conference Hall of HFRI and some were connected through virtual platform.



Dr. Samant informed that RAG is the major body pertaining to research matters and is mandated to give directions and bring in innovations in the research to be carried out by the Institute. He informed that the role of RAG is critically important, particularly to consider and advise on regional research requirements of the mandated State and Union Territories of the Institute. In view of the project prioritization methodology, recommendations of the research proposal to Research Policy Committee (RPC) being followed by different Institutes of Indian Council of Forestry Research & Education (ICFRE), the role of Research Advisory Group (RAG) gains more significance. The Meeting, in fact, provides an opportunity to be utilized to the fullest, not only in terms of review of progress of ongoing projects, examination, prioritization of new research proposals but also to take maximum benefits of the expertise of Hon'ble RAG Members on various research issues.

Chairman, RAG briefed the house about the genesis of the Council and Institute. He further informed that Council has pan India presence across the country and it is the apex body in forestry research and education. He further added that Institute has prepared DPRs of five major rivers viz., Jhelum, Chenab, Ravi, Beas and Sutlej of Indus Basin in time bound manner and submitted the same to MOEF&CC. He further informed that Institute has prepared carbon neutral action plan for Ladakh Union Territory. He also added that for the research and extension activities for the benefit of communities of Ladakh UT, VVK has also been established by the Institute at Leh. Besides, Institute has established VVK at Jammu, J&K UT and Manali, HP. One new VVK is under the process of establishment at Dharampur

Mandi, HP. He told that the Institute has signed different MoUs with various universities, government and NGO's for extending research and extension activities of the institute among community and to different research organizations so that different stakeholders can be benefited. At the end of his inauguration speech, Director, HFRI & Chairman – RAG once again thanked the Hon'ble Members of RAG and hoped that their suggestions and critical evaluation of the new project proposal would help in improving and fine tuning of the new research projects.

Dr. Sandeep Sharma, Member Secretary of RAG also invited **Dr. Vimal Kothial**, **ADG (Research Planning)**, ICFRE, representative of ICFRE, Headquarters to say few words of wisdom, those will also guide the institute during the day long meeting.

Dr. Vimal Kothial, ADG (RP), ICFRE, as a representative of ICFRE, Headquarters,

also welcomed all the Hon'ble Members of RAG, Scientists and Officers of HFRI on his own and on behalf of ICFRE. He urged RAG Members to evaluate the project proposals critically and expected that only those project proposals should be send before **RPC** of ICFRE for final



approval which has direct benefits to the stakeholders. He further informed RAG members about the minimum qualifying criteria for new research proposals. He further urged RAG members to review the quality of the new project proposals besides avoiding any duplicity of the work. He also said that discussion must be held for possibilities of involvement of universities, NGOs, etc. for multidisciplinary and multi-institutional component of AICRPs so that the desired objectives can be achieved. Dr. Kothiyal once again emphasized that RAG has to play important role in fine tuning and revision of the new research projects, which are being presented before RAG in this meeting and looking forward for the sincere contribution of the Hon'ble members of the RAG.

After informing the RAG Members about research endeavours of the institute, Dr. Samant, Director & Chairman, RAG made a sincere appeal to all the RAG Members to critically examine and evaluate the projects on their merit of innovativeness, objectivity and output, and recommend research proposal for their presentation before the Research Policy Committee (RPC) of ICFRE for its final approval.

SOME GLIMPSES OF THE RAG MEETING



AGENDA ITEM NO. –I

Presentations of the New Research Proposals, proposed to be initiated from APRIL, 2022 onwards by various Research Divisions subject to approval by the Research Policy Committee (RPC)

Starting with the Agenda Item No. I, **Group Coordinator Research/Member Secretary** briefed about the new research proposals to be presented before RAG for seeking necessary comments/ recommendations for further submission to the **Directorate of Research (ADG-RP)** at *ICFRE*, Dehradun. He further informed the Hon'ble Members that this year the research divisions of this Institute are presenting **05 New Research Proposals**, within the thrust areas and themes of the council and in accordance with the guidelines of ICFRE, Dehradun.

The Member Secretary further informed the Hon'ble Members that the Scientists, those who will present their research proposals will be invited as per the details below:

S. No.	Title of the New Project	Name of PIs	Thrust Area and Theme	Duration	Budget (Rs. in Lakhs)
1	2	3	4	5	6
1.	Studies on mycorrhizal relationship of <i>Juniperus</i> <i>polycarpos</i> C. Koch and impact of mycorrhizal inoculations on its performance under nursery and field conditions	Dr. Ashwani Tapwal, Scientist-F	ManagingForestsand forests productsforlivelihoodsupportandeconomic growthApplicationofmicrobes in forestry	5 Years (April, 2022- March 2027)	42.81
2.	Insect-pests incidences on Poplar and Willow in Ladakh U.T. and their eco-friendly management	Dr. Pawan Kumar, Scientist-E	Managing Forests and forests products for livelihood support and economic growth Integrated pests and disease management	5 Years (April, 2022- March 2027)	51.10
3.	Identification of superior genotypes of Olea ferruginea Royle bearing high oil content in North Western Himalayan Region and development of its propagation techniques	Sh. Pravin Rawat, Scientist-B	Forest genetics resource management and tree improvement <i>Tree Improvement</i>	4 Years (April, 2022- March 2026)	40.76
4.	Studies on regulation and management of cone induction and seed yield in <i>Pinus gerardiana</i> Wall. ex D. Don	Dr. Balkrishan Tiwari, Scientist-B	Forest Genetics Resource Management and Tree Improvement <i>Biotechnology</i>	5 Years (April, 2022- March 2027)	63.02
5	Testing of selected superior strains of <i>Picrorhiza kurroa</i> Royle ex Benth and <i>Valeriana</i>	Dr. Balkrishan Tiwari, Scientist-B	Forest Genetics Resource Management and Tree Improvement	5 Years (April, 2022- March	47.57

jatamansi Jones through multilocation trials to release their new varieties

The session on **"Presentation on New Research Proposals"** was chaired by **Dr. S. S. Samant, Director, HFRI and Chairman, RAG**. In the very beginning of the session, Chairman invited all the scientists to present their new research problems within the timeframe of 10-20 minutes and also requested all the RAG members to give their valuable suggestions for further improvement of research proposals. In this session, above 05 new research proposals were presented by Dr. Dr. Ashwani Tapwal, Scientist-F (01 No.), Dr. Pawan Kumar, Scientist-E (01 No.), Dr. Balkrishan Tiwari, Scientist-B(02 Nos.), Sh. Pravin Rawat, Scientist-B (01 No.). After presentation of each of the research proposals, lots of discussions were held and querries raised by the RAG members were duly answered by the PIs of the new proposals. The suggestions/ comments given by the Hon'ble Members have been provided at the relevant places of the documents (Form-5: Tables: 5-8).



AGENDA ITEM NO.: II

Presentation of Research Activities/ Highlights and Review of the Ongoing Research Projects being implemented by various Research Divisions and their extension/changes, if any.

After the presentations on New Project Proposals (Agenda Item No. I), the Chairman informed the RAG members about one ongoing research project entitled "Identification, Ecological Assessments for Selection & Screening of Superior and Insect-Pest Resistant Clones of Salix for their Cultivation, Production Trends and Conservation in the Cold Deserts of Himachal Pradesh and Jammu & Kashmir", will be presented in this agenda for seeking approval of additional budget.

PI after detailing the progress of the project highlighted the reasons for additional budget requirement as the salaries of Project Assistants (Pas), Junior Project Fellows (JPFs) and Junior Research Fellows (JRFs) enhanced in the year 2018 and also in 2020 and moreover, project is sanctioned for 7 years w.e.f., 2017-2024 but, the budget is approved only for 5 years (i.e. upto March, 2022), which is only Rs. 54.88 lakhs. The additional budget of **Rs. 32.38 lakhs** is required for the remaining period of the project i.e. 2022-23 & 2023-24.

This was followed by the detailed presentation of the remaining ongoing research projects (08 Nos.) being implemented by the Institute under PLAN as per the division-wise projects & PIs detail given below.

1]. RESEARCH PROJECTS UNDER PLAN BUDGET

A].	DIVISION OF FOREST ECO	LOGY AND CLIMATE CHANGE
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1.	Carbon Sequestration Potential of Existing Land-use Systems in Lahaul Valley, Himachal Pradesh
	Dr. R.K. Verma, Scientist-G
2.	Assessment of Floristic Diversity of Giri Khad Watershed, Himachal Pradesh for Developing Conservation Strategies
	Dr. Ranjeet Kumar, Scientist-E

B].	DIVISION OF FOREST PROTECTION:
3.	Studies on changing forest insect pest status of high altitudinal transitional zones
	and their management in Himachal Pradesh– IInd Part of the Project
	Dr. Pawan Kumar, Scientist-E
4.	Studies on effect of AM inoculations on the active ingredient contents and biomass
	production in Angelica glauca Edgew. and Valeriana jatamansi Jones
	Dr. Ashwani Tapwal, Scientist-F
5.	Insect pests of Western Himalayan Oaks and their Control
	Dr. Pawan Kumar, Scientist-E
6.	Study on impact of mycorrhizal inoculations on the growth and field performance
	of Abies pindrow and Picea smithiana
	Dr. Ashwani Tapwal, Scientist-F

D]. DIVISION OF SILVICULTURE & FOREST MANAGEMENT

7.	Population assessment, ecological niche modelling and developing sustainable									
	harvesting technique of Pinus gerardiana for conservation in Himachal Pradesh									
	and Jammu & Kashmir.									
	Dr. Swaran Lata, Scientist-D									
8.	Assessment, Ecological Niche Modelling and Strengthening of Agroforestry									
	Systems for Securing the Livelihoods of Inhabitants in Cold Desert Region of									
	Himachai Pradesh and Ladakh									

All the Hon'ble Members of RAG reviewed the progress made under the ongoing research projects by all the PIs during the year and showed satisfaction on the progress.

Other related and relevant details of the Ongoing research projects under PLAN funded have been provided in the following pages in **Annexure-2 (Information Required on ICFRE Plan Projects for RPC-2022) – Form-1-Tables:1-4, Forms-2, 3 and 4.**

Members of Research Advisory Group 2021-2022



















Annexure-2

Information Required

on

ICFRE Plan Projects for

XXI RPC 2022-23

Thrust area wise list of Ongoing Research Projects and detailed budget for 2022-23:

Ongoing Projects

Table 1: Thrust area I-Managing Forests and Forests Products for Livelihood Support & Economic Growth

			Т	hrust area	a wise list o	of ONG	DING RES	EARCH	PROJECT	ſS		
Thrust area I: Managing Forests and Forests Products for livelihood support & eco							conomic gi	rowth				
S. No.	Project title/PI/Duration (Start and end year)	ed (Rs.	E	ring	Details	of budge Si	t required 1b Head wis	for 2022-23 se breakup	3 (Rs. in lal for 2022-23	xhs) 3	Required / engaged	Remarks: [Extension granted; modification in
		Total approve budget outlay in lakhs)	Cumulative expenditure t March 2021	Cumulative expenditure t March 2021 Approx. expenditure du 2021-22	Budget require for 2022-23 (Su of 6 to 10)	Consumables (M&S)	Research expenditure (FRE)	Travel And conveyance (Res)-TE	Capital (Scientific Equipments)	Fellowship	Manpower (RA/ SRF/ JRF/ PA/ FA etc.)	a) objectives; b) budget outlay
1	2	3	4 a	4b	5	6	7	8	9	10	11	12
]	I) Institute: Himalayan For	est Resear	ch Institu	te (HFRI)	, Shimla	1	1		1	1	r	
i.	Insect pests of Western Himalayan Oaks and their Control. [HFRI- 068/Th.:01/IPDC(17)/(FPT -15)/ PLAN/ 2019-23] PI: Dr. Pawan Kumar, Scientist- E Duration: 4 years October, 2019 to Sept., 2023 Theme: Integrated Pest and Disease Management	9.26	2.94	2.5	4.36	0.35	0.65	0.75	0	2.61	JPF-01	 Since, the project was approved in RPC-2017 for a period of 04 years (2017 to 2021) but, budget was not released for HFRI component and activities could not be initiated in HFRI. As per the suggestion of RPC-2019 [(meeting held on 26-27 Feb, 2019 (OG-23, pg-21)] matter was taken up by FRI, Dehradun and HFRI, Shimla with ICFRE. Subsequently, budget was released in October, 2019. The project was started at HFRI, Shimla from October, 2019 for a period of four (04) years, thus, project duration will be 2019-2023 i.e. from October, 2019 to September, 2023.
ii.	Studies on effect of AM inoculations on the active ingredient contents and biomass production in	26.33	9.76	5.15	8.13	0.50	2.30	0.75	0	4.58	SRF-01	

	Angelica glauca Edgew.and Valeriana jatamansiJones PI: Dr. AshwaniTapwal, Scientist-F Duration: 05 years(2019-2024) Theme: NTFP ResourceDevelopment (A)											
iii.	Studyonimpactofmycorrhizalinoculationsonthe growth and fieldperformanceofAbiespindrowandPiceasmithianaPI:Dr. AshwaniTapwal, Scientist-FDuration:05 years(2021 - 2026)Theme:ApplicationTheme:Applicationof	29.93	This is a new project started from April, 2021.	4.15	6.42	1.00	1.80	1.00	0	2.62	JPF-01	
iv.	Populationassessment, ecological niche modelling and developing sustainable harvesting technique of <i>Pinus gerardiana</i> for conservation in Himachal Pradesh and Jammu & KashmirPI:Dr. Swaran Lata, Scientist-DDuration:05 years (01.04.2020) to 31.03.2025)Theme:Social Forestry/Farm Forestry	50.96	4.696	8.85	10.13	0.90	2.00	2.00	0	5.23	JPF-02	

v.	Assessment, Ecological	60.55	7.83	10.30	11.99	0.50	3.50	2.75	0	5.24	JPF-02	
	Niche Modelling and											
	Strengthening of											
	Agroforestry Systems for											
	Securing the Livelihoods of											
	Inhabitants in Cold Desert											
	Region of Himachal											
	Pradesh and Ladakh											
	PI: Sh. P.S. Negi,											
	Scientist-D											
	Duration: 05 years											
	(01 04 2020 to 31 03 2025)											
	(01.04.2020 to 51.05.2025)											
	Theme: Social Forestry,											
	Agroforestry/Farm											
	Forestry											
vi.	Studies on Changing Forest	11.65	5.15	5.15	6.50	0.30	0.60	0.70	0	4.90	JRF-01	II phase of the project initiated
	Insect-Pest Status of High										PA-01	from 1 st April, 2021
	Altitudinal Transitional											.(April 2021-March, 2023)
	Zones & Their											
	Management in Himachal											
	Pradesh											
	Dr. Dr. Dawon Kumor											
	Scientist E											
	Scientist- L											
	Duration: 2 years (24											
	months) April, 2021 to											
	March. 2023											
	Theme. Integrated pasts											
	and disease management											
	una aisease management		1			I				1		

Thrust area wise list of ONGOING RESEARCH PROJECTS												
Thru	ist area II- Biodiversity conse	rvation and	ecological s	security								
S. No.	Project title/PI/Duration (Start and end year)	pa	e till 1	e -22	Details	of budg	et required Sub Head w	for 2022-23 ise breakup	(Rs. in lak) for 2022-2.	hs) 3	Required / engaged	Remarks: [Extension
		Total approve budget outlay (Rs. in lakhs)	Cumulativ expenditure March 202	Approx. expenditur during 2021.	Budget required for 2022-23 (Sun of 6 to 10)	Consumabl es (M&S)	Research expenditure (FRE)	Travel And conveyance (Res)-TE	Capital (Scientific Equipments	Fellowship	Manpower (RA/ SRF/ JRF/ PA/ FA etc.)	granted; modification in a) objectives; b) budget outlay
1	2	3	4 a	4b	5	6	7	8	9	10	11	12
]	1) Institute: Himalayan Fore	est Research	n Institute (HFRI), Sh	imla					1		
vii.	Assessment of Floristic Diversity of Giri Khad Watershed, Himachal Pradesh for Developing Conservation Strategies PI: Dr. Ranjeet Kumar, Scientist- E Duration: 3 years (36 months) April, 2021 to March. 2024) Theme: Biodiversity Conservation	24.998	This is a new project started from April, 2021.	7.97	8.45	0.25	0.90	1.00	0	6.30	JRF-01 PA-01	

Table 2: Thrust area II- Biodiversity conservation and ecological security

Table 3: Thrust area III- Forest and Climate Change

Thrust area wise list of ONGOING RESEARCH PROJECTS														
Thru	ist area II- Forest and Clin	nate Chan	ge											
S.	S. Project title/PI/Duration No. (Stort and and year) = 2022-23 (Rs. in lakhs) Required / angeograd													
No.	No. (Start and end year)													
	March 2021 March 2021 March 2021 March 2021 March 2021 March 2											granted; modification in a) objectives; b) budget outlay		
1	2	3	4a	4b	5	6	7	8	9	10	11	12		
]	II) Institute: Himalayan Fore	est Research	Institute (HFRI), Shi	mla									
NA														

Table 4: Thrust area IV- Forest Genetic Resource Management and Tree Improvement

	Thrust area wise list of ONGOING RESEARCH PROJECTS													
Thru	'hrust area IV- Forest Genetic Resource Management and Tree Improvement Details of hudget required for 2022 23 (Ds in labbs)													
S.	S. Project title/PI/Duration Details of budget required for 2022-23 (Rs. in lakhs) Required /													
No.	No. (Start and end year)													
	endaged frequired duri. F ellowship F ello											granted; modification in a) objectives; b) budget outlay		
1	1 2 3 4a 4b 5 6 7 8 9 10 11													
I) Institute: Himalayan Forest Research Institute (HFRI), Shimla														
	NIL													

Form-2

Thrust area wise Ongoing Projects with CHANGE REQUEST for 2022-23 (Note: Projects reflected here may not be added in ongoing projects list to avoid duplicity)

S. No.	Title of the project/	Change request with justification	RAG's comments	Rs.	rch	22	()	Budget required for 2022-23 (Rs i lakhs)			in	I	Remarks: [No of		
	PI / Duration (Start and end year)			Total approved budget outlay (in lakhs)	Cumulative expenditure till Ma 2021	Approx. expenses during 2021.	Balance available (Rs in lakh	Budget required for 2022-23 (Sum of 7 to 10)	Consumables (M&S)	Research Expenditure (FRE)	Travel And Conveyance (Res)-TE	Capital (Scientific Equipment)	Fellowship	Required / engaged Manpowe (RA/SRF/ JRF/ PA/ FA etc.)	Extension granted; modificatio n in a) objectives; b) budget outlay
1	2	3	4	5	4 a	4b	4c	6	7	8	9	10	11	12	13
i.	Thrust area I: Mana	iging Forests and Fores	ts Products for L	ivelihoo	d Suppo	rt & Eco	onomic	Growth							
	NA														
ii.	Thrust area II: Biod	iversity Conservation a	nd Ecological Se	curity			•								
ix	Identification, Ecological Assessments for Selection & Screening of Superior and Insect- Pest Resistant Clones of <i>Salix</i> for their Cultivation and Conservation in the Cold Deserts of Himachal Pradesh and Jammu & Kashmir Coordinator:	Change in Budget part Justification is given as under please; The project was earlier sanctioned for 7 years and budget allotment (Rs. 54.88 lakhs) was made only for 5 years (i.e. upto March, 2022). Additional budget of Rs. 32.38 lakhs is	Recommended for additional budget of Rs. 32.38 lakhs by RAG for approval of RPC	54.88	39.90	14.47	0.51	16.19	1.50	2.75 (2.00 FRE +0.75 Exten sion)	2.50	0	9.44	1-JRF 3-PA	No extension granted till date Need modification in budget

	Dr. Rajesh	for the year 2022-23									
	Sharma, Scientist-	& 2023-24 as the									
	G (Till 31 March	salaries of Project									
	2021- now	Δ solution to $(\mathbf{P}\Lambda)$									
	transferred to	Assistants (FA),									
	ICFRE Dehradun)	(IDE) 1 J									
	,	(JPF) and Junior									
	Dr. Sandeep	Research Fellows									
	Sharma, Scientist-	enhanced in the year									
	G, Project	of 2018 and also in									
	Coordinator (from 1	2020.									
	April 2021										
	onwards)										
	DI										
	PIS:										
	Dr. Sandeep										
	Snarma, Scientist-G										
	Dr. Ranjeet Kumar,										
	Dr. Vanoat lishtu										
	DI. Vancet Jishtu, Scientist-F										
	Dr. Pawan Kumar										
	Scientist-F										
	Dr Balkrishan										
	Tiwari										
	Scientist-B										
	Selentist D										
	Duration: 7 years										
	(January, 2017 to										
	March. 2024)										
	······,										
	Theme:										
	 Biodiversity 										
	Conservation										
	• Conservation of										
	Forest Genetic										
	Resources										
iii.	Thrust area III: For	est and Climate Change	9								
	NA										
iv.	Thrust area IV: Fore	est Genetic Resource M	anagement and	Free Imp	roveme	nt					
	NA										

	Thrust Area Wise Abstract of Ongoing Research Project Proposals												
NAME OF TH	E INSTITUTE:												
Himalayan Fo	orest Research	Man Power Engaged											
Institute (HFRI),	Shimla												
THRUST	No. of Projects	RA	SRF	JPF	JRF	PA	FA	TA	Con.	DEO	Total		
AREA													
Thrust Area I	06		01	06	01	01					09		
Thrust Area II	01				01	01					02		
Thrust Area III													
Thrust Area IV											-		
Total Projects	Total Projects 07 01 06 02 02 11												
RA: Research Ass	RA: Research Associate, SRF: Senior Research Fellow, JPF: Junior Project Fellow, JRF: Junior Research Fellow, PA: Project												
Assis	Assistant, FA: Field Assistant, TA: Technical Assistant, Con: Consultant DEO: Data Entry Operator												

Thrust area wise summary of ongoing projects of ICFRE Institutes for 2022-23

Note: Give number only. Figures should match with Form 1 (Tables 1-4). This table will not include ongoing projects submitted for change request (Form 4)

Form-4

Thrust area wise summary of ongoing projects submitted for <u>CHANGE REQUEST</u> 2022-23

Thrust are	Thrust area wise abstract of ongoing research projects for Change Request													
NAME OF THE	NAME OF THE INSTITUTE Man Power Engaged													
THRUST No. of RA SPF JPF PA FA TA Con. DEO Total														
Thrust Area I														
Thrust Area II	01			01	03					04				
Thrust Area III														
Thrust Area IV														
Total Projects	Total Projects 01 01 03 04													
RA: Research Associate, SRF: Senior Research Fellow, SPF: Senior Project Fellow, JRF: Junior Research														
Fellow, JPF: Jun	Fellow, JPF: Junior Project Fellow, PA: Project Assistant, FA: Field Assistant, TA: Technical Assistant,													
	Con: Consultant DEO: Data Entry Operator													

Form-5 (Tables 5-9)

Thrust area wise NEW project proposals for 2022-23

I) Institute: HIMALAYAN FOREST RESEARCH INSTITUTE, SHIMLA

Table 5: Thrust area I- Managing Forest and Forests Products for Livelihood Support and Economic Growth

Project No. 1		
Project title- Studies on mycorrhizal relationship of Juniperus polycarpos C. K	och and impact of mycorrhizal inoculations of	on its performance under nursery and
field conditions		-
ICFRE Thrust Area	ICFRE Theme	
Managing Forest and Forests Products for Livelihood Support and Economic	Application of microbes in forestry	
Growth		
Name & Designation of the PI / Co-PI	Budget outlay of the Project (Rs in lakhs)-	Rs. 42.81 Lakhs
PI: Dr. Ashwani Tapwal, Scientist-F, Forest Protection Division	Duration (start & end date)-	April, 2022-March 2027
Co-PIs : Sh. P.S. Negi, Scientist-D, Silviculture & Forest management	No. of years-	05 Years
Division		
Name of Division: Forest Protection Division	Score on Technical criteria of Project Assess	ment (out of 100)- 83.59
Silviculture & Forest management Division	N 1	
Name and cost of equipment proposed	Benchtop, portable pH meter, Portable microto	ome, Vacuum sealer machine, Magnetic
	Stirrer and Rotor/ other accessories for existing	centrifuge (1.00 Lakh)
Gap in knowledge identified		
The mycorrhizal relationship of Junipers of N.W. Himalaya had not been studied so f	ar. In India, only some work has been done on th	e diversity of AMF in the rhizosphere of
Junipers and efforts were not attempted on identification of associated AMF and produ	cing mycorrhizal tailored seedlings. This may be o	due to distribution of these species in cold
desert region, seed dormancy and long gestation period of 5-6 years of seedlings un	nder nursery conditions. It is need of hour to inv	vestigate its mycorrhizal relationship and
identification of suitable mycorrhizal fungus for artificial inoculation. In India, molecula	r characterization of mycorrhizae was not attempte	d in Junipers.
Long term objectives of the project		
1. Utilization of mycorrhizal fungi to enhance the growth parameters of Juniperus polyce	arpos seedlings	
Short term objectives of the project		
To investigate the mycorrhizal relationship in the roots of <i>Juniperus polycarno</i>	s and diversity of AMF in the rhizosphere soil	
2. To isolate, identify and inoculate <i>Juniperus polycarpos</i> seedlings with mycorrh	izal fungi	
3. To evaluate the growth and development of artificially inoculated seedlings un	der nursery and field conditions	

Novelty of Project

This project has been proposed keeping in view the fact that systematic investigation on the nursery and field performance of *J. polycarpos* seedlings tailored with mycorrhizal fungi has not attempted in the past. The seedlings raised by artificial inoculation of mycorrhizal fungi will certainly accelerate quality growth parameters and outplanting performance. It is also expected that the nursery period of the seedlings will also be reduced. This will reduce the cost of raising the seedlings.

Relevance of the Project to the work already done

PI of the project had studied the diversity of mycorrhizal fungi associated with *Pinus gerardiana* and also investigated the effect of artificial inoculation of *Scleroderma polyrhizum* on its growth, development and field performance. The seedlings inoculated with mycorrhizal fungi have significantly higher growth parameters and they have performed better upon outplanting. Co-PI of the project has standardized the nursery techniques of for the *Juniper polycarpos*. Therefore, it is further planned to test the efficacy of mycorrhizal inoculation on the growth and development of this slow growing species of cold desert region. It is expected that the artificial inoculation will improve the growth parameters of seedling and result in reduction of nursery period.

Deliverables at the end of the project

- i. Identification of type of mycorrhizal association in Juniperus polycarpos
- ii. Inventory of mycorrhizal associated with J. polycarpos
- iii. Germplasm conservation of mycorrhizal fungi
- iv. Efficacy of artificial inoculation with mycorrhizal fungi on the growth and development of seedlings
- v. Production of superior seedlings of *J. polycarpos*
- vi. Capacity building training to stakeholders

Summary of Comments of RAG

Dr. Ashwani Tapwal, Scientist F, Forest Protection Division started the session with project entitled **"Study on mycorrhizal relationship of** *Juniperus polycarpos* **C. Koch and impact of mycorrhizal inoculations on its performance under nursery and field conditions"** and threw light on problem statement, review of literature, objectives, research methods, action plan, project cost and predicted outcomes of the proposed project. During the presentation he told that *J.polycarpos* has immense ecological, socio-cultural and religious significance in Kinnaur, Lahaul & Spiti and Ladakh Trans- Himalayan region. Natural population of the species is declining due to anthropogenic pressure, harsh environmental condition and poor natural regeneration. He also stress on the need of restoration of Juniper forests which can be achieved only by raising quality seedlings in the nurseries but seed dormancy and long gestation period of about 5-6 years in nursery is major hurdle. He informed HFRI has developed nursery and planting technique of this species, but still artificial inoculation with suitable mycorrhizal fungus have not attempted so far. Beside this, studies on micorrhiza associated with *J. polycarpos* is not available. Thus, inoculation of Juniper seedlings with suitable mycorrhizal fungi can improve their growth in nursery and also help the seedlings establishment upon out planting.

During discussion, the following suggestions/comments were given

- Sh. Vimal Kotiyal, ADG (R&P) inquired about the long term storage of the isolated mycorrhizal fungi and suggested to broaden the scope of the project.
- Dr. Sanjay Sood, IFS, APCCF (Research & Planning) HPFD, raised his query about need of identification and isolation of mycorrhizal associates of *J. polycarpos*, if such mycorrhizal species are already known. In response, Dr. Tapwal informed that cultures at native mycorrhizal fungi will be raised for artificial enoculation in nursery. Dr. Sood informed that HPSFD has 726 nurseries in HP and HFRI is welcomed to conduct trials in their nurseries.
- In response, **Dr. Ashwani Tapwal** appraised that investigation and identification of the different mycorrhizal relationship in the roots is necessary to find out the diversity of AM fungi in the rhizosphere of *J. polycarpos*. Director, HFRI **Dr S.S.Samant** also substantiated that the idea is to take samples from different populations and to identify more mycorrhizal species and carry out detailed mycorrhizal studies for developing complete packages as this species is in high demand in Cold deserts.
- Dr. Jagdish Singh, Scientist-F, HFRI, suggested to replace word 'Study' with word'Studies' in the title of the project.
- Prof. (Retd.) T. N. Lakhanpal added that in *J. polycarpos*, all the earlier work has been done on non- mycorrhiza issues and work behaviour of mycorrhizal associations with conifers is very complex, therefore isolation, identification and characterization of various ecto-mycorrhizal species associated with *J. polycarpos*

is necessary for selection of most suitable species having significant impact on the growth characteristics.

- Dr. Lal Singh, Director, Himalayan Research Group (HRG) emphasized that community should remain at the forefront during the conceptualization and implementation of research projects and options for better community interface should also be worked out in present study as this species contributes significantly in livelihood of locals. He further added that status of mycorrhiza in nursery and plantation sites also need to studied.
- Prof. (Retd.) S.P. Bhardwaj, University of Horticulture and Forestry, (UHF) Nauni, suggested for carrying out the survey on wide basis and after identification, most important mycorrhizal fungi species should be preferred for inoculation with *J. polycarpos* seedlings. He further added that main custodian of this species is public and the results of the project will contribute in welfare of societies of tribal communities cold deserts.
- Prof. Arvind Kumar Bhatt, Dean Planning & Teachers Matter, Himachal Pradesh University, Shimla endorsed the proposal and suggested that capacity building of field functionaries and other stakeholders is important. In response, Dr. Ashwani Tapwal said major beneficiaries of this project is farmers and HPSFD.
- Sh. Surinder Mohan Gupta, Proprietor, Natural Biotech Product, Mandi informed the house that the *J. polycarpos* is fragrant species and used as incense and fuel wood by local communities and supported the need of study.

Dr. S.S. Samant suggested the PI to include the comments/ suggestions given by RAG Members for the improvement of proposal.

Whether the project has been modified as per RAG comments (if yes, give details)

Yes. The above mentioned suggestions/comments of RAG members have been included in the proposal.

Benefits of the project for the society (Not more than 100 words)

Application of mycorrhizal fungi will improve the growth of seedlings in nursery and performance upon out planting. The outcomes will be shared with Forest Department and native peoples by conducting capacity building trainings and printed extension material. *Juniper polycarpos* is important tree species of cold desert and have social relevance in the area. The plants raised by artificial inoculation of mycorrhizal fungi will out planted in suitable places in forest land or farmer's field.

Project No. 2.						
Insect-pests incidences on Poplar and Willow in Ladakh U.T. and their	ecofriendly management					
ICFRE Thrust Area	ICFRE Theme					
Managing forests and forests products for livelihood support and economic	Integrated insect pests and disease management					
growth						
Name & Designation of the PI / Co-PI	Budget outlay of the Project (Rs in lakhs)-	Rs. 51.10 lakhs				
PI-Dr. Pawan Kumar, Scientist-E, Forest Protection DivisionCo-PI-Dr. R.K. Verma, Scientist-G, FE&CC Division	Duration (start & end date)-	April, 2022-March, 2027				
Name of Divisions- Forest Protection Division	No. of years-	05 Years				
Forest Ecology and Climate Change Division	Score on Technical criteria of Project Assessm	nent (out of 100)- 83.86				
Name and cost of equipment proposed	 Image analysis software for existing Trinocular microscopes (3D) along with computer peripheral and accessories: 3.0 Lakhs Insect/Biological Growth Chamber: 2 Lakhs (The instrument is required to conduct the experiments on life histories and maintaining the inse culture during unfavorable conditions) (Total 5.00 lakhs) 					
Gap in knowledge identified						
Willows (Salix spp.) and Poplars (Populus spp.) constitute the major comp	onent of the vegetation structure of the cold deserts of	of Ladakh UT, recently heavy insect pests attack				

including 'epidemic outbreaks' were reported on these two species. Both the species have been found attacked by variety of spp. such as defoliators, sap suckers, borers stem etc. throughout the cold deserts.

- As these species are the key species for plantation program in the region, widespread mortality of Willows and Poplars in the region is matter of great concern, which had caused a lot of damage to ecology of the unique ecosystem and adversely affected the socio-economic status of local population in particular.
- > The Institute has also received communications from Govt. of Ladakh (UT) on insect-pests attacks and mortality of trees of different species in the cold desert.
- It has been noticed that the insect pests attack region has become regular phenomena and variety of insect species are proliferating and attacking these species. The severity of insect attack is so profound that whole the plant is completely defoliated by these insects
- During preliminary studies it has been found that insect pests attack on the young and mature trees (Willow and Poplar) of cold desert species were dying because of heavy attack and outbreaks of insect pest which may be promoted by influence of climatic disturbances or due to stress caused by external pressures like abiotic factors, fire, drought, etc.
- Other factors like associated vegetation acting as a secondary host may also be helping in population build up of the insect pests in the region. As the dying of young and mature trees in the region have become widespread regular and reoccurring process causing severe problems which needs immediate solutions. The present research work will focus on monitoring the influence of biotic and abiotic pressures and finding the cause of large scale mortality of young and mature trees due to insect pests attack and to develop effective ecofriendly control measures.
- The Institute has also received communications from the Govt. of Ladakh (UT) to suggest the management practices against these attacks on both Willow and Poplars. The outcome of the research project i.e. development of Database of insect pests of Cold deserts; identification, characterization and taxonomy of insect species; influence of abiotic and biotic stresses; insect pest incidences and their effective IPM will be major highlight of the study leading to new contribution of the ICFRE.

Long term objectives of the project

> To monitor the climatic influences and role of biotic components in promoting insect pest outbreaks in Willow and Poplar and develop effective eco-friendly control practices

Short term objectives of the project

- > To assess the current status and population dynamics of insect-pest incidences on *Salix* spp (Willow) and *Populus* spp. (Poplar) in Ladakh UT
- > To monitor the seasonal abundance, influence of abiotic factors & associated vegetation promoting the growth and multiplication of insect pests
- > To create the database on information and knowledge support on threats of insect pest attacks, and their GIS mapping
- > To develop different management practices against serious insect-pests viz. defoliators, sap suckers and borers and formulate eco-friendly IPM program against key pests
- > To provide extension and capacity building support involving community participation on sustainable and eco-friendly management of insect-pest

Novelty of Project

Recently, heavy build up and frequent reoccurrence of population of different insect pests such as defoliators, sap suckers, stem borers, *etc.* leading to epidemic outbreaks, have been noticed attacking and heavily infesting the plantations of *Salix* and Popular throughout the cold deserts of Indian Himalaya including Ladakh UT. Some of our most destructive pests are included among the several hundred kinds of these highly specialized insects. They are so small that the average person seldom realizes that they are responsible for the sickly or dying condition of a tree or shrub. Widespread mortality in willow and poplar due to aggravated insect attack in the cold deserts is matter of great concern, which had caused a lot of damage to ecology of the unique ecosystem and has adversely affected the socioeconomic status of local population in particular.

To conclude the exact reason behind such attacks which has been very frequent in the recent need to assess the different factors like abiotic and biotic stresses caused by external pressures like climatic factors, fire, drought, associated vegetation promoting growth and multiplication of the insect pests leading to outbreaks causing mortality of young and mature trees which is very unusual process in the cold deserts of Ladakh region which used to be covered with snowfall for more than half of the year. The problem of heavy damage of plants by insect pests sometime leading to epidemic outbreak is a unusual happening in the cold deserts, keeping in view the adverse climatic conditions which are not favorable growth and multiplications. But, recent outbreaks of insect pests on different plant species in the cold deserts have wide opened the way for scientists to work on the menace and develop effective as well as ecofriendly control measures keeping in view the unique fragile ecosystem of the region. Different control measures like use of insecticides, biopesticides/mineral oils, plant extracts, and natural enemy complex will be utilized to develop holistic ecofriendly control measures to contain the insect pest attack in the cold desert of Ladakh (UT). So, the study will help in addressing following key issues:

- > Database of insect pests of Willow and Poplar in the region
- > Impact of climatic influence and geographical parameters on insect pests multiplication
- > Habitat association and vegetation structure promoting the insect pests growth and multiplication

- GIS mapping of the insect pests incidences
- > Develop eco-friendly control measures (IPM) against key pests of Willow and Poplar
- > Capacity building support and local community resilience on threats of insect pests outbreaks and their ecofriendly management without harming the ecosystem

Relevance of the Project to the work already done

The research project has been conceptualized keeping in view the new insect pests attack prevailing in the cold deserts causing heavy damage to the vegetation of the region. So far no systematic studies have been conducted on different aspects of cold desert therefore during present investigations, biology of the insect species, symptomology, effect of climatic factors influencing the growth and multiplication of the pests, associated vegetation of the region by acting as secondary host and promoting the survival of the pests will be fulfilled. The different control measures like use of insecticides, biopesticides, plant extracts, and natural biocontrol agents like insect predators and parasites (*Chrysoperla* spp, *Trichogramma* spp., etc.) will be tested against insect pests prevailing in the region to develop effective control measures to contain the pest infestation.

Deliverables at the end of the project

- > Database of insect pests, Lepidoptera bioindicators, and associated vegetation
- > Identification keys of insect pests and Lepidoptera bioindicators of cold deserts including their GIS mapping
- Efficacy of different treatments (insecticides, Biopesticides, Biocontrol agents) in containing the insect pests
- > Development of techniques to control the key pests of prevailing in the selected vegetation of the region

Summary of Comments of RAG

Dr. Pawan Kumar, Scientist E, Forest Protection Division started his presentation on research project entitled **"Insect Pest Incidences on Poplar and Willow in Ladakh (UT) and their Ecofriendly Management"** and threw light on problem statement, review of literature, objectives, research methods, action plan, project cost, predicted outcomes of the proposed project. During the presentation, he said Willows (*Salix* spp.) and Poplars (*Populus* spp.) constitute the major component of the vegetation structure of the cold deserts of Ladakh UT, but recently heavy insect pests attack including 'epidemic outbreaks' were reported on these two species. These species are the key species for plantation program in the region but widespread mortality of Willows and Poplars in the region is matter of great concern, which had caused a lot of damage to ecology of the unique ecosystem and adversely affected the socioeconomic status of local population in particular. He further added that the Institute has also received communications from Govt. of Ladakh (UT) to address the insect-pests attacks and mortality problem of these species. Therefore, studies on population dynamics of insect-pest incidences on *Salix* spp. (Willow) and *Populus* spp. (Poplar) in Ladakh UT is required to formulate eco friendly IPM program against key pests.

After the presentation, Director, HFRI invited RAG members for their valuable suggestions/comments for refinement of the proposal.

- Dr. S. S. Samant raised his concern about the less budget proposed under the travel head. He asserted that as the study area is located far away from the Institute and more travelling will be required for taking observations and collection of field data from time to time under this project. He recommended to curtail the budget in capital head and putting more budget under the travel head.
- Dr. Sanjay Sood, IFS, APCCF (Research & Planning) HPFD illustrated that as per general observation the defoliator attack is more pronounced on the exotics species e.g., *Populus deltoides* and *Populus nigra*. Therefore, there is a need to study the introduction of exotics very critically. He also asked about the relevance of references of defoliator attack in Southern India cited under the bibliography and questioned the associate linkages between references. In response, **Dr. Pawan Kumar** said that comprehensive bibliography has been cited to get an idea about previous works carried out in this direction so far.
- **Prof.** (**Retd.**) **T. N. Lakhanpal** also endorsed the statement of PI of the project and said that wide literature review is required to find out the continuity of the epidemics and identify the missing linkages and knowledge gaps and arriving at logical conclusion.
- **Prof. (Retd.) S.P. Bhardwaj, University of Horticulture and Forestry, (UHF), Nauni,** also said that since insects pests are not limited by geographical boundaries. Thus, comprehensive and relevant literature is required to be reviewed about the occurrence of Insect-Pest attack on plants/ trees in different regions. He stressed that bio- control agents must be studied and multiplied because they are the effective alternative to manage the incidences of Insect-Pest attack in Forests. He also suggested to study the host plants as these defoliators escapes from winters and observation of the degree of infestation in natural condition is important to control/manage of these defoliators.
- Dr. Sanjeev Thakur, Dean, College of Forestry, UHF, Nauni, quoted the relevance of level claim for insecticide or pesticide. He said that level claim should

be obtained for particular species.

- Sh. Vimal Kothiyal, ADG (R&P) questioned in context with occurrence of Insect-Pest incidences in different valleys of Leh, Ladakh (UT) and asked that which valleys are severely affected due to these Insect-Pest incidences. He opined to focus on the most affected regions. He also queried about the areas visited before project formulation and areas of experimental trials. In response **Dr. Pawan Kumar** informed that the incidences of Insect-Pest outbreaks in Polar and Willow are prevalent in valleys *viz.*, Leh Valley, Nubra Valley in Ladakh UT and these incidences are on the rise with passage of time. He said that experimental trials in this project will be laid out in 1 hac area in different sites and the area will be selected in consultation with Forest Department of Ladakh UT. He also suggested to incorporate the time period from which Poplar and Willow are facing problem of defoliators along with reasons.
- Dr. S. S. Samant, Director HFRI and Chairperson said that *Salix* spp. and *Polar* spp. are the life- lines in cold and arid trans-Himalayan landscapes. The project has been envisaged to develop eco-friendly practices and packages for managing the Insects pest of these two important tree species of unique cold desert ecosystems.
- In response, Dr. Pawan Kumar informed that he is well answers about the study area and insect-pest incidences in different valleys of Ladakh will be documented.

Director, HFRI, Shimla asked the presenter to include all the suggestions given by RAG members before final submission of the proposal for RPC.

Whether the project has been modified as per RAG comments (if yes, give details)

Yes, the above given suggestions/comments have been included by the Principal Investigator in the project document.

Benefits of the project for the society (Not more than 100 words)

The study will help in developing eco-friendly techniques to control the insect pests prevailing in the cold deserts of the Ladakh. It is expected that the use of insecticides amalgamated with commercial biopesticides and plant extracts tailored with biocontrol agents will perform better in containing the pests of the region. So, the findings will help especially the local community of the region. Moreover, the forest Department is also involved in plantation of same species at large scale in its plantation programs, so the research findings of this study will be helpful at great extent to the Forest Department of the Ladakh (UT) also. The outcomes will be shared with Forest Department and local community involving different groups especially the women self help groups and which can be replicated easily in their plantations on larger scale. Capacity building training, Awareness programs and field demonstrations will be conducted for field functionaries of Forest Department and local community of the region.

Project No. N	il
Project title	
ICFRE Thrust Area:	ICFRE Theme:
	Index Score project (project prioritization score)
Name & Designation of the PI/ Co-PI	Budget outlay of the Project (Rs in lakhs):
	Duration (start & end date):
Name of Division:	No. of years:
	Score on Technical criteria of Project Assessment (out of 100):
Gap in knowledge identified:	
Long term objectives of the project:	
Short term objectives of the project:	
Novelty of Project:	
Relevance of the Project to the work already done:	
Deliverables at the end of the project:	
Summary of Comments of RAG:	
Whether the project has been modified as per RAG comments (if yes, give de	tails)

Table 6: Thrust area II- Biodiversity Conservation and ecological security

Table 7:	Thrust area	III-	Forest and	Climate	Change
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Project No.	Nil
Project title	
ICFRE Thrust Area:	ICFRE Theme:
	Index Score project (project prioritization score)
Name & Designation of the PI/ Co-PI	Budget outlay of the Project (Rs in lakhs):
	Duration (start & end date):
Name of Division:	No. of years:
	Score on Technical criteria of Project Assessment (out of 100):
Gap in knowledge identified:	
Long term objectives of the project:	
Short term objectives of the project:	
Novelty of Project:	
Relevance of the Project to the work already done:	
Deliverables at the end of the project:	
Summary of Comments of RAG:	
Whether the project has been modified as per RAG comments (if yes, give details)	
Benefits of the project for the society (Not more than 100 words):	

Table 8: Thrust area IV- Forest Genetics Resource Management and Tree Improvement

Project No.	1.									
Project title										
Identification	of superior genotypes of Olea ferruginea Royle bearing high oil	l content in North Western Himalayan Reg	jion and development of it	s propagation						
techniques										
ICFRE Thru	st Area	ICFRE Theme								
Forest Genetic	c Resource Management and Tree Improvement	Tree Improvement								
Name & Desig	gnation of the PI / Co-PI	Budget outlay of the Project (Rs in lakhs)- Rs. 31.76 lakhs								
PI-	Pravin Rawat, Scientist -B, Genetics & tree Improvement									
	Division	Duration (start & end date)-	April, 2022-March, 2026							
Co-PI-	Dr. Sandeep Sharma, Scientist-G, Silviculture & Forest	No. of years-	04 Years							
	management division									
	Dr. Balkrishna Tiwari, Scientist-B, Genetics & tree Improvement	Score on Technical criteria of Project Asso	essment (out of 100)-	84.21						
Name of Divis	sions- Genetics & tree Improvement Division									

Silviculture & Forest management division	
Name and cost of equipment proposed	Grafting budding and other nursery tools (Rs. 0.30 lakh)

Gap in knowledge identified

Studies on assessing species regeneration and identification of superior genotype for higher oil content has been conducted in past on small scale, which are lacking on development of commercial propagation techniques for production of improved quality planting material in mass. Considering the above mentioned facts in mind, there is an urgent need for the identification of superior genotype, development of propagation and cultivation technique and the selection of high oil yielding tree of *O. ferruginea* Royle in North Western Himalayan Region. It is also mentioned in the literature that the wild population of *O. ferruginea* Royle has low oil content than the cultivated population. Besides the genetic improvement by various means of selection and rejection methods, will also be undertaken in the present research proposal.

Long term objectives of the project

- > To domesticate the high yielding native Indian olive tree for commercial cultivation and conservation
- > To establish seedling seed orchard and clonal orchards of O. ferruginea

Short term objectives of the project

- > To survey and select superior genotype of *O. ferruginea* on the basis of morphometric traits for higher seed production
- > To identify high oil yielding individuals of *O. ferruginea*
- > To develop propagation techniques of *O. ferruginea* for mass production of nursery stock
- > To organize training and awareness programmes for the end user's

Novelty of Project

- Selection of high oil yielding population of *O. ferruginea*
- ➢ Genetic improvement of planting stock of O. ferruginea
- > Standardization of propagation technique for large scale commercial plantation

Relevance of the Project to the work already done

Identification of superior genotypes of Olea ferruginea Royle bearing high oil content in North Western Himalayan Region was not done earlier.

Deliverables at the end of the project

The identification of superior plus trees of O. ferruginea for higher seed production and oil yield.

Improved propagation techniques for mass multiplication, restore natural population and conservation of selected germplasm of indigenous olive species for posterity. The project findings will be published in the form of research papers/Conference papers and/or Booklet, which will help the personnel's of State Forest Departments and local people for adopting the species for afforestation on wasteland, community land and other agroforestry systems in Western Himalayan Region. Technology transfer to the personnel's of State Forest Departments and local people by organising two training programme programmes.

Summary of Comments of RAG

Sh. Pravin Rawat, Scientist - B, Genetic and Tree Improvement Division, started his presentation on research project entitled "**Identification of superior genotypes of** *Olea ferruginea* **Royle bearing high oil content in North Western Himalayan region and development of its propagation techniques**" and threw light on problem statement, review of literature, objectives, research methods, action plan, project cost, predicted outcomes of the proposed project. In his presentation he said *O. ferruginea* multipurpose native tree species of the Western Himalayan Region. As day by day increasing demand for olive oil, various efforts for introduction of *O. europaea* and its

cultivars through out the world. Although exotic olive genotypes performed well in Temperate Himalayan Region initially, but the production was low due to climatic differences. Despite of its multipurpose nature including drought tolerance, high economic value and wider adaptability, the species is underutilized. Thus, there is a need to identify superior plus trees of native olive species and development of its propagation techniques.

During the discussion on the proposal, the following suggestions were made for the refinement of the proposal before submission to RPC.

- **Dr. Sanjay Sood, IFS** said that the native olive species (*O. ferruginea*) is also found in good number in some parts of Uttarakhand. Hence, the apart from HP and J&K UT, the field surveys should be also conducted in these parts to select phenotypically superior trees.
- Dr. Lal Singh, Director, (HRG) sought information on the distribution of native olive species (*O. ferruginea*) in Himachal Pradesh. He provided information to the PI about exact locations the species in Mandi and Kullu districts of Himachal Pradesh.
- **Prof.** (**Retd.**) **S.P. Bhardwaj**, (**UHF**), **Nauni** talked about the packages of practices already developed for exotic olive (*O. europaea*) and recommends for studying all the populations of the native species. Then, **Dr. Sanjeev Thakur, Dean, UHF**, **Nauni** asked about criteria for selection of high fruit/ seed yield and plus trees of *O. ferruginea*. In response PI said that the selection will be done on the basis of morphometeric traits e.g., diameter class and height of the tree
- Expressing his comments on this project proposal, Sh. Vimal Kothiyal, ADG (R&P) said that as the native species of olive is distributed in parts of H.P., J&K UT and Uttarakhand, the review of the literature about earlier works on all aspects of this species should be carried out intensively. He also advised to bring out the outcome of the project clearly, reduce manpower, revise the budget and also advised to check the species is already included in AICRPs and FGR project or not for no duplication of work.
- Dr. S. S. Samant, Director HFRI said that taxonomic description is already included and reference from studies on *O. ferruginea* in Pakistan and Nepal will be included in the proposal.

Director, HFRI, Shimla asked the PI to incorporate the suggestions of RAG Members for refinement of the project proposal.

Whether the project has been modified as per RAG comments (if yes, give details) Yes, The suggestions of RAG members were included by the Principal Investigator.

Benefits of the project for the society (Not more than 100 words)

ICFRE will be pioneer to explore the diverse genotypes of *Olea ferruginea* with improved oil yield capacity and develop nursery propagation technique for mass multiplication of the species. The project work will generate the realistic information on improved genotype with respect to high oil content and standardized nursery propagation technique for mass multiplication of the species in the North Western Himalayan region. These outputs will help the farmers, State Forest Departments and other stakeholders to adopt the species not only for commercial utilization, but also for various afforestation and biodiversity conservation programme.

Project N	[0. 2.											
Studies on regulation and management of cone induction and seed yield in Pinus gerardiana Wall. ex D. Don populations in North Western Himalaya												
ICFRE Th	rust Area	ICFRE Theme										
Forest Gene	etic Resource Management and Tree Improvement	Biotechnology										
Name & Do	esignation of the PI / Co-PI	Budget outlay of the Project (Rs in lakhs)-	Rs. 56.27 lakhs									
PI-	Dr. Balkrishna Tiwari, Scientist-B, GTI	Duration (start & end date)-	April, 2022-March, 2027									
Co-PI-	Dr. Sandeep Sharma Scientist -G, SFM Sh. Pravin Rawat, Scientist-B, GTI	No. of years-	05 Years									

Name of Divisions-	Genetics & Tree Improvement Division Silviculture & Forest management Division	Score on Technical criteria of Project Assessment (out of 100)-	82.60
Name and cost of equi	pment proposed	1. Quantitative real-time PCR (QRT-PCR) (1 No.)	
		2. Autoclave (1 no.)	
		(Total 15.0 lakhs)	

Gap in knowledge identified

Information regarding the reproductive developmental process such phase change from juvenile to reproductive, initiation and differentiation of reproductive bud primordia and impact of environmental as well as internal factors on these processes in *P. gerardiana* is not well known. The information on hormonal and molecular regulation of reproductive development in gymnosperm is also very limited. Exogenous application of growth regulators promotes cone formation in many conifers, but their effect on *P. gerardiana* has not yet been studied.

Long term objectives of the project

> To develop strategies for regular seed production of *P. gerardiana* for its conservation and livelihood generation of tribal communities

Short term objectives of the project

- > To assess the impact of annual thermal oscillation, precipitation pattern and edaphic factors on cone production in *P. gerardiana*
- > To study the phenology, morphology and anatomy of vegetative and reproductive buds of *P. gerardiana*
- > To determine the role of metabolic and genetic regulation in induction of cones in *P. gerardiana*
- > To study the effect of exogenous application of growth regulators on cone formation and seed yield in *P. gerardiana*

Novelty of Project

First time an integrated metabolomics and transcriptomic approach will be used to understand the role of extrinsic and intrinsic factors in regulation of reproductive organ development in *P. gerardiana*. Mechanism underlying genetic regulation of cone initiation is still not known in *P. gerardiana*. Hence, the study will pave a new way in understanding the complex signaling of cone developmental processes and identification of candidate genes related to flowering. Since, work related to the artificial cone induction has not yet attempted in *P. gerardiana*; in this regard our approach will be novel to solve the problems related to regular seed production, seed orchard establishment, breeding and tree improvement programs.

Relevance of the Project to the work already done

Several works related to forest genetic resource characterization and conservation and tree improvement are going on in our organization. Works on genetic diversity analysis using isozymes, conservation and livelihood generation through scientific interventions in *P. gerardiana* have already been carried out at the Institution. The proposed work is a step forward to understand the various aspects of cone and seed production in *P. gerardiana* for artificial management of seed production. Our ultimate aim is to enhance the seed production for livelihood generation and to promote the conservation, management and tree improvement practices of *P. gerardiana*.

Deliverables at the end of the project

- The proposed work will help in understanding the correlation between climatic factors and reproductive developmental processes as well as quality seed production. Information related to pattern of mast-seeding phenomena and cone production potential of various *P. gerardiana* stands will help in prediction of productivity in a particular year.
- Precise phenological information related to cone initiation, differentiation and maturation will be generated and anatomical differences in male female and vegetative buds will be determined.
- The proposed metabolomic analysis will give a new insight into understanding the role of phytohormones and other metabolites in regulation of cone formation in *P. gerardiana*.
- > Transcriptome analysis will help in understanding the mechanism underling the genetic regulation of male and female cones formation.
- Identification of candidate genes related to reproductive developmental process and various other metabolic pathways will help in development of strategy for metabolic and genetic engineering to manipulate cone production in *P. gerardiana*.

- Transcriptome sequence data obtained from this study will facilitate further research in molecular biology. It can be used in development of more reliable SSR and SNP markers to estimate genetic diversities of *P. gerardiana* populations for conservation, breeding and tree improvement activities.
- A protocol for the artificial cone induction will be developed to manage the seed source/seed orchards of *P. gerardiana* for regular improved seed production. It will help in revenue generation by SFD and improve the earning of local tribal communities.

Summary of Comments of RAG

Dr. Bal Krishan Tiwari, Scientist-B, Genetic and Tree Improvement Division, started his presentation on research project entitled "Studies on regulation and management of cone induction and seed yield in *Pinus gerardiana* Wall. ex D. Don populations in North Western Himalaya" and threw light on problem statement, review of literature, objectives, research methods, action plan, project cost, predicted outcomes of the proposed project. In his presentation he said *P. gerardiana* is a coniferous tree endemic to the North Western Himalaya and despite of great economic, ecological and social value, Chilgoza forests are regularly declining and this species is at the risk of extinction due to lack of natural regeneration, habitat destruction due to developmental activities and climate change. Information on vegetative to reproductive phase changes and initiation as well as differentiation of cones are also very scanty for this species. Hence considering these proposed project is formulated with long term objective to develop strategies for regular seed production of *P. gerardiana* for its conservation and livelihood generation of tribal communities.

After the presentation, Director, HFRI invited RAG members for their valuable suggestions/comments for refinement of the proposal.

- Dr. Sanjay Sood, IFS commented that the study area should be clearly mentioned in the title of the project. He also emphasized to coordinate such research activities with other organizations and State Forest Department.
- Dr. Sanjeev Thakur, Dean, UHF, Nauni recommended to select the natural populations of *Pinus gerardiana* on the basis of diameter, class and age. He further suggested to ascertain the role of fertilizer in cone initiation and development.
- Dr. Meenu Sood, Professor & Head, Departt. of Forests products, College of Forestry, UHF, Nauni also recommended to mention the specific sites and treatments for conducting the experiments.
- Prof. (Retd.) T. N. Lakhanpal provided valuable inputs and advised the PI of the project to consult the painstaking work done by Prof. P.N. Mehra and Prof. Maheshwari on Pinaceae, in University of Delhi.
- Dr. K.S. Kanwal, Scientist In-Charge, GB Pant National Institute of Himalayan Environment, Himachal Regional Centre, Mohal Kullu (H.P.) who was virtually attending the meeting endorsed the concept of the project proposal and appreciated the scientist for preparing it nicely and meticulously.
- Sh. Vimal Kothiyal, ADG (R&P) raised query on the requirement of Junior Research Fellow (JPF) and Senior Project Fellow (SPF) in this project. He reiterated that additional manpower escalates the project cost. Therefore, one project fellow or field assistant may be proposed under the project and new Scientist should work out the budget in consultation with the Senior Scientists in the Institute to avoid over budgeting or under budgeting.

Director, HFRI, Shimla asked the presenter to include all the suggestions given by RAG members before final submission of the proposal for RPC.

Whether the project has been modified as per RAG comments (if yes, give details)

Yes, the above given suggestions/comments have been included by the Principal Investigator in the project document.

Benefits of the project for the society (Not more than 100 words)

The State Forest Department and local tribal communities will also be benefited by our work. The protocol for artificial cone production will be optimized on selected trees in a small population but it could be used at the larger scale for management of seed orchards/seed source for regular quality seed production of *P. gerardiana*. It will help to scale up the afforestation and reforestation activities of the State Forest Department in Jammu and Kashmir Union Territory and Himachal Pradesh states of India. It will also enhance the annual income of local tribal community.

Project No. 3.

Testing of selected superior strains of Picrorhiza kurroa Royle ex Benth. and Valeriana jatamansi Jones through regional and national level multilocation trial to

release their varieties for the benefit of the farming communities										
ICFRE Thrust Area	ICFRE Theme									
Forest Genetic Resource Management and Tree Improvement	Conservation of Forest Genetic Resources									
Name & Designation of the PI / Co-PI	Budget outlay of the Project (Rs in lakhs)- Rs. 41.77 lakhs									
PI-Dr. Balkrishna Tiwari, Scientist-B, GTICo-PI-Dr. Jagdish Singh, Scientist-F, Extension Division	Duration (start & end date)-	April, 2022-March, 2027								
	No. of years-	05 Years								
Name of Divisions-Genetics & Tree Improvement Division										
Extension Division	Score on Technical criteria of Project Assessn	nent (out of 100)- 82.56								
Name and cost of equipment proposed:	NIL									

Gap in knowledge identified

Except a few, there is no any potent variety of *P. kurroa*, and *V. jatamansi* available for commercial cultivation by the pharming communities. Thus, there is need to develop more potent and region-specific varieties of both the species to promote their cultivation. There is also need to put an extra effort to generate awareness among the small and marginal pharming communities to promote cultivation of best performing varieties of both the species for sustainable yield and livelihood generation.

Long term objectives of the project

> To release variety of *P. kurroa* and *V. jatamansi* for commercial cultivation and livelihood generation

Short term objectives of the project

- > To establish regional and national level multilocation trial of *Picrorhiza kurroa* and *Valerian jatamansi* to release their variety
- > To evaluate the stability for *a.i.* content and postharvest growth characteristics of superior strains of *P. kurroa* and *V. jatamansi*
- > To create awareness among different stakeholders regarding the released varieties of the medicinal plants

Novelty of the Project

For commercial cultivation of a crop in a particular region, specific varieties with sustainability in yield are always required. Although, several agencies are making efforts to promote medicinal plants cultivation, lack of approved variety for cultivation has been observed as a major constrain. Thus, the project is novel in the way that we are proposing to release the best performing candidate strains of *P. kurroa* and *V. jatamansi* available at the Institution as a variety. It is an attempt to transferring the research from lab to land for ensuring sustainability in the yield and income generation to farming community.

Relevance of the Project to the work already done

The Himalayan Forest Research Institute, Shimla has been working on medicinal plants since last one and half decade. The Institute was mainly involved in detailed survey of cold deserts and alpine areas particularly for assessing the availability of medicinal plants and establishment of Herbarium. Recently the institute has embarked upon collection and maintenance of germplasm of medicinal plants of economic importance of temperate Himalayas and development/improvement of agro-techniques for their commercial cultivation. HFRI is now in a position to handle higher temperate medicinal plants project having expertise as well as field stations to cater to the specific requirements of those species. At Shillaru near Narkanda (H.P.), the Institute has 0.5 ha nursery presently being used extensively for various medicinal plants specific activities. Similarly, at Brundhar near Manali, the Institute has around 3.0 ha. Nursery and also at Shilly Solan has around 1.5 ha nursery mainly dedicated to medicinal plants activities. The nurseries are also equipped with facilities like Poly House, Shade House and various modern nursery tools to raise quality planting stocks of the selected medicinal plants. All these medicinal plant species have very good domestic as well as international market. Therefore, it is right time to release the candidate strains as varieties and extended to the farming community of temperate Himalayas through active extension programmes.

Deliverables at the end of the project

Role of genetic and environmental factors on growth as well as yield of the selected strains will be determined.

Based on information regarding stability in a.i. content under varied cultivation conditions, the most suitable sites will be recommended for the commercial cultivation of selected medicinal plants. New strains of *P. kurroa* and *V. jatamansi* superior over existing varieties will be released for commercial cultivation on farm lands. Awareness regarding the region-specific best varieties of *P. kurroa* and *V. jatamansi* will be created among the stakeholders. It will lead to productivity enhancement and livelihood generation of rural marginal farmers.

Summary of Comments of RAG

Dr. Bal Krishan Tiwari, Scientist -B, also presented his second project proposal, with project entitled **"Testing of selected superior strains of** *Picrorhiza kurroa* **Royle ex Benth. and** *Valeriana jatamansi* **Jones through regional and national level multilocation trial to release their varieties for the benefit of the farming communities"** and threw light on problem statement, review of literature, objectives, research methods, action plan, project cost, predicted outcomes of the proposed project. In his presentation he said *Picrorhiza kurroa* and *Valeriana jatamansi* are the most important medicinal plants of Western Himalayas extensively used in the pharmaceutical industries. Due to their high demand in the national and international market these plants are over exploited from their natural habitats and have become endangered. Thus development of genetically superior varieties and commercial cultivation close to the natural settings is needed for conservation of the species, fulfilling increasing industrial demand and for improving livelihood of farming communities.

After the presentation, Director, HFRI invited RAG members for their valuable suggestions/comments for refinement of the proposal.

- **Dr. Sanjay Sood, IFS,** put forth his view point that since the project proposed by the scientist is basically an extension project, so it should be executed in the collaboration with State Forest Department. He suggested the laboratory related work under this project can be done by the Institute and field work e.g., raising of trials, collection of data, recording /monitoring of growth parameters can be performed in the nurseries of Forest Department.
- Dr. Lal Singh, Director, (HRG) said that the thrust of the project is to release new varieties of *P. kurroa* and *V. jatamansi*. Evidently, it is needed to go for cultivation with the involvement of community to increase credibility in the market. He also raised concerns about the problems arising at marketing time of medicinal plants.
- Sh. Surinder Mohan Gupta, Proprietor, Natural Products, added that considerable variation is found in chemical constituents and active ingredient content of medicinal plants according to different locations. He substantiated the statement by citing example of *V. jatamansi* found in Salooni region of Chamba district and Barot area of district Mandi in Himachal Pradesh. He asked about the criteria for selection of best planting material of *V. jatamansi*.
- Dr. Jagdish Singh, Scientist –F, HFRI apprised that the work on screening of best strains of these two medicinal plants has done by HFRI and superior strains from Himachal Pradesh and Jammu & Kashmir UT have already been identified. He further enlightened that multiplication trials at regional as well as national level are required for establishment and release a variety.
- Dr. Meenu Sood, Professor & Head, UHF, Nauni explained about the perennial nature of these plants and suggested to set up three times replications during field trials
- Sh. Vimal Kotiyal, ADG (R&P) exhorted to consult and follow thoroughly all the guidelines related to testing of release of new varieties. Indicating the excess budget proposed under FRE head in this project, he advised for assessment of budget properly and reasonably.

Director, HFRI, Shimla asked the PI to include all the suggestions given by RAG members before final submission of the proposal for RPC.

Whether the project has been modified as per RAG comments (if yes, give details):

Yes, the above given suggestions/comments have been included by the Principal Investigator in the project document.

Benefits of the project for the society (Not more than 100 words):

The research findings in the end of the project can be replicated in other areas of high hill temperate regions of H.P., J&K UT and Uttrakhand. The package and practices and varieties developed for commercial cultivation of these selected medicinal plants needs to be disseminated among different stakeholders in the above-mentioned states so that more and more farmers come forward to take up the cultivation of medicinal plants, which will lead to productivity enhancement and livelihood generation of rural marginal farmers besides conservation and protection of the species.

Form-6

Thrust area wise summary of New Research Projects proposed by the ICFRE Institutes for 2022-23

NAME OF THE INSTITUTE: HIMALAYAN FOREST RESEARCH INSTITUT	ſE	Man Power (give number only)									
THRUST AREA	No of Projects	RA	SRF	JRF	JPF	PA	FA	ТА	Con.	DEO	Total
Managing Forests & Forest Products for Livelihood Support and Economic Growth	02				02		01				03
Biodiversity Conservation & Ecological Security	-										
Forests and Climate Change											
Forest Genetic Resource Management & Tree Improvement	03				03						03
Total Projects	05	-			05	-	01				06
RA: Research Associate, SRF: Senior Research Fellow, JF Assistant, Con: Consultant DEO: 1	RF: Junior R Data Entry (esearch Fellow, PA: Project Assistant, FA: Field Assistant, TA: Technical Dperator, JPF/SPF: Junior/Senior Project Fellow							hnical		

Note: Give number only. Figures should match with Form 7 (Tables 9-12)

Thrust area wise list of NEW Projects and Detailed budget for 2022-23

	Thrust area wise list of NEW RESEARCH PROJECTS													
	Thrust area I: Managing Fore	sts and Fo	orests Pro	oducts for	livelihood	suppo	rt & eco	nomic gro	wth					
S. No.	Project title/ PI/ Duration (Start and end year)		Total c	ost of the]	Project (R	s. in La	akhs)	Details	s of budg	Rs. in	Required Manpower			
		khs)				1		or 10 to		Sub-head 2	wise brea 022-2023	kup for		(RA/SRF/ JRF/JPF/ PA/ FA
		Total cost (Rs. in La (sum of 4 to 8)	Consumables (M&S)	Research Expenditure (FRE)	Travel And Conveyance (Res)- TE	Capital (Scientific Equipments)	Fellowship	Budget required f 2022-2023 (Sum of 1 14)	Consumables (M&S)	Research Expenditure (FRE)	Travel And Conveyance (Res)- TE	Capital (Scientific Equipments)	Fellowship	etc.)
1	<u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> <u>11</u> <u>12</u> <u>13</u> <u>14</u>											15		
I II) Institute: Himalayan Forest Research Institute, Shimla														
1.	Studies on mycorrhizal relationship of <i>Juniperus</i> <i>polycarpos</i> C. Koch and impact of mycorrhizal inoculations on its performance under nursery and field conditions PI: Dr. Ashwani Tapwal, Scientist-F Duration: 5 Years Start and end year: April, 2022-March, 2027	42.81	6.30	11.75	9.50	1.00	14.26	9.12	2.50	1.50	1.50	1.00	2.62	JPF-01
2.	Insect-pests incidences on Poplar and Willow in Ladakh U.T. and their ecofriendly	51.10	3.00	7.00	12.50	5.00	23.60	13.22	0.50	1.00	2.00	5.00	4.72	JPF-01 FA-01

Table 9: Thrust area I-Managing Forests and Forests Products for Livelihood Support & Economic Growth

management							
PI: Dr. Pawan Kumar, Scientist-E							
Duration: 5 Years							
Start and end year: April, 2022-March, 2027							

Table 10: Thrust area II- Biodiversity conservation and ecological security: NIL

	Thrust area wise list of NEW RESEARCH PROJECTS															
Thru	ıst area II- Biodiversity cons	servatior	n and ec	ological	security											
S. Project title/PI/Duration Total cost of the Project (Rs. in Lakhs) Details of budget required for 2022-2023 (Rs. in lakhs)												(Rs. in lakhs)	Required			
No.	(Start and end year)	()	Sub-h	ead wise	breakup	of total	cost	0		Sub	-head wise	breaku	p for	Manpower		
		khs			1			o t			2022-	2023	•	(RA/SRF/ JRF/		
		ost (Rs. in Lal im of 4 to 8)	umables A&S)	search iture (FRE)	vel And ance (Res)- TE	vel And ance (Res)- TE I (Scientific ipments) lowship		et required fo 23 (Sum of 1 14)	sumables M&S) search liture (FRE) vel And		vel And ance (Res)- TE	l (Scientific ipments) lowship		PA/ FA etc.)		
		Total co (su	Cons (N	Re Expendi	Tra Convey	Capital Equi	Fell	Budg 2022-20	Cons (N	Re Expendi	Tra Convey	Capital Equi	Fell			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
]	I) Institute: Himalayan Forest Research Institute, Shimla															
	NA															

Infust area wise list of NEW RESEARCH PROJECTS														
Thru	st area III- Forest and Climate Change													
S.	Project title/PI/Duration (Start and end	Total co	ost of th	e Project	(Rs. in La	khs)		Detail	s of bud	lget req	uired for	2022-20	023	Required
No.	year)		1							(Rs. in l	akhs)			Manpower
			Sub-h	nead wise	breakup o	f total co	ost		Sı	ib-head	wise bre	eakup fo	r	(RA/SRF/
		hs)			1		1	1 21		2	022-2023	3		JRF/ PA/ FA
													etc.)	
		S. i 4 1	S	end	nd Res	ent nts)	uip	red of 1	S	end	nd Res	ent nts)	uip	
		t (R	oles	E	e (]	Sci mei	wsh	int	oles	Å X	Ы А е (]	Sci	wsh	
		cost	nab	h E	ave anc	al (uip	llo	re (Su	nab	h E	ave anc	al (uip	llo	
			uns	arc	Tr vey	Dit: Eq1	Fe	get 22	uns	arc	Tr vey	pit: Eq1	Fe	
		Tot	on	ese	onv	Ca		ud 20	on	ese	onv	Ca		
		-	0	Ř	Ŭ			Ħ	0	R	Ŭ			
1	2	3 4 5 6 7 8 9 10 11 12 13 14										15		
I	I) Institute:													
	NA													

Table 11: Thrust area III- Forest and Climate Change: NIL Thrust area wise list of NEW RESEARCH PROJECTS

	Thrust area wise list of NEW RESEARCH PROJECTS													
Thru	st area IV- Forest Genetic Resource Manage	ment and	l Tree Iı	nproven	nent									
S. No.	Project title/PI/Duration (Start and end year)	Total c	ost of th Sub-he	e Projec	t (Rs. in breakup	Lakhs) of total	cost	Detai	ils of bu	Required Manpower (RA/SRF/ JRF/				
		(Su	545 14					1) 2 0-		2	2021-202	2		PA/ FA etc.)
		Total cost (Rs. in Lakl (sum of 4 to 8)	Consumables (M&S)	Research Expenditure (FRE)	Travel And Conveyance (Res)-TE	Capital (Scientific Equipments)	Fellowship	Budget required for 20 2021 (Sum of 10 to 14	Consumables (M&S)	Research Expenditure (FRE)	Travel And Conveyance (Res)-TE	Capital (Scientific Equipments)	Fellowship	
1 2 3 4 5 6 7 8 9 10 11 12 13 14											15			
Institute: Himalayan Forest Research Institute, Shimla														
1.	Identification of superior genotypes of <i>Olea</i> <i>ferruginea</i> Royle bearing high oil content in North Western Himalayan Region and development of its propagation techniques PI: Sh. Pravin Rawat, Scientist -B	31.76	2.20	10.00	8.00	0.30	11.26	7.42	0.50	2.50	1.50	0.30	2.62	JPF-01
	Duration: 04 Years													
	Start and end year: April, 2022- March, 2026													
2.	Studies on regulation and management of cone induction and seed yield in <i>Pinus</i> <i>gerardiana</i> Wall. ex D. Don PI: Dr. Balkrishna Tiwari, Scientist-B	56.27	7.00	12.25	7.75	15.00	14.27	22.87	2.00	1.25	2.00	15.00	2.62	JPF-01
	Duration: 5 Years													

Table 12: Thrust area IV- Forest Genetic Resource Management and Tree Improvement

	Start and end year: April, 2022-March, 2027													
3.	Testing of selected superior strains of <i>Picrorhiza kurroa</i> Royle ex Benth. and <i>Valeriana jatamansi</i> Jones through regional and national level multilocation trial to release their varieties for the benefit of the farming communities.	41.77	6.00	12.50	9.00	0	14.27	5.87	0.75	1.00	1.50	0	2.62	JPF-01
	 PI: Dr. Balkrishna Tiwari, Scientist-B Duration: 5 Years Start and end year: April, 2022-March, 2027 													

Table: Tentative total budget requirements (Ongoing, Ongoing with Change Request and New Research Projects) for 2022-2023of ICFRE Institutes (Rs in lakhs)

Sl. No	Institutes	Consumables (M & S)	Consumables (M & S) Research Expenditure (FRE)		Capital (Scientific Equipments)	Fellowship	Total (A)				
		Requirements of research projects									
1	Ongoing Projects	3.80	11.75	8.95	0	31.48	55.98				
2	Ongoing with CHANGE REQUEST	1.50	2.75	2.50	0	9.44	16.19				
3	New Projects (For first year of the project)	6.25	7.25	8.50	21.30	15.20	58.50				

Institute: Himalayan Forest Research Institute, Shimla

Note: Total should match with Form No. 1(Tables 1-4), 2 and 7(Tables 9-12).

Form-9

Table:Budget required for 2022-2023 for research activities other than research projects (Rs in lakhs)Name of the Institute:Himalayan Forest Research Institute, Shimla (H.P.)

SI. No	Proposed Activities	Consumables (M & S)	Research expenditure (FRE)		Travel and conveyance (Res) - TE	Capital (Scientific	Equipments)	Maintenance of equipments used in research	RAG Meetings	Total
			General FRE	Engagement of unskilled / skilled worker (other than research projects)		Part of Approved research projects*	Not part of research projects			
1.	e.g. Maintenance of Nurseries	4.00*								4.00
2.	Maintenance of plantation, research plots	2.00**								2.00
3.	Maintenance of scientific equipments, labs							06.00		06.00
4.	Maintenance of field station			14.04***	3.00****					17.04
5.	Working Plan									
6.	Seed bank									
7.	Patent fees									
8.	RAG Meeting								02.00	02.00
	Total	6.00		14.04	3.00			06.00	02.00	31.04

Note:

*Figure should match with requirement of research projects.

While giving the requirements, Institutes are requested to include their Research Centers also.

Justification: Provide proper detailed justification on separate sheet for the above budget requirement.

This table is for budget requirement for maintenance of nurseries/plantation/research plots, maintenance of scientific instruments, maintenance of laboratories, maintenance of field stations, laboratories, equipments, seed bank, patent fees and working plan etc.

Examples under proposed activities are given, may vary from Institute to Institute. The budget in this table will be discussed during RPC. Directors therefore are requested to come prepared.

Justification for the above budget requirement

- * Denotes the budget required for repairing /maintenance of infrastructure of various nurseries, etc.
- ** Denotes the budget required for purchase of FYM etc. and maintenance of research plantations
- *** Denotes the budget required for the engagement of labour for maintenance of Field research stations/nurseries. (9 nos X 12 months X @13000/- per month= 14.04)

****Denotes the budget required for visits to Field research stations/nurseries regarding proper supervision by Incharge/ HoDs/GCR/ Director.

CONCLUDING REMARKS

Dr. Sandeep Sharma, GCR informed that there is no proposal for any mid-term modifications in the approved projects.

At the end, **Dr. S.S. Samant, Director, HFRI, Shimla** and **Chairman, RAG** once again thanked the Hon'ble Members of RAG to attend this important meeting. **Director, HFRI** requested all the RAG Members to give their overview about the ongoing research projects and on the new research projects.

Dr. K.S. Kanwal, extended thanks to Chairman, RAG and PIs for nice presentation of the new project proposals. He further added that Himachal Regional center of GBPNIHESD, Alomora can extend its possible collaborations with HFRI, Shimla in any DBT funded project for the betterment of both the Institutes.

Sh. Rajesh Kumar Guleria and Sh. Surender Mohan Gupta said that the project proposals were community oriented and well presented by the PI.

Sh. Gupta said that *Olea ferruginea* has tremendous benefits to health and this project have communities' benefits also. Adding to that Chairman RAG, said that this species is also stress tolerant and GCR & Co-PI also added that grafting technique of *Olea ferruginea* will be undertaken in second phase of the project.

Dr. Lal Singh in his closing remarks said that Forest Department is main stakeholder but local communities are also very important, therefore, exchange of the new concept linkages with the social sector is very important. Signing of MoUs with social sector with mutual interest can help in achieving the goal of sustainable development. Institute can collaborate with NGOs and other Government organizations in 3-4 different geographical regions of the mandated State and UTs, so the technology showcase of the Institute will become more social centric and research ideas can also be redefined in new ways and at the end, it will become more understandable to the local communities.

Dr. Mohar Singh, suggested that gene pool is very important for identification and selection of the species and further, he stressed that NBPGR Phagli, Shimla is keen to collaborate with HFRI for material introduction and gene pool selection. He also added that HFRI should work and can take up GI Status of Chilgoza.

Dr. S.P. Bhardwaj while agreeing with the suggestions of Dr. Singh said that outcome of the projects must be beneficial to the end users, including communities which will not only help in improving their livelihoods, but also help in adding values to the State.

Dr. Sanjay Sood, emphasized that it is now time to develop linkages with other sister organizations and universities of State and UTs so that something fruitful can be delivered to the society.

Prof. A.K. Bhatt in his closing remarks said that although new research proposals were community based covering various end users field functionaries and resource users, but they should be more market oriented. Citing examples of medicinal plants demand and supply, he emphasized that such type of research will not only prove beneficial to the Institute, but, it could improve livelihood of the local peoples.

Dr. Menu Sood, highlighted upon the missing linkages of new project proposals with the communities.

Dr. D.P. Sharma told that HFRI should look into mapping of carbon sequestration potential of Ladakh region, which will not only help the Institute, but also for policy makers.

Dr. Vimal Kothiyal, ADG (RP) while highlighting the issues of variety release, said that only those varieties would be suitable to release which has some market potential and before the release of variety, we must follow the procedures critically and meticulously with all the required practices and seed certification manual. Such things must be simultaneously done before release of any variety or clone. On behalf of the DG, ICFRE, he formally thanked all the RAG Members for making the Meeting fruitful.

Dr. Samant, Chairman RAG said that due care will be taken of comments and suggestions of RAG Members and will be incorporated in the new project proposals. Replying to the community part suggestions of RAG members, he further added that although ICFRE and HFRI have network with various Universities, Govt. and NGOs to strengthen the R&D and extension activities, but in near future, the Institute will have definitely more MoUs of collaborations with such organizations and will implement them at the ground level for fruitful results. He further added that soon the Institute will have discussion with L.G. Ladakh, UT for carbon neutrality, which will be beneficial for both Institute and Ladakh UT. He again thanked all the RAG Members for their active participation, furnishing valuable comments/ suggestions and inputs, which will definitely prove beneficial for the strengthening of R&D activities of the Institute.

VOTE OF THANKS

At the end, **Dr. Sandeep Sharma, Scientist-G, Group Coordinator Research and Member Secretary, RAG** extended Vote of Thanks to the Hon'ble Members of RAG and other distinguished participants for sharing their experience and providing best suggestions for fine tuning of the proposed research proposals. He thanked all the Hon'ble members of RAG including ADG (RP) for giving valuable suggestions and critically evaluating the new proposals. He added that the Scientists of this Institute will definitely be benefited from the fruitful interactions held during the day. He also thanked the Director, HFRI and the team of Research Coordination Division and IT Cell of the Institute for making this event a success. He further extended his thanks to all the speakers and participants of RAG for making this Meeting meaningful and fruitful.




