



## PROCEEDINGS OF XXVI<sup>th</sup> ANNUAL RESEARCH ADVISORY GROUP (RAG) MEETING OF ICFRE-HIMALAYAN FOREST RESEARCH INSTITUTE HELD ON 22 SEPTEMBER, 2025

The XXVI<sup>th</sup> annual **Research Advisory Group (RAG) Meeting** of ICFRE- Himalayan Forest Research Institute (HFRI), Shimla was held in the conference hall of the institute on 22 September, 2025. At the outset, In the beginning, **Ms. Savita Kumari Banyal**, Chief Technical Officer welcomed all RAG members and apprised about genesis and objectives of RAG meeting. She also apprised the members that **Dr. Sandeep Sharma, Director (In-Charge)**, ICFRE-HFRI will chair this RAG meeting.



Thereafter, **Dr. Sandeep Sharma**, Director (In-Charge) & chairman of the meeting extended warm welcome to all the distinguished RAG members present physically and those who were connected virtually. In the opening remarks, he succinctly highlighted research achievements of institute aligning with its mandate and major thrust areas. He apprised the members about different plant based products developed by HFRI like mycorrhizal biofertilizer (Him Mrida Sanjeevani ), bio-fungicide(Him Tricho Kawach), mycorrhizal biofertilizer (Himgrowth booster) and bio-pesticide (Him-Albiwash), Him-Biokil-1 and five (05) varieties of important temperate medicinal plants (*Valeriana jatamansi*, *Picrorhiza kurroa*, and *Podophyllum hexandrum*) released by the institute. He told that six (06) new project proposals under various themes are to be presented before the RAG. Underscoring the significance of inputs /suggestions of expert RAG members for fine tuning of new research proposals, he requested RAG members to evaluate all project proposals critically and actively take part in the discussions for next level improvement. Further he explained criteria of evaluation of projects and informed that after thorough discussions and modifications of project in RAG, projects would be further submitted to Research Policy Committee (RPC) at the ICFRE, Dehradun for consideration and grant of funds.



Then, **Dr. R.K. Verma, Scientist-G** made an illustrative

presentation about institute and brought out its genesis from a conifer research centre (CRC) to the level of institute. He talked about the organisation structure, infrastructure, research facilities, Field Research Station(FRS), current Research and Development (R&D) activities, extension programmes, *etc.* He presented the overview of the past and on-going projects, all India coordinated Research Projects (AICRPs), externally aided projects (EAPs), consultancies executed by ICFRE- Himalayan Forest Research Institute, Shimla. **Dr. Verma** also concisely summed up the salient achievements under different on- going research projects.

Addressing the participants of the meeting, **Dr. P.S.**

**Rawat, ADG (R&P),** ICFRE, Dehradun welcomed the eminent members of the RAG. He said that Research Advisory Group (RAG) is the apex body at institute level to discuss the new research proposals and reframe concepts in terms of stakeholder's



perspective and needs. He threw light on significance of developing synergy in research and insisted for capitalising on external funding for research. Apart from that, ADG (R&P) requested Scientists/Principal Investigators to gauge the actual research needs of society and target benefit of end users as final outcome of research projects. At the same, he requested learned members of RAG to methodically examine all the proposals and provide valuable comments so that objective of applied research in forestry sector can be achieved. He added that the discussions and deliberations held during the meeting will be immensely fruitful for project proponents/Pis to reshape different aspects of research proposals in consonance with suggestions / recommendations of RAG members.

### **Technical session-I (New Research Proposals):**

The chairman sought permission of the ADG (R&P) to start the session and instructed PIs to present the research proposals before the RAG members particularly focussing on clear cut objectives, scientifically validated methodology, budget and outcomes/potential benefits for stakeholders.

In the technical session of the RAG, **total six (06) new research projects proposals were presented by the scientists of ICFRE-HFRI.**

**Project 1: “Investigate the factors promoting the changes in insect pests dynamics attacking selected conifer forests of NW Indian Himalaya and develop effective management practices against serious insect pests”.**

First of all, **Dr. Pawan Kumar**, Scientist- F, Forest Protection division presented the research project titled “**Investigate the factors promoting the changes in insect pests dynamics attacking selected conifer forests of NW Indian Himalaya and develop effective management practices against serious insect pests**”



The PI explicated the problem statement in light of epidemic outbreaks of insect pest attack causing widespread mortality of important conifer tree species viz., *Abies pindrow* (Silver fir), *Picea smitihiana* (Spruce) and *Pinus gardiana* (Chilgoza-pine) in various parts of H.P. and UT J&K. The PI apprised the RAG members about the frequent correspondence received from forest divisions of H.P.

and UT J&K on insect pests attacks and mortality of trees of conifer species. **PI** showed concern about the severity of the insect-pest attack problem across NW Himalayas and nicely related the context of changing climatic conditions proving conducive for rapid proliferation of insect pests and increase in their population. Explaining the details of the proposed work, the PI outlined the short term and long term objectives, study area, methodology, experimental design/statistical analysis and expected outcome from the research work. The PI proposed that the project will be carried with in collaboration with Forest Survey of India (FSI) for development of comprehensive database using GIS tools and techniques. He strongly emphasized need of the study for formulating cost effective ecofriendly strategies to manage the unique forest ecosystems of NW Himalayas. After the presentation, chairman requested the RAG members to evaluate the project proposal and provide their inputs/comments.



Starting the discussion on the project proposal, **Dr. Harinder Singh Banyal**, Chairman, department of Bio-sciences, Himachal Pradesh University, Shimla appreciated the idea and said that it is very pertinent topic for study as conifers are important tree species. He endorsed that study is essentially required to assess population dynamics of insect pests attacking conifer species in fragile

Himalayan region. Nevertheless, he asked the PI to identify the existing research gaps and provide information about the the group of insects to be targeted by PI in the proposed project.

The concerned Principal Investigator (PI) responded that limited work has been done related to impact of biotic and abiotic factors on the population dynamics of insect pests in natural forests.

He added even minor pests are causing potential damage to the trees species due to changing climatic scenario and self-defence mechanism of plants is becoming less effective against wide

spectrum of insect and pests. The PI said that GIS based studies on symptomology and damage status in natural forests of selected conifer species will be taken up in the project. He informed that insect pests belonging to Coleoptera, Hymenoptera and Lepidoptera orders will be focussed for assessment of population dynamics.

**Dr. Lal Singh, Director**, Himalayan Forest Research Group (HRG) pointed out that the title of the project is too long and needs to be shortened or reframed. He said that GIS objective of the project is masking other objectives and PI should clearly describe its effectiveness in the study. In addition to this, he was also interested to know about potential sites selected for study and examples of insects pests not studied on these aspects.

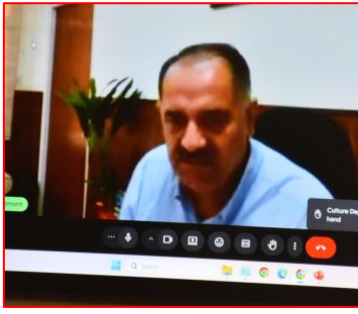


Answering the queries, **Dr. Pawan Kumar** asserted that data generated using GIS tools will help in developing long term conservation of the forests of NW Himalaya on specific locations. He said that GIS objective will be achieved in collaboration with HIMCOSTE and FSI.

**Dr. D.P. Sharma**, Professor (Retd.), UHF Nauli, Solan, asked PI to explain the extent of area to be selected for the proposed study. He apprehended that GIS tools are effectively applicable for larger area. In response to the query, the PI informed that field trials will be conducted on natural forests of selected species of conifers viz., *Abies pindrow*, *Picea smithiana* and *Pinus gerardiana* in Shimla, Chamba and Kullu forest divisions of H.P and Marwah forest divisions of (J&K). He further added that GIS mapping of the area will provide baseline information for assessing the extent of damage due to biotic and abiotic components in natural forests.

**Smt. Upasna Patiyal**, IFS, APCCF, HPSFD, Talland, Shimla, who was connected on-line to the meeting praised the PI for selecting interesting topic for study and said careful examination of baseline data of meteorological parameters is important in view of the frequent changes taking place in climate. She stressed to look into the retrogressive as well as forthcoming dimensions of the study. In addition to this, She enquired that why PI has proposed the use of **Horticultural Mineral Oils (HMOs)** as bio-pesticides even though HFRI has developed a couple of bio-pesticides as well.

Dr. Pawan Kumar, PI of the project replied that project proposes to investigate symptomology and typology of causative species of insect pests using **Horticultural Mineral Oils (HMOs)** as its efficacy has already been tried and tested and results are very encouraging. Apart from that, natural enemies like parasite, predators, and parasitoids will also be isolated and tried for control of insect pests and comparative assessment will be done.



**Sh. B.M. Sharma**, Principal Secretary, Cultural department, UT J&K, was virtually connected to the meeting. He opined that mortality of conifers species have also been reported due to other micro-organisms including fungi, *etc.* He suggested to expand the scope of the study on holistic or integrated lines covering more ecological aspects.

**Dr. C.L. Thakur**, Dean, College of Forestry, Nauni, Solan requested the PI to clarify difference between the proposed project and earlier works done by him on insect pest management.

Dr. Pawan told that selected species are altogether different and study will be implemented in natural forests while previous works were mostly confined to nursery or plantation forests.

**Dr. Sanjeev Thakur**, Retired Dean, UHF, Nauni, Solan raised doubt on the budgetary part and said it may be insufficient considering the number of sites and area. He suggested PI to work out the cost of treatment per unit area and make proportionate changes in the proposed budget component for smooth implementation of project activities.



**Dr. Mohar Singh Thakur**, Scientist, ICAR, NBPGR, Phagli, observed that changing climatic conditions are mediating the emergence of new insects and asked the PI to explain the validity and bonafide mechanism to be followed for the correct identification of different insect pests. The PI said that identification will be done on the basis of taxonomic keys and help of expert scientist from

Zoological Survey of India (ZSI), Solan will be taken on this aspect.



**Dr. Avatar Kaur**, Principal Scientist, ZSI, Solan joined the discussion and consented to help HFRI in authentic identification of insect pests to be investigated in the proposed project. Simultaneously, she expressed concern about the quantum of field work to be done for studying the complete biology and life-cycle of

insect pests and suggested PI to take services of Junior Project Fellow/ Project Assistant for executing the extensive field activities / Lab work.

**Dr. S.P. Bhardwaj**, Retd. Professor and Ex-Dean College of Forestry, University of Horticulture and Forestry (UHF), Nauni said that study is utmost important for conservation of forests. He advised that title of the project should be terse and telling. He also highlighted



the significance of correlation of precipitation, humidity and temperature related weather data with the emergence of insect/ pests and emphasised exact selection of area where the real problem of insect pest incidences exist. Moreover, the veteran academician specified that drying of trees in forests is not effected by single factor and inclusion of experts from other domain will be helpful. He also said that bio-pesticides for controlling the insect pest should be studied on exponential basis and more emphasis should be done on green pesticides.



**Sh. Prabhu Dayal Sharma**, progressive farmer and Executive Director, Parvtiya Jan Shiksha Evam Vikas Sangthan, Bag Pashog, established the connection of proposed study with the agricultural crops and raised serious concerns about damage caused by insect pests to the agri- crops. He also requested to share the findings of the study with farmers. The PI said that awareness/ training

programmes has been proposed under the project and findings will be shared by developing printing material, booklets, brochures, *etc.*

Finally, **Dr. P.S. Rawat, ADG(R&P)** expressed his remarks on the project proposal saying that it is an ambitious project to study the behaviour and changes of insects pests of forestry species in current scenario. He agreed that identification of serious pests in selected area and suggesting appropriate management strategy will be very useful for the stakeholders. He asked PI to modify the title, synergise short term and long term objectives and suggest effective management strategies/eco-friendly control measures. Besides, he put forward the idea to prepare a mega integrated project on same lines and submit for funding to other agencies.

## **Project 2: “Assessment of floristic diversity in Sechu Tuan Nalla Wildlife Sanctuary, Himachal Pradesh”**

**Dr. Ranjeet Kumar, Scientist-F**, Forest Ecology and Climate Change(FE&CC) division, presented the next research project proposal titled ‘**Assessment of floristic diversity in Sechu Tuan Nalla Wildlife Sanctuary, Himachal Pradesh**’ focussing the theme biodiversity



conservation. In the beginning, the PI elaborated the problem statement covering the vast floristic diversity, distribution pattern of native, endemic and economic species of the protected area and community dependence, *etc.* Outlining the study area, methodology, objectives, and outcomes of the project, the PI told that proposed study is important for generating baseline information, sustainable utilization of natural resources, in situ conservation practices and

protecting precious biodiversity. After the presentation, chairman RAG invited the learned members for discussions on the project proposal.

At first, **Dr. S.P. Bhardwaj**, Retd. Professor & Dean, UHF, Nauni asked PI to provide details of work already carried out in the Protected area chosen for assessment of floristic diversity and if all the enlisted objectives are new. The PI responded that floristic attributes of the Sechu Tuan Nalla Wildlife Sanctuary are less documented and review of literature reflects only few studies on medicinal plants on the area. He told that location of the sanctuary is very remote and terrain is extremely tough.

**Dr. R.K. Verma**, Senior Scientist, ICFRE-HFRI supported the viewpoint of PI and said that Sechu Tuan Nalla Wildlife Sanctuary is in far-flung Pangi valley of district Chamba and existing scientific work in terms of biodiversity estimation is scanty and sketchy. He strongly supported the need of study for comprehensive assessment of status of Plant wealth and prioritize important species for conservation.

Sharing his experiences, **Dr. Lal Singh**, Director, Himalayan Research Group, said that landscape of the sanctuary is predominantly barren and habitation is present in fringe areas. Considering the dependence of community on biodiversity, data/information related to collection season, extraction pattern, uses of plants/plant parts for medicinal and veterinary purposes will provide important leads for preparing effective management plan. He tried to find out the robust methodology for documenting the biodiversity attributes.

**Dr. Ranjeet Kumar**, PI of the project replied that information on use of bio-resources by community will be collected and analysed by probability of use (PU) and Resource Use Index (PUI) methods



**Dr. Dharam Pal Walia**, Head and Principal Scientist ICAR-I.A.R.I., Regional Station, Shimla appreciated the concept of the project and propounded propounded to study the regeneration status of green fodder species identified on the basis of floristic estimation. The PI described that management plan of protected area illustrates dependence of community on sanctuary resources and socio-economic survey will be carried out in fringe villages for collecting information on green fodder species. He agreed that assessment of regeneration status of green fodder tree species will be included in the study.

**Dr. Lal Singh**, director, HRG, observed if management plan of **Sechu Tuan Nalla Wildlife Sanctuary** is already in place then what is the need of study ? Similarly, **Smt. Upasna Patiyal**, APCCF, HPSFD asked about the rights of villagers in protected areas. She asserted that permission from wild life wing of HPSFD will be required to initiate the studies in wild life areas.

The PI answered that the existing management plan has been prepared from different perspective and lacks vital information about socio-economics of floristics. He told that some rights of communities dwelling in fringe villages of protected areas are settled and cited the example of similar work carried out in Shimla Water Catchment Sanctuary.



**Dr. C.L. Thakur**, pointed out the methodology part of the project and sought clarification about the implication of floristics assessment in buffer zone or core zone of sanctuary. He asked PI to shed light on the novelty component in the project proposal. In the same way, **Dr. H.S. Banyal** tried to find out significant contribution from the proposed study.

**Sh. B.M. Sharma** suggested that that enlisting to species is not enough instead assessment of germplasm of particular species of high socio-economic importance will add real value to the project. Responding to the queries and apprehension of RAG members, PI elucidated that detailed investigation of flora will be carried out across altitudinal gradients in different valley of the sanctuary. He described that analysis of the phytosociological and socio economic data set will be useful for finding out the status, distribution pattern, threat categories of different of native /endemic species and prioritise potential species for conservation. Lastly, the chairman invited ADG(R&P) for his comments.

In conclusion, **Dr. P.S. Rawat**, ADG(R&P) articulated that issues of biodiversity conservation are important and project proposal is relevant. He underlined the connection of livelihood aspect with the biodiversity. Endorsing the comments given by RAG members, he suggested the PI align the objectives with the proposed study properly and initially submit the three years duration project in phase –I with revised budget.

### **Project 3: “Selection and on-farm multilocation yield trial of *Lycium ruthenicum* (Black Goji Berry) in cold desert region of Ladakh”**



The third project proposal was presented by **Dr. Mohd. Ibrahim**, **Scientist- E**, Genetics and Tree Improvement (GTI) division. Firstly,

he shared the presentation on the project “**Selection and on-farm multilocation yield trial of *Lycium ruthenicum* (Black Goji Berry) in cold desert region of Ladakh**”. The PI nicely put together information on the ecological and significant medicinal value of the species indicating its high demand in nutraceutical cosmetic, industries due to rich phyto-chemicals content, anti-inflammatory, immunomodulatory, and neuroprotective benefits. He briefly outlined background status, research gaps, methodology, objectives and outcome of the project. Thereafter, the chairman requested RAG members to discuss the project proposal and provide insights/suggestions for improvement.

Initiating the discussion on the project proposal, **Dr. Sanjeev Thakur** highlighted the importance of value chain aspect of the target species. He substantiated his observation citing the example of *Hippophae* spp and value added products prepared from the species. He strongly brought out the need of assessment of market acceptance/ prospective gains from the species products before embarking on its cultivation.

Falling in line with these observations and comments, **Dr. Lal Singh** also highlighted the impact of value chain for commercialisation the cultivation of species. He opined that value addition should be seen in terms of monetary gains to local people and aim at developing local enterprise or GI kind of product. In addition to this, he also suggested to consult the works of DRDO-DIHAR, Leh on similar lines.

The PI replied that berries of the plant can be used as potential source for making value added products considering the significantly higher content of petanin. He informed that cultivation and commercialization of targeted species is high in China. He explained that local farmers of Ladakh mostly unaware of cultivation potential and commercial utilization of *Lycium ruthenicum* (Black Goji Berry). The PI acknowledged that DRDO- DIHAR, Leh have worked on standardization of nursery techniques and cultivation practices of species, clone of the species developed by DIHAR will be used as check in the proposed study.

During the discussion, **Dr. S.P. Bhardwaj** and **Dr. Mohar Singh Thakur** asked PI to describe the distribution, propagation methods, criteria for identification, number of genotypes to be selected for study in the project.

**Dr. Mohd. Ibrahim** apprised that distribution of the species largely confined to Nubra valley and study will aim at collection of phenotypically superior germplasm from various locations across the Nubra valley. He added that the study implied identification of high-yielding stable genotype with reduced thorn density and which will be easy to be harvest.

**Dr. Mohar Singh Thakur** suggested only superior genotype should be taken for domestication and important parameters like root /shoot ratio, pulp content and Total Soluble Sugar (TSS) assay may be taken into consideration for studying the variations.

**Sh. B.M. Sharma** complimented the PI for selection of species for study. He accepted that harvesting of the berries is challenging task and identification of high yielding strain will be significant achievement. He put forth the suggestion to include the Nimmu area of Kargil district for studying the distribution of the species and vegetative measures of propagation e.g. root suckers or shoot cutting also be explored. He also recommended to engage a local research scholar under the project for curtailing the budgetary propositions under travel head in the project.

**Dr. PS Rawat, ADG(R&P)** summarised the discussions and said that PI should incorporate suggestion of RAG members expand the scope of the study and reduce budget.

#### **Project 4: “Distribution, genetic diversity estimation and conservation of *Juniperus semiglobosa* in cold desert region of Ladakh”**

In continuation, **Dr. Mohd. Ibrahim** presented his next research project on “**Distribution, genetic diversity estimation and conservation of *Juniperus semiglobosa* in cold desert region of Ladakh**”. He explicated on the immense ecological, cultural, and spiritual significance of the species and chosen as state tree of UT Ladakh. He also mentioned the problem statement in backdrop of taxonomic confusion with the species of same genera, meagre documentation on distribution pattern, and regeneration issues of important tree species. The PI briefly explained the objectives, methodology and possible outcome of the study.

**Sh. B.M. Sharma** substantiated the importance of project proposal. He said that *Juniperus* sp seamless connected to the rituals and lives Buddhist people in Ladakh. The species exploited to multipurpose uses and due to sporadic distribution, very low regeneration it has become threatened species of Hindu-Kush Himalayan region. Besides, he impinged on the taxonomic aspects of the *Juniper* spp and said that authentic identification of species or sub-species will be very useful and advised to include the component of nursery development may be included in the project. Considering the community linkages and relevance of the concept, he recommended to send proposal to Leh Hill Development Council (LAHDC) for funding.

Endorsing the comments, the **ADG(R&P)** also appreciated the concept of the project and advised the PI to include taxonomist in the project and take propagation aspect into consideration for seeking funds from SFDs or other agencies as well.

### **Project 5: “Assessment of Regeneration Status and Development of Nursery Techniques of *Abies spectabilis* (D. Don) Mirb. for Raising Planting Stock”**

The fifth presentation was given by **Sh. Pitamber Singh Negi, Scientist-E**, Silviculture and Forest Management (SFM) division on research project proposal – ‘**Assessment of Regeneration Status and Development of Nursery Techniques of *Abies spectabilis* (D. Don) Mirb. for Raising Planting Stock**’. In the nutshell, the PI presented the concept of the study, highlights the research gaps in regeneration studies, conservation needs, hypothesis, objectives and anticipated outcomes of project proposal.



Then, the chairman requested the RAG members to provide their comments on the project proposal. Initiating the discussion, **Dr.D.P. Walia** questioned about demand of nursery techniques by state forest departments (SFDs). PI replied that state forest department wanted to carry out the plantation of species but due to non-availability of established nursery techniques, plantation not done. The PI talked about the scientific assessment of the regeneration status of the species.

**Dr. S.P. Bhardwaj** advocated the idea of the project saying that demand can be generated once the protocols of nursery development and propagation of the species got established. He said that trainings can be imparted to the stakeholders on these aspects.

Similarly, **Sh. B.M. Sharma** supported the project proposal and said that *Abies spectabilis* (Silver fir) is one of the most beautiful tree species of forest ecosystem and stakeholders are not less familiar with it. He suggested focusing on the conservation and ecological value of species apart from developing the seedlings for propagation. He also advised PI extent the scope of the project to J&K and consults the work done by State Forest Research Institute (SFRI), J&K on the nursery techniques and propagation of the species

**Smt. Upasna Patiyal**, IFS, APCCF said that subject of the study is very important for Himachal forest department and its findings will be useful. She suggested PI to associate the divisional level officers in the research work.

**Dr. PS Rawat, ADG(R&P)** concluded the discussions and appreciated the interest shown by State Forest Departments (SFDs) in the project proposal. He asked PI to work on the sites of probability of experiments/trials, reframe and modify the project proposal and submit it as a collaborative project to the forest departments of Himachal Pradesh and Jammu & Kashmir.

**Project 6: “Pine Needle-Mediated Synthesis of SiO<sub>2</sub>, TiO<sub>2</sub>, and Fe<sub>2</sub>O<sub>3</sub> Nanoparticles and Assessment of Their Growth Promoting Potential for *Juniperus polycarpus* and *Quercus leucotrichophora*”.**

The sixth and last presentation of technical session was given by **Dr. Bal Krishna Tiwari, Scientist-C**, Genetics and Tree Improvement (GTI) division on research project proposal “**Pine Needle-Mediated Synthesis of SiO<sub>2</sub>, TiO<sub>2</sub>, and Fe<sub>2</sub>O<sub>3</sub> Nanoparticles and Assessment of Their Growth Promoting Potential for *Juniperus polycarpus* and *Quercus leucotrichophora*”.** In the very beginning of the presentation, ADG (R&P) instated PI to justify the use of nano-particles for taking up the research project proposal.



Describing the concept of the research project, the PI put together information about problems of growth in targeted species and elaborated the potential of nano-particles in enhancing the growth of plants by mediating various photosynthetic pathways of plants including light absorption, increasing CO<sub>2</sub>uptake, developing resistance to environmental stress. In the presentation, the PI discussed the previous studies reporting the positive response of nano-particles in growth of plants. He provided the granular details of bio-synthesis of SiO<sub>2</sub>, TiO<sub>2</sub> and Fe<sub>2</sub>O<sub>3</sub> nano-particles and their impact on growth and physiology of plants. He also listed the broad objectives and expected outcomes of proposed project. After the presentation, chairman requested the RAG members for their comments and views on the research Project Proposal.

**Dr. Mohar Singh Thakur**, raised query about selection of pine needles for bio-synthesis of nano-particles and analysis method proposed under the project.

The **Principal Investigator (PI)** answered that *P. roxburghii* needles have shown promising potential and encouraging results in green synthesis of metal oxide nano-particles. He said that the reducing and stabilizing potential of the needles will be tried for synthesis of nano-particles with SiO<sub>2</sub>, TiO<sub>2</sub>, and Fe<sub>2</sub>O<sub>3</sub>. Besides, the PI told that using pine needles will be comparatively cheap.

Likewise, **Dr. S.P. Bhardwaj** asked PI to provide details on the stages of extraction and estimation of optimum level of nutrients should be a part of established standards.

In response, **Principal Investigator (PI)**, spelled out the extraction procedure of nano-particles involving preparation of aqueous extract of *Pinus roxburghii* needles and converting it to nano-particles by adding chemicals e.g. Sodium metasilicate, Titanium chloride, and FeCl<sub>3</sub>·6H<sub>2</sub>O as substrate.

**Dr. Mohd. Ibrahim** enquired about the method of using nano-particle for boosting the growth of seedling

The **PI** replied that nano- particles can be used either as foliar spray or in the soil for enhancing the growth and reducing nursery period.

The **ADG(R&P)** put forth his final remarks and observed that idea of green synthesis of nano – particle using pine needles should be viable and outcomes should be in terms of some product. He asked PI to explain the quantity of pine needles to be required for synthesis of nano- particles.

**Principal Investigator (PI)** illustrated there are several reports which confirm the positive impacts of nano-particles on the growth of plants. He further explained that about 10 gms of needles will be required for making 100 ml of extract and working out the amount of pine needles to be used for nano-particle synthesis will be one of the findings of the project. He also told that nano-particles will be synthesised in crystalline form.

**Dr. PS Rawat, ADG(R&P)** asked PI to divide the project proposal into phase –I and Phase- II, reduce budget and initially submit phase-I for funding.

### **Technical Session-II (On-going Research Projects Progress):**

The second technical session of the RAG meeting was slated to present the progress of on-going research projects. As **Dr. R. K. Verma**, earlier in his presentation of institute presented the brief progress of all ongoing projects so all the RAG members found progress of ongoing projects satisfactory and recommended them for continuation.

After the completion of technical sessions, **Dr. Sandeep Sharma, Director (In-charge) and Chairman** summed up the proceedings of the technical session and invited **ADG (RP)** to provide valuable suggestions in connection with different research proposals presented during the RAG meeting. **Dr. P. S. Rawat, ADG (Research and Planning)** expressed regards to revered professors and thanked all members RAG for providing valuable suggestions. He advised the **Principal Investigators (PIs)** to make suggested structural changes and modify their project proposals as per the comments/inputs from expert members. He asked the PIs to incorporate all the recommendations of RAG members in respective projects before submitting them to RPC at ICFRE, H.Q. At end, **Dr. Ashwani Tapwal, Scientist-F, ICFRE- HFRI** proposed the formal vote of thanks. He thanked esteemed members of **RAG** for sparing the time and providing their valuable inputs for improving the Project proposals.





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