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From The Director's Desk



This issue mainly presents the achievements made during the January month by this Institute including the brainstorming session on “Extreme Rainfall Induced Flooding, Soil Erosion and Land Degradation in Kerala” organised by the RC, Udthagamandalam that benefited greatly in understanding what

is really happening in the Western Ghats Region. Under *Azadi Ka Amrit Mahotsav* (AKAM), a motivational talk on Swami Vivekananda delivered by Dr P.S. Brahmanand, Principal Scientist, ICAR-IIWM, Bhubaneswar, with his powerful oration enlightened the audience on ideology and vision of Swami Vivekananda for spiritual advancement and science based materialistic/worldly progress. I wish and hope that the teachings of Swami Ji, generates a renewed consciousness and enthusiasm.

The Institute has finalised two important MoU, and I, especially want to underline the one that was extended for second time in a row. The MoU with Eco Task Force (ETF) was extended for another five years. The activities manifested under the agreement are proving immensely beneficial, not only to ecology of the region but also to the society.

I congratulate the staff who got promoted to next higher level and increased their role and responsibilities in the Institute’s progress. Many outreach activities are being implemented at village level benefiting many needy communities. My appreciation to all the scientific staff for getting external funded projects, good publications, *etc* and the support in various activities. My best wishes to all the readers and your feedback is valuable.

M. Madhu

NEW INITIATIVES

MoU Signed

■ *MoU with Career Point University, Kota*

ICAR-IISWC, R C, Kota signed MoU with Career Point University, Kota on 17th January, 2022. The MoU is aimed at stimulating and facilitating collaboration in students training and research besides promoting mutually-agreed upon common programmes that help students, farmers and researchers' intellectual interests and agricultural development.



■ *MoU with Eco-Task Force 127 Infantry Battalion (TA) Ecological extended*

The collaboration between ICAR-IISWC and Eco-Task Force (ETF), 127 Infantry Battalion (TA) Ecological, Garhwal Rifles Garhi Cantt, Dehradun that commenced during 2016 for two years and reaffirmed again in the year 2019, was further extended for another five years on 20th January, 2022, with additional objective of

developing a model village in Jounsar Bhabar area of Uttarakhand. On the occasion, Dr D.V. Singh, Principal Scientist & Head (Acting), HRD and SS Division elaborated upon the objectives, accomplishments and new areas of cooperation, identified. The agreement was aimed at suggesting location specific species of trees, shrubs and grasses for afforestation; demonstrating cost effective and site specific soil and water conservation measures; capacity building on different aspects of soil and water conservation and afforestation and impact assessment in terms of carbon stock, diversity and other eco-system services.

Along with the signatories, Dr M. Madhu, Director and Col. Rohit Srivastav, Commanding Officer –ETF, the meeting was attended by other Divisional heads, Dr N.K. Sharma, Head, SSA and Dr Charan Singh, Head, Plant Science and Dr M. Muruganandam, OIC (PME Cell) also.



IMPORTANT EVENTS

■ *Live streaming of Hon'ble Prime Minister's address*

ICAR-IISWC, Dehradun and its Research Centres (Ballari, Chandigarh and Vasad) made elaborate arrangements for live streaming of Hon'ble Prime Minister's address in the event of releasing

PM Kisan Samman Nidhi funds on 01st January, 2022. Hon'ble Prime Minister Sh. Narendra Modi released the financial benefit in a virtual event in line with the government's continued commitment to empower grassroots-level farmers. During the event, the Prime Minister also released an equity

grant of more than Rs 14 crores to about 351 Farmer Producer Organizations (FPOs), which will benefit more than 1.24 lakh farmers. In his address PM Modi mentioned that India is moving towards Digital India at a much faster pace as in 2021 about 70 lakh crore rupees transactions in India was done only through Unified Payments Interface (UPI).



Listing how India is contributing to saving the planet and the country's initiatives in the past year, PM Modi said that by leading the world against climate change, India has also set a target of net-zero carbon emissions 2070. Union Agriculture Minister Narendra Singh Tomar also addressed the audience and informed that under *PM Kisan Samman Nidhi Yojana*, in the current financial year 2021-22, an amount of more than Rs 65,800 crore has been transferred to the beneficiary farmers.



Along with the staff members of the institute a large number of farmers also participated. Farmers took keen interest in various aspects of natural farming, which were discussed in detail during the proceedings. An interaction session of farmers with the scientists was also conducted, with the focus on prospects and constraints of "Natural farming".



■ *Interface meeting with women farmers' Self Help Group (SHG)*

ICAR-IISWC, Dehradun organised an Interface Meeting with Women Farmers' Self Help Group (dependents of COVID-19 migrants) under Farmers' First Project on 04th January, 2022 at village Koti Maychak of Raipur Block, Dehradun. The Self Help Group named 'Perna Self Help Group' was formed by women farmers (18) and trained by the institute on "food processing and value addition" during the month of November, 2021. The Self Help Group started their own venture and undertook the processing of fruits, vegetable, spices, food grains *etc.* The SHG successfully processed and marketed various products like pickles of mango, aonla, ginger, jackfruit, chilli, garlic; flour of ragi and maize; turmeric and coriander powder; biscuit made up of ragi, maize *etc.* They group put up stall in front of a hotel on the way to Jolly-grant Airport, Dehradun and was able to earn about Rs 2500-3000/- per day. The group members are quite satisfied and motivated to scale up their venture to earn better livelihood. Most of the group members were solely dependent on small private jobs and also working as labourers in nearby areas. Due to Covid-19 pandemic, they lost their jobs and were searching for better options to support their livelihoods.



Dr Bankey Bihari, PI, Farmers' First Project congratulated the group members for their venture and motivated them to work with positive thinking following the principles of hard work and transparency. He also assured them for providing all kind of technical support under the Farmer FIRST Project.

■ *Distribution of motor driven sewing machines*

In order to create self employment and impart sewing skill among the landless schedule caste women (Below Poverty Line), ICAR-IISWC, R C, Ballari organised a programme for distribution of motor driven sewing machines under SCSP on 07th January, 2022. Speaking on the occasion, Dr B. S. Naik, Sr. Sci. (SWCE) & Head (acting) of Centre asked all the women to utilize the sewing machine for generating income among themselves in the village. He encouraged other interested women to use the machines for learning the skill at the earliest. Further, Dr M. Madhu, Director also interacted with the participant women and conveyed his wishes to village Head Sh. Venkataswamy and other women present at the event. Dr Madhu called up the village women to take maximum advantage of the opportunity and form a Self Help Group, set-up an entrepreneurship unit through start-up.



■ *Field training on poultry farming and piggery*

ICAR-IISWC, Dehradun organised field training for 25 progressive farmers of Raipur Block under the Farmers First Project's module of doubling farmers' income, on 07th January, 2022. The training was mainly focused on promoting farmer-managed small-scale hatchery units at the village premises as

a source of rural enterprises and livelihoods. The training programme exposed the participants to various concepts and management techniques of rural poultry hatchery, poultry farming, pig breeding, rearing and fattening. Live interaction and discussion helped farmers to a great extent on the methodical procedures, utensils like feeders, drinkers, egg-holding trays, etc. & equipment requirements especially for brooding and hatching eggs. Features of improved breeds including Kroiler, Kadaknath, Vanaraja & Desi poultry birds & large york whiteshire pig breed and precautions needed were also discussed.



Dr Manoj K Tiwari, Sr. Veterinary Officer, State Government Poultry Hatchery, Pasulok, Rishikesh explained the process of egg collection and hatching of improved poultry breeds through live demonstrations and interactive discussion. He further highlighted the prevailing poultry diseases, health problems, managerial strategies and solutions including periodic vaccinations and deworming for successful poultry farming. Sh. Anand Singh Bagri, Livestock Extension Officer of the Poultry Hatchery conducted exposure visit to the facilities and other installations at the hatchery. Dr M. Muruganandam, Principal Scientist & OIC (PME Cell) shared scientific information on poultry and pig farming under various research and demonstration projects executed by the IISWC. Speaking on the occasion, Dr Bankey Bihari, Principal Scientist & PI expressed hope that the training would provide an opportunity for the farmers to start rural poultry hatcheries and poultry units in the region.



■ *Tribal farmer's training cum distribution of earthworm*

ICAR-IISWC, RC, Koraput in association with MSSRF, Jeypore organised one day Tribal Farmers Training cum distribution of earthworm programme under DBT Biotech KISAN Hub project supported by DBT, Government of India on 13th January, 2022 at Khairput block of Malkangiri District. On this occasion, Sh. Prasant K. Parida, Development Coordinator, MSSRF, Jeypore highlighted the importance of vermin-compost in improving soil health and discussed low cost vermin-compost preparation and its benefits to the farmers.

He urged the farmers to establish some units to raise the earthworm and sell the vermin-compost as well as earthworms to generate additional income from this enterprise.



Along with live demonstration of low cost vermi bed preparation a video on earthworm rearing in the vermi beds was also played on the occasion. Do's and don'ts related to vermicompost preparation

and care of earthworms were shared with the farmers. Around 80 Farmers including women participated in the programme. During the interaction session, experts from different subject groups addressed the queries raised by the participants and the invaluable feedback of the tribal farmers was recorded.

■ *Motivational talk on Swami Vivekananda*

As a part of ongoing celebrations of 75 years of India's Independence “Azadi Ka Amrut Mahotsav”, a special guest lecture by Dr P.S. Brahmanand, Principal Scientist ICAR-IIWM Bhubaneswar, a Guinness world record holder, on “Ideology and Vision of Swami Vivekananda for Man Making and Nation Building” was organised on 15th January, 2022 in virtual mode. Dr Brahmanand, in his speech elaborated upon the important events during the life time [12th January, 1863 to 04th July, 1902] of Swami Vivekananda and emphasised upon Swamiji's ideology and vision for India and Nation Building.

Dr M. Madhu, Director, IISWC profusely appreciated the motivating speech and urged everyone to follow the ideology of Swami ji and requested Dr Brahmanand to be available for such inspirational talks in future also.

Dr P.K. Mishra, Ex-Director, ICAR-IISWC and Dr K.G. Mandal, Director, ICAR-MGIFRI, Motihari also expressed their views on the occasion. Dr P.R. Ojasvi, Principal Scientist & Head, H&E, welcomed the participants and Er S.S. Shrimali introduced the speaker to the audience and elaborated upon his achievements in details.



■ ***Campaign on processing and storage of food grains and pulses***

ICAR-IISWC, RC, Koraput organised “Sectoral Campaign on Processing and Storage of Food Grains and Pulses” on 24th January, 2022. The programme was organised in collaboration with MSSRF, Jeypore to commemorate 75th year of Independence. Posters and banners were displayed at prominent places of the centre to create awareness among the people. Around 20 officials participated in the programme.



■ ***Demonstrations on pisciculture in farm ponds***

ICAR-IISWC, RC, Ballari organised demonstrations on pisciculture in farm ponds under TSP on 25th January, 2022. Demonstrations were conducted in five identified farm ponds located in Mattajanahalli Watershed. The fingerlings of 30 mm to 35 mm size, common carp fish were selected and procured (16000 fingerlings) from the fishery department, Koppal. The beneficiaries were sensitised about the rearing practices of common



carp (*Cyprinus carpio*) fish in farm ponds and provided detailed information on feeding aspects, diseases *etc.*

■ ***Session on “Extreme rainfall induced flooding, soil erosion and land degradation in Kerala”***

ICAR-IISWC, R C, Udthagamandalam organised a brainstorming session on “Extreme Rainfall Induced Flooding, Soil Erosion and Land Degradation in Kerala” on 29th January 2022, in a virtual mode under the DST sponsored online training programme. The session was chaired by Dr M. Madhu, Director, ICAR-IISWC, Dehradun and coordinated by Dr P Raja, Principal Scientist and Dr Sudheer Kumar Annepu, Scientist, ICAR-IISWC, RC, Ooty. A total number of 130 participants from different ICAR organizations, State Agricultural Universities, Krishi Vigyan Kendras, progressive farmers and officials from the Department of Soil Survey and Soil Conservation, Kerala participated in the event.



Senior executives and subject matter experts delivered brief technical talks on various topics pertaining to the theme event. Dr Manoj P. Samuel, Executive Director, CWRDM, Calicut, Kerala discussed about the flood induced disaster management in Kerala. Dr S. Sreekumar, Former Director, IRTC, Palakkad, Kerala discussed about the mitigation strategies for landslides risk reduction in Kerala. Dr Eldho, Professor, IIT-Mumbai delivered a talk on “Climate and Land Use Land Cover Changes in Kerala Region - Possible Future Impacts on Flooding?.” Dr K.M. Durga Devi,

Professor & Head (Soil Science), Velliankara, KAU, Kerala delivered a talk on “Impacts of 2018 Floods on Soils of Kerala”. Dr P. Rathakrishnan, Principal Scientist & Head, ICAR-KVK, IISR, Peruvannamuzhi has delivered a talk on “Agriculture management interventions to tackle flood induced damages in Kerala. Dr K.S. Anilkumar, Principal Scientist, ICAR-NBSS & LUP, RC, Bangalore delivered a talk on “Excess rainfall induced soil erosion and land degradation in the Western Ghats of Kerala: Challenges for Natural Resource Management”. Dr Anu. Mary. C. Philip, Deputy Director, Institute of Watershed Development & Management, Chadyamangalam delivered a talk on “Analysis of rainfall data in relation to incidence of flood and other natural disasters in Kerala”. Dr Girish Gopinath, Associate Professor, KUFOS, Kochi, Kerala delivered a talk on “Mapping Flood – 2018 and Analyses of Landslides in Kerala”.

Also, there were deliberations on development of mitigation strategies for rainfall induced flooding, soil erosion and land degradation with special reference to Kerala state. The panel experts *viz.*, Dr Sriram Appulingam, DGM, BIRD, NABARD, Lucknow (UP), Dr HP Maheswarappa, Director of Research, UHS, Bagalcot, Karnataka, Dr S. Panneer Selvam, Director, WTC, TNAU, Coimbatore (TN), Dr P. Subramanian, Principal Scientist & Head, ICAR-CPCRI, Kasargode, Kerala, Dr Celin George, Head and Senior Principal Scientist, CWRDM, Calicut shared innovative ideas on the subject. Scientists and Heads of the different divisions and research centers of ICAR-IISWC, Dehradun shared their experiences and latest technological advances in soil and water conservation practices.

Farmer's scientist interaction meet was also organised, on the occasion. The success stories of the few farmers of the district Nilgiris were shared during the farmer's scientist interaction meet. Dr K. Kannan, Principal Scientist and Head of the Centre in his address emphasized the importance of new vision in combination with improved tools and

methods to deal with natural resource management, SWC technologies under different climate change scenarios. Dr M. Madhu, Director, ICAR-IISWC, Dehradun in his concluding remarks accentuated the need for development of location specific mitigation and adaptation strategies to conserve the natural resources and to ensure the food and nutritional security to the future generations.

■ *Training on “Climate smart and resource conservation practices”*

ICAR-IISWC, R C, Koraput Odisha organised a training programme on “Climate Smart and Resource Conservation Practices” at Tikaripada Village in Dasmantpur Block, Koraput on 29th January, 2022. On the occasion, Dr D. C. Sahoo, Head (acting) sensitised farmers about the role of soil and water conservation in making the crop production climate resilient, and explained different measures of soil and water conservation recommended for the region. The role of crop advisories in crop management was discussed, and how 'date of sowing' and 'harvesting operations' can be tweaked to avoid the crop production losses in case of extreme weather conditions was underlined. Also, importance of millets in natural resource management, and in creating climate resilience in crop production system was debated in detail.



HUMAN RESOURCE DEVELOPMENT

[A] Capacity Building: (In house employees)

- Institute scientists attended six (6) days training on “National Facilitator Development Programme (NFDP)” organised by National Institute of Agricultural Extension Management (MANAGE), Hyderabad during 17-22nd January, 2022.
- Institute organised *Himalayan Conclave* at ICAR-IISWC, Dehradun during 29th January, 2022.
- Institute scientists attended twenty one (21) days training programme on “Advance geospatial technologies for assessment and monitoring of land degradation in changing climate” organised by ICAR-NBSS&LUP, Nagpur, sponsor by DST during 08-28th February, 2022.

[B] Capacity Development: (Programs organised for stakeholders)

- Interface Meeting with Women Farmer's under FFP was held at Koti Maychak Village, Raipur, Thano, Dehradun on 4th January, 2022.
- One day exposure visit to Karireeya village District Tonk, Avikanagar (Rajasthan) was organised for farmers of different villages adopted under SCSP scheme during National Sheep and Wool Fair at CSWRI, Avikanagar on 04th January, 2022.
- Kisan Gosthi & review meeting with the farmers of the SCSP village, for increasing the pace of different soil and water conservation works and planning in field for the execution of approved works was organised on 12th January, 2022 at village Navagam Vanta Distt. Anand & Khambhat (Gujarat) by ICAR-IISWC, RC, Vasad.
- Kisan Gosthis & review meetings were organised by ICAR-IISWC, RC, Vasad on 18th and 24th January, 2022 with the farmers of villages adopted under TSP, for increasing the pace of different soil and water conservation works and planning in field for the execution of approved works.
- ICAR-IISWC, RC, Udhagamandalam organised 12 days training programme (Online Mode) on “Soil & Water Conservation Technologies for Climate Smart Agriculture in the Context of Extreme Weather Event” for Group A officers during 24th January, 2022 to 04th February, 2022.
- ICAR-IISWC, RC, Agra, organised scientists-farmers interaction meet on “Village Development” at village, Nayabans, Etmadpur, Agra (UP).
- One day training on “Crop Residue Management” was organised by ICAR-IISWC, RC, Agra. Dr Manish Singh, Head, KVK, Avagarh, Etah (UP) delivered lecture on crop residue management.

PUBLICATIONS

Research Papers

Mandal, U., Chowdhury, A., Dutta, A. and Roy, T. 2021. Comparative study for estimating reference evapotranspiration using artificial neural network and empirical techniques. *Indian Journal of Soil Conservation*, 49(2), pp 22-129. (NAAS Rating: 5.23)

Srinivasan, R., Hegde, R., Thilagam, V. K. and Kumar, S.N. 2021. Soil-site characterization on crop productivity in Alfisols of Eastern Ghats of Tamil Nadu, India. *Journal of Soil*

and Water Conservation 20(4): pp 355-364. DOI: 10.5958/2455-7145.2021.00045.X. (NAAS Rating: 5.20)

Vanitha, S.M. and Reddy, C.B.V. 2021. Diversification through multiple cropping: An economic analysis of mango with vegetable intercropping at Kolar District, Karnataka. *Frontiers in crop improvement*, Vol. 9: pp 2462-2464 (Special Issue-VI) (NAAS Rating: 4.67)

In High Ranking Research Journals- Congratulations, Keep it up !

Sreenivas, G., Mahesh, P., Mahalakshmi, D.V., Kanchana, A.L, Chandra, N., Patra, P.K., Raja, P., Sesha, S.M.V.R, Pada, S.S., Rao, P.V.N. and Dadhwal, V.K. 2022. Seasonal and annual variations of CO₂ and CH₄ at Shadnagar, a semi-urban site. Published in *Science of The Total Environment, Elsevier Publ.* <https://doi.org/10.1016/j.scitotenv.2022.153114>. IF.7.963; **(NAAS Rating: 13.963)**

Jinger, D., Dhar, S., Dass, A. Sharma, V.K., Shukla, L., Paramesh, V., Parihar, M., Joshi, N., Joshi, E., Singhal, V., Gupta, G. and Singh, S. 2022.

Residual silicon and phosphorus improved the growth, yield, nutrient uptake and soil enzyme activities of wheat. *Silicon*. <https://doi.org/10.1007/s12633-022-01676-w> **(NAAS Rating: 8.67)**.

Panwar, P., Chauhan, S., Das, D. K., Kaushal, R., Arora, G. and Chaturvedi, S. 2021. Soil organic carbon dynamics in *Populus deltoides* plantations using Roth C-model in the Indo-Gangetic region of India. *Current Science.*, 121,(12): pp1623-1627. doi:10.18520/cs/v121/i12/1623-1627 **(NAAS Rating: 7.10)**.

Popular Article

Srinivasan, R. and Kasthuri, T.V. 2022. Application of Tank Silt for improving the maize productivity in Southern Karnataka. *Vigyan Varta*3(2): pp 20-23

Yadav, S.K., Mishra, M. and Sankar, M. 2022. Judicious management of mango orchards in Doon Valley. *Food and Scientific Reports*. Vol 3 (4).

Books

Singh, R.K., Kurothe, R.S., Kumar, A., Ali, S., Singh, A.K. and Mishra, P.K. 2021. Ravine land management-principles, practices and strategies. Directorate of Knowledge Management in Agriculture (DKMA), Indian Council of Agricultural Research (ICAR), New Delhi, ISBN-978-81-7164-197-0, 283p.

Book Chapters

Singh, G. Dinesh, D., Kumar, R., Kakade, V.D., Jinger, D. And Singh, A. K. 2022. Adaption and mitigation strategies for combating climate change in Indian Agriculture. Eds. Rangasami *et. al.*, Climate change and its impact on environment. Veda Publications, Madurai, 121p. ISBN: 9788195226290

Radio Talks

Dr V Kasthuri Thilagam delivered a Radio talk (All India Radio, Ooty) for Sustainable production of vegetables at Nilgiris broadcasted on 28th January, 2022.

Dr D. Mandal delivered a lecture in an international training programme for the trainees from Sri Lanka Forest department.

PERSONALIA

Promotions

- Sh. Bhagwan Das Kushwaha, promoted to Technical Officer (T-6) with effect from 19th May, 2018.
- Sh. B.N. Seshadri, promoted to Technical Officer (T-6) with effect from 21st October, 2018.
- Sh. Kamlesh Kumar, promoted to Assistant Chief Technical Officer with effect from 01st July, 2019.
- Sh. Suresh Kumar, promoted to Chief Technical Officer with effect from 01st July, 2019.
- Sh. J.S. Deshwal, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.
- Sh. B.P. Joshi, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.
- Sh. K. Someswara Rao, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.
- Sh. H.C. Sharma, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.

- Smt. Sarita Gupta, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.
- Sh. K.R. Joshi, promoted to Assistant Chief Technical Officer with effect from 01st January, 2020.
- Sh. George John, promoted to Technical Officer (T-6) with effect from 08th March, 2020.
- Sh. Bhagwati Prasad, promoted to Chief Technical Officer with effect from 14th December, 2020.
- Sh. Rakesh Kumar, promoted to Chief Technical Officer with effect from 13th February, 2021.
- Sh. Umesh Kumar, promoted to Assistant Chief Technical Officer with effect from 01st June, 2021.

Retirements

- Dr (smt.) Sangeeta Naithani Sharma, CTO retired on superannuation on 31st January, 2022.
- Er S.K. Sharma, CTO retired on superannuation on 31st January, 2022.

Salient Research Findings

Soil Working Techniques for Enhancing Tree Establishment under Rainfed Conditions of North-Western Himalayas

Field experiments were under taken-up to develop effective soil working technique that can counter water scarcity, low temperature, forest fire problem and enhance tree establishment under rainfed conditions of North-Western Himalayas. Experiments were conducted on horticulture, where mango (with seven treatments) and *Malta* (with six treatments) has been planted. The analysis of data indicated that if soil working technique is improvised with sub-surface planting, it can result in better plant growth. The plant growth of both the species (Mango and *Malta*) was found to be significantly better in treatments with modified sub-surface planting. On an average about 13 to 24 % improvement was observed in plant height, collar diameter and canopy spread of mango due to the sub-surface planting method. In case of *Malta*, especially, the improvement in these plant growth parameters ranged from 27 to 58 %.

With regards to soil moisture, data from the field experiment on mango shows that during summer months in sub-surface soil layer, soil moisture was recorded 40% higher in 15-30 cm layer and 62 % higher in 30-45 cm layer as compared to that in upper layer (0-15 cm). Whereas soil moisture



Sub-surface planting in *Malta*

in winter season was observed to be 31% higher in 15-30 cm layer and 46 % higher in 30-45 cm layer in sub-surface as compared to surface layer. Similarly, in case of *malta* field, during summer months 21% higher moisture was recorded in 15-30 cm layer, 52 % higher in 30-45 cm layer and during winter it was 20% higher in 15-30 cm layer and 46 % higher in 30-45 cm layer as compared to that was recorded in surface layer. From these observations it could be confirmed that in sub-surface soil, moisture is retained even during dry period. Therefore, it is ascertained that modified sub-surface planting can provide proofing against stresses of moisture deficit in surface layer during dry spell.

Assessment of Productivity, Hydrological Behaviour, Resource Conservation and Intangible Benefits of Selected Commercial Bamboo Species in Uttarakhand

Potential of bamboo species for resource conservation, improved biomass production and intangible benefits in Himalayan foothills was evaluated in eight year-old plantation. Bamboo plantation, irrespective of the species, helped in enhancing the fraction of Soil Organic Carbon (SOC) and enhanced C build-up in the soil in comparison to the open fallow. Bamboo positively impacted both the active and the passive C pools. Runoff and soil loss data collected revealed that, as compared to other bamboo species, *D. stocksii* and, *D. hamiltonii* were more effective for soil-water conservation in the region. Bamboo species, *D. hamiltonii*, due to higher interception, litter fall, finer root intensity and below ground biomass, can bind the soil more efficiently and thus can be suitably grown for checking soil erosion and rehabilitation of degraded lands. On the basis of biomass and carbon sequestration rate *B. balcooa* and *B. vulgaris* species can be recommended for commercial cultivation in Himalayan foothills. Species, *D. hamiltonii*, *D. strictus* and *B. nutans* emerged as the most promising for rehabilitation of degraded land and could monitor soil erosion and land degradation problems in the foot hills of North-West Himalayas.

