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In this issue

From The President's Desk

During last few decades, over exploitation of natural resources has led to degradation and changes in the climate. We can observe frequent droughts, floods and many other natural disasters in recent years. Climate change -the increased frequency of extreme weather events such as droughts, floods and storms is the most challenging issue. Climate change affects food systems as severity of floods and storms over the past 30 years has put the agriculture sectors of many developing countries at the risk of growing food insecurity. Around 570 millions farms across the world are facing the threat of climate change at present. According to a report by FAO, to achieve food security and agricultural development goals by 2030, adapting to climate change and lowering emissions of green house gases (GHG) will be necessary. Around 41 per cent of GHGs come from agriculture as per CGIAR. Climate resilient agriculture will essentially involve judicious and improved management of natural resources, namely land, water, soil and genetic resources through adoption of best practices, appropriately integrated and timely management of farming systems and farm mechanization. Growing food in a sustainable way means adopting practices that produce more with less in the same area of land and use natural resources wisely. It also means reducing food losses before the final product or retail stage through a number of initiatives including better harvesting, storage, packaging, transport, infrastructure, market mechanisms, as well as institutional and legal frame works. This is the only way that we can ensure the well-being of the ecosystem and rural population and reduce GHG emissions. Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. Climate-smart agriculture is a way to achieve short-and-long-term agricultural development priorities in the face of climate change and serves as a bridge to other development priorities. It seeks to support countries and other actors in securing the necessary policy, technical and financial conditions to enable them to: - Sustainably increase agricultural productivity and incomes in order to meet national food security and

development goals; - Build resilience and the capacity of agricultural and food systems to adapt to climate change; - Seek opportunities to mitigate emissions of greenhouse gases and increase carbon sequestration. These three conditions viz. food security, adaptation and mitigation are referred to as the "triple win" of climate-smart agriculture.

Further, the anthropogenic activities in various ways cause degradation of natural resources and put pressure on the prevailing climate leading to frequent aberration. Hence, natural resources management with innovative technologies focusing on location specific problems is not only crucial but a great challenge to double the income of farmers by 2022 and to produce 108 million tons more by 2050. Thus, sustainable and productive agriculture system will depend on efficient use and management of natural resources harnessing the potentialities of Integrated Farming System, watershed approach, conservation agriculture, agroforestry, bioresources etc. which will definitely bring resilience to agriculture production systems. More so, for sustainable and climate resilient agriculture, for which a way forward policy needs to be drawn. Better land management practice is one of the ways to fight climate change and increase resilience of farming systems. Agro ecology, conservation of agricultural diversity, organic farming using on-farm inputs, appropriate crop management to manage and sustain soil health and safety and nutrition of food are the paths to a sustainable future. Climate-smart agriculture would ideally invest in and promote innovative, adaptive farming communities working towards restoring and conserving soil health. Every climate-smart farmer would incorporate practices like farm ponds, bundings, trenching, mulching and other practices for conservation of soil moisture, use appropriate seeds and on-farm inputs and to have better access and control over required water resources. Strategies also need to be developed to double the farmers' income as per the initiatives of Central Government through judicious use of natural resources as well as agricultural inputs, adoption of improved techniques and ensuring sustainability of the agricultural production.

26th National Conference at Meghalaya

The 26th National Conference on "Natural Resource Management for Climate Smart Sustainable Agriculture" was organized by SCSI in association with the Central Agricultural University, Imphal from September 11th to 13th, 2017 at College of Post Graduate Studies, CAU(I), Barapani, Shillong, Meghalaya.

Inaugural Session

The conference was inaugurated on September 11th, 2017 by Shri Banwari Lal Purohit, Hon'ble Governor of Meghalaya as the Chief Guest and it was presided over by Dr. M. Premjit Singh, Hon'ble Vice Chancellor of Central Agricultural University (CAU), Imphal. The other dignitaries present during the Inaugural sessions were Dr. P.K. Sharma, Vice Chancellor, SKUAST, Jammu as Guest of Honour, Dr. S.V. Nagchan, Director, ICAR-NEH, Barapani as special guest, Dr. Suraj Bhan, President, Soil Conservation Society of India and Chairman of the Conference, Dr. N.B. Singh, Dean, CPGS and Convenor and Dr. Sanjay Swami, Associate Prof and Organizing Secretary of Conference.

Shri Banwari Lal Purohit, Hon'ble Governor stressed on the importance of conservation of natural resources especially in the environmentally fragile hill eco-system. He elaborated the strides of NE states in managing natural resources and stressed the need of judicious management of natural resources to provide livelihoods. Dr. Suraj Bhan, President, SCSI highlighted the role of Soil Conservation Society of India in scientific conservation of natural resources especially those of soil and water by shouldering the responsibilities through it wide network of members.

Dr. M. Premjit Singh underscored the importance of local practices and customs in upholding the preservation of natural resources and sustaining livelihoods in the hill region. Dr SV Nagchan applauded the efforts of the society and CAU to organize conference on important issue of NRM. Dr. N.B. Singh, Dean, CPGS briefed about the activities of college and welcomed all the participants. Dr. Sanjay Swami, presented the vote of thanks.

More than 200 participants including scientists, officers, field functionaries, research scholars, students and progressive farmers attended the Conference. Three publications, *viz*. Souvenir of National Conference, Abstract book and an e-book of Conference on CD was released on the occasion.

Technical Sessions

There were total of 8 technical sessions during 3 days of national conference. The Technical session-I on Conservation and Efficient Management of Natural Resources was Chaired by Dr. P.K. Sharma, VC, SKUAST Jammu with Dr. Anshuman Kohli as Co-chairman and Dr. Jitendra Sinha and Dr Lala I.P. Ray as Convenors. The session started with welcome of Chairman, Co-chairman and Lead speakers, which is followed by lead presentation of Dr P. K. Sharma on "Conservation and Management of Natural Resources". Dr P. K. Sharma showed his concern on the escalating food need of growing population for the world and India in particular. He explained different terminology of climate change and warned that climate change is not a myth but a real threat to human kind. He suggested that we can have control on anthropogenic factors but not on natural processes responsible for climate change. The climate change scenario has been escalated since the inception of industrial revolution and excessive use of petroleum and intensive agriculture as agriculture is responsible for the world's 25% of the green house gases. He illustrated that carbon dioxide is more deadly than methane as the former stays in for centuries. He warned about the consequences of rise in temperature because of high level of CO_2. Even an increase of 0.1^0C of temperature will have tremendous decline in pH of soil. He also warned that frequency of heavy rainfall will increase but number of rainy days will reduce. This will create problem of storage in water body. He also described the retreat of glaciers because of global warming and rise of sea level by 1 to 2 mm/year. He informed the house that the sea level has already raised by 8 inches during the period from 1880 to 2017. The river flow may decline by 30% while paddy production may fall by 20%. He also describes that with increase in CO_2 photosynthesis may increase but increase in temperature will nullify it. High temperature will also adversely affect organic matter and CN ratio. He calls for climate smart agriculture, ecosystem resilience and minimize green house gases. He advocated that Natural Resource Management is foundation for climate smart agriculture and NRM programmes must get support from all walks of life. For water sector he insisted on expansion in rainwater harvesting, conservation, reuse and

enhancement of water use efficiency. He cautioned that South Asian countries including India will be a major sufferer as agriculture is more vulnerable. He calls for awareness and combating technologies at equitable approach on global scale. He concluded with "Act now, Act together and Act differently".

Second lead paper was presented by Dr M. S Hadda on "Rainwater harvesting and its management in north-western tract of India for improving the productivity potential". He presented study of watersheds with soil water storage in 180 cm profile. He informed that in a water body of 50m x 40m x 4m, partial polythene lining can reduce the storage losses from 10% to 2%.

First oral presentation was made by Dr Jayanta Layek on "Land use model for arresting land degradation and sustaining production in hill agriculture". He presented importance of small 30,000 liter capacity tank with poly lining for food and nutritional security. Dr M. S. Hadda also presented a study on "Estimation of Curve Number from small watershed in Himalayas of North Western tract of India". He emphasized on importance of parameter "S" potential maximum storage in generating CN values. Dr Dinesh Sah delivered on "Growth and development parameters of vegetable cowpea as influenced by mulching implications." He stressed on the importance of use of organic mulching. Dr Bhabesh Gogoi presented study on "Soil productivity and potato yield improvement by mulching and integrated supply of nutrients in acid soils of Assam" He remarked an increase of 15 to 23 % in tuber production. Dr S. C. Tiwari delivered study on "Carbon sequestration in soils of different land use systems". He remarked soil as a sink for carbon and emphasized on the need to convert all kinds of wasteland into forest land. Mr Yearbok Marwein presented on "Impact of organic mulching on soil nutrient and yield of French bean" and showed the importance of mulching in yield of French bean. Mr Alok Maurya delivered his study on "Critical limits of soil available phosphorus for rapeseed (*Brassica campestris* var. toria) growing acidic soils of Meghalaya" and remarked that rapeseed can be grown







with moisture stressed condition. Dr VW Ambekar showed his concern on the bio mass requirement for supplying vermi-compost @ 5 tons/ha. He suggested NADEP compost as an alternative.

The Technical session-II on Climate Smart Agriculture and Integrated Farming System was Chaired by Dr. M. Prejit Singh, VC, CAU, Imphal along with Dr. Ajay K Bhardwaj as Co-chairman and Dr. V.M. Arya and Dr. Deepak Jajharia as convenors. Two Lead papers were presented and total seven oral papers were presented. The general recommendations emerged of the session were: (i) There is an urgent need of estimating actual evapotranspiration for different crops in the climate change scenario and global warming, (ii) It is well known fact that temperature has risen in various places, there is a need to come out with strategies to overcome the adverse impact of high temperature on different grain crops, (iii) Special emphasis should given to devise the strategies to tackle the situation arising out of the earth's surface temperature reaching to the threshold level for rainfed areas of the country under changing climate, (iv) There should be extensive research to study the climate change in soil biological properties under climate change scenario after collecting long term soil data.

Special emphasis should given to study the adverse impact of climate change for organic cultivation states/ regions as NE regions encourage organic cultivation with Sikkim being the fully organic state.

The technical session III on Diversified Agriculture, Forest and Animal Resource Management was Chaired by Dr N.B. Singh along with Dr M.J. Singh as co-chairman and Dr A.K. Singh and Dr O.P. Aishwath as Convenors. In the lead paper presented by Dr NB Singh, he stated that for diversification in Agroforestry, Willow improvement is required. Farmers are encouraged to grow Willow trees

under small scale forestry in suitable agro-forestry systems. The State and Central Government should take active steps to have pilot project for growing willow for sustaining the cricket bat industry in future. He emphasized that the ecological balance and landscape development can be made by the intervention by the government. In the oral presentation, Abul K. Azad, highlighted the roles of livestock farming in doubling the farmer's income. Dr. Tantuja Nandy presented the research work on characterization and classification and soil-site suitability for rice of some coastal soils of Guntur District of Andhra Pradesh. She pointed that in order to plan any kind of conservation practice for sustainable agricultural production pedological study is important. Kankabati Kalai presented paper on Internal Gender migration in India: A move for seeking better life and opportunities. In the paper it was pointed that Migration rate of women migrant in both rural and urban area was found to be higher than migration rate of men migrant. Migration rate of women migrant was observed to have increased in the age group of 20-24 years and 25-29 years. And among the North eastern states Sikkim was found to have highest per cent of women migrant in both rural and urban areas. It was stressed that responsible authority should plan for providing incentives to reduce undesired migration, rural development programmes which aimed at increasing rural production, efficiency and incomes. Dr M.S. Hadda presented a study on comprehensive assessment of soil quality in North-Western tract of India. He narrated the soil quality indices selected under a land use is of smaller in magnitude than that in LS method on same scale. The study reports that SQI was in the order: Forest>Grasses>Horticulture> Cultivated>Bare.

The Technical session IV on Biodiversity Management and Organic Farming was chaired by Dr. B.C. Deka. The co-chairman of the session was Dr Nilay Borah. The session was convened by Dr. Brijesh K. Mishra and Dr. Anil Sharma. First lead paper was presented by Dr Sanjay Arora on halophilic microbial formulations use for enhancing productivity of crops on sodic soil and thus bio-remediating the salt affected soils. It was emphasized that the prepared liquid bio-formulations Halo-Azo, Halo-PSB and halo-Zn having salt and pH tolerance are effective under salt stress. Wider adoption of this eco-friendly and cheap technology can alleviate salt stress and optimize crop production from degraded lands. Based on the observations, similar studies needs to be attempted in acid soils of North-East through potential tolerant microbes. Second lead paper was presented by Dr Anil Sharma on "Aquatic waste management through vermitechnology". Very good efforts for lake clearing in Jammu & Kashmir. This is very helpful by converting the aquatic weeds into vermi-compost. Vermi-pellets having dispersible, antagoniser for soil born diseases, high in nutrients has been prepared for ease of application. Oral presentations made by Rokozeno Chalie-u highlighted the role and potential of mycorrhizal fungi for soil carbon sequester. Soil organic carbon pools under different land uses in relation to pedogenesis in Ri-Bhoi district of Meghalaya was presented by Ms. Euwanrida Adleen. Weed flora and its competitiveness on growth and yield of groundnut under mid altitudes of Meghalaya was presented by Santosh B. Korav and Lipa Deb presented work on evaluation of biological compatibility of entomopathogenic fungus *Beauveria bassiana* with different botanicals. Co-chairman thanked the organizers of the 26th National conference. He congratulated the presenters especially Dr Sanjay Arora for halophilic bioformulation use for sodic soil management. He also advised for heavy metal concentration in public place wastes for composting. Chairman of the session praised the work presented by Dr Sanjay Arora for holophilic biofertilizers and advised for similar work for acid soils present in North East region and other parts of the country.

Technical session V on Soil Health and Nutrient Management for Sustainable Production was Chaired by Er. V. W. Ambekar and co-chaired by Dr. Sanjay Arora. Dr. Seema Sharma and Dr. Tantuja Nandy were the convenors of the session. First lead paper on Declining soil health in the lower North-western Himalayas in Jammu and Kashmir was presented by Dr. Vikas Sharma. The speaker explained about the existing erosion problem focusing in lower Himalayas and the associated social problems such as poverty mainly due to poor output, less investment, less reliance on land and small land holdings of the farmers. He also highlighted that soil erosion is expected to rise hence soil quality indicators was studied by him pertaining to the area. The SQI studies revealed that Lower Shiwaliks was least eroded. Among the different forms of carbon the C content of agricultural soils were at par with degraded lands. The speaker concluded by saying that low cost technologies, minimum tillage and mulching could be effective conservation technologies for this region. The house thanked the speaker for his interesting and useful research. The other lead paper on Productivity enhancement and soil health improvement in rice-wheat system through efficient weed management practices was presented by Dr. Kaberi Mahanta. She highlighted the concerns related to ecology and agriculture and emphasized weed being the major biotic constraint and herbicide application to be the cheaper and effective option to overcome the yeld loss due to it. Different weed management practices were studied out of which pretilachlor 0.75 kg ha^{-1} to rice and isoproturon 0.75 kg ha^{-1} + surfactant to wheat resulted in significant weed control thereby reducing nutrient mining by weeds and providing a better environment through increased in soil nutrient status, carbon stock and improvement in BD. The oral presentation made by Dr. Hardev Ram on Effect of nitrogen management and crop establishment

methods on baby corn and fodder productions, emphasized urbanization to be the main reason behind declining areas under fodder cultivation and the burning of residues by the farmers the reason for declining soil health. He also said that the tremendous pressure for feed and fodder demands a profitable crop such as baby corn to be cultivated. He also highlighted that farmers should opt for zero tillage as the call of the hour with the government subsiding them and cropping systems such as maize –wheat and maize-mungbean as best cropping practices in terms of nitrogen management and water productivity. Mr B. Tamang presented on Phosphorus and sulphur role in black gram in acid Inceptisol. He mentioned about the synergistic as well as antagonistic relation between phosphorus and sulphur. He explained about the different treatments and combinations in his pot experiment and concluded that 60 mg P per kilogram and 30 mg per kilogram soil could be best combination application for highest nutrient uptake in black gram in Rhi-Bhoi. Dr. Anshuman Kohli, presented a paper on Soil profile penetration and explained about functions of the cone penetrometer and cone index which functionally relates to measurable variable of soil that is infiltration. For rainfed based cropping system of South Bihar the steady state infiltration rate was higher cereal crops. Lentil cropping offered highest resistance to penetration.

Technical Session-VI on Conservation Agriculture and Watershed Management was Chaired and co-chaired by Dr. Suraj Bhan and Sh. Jagatveer Singh. The conveners of the session were Dr. B.P. Lakshmikantha and Dr. A.S. Yadav. In this session 3 lead papers and 4 oral papers were presented. Dr. Vinay K. Pandey, Dean IGKVV, Raipur in his lead presentation on Application of physically based hydrological model for development of watershed plan, presented a case study of hydrological model for development of watershed plan. He emphasized that how through model get information of different soil and its properties, so we better planning for watershed area. Also application of geo-hydrological model, gives good information in less time and precise information, so we can save time also. Dr. R.K. Sahu, presented a lead paper on Addressing the challenges of water logging under small holdings through low cost under drainage system in Chhattisgarh. He presented the drainage problems of small holding farmers of Chhattisgarh and the water logging at early stage affecting the crop growth. The use of PVC pipes with coir for sub-surface drainage was effective and this technology intervenes in pigeonpea, soybean, maize and groundnut crops worked well. Dr Suraj Bhan in his lead paper on Shifting cultivation- A tribal way of life stressed how shifting cultivation is a socio-cultural life of the tribal people of NE regions of India. The major problems are acidic soil, high rainfall, humidity, low temperature, soil erosion and land degradation etc. He expressed that through various soil and water conservation approaches solve these problems.

The oral presentation by Dr A.K. Verma was based on GIS based watershed modeling: An effective way of watershed management. In the presentation effects of soil conservation measures on sediment yield was presented and how GIS based models are important for the study. Dr. R.M. Patel presented Evaluation of micro-watersheds of Navsari. The usefulness of satellite data in obtaining high dynamic landuse/land cover information on spatial scale was effectively demonstrated. The model's ability to simulate no. of different process and its limits with area view interface gave a great potential as a tool for predicting the sediment yield. Dr Praveen G.S. presented Utilization of land resource inventory for generation of soil and water resource action plan for a micro-watershed in Karnataka using RS and GIS. The evaluation and prioritization of micro watershed was done for the remotely sensed data and ground truthing on the criteria of hydrology, water available etc. RS & GIS technology use was presented by Dr Lakshmikantha. Action plan developed by new approaches would help to identify the sustainability of treatments particular to farm type. Repetition of treatment would be avoided in turn reduces the cost of implementation.

The Technical session VII on Water Resource Conservation and Management was the seventh session of conference that was Chaired by Sh. H.S. Lohan and co-chaired by Dr. Susama Sudhishri. The session was convened by Dr. Mukesh Kumar and Dr. S.K. Pattannaik. One Lead paper and total seven oral papers were presented in the session. The recommendations that emerged from session are: (i) Extreme drought events were observed in the months of May, July, August, September and October. In the months of January, November and December, the frequency of near normal was 34, 33, 34 years respectively. It was suggested that drought years may be correlated with the actual yield of crops during that year from the state govt. Department of Tripura, (ii) Almost 76% of the total annual rainfall received in monsoon season over the border districts of Arunachal Pradesh. On annual time scale, Arunachal Pradesh witnessed statistically significant decreasing trends in total rainfall in range of 27.1 mm/year to 40.1 mm/year. Decline in rainfall observed in the border districts of eastern Arunachal Pradesh in different time scales may affect the crop-production especially in the Kharif season. It was suggested that Modified Mann-Kendall Text may be tested for the rainfall data analysis, (iii) The water stress condition of horticultural crops is tackled by the technology of integrated rainwater harvesting system in conjunction with solar pumping and micro-irrigation system. This may be implemented both in the valley and sloppy cultivated lands of NEH region of India including Arunachal Pradesh, where electricity is a recurrence problem. The Integrated Technology of RWH-Solar Pumping Technology-Micro Irrigation for the agro climate conditions of Arunachal Pradesh may be included

in direct irrigation plan, Govt. of India, (iv) Irrigation scheduling is very important to get a good potato harvest with judicious use of water, (v) There is a need to generate awareness about the Indigenous Water Conservation Technological Knowledge among stakeholders. Indira Gandhi National Open University has taken lead in this direction by developing two educational programmes namely (a) One-year diploma programme in Watershed Management in collaboration with Department of Land Resources, Ministry of Rural development, Government of India and (b) Six-month certificate programme in Water Harvesting and Management, (vi) Renovation of Traditional Water Conservation structures may be carried out through the Govt. departments. *Bael* tree intercropped with cowpea incorporating with trench moisture conservation practice can fetch more income and enhancing soil fertility under rainfed conditions of arid and semi-arid climate.

Eighth Technical session on the theme Innovative approaches for sustainable farming to enhance farmer's income was chaired by Dr M. S. Hadda. This technical session was co-chaired by Dr B K Sinha and the convenors were Dr P. K. Bora and Dr Dinesh Sah. Session started with lead lecture on Innovative plasticulture technologies for doubling farmers income by Dr R. K. Singh, PC, CIPET Ludhiana, Punjab. Dr Singh presented scenario of polymer use in India and world and explained advantages of plastic in agriculture as well as causes of not much adaptability in India. High cost of plastic and need of technology may be one of the major causes of non adaptability. He also emphasizes on use of polyhouse for cultivation of off season vegetables like tomato, chilli, cucumber etc with good quality of produce to fetch good profit from market.

In the Corporate slot, Mr Somnath Mishra, representative of Maccaferi Environmental Solutions Pvt. Ltd. presented the eco-friendly and innovative solutions for infrastructure development in hilly areas. In his presentation Mr Mishra highlighted the problems of hilly region and highlighted various products and success stories of company.

Under oral presentation section total six (6) presentations delivered by delegates on various topics. Dr J. Sinha through his presentation stressed on use of used plastics as source of input in agriculture with aim to minimize waste. As per his findings use of used plastics in farming is helpful in environmental protection as well as income generation of farmers. Jyoti S S concludes her presentation narrated the message that farmers to farmers extension approach is one of the viable extension method. Victoria Devi highlights the role of ICT like TV, Mobile etc as well as youth of nation in climate change mitigation strategy. Role of livestock farming and management of fodder for cattle was explained by one of speaker during the session. As per her findings narrow spacing is good for fodder maize cultivation. During question hour, Dr Srivastava suggested the delegates to increase use of plastic in agriculture by various ways with aim to increase productivity and profitability.

Valedictory Session

The valedictory session of the 26th National Conference was held on 13th September 2017. The session started with the welcome address by Dr. N.B. Singh. The proceedings of the conference with general recommendations were presented by Dr. Suraj Bhan, President, SCSI. Special guest, Er VW Ambekar, gave an overview of the conference with some take home points emerged. Chief Guest Shri Ronnie V Lyngdoh, Minister of Soil and Water Conservation, Meghalaya congratulated the organizers for successful organizing the conference and also apprised about the activities taken up in the state to conserve the natural resources vi-a-vis mitigating climate change effects. On the occasion, Dr. Sanjay Arora, Convenor of Conference announced the session wise awards for poster and best paper presentations. Vote of thanks was presented by Dr Sanjay Swami, organizing secretary and Dr Anshuman Kohli on behalf of society.


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CLIMATE SMART SUSTAINABLE AGRICULTURE
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Major Recommendations

Following recommendations have been emerged after deliberation, discussions, interactions among learned scientists, professionals during various sessions consisting of 8 different themes.

- In sloppy lands, contour bunds need to be constructed at suitable intervals for checking erosion and moisture conservation. In high slopes, terraces have been practiced to control soil erosion and safe agriculture. In case of occurrence of high intensity storms, arrangement for safe disposal of drainage needs to be provided to check soil erosion.
- Intensive soil and water conservation measures along with water harvesting need to be taken up at appropriate locations to increase the moisture regime and stabilize the land slope.
- Suitable grasses and pineapple etc. need to be planted on the contour bunds.
- Dibbling of granular fertilizer enhances the yield of the crop. High yielding seeds of different crops need to be introduced.
- Suitable fodder, willow, timber and fuel trees need to be planted on the boundaries to meet the requirement of the farmers.
- Traditional knowledge based practices of the farmers needs to be revisited and scientifically validated for the development of shifting cultivation areas.
- Database on natural resources on watershed basis should be created in GIS domain using RS and GIS tools for strategizing management of land and water resoruces.
- Rainwater conservation, both in-situ and ex-situ rainwater harvesting needs to be promoted through location specific cost effective conservation measures, integrating land, water, crop, fish, birds and animals facilitating ground water augmentation and irrigation to realize increased yield and income to the farmers.
- Soil health management through eco-friendly approaches using efficient microbes can not only improve crop yields in sustainable way but also reduce input cost. Bio-remediation of problematic soils can also be one of the potential approach through use of microbes and useful plant species.
- Use of plastic mulches has been proven to be effective in moderating the temperature, moisture conservation and weed control. However, due to additional investment, small and marginal farmers are reluctant to adopt this technology. This can be resolved through the application of used plastic based mulches, prepared from wheat flour bags, rice bags, fertilizer bags etc. Small and marginal farmers can avail these benefits for growing vegetables.
- Over exploitation of groundwater in many areas has been a cause of concern, threatening sustainability of agriculture. Therefore, this is high time to promote conjunctive use of surface and ground water. It also included mitigation of shortages in canal supplies, increasing dependability of water resources, alleviating problems of declining water table and salinity control.
- People's participation in water management and capacity building needs to be strengthened. This can be achieved by increased awareness, increased communication among stakeholders, water panchayats and irrigation officials.
- Women empowerment is another key issue which needs to be addressed for food and nutritional security of agricultural community. It can be done through MGNAREGA, micro enterprises and entrepreneurship development.
- Use of water resources with increased efficiency and equity have the potential to double the irrigated area with the same amount of available water. Matching and selection of the crop/varieties according to water requirement and quantum availability has a great deal in saving precious water resources to a great extent.
- Increased water use efficiency can be obtained easily by reducing storage losses by 50% through lining of the water resources.
- Erosion management through control measures, viz., slope and runoff management have to be adopted to minimize both onsite and offsite effects of soil erosion, thus playing a supporting role to the erosion-preventive measures.
- Climate Smart Agriculture in itself is not a fixed set of practices that can be applied anywhere. It is simply a concept that integrates the climate related risks to agriculture and vice versa into our approach for sustainable crop production. Based on this concept the policies and practices need to be identified as well as developed at local level for local communities.

World Association of Soil and Water Conservation (WASWAC)
International Soil Conservation Organization (ISCO)
&
Soil Conservation Society of India (SCSI)

Jointly Announce an International Conference on

Managing Soil and Water Resources for Climate-Smart Agriculture Toward Global Food and Livelihood Security

At New Delhi, India, November 5th-9th, 2019

PRIMARY CONFERENCE TOPICS

I. Advances in natural resources inventory for food, energy and livelihood security.
II. Soil quality and challenges in resilient agriculture, afforestation, bio-diversity losses and forest management.
III. Rainwater harvesting, efficient use of water, integrated watershed management and community participation.
IV. Biodiversity conservation, coastal ecosystem management, for sustaining soil health and productivity.
V. Prospects for intensification of cropping systems, sustainable production systems, integrated farming systems
VI. Innovations in irrigation and drainage management
VII. Land management in mountainous areas, sloping lands, plateaus, plains, deserts, community grasslands, rangelands and alpine and sub-alpine pastures.
VIII. Water and wind erosion and their effects on soil, soil carbon sequestration under different land uses and energy management.
IX. Soil salinization, acidification, contaminated soils, mined soils, wastelands and degraded land management.
X. Remote sensing and GIS, Empirical approaches and modeling soil and water degradation processes, decision support system.
XI. Treatment and management of low quality residual waters, Environmental issues and protection strategies of water bodies,
XII. Socioeconomics of profitable farming for enhancing rural livelihoods,
XIII. Research and Education in soil and water conservation issues for sustaining land and water productivity,
XIV. Constraints, challenges and future strategies for implementing soil and water conservation practices
XV. Policy interventions, socio-economic constraints and challenges in global food security
XVI. Climate change mitigation and adaptation strategies, land use and land use planning for smart agriculture and rural livelihood
XVII. Women empowerment, rehabilitation, environment protection, employment generation, energy utilization, soil solarization, hill cultivation, micro flora and fauna

Conference updates

Detailed information and updates about the Conference will be available at the website of SCSI (www.scsi.org.in), ISCO (https://www.tucson.ars.ag.gov/isco/) and WASWAC

Contacts

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Convener: Dr. Sanjay Arora (India)

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