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International Decade of Soils 2015-2024

FROM THE PRESIDENT'S DESK

Climate change impacts on soil erosion have been observed over the world. Many studies suggest that rainfall is the most direct influencing factor. Every 1% change in precipitation has led to 2% change in sediment loads and 1.3% change in water discharge. Climate change also put further pressure on soil quality and increases the risk of desertification and land degradation. In May 2021, the World Meteorological Organization noted about 40% chance of the annual average global temperature temporarily reaching 1.5° C above the pre-industrial level in at least one of the next five years. It added that there is 90% likelihood of at least one year between 2021 and 2025 becoming the warmest on record and dislodge 2016 from the top rank. Therefore, it has been observed more cloudbursts in Himalayan region because the decadal temperature rise in the Himalayan region is higher than the global rate of rising temperatures.

Climate change is projected to increase soil erosion in many regions of the world. The study estimated that by 2070, soil erosion rates could increase by 30-66% in some areas, particularly in the Mediterranean, Middle East, and parts of Africa. A report by the United Nations Food and Agriculture Organization (FAO) in 2020 highlighted that climate change is accelerating soil degradation processes worldwide. It is estimated that nearly one-third of the world's soils are already degraded due to climate change, land use changes, and other factors. According to the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), the average rate of soil erosion in India is estimated at 16.4 tons/ha/year, with the highest rates of erosion found in the hilly regions of the country. Soil erosion reduces the productivity of the land, leading to a decline in agricultural yields and an increase in land-use conflicts. According to the Ministry of Environment, Forest and Climate Change, over 96 million hectares of the country's land is affected by degradation, with around 82 million hectares experiencing desertification. Soil erosion, salinization, and water logging are the primary causes of land degradation in India. This has led to a decline in soil fertility, decreased agricultural productivity, and increased land-use conflicts.

Climate change also has significant implications for biodiversity, agriculture, human health, and the global economy. It can cause shifts in plant communities, including changes in species composition, distribution, and productivity. These changes can affect soil carbon storage, nutrient cycling, and water use efficiency. Climate change is causing shifts in plant communities worldwide, with many species moving towards cooler, higher elevations. An estimate suggests that by 2070, up to 57% of plant species in some regions could face extinction due to climate change.

In India, several programs have been implemented to promote watershed management, including the National Watershed Development Project for Rainfed Areas (NWDPRA), the Integrated Watershed Development Program (IWDP), component of PMKSY and Jal Shakti Abhiyan, different slogans 'catch the rain', revival of ponds, Amrut Sarovar programme, per drop more crop etc. These programs have helped and will help to mitigate the effects of soil erosion and improve land fertility, and conserving natural resources and improving livelihoods. Other than these *in-situ* and *ex-situ* water harvesting, bio-engineering measures, conservation agriculture, conservation tillage, crop rotation and agro-forestry, cover cropping, water-saving technologies like micro-irrigation and land degradation neutrality principles are essentially to be implemented.

Soil quality under traditional land use systems in North Eastern Himalayas

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The concept of soil functions defines six tasks a soil fulfils, including biomass production, protection of humans and the environment, gene reservoir, physical basis of human activities, source of raw materials, and geogenic and cultural heritage. Soil functions are closely related to soil quality which may be defined as the capacity of soil to fulfill ecological functions and provide ecosystem services to maintain biological productivity and environmental quality, and enhance the plant and animal health. Soil quality comprises two aspects, inherent soil quality as determined by nominally fixed factors, *i.e.*, climate, organisms, topography, parent material and time, and dynamic soil quality which refer to those aspects of soil quality that change as a result of land use and soil management. Soil quality can be assessed by measuring the status or the (rate of) change induced by perturbations of soil chemical, physical and biological properties that together determine the capacity of the soil to perform processes. Soil quality indices (SQIs) synthesize soil attributes into a format that enhances the understanding of soil processes to inform on appropriate management or policy interventions.

Soil quality indicators and their related functions:

Physical indicators:	Aggregate stability, available water capacity, bulk density, infiltration, slaking, soil crusts, soil structure and macropores
Chemical indicators:	Reactive carbon, soil pH, EC, soil nitrate
Biological indicators:	Earthworms, particulate organic matter, potentially mineralizable nitrogen, soil enzymes, soil respiration, and total organic carbon

Soil quality index is calculated from the following formula

$$SQI = {}_{10}\log m - \frac{\sum_{i=1}^{N} |\log m - \log n_i}{N}$$

Where, m- referenced indexed values (each value set of 100%) from the adjacent forest soil
n- measured values as percentage of the reference
N- total number of parameters

Comparison of two soil quality indices

(1) "Bodenkonzept Stuttgart" (BOKS) soil quality index:

BOKS = (sva*a) + (wc*a) + (fbc*a) + (cnh*a) + (cont*a) + (seal*a)

a - parcel area, svc - suitability for natural vegetation and cultivated crops, wc - regulation of the water cycle, fbc - filtering and buffering capacity, cnh - archiving cultural and natural history, cont - contaminated sites, seal - level of soil sealing

(2) SQUID (Soil Quality Indicator):

$$SQUID = \frac{\sum_{i=1}^{n} ESi}{i}$$

$$ESi = \sum_{j=1}^{n} sfij * wij \,, \quad \sum_{j=1}^{n} wj = 1$$

ESi are soil-based ES, with i running from 1 to 23.
sfij is the quality of soil function j contributing to a given ecosystem service i.
wij is the expert-assigned weight, *i.e.*, the contribution level of soil function j to an ecosystem service i.

Shifting cultivation in North Eastern Himalayas degrade soil quality by removing nutrients from the soil, inadequate irrigation practices and decreases soil microbial biomass which reduces enzymatic activities vital for soil health and functioning. By evaluating impact of shifting cultivation on soil quality using weighted soil quality index with four forest sites and three sites by using physical parameters (texture, bulk density) and chemical parameters (organic carbon available N, P, K and exchangeable cations) at three different soil depths 0-30 cm, 30-60 cm, 60-90 cm, three different classes of soil quality were identified *viz.*, high quality ($SQI_w > 0.70$) for two forest soils and land under

shifting cultivation, low quality ($SQI_w < 0.50$) for FS3 and intermediate quality ($0.50 < SQI_w < 0.70$) in the other soils. To detect the most suitable soil quality indicators and assess the influence of five most predominant land use and soil management types [Dense forest (DF), Bun cultivation (BC), Pine forest (PF), Shifting cultivation (SC), abandoned land after shifting cultivation (AS)] in two districts of Meghalaya, the soil quality indices taken were bulk density, particle density, soil pH, EC, organic carbon, available N, P, K, and total nitrogen. The overall soil quality index was in the order of 0.91 (DF) > 0.69 (SC) > 0.63 (PF) > 0.57 (BC) > 0.37 (AS). Soil organic carbon and soil acidity were observed to be most powerful soil quality indicator under different traditional land uses which is the key for improving the soil quality index of the study area.

Likewise, implementation of SQI to estimate the effect of shifting cultivation on the soils of Kohima district in Nagaland concluded that continued cultivation may lead to the depletion of soil nutrients and cause soil degradation. Four sites *viz*., shifting cultivation site or jhum land in its 3rd cycle of cultivation, fallow land 3, fallow land 7 and fallow land 12 (Fallow land indicates no anthropogenic disturbances) at 3 different depths 0-10 cm, 10-20 cm and 20-30 cm were selected. Soil pH, EC, SOC, available nitrogen, phosphorus, exchangeable potassium, soil moisture, bulk density, clay content and CEC values were lower under shifting cultivation system indicating unsustainable soil practices degrade soil quality in overall depths of 0-30 cm. Depth wise comparison of soil quality index showed that additive SQI was in the order of SCS < FL-3 < FL-12 < FL-7, while weighed SQI was in the order of SCS < FL-3 < FL-7 < FL-12, respectively. Soil quality (depth wise) was in the order of 0-10 cm > 10-20 cm > 20-30 cm.

Agro-forestry is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic and social benefits. Traditional alder (*Alnus nepalensis*) based agro-forestry system is an age-old ecological farming practice of some indigenous tribes of Nagaland. In this system of farming, crops are grown as intercrop with alder trees. Agricultural crops co-cultivated with alder forms a very remunerative agro-forestry system. This system is an outstanding model of sustainable land-use evolved through numerous years of testing by the indigenous tribes and widely practiced in Khonoma village of Nagaland. The root nodule of alder is responsible for fertilizing the soil whereas, the spreading nature of the roots helps in preventing soil erosionin slopes. Therefore, the effects of six different agro-forestry practices *i.e.* Alder + Tea + Black pepper; Silver oak + Pineapple + Som + Broom + Pineapple; Alder + Large cardamom + Alder + Ginger; Gumhar + Turmeric was evaluated on soil quality attributes at a depth of 0-15 cm. Soil quality index (SQI) was highest for Alder + Large cardamom (0.858) followed by Alder + Tea + Black pepper (0.758) and Alder + Ginger (0.756). The alder based agro-forestry system improved the soil health and environmental sustainability.

Sol quality assessment provides a way to assess the suitability and sustainability of traditional land-use and soil management practices prevalent in a region. Soil quality indicates assessment of soil properties and processes as they relate to ability of soil to function effectively as a component of a healthy ecosystem. Soil quality index was highly influenced by land use and soil management. Minimum data set can be used to assess soil quality faster. Soil quality of area under shifting cultivation was high initially and rapidly declining with time due to leaching and runoff which relates to low soil quality index. Out of different land uses soil quality index was highest in forest area followed by agricultural lands. Identification of soil quality indicators helps in real time monitoring of soil health and ecological processes in future.

(Plate: Soil sampling from traditional land use systems)

Converting fallow lands to alder-based agro-forestry systems results more soil carbon retention and nutrient accumulation which in turn reflects to improved soil quality and resulted in high soil quality index. The alder-based farming system can be used as acclimate smart agriculture practice in these soils. Monitoring land use with soil quality index helps to increase crop productivity, sustainability, and livelihood security. The alder-based agro-forestry have high nitrogen fixing capacity and was found to be the best land use practice for improving the soil health which was reflected by better soil aggregation, water retention, nutrients availability and the higher soil quality index value. Due to high slopping and rainfall, the North Eastern Himalayas is highly vulnerable to land degradation. Alder-based agro-forestry system can be a sustainable system to protect the soil resources and at the same time sustain the production system for the resource poor hill farmers.

Summary of the 31st National Conference held at Navsari Agricultural University

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The 31st National Conference on "Innovative resource management approaches for coastal and inland ecosystems to sustain productivity and climate resilience" was held from October 13-15, 2022 at Navsari Agricultural University, Navsari, Gujarat, in collaboration with Soil Conservation Society of India (SCSI) and Gujarat State Chapter of SCSI supported by Ministry of Jal Shakti, Department of Water Resources, GoI; Indian Council of Agricultural Research (ICAR), and National Bank for Agricultural and Rural Development (NABARD) and Ministry of Earth Sciences, New Delhi, including few private firms linked with the university.

Organizing the 31st National Conference at Navsari Agricultural University, Navsari was the brainchild of Dr. Suraj Bhan, President, Soil Conservation Society of India, who consistently persuaded the members for making the event successful. The programme was inaugurated and presided over by Hon'ble Vice Chancellor, Dr. Z.P. Patel in the gracious presence of Dr. A.K. Singh, Vice President, NAAS, New Delhi as the Chief Guest; Dr. A. Arunachalam, Director, ICAR-Central Agroforestry Research Institute, Jhansi, Uttar Pradesh and Mr. Maniswara Raja, Chief Conservator of Forest, Valsad, as the Guest of Honours'; Dr. T.R. Ahlawat, Director of Research & Dean Post Graduate Studies, Dr. O.P. Aishwath, Vice President, SCSI, West Zone and Principal Scientist, ICAR-NRCSS, Ajmer, Dr. P.K. Shrivastava, Convener & Dean, College of Forestry (CoF), NAU; Dr. J.M. Patel, Research Scientist, SWMRU, Navsari and Dr. K.G. Patel, Co-organizing Secretary were present in the inaugural programme. Further, during the inaugural programme, the dignitaries released the Book of Abstracts and Souvenir of the Conference. Also, twenty-five academicians affiliated with Soil Conservation Society of India (SCSI) were conferred with various awards, for their outstanding contribution in the various fields of Science and Technology and Natural Resource Conservation and Management. Before the inaugural function, dignitaries inaugurated an exhibition comprising of products made in different Units of the University as well as the products made by the students under experiential Learning Units of various colleges of the University.

Dr. Z.P. Patel, Hon'ble Vice Chancellor stated that the aim behind the organization of this event was to deliberate on latest issues and concerns of soil and water conservation, land use systems, coastal ecosystem, natural farming, traditional farming systems and its socio-economic impact on the farming community. Dr. A.K. Singh, Chief Guest, highlighted that agriculture has been the backbone of the Indian economy since time immemorial and it is still perceived as a way of life. He emphasised to the line departments that inclusion of Soil &Water Conservation Engineering, Forestry, Horticulture and allied agricultural sciences is the need of the hour. To revive Indian agriculture, Dr. A. Arunachalam, emphasized that there is a need of paradigm shift from agriculture to agroforestry, through suitable tree-crop combinations, which is very crucial to seize the hidden and untapped potential of agriculture and allied sector. Mr. Maniswara Raja, Guest of Honour, said that by transforming conventional forestry into consumer driven forestry enterprise through deliberately incorporation latest technologies developed by SAUs/ CAUs on soil conservation, water management, latest nursery techniques on forest lands, Line departments could make soil and water viable and sustainable.

Following recommendations emerged from the three-day conference

Soil issues

- Reduce stubble burning to reduce emissions from agriculture sector, the crop residue may be converted to biochar to increase soil carbon which shall result in enhanced soil fertility and improvement in soil health. Stubble burning cannot be minimized forcefully but with the help of technology and incentivization
- Achieving carbon neutrality, by offsetting emissions by sequestering C in land-based sinks, can limit the global temperature to below by 2^0 C.
- Bamboo plantation is a potential crop for degraded lands to improves soil porosity, check soil erosion, improve soil fertility in addition to providing source of income.
- Biological remediation in the form of plants and microorganisms could be used as an alternative to mitigate the negative impacts of heavy metal from the contaminated soil.

Traditional/Natural farming

- There is a need to identify key indicators and robust monitoring and evaluation systems to accelerate regenerative goals through natural farming practices.
- Regenerative agriculture and emphasis on plant-based diet for nutritional security needs to be adopted to feed the population, create positive carbon budget for improvement in quality and quantity of yield.
- Crop residue incorporation improves infiltration rate of soil by 10.7 % over without residue retained treatment. The water holding capacity of soil was found to be 8 % more under residue incorporation than conventional practice.
- Application of 100 % and 75 % RDN through bio compost as well as enriched banana pseudo stem sap @ 1 % and Jeevamrut @ 1 % is good nutrient (Fe, Mn, Zn, and Cu) for Finger Millet [*Eleusine coracana* L.] grown under organic farming system.
- Climate smart resource conservation in pulses like chickpea through conventional tillage and rice straw mulch could be a better option for higher productivity and improvement of soil properties followed by minimum tillage. The placement of fertilizer at 8 cm depth was more remunerative followed by 11 cm depth, for growth, yield, quality, and economics of chickpea
- Crops and varieties respond differently to natural and organic farming systems. Low input responsive rice varieties are better suited and need to be screened for natural farming systems.

Coastal agro-ecosystem

- Aqua – agro-forestry model in coastal areas for financial security of residents of coastal areas
- Issues of climate change and sea water ingress, soil salinity, management of soil salinity along the coastal belt needs proactive land use planning and field execution.
- Commercial potential of horticulture, aromatic, spices, and medicinal species like ashwagandha, senna, kalmegh, basil, lemongrass, and palmarosa needs to be promoted in coastal degraded soil.
- Application of gypsum on coastal salt affected soil and growing of hybrid Napier grass has the capacity to reduce soil sodicity while increasing the nutrient status of soil.

Forestry/agroforestry

- Suitable tree-crop combinations and Agroforestry needs attention not only to mitigate the impacts of climate change but also to meet food, fodder and water demand in the wake of decreasing forest cover. Restructuring of Agroforestry policy in order to accommodate many forest tree species that can easily be grown without transit like bamboo.
- Emphasis on Industrial Agroforestry, Urban Agroforestry and Agroecology for meeting the industry demand and mitigate the impacts of climate change.
- Utilizing land space like bunds, alley, etc. for additional income by planting fast growing multifunctional tree species

Technology Driven

- Precision agriculture for natural resource management and techniques like Variable Rate Technology (VRT), soil sampling through Geographic Information System (GIS), drones and use of unmanned vehicles is the way forward to achieve the desired crop growth and retain youth in the farming sector.
- Execution of available soil and water conservation technologies of land reclamation and ground water recharge in the coastal region for sustainable agriculture.
- Need to develop regular drought monitoring and early warning system for different climatic regions.
- Demarcation of areas vulnerable to drought for effective mitigation planning.
- Emphasis on learning methodologies on Robotics and Drones applications in Agriculture in course curricula of Agricultural Engineering and introduction of short-term certificate courses for youth on use, operation, and maintenance of drones and for specific farm operations.
- Land levelling methods to prevent salt build-up should be adopted under the good land management practices.

Policy

- Scientific community should focus on food and nutritional security along with agricultural sustainability and climate resilience in the Amrit Kal of next 25 yrs.

- Concerted efforts should be made to celebrate 2023, as the International Year of Millets proposed by India aiming for higher productivity, greater profitability with lesser inputs and risk mitigation.
- Farm size, access to credit, possession of machinery and awareness of climate change are the decisive determinants for farm level climate change adaptation variables.
- Emphasis of Corporate Social Responsibility (CSR) to address farm sector issues especially for sustainable agriculture, environmental impacts, natural resource conservation, innovation and technological development, social development, entrepreneurship, livestock, and market development.
- To promote CSR activities in agriculture sector, commitment and representation of various stakeholders, effective policy support, proper monitoring system at various levels is needed. The CSR activities will be a power tool to maintain customer relationship.
- Concerted efforts are needed by various agricultural branches of Agriculture, Agricultural Engineering, Forestry, Horticulture, Biotechnology, and allied sciences for increasing productivity and profitability.

The valedictory function of the 31st National Conference was presided over by Dr. Z.P. Patel, Hon'ble Vice-Chancellor, NAU, Navsari. On the occasion, Dr. S. Raman, Former Research Scientist, GAU, Gujarat was invited as the Chief Guest and Dr R G. Patil, Retd. Research Scientist, Soil & Water Management Research Unit, NAU was the Guest of Honor.

At the outset, Dr. Mukesh Kumar, Professor & Treasurer, SCSI, New Delhi welcomed all the dignitaries and explained the purpose of conference and informed that until now Society had organized 30 National and 4 Intentional conferences at various places in India. Dr. P.K. Shrivastava, Convener and Principal & Dean, College of Forestry, NAU, Navsari presented the brief report of the 31st National conference. He informed that the conference was attended by about **250 participants from 19 states** of India including a participant from Egypt. The conference had four technical sessions along with poster and oral presentations by the delegates and the students. There were 306 abstracts submitted by researchers, out of which 141 papers were listed for Oral and 166 papers for poster presentations. Total 250 researchers and students registered much above the expected 200 participants, of which 135 abstracts were submitted from NAU alone, due to the initiative of Hon Vice Chancellor Dr. Z.P. Patel. The USP moment of the Conference was the message from Prime Minister Narendra Modi directly in the inaugural session. During the Conference 17 eminent and experienced speakers enlightened the gathering with lead lectures, including the online presentation of paper by Padmshree and Professor (Dr) Ratan Lal, from Ohio State Agricultural University, USA. While, Dr S Raman, delivered the J S Bali (1923-2016) Memorial Lecture on the topic "Climate Change in India, an overview" just before the plenary session. Also, on the first day, to entertain the delegates coming from various corners of the country, a colorful cultural programme depicting different forms of garba dance and songs of Gujarat, was also organized with the participation of students from various colleges of the University.

Dr. Z.P. Patel in his Presidential address, congratulated the Soil Conservation Society of India and the Organizers of the Conference for successfully organizing the 31st National conference. He expressed his apprehensions about sea water ingress and soil salinity all along the coast. He persuaded the scientific community to ponder the practical ways to deal with this major problem all along the coastal areas of India. He also emphasized about the need of collaboration and co-ordination among various departments for successful implementation of projects. Dr. S. Raman, former Research Scientist, GAU, Gujarat opined on the collaboration and linkages between KVKs and ICAR institutions. He also discussed regarding issues of climate change and salinity of soil, management of soil salinity with especial reference to coastal belt. Dr. R.G. Patil, Guest of Honor gave the brief history about the different schemes *viz*; NARP, NATP, NAIP and NAEP *etc.* and emphasized about the responsibility of attending the sessions with all sincerity, once registered, and delegated by the institutions for attending such Conferences / Seminar / Symposia / Workshops.

Dignitaries disbursed 24 awards to participants listed under various themes of oral and poster presentations. During the session, Dr. Jitendra Kumar, ICAR- Indian Institute of Soil Science, Bhopal; Dr. Nagendra Prasad K, Senior Research Consultant, World Pranic Healing Foundation Mysore, and Prof. (Dr.) S.L. Swami, from IGKVV, Raipur, Chhattisgarh gave the positive feedback and appreciated the hospitality and arrangements in the conference. The program ended with the vote of thanks by Dr. K.G. Patel, Professor & Head, Department of Soil Science, NMCA, NAU, Navsari.

2023: The Year of Millets

P.K. Rai, Preeti and Anuragini
Sher-e-Kashmir University of Agricultural Sciences & Technology-Jammu

Millets are small-seeded grasses that are hardy and grow well in dry zones as rain-fed crops under marginal conditions of soil fertility and moisture. They are possibly the first cereal grain to be used for domestic purposes. During the last 5 years, our country produced more than 13.71 to 18 million tonnes of millets with the highest production in 2020-21 which is about 5 percent of the national food grain basket. It has the highest market share of 9.62 million tonnes, followed by jowar with a production of 4.23 million tonnes. Ragi is another important millet, which contributes to the production of 1.70 million tonnes and the production of other millets is 0.37 million tonnes. In declaring 2023 the International Year of Millets (IYOM23), the resolution calls on all stakeholders to provide support to "activities aimed at raising awareness of and directing policy attention to the nutritional and health benefits of millet

consumption, and their suitability for cultivation under adverse and changing climatic conditions, while also directing policy attention to improving value chain efficiencies." India is leading the world towards millet revolution. The world needs to produce more food to feed a rapidly growing global population, which is projected to reach 8.5 billion by 2030, and a staggering 9.7 billion by 2050. With a deepening climate crisis and aggravating environmental stresses, there is a need for crop diversification by promoting crops suitable for cultivation in the toughest of environments. Increasingly erratic rainfall patterns and crop losses due to climate change factors has forced farmers who were following to conventional agriculture to return to sorghum, little millet and foxtail millet cultivation, having realised that this crop is much more resilient to environmental stress, gives an assured yield in both low and excess rainfall conditions, while keeping input costs low. Acknowledging the role of millets in responding to nutritional, agrarian and climate challenges, the UN resolution considers the "urgent need to raise awareness of the climate-resilient and nutritional benefits of millets and to advocate for diversified, balanced and healthy diets through the increased sustainable production and consumption of millets." They are rich in vitamins and minerals, including iron and calcium; are high in protein, fiber, resistant starch, and have a low glycemic index, which can help prevent or manage diabetes.

There are several reasons why millets are the crops that need to be cultivated in earnest today. They are climate-smart and can be grown in drought-hit, arid regions more successfully than any other crop. They also have an extremely low water footprint, with a crop of millets requiring around 80 percent less water than main crops and are excellent for soil conservation. Millets, as organic matter, are slow to break down in soil. Their slow composting nature helps in maintaining soil structure and retaining water, thus preserving soil health for extended durations. Another reason why millets are good soil preservers is their root network. Millets, like most grasses, have a fibrous root network that helps maintain soil integrity due to its extensively branched nature. Millets have a high tendency to form symbiotic relationships with mycorrhizal fungi. These fungi colonise the root system of the plant and provide increased water and nutrient absorption capabilities. Fungi can easily absorb phosphorous and nitrogen – two elements that are vital for a crops' growth but are present in small quantities in soil during fallow periods. Organic farming and millet cultivation were common practices in India for millennia.

The green revolution, despite its many benefits, ignored millets and instead concentrated on rice and wheat. Now, there is no diversity in our food in terms of nutritional value. Our food habit is going in the negative direction. In the era of climate change, which has distorted our weather pattern, millets come as a saviour for farmers. A crop that can grow in areas with less than 350 mm of rainfall and with a cultivation cycle completed within 70-100 days has resulted in farmers in dry regions of parts of south India witnessing a millet revival. The small millet family, which includes Foxtail Millet, Brown Top Millet, Little Millet, Kodo Millet, Barnyard Millet and Finger Millet. We can say they are the Future Crops. Of these, Barnyard Millet is the fastest growing, producing a crop in six weeks and offering 10 times more fibre than wheat. Koralu is drought-resistant and can be cultivated in any kinds of soil, while Kodo Millet, also drought-resistant, is an ideal crop for fallow and infertile lands with pebbles. Its straw is used as thatch for roof. It is grown with pulses which helps in nitrogen fixation and improves the fertility of the soil. The fibrous root system of millets helps in checking soil erosion as the roots are extremely branched. We can say that Millets are good soil preservers.

India's semi-arid regions have expanded by 10% in recent decades, which includes swathes of Rajasthan, Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu, making the inhabitants most vulnerable to climate change. In addition to this, rural India is witnessing growing agrarian distress despite bountiful harvests. According to study published in Economic and Political Weekly magazine, there will be a huge deficit, about 13.91 million tonnes of rice in 2030 with a 20% rainfall deficit and a deficit of 28.66 million tonnes, if the rainfall deficit is 30%. Millets are putting less pressure on nature as compared to other crops like rice, wheat, and sugarcane. In India, most millet crops are grown organically and are less dependent on chemical fertilizers and pesticides. They are drought tolerant and can be grown with less rainfall of 350-400 mm. This crop grows faster and matures within 60-65 days. The Mixed Cropping System is followed in millets. It is grown with pulses which helps in nitrogen fixation and improves the fertility of the soil. The fibrous root system of millets helps in checking soil erosion as the roots are extremely branched. We can say that Millets are good soil preservers. Millets support the fodder security of the cattle and thus contribute to the animal health of a community. Land degradation has been a major problem in India, causing massive economic losses year after year. The inter-cropping of millets with other crops is especially beneficial because the fibrous roots of millet plants help in improving soil quality keep water run-off in check and aid soil conservation in erosion-prone areas, thereby restoring natural ecosystems. Sweet Sorghum will be used in the production of biofuels. Biofuels will have less impact on the environment as exhaust gases will be much cleaner and there will be a reduction in greenhouse gas emissions. Most ethanol is produced from sugar cane molasses. But when we compare Sweet Sorghum with Sugar cane, Sweet Sorghum is much ahead in terms of duration and also the requirement of inputs and water As per a research study by the Indian Institute of Millet Research, Hyderabad, Sweet Sorghum has ethanol recovery of 6-9% of juice and ethanol yields about 1400-2000 litre/ha/season and power from the residue (bagasse) is 2.5 to 3.5 MW/ha. Ethanol blending with fossil fuels will help in reducing pollution and thus keep the environment clean. Millets are the crops grown in the dryland areas by the small and marginal farmers and it has the least impact on the environment and the farmers are producing grains for their consumption and sustaining their

livelihood. This is exemplified by comparing the amount of water needed to grow rice with that for millets. One rice plant requires nearly 2.5 times the amount of water required by a single millet plant of most varieties, according to the Crops Research Institute for the Semi-Arid Tropics (ICRISAT), a global research organisation helping to make millets more popular. Restoring ecosystem large and small protects and improves the livelihood of the people who depends on them. Millets support the fodder security of the cattle and thus contribute to the animal health of a community. Ministry of Agriculture and Farmers Welfare working in mission mode to increase millet production and consumption. Now farmers turn to millets as a climate-smart crop. Agriculture Ministry has launched several initiatives as run-up to the International Year of Millets 2023 to create awareness about the ancient and forgotten golden grains. To commemorate this, MyGov is hosting various interactive activities around Millets. It is intended to showcase the health benefits of millets to raise awareness among the masses. Activities like. Logo Competition for Mega Food Event 2023, Tagline Competition for Mega Food Event 2023, Pledge Nutrition through Nutri-cereals, Millets Magic – Share your recipe, Goodness of millets quiz, Test your knowledge about Mighty Millets, Importance of millets for nutritious diet - Slogan contest., Inviting Videos from Millets Ambassador, Anna Devo Bhava Quiz, Make interesting comics on millets, Compose catchy songs on millets, Create an informative documentary on millets, Create a documentary on importance of millets, Create awareness about millets through songs, Designing creative logos for International year of Millets, Inviting innovative ideas to increase millet production and consumption.

POSHAK ANAJ SE POSHAN PLEDGE

Nutrition through Nutri-cereals

- I pledge to eat one Millet Meal a Day
- I pledge to bring back the glory of Millets to increase consumption and make Indian farmers and markets Aatmanirbhar
- I pledge to promote Millets to foster climate resilient and smart agriculture.
- I pledge to Cultivate Diversity, Justice, Resilience, and Health for Zero Hunger

G20 भारत 2023 INDIA
वसुधैव कुटुम्बकम्
ONE EARTH • ONE FAMILY • ONE FUTURE

INTERNATIONAL YEAR OF MILLETS 2023

SUSTAINABLE NATURAL RESOURCE MANAGEMENT UNDER GLOBAL CLIMATE CHANGE

SOIL CONSERVATION SOCIETY OF INDIA

5th International Conference on

SUSTAINABLE NATURAL RESOURCE MANAGEMENT UNDER GLOBAL CLIMATE CHANGE

November 7-10, 2023

At NASC Complex, New Delhi, India

Organized by

Soil Conservation Society of India (SCSI), New Delhi, India

Conference updates

Detailed information and updates about the Conference will be available at the society's website www.scsi.org.in

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