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FROM THE PRESIDENT'S DESK



Soil health is the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Healthy soil gives us clean air and water, bountiful crops and forests, productive grazing lands, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions *viz.*, regulating water, sustaining plant and animal life, filtering and buffering potential pollutants, cycling nutrients, and providing physical stability and support. Soil health management is crucial in changing climate scenario, acting as both a mitigation and adaptation strategy. Healthy soils can sequester carbon, reducing greenhouse gas emissions, and improve resilience to climate change impacts like drought and extreme weather. Practices like reducing tillage, increasing organic matter, using cover crops, and managing nutrients are key to improving soil health and mitigating climate change.

Increased temperatures may affect soil microbial activity, nutrient cycling, and organic matter decomposition. Altered precipitation patterns lead to increased erosion, reduced water infiltration, and water stress for plants. Changes in carbon and nitrogen cycles impact soil organic matter (SOM) and greenhouse gas emissions. Extreme weather events like droughts and floods can degrade soil structure and reduce productivity. For managing soil health in a changing climate, farmers must adopt practices like no-till farming, cover cropping, and crop rotation minimize soil disturbance, enhance soil structure, and improve water infiltration. Adding organic matter through composting, cover cropping, and crop residues improves soil fertility, water retention, and carbon sequestration. Optimizing nutrient use through balanced fertilization and other methods minimizes greenhouse gas emissions and reduces pollution. Integrating trees and shrubs into agricultural systems improves soil health, provides carbon sequestration, and enhances resilience to climate change. Rotating crops and using diverse

plant species enhances soil biodiversity and improves soil health. Implementing water-efficient irrigation techniques and promoting water harvesting can mitigate water scarcity issues. By adopting these sustainable soil management practices, farmers can enhance soil health, mitigate climate change, and build more resilient agricultural systems.

Soil Acidity Impacts, Management and Limitations

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India has many types of soil, formed by different factors like weather, rocks, land shape, plants, and time. The main types are alluvial, black, red, laterite, desert, forest, peaty, and saline soils. Each has unique features and is important for farming. Broadly acidic soils in India can be classified in distinct groups like laterite, laterite and red, mixed red, black and yellow. These soils are found in places where the rainfall is frequent and heavy. Dry areas do not have acidic soils. These soils pose significant challenges to crop productivity and overall soil health, thereby impacting the livelihood of predominantly agrarian population. Beyond the direct effects on plant growth, soil acidity also significantly impacts soil biological activity and nutrient cycling processes, which are crucial for maintaining long-term soil health. The current soil management practices include traditional methods along with modern approaches such as liming, the use of organic manures, and the cultivation of acid tolerant crops and varieties. While these practices offer some mitigation, however possess limitations and often require optimization. The key area requiring further investigation include the optimization of liming strategies, the long-term effect of soil amendments, the intricate dynamics of phosphorus availability, the socio-economic factors influencing farmers adaptation of management practices, the impact of climate change on soil acidity, the role of microbial communities, the potential of cost effective and locally available amendments, and the implementation of site-specific nutrient management approaches.

Soil acidity impact on major crops

The acidic nature of soil has a predominantly negative impact on yield and quality of major crops. For instance, rice productivity is limited due to toxicity of aluminium and deficiency of phosphorus in acidic soil. In the cultivation of black gram, the application of lime with organic and inorganic fertilizers has been found to significantly increase yield and improve soil nutrient status. Furthermore, the response of rapeseed to different phosphorus sources and levels in acidic soils has also been investigated, highlighting the complex nutrient dynamics in these conditions. But certain crops naturally more suited to the acidic crops, these include pineapple, citrus fruits, tea, coffee, and rubber.

Soil acidity impact on soil biodiversity

Soil acidity plays a significant role in shaping the composition and function of soil biodiversity. Acidic

soils tend to favour the proliferation of specific microbial communities, notably acidophilic bacteria. These microorganisms are essential for various nutrient cycling processes within the soil, contributing to its overall health and fertility. However, soil acidity can also influence the distribution of other soil organisms, such as nematodes. Studies have indicated that acidic soils with lower pH and higher organic carbon content in soil tend to have higher populations of plant-parasitic nematodes, including *Meloidogyne sp.* and *Xiphinema sp.* These types of nematodes are known to negatively impact agricultural productivity by damaging plant roots. Furthermore, certain human activities, such as limestone mining, can potentially have adverse effects on soil biodiversity in the region.

Soil acidity significantly shapes the composition and function of soil biodiversity, with implications for nutrient cycling and plant health. The presence of acidophilic bacteria suggests a natural adaptation of some microbes to the prevailing environmental conditions. However, the observed increase in plant-parasitic nematodes in acidic soils points to a potential negative consequence of acidity on agricultural productivity. The impact of mining activities further complicates this picture, indicating that human interventions can also alter soil biodiversity through induced changes in soil pH and other properties.

Traditional and current management practices

- The use of organic manures, such as farmyard manure (FYM), vermicompost, green manure, and biofertilizers, plays a crucial role in enhancing soil fertility, improving nutrient availability, and stimulating microbial activity.
- Cultivating crops that are naturally tolerant to acidic conditions, such as pineapple, citrus fruits, tea, coffee, rubber, and certain varieties of rice, is another strategy employed by farmers.
- Soil conservation practices like agroforestry and terracing are also implemented to mitigate soil erosion, particularly in hilly areas.
- Integrated nutrient management (INM), which involves the judicious combination of organic and inorganic nutrient sources, is increasingly promoted for sustainable soil health and crop productivity.

- e) Other specific practices include the use of *Azolla*, a nitrogen-fixing aquatic fern, as a biofertilizer in rice cultivation, and the application of biochar, a carbon rich material, to improve overall soil health.
- f) The Soil Health Card (SHC) scheme has been implemented to provide farmers with location-specific information on soil nutrient status and recommendations for fertilizer and amendment use.

Evaluation of effectiveness and limitation

- a) While liming has demonstrated effectiveness in increasing soil pH and subsequently improving crop yields, research suggests that further optimization of lime application rates, methods, and an understanding of its long-term effects are still needed.
- b) Organic manures are beneficial for enhancing soil health, but the release of nutrients from these sources can sometimes be slow, and their availability might not always align with the immediate nutrient demands of crops.
- c) The cultivation of acid-tolerant crops offers a viable solution in certain contexts, but these crops might not always be the most economically lucrative or preferred by farmers in all situations.
- d) The adoption of sustainable practices like agroforestry and terracing, although beneficial for soil conservation, can be limited by various socio-economic factors and the level of awareness among farmers.
- e) The potential of biochar as a soil amendment shows promise but requires further investigation within the specific context of a region's diverse cropping systems and soil types.

Specific challenges and constraints

Implementing effective soil management practices for acidic soils faces several specific challenges and constraints. Economic constraints are also a significant factor, as the cost of amendments and the labour required for their application can be prohibitive for small and marginal farmers, who constitute a large proportion of the agricultural community in the particular region. Furthermore, there might be a lack of sufficient awareness among farmers regarding the benefits of certain recommended soil management practices. Different crops have varying requirements and tolerances to soil acidity, necessitating tailored management strategies that consider these specific needs. It is also important to note that while liming is a common solution for acidity, over-application can lead to other nutrient imbalances in the soil, highlighting the need for precise assessment of lime requirements. Socio-economic factors and practical implementation challenges play a significant role in the adoption and overall effectiveness of acidic soil management practices in. The logistical challenges associated with the hilly terrain and the economic constraints faced by smallholder farmers are particularly relevant.

Optimization of liming strategies

While liming is a primary method for managing acidic soils, there is a need for more research to optimize its application. This includes determining site-specific lime requirements based on varying soil types, prevalent cropping systems, and the economic feasibility for farmers. Further investigation is required to ascertain the most effective and cost-efficient application methods, comparing techniques like furrow application versus broadcasting. The long-term impact of different liming materials, such as calcitic and dolomitic limestone, as well as the potential of industrial by-products like paper mill sludge, on soil properties and crop yields also warrants further study. Although liming is a key management practice for acidic soils, there is a noticeable lack of detailed, context-specific recommendations for its optimal use. Research shows that liming generally leads to improved crop yields, but the ideal rates and application methods are likely to vary significantly depending on local soil conditions and the specific crops being cultivated.

Long term studies on soil amendments

Most current research tends to focus on short-term impacts, and there is a limited understanding of the sustained effects on soil pH, organic carbon content, nutrient availability, and microbial activity over multiple cropping cycles. Specifically, the long-term impact of biochar application on soil properties and its potential for carbon sequestration in the specific under diverse cropping systems and soil types requires further investigation. Sustainable agriculture necessitates a thorough understanding of the long-term consequences of any interventions. Therefore, future research should prioritize monitoring key soil health indicators over extended periods to accurately assess the true sustainability and overall effectiveness of different soil amendment strategies in maintaining and improving the productivity of acidic soils.

Socio-economic factors and farmer adoption

There is a limited understanding of the various socio-economic factors, such as farmer age, education level, landholding size, income, access to resources, and prevailing cultural practices, that significantly influence the adoption of recommended soil management practices. Studies are needed to assess the cost-effectiveness of different soil amendments and their affordability for the predominantly smallholder farmers. Furthermore, research should focus on developing effective extension strategies and communication channels to promote the adoption of best management practices among farmers. Even the most scientifically sound technical solutions for managing acidic soils will not be successfully implemented if they are not economically viable or socially acceptable to the farmers. Therefore, future research endeavours should incorporate socio-economic assessments to better understand the needs, constraints, and preferences of farmers, ensuring that the recommended soil management practices are both effective and readily adoptable.

#Beatplasticpollution

SCSI-Meghalaya Chapter Observed World Environment Day

The Meghalaya Chapter of Soil Conservation Society of India observed 'World Environment Day' on 5th June, 2025 by arranging a lecture by eminent speaker, Dr. P.K. Sharma, Professor, Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, BHU, Varanasi. Dr. Sanjay Swami, Professor (Soils) & Chairman of the SCSI-Meghalaya Chapter, while welcoming the participants and resource person informed that the chapter is celebrating World Environment Day every year on 5th June to spread awareness among the people and encourage them to take some actions to protect the environment. This year's theme is "Beat Plastic Pollution" emphasising need of collective actions to tackle plastic pollution. He shared that hilly areas like Meghalaya are also facing the challenge of plastic pollution and the rapid increase of plastic waste in hilly regions is driven, to a large extent, by tourism.

Dr. Amit Mishra, Associate Professor (Soils) formally introduced Dr. P.K. Sharma highlighting his academic achievements. Speaking on this occasion, Dr. P.K. Sharma highlighted the significance of celebrating environment day to end the plastic pollution. He informed the house that plastic is ubiquitous everywhere, from the top of the highest mountain to the deepest of trenches in the ocean. It is found even inside the human lungs and placenta.

Microplastics are formed by the degradation and the fragmentation of large plastic pieces that are improperly disposed of. Microplastic deposition and accumulation has been found in the Himalayan mountains, rivers, lakes and streams. Unscientific plastic disposal is causing soil and water pollution in the Indian Himalayan Region and impacting its biodiversity, which is having an adverse impact on the fresh water sources that communities downstream depend on. He further explained that pollution of plastics amplifies the harsh impacts of the triple planetary crisis i.e., climate change, nature, land and biodiversity loss, and pollution & waste. Therefore, we must "refuse, reduce, reuse, recycle, and rethink" the use of plastics and contribute towards ending plastic pollution. Dr. Sharma also shared his academic experiences with the scholars and motivated them to work hard with full dedication for getting success. At the end, he expressed his gratitude to the Meghalaya Chapter of SCSI for inviting him to interact with the participants, particularly the scholars who are the real ambassador of the Nation.

A tree plantation programme was also carried out at the college campus. The programme ended with the vote of thanks proposed by Dr. Amit Mishra, Associate Professor (Soils), School of Natural Resource Management, CPGS-AS, Umiam.



Delhi State Chapter Celebrated 55th World Earth Day

The Delhi State Chapter of the Soil Conservation Society of India celebrated 55th World Earth Day on 22.4.2025 in hybrid mode (physical and online participation) on the theme 'Our Power, Our Planet' in the Society Office at the NASC Complex, New Delhi. The program was graced by Dr. A. Velmurugan, ADG (Soil and Water Management) as the chief-guest. The program was chaired by Dr. T.B.S. Rajput, President of SCSI. The programme was attended by about 70 participants, 20 in physical mode and 50 through online mode. The program created awareness among participants about the importance and ways of 'Promotion of the green and clean energy and tripling clean energy generation by 2030'.

Dr. Anchal Dass, Chairman Delhi Chapter, during his welcome speech gave some historical view of world Earth Day celebration. He mentioned that Earth, having a diameter of approximately 12,756 km and the fifth-largest planet in our solar system, is known as the "Goldilocks planet" due to its unique conditions that support life. Earth Day was first observed in 1970, an era when industries belched out smoke and sludge. During that period air pollution was accepted as the "smell of prosperity", especially in America. Inspired by the ravages of a massive oil spill in California, Senator Gaylord Nelson of Wisconsin (sometimes seen as the father of Earth Day) envisioned a day of education and activism. Mr. Denis Hayes was the coordinator of first 'Earth Day Celebration'. Currently, the Earth Day is observed in over 192 countries. Dr. Dass stressed upon the solutions needed to create clean, inexpensive, and unlimited energy for the entire planet through renewable sources such as solar and wind energy along with other technologies within our reach.



Dr. A. Velmurugan ADG (S&WM), NRM Division, ICAR, New Delhi and chief guest of the function spoke about overall sustainability of different ecosystems on the Earth, such as coastal, eco-systems, aquatic ecosystems, agro-ecosystems, forest ecosystems, and so on. He was very particular about the adoption of green ways of agriculture. He highlighted that unjustified greed of human beings and over exploitation of natural resources by them for wealth and luxury have led to destruction and degradation of natural resources. In this context, he said that the carrying capacity of the different resource-regions on the Earth should be understood and enhanced by employing regenerative practices including organic farming and natural farming. Humans should



learn from the indigenous people like tribal people to live in harmony with nature, a biological entity. Sound natural resource management practices and ongoing crop breeding programs should take into account the soil losses alongside the productivity and profitability. We should produce only that quantity which is necessary, accumulations in buffers at the cost of natural resources has no meaning.

Dr. T.B.S. Rajput, President (SCSI) & Chairman of the Programme during his remarks informed that the 2025 Earth Day theme, "Our Power, Our Planet," emphasizes that everyone – individuals, businesses, governments – has a role in protecting the mother Earth, the home to all lives. This theme underscores the collective responsibility to switch to renewable energy, conserve resources, and foster a sustainable future for all. This signifies the power of individual choices and collective action in addressing the climate change thus protecting our planet. Dr. Rajput pointed towards the necessity of shifting from heavy dependence on fossil fuels to renewable energy sources like solar, wind, and geothermal. He stressed on the urgent need to conserve resources, reduce waste, and protect ecosystems, and thus, all individuals should make conscious choices. Businesses should adopt sustainable practices and governments should implement policies that support a greener economy. As water is the key input to agriculture and allied sectors apart from industrial and home usages, he particularly urged upon the water conservation by scientists, farmers and policy makers by all possible means, and to use green ways of harnessing, developing and using water resources. He also suggested ways of learning about environmental issues, spreading awareness, and encouraging others to take action. He concluded with the words that earth's resources are



finite, and the effects of climate change are becoming increasingly evident so these challenges require immediate action and collective effort. By recognizing our individual and collective power, we can create a sustainable future for ourselves and generations to come.

The SCSI members who joined through online mode

showed keen interest and interacted with speaker and chairman of the programme. Dr. Indu Chopra, Secretary, Delhi State Chapter, while presenting vote of thanks, also highlighted the role of healthy soils in addressing climate change issues and sustainability of life on the Earth.

Meghalaya Chapter Organized Special Annual Lecture on Water Management

The Meghalaya Chapter of the Soil Conservation Society of India (SCSI) organized a highly insightful Special Annual Lecture which was delivered by a distinguished expert, Dr. Atul Kumar Singh, Ex-Principal Scientist (Soil & Water Conservation), ICAR-CSSRI Regional Research Station, Lucknow on "Agricultural Water Management for Enhancing Productivity" on 29th March, 2025 at Seminar Hall of the College of Post Graduate Studies in Agricultural Sciences (CPGS-AS), Barapani, Meghalaya. The event was attended by all the members of Meghalaya Chapter, faculty members and students fostering valuable discourse on sustainable water use in agriculture.

At the outset, Dr. Sanjay Swami, Prof. (Soils) & Chairman of the Meghalaya Chapter formally welcomed and introduced Dr. Atul Kumar Singh highlighting his expertise in water management for sustainable agriculture. The dean of CPGS-AS, Barapani honoured Dr Singh by a shawl and bouquet of flowers, and praised the Meghalaya Chapter for arranging such a special lecture by eminent expert on water management domain which is very crucial for hilly regions like North East India.

During his lecture, Dr. Atul Kumar Singh provided an in-depth exploration of modern techniques and strategies for optimizing water resources to boost agricultural productivity, particularly in the context of changing climate patterns and increasing water scarcity. Dr. Singh emphasized the importance of pressurized irrigation, such as drip and sprinkler systems along with water harvesting and conservation techniques tailored to local conditions of the region. The lecture concluded with an engaging in house discussion, where students actively interacted with Dr. Singh, seeking guidance on implementing water management strategies in their research and fieldwork. The program was a resounding success, serving as a meaningful step toward fostering sustainable agricultural practices in the region.

Dr. Atul Kumar Singh also lauded the efforts of Meghalaya Chapter of SCSI in general and Dr. Sanjay Swami in particular for this initiative and commitment for promoting scientific discourse in agriculture. The event concluded with a vote of thanks proposed by Dr. Lala I P Ray, Treasurer of the chapter who expressed gratitude to Dr. Singh for accepting the invitation and delivering an informative lecture. He also appreciated the dean, faculty of CPGS-AS and members of Meghalaya Chapter for their presence, participation and interaction.



Used Plastic Packets as Nursery Grow Bags: Curbing the Menace of Burgeoning Plastics Waste

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One of the biggest challenge before the scientific community is to minimize the carbon, energy and water footprint to make the planet sustainable for future generations. As per the industrial transformation 2050: pathways to net-zero emissions from EU heavy industry, Material Economics - University of Cambridge Institute for Sustainability report 2019, the carbon footprint of plastics has been estimated to be up to 5 kg CO₂ per kilogram of plastic, including an average 2.3 kg CO₂ per kilogram of plastic from feedstock production, plastic conversion, and electricity, and 2.7 kg CO₂ per kilogram of plastic of carbon being embedded in the material. The carbon footprint of producing 1 kg of plastic grow bags is around 3 kg of CO₂ equivalent while the water footprint is estimated to be around 105 liters. Further, the average gross energy required to produce 1 kg of high density polyethylene is 76 MJ with a range extending from 56 MJ to 91 MJ. Considering 72 MJ it would be 20 units of electricity. One of the emerging business would be the carbon credit which represents one metric ton of carbon dioxide (CO₂) emissions reduced or avoided, and its value fluctuates based on market conditions, ranging from around \$4 to \$80 per credit. With \$40 per ton, it would be ₹ 3 per kg.



Plastic grow bags is commercially produced in different shapes and sizes. These nursery grow bags are used for planting several kinds of herbs, shrubs and trees plants while after uses creates environmental problems. On the other hand, due to widespread applications of plastic in all



walks of life, every day tons of plastic waste is produced. What every individual can do is refuse, reduce and reuse to curb the burgeoning menace of plastic garbage. Rice, wheat flour, fertilizers, oil, milk and milk products, snacks etc. comes in plastic packets of various sizes and shapes. Most of these packets find its way in the drainage channels, gutter, public places and more. It not only destroys the aesthetic look of the surrounding but also pollutes our soil and water. Burning further deteriorates the air quality and creates problems for the many. The simple question is can we utilize (reuse) these used bags as nursery grow bags? 'REUSE' is a wonderful solution and can address so many things. Firstly, the size of grow bags required for nursery and the size of food/goods packets available in garbage or thrown as garbage often matches.

Second issue is the demand of grow bags for nursery versus the availability of reusable plastic packets. It was roughly ascertained that in Mungeli district, Chhattisgarh, Bharat; reusable plastic packets are available in plenty more than



the requirement (So is in every district). These packets otherwise are threat to the society and environment. The question arises and often knocks is "Can we reuse these plastic packets as grow bags for growing plants nursery as a replacement to the conventional nursery plastic packets?" It is realized that after use these conventional nursery plastic packets also finds its way to dumping yard or recycling plant. It is also worth to mention that recycling itself is having its own carbon, energy and water footprint. Further, the question arises "With what degree of compromise these plastic packets can be utilized as nursery grow bags and what would be the cost?" The answer addresses to the emergent need of care of "our mother, mine mother, your mother, his mother, her mother, their mother as she is in ICU, she is our common mother - our mother earth". It also encompasses our care for the poorest of poor section of our society - The rag pickers. One such old man Shri Doman Ratre has been trained for the job (Collection-bucket cleaning-sorting-scissoring-drilling-bundling-selling) and is happy with the remuneration he got for it. Within 3 to 4 hours, around 500 reusable plastic packets of milk, milk products, wheat flour, snacks, oil etc. were procured and sold @ Rs. 1 to 3. The cost of conventional nursery plastic packets also varies in material and sizes ranging from ₹100 to 300 per kilogram or ₹1 to 50 per packet. The work highlighted a number of tangible and intangible benefits for all. With this in view, a work is going on at BRSM College of Agricultural Engineering & Technology and Research Station, Mungeli, IGVV to create an environment and societal friendly

nursery. Sequence of operations for preparation of nursery grow bags from used plastic material: Collection-bucket cleaning-sorting-scissoring-drilling-bundling-selling -purchase from rag pickers – filling with media, compost, soil – seeding – growing nursery.



Ek ped MAA ke naam

Soil Health Matters

Dr. Jagdish Prasad

Adjunct Professor, Bihar Agricultural University, Sabur

The Earth is unique in the entire universe. Its present surface is the result of erosional and depositional cycles (including earthquakes and tectonics). Earth is far suited for life than any other planet, yet even here many of the environments are either too hot or too cold, too far underground or too far above ground to support much life. However, thin section of it is teeming with life and it is said that one small cup of soil has more microbes in it than there are people on the earth. This thin section (soil), water and bioclimates, being integral part of land, greatly influence the productivity of plants and animals. However, suitable agro-interventions have their own impact on production of targeted farming system.

Although India has successfully achieved self-sufficiency in food production and came out from the clutches of ship to mouth situation owing to coordinated efforts of breeders, fertilizer industries and planners. Later on, it is realized that gain in production could not sustain owing to various factors including non-judicious use of resources, weather aberration (climate change) and economic consideration by stakeholders. Further, we are facing great challenge of land degradation due to climate and anthropogenically induced degradation and thus, productivity and nutritional security are at cross-road.

The sustainable production deals with short and long term goal for providing the needs of today and tomorrow. It combines the economic consideration and ecological restoration. These issues can be addressed by scientifically managed soil health which is central to food quality, crop health, farm health and ecosystem health. We have wisdom, ways and means in terms of doable technologies but it needs proper co-ordination, implementation and awareness at every level.

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