SOIL CONSERVATION SOCIETY OF INDIA

SOIL AND WATER CONSERVATION Today

Vol. 13 No. 3 | ISSN 0975-4059 | July-September 2018

In this issue

- From the President's Desk 1
- Farm Bunding and Trenching: A Success Story 2
- Rainfall Simulation for Soil Erosion Studies 3
- Tackling Gully Erosion in Foothills of Lower Shiwaliks 4
- Conservation of Natural Resources for Enhancing Livelihood Food Security 5
- Improving Nutrient Use Efficiency for Crop Production 7
- Meghalaya Chapter of SCSI Organized Lecture on Soil Restoration 8
- Editorial Board 8

Coming Up!

27th National Conference
Oct. 25-27, 2018
Assam Agri. Univ., Jorhat

*****

International Conference 2019
A Joint Conference of
WASWAC, ISCO & SCSI
Nov. 5-9, 2019
At New Delhi

International Decade of Soils 2015-2024

From The President's Desk

Keeping in line with the changing crop production systems in many parts of the world, we need to actively consider organic farming, conservation tillage, stubble mulching, no-till system, minimum tillage etc. The main theme of these systems is turnover of organic crop residues into the soil with concurrent use of herbicides in weed control. Earlier our argument had been that we have too many fronts. Firstly the milch cattle are increasing and draft cattle are decreasing. Secondly mechanical power input in farming is on the increase. The goat population is on the rise while sheep are on decline. Then the demand for green fodder would be on increase. The dry fodder (stover/haulms) demand for green fodder would be on increase. The dry fodder (stover/haulms) demands would be reduced. Incidentally this is corroborated by a study of the National Dairy Research Institute (NDRI). The pastures have deteriorated and we need to improve them.

So now our earlier arguments on stover/haulms need reconsideration. In years to come crop residue incorporation would be a distinct possibility. So we must initiate research on IPNS more intensively, particular with reference to on-farm crop residue management.

Let us examine one of the novel crop residue management systems in rainfed rice. In North Eastern India, in many a field the earheads of rice is harvested leaving the stalks in the field for grazing. By the time next monsoon crop is to be taken, same crop residue remains, also considerable dung and urine would have been added, enriching the soil. The residues are ploughed down before planting the monsoon rice. Since the conditions are anaerobic, rice straw with a wide C/N ratio also would decompose faster.

Another is a good example of IPNS. It is the set row cultivation of crops in Saurashtra region of Gujarat. The farmers grow groundnut- pearlmillet in set rows of about 60cm width. The crops rotate, but the rows remain. All the manure, fertilizer and other soil based inputs are placed in these rows. In fact even rainwater is trained to flow into these rows. The rhizospere in such set rows is superior and it is in fact a less external input sustainable agriculture (LEISA) system of crop production. Unfortunately by moving to bunch varieties of groundnut along with intercropping and tractorisation, this system is gradually vanishing in the region.

Yet another example of crop residue incorporation comes from Vertisol region of North Telangana. Greengram is taken as the first crop followed by rabi sorghum. The haulms of greengram are incorporated in situ before taking up rabi sorghum.

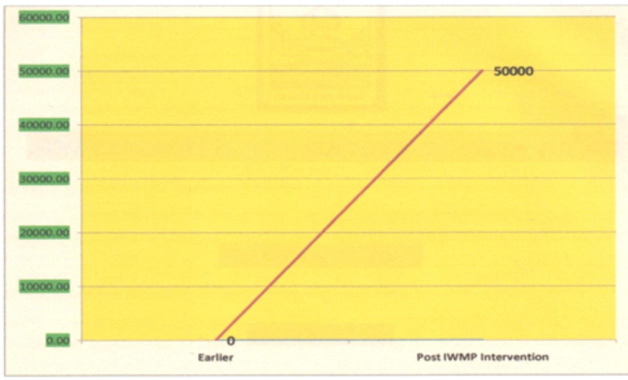
Logically then we must take up studies on in-situ crop residue management in various agro-climatic zones to (i) establish feasibility and (ii) improve soil health. Lastly we must remind ourselves that the importance of a legume in crop production system had been realized even by 2000 BC. And farmers have been growing legumes either in mixed cropping, sequence cropping or crop rotation thereby improvement in soil health for sustainable agriculture.

Farm Bunding and Trenching: A Success Story

JAGAT VIR SINGH

The income of Shri. Sanjay Oraon, a farmer residing at village- Rendo, Karamtoli, Block- Kanke in Ranchi District has enhanced by cultivation of Tomato through his initiative along with the watershed team. Mr. Oraon possessed land of over 0.45 Hq. Watershed team from BIT Mesra visited the village and were quite keen to make amendments on the land of Mr. Sanjay Oraon and others. So, they presented a proposal in the Gram Sabha for Land Levelling & Farm Bunding on beneficiaries land. Soon the proposal was accepted and process of Land Levelling along with Trench Cutting & Farm Bunding was done in his plot in order to maximise the utilisation of water for farming. This activity resulted into enhancement of moisture content in his dry land and aided in reducing the soil erosion. Simultaneously, the runoff of rain water was arrested by the trench work covered in the same plot.

This facilitated Mr. Oraon commencing farming & starting vegetable cultivation focussing on Tomato & French Beans. Mango & Guava plants were provided to him. A total 30 plants were provided to him out of which only 5 were dead resulting into a survival rate of over 80% and that's a commendable achievement as per Jharkhand's perspective. Mr. Oraon earned about Rs. 50,000 in 3 months from the high yield of tomato cultivation. He is quite pleased that this transformation raised his standard of living. He is extremely happy to



Income through Farm Bunding & Trench Work

the fact that he is sending his kith n kins to a renowned private school.

While conversation with MEL&D's Project Assistant, Mrs. Pooja Kumari *the beneficiary seemed very pleased & satisfied and even went to an extent by saying that he would anytime opt farming even if he is offered a handsome salaried job.* Such is his passion for farming. This is what watershed team thrives for to revive and ignite the passion among the agriculture section of the society.

Rainfall Simulation for Soil Erosion Studies

M. J. SINGH AND ABRAR YOUSUF

Rainfall simulator, a device to produce rainstorms of desired characteristics, has been widely used as a research tool in soil erosion studies because of unpredictable, infrequent and random nature of rainfall. Rainfall simulators were initially used to study soil erosion. However, over the years they have been extensively used to generate data on runoff, infiltration, and erosion both in laboratory and field experiments. The result of these experiments are typically used for better understanding of point and plot scale hydrological processes including runoff routing and effects of characteristics such as slope, composition and surface characteristics.The use of rainfall simulators has become more widespread with the development of automated instrumentation and control systems which offer a physically based system of predicting soil erosion.The major advantages of rainfall simulator research are four fold: it is more rapid, more efficient, more controlled and more adaptable than natural rainfall research. There is possibility to vary the system configuration for simulating different scenarios of rainfall field characteristics (duration, intensity and drop size distribution).

The disadvantages of rainfall simulators are high cost, time required to construct a suitable rainfall simulator and difficulty in simulating natural rainfall characteristics. The more important limitations are the restricted area over which rainfall can be simulated, the inability to completely match the characteristics of natural rainfallevents, and the logistical difûculties of carrying out the simulations when and where necessary.

A variety of rainfall simulators have been developed to apply water at desired rates and durations. In terms of size, rainfall simulators range from a simple, small, portable infiltrometer with 15 cm diameter rainfall area to the complex rainfall simulatorwhich covers a plot of 4.5 m x 22 m. Important design requirements of simulators include rainfall intensity, raindrop size, drop size distribution, drop velocity at impact and kinetic energy of rainfall.

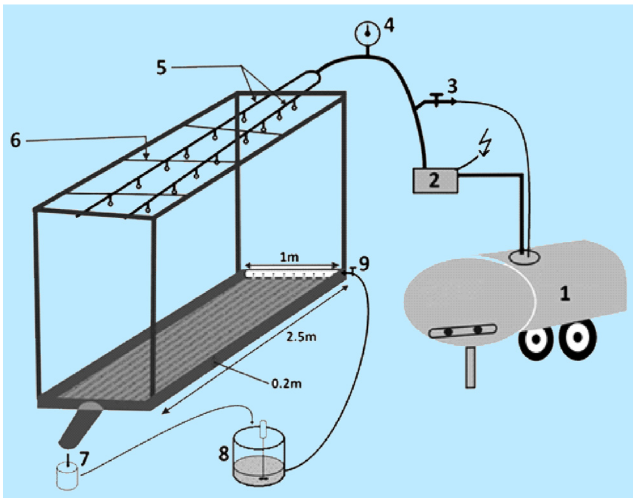
Types of rainfall simulators: Rainfall simulators can broadly be classified into two groups i.e. those involving nozzles from which water is forced at a significant velocity by pressure and those where drops form and fall from a tip starting at zero velocity. Rainfall intensity, length of simulated rainstorms and sequence of rainstorm can be varied as per requirement of the study. The most important characteristics of a rainfall simulator are cost, transport and assembling, capacity to generate homogeneous rainfall, and water consumption.

a. **Dripping type rainfall simulators**: In dripping simulators the common practice has been to form drops at the tip of a material by some suitable device (i.e. a drop former) until the weight of the drop overcomes the surface tension force of the drop former and the drop falls with an in initial velocity of zero. In the early stage of development of such simulators, hanging yarns and glass capillary tubes were used as drop formers. Recent designs include metal tubes, hypodermic needles and poly ethylene and plastic tubing.

b. **Nozzle type rainfall simulators**: To create a wider drop size distribution, many different types of nozzles have been used for rainfall simulation. In nozzle simulators, the spray pattern, median drop size and drop size distribution are governed by the shape characteristics and discharge of the nozzle. Available nozzles can produce drop and energy characteristics comparable to natural rain fall but relatively high capacity limits their use in rainfall simulation. The problems of high flow rates have been resolved by the following methods:

   1. Covering a large area by spraying the water upward.
   2. Physically moving the nozzle back and forth across the plot
   3. Intercepting a major portion of the spray by introducing a physical obstruction

Selection of suitable rainfall simulator: The first step in the development of a rainfall simulator is the



Water supply: (1) Water tank (5000 L), (2) Electric water pump
Regulation of rainfall intensity and energy: (3) Bypass flow, (4) Pressure gauge
Rainfall simulator: (5) Micro sprinkler nozzles, (6) Support frame, (7) Measuring cup at outlet pipe
Runoff simulator: (8) Runoff collection barrel with stirring device, (9) Overflow pipe

Nozzle type rainfall simulator used by the authors for calibration of Erosion 3D model under field conditions

establishment of selection criteria depending upon the rain fall characteristics required and objectives of the research program. For erosion research some of the most important characteristics for rainfall simulation are:

1. Drop size distribution similar to natural rainfall.
2. Drop impact velocity approximating terminal velocity of natural raindrops.
3. Rainfall intensity in the range of the requirements of the research program.
4. Uniform rainfall and random drop size distribution.
5. Total energy corresponding to natural rainfall.
6. Accurate reproduction of given storms.
7. Rainfall intensity nearly continuous throughout the study area.
8. Angle of impact nearly vertical for most drops.
9. Sufficient area of coverage.
10. Satisfactory characteristics under varying climates.
11. Complete portability from site to site.

Rainfall simulation under field conditions: In recent years considerable use has been made of rainfall simulators in the field conditions. Natural runoff plots have been virtually replaced by these simulated studies as a research tool. Field rainfall simulators provide the advantages of field conditions for soils, slopes and plant cover, all of which are difficult to reproduce in the laboratory, with the benefits of a repeatable storm. Several designs for simple, portable simulators have been produced with the ability to generate rainfall at intensities between 40 and 120 mmh^{-1}.

Runoff simulation: In small soil plots, the rainfall simulator may be supplemented by a device to supply a known quantity of runoff at the top of the plot. Sediment can also be added to the runoff upslope of the test soil. This type of simulation is usually used to study the rill erosion under controlled conditions.

Tackling Gully Erosion in Foothills of Lower Shiwaliks

RAJAN BHATT

The foothills of Shiwaliks covering an area of 2.14 m ha falls in four states of India i.e. Punjab (0.14 m ha), Haryana (0.06 m ha), Himachal Pradesh (1.14 m ha) and Jammu and Kashmir (0.80 m ha) and represents the most fragile ecosystem of Himalayan mountain range because of its peculiar geological formations and highly erodible soils. Runoff and soil loss in the region varies from 35- 45% and 25- 225 t/ha/year, respectively. Among different types of soil erosion, gully erosion is the most serious one in the region as around 20% of the area is already under gullies Ephemeral gully erosion has been reported to account for 48.5 to 72.8% of the total soil loss About 70-80% of the gully erosion control structures have failed in the region The reasons attributed for the failure of gully control structures in the region include lack of information on gully network including distribution and extent of different-ordered gullies, gully density, gully texture, behaviour and development of gullies in the region. Secondly, the installation of gully control structures is generally done in the highest-ordered gully on lower, middle and upper segments of the catchment. After some time, the gully control structure gets silted up along the upstream side, after which the runoff water starts falling down from the crest height of the structure and causes higher erosion losses. The lower ordered gullies are seldom tackled in the region while controlling the runoff and soil loss and are generally ignored in all the soil conservation programmes. Therefore, it is desired to have an insight into the behaviour and patterns of gully erosion in the foothills of lower Shiwaliks with higher attention to the lower ordered gullies. For this purpose a detailed

field survey for gully erosion must be planned by dividing targeted catchments into grids of 50 × 50 m^2 each. For the detailed field survey, each gully line was sketched on the contour maps (at a scale of 1: 1000) manually after measuring the distance between wooden pegs laid out in the grids. The gullies up to the 1st order were marked on the maps. Gullies were classified as 1st, 2nd, 3rd, 4th and 5th order gullies, depending upon extent of their bifurcation. The length of different ordered gullies were measured in each catchment from the gully erosion map. The total length of all the gullies in the catchment were expressed as “gully density” (km/km^2) while the number of first-order gullies per unit area was expressed as “gully texture” (number/km^2). *Finally, it could be concluded that for effective control of gullies in the region, 1st ordered gullies must be checked with the help of spade as these are the main culprits collecting runoff water from every nook and corner of the catchment and contribute it to the higher ordered gullies instead of spending lakhs of rupees in constructing the check dams in the higher ordered gullies.*

Conservation of Natural Resources for Enhancing Livelihood Food Security

VIJAY KUMAR

Land and water are the two most important natural resources for sustainability of agriculture. However, the soil and water depletion at upsetting rates are being felt in the Jammu region. Land and water depletion day by day in this region as the soil topography is undulating. The rainfall pattern is erratic, high frequency and low distribution in overall Jammu and Kashmir. The natural resources are disturbed by landuse system and low soil fertility status. The rain being ill disturbed, a lot of rain water goes as runoff leading to sediments losses and reduced nutrients status of these region.

Challenges of land and water

The availability of land and water for the national and global demands for food and agriculture production have been put into quick relief following the recent rise in commodity price levels (and associated volatility) and increased large-scale land hardest. The buffering capacity of global agricultural markets to absorb supply shocks and stabilize agricultural commodity prices is attached to the sustained functioning of land and water systems. At the same time, climate change brings supplementary risks and further unpredictability of harvests for farmers due to warming and connected aridity, shifts in precipitation patterns, and the frequency and duration of extreme events. The rainfall pattern was unpredictable and space allocation was mistaken. Although warming which may perhaps extends the boundary for agriculture in the northern hemisphere, it is anticipated that key agricultural systems in lower latitudes will need to cope with new temperature, humidity and water stresses.

Status and trends in the use of land and water resources

Over the last 50 years, land and water resources management have met hurriedly rising demands for food and fibres. In exacting, input-intensive, mechanized agriculture and irrigation have contributed to speedy increases in productivity. The world's agricultural production has grown between 2.5 and 3 times over the period, while the cultivated area has grown only by 12 percent. More than 40 percent of the increase in food production came from irrigated areas, which have doubled in area. In the same period, the cultivated area of land per person gradually declined. Rainfed agriculture is the world's predominant agricultural production system, but also hosts the majority of the rural people. The cereal production in the northern hemisphere will continue to supply global markets, and may even see a northward expansion, nudged by global warming. Instead, in the dry tropics and subtropics, rainfed production is held detainee by erratic precipitation. Irregular soil moisture availability over the course of a growing season reduces nutrient uptake and consequently, yields. Engaged in the midst of low soil fertility and carbon content of tropical soils, yields in rainfed systems are little more than half the achievable potential in many low-income countries. The rural people are poor on marginal lands with limited access to improved seed, fertilizer and information remain vulnerable.

Management of natural resources

Improving land productivity: The sustainable land management (SLM) as means of arresting and reversing land degradation, specifically desertification and deforestation in Jammu region. SLM an invaluable occasion to improve ecosystem services in production because more than 70% of the people depend on agriculture, livestock, and agro-forestry; investment will translate into direct benefits for food and livelihoods security.

Biodiversity Conservation: The biodiversity protection offers an opportunity for countries to improve ecosystem function and diversify livelihoods at multiple scales. The resources for strengthening protected area systems, mainstreaming biodiversity in production landscapes and sustainable use. These investments will enable countries to improve biodiversity conservation within production sectors, especially in relation to reducing pressure on the brittle ecologies. Global Environment Facility (GEF) resources will enhance sustainability of protected area systems through expansion or rehabilitation of existing protected areas, development of biological corridors, support to protected area management, and fostering strong links between economic sectors and protected areas.

Climate Change Mitigation: Climate change mitigation financing by the Global Environment Facility (GEF) focuses on opinionated developing countries and economies in transition toward a low-carbon development pathway. Emissions from deforestation and forest degradation represent a significant negative impact of poor land use practices. In GEF resources would be support activities grouped under the land use, land-use change and forestry. Land use, land-use change and forestry aims at reducing forest emissions and promoting forest conservation, afforestation, deforestation, and sustainable forest management. By supporting low carbon technologies, GEF resources will enable countries to follow a low-carbon development, for example, through increased use of renewable household energy sources as alternatives to traditional approaches.

Sustainable Forest Management: The GEF advocates a landscape approach, embracing ecosystem principles as well as the connectivity sandwiched between ecosystems. In supporting an integrated approach to managing forest ecosystems, the GEF strives to achieve global as well as environmental benefits. These include the protection and sustainable use of biodiversity, climate change mitigation and adaptation, and combating land degradation. The GEF funding will enable countries to invest in practices that reduce pressures on forest resources and generate sustainable flows of forest ecosystem services.

National support for sustainable land and water management

Farmers are necessarily engaged in the planning and sustainable land and water management, except many are forced into unsustainable able practices by poverty and lack of aligned incentives, insecure land tenure and acquaintance. The three principal areas of investment are vital. (1) At the national level, governments force need to invest in public goods such as roads, storage, land and water resource protection works and to facilitate private investment. (2) Investment is needed in the institutions that normalize and promote sustainable land and water management: research and development, incentives and regulatory systems, and land use planning and water management. (3) At basin or irrigation scheme level, an integrated planning approach was needed to drive a sequenced programme of land and water investments. For irrigation schemes, a focus on modernization of both infrastructure and institutional arrangements is needed. That encourages land and water degradation, such as cheap energy prices that drive insufficient and ground water depletion. Developing strategy for land governance, or regulate international investments backed up by capacity building at all levels, would be useful to improve decision-making and negotiations.

Hence the need to improved agricultural production, livestock management, biodiversity conservation, and sustainable forest management can be achieved with global environmental and reimbursement. The pursue development pathways that will increase the resilience both its ecosystem and human communities — to climate change and variability. The integrated ecosystem management, which enables countries to harness synergies in environmental programs by aligning investments in land, forests, water resources, and climate change for long-term sustainability. Global and national policies will need to be aligned and institutions transformed to become genuine collaborators in applying knowledge and in responsible regulation of the use of natural resources. The status and trends of land and water resources for food and agriculture provide a basis for designing and prioritizing regional programmes and financing, to enhance sustainable management of land and water and address the systems at risk. Investing in natural resource management will enhance solutions to threats posed by land and soil degradation, desertification, deforestation, water scarcity, and loss of biodiversity.

93rd Birthday Celebrated

The working group of the Executive Council of Soil Conservation Society of India celebrated the 93rd birthday on 7th August, 2018 of Padam Vibhushan Prof. M.S. Swaminathan. The members wish a very happy, prosperous healthy and long life. This day was also celebrated in different corners of India and also worldwide. He is regarded as the Chief patron of the society which is functioning well under his able guidance and blessings.

He always preached to maintain soil health for improving productivity thereby Agriculture production. He is also regarded as the "the architect of Green Revolution in India". Humanity personified his students, fellows and farmers in millions adore him for transforming India from the state of "ship to mouth" existence to "mountains of grains" ensuring national development. "Zero hunger and economic security" are his slogans for India becoming a developed Nation and self sufficient in food & nutrition. His guidance in various ways is being adopted by the world organizations for furtherance of the total agriculture to combat the hunger. Soil Conservation Society of India salutes him and wishes many more years of his service to the nation and the world.

Improving Nutrient Use Efficiency for Crop Production

RAJAN BHATT AND SANJAY ARORA

Agricultural sector in India has been and is likely to remain the major consumer of water but the share of water allocated to irrigation is likely to decrease by 10-15% in the next two decades. Irrigation is the largest direct human water use, including large amounts of green and blue water required for this sector. Extensive rice-wheat cropping sequence has resulting in declining soil health, underground water table, land and water productivity, emerging micro-nutrient deficiencies and finally lower livelihoods. Further, the productivity and sustainability of rice-based systems are threatened because of the inefficient use of inputs, increasing scarcity of resources especially water and labor, the emerging energy crisis and rising fuel prices. Punjab, the food basket of India had marked a significant growth in agricultural growth due to adoption of high yielding varieties, assured irrigation and higher fertilizer use over the last five decades. As a result, Punjab contributes a lot in the central pool. But this is one side of the coin, as on other side this remarkable agricultural growth has been accompanied by many negative impacts on the natural resources *viz*. land and water as soil health declined and as a result delineates deficiency of many macro (70% soils deficient in N, 20% deficient in P, 10% in K and 20% in S) and micro-nutrients (21% soils deficient in Zn, 12% deficient in Mn and Fe and 2% in Cu). Therefore, Punjab paid a lot for the green revolution of the country in terms of both its soils and water. Keeping this under consideration scientists have developed, tested and disseminated a number of technologies for improving declining both land and water productivity along with improving soil health which ultimately improves the declined livelihoods of the farmers of the state.

Technologies for improving the nutrient use efficiency

1. For supplementing N requirement of the crop, urea is the superior source should be applied in the splits while phosphorus and potash (immobile nutrients) should be drilled close to the seed.
2. Real time and need based application of N fertilizer to the crop improved NUE along with decreased fertilizer use. Leaf Colour Chart (LCC) is farmer friendly gadget.
3. Organics *viz*. farmyard manure, green manures (*Sesbania* and sunhemp) improved crop yields in cereals *viz*. rice, wheat, maize etc. which further saved about 40-60 kg N ha^{-1}.
4. Poultry manure @ 5 t ha^{-1} compensate for 80 kg N ha^{-1} in rice, 30 kg N and 60 kg P_2O_5 in the following wheat.
5. Agro-industrial wastes *viz*. rice husk ash and bagasse ash @ 10 t ha^{-1} improved the overall land productivity in rice-wheat cropping sequence.
6. Grain yield of maize could be increased by 5-10 q ha^{-1} by incorporating residues of pea within field prior to maize sowing.
7. Sulphated- P fertilizers material can be used in the case of non-availability of the phosphorus or sulphur fertilizers.
8. In Zn deficient soils, application of $ZnSO_4$ at transplanting of paddy or sowing of maize, cotton helps in correcting Zn deficiency. 0.5% foliar application of $ZnSO_4$ solution at the later stages also helped in correcting the deficiency.
9. Always apply fertilizers as the soil test reports, depending upon the inherent fertility of the soil as crop is to be fed but not the soil.
10. Apply 0.5% of foliar application of $MnSO_4$ in case of manganese deficiency in wheat.
11. In Paddy, iron deficiency in coarse textured sandy soils can be corrected by applying 3 foliar sprays of 1% $FeSO_4$.
12. Integrated nutrient management *viz*. proper use of chemical fertilizers alongwith organic inputs *viz*. farm yard manure, compost, poultry manures found to be best strategy for practicing climate smart agriculture.

Thus, by adopting these tips in different crops on one side where farmers could improve their land and water productivity, while on other side also contributes a lot in mitigating the consequences of global warming so as to practice the climate smart agriculture in the region by reducing the emission of green house gases into the atmosphere and reducing the contamination of the underground water.

Meghalaya Chapter of SCSI Organized Lecture on Soil Restoration

Meghalaya Chapter of Soil Conservation Society of India, New Delhi has invited Dr. Peter Mortimer, Soil Biologist from Kunming Institute of Botany (KIB), Kunming, China functioning under Chinese Academy of Sciences (CAS). Dean of the College of Post Graduate Studies in Agricultural Sciences (CPGSAS), Barapani of Central Agricultural University, Imphal formally welcomed Dr. Mortimer in the campus by presenting flower bouquet and shawl. Dr. Mortimer delivered an informative talk on "Role of Soil Fungi in Soil Restoration" on 24-08-2018 in the Conference Hall of the College. All the members of Meghalaya Chapter of Soil Conservation Society of India, faculty members from School of Natural Resource Management as well as students actively interacted with the resource person on various aspects of the soil restoration, especially acidic soils of North Eastern Hill (NEH) region of India. Dr. Sanjay Swami extended sincere thanks to Dr. Peter Mortimer for accepting his invitation for delivering lecture and Prof. M. Premjit Singh, Hon'ble Vice-Chancellor, CAU, Imphal for granting permission for organizing this lecture. Thereafter, Dr. Mortimer visited laboratory facilities available in the various schools of the college and expressed his concern for better maintenance of the sophisticated instruments. He also visited few farmers' field in the nearby Umeit village to learn about the agriculture scenario of the region. He showed his willingness for initiating joint venture in the areas of common interest by signing MoU with CPGSAS, CAU.

Welcome of Dr. Peter Mortimer by Dean

Visit to the farmer at Umeit village

Journal of Soil and Water Conservation, quarterly published by Soil Conservation Society of India is now available on-line at www.indianjournals.com and on official website of society www.scsi.org.in

Published by Secretary General, Soil Conservation Society of India, National Societies Block A/G-4, National Agricultural Science Centre (NASC) Complex, Dev Prakash Shastri Marg, Pusa, New Delhi 110 012; *Tel.:* 011-25848244; *Telefax:* 25848244; *e-mail:* soilcsi@gmail.com, bhan_suraj1945@yahoo.com; *Website:* www.scsi.org.in