



NEWSLETTER

JABALPUR CHAPTER OF INDIAN SOCIETY OF SOIL SCIENCE

Department of Soil Science & Agricultural Chemistry
Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) 482004



NEWSLETTER

No. 2

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"To Forget how to Tend the Soils is to Forget Ourselves"- Mahatma Gandhi

Soil is considered to be the "skin of the earth" with interfaces between the lithosphere, hydrosphere, atmosphere and biosphere. Soil provides ecosystem services critical for life. Soil acts as a water filter and a growing medium; provides habitat for billions of organisms, contributing to biodiversity; and supplies most of the antibiotics used to fight diseases. Humans use soil as a holding facility for solid waste, filter for wastewater, and foundation for our cities and towns. Finally, soil is the basis of our nation's agro-ecosystems which provide us with feed, fiber, food and fuel.

In this issue

Chief Patron's Message.....	01
Patron's Message.....	02
Presidential Remarks	02
Visits.....	03
Participation in Meeting/Training/ Seminar/Workshop/Kisan Mela	03
Awards Received by the Faculty Members	04
Events and Activities of Jabalpur Chapter of Indian Society of Soil Science : National Conference	05
Centre of Advance Faculty Training	06
Academic Activities	07
Soil Trivia	07
Liquid Bio-fertilizers: A Potential Tool For Sustainable Crop Production.....	07
Retirement	08
Obituary.....	08

FORTHCOMING EVENTS

National Training Programme on "Climate Resilient Soil Management Strategies for Sustainable Agriculture" from October 14 to November 03, 2015 under Centre of Advanced Faculty Training.

Chief Patron's Message



"Soil Health for Human Health"

Soil is the living outer layer of our planet and is a wonderful gift of nature which serves as a medium for plant growth and a habitat for animals and other organisms. It has been established that soil fertility is one of the key components to determine productivity of farming systems, however the understanding of soil physical and biological properties is of utmost important. With the advent of sustainable agriculture concept the sustainability of soil productivity takes into consideration areas where dependence on agrochemicals and fertilizers has sharply increased for crop production. The current concept of soil health monitoring thus is a subject of vital concern for not only the soil fertility and productivity factors but also other aspects responsible for the better health of soil.

The scope of increasing land area for producing food is very limited, bringing the marginal lands under plough is very risky and may pose threat to fragile ecosystem. The situation is getting worse due to competition from other sectors and changing climatic pattern and also due to deteriorating soil quality because of increased anthropogenic activities. In view of these issues, the pressing need has arisen for managing the precious soil resources for improving and sustaining its various functions to meet the demand of quality food and quality environment. However, in the era of rapidly degrading environment due to increased interference by man, role of soil in various environmental processes such as sink and source for pollution is emphasized in policy making.

A need therefore, arises to integrate all our efforts to improve and sustain the health of soil for higher quantity and better quality of food and fodder production from diversified farming system as well as for better quality of environment. As a result of intensive farming soils of various agro-ecological zones have developed fatigue with declining fertility of cultivated soils, particularly with respect to plant nutrients. Adoption of inappropriate cropping systems along with faulty soil management has also contaminated soils and groundwater resources.

Comprehensive soil fertility research has emphasized that there is an urgent need for effective soil protection and land use policy along with establishment of framework for monitoring of soil fertility to save precious soil resources from misuse and degradation. The loss of soil fertility from continual nutrient mining by crop removal without adequate replenishment, combined with imbalanced plant nutrition practices, poses a serious threat to soil fertility and agricultural production. Hence, the concept of integrated nutrient management (IMN) needs to be popularized wherein use of chemical fertilizers along with organic manures is practiced to meet crop requirement.

The Jabalpur Chapter of Indian Society of Soil Science is actively engaged in teaching and research. The role played by the chapter in developing potential agricultural human resource is of utmost importance. This Newsletter will certainly prove as catalyst in enhancing the health of soil and plants.

I wish the members of this chapter a grand success in their endeavour.

With best wishes and compliments.

Prof. V. S. Tomar
Vice Chancellor
JNKVV, Jabalpur



Patron's Message

Anticipating future developments in global agriculture is by no means a simple exercise. In the last few years, many of the acute phenomena observed have complicated further the formulation of long-term prospects. At present agriculture experiences a wide climate variability and natural resource base economic development.

Global projection indicated that agricultural and food demand is expected to slow over the next decades, following slowing population growth and raising incomes. However, population will still grow considerably in the coming decades, and require world agricultural production to increase substantially by 2050. The macroeconomic outlook indicates that economic growth may bring significant reductions in poverty in the 2050 horizon, but climate change may impose additional constraints, particularly through increased pressures on land and water resources.

Other areas explored in the volume are natural resources - notably land and water-as well as capital investment and technology. However, the bulk of production increase will need to be generated through increased yields. Technically, there seems to be considerable scope for pushing the agricultural technology frontier outwards. But much could also be done by simply applying existing technologies. To overcome this, farmers and other stakeholders along value chains need to receive the correct scarcity signals from markets to be able to access appropriate inputs and to invest. Global fixed capital stock in agriculture has been growing steadily over the last three decades, although at declining rates. Research is shown to be among the most productive investments for supporting agriculture, education, infrastructure and input credits.

India is bestowed with diverse soil groups due to variability in parent materials, land topography and climatic conditions in different regions. Each soil group as well as subgroup has a distinct physical and chemical properties influencing soil-plant-atmosphere continuum and thus contributing to distinct advantages and constraints in various operations of crop management practices affecting the productivity of crops.

Enhancement and maintenance of soil productivity is essential to the sustainability of agriculture and for meeting basic needs of rising population. In this context, some important issues that need to be addressed includes the existing natural resources which may be adequate to meet the food demands, identification of the potentials and constraints of soil resources and development of generic technology that can be adopted to soil and site specific conditions for sustainable management in increasing the fertility of soil and productivity of the various cropping system.

Dr. S.S. Tomar

Director Research Services
JNKVV, Jabalpur



Presidential Remarks

Soil is linked to everything around us and performs many important roles in sustaining life on Earth. Soil plays seven key roles:

Providing the basis for food and biomass production: Unless sealed (covered over by roads, buildings, etc.), all soils support biomass production, whether it is natural

vegetation or planted for agriculture and forestry. From the smallest seedling to the largest tree, all land-based vegetation depends on soil to provide them with nutrients, water and root support. In turn, this vegetation supports animal life on land. The productivity of soil is dependent upon its physical, biological and chemical conditions, as well as on climate. The most productive soils are usually used for arable farming and less productive soils support grassland, heath land and forests. Currently, major portion of land is used for food production; however, future needs (e.g. biofuel production, urban development) may result in competition for this high quality agricultural land resulting in further pressure on soil.

Controlling and regulating environmental interactions-regulating water flow and quality: Soil and water quality are very closely linked and, to a significant extent, soil properties determine water quality. As water passes through soil it is filtered and purified which helps to generate clean and wholesome groundwater.

Storing carbon and maintaining the balance of gases in the air: Soil organic matter is an extremely important component of soil. It improves nearly all soil properties (e.g. moisture retention, soil structure, drainage, nutrient storage etc.) and therefore plays a vital role in many functions of soil. The ability of soil to store carbon is important in reducing the amount of carbon dioxide (CO₂) in the atmosphere, thereby regulating climate change. Soil organisms continually breakdown complex organic molecules into simpler organic molecules and when the process is complete they are released as nutrients and gases, including greenhouse gases such as CO₂. However, soil organisms are also involved in a process called humification where new, more complex and stable organic matter is formed. The amount of organic carbon in a particular soil is determined by the balance between carbon input to the soil (as organic matter) and carbon loss from the soil. On a global scale, soils contain about twice as much carbon as the atmosphere and about three times as much as vegetation. The majority of CO₂ emissions from soil occur as a result of land use changes such as the draining or cultivating of organic soils, or the conversion of grasslands to arable land.

Providing valued habitats and sustaining biodiversity: A habitat is a place that provides an organism with everything that it needs to survive, including food and shelter. Soil is a very complex habitat, sustaining a diverse range of organisms both above and below ground. Biodiversity is the term used to refer to all the variety of life on Earth. It consists of all species,

varieties and genes living both above and below ground. Biodiversity above and below ground is influenced and controlled by soil properties. Scientists believe that soil biodiversity is much higher than in any other terrestrial habitat, even rainforests. Whereas above ground biodiversity is relatively well known and understood, most soil organisms are still unknown and not yet scientifically described. The largest groups of soil organisms are micro-organisms such as bacteria and fungi.

Providing a platform for buildings and roads: Buildings and infrastructure require land for their construction. The constant need for land for development has resulted in a gradual reduction in productive soil and land as they become permanently covered with roads and buildings.

Providing raw material: Soils provide a direct source of minerals and other resources. These include: material for potters, sand, gravel & stones for building, ore for industry, peat and coal for heating and peat for horticulture.

Preserving cultural and archaeological heritage: Soil can conserve and preserve the archaeological record by forming a protective layer over archaeological sites and buried artifacts, ensuring their protection from potentially destructive elements like wind and rain. Landscape features such as cultivation terraces and rig and furrow resulting from historic land use also form part of our cultural heritage.

Dr. A.K. Rawat

President, Jabalpur Chapter of ISSS
Prof. & Head, Department of Soil Sci. & Agril. Chem.
JNKVV, Jabalpur



- 1 Dr. Pradip Dey, Project Coordinator, AICRP on STCR, IISS, Bhopal visited on farm experiments on September 3, 2014 at JNKVV, Jabalpur (MP).
- 1 Dr. Muneshwar Singh, Project Coordinator, AICRP on LTFE, IISS, Bhopal visited on farm experiments on September 3, 2014 at JNKVV, Jabalpur (MP).

VISITS

- 1 The ICAR accreditation team members Dr. Chinnachany Ramasamy, Former Vice Chancellor, TNAU, Coimbatore, Dr. T.A. More, Vice Chancellor, MPKV, Rahuri, Dr. Opendar Koul, Director, Insect Biopesticide Research Centre, Jalandhar and Prof. Syed Akhter Hussani, Professor & Head, Biotechnology, Jamia Millia Islamia, New Delhi visited the laboratories, classrooms, seminar hall and other infrastructure facilities of the department and reviewed the progress of the departmental activities on October, 29, 2014.



PARTICIPATION IN MEETING/TRAINING /SEMINAR/ WORKSHOP /KISAN MELA

- 1 Dr. A.K. Rawat, Prof. & Head and Principal Investigator attended group meeting of All India Network Project on Soil Biodiversity-Biofertilizers at Directorate of Groundnut Research, Junagarh during December 6-8, 2014.
- 1 Dr. B.L. Sharma, Principal Scientist and Dr. H.K. Rai, Senior Scientist attended state level meeting on Soil Health, organized by Principal Secretary, Department of Farmer Welfare & Agril. Development, Bhopal on August 22, 2014.
- 1 Dr. H.K. Rai attended workshop on revising IPM package held at National Institute of Plant Health Management, Hyderabad during August 25-27, 2014.
- 1 Dr. P.S. Kulhare, Principal Scientist, attended International Symposium on New-Dimensions in Agrometeorology for Sustainable Agriculture (NASA-2014) during October 16-18, 2014 held at G.B. Pant University of Agriculture & Technology, Pantnagar.
- 1 Dr. H.K. Rai, Senior Scientist delivered a lecture on Integrated Nutrient Management in Organic Farming

during one day State Level Workshop on Jaivik Kheti held at JNKVV, Jabalpur on December 17, 2014.

- Shri Vinod Kumar, Ph.D. Scholar attended the Asian Plant Science Conference held at Bhairahava, Nepal 1-3 November, 2014.



- Shri Vinod Kumar, Ph.D. Scholar attended the 79th Annual Convention of Indian Society of Soil Science held at ANGRAU, Hyderabad during November 24-27, 2014.



- A field day and training programme was organized under AICRP on Long Term Fertilizer Experiment at Kuramaili village of Mandla district on Oct. 29, 2014.



- A field day and training programme was organized under AICRP on STCR at Katamal village of Mandla district on November 11, 2014.



Awards received by the faculty members

Best poster presentation awards received by the faculty members under different themes of the National Conference on "Soil Health: A Key to Unlock and Sustain Production Potential" organized by the Department of Soil Science and Agricultural Chemistry, JNKVV, Jabalpur (M.P.) during September 3-4, 2014.

- Dr. R.K. Sahu – First position in "Soil health management and biodiversity" theme



- Shri S.S. Baghel – Second position in "Soil health management and biodiversity" theme



- Dr. R.K. Thakur – First position in "Strategic nutrient management for sustainable soil health" theme



- Dr. G.D. Sharma – Second position in "Strategic nutrient management for sustainable soil health" theme



- Shri G.S. Tagore – First position in "Remote Sensing and GIS application for soil health management" theme



- Dr. B.S. Dwivedi – First position in "Socio-economic aspects" theme



- Dr. B.S. Dwivedi, received the best poster presentation award in National Seminar on "Challenges and opportunities for Agricultural crop productivity under climate change" September 21-22, 2014 held at College of Agriculture, Rewa (M.P.).



- Dr. R.K. Sahu, received 2nd runner up award in NASA-2014 International Symposium on New-Dimensions in Agrometeorology for Sustainable Agriculture during October 16-18, 2014 held at G.B. Pant University of Agriculture & Technology, Pantnagar.



Events and Activities of Jabalpur Chapter of Indian Society of Soil Science

National Conference

On the eve of Golden Jubilee Celebrations of the Vishwa Vidyalaya, Jabalpur Chapter of Indian Society of Soil Science, Department of Soil Science & Agricultural Chemistry, JNKVV, Jabalpur in Collaboration with Indian Society of Soil Science, New Delhi and Indian Institute of Soil Science, Bhopal organized a National Conference on "Soil Health: A Key to Unlock Production Potential" during September, 3-4, 2014. The conference was partially sponsored by M.P. Council of Science & Technology, Bhopal.



Inaugural Function



Felicitation of Chief Guest Dr. A.K. Sikka, Hon'ble DDG (NRM), ICAR by Hon'ble Vice Chancellor, Dr. V.S. Tomar



Felicitation of Dr. A.K. Singh, Hon'ble Vice Chancellor RVSKVV, Gwalior by Hon'ble Vice Chancellor Dr. V.S. Tomar



Felicitation of Dr. S.K. Patil, Hon'ble Vice Chancellor IGKV, Raipur by Director Research Services, Dr. S.S. Tomar



Felicitation of Hon'ble Vice Chancellor, Dr. V.S. Tomar by Dr. A.K. Rawat Prof. & Head and Organizing Secretary of the National Conference

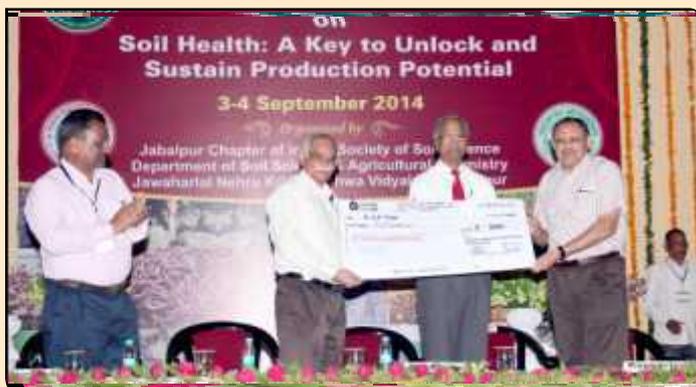


Release of Souvenir of National Conference



Release of Newsletter of Jabalpur Chapter of Indian Society of Soil Science

- Dr. A.K. Singh, Hon'ble Vice Chancellor, RVSKVV, Gwalior delivered 8th Dr. T.D. Biswas Memorial Lecture of Indian Society of Soil Science, New Delhi on "Feeding 1.6 billion - Can Soil Scientists Deliver ?" during the National Conference.



Centre of Advanced Faculty Training

- Department of Soil Science & Agricultural Chemistry, JNKVV, Jabalpur organized a National Training programme on "Management of Soil Health: Challenges and Opportunities" under CAFT during September 29 to October 19, 2014 sponsored by Indian Council of Agricultural Research, New Delhi. A good response was received for this training programme. Forty three applications were received for participation and out of these, twenty five applicants from twelve states were selected for the training programme.



Academic Activities

Student's Placement

- | Mr. Dinesh Baretha, joined as FEO at Cost of Cultivation Scheme (CCS), Dept. of Agril Economics & Farm Management, College of Agriculture, Jabalpur
- | Mr. Shri Ram Patel joined as Team Member at Watershed Management Organization at Barwani

- | Mr. Vijay Jat joined as Team Member at Watershed Management Organization at Dewas
- | Mr. Chandrabhan Raghuwanshi joined as Credit Manager in HDFC bank at Itarsi
- | Mr. Samrath Patidari joined as Credit Manager, HDFC bank at Dhar
- | Mr. Gajendra Patel joined as Field Executive Officer, IGS, NGO at Seoni

Award/Recognition

- | Mr. Narendra Chouhan, Research Associate qualified for the National Eligibility Test (NET) - 2014
- | Mr. Rishikesh Tiwari, M.Sc. (Previous) received the best poster award in Agriculture Exhibition during Golden Jubilee Year 2013-14 on October, 01, 2014.
- | Mr. Anil Nagwanshi, Ph.D. Scholar qualified the National Eligibility Test (NET) - 2014



SOIL TRIVIA

- | Do you know that there are more living individual organisms in a tablespoon of soil than there are people on the earth?
- | Do you know that almost all of the antibiotics we take to help us fight infections are obtained from soil microorganisms?
- | Do you know that agriculture is the only essential industry on earth?
- | Do you know that soil is a non-renewable natural resource?
- | Do you know that the best china dishes are made from soil?
- | Do you know that about 70% of the weight of a text book or glossy paged magazine is soil?
- | Do you know that putting clay on your face in the form of a "mud mask" is done to cleanse the pores in the skin?

Dr. A.K. Rawat

Liquid Bio-fertilizers: A Potential Tool For Sustainable Crop Production

Soil fertility declines when its nutrient content diminishes, and/or when it's physical, chemical and biological makeup changes in a way that lower its ability to support and nourish plants which limited crop production. Low soil fertility is caused by continue crop and using imbalanced chemical fertilizer. The availability and affordability of fossil fuel based chemical fertilizers at farm level in India have been ensured only through imports and subsidies which are largely dependent on GDP of the country. Nitrogen and Phosphorous

are two major nutrients for plant growth which are provided through chemical fertilizers or organic manures. Certain soil microorganisms have an ability to fix part of elementary form of atmospheric nitrogen to the available form for the plants and / or solubilize part of the bound phosphates of the soil and thereby make them available to the plant which increases fertility of the soil and crop yield. India is one of the important countries in the world towards biofertilizers production and consumption. In agricultural eco-system, microorganisms have vital role in fixing/solubilizing/ mobilizing nutrient recycling. These microorganisms occur in soils naturally, but their populations are often scanty. In order to increase the crop yield, the desired microbes from rhizosphere are isolated and artificially cultured in adequate count and mixed with suitable carriers or as they are in suitable combinations (microbial consortium) by artificial culturing. These are known as Biofertilizers or microbial inoculants. In order to encourage the biofertilizers, five biofertilizers namely *Rhizobium*, *Azotobacter*, *Azospirillum*, Phosphate solubilizing bacteria and *Mycorrhiza* have been incorporated commonly in crop production.

The earlier products of bio-fertilizers were carrier (solid) based where lignite is usually added as a carrier material. Carrier based bio fertilizers are not so tolerant to the temperature which is mostly unpredictable and uncertain in the crop fields. In the carrier-based (solid) bio-fertilizers, the microorganisms have a shelf life of only six months. They are not tolerant to ultra-violet rays and temperatures more than 30 °C. The population density of these microbes is only 10⁸ colony forming unit (CFU) ml⁻¹ at the time of production. This count reduces day by day during stage. In the fourth month it reduces to 10⁶ CFU ml⁻¹.

These defects are rectified and fulfilled in the case of Liquid Bio-fertilizers (LBF). LBF formulation is the promising and updated technology of the conventional carrier based production technology. Basically LBF have been classified into, 1) Dry products which include dusts, granules and briquettes and, 2) Suspensions containing cell protectants. A consortium of microorganisms provided with suitable medium to keep up their viability for certain period which aids in enhancing the biological activity of the target site. The shelf life of the microbes in these liquid bio-fertilizers is two years. They are tolerant to high temperatures (55 °C) and ultra violet radiations. The count is as high as 10⁹ CFU ml⁻¹, which is maintained up to two years. So, the application of 1 ml of liquid bio-fertilizers is equivalent to the application of 1 kg of

5 months old carrier based bio-fertilizers. Since these are liquid formulations, the application in the field is also very simple and easy. They are applied using hand sprayers, power sprayers and as basal manure mixed along with FYM etc.

OTHER ADVANTAGES OF LBF:

1. Contains special cell protectants or substances that encourage formation of resting spores or cysts
2. It ensure longer shelf life, better survival on seeds and soil and tolerance to adverse conditions
3. Since the organisms are stabilized during production, distribution and storage, the activity is enhanced after the contact and interaction with the target crops
4. No loss of properties due to storage up to 55 °C
5. Product can be 100% sterile with least contamination
6. Greater potentials to fight with native population
7. Dosages are 10 times lesser than the carrier-based bio-fertilizers
8. Very high enzymatic activity since contamination is minimum or nil
9. Additionally, LBF can be used in drip irrigation and as a component of organic farming
10. No health hazards to production workers and easy to transport, handle and apply

**Vinod Kumar (Ph.D. scholar) &
Ms. Chinmayee Roy (M.Sc. student)**

Retirement

- 1 Dr. S.M. Singh, Associate Professor, College of Agriculture, Rewa, retired on 31-10-2014
- 1 Shri G.P. Tembe, Associate Professor, Department of Soil Science & Agricultural Chemistry, JNKVV, Jabalpur retired on 31-10-2014

Obituary

- 1 Dr. M.S. Padihar, Sr. Scientist, Soil Science & Agril. Chemistry, Zonal Agricultural Research Station, Powarkheda passed away on July 11, 2014.
- 1 Shri T.S. Chopra, Retired Professor, Department of Soil Science & Agricultural Chemistry, JNKVV, Jabalpur passed away on November 22, 2014.
- 1 Dr. D.C. Bisen, Retired Professor, Department of Soil Science & Agricultural Chemistry, JNKVV, Jabalpur passed away on November 30, 2014.



Compiled and edited by

Dr. A.K. Rawat, Dr. A.K. Dwivedi, Dr. H.K. Rai and Dr. R.K. Thakur

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