BIOGYAN

Sikkim State Council of Science & Technology
Vigyan Bhawan, Deorali – Sikkim

Quarterly Newsletter | March - 2017 | Volume - X

Inside this issue:

Union Minister Dr. Harsh Vardhan visited Sikkim State Council of S&T acknowledged the role of Science & Technology councils throughout the country.

Fig. Union Minister Dr. Harsh Vardhan addressing the mass.

Honorable Union Minister for Science and Technology and Earth Sciences, Dr. Harsh Vardhan, Who was on his 3 days visit to Sikkim, visited Department of Science, Technology & Climate Change, Vigyan Bhawan. Shri. T.W. Lepcha, Minister, Government of Sikkim and Special Secretary, Additional Directors & others DST&CC officials were also present in the occasion.

Fig. Bioinformatics web Lab

Fig. Welcoming Union Minister at SSCS&T

While addressing the august, Union Minister Dr. Harsh Vardhan praised Sikkim for being the first organic state of the country. Appreciating the achievement of the council in the field of Science and technology, Dr. Vardhan told that small state like Sikkim could be a model state in science and technology and urged those involved in it to be pro active and work towards achieving that. He said Science is universal but technology is local and suggested to understand the problem at root and intervene to solve them. Dr. Vardhan said setting-up of science and technology councils throughout the country was a vision of Shri Atal Bihari Vajpayee, (Honorable former-Prime Minister of India), and to see how it has prospered over the years reaching out even to the farthest corner of the country is something to be proud of, for everyone.

In this occasion Shri. T.W. Lepcha, State Minister, also addressed the gathering, where he emphasized upon the importance of scientific researches in developing bioresources of Sikkim.

Training on "Computational R-Bioinformatics and PERL Programming"

A week long hands on organized by Bioinformatics Sub-DIC Centre, Sikkim State Council of Science & Technology, DST&CC, was conducted from 26th September to 1st October 2016 at Vigyan Bhawan, Deorali. The training programme is being funded by Department of Biotechnology, Government of India. The training programme was formally inaugurated by Mrs. Hemanta Basnet, Special Secretary, DST&CC,GoS. The participants of the training programme were PhD scholars of Sikkim University. The inaugural function was also attended by Dr. B. C. Basistha, Additional Director and other staffs, research scholars of the department. Dr. Basistha who is also the Coordinator of Bioinformatics Sub-DISC delivered the key note address and highlighted on the use of R-Bioinformatics and PERL programming in analysis of molecular data.

Fig. Trainees along with guests and Resource person.

The Resource Persons of the training programme are Dr. Samrat Adhikari, HOD, Biotechnology, St. Edmund's College, Shillong, Meghalaya and Shri. Laydong Lepcha, Information Officer, Bioinformatics Sub-DIC, SSCST.

Shri. Lepcha imparted hands – on training on access of Genomic and Proteomics web source databases by using Computational programming such as R and PERL.

While Dr. Adhikari imparted hands-on training upon the Bioinformatics analytical softwares in studying phylogenetics and protein modeling. The training concluded with a valedictory program on 1st Oct.2016.

The 3rd Review Meeting of North East DBT's Overseas Associateship Programme

Sikkim State Council of Science & Technology, has organized a 3rd Review Meeting of North East Department of Biotechnology, Government of India's Overseas Associate Programme, w.e.f. 29th to 30th November, 2016, at Gangtok. The meeting was chaired by Shri. T.W Lepcha, Hon'ble Minister for Department of Science, Technology and Climate Change, FE&WM and Mines & Geology Department, Government of Sikkim. Dr. Dinabandhu Sahoo, Director Institute of Bioresources and sustainable Development (IBSD), Dr. RNS Yadav, Dibrugarh University, Dr. Pawan Sharma, Senior Consultant, NER-BPMC, Shri. Vinod Kumar, Manager, BCIL, along with Special Secretary, Additional Directors and other officials of DST&CC were present. Overseas Associateship Beneficiaries from various scientific Institutions and Universities from all over North East Region (NER) were present in this programme.

During the programme, Dr. T. Madhan Mohan, Advisor, Department of Biotechnology, Govt. of India was felicitated by the Sikkim State Council of Science & Technology for rendering major contribution towards the growth and development of biotechnology researches and infrastructure in India and North East in particular. The appreciation note was read by Dr. B.C Basistha, Additional Director. He highlighted upon Dr. Madhan Mohan's commitments and utmost architecture in bringing up advance research infrastructure facilities in North East, such as biotech Labs etc. Hon'ble Minister Shri. T.W. Lepcha, in his address acknowledged the role of Department of Biotechnology in the state and highlighted upon the importance of biotechnological researches for sustainable utilization of bio-resources in Sikkim. The Minister praised the visionary environment conservation initiative of the Hon'ble Chief Minister of Sikkim - the State Green Mission. The mission engages every Sikkimese in avenue plantation and beautification of all vacant and waste lands asserting the international recognition of Sikkim as an incomparable Green State.

Further, he said that under the visionary leadership of Honorable Chief Minister Shri. Pawan Chamling, Sikkim is now the first fully organic State of the country declared by Honorable Prime Minister Shri. Narendra Modi at a Sustainable Agriculture Conference held at Gangtok on January 18, 2016. Shri. Lepcha concluded by praising DBT's various initiatives in biotechnological research and added such programme will provide an ideal platform for discussion on crucial issues regarding the legitimate growth and development of Biotechnological researchers in the North East Region. He also requested DBT, GoI to upgrade the State Biotech Hub to a full state of art facility. During the programme, a progress report presentation were presented by over 60 beneficiaries of DBT's Overseas Associateship Programme for NER. Their research progress were reviewed and evaluated by an DBT expert committee. The meeting came to develop an special inceptions for the early and mid-career Scientists holding permanent positions in NE region conducting research to generate human resource trained in cutting edge areas of biotechnology.

Fig. Release of Proceeding by Hon'ble Minister.

Fig. Hon'ble Minister Shri. T.W. Lepcha, addressing in mass.

The two day programme had participation of Over 60 Overseas Associateship Beneficiaries from various scientific institutions and Universities from all over North East Region (NER).

International Conference on Structure and Dynamics of Biomodules

An International Conference on Structure and Dynamics of Bio-modules, was organized by Department of Physics, D.D.U. Gorakhpur University, Uttar Pradesh, from 27th to 28th Jan, 2017.

The conference was inaugurated by Prof. Ashok Kumar, Vice Chancellor. D.D.U. Gorakhpur University. Dr. G. Narhari Sastry, Indian Institute of Chemical Technology, Hyderabad, was also present during the occasion. Scientists from different parts of the world such as Hebrew University of Jeruslaem, Israel, USA, Czech Republic, etc have presented their valuable research works during this two days international conference.

Fig. D.D.U. Gorakhpur University, Gorakhpur, Uttar Pradesh

Laydong Lepcha, Information Officer, Bioinformatics Sub-DIC, Sikkim State Council of Science & Technology, has presented his published Bioinformatics research paper on " Hydropathicity, Phylogenetics and Possible codons Analysis for Asparagine, Glutamine, Arginine, and Proline Proteins In *Vicilin Genes of Abroma angusta, Solanum lycopersicum, Theobroma cacao. Herrania nycterodendron, Z. furfuracea, Pisum sativum, Vicia faba".*

DeLCON
DBT E-Library Consortium

DeLCON: *A Scientific Boost*

DeLCON (DBT's e-Library Consortium), is a unique Electronic Journal Consortium, which have been operating since 2009. In Sikkim the consortium facility is established since 2011 at Sikkim State Council of Science & Technology. There are about 1171 journals published by world renowned publishers, such as NATURE, ELSEVIER, OXFORD, WILLY, American Association For The Advancemnt Of Sciences, American Association For Cancer Research, Taylor & Francis, American Association Of Immunologist ,PNAS, NEEJM, etc.

The facility is available at Bioinformatics Sub-DIC, web laboratory, Sikkim State Council of Science & Technology, Vigyan Bhawan, Deorali, Gangtok. The researchers may visit during office hours and avail this facility.

ARTICLE : "Autumn Olive (*Elaeagnus umbellata*): A potential future horticultural crop of Sikkim"

Prerna Pradhan, JRF State Biotech Hub

Autumn Olive (*Elaeagnus umbellata*) of family *Elaeagnaceae* commonly known as Musleri is found growing in hilly terrain of India. In Sikkim it is mostly found growing in North District namely Lachung and Lachen (Sundriyal *et al*., 2003). It is a large shrub growing 10 to 15 feet tall and up to 20 feet across. Plants are readily identifiable by the distinct silvery colour of the leaves, particularly on the underside, the small pale-yellow fragrant flowers that emerge in April-May, and the red berries that ripen in autumn.

It is native to China, Korea, Japan and India (Hooker, 1886; Kirtikar and Basu, 1938). The plants are relatively fast growing, tolerant of drought, saline soils, and of soil pH ranging from alkaline to acid. The roots also form a nitrogen-fixing symbiotic relationship with Frankia bacteria (Benson & Silvester, 1993), similar to the relationship between legume plants and *Rhizobia*. These characteristics make autumn olive particularly adapted to low-fertility loamy and sandy soils. The plant was reported to be distributed by the U.S. Soil Conservation Service and planted widely for windbreaks, and to attract wildlife (Zerger 1980).

Fig: Flowers of *Elaeagnus umbellata* (Lachung, Sikkim)

Fig: Fruits of *Elaeagnus umbellata*

Mature shrubs can produce large numbers of small red fruits that ripen in September and October. The fruit have a unique sweet-tart flavour when ripe, and are consumed by the locals mostly children in the plant growing areas. Birds are attracted by the ripe fruit and subsequently scatter the seeds. Wild plants are found growing throughout the cultivated land and scanty forests areas of North Sikkim and are commonly reported to be found along roadsides and fencerows. The fruit is said to contain high amounts of lycopene a carotenoid pigment mostly associated with tomato, and is also rich in vitamin A, E, C and Flavonoids (Ahmed *et al.,* 2005). Lycopene is considered as an important phytonutrient, and is thought to prevent or fight against cancer of the prostate, mouth, throat and skin, and to reduce the risk of cardiovascular disease. Because of the high lycopene levels in autumn olive fruit, and the potential health benefits of this phytonutrient, there has been increased interest in commercial fruit production.

Fig: Machine harvesting of *Elaeagnusumbellata* in United States **(***Black, B.L.and I. Fordham. 2005.)*

The plant has been successfully machine-harvested in The United States for the past three years. Some pruning was required for shrubs to pass through the harvester. The fruit can also be efficiently harvested on a small scale using a bat or club to beat the branches, and catch frames or tarps to collect the falling fruit. Unripe fruit is very astringent due to high tannin content. The deep red colour often develops before the fruit is fully ripe. During ripening, tannins and acids decrease and the sugar content increases. The best method for determining fruit ripeness is taste testing, or watching for bird feeding in the upper branches. Ripe fruit can be processed into a number of products including salsa, steak sauce, meat glaze, pie filling, ice cream topping, jams and preserves (Facciola 1990, Reich 1991)..Each fruit contains a single seed or pit that constitutes about 10% of the total weight of the fruit. For best results, the seed should be removed from pulp during processing. There has been success separating the seeds by cooking the fruit and pressing the pulp through a screen designed for home processing of grape.

Lycopene is soluble in oil, but not water or alcohol and therefore stays in the pulp and does not come out in juice or wine.Marketing of fruit products will require some consumer education as the fruit is not a part of the traditional diet of most ethnic groups in Sikkim and rest of India, although it is consumed somewhat in China, Japan and Korea, where it is valued for its perceived health benefits. Further, none of the currently used common names connote a fruity flavour. The name 'Autumn berry' has been suggested by the U.S as a more palatable alternative.

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ARTICLE : Cow Dung: Bioresource with tremendous future potential

Neelam Gurung, JRF State Biotech Hub

Cow dung is the undigested residue of consumed food materials being excreted by of herbivorous bovine animal species which includes domestic cattle such as cow, buffalo, yak and water buffalo. It mainly consists of lignin, cellulose and hemicelluloses. It also contains 24 different minerals like nitrogen, potassium, along with trace amount of sulphur, iron, magnesium, copper, cobalt and manganese.

Micro flora Associated and Human Health Management

Cow dung harbours a rich microbial diversity, containing different species of bacteria (*Bacillus* spp., *Corynebacterium*spp. and *Lactobacillus* spp.), protozoa and yeast (*Saccharomyces* and *Candida*).Many other different bacterial genera such as *Citrobacterkoseri*, *Enterobacteraerogenes*, *Escherichia coli*, *Klebsiellaoxytoca*, *Klebsiellapneumoniae*, *Kluyvera* spp., *Morgarellamorganii*, *Pasteurella*spp., *Providenciaalcaligenes*, *Providenciastuartii*and *Pseudomonas* spp.are also present.Cow dung possesses antiseptic and prophylactic properties. It destroys the microorganism that causes disease and putrefaction. Medicinal properties of five products collectively known as panchgavyaobtained from cow namely milk, ghee, curd, dung and urine are supported by their use in the preparation of various herbal medicines for the treatment of many diseases like flu, allergies, colds, cough, asthma, renal disorders, gastrointestinal tract disorders, acidity, ulcer, wound healing, heart diseases, skin infections, tuberculosis, chickenpox, hepatitis, leprosy and several other bacterial and viral infections. It has antifungal substance that inhibits the growth of coprophilous fungi. Microbes present in cowdungproduces patulodine- like compounds viz. CK2108A and CK2801B with significant antigungal property. They also produce a heat stable, largelyhydrophobic antimicrobial substance with significant antimicrobial activity against pathogenic Gram-negativebacteria. Several genera of Bacillus and Pseudomonas species isolated from cow dung are known for their antagonistic activity against several pathogenic bacteria and fungi. It could be a potent source of microbial enzymes such as xylanases, cellulases, amylases, gelatinase, urease and β-galactosidase. Not only as a microbial source but cow dung may also serve as goodsubstrate for enzyme production in production of alkaline protease and fibrinolytic enzyme.

Table: Applications of Cow dung with its several benefits

Sl.No.	Application		Benefits
1.	**Fertilizer**		♦ Excellent growing medium for agriculture as well as for garden plants. ♦ Composted for several days say 3-4 weeks and fed to plants and vegetables either mixed into soil or used as top dressing. ♦ Rich in minerals, especially nitrogen, phosphorus and potassium. It can sup port the growth of beneficial microorganisms when it's mixed with soil. Manure can also improve the texture of the soil and help it to maintain moisture. ♦ Less sprinkling of water in the field as the roots of plants can use the additional water and nutrients from the manure whenever needed. ♦ Increases the breakup of compacted soils through aeration in the soil.
2.	**Fuel and Biogas (Green energy)**		♦ Dried are lit to provide heat and a flame for cooking which has lost its objectionable odour. ♦ A biogas is a mixture of gases produced by the anaerobic digestion of organic matter by bacteria. An "anaerobic" process occurs in the absence of oxygen.
3.	**Building Material**		♦ Mixture of mud and cow dung paste is applied to the floors and walls, forms water proof layer which insulate the house ♦ A relatively new process is to make building bricks with straw dust which are much lighter. ♦ Manure residue from biogas production could be used instead of sawdust to make fibreboard used in manufacture of furniture and floor in homes. ♦ High fibre content of cow dung also enables to make paper which can also be bought commercially as well.
4.	**Insect Repellent and a Disinfectant**		♦ Smoke from burning cow dung repel insects, including mosquitoes. ♦ In some cultures cow dung is applied to walls and floors as a disinfectant as well as an insulator.
5.	**Dwellings to Dung Beetles**		♦ Beetles take a small piece of dung from a cow pat and shape it into a ball. They roll the ball away and bury it in the ground. The beetles use the ball as food or as a place to lay eggs. Some dwells inside the cow pat in a shallow pit.

Conclusion:

Cow dung has wide range of applications in several fields. It has become effective tools to improvephysico-chemical and biological properties of the soil with higher yield of plants in sustained basis without affecting the fertility of soil. The Judicious use of dung will contribute to increase energy security and reduce environmental pollution.It is a promising untapped source of microorganisms, which may have novel antimicrobial metabolites. It encompasses variety of microorganisms with profuse significance. It is the bioresourcewhich is available on large scale and yet to be utilized fully. The understanding of the mechanisms enabling cow dung microbes to degrade hydrocarbons can promote bioremediation of environmental pollutants. Another exciting area of research for future studies is developing microbial enzymes and antimicrobials. The production of enzymes by microorganisms from this economicresource can find varied uses in severalfields such as agriculture, chemistry and biotechnology. It also promotes human health, but, comprehensive screening ofthese microorganisms for the production of antibacterial,antifungal and antiviral metabolites are required to be done. Further, there is still anenormous scope for research and development for industrial production of antibiotics and enzymes. Hence, cow dung may be regarded as an easily available bioresource that holds a great prospective for sustainable development in the future.

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Recent development in Bioinformatics

Warbler genomes look to be 99.97 percent alike

This is an illustration of warbler.

For decades, conservationists have considered blue winged warblers to be a threat to golden winged warblers, a species being considered for federal endangered species protection.

Blue-winged warbler populations have declined 66 percent since 1968, according to the North American Breeding bird Survey.

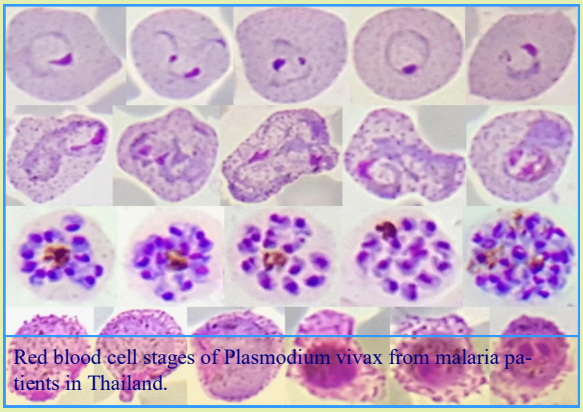
Every grain of rice: Ancient rice DNA data provides new view of domestication history

Rice, or Oryza sativa as its scientifically known, feeds more than a third of the globe. Yet the majority of rice crops that supply 90 percent of the world come from just two domesticated varieties, japonica and indica.


This is a comparison of ancient rice remains and modern rice.

Gene sequences reveal global variations in malaria parasites

Plasmodium vivax (P. vivax) parasites, which cause a debilitating form of malaria, are yielding their secrets to an international team of researchers funded by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health. In the largest such effort to date, the team determined complete genomes of nearly 200 P. vivax strains that recently infected people in eight countries. Comparative analysis showed the parasites clustered into four genetically distinct populations that provide insights into the movement of P. vivax over time and suggest how it is still adapting to regional variations in both the mosquitoes that transmit it and the humans it infects.


Red blood cell stages of Plasmodium vivax from malaria patients in Thailand.

Source : www.biologynews.net

Fig. Assam, Dibrugarh University's MSc. Students Visited SSCS&T, Vigyan Bhawan.

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