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## Bioinformatics Education Program (BEP)-2015

Bioinformatics Sub-DISC, Sikkim State Council of Science & Technology, Department of Science, Technology and Climate Change, with the support of Department of Biotechnology, Government of India, has successfully completed a month long outreach program on Bioinformatics education for the Science Students of Various School in the state.

The series long Bioinformatics Education Programme 2015, was started from Mangshila Government Senior Secondary School, North Sikkim on 16<sup>th</sup> September 2015. The same were also concluded in Dentam Government Senior Secondary School, West Sikkim, Enchey Senior Secondary School, Gangtok and Namchi Government Girls Senior Secondary School, South Sikkim, on 22<sup>nd</sup>, 26<sup>th</sup> and 29<sup>th</sup> September respectively and Yangang Senior Secondary School, South Sikkim, on 12<sup>th</sup> October and Dikling Senior Secondary School, East Sikkim on 06<sup>th</sup> Oct. 2015.

The Bioinformatics Education Programme is inspired by Dr. Anil Mainra, IFS, Principal Secretary, Department of Science, Technology and Climate Change, Dr. Bharat Basistha, Additional Director and Coordinator and Shri. K.B. Subba, Assistant Scientific Officer (ASO) and Co-coordinator, SSSCS&T.

Sikkim being one of richest spot of Biodiversity in the world has huge potential of exploring its Bio-resources to generate genuine biological resources for the state and the country.



Namchi Girls School, Namchi



Yangang Sr. Sec. School, South Sikkim



Mangshila Sr. Sec School, North Sikkim



Enchey Senior Secondary School, Gangtok

## Bioinformatics Hands on Training

Hands-on Training on "Bioinformatics Tools and Techniques" was held at Bioinformatics Centre, Sub-DISC, SSSCS&T in five days long Training organized by State Biotech Hub w.e.f. 24<sup>th</sup>- 28<sup>th</sup> May 2016. The participants were M.Sc Students from Horticulture Department, Sikkim University. During the training, Mr. Laydong Lepcha, Information Officer, Bioinformatics Sub-DISC trained the participants upon Protein and gene sequence analysis and Primer designing of valuable crops species.



## Training on Biotechnology and Bioinformatics:



The total of six 5 days Hands on Training on Biotechnology and Bioinformatics was organised by Sikkim State Biotech Hub, SSCS&T, targeting different sets of people

- I. Molecular Techniques and Statistical Analysis of Molecular Data for M.Sc Students .
- II. Isolation of Plant Genomic DNA, PCR and Statistical Analysis of Genetic Data for M.Sc Students.
- III. Hands on Training on Biotechnological Techniques for PGT and GT Biosciences Teacher.
- IV. Hand on Training on Molecular Techniques on Horticulture crops for Ph.D Scholars and B.Sc Horticulture students .
- V. Hand on Training on Molecular Technique and Statistical Analysis of Data for M.Sc Medical Biotechnology students.
- VI. Hand on Training on Plant Genomics for B.Sc Horticulture students.



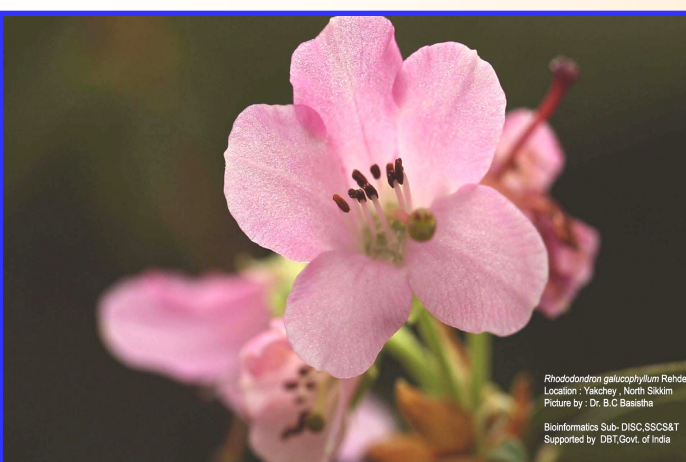
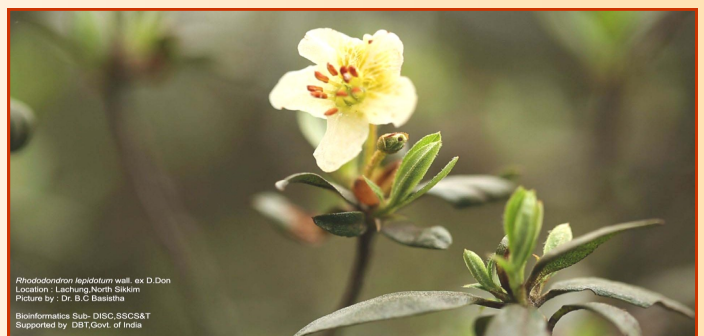
The hands on training covered the isolation of plant genomic DNA, preparation of DNA extraction buffers, Gel Electrophoresis, DNA quantification in Biospectrophotometer, Amplification of DNA in Polymerase Chain Reaction, Microbial Techniques, Statistical analysis of molecular data and Technical session on Bioinformatics on "Protein and gene sequence analysis"

The hands-on training was imparted by Dr. Sushen Pradhan, Research Associate and Shri. K.B. Subba, ASO (DST) on Isolation of DNA, Gel Electrophoresis, DNA quantification and PCR. Dr Shiva Kr. Sharma, ASO (DST) trained students on statistically analysis of Molecular data using POPGENE & NTSYS software and also basic microbial techniques session was covered by Ms. Neelam Gurung and Ms. Prerna Pradhan, JRF. A technical session on Bioinformatics on Protein & gene sequence analysis by Mr. Laydong Lepcha (Information Officer, Bioinformatics).

## Database on Rhododendron



Database on Rhododendron of Sikkim has been prepared by Bioinformatics Sub-DISC (Bioinformatics Sub Distributed Centre), Sikkim State Council of Science & Technology (SSCS&T), Vigyan Bhawan, authenticated and certified by Sikkim Biodiversity Board, Forest & Wildlife Management Department, Government of Sikkim. The database is going to be released in the form of a compendium Book by Honorable Chief Minister of Sikkim on the occasion of 70<sup>th</sup> Independence Day.



Digital frame of 29 Rhododendron Species of Sikkim are also been developed which will be used as a souvenir during the event. All the featured photographs were captured by Dr. B.C. Basistha, Additional Director, SSCS&T.

## 27th BTISnet Annual Coordinators Meeting



Bioinformatics Infrastructure Facility (BIF), Department of Biotechnology has organized 27<sup>th</sup> BTISnet Annual Coordinators Meeting on 3<sup>rd</sup> -5<sup>th</sup> March, 2016 at Kuman University, Nanital, Uttarakhand and also organized a workshop on "Patinformatics".

The Meeting was inaugurated by Hon'ble Chief Minister of Uttarakhand. The meeting was attended by all the BTISnet Coordinators and officials from various Bioinformatics centers of India.



Shri. Laydong Lepcha, Information Officer, Bioinformatics Centre, SSCS&T represent the Sikkim Bioinformatics Centre in this meeting.

Agriculture is the back-bone of Indian economy. 70% of the total population is involved in farming sector directly or indirectly. Agronomic crops are susceptible to attacks by various kinds of pests in form of insects, fungus, bacteria or virus or weeds and control of these has become necessary to reduce losses to a minimum. This problem was solved to a large extent, with the introduction of chemically synthesized pesticides. But the complete dependency on chemical pesticides and subsequent uninhibited use of them has necessitated for substitution mainly for environmental and health concerns. Degraded top soil and groundwater contamination has resulted in nutritionally imbalanced and infertile lands. Pesticide residues also raise food safety concerns among inland users and create trade obstructions for export crops. Hence, an environmentally friendly substitute is necessary.



Biopesticide are pesticide of biological origin. It may be microorganism such as bacteria, fungi and animal, certain minerals or plant based product like secondary metabolite. It is one of the ways out for sustaining agricultural productivity and environmental quality. Biological pesticides based on pathogenic microorganisms specific to a target pest offer an ecologically sound and effective solution to pest problems. They pose less threat to the environment and to human health. In 2014, the U.S. Environmental Protection Agency (EPA) registered more than 430 active biopesticide ingredients in 1,320 products. The most commonly used biopesticides are living organisms, which are pathogenic for the pest of interest. These include biofungicides (*Trichoderma*, *Streptomyces*), bioherbicides (*Phytophthora*) and bioinsecticides (*Bacillus thuringiensis*, *Beauveria*, *Nuclear polyhydrosis virus*, *Granulosis virus*). The potential benefits to agriculture and public health programmes through the use of biopesticide are substantial. Bio-pesticides should be effective in regulating the pests that they are intended to control. Mostly bio-pesticides are single host specific, but it is desired to have a bio-pesticide that can control a broader range of targets. Scientists believe that biological pesticides may be less susceptible to genetic variations in plant populations that cause pesticide resistance problems, which would make them very interesting.

Biopesticide could be a very effective tool that will help achieving farmers conversion from highly toxic conventional pesticides to the era of actually sustainable farming. Biopesticide will certainly play major role in transforming agriculture into totally organic. Some states like Sikkim and Uttarakhand have already declared their states as organic. Other states that are active in organic farming are Madhya Pradesh, Mizoram, Kerala, Rajasthan and Himachal Pradesh. Hence, there is enormous scope of progress of biopesticide sector in India. Due to rich biodiversity, India offers profuse resources in terms of biological control organisms and plant based pesticide. In order to increase the agriculture yield and sustaining human health and environment, promotion of biopesticide is highly recommended. Also, research and development of biological pest control methods must be given high priority and people in general and agriculturists in particular should be educated about the hazards posed by handling and use of chemical pesticides.

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Citrus fruits, widely used edible fruits of plants belonging to *Citrus* and related genera of the family Rutaceae (orange family). Included are the tangerine, citrange, tangelo, orange, Pummelo, grapefruit, lemon, lime, citron, and kumquat. Almost all the species bearing edible fruits are small trees, native to SE Asia, Indonesia, or Malaysia. The citron was introduced to the Mediterranean area from Asia before the advent of Christianity; the others were spread chiefly by the Arabs during the middle ages. Introduced throughout Europe during the Crusades, they were brought by Portuguese and Spanish explorers to the West Indies, North and South America. Commercially they are now the most important group of tropical and subtropical fruits in the world. And have been recognized as some of the most high-consumption fruits in terms of energy, nutrients and health supplements.



The citrus fruits are rich in vitamin C (ascorbic acid) and also abundant in other macronutrients, including sugars, folate, dietary fiber, potassium, calcium, niacin, thiamin, vitamin B6, phosphorus, magnesium, copper, riboflavin and pantothenic acid. Vitamin C is a powerful antioxidant and protects the body from damaging free radicals. It is also required for the synthesis of collagen, which helps wounds heal and helps hold blood vessels, tendons, ligaments and bone together. The vitamin C in citrus fruit also enhances the absorption of iron in food. Vitamin C binds to iron in the digestive tract and the iron-vitamin C complex is absorbed together. Folate is necessary for cell division and DNA synthesis. Thiamin is a B vitamin important in metabolism.

It also contain compounds called flavonoids, which have anticancer properties. Citrus flavonoids are also antioxidants that can neutralize free radicals and protect against heart disease. Studies shows that citrus flavonoids may improve blood flow through coronary arteries, reduce the ability of arteries to form blood clots and prevent the oxidation of LDL ("bad") cholesterol, which is an initial step in the formation of artery plaques. The peel, which contains numerous oil glands are a source of essential oils used for perfumes and similar products. The scent of citronella can inhibit the growth of cancer cells, including cancer of the liver, terpene, a main component of essential oils, can prevent or slow cancer cell growth. Scientists analyzed the molecular mechanisms by which cancer cell growth is slowed using citronellal, the primary chemical compound responsible for giving citrus its distinctive lemon scent.

Identified that the olfactory receptor OR1A2 is crucial for stopping cancer cell replication. Essential oils are also used to treat a variety of ailments including asthma, bronchitis, HIV, heart strokes. Aside from many health benefits, essential oils can make skin more beautiful, as well as aid with relaxation and sleep.

Numerous studies have focused on *Citrus* secondary metabolites as well as bioactivities and have been intended to develop new chemotherapeutic or complementary medicine in recent decades. *Citrus*-derived secondary metabolites, including flavonoids, alkaloids, limonoids, coumarins, carotenoids, phenolic acids and essential oils, are of vital importance to human health due to their active properties. These characteristics include anti-oxidative, anti-inflammatory, anti-cancer, as well as cardiovascular protective effects, neuroprotective effects, etc.



It only takes a minute to squeeze all those nutrients into your diet. Take a 'half-time' break with your family and oranges! Whether you prefer eating your orange whole, slicing segments for your little ones or introducing them to delicious dishes, oranges are the perfect low-fat sweet treat! Look after yourself and smile with oranges!

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## Recent Journals Publication

**TITLE:** 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*, *Theobroma cacao*

Lepcha Laydong\*, B.C. Basistha, K.B. Subba  
**International Journal of Bioinformatics Research** Volume-7 Issue-1 Published on 28 April 2016

**Abstract** - The study was conducted by analyzing and retrieving DNA Vicilin genes of various plant species whose partial genomic information or database are so far been experimented and submitted in gene bank. The DNA sequences of Vicilin genes were retrieved from plant species such as *Abroma angusta*, *Solanum lycopersicum*, *Theobroma cacao*, *Herrania nycterodendron*, *Z. furfuracea*, *Pisum sativum*, *Vicia faba*, *Theobroma cacao*. Specific Bioinformatics software tools were applied to analyze the necessary genomic information from studied Vicilin genes. The codons ratio of proteins amino acids such as Asparagine (AAC, AAT, GAC, GAT), Glutamine (CAA, CAG), Arginine (AGA, AGG, CGA, CGC, CGG, CGT), and Proline (CCA, CCC, CCG, CCT), were analyzed from within the retrieved DNA Vicilin genes. The study found that the major storage protein amino acids Asparagine (Asn), Arginine (Arg) and Proline (Pro) is ingredient more in Vicilin genes of *Abroma angusta*. It also studied the hydropathicity nature of specific amino acids from various vicilin genes of studied plant species. It helps to understand the protein amino acids interaction behaviour with the hydrogen bond of H<sub>2</sub>O. According to the Phylogenetic study, two of the Vicilin genes possessing plant species; *Pisum sativum* and *Vicia faba* are close relatives, belonging to family Fabaceae. This signifies that family Fabaceae is possibly being a dominant plant family in exhibiting secretion of Vicilin genes, an anti-decay gene. The main objective of the study was to analyze and understand the efficient Vicilin gene from various studied Vicilin genes of species respectively regarding their constituents of major proteins amino acids such as Asparagine, Glutamine, Arginine, and Proline. And also to find out the plant family that exhibits the most dominant status for the ingredients of Vicilin genes. Keywords- Codons, Proteins, Bioinformatics, Genomic, Phylogenetic, Hydropathicity, Amino acids.

### Gene sequences reveal global variations in malaria para-

*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.*

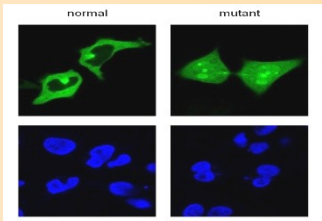
## Recent development in Bioinformatics

Bioinformatics software developed to predict effect of cancer-associated mutations Software analyzes 40,000 proteins per minute.

**Summary:** A new piece of software has been developed that analyses mutations in proteins. These mutations are potential inducers of diseases, such as cancer. The development is free, easy, versatile and, above all, fast bioinformatics application that is capable of analyzing and combining the information from 40,000 proteins within the space of one minute.

Date: June 30, 2016

Source: University of the Basque Country  
[www.sciencedaily.com/releases](http://www.sciencedaily.com/releases)



## Genome of 6,000-year-old barley grains sequenced for first time.

An international team of researchers has succeeded for the first time in sequencing the genome of Chalcolithic barley grains.

This is the oldest plant genome to be reconstructed to date.

The 6,000-year-old seeds were retrieved from Yoram Cave in the southern cliff of Masada fortress in the Judean Desert in Israel, close to the Dead Sea. Genetically, the prehistoric barley is very similar to present-day barley grown in the Southern Levant, supporting the existing hypothesis of barley domestication having occurred in the Upper Jordan Valley.

Source : [www.biologynews.net/archives/bioinformatics](http://www.biologynews.net/archives/bioinformatics)

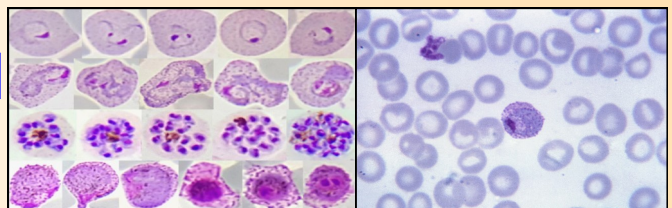


Fig: Red blood cell stages of Plasmodium

Source : [www.biologynews.net/archives/bioinformatics](http://www.biologynews.net/archives/bioinformatics)

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