



SYNTHESIS

Newsletter of Science Technology & Climate Change Department, Govt of Assam

VOL.1, August, 2023

Chandrayaan-3 is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface. It consists of Lander and Rover configuration. It will be launched by LVM3 from SDSC SHAR, Sriharikota. The propulsion module will carry the lander and rover configuration till 100 km lunar orbit. The propulsion module has Spectro-polarimetry of Habitable Planet Earth (SHAPE) payload to study the spectral and Polari metric measurements of Earth from the lunar orbit.



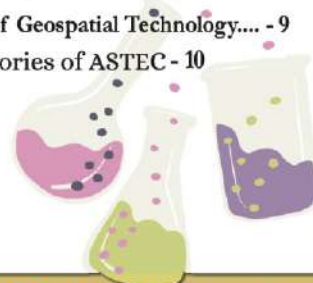
Chandrayaan-3 consists of an indigenous Lander module (LM), Propulsion module (PM) and a Rover with an objective of developing and demonstrating new technologies required for Inter planetary missions. The Lander will have the capability to soft land at a specified lunar site and deploy the Rover which will carry out in-situ chemical analysis of the lunar surface during the course of its mobility. The Lander and the Rover have scientific payloads to carry out experiments on the lunar surface. The main function of PM is to carry the LM from launch vehicle injection till final lunar 100 km circular polar orbit and separate the LM from PM. Apart from this, the Propulsion Module also has one scientific payload as a value addition which will be operated post separation of Lander Module. The launcher identified for Chandrayaan-3 is LVM3 M4 which will place the integrated module in an Elliptic Parking Orbit (EPO) of size ~170 x 36500 km.

The mission objectives of Chandrayaan-3 are:

1. To demonstrate Safe and Soft Landing on Lunar Surface
2. To demonstrate Rover roving on the moon and
3. To conduct in-situ scientific experiments.

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MESSAGES



Sri Keshab Mahanta
Minister
Science, Technology and
Climate Change Department
Govt. of Assam

It gives me immense pleasure to connect with you through this issue of the newsletter "SYNTHESIS". It is an initiative of Science, Technology & Climate Change Department, Govt. of Assam to highlight its activities and success stories to the general public.

As we navigate the challenges posed by climate change, the crucial role of science and technology in finding innovative solutions becomes increasingly evident. Assam, with its diverse landscapes, rich biodiversity, and vibrant communities, is particularly susceptible to the impacts of climate change. However, I firmly believe that with collective efforts, we can transform these challenges into opportunities for growth and development.

In this newsletter, you will find updates on various ongoing projects of the department such as District Science Centres & Planetarium, Science City, R&D, Technology Incubation Centre etc., inspiring stories of individuals making a difference, and information about upcoming events aimed at building a sustainable future for Assam.

Together, we have the power to protect our environment, promote innovation, and create a brighter tomorrow for generations to come. Let us walk hand in hand towards a greener, more resilient Assam.



Smti. Laya Madduri
Secretary
Science, Technology and
Climate Change Department
Govt. of Assam

It gives me immense pleasure in presenting "SYNTHESIS" the newsletter of the Science, Technology and Climate Change Department, Govt. of Assam. Publication of this Newsletter is an initiative to highlight various schemes, Programmes and success stories of the department. The department through its different agencies has been consistently working for the overall development in the field of science communication and popularization, research & development, promotion of innovation, human & institutional capacity building, S&T intervention for socio-economic development, adaptation and mitigation related to climate change, application of space technology, etc. We are working on setting up effective Science, Technology and Innovative ecosystem.

I am pleased that, with revival of SYNTHESIS our department will be able to reach out to the young minds of the state for boosting creativity and scientific temper. "SYNTHESIS" will certainly serve as a beacon light on our path to scientific enlightenment for the state.

I appreciate the ASTEC team for taking up the initiative to publish the newsletter and I hope our young readers will enjoy reading the stories told here.

The Science, Technology and Climate Change Department is relentlessly working through its various organs to bring the benefits of science & technology to all sections of the people of Assam. Its science communication programmes have reached the remotest corners of the state through Aryabhata Science Centres and Children's Science Congress. Its continuous effort for eradicating superstitious beliefs from the society also has been well received.

Presently, the department's major focus is on climate change and creating sustainable scientific infrastructures in different districts. Formulation of Science, Technology and Innovation Policy is also in an advanced stage.

"Synthesis" wants to highlight the programmes and schemes, and the notable successes of the initiatives of the Department. This newsletter will also act as a platform for transaction of scientific knowledge and updates.

The Editorial Board at ASTEC is indebted to the Secretary, Science, Technology and Climate Change Department for her insistence and guidance to revive the newsletter, which will let public to have knowledge and understanding of the efforts of the Department and its various organs.



Dr. Jaideep Baruah
Director
Assam Science Technology and
Environment Council

PATENT INFORMATION CENTRE (PIC)

The Centre was set up in 2003 under the sponsorship of Patent Facilitating Centre (PFC), (TIFAC), DST, Govt. of India and DST, Govt. of Assam with the following objectives :

- To create awareness about IPRs, especially patents, in the state and neighboring region of this centre and enable patent searches using modern search software for the universities, industries, government departments and R&D institutions in the State and around.
- To facilitate universities, industries, government departments and R&D institutions for patenting and searches, GI registration, Copyrights, Industrial design, Trademarks, Electronic circuit copyrights, etc.
- To guide the inventors in respect of patenting their inventions and supporting creators, authors etc. in protecting their work with the appropriate type of IPR.
- To identify the goods of our state to be registered as Geographical Indication.

The Centre has registered many Patents, Designs, Trademarks, Copyrights etc. since its inception till now and sensitized thousands of people in the state about Intellectual Property Rights (IPR) and its benefits.

A recent achievement of the Centre is registering Gamosa of Assam as a Geographical Indication (GI No. 594) certified on 13/12/2022. PIC is the facilitator of the said GI application with Directorate of Handloom & Textiles, Assam being the Proprietor.



ASSAM ENERGY DEVELOPMENT AGENCY (AEDA)

Assam Energy Development Agency (AEDA) under its Research & Development initiative promoting green energy innovation solution, supported a local incubator, Ripam Borooah for development of Reverse Solar Charge Trike Vehicle with a funding of Rs.2.00 Lakhs. The vehicle was developed as a Two-Seater Micro Electric Car which could be a sustainable and new vehicle category for intra-city use both in Private mode or Commercial use like Ride sharing, Ecommerce & Public Car Sharing Platform. The Reverse Solar Charge Trike Vehicle design is a novel idea and the same is applied for Patent. This innovative design also clinched Maruti Suzuki NURTURE Idea Hunt Award 2023 held recently in IIM Calcutta.



SUMMER CAMP

Chief Minister's Climate Resilient Village Fellows at Kohora, Kaziranga.

Assam Science Technology and Environment Council (ASTEC) in collaboration with Aaranyak has conducted a Field Orientation Programme for 44 selected Fellows of the "Chief Minister's Climate Resilient Village Fellowship (CMCRVF)" from 16th-21st July, 2023 at Community Resource Centre, Chandra Sing Rongpi Village, Kohora River Basin, Kohora, Kaziranga. The programme was conducted in two batches tandemly for three days, i.e. 16th-18th July, 2023 for first batch and 19th-21st July, 2023 for second batch. Secretary to the Science, Technology and Climate Change Department, Government of Assam, Smt. Laya Madduri inaugurated the event.

The programme included technical sessions, practical exercises, and interaction with villagers to address climate change challenges. Advisory Committee members, Mentors and Fellows had an interaction session where they were encouraged to work diligently on their projects.

The programme was coordinated by Dr. Jayanta Kumar Sarma and the key resource persons present for this event- Shri P.L.N. Raju, Director, Assam State Space Application Centre (ASSAC), Shri Prasanna Baruah (ASSAC), a panel of Core-Advisory Committee Members – Dr. Partha Jyoti Das, Dr. Sangeeta Barthakur, Mr. Rizwan Uz Zaman, Mentors – Dr. Dhanjit Deka, Dr. Binita Pathak, Dr. Himangshu K. Borah, Dr. Manoj Kr. Phukan and Dr. Nirmali Gogoi,



Smt. Laya Madduri, inspiring fellows to become 'agents of change' in climate adaptation at the grassroots level.

Dr. Manoj Kr. Phukan and Dr. Nirmali Gogoi, Arup Kr. Das (Aaranyak). Other dignitaries present- Dr. Chandra Barooah (Head of Environment Division, ASTEC), Shri Arun Vignesh CS, DFO and Shri Shashidhar Reddy, ACF of Kaziranga National Park & Tiger Reserve and Shri Khargeswar Goswami, Deputy Finance and Accounts Officer, ASTEC.

The CMCRVF Field Orientation Programme provided a transformative learning experience for the fellows, empowering them with essential skills and knowledge to contribute effectively to climate resilience efforts. By building strong connections with rural communities and fostering cross-learning, the CMCRVF continues to make a positive impact in tackling the challenges posed by climate change in vulnerable areas.



SUMMER CAMP

Organised by **ARYABHATTA SCIENCE CENTRES**

A week long summer camp was organized by Aryabhata Science Centres in different districts of Assam from 17th-21st July, 2023 with the aim of promoting STEM (Science, Technology, Engineering, and Mathematics) education and fostering an interest in various scientific disciplines among students in different districts of Assam. The summer camp was conducted in multiple locations across the state and offered a diverse range of activities to enhance student's knowledge and skills. The camp was open to students from various age groups (10-15years), ensuring a wide outreach. Following activity based events were organised in different Aryabhata Science Centres:

1. STEM Exploration :

Hands-On Activities through Science & Mathematics: The STEM Exploration sessions were the core component of the summer camp, offering hands-on activities to engage students in practical learning experiences. These activities covered a wide range of scientific concepts, including physics, chemistry, biology, and mathematics.

2. Space Science & Popular Talk :

The camp also included a special session on space science, where resource persons delivered talks on various topics related to astronomy, space exploration, and the universe. The students were shown celestial bodies by using telescopes.

3. Environmental Science :

Understanding the significance of environmental conservation, a segment of the summer camp was dedicated to environmental science. Students learned about the impact of human activities on the environment and explored sustainable solutions.

4. Design & Fabrication :

The Design & Fabrication workshop aimed to introduce students to the world of engineering and innovation. Students were encouraged to come up with their ideas and build simple models using readily available materials.

5. Career Guidance:

To help students make informed decisions about their future careers, the summer camp included a dedicated career guidance session. Expert career counsellors and professionals from different domains guided students about various career options, skill requirements, and educational pathways.

6. Scientific Film Show :

The camp concluded with an entertaining yet educational scientific film show. The selected films viz. Space exploration by Michael Fincke, Documentary on KalpanaChawla: First Indian Woman Fly to Space, Ripples of hope, Manar Andhar, Puhoroloi (Towards hope) showcased.



Activities of Guwahati Biotech Park.

The Technology Incubation Centre of Guwahati Biotech Park (GBP) is involved with numerous activities related to promotion of entrepreneurship and human resource development in the area of Biotechnology and allied sectors. The key activities for the period of April 2023 to July 2023 are noted below: -

- **Guwahati Biotech Park** celebrated one year completion of the Technology Incubation Centre of Guwahati Biotech Park (GBP) at its permanent campus on 20th June, 2023 where the following activities were conducted- Award Distribution, Onboarding New Incubatees, Inauguration of NIDHI PRAYAS Centre, DST, Inauguration of Packaging Unit and EXPO at GBP.
- **Internship programs :**
GBP is organizing internship/training programs on a regular basis. Total Number of Internship program conducted: 9 and Total number of HR trained: 41
- **Training programs :**
GBP is organizing internship/training programs on a regular basis. Total Number of Training program conducted (April –July2023): 8 and Total number of HR trained: 476
- **Exposure visit :**
To create awareness on entrepreneurship and to offer exposure to the equipment facilities of TIG, GBP; GBP is hosting Exposure visits on a regular basis.
- **Total Number of College/Institute visited :**
9 and Total number of visitors under Exposure visit scheme: 163
- **MoU exchanges :**
Guwahati Biotech Park exchanged MOUs with three distinguished colleges in Assam: Lumding College, Nalbari College, and Birjhora MahavidyalayaBongaiga on 20th June 2023 . This initiative was taken as per the New Education Policy, where student/faculty exchange programs will be conducted and collaborative academic activities for the benefit of both the students and the faculty members.



- **23rd BIG grant writing session 12th July 2023 :**
A grant writing session was organized online jointly with KIIT, TBI on 12th July 2023 for Biotechnology Ignition Grant 23rd Call.
- **IPR workshop on 19th July 2023 :**
National Research Development Corporation (NRDC) jointly organised a IPR workshop with GBP under the RashtriyaBoudhik Sampada Mahotsav on 19th July 2023. It was a great opportunity to learn and share about the importance of intellectual property rights for innovation and development. Speakers were from DSIR, FINER, ASSAC, NLUJA, IPO, NRDC, GBP and ICC who enlightened the participants with their insights and experiences. Representatives from Industries, MSME, farmers, artisans, researchers and academia, students from both colleges and universities were participated.



Activities of Jorhat Science Centre and Planetarium



Outreach Interactive Science Demonstration Lectures:

As a new initiative, the team of JSC&P had organized 10 no.s of Outreach Interactive Science Demonstration Lecture in different rural schools of Jorhat district from 19/4/2023 to 17/5/2023. The basic motive is to promote scientific awareness among the public, specially the students. Students got an wonderful opportunity to learn hands-on scientific experiments & thus making learning more interesting which help them to excel in the future.

World Environment Day 2023:

JSC&P had collaboratively celebrated WED-2023 with Borholla H.S School, Borholla, CRCC, Borholla, Bosa & Ekorani cluster & Innovation Hub, JSC&P on 3rd of June,2023 at Borholla H.S School. A host of activities were arranged on that particular day to mark its importance & make the people aware of keeping the environment green. Such as: Poster & model presentation competition, Students Seminar competition for the school students from classes (VI-XII), along with plantation drive & an eco-friendly procession.



10th Foundation Day celebration

Every year 6th July is celebrated with much gaiety as it is a memorable day for Jorhat Science Centre & Planetarium. On this particular day, JSC&P was inaugurated in 2013 & opened for the public to discover the wonders of science, & this year it's the 10th Foundation Day celebration of JSC&P. This year JSC&P organized a host of programmes such as 10th foundation day lecture delivered by Dr Alok Kr. Borgohain, Chancellor of Girijananda Chodhury University, Guwahati, Science Model presentation exhibition, Development of a new scientific show entitled "Super Cool Science Show" using liquid N₂. In addition to this, there is also a ceremonial release of "Annual Activity Report-2022-2023"





Activities of Guwahati Planetarium

Guwahati Planetarium, the first and the biggest hub for Astronomy and Space Science within the North – East India, is a very unique institution of its kind. For the period of last 29 years since its inception in 1994, Guwahati Planetarium, as a public utility service, has always been a center place of attraction for the whole mass of tourists and visitors thronging to this region of the country. Guwahati Planetarium is constantly putting its warm hearted efforts to spread out the domain of Astronomy & Space Science down to the grass root level of the Society. The activities of Guwahati Planetarium has touched the lives and livelihoods of the millions of this region through its numerous kinds of in-house as well as outdoor activities outreaching the farthest remote corners of the State. This would indeed be able to give direct benefit to the fields of Science Education & Research, Tourism, etc., in the State, will also help in removing age old myths, misconceptions and superstitious beliefs, thereby building a scientific temperament among the general mass of people of the Society, especially, the Student, Teacher and Children communities across the State. Since the year 2021 different facilities viz. Astronomy Gallery, Virtual Reality Zone, 3D Theatre Show have been added in addition to regular Planetarium show of the Guwahati Planetarium.

Recent Activities of Guwahati Planetarium :

Guwahati Planetarium has conducted regular demonstration of Virtual Reality (VR) Zone and Astronomy Gallery to its thousands of regular visitors, and also organized a State Level "Mass Awareness Workshop-cum-Hands on Training on Basic Observational Astronomy through Naked Eye and Telescope covering all the districts of Assam", covering participants from all the districts of Assam during 3rd to 5th June 2023. The activities were highly demanded, following its legacy, extent, activities and, more importantly, scientific mass gatherings within the society. State Level Mass Awareness Workshop-cum-Hands on Training will definitely help the common people in understanding the science behind these Celestial Phenomena and encourage the Students, Children and General Public to take the opportunity to witness these phenomena by safe means and thus to create a scientific temperament among the general mass of the society. A 3D Show Theatre inaugurated by the Hon'ble Minister Science & Technology, Sri Keshab Mahanta in the presence of the Secretary to the Govt. of Assam Smti Laya Madhuri ,Science & Technology Department and the Director of Guwahati Planetarium Smti. Kimnei Changsan on 30th November,2022.



Inauguration of the 3-D Theatre on 30th November 2022



Training Program at Guwahati Planetarium during 3rd-5th June ,2023



Virtual Reality (VR) Zone and Astronomy Gallery



Sky Observation Program



Huge rush of visitors at the Guwahati Planetarium during the month of July, 2023



Assam CM Himanta Biswa Sarma chairs meeting

Pratidin Time

Updated on : 21 May 2023, 8:31 pm

Utilization of Geospatial Technology for Monitoring & Planning of Educational Institutions in Assam

P.L.N. Raju,Utpal Sarma, Runjun Baruah, Debashish Baruah, Kunal Borah, Pradyut Kashyap, Kaustabh Baruah, Suraj Sarmah and Amlan Saikia

Hon'ble Chief Minister of Assam has asked Assam State Space Application Centre to develop a Decision Support System Dashboard for Education Department using Geospatial Technologies for following two specific areas :

1. Site Suitability Analysis for 100 Proposed Tea Garden Model High Schools.
 2. Site Suitability Analysis for 21 Proposed Model Degree Colleges.
- The basic objectives were as follows:

- i) Mapping of Existing Tea Garden Model High School (TGMHS) (i.e. 118 nos.) and Existing Non Model Schools (i.e. 109 nos.). Distances of these schools from 100 nos. of Proposed Model School (i.e. Considering a buffer of 5Km around Proposed Model School Location) and to identify suitable Proposed School Location for Recommendation considering a criteria that there is not a single Model High School within 5Km buffer of Proposed Location.
- ii) Mapping of existing locations of following types of colleges (i.e. Provincialised College 321 nos., Government College 5 nos., Functional Government Model College 11 nos., Government Model Colleges (to be commissioned) 8 nos., Government Women Model College under NIDA 9 nos., Proposed 10 nos. of Colleges under NESID) . Transfer of locations of 21 proposed Government Colleges. To identify number of existing colleges as above within 25Km buffer of Proposed 21 Locations. To prioritise Proposed Colleges (out of 21) based on CPI (i.e Location which falls within range between 0-10 & 10-20) and having minimum number of colleges (say less than 5 nos. of existing college) within 25 Km buffer.
- iii) Development of a WEB GIS portal

The location information of 100 proposed Tea Garden Model Schools were shared by PWRD, GoA and for 21 proposed Government Colleges were shared by RUSA. The above locations are integrated with District Administrative boundary and Google Image. A Web GIS portal using ARC/ GIS Enterprise services was developed which are having the following functionalities and tools for necessary query as well as decision making.

- (1) District Filter
- (2) LAC Filter
- (3) Legend Information
- (4) Universal Search Bar
- (5) Buffering Tools
- (6) Proximity analysis based on buffer
- (7) Distance Measurement Tools
- (8) Tabular data extraction in .csv format

To further illustrate the study, Figure 1 (Photo of review meeting by HCM for new schools and colleges, tracked using GIS), Figure 2 (Web portal developed for the Tea Garden Model Schools) and Figure 3 (Gap analysis for each 25 x 25 KM grid for existing colleges in Assam, to help in finding locations for new proposed colleges) may be referred for more details.

Based on stated objectives, GIS analysis was done and offered the following recommendations for the proposed TGMHS and model colleges:

- 1) For TGMHS based on 5km buffer analysis it is observed that out of 100 Proposed TG Model Schools, 21 schools may be recommended to construct. Moreover, additional 7 numbers of Proposed TGMHS may also be considered which are falling within the range of 4.5 Km to 5 Km from the Existing Model and Non-Model Schools. Hence in total 28 no of proposed locations for TGMHS were recommended.
 - 2) In case of proposed Model Degree Colleges based on 25 KM of buffer analysis were carried out for all proposed 21 locations and results were tabulated along with district CPI values. 15 ideal locations are to be finalized by Education Department considering the output of buffer analysis, CPI for districts as well as considering other significant criteria as applicable.
- Application of Geospatial Technology is found to be an effective tool for Identification, Monitoring and Decision making.



Figure 2: Web portal developed for the Tea Garden Model Schools (existing and proposed) with GIS analysis functionality for finding new locations for the proposed Model Schools. Weblink: <https://bit.ly/tgsmmap>, username: assacmaps , password: assacmaps@123

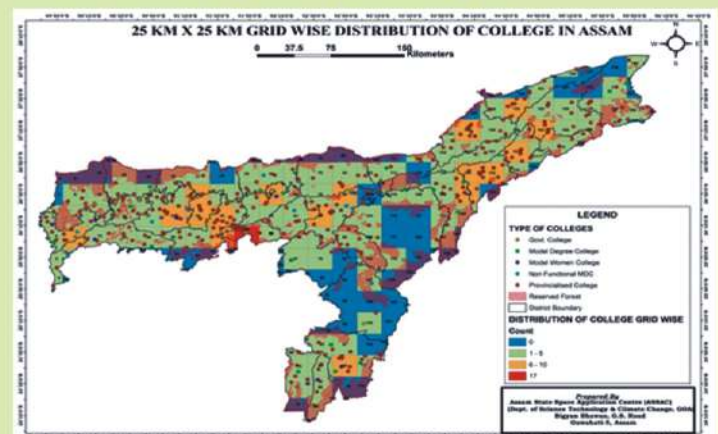


Figure 3: Gap analysis for each 25 x 25 KM grid for existing colleges in Assam, to help in finding locations for new proposed colleges

Technology development of vinegar production from traditional fruits Leteku (*Baccaurea motleyana*), Kordoi (*Averrhoa carambola*), Poniyal (*Flacourtia jangomas*) of Assam.

P. I. Prof. Utpal Bora,
Indian Institute of Technology Guwahati, North Guwahati-781039

Korodoi (Star fruit) Fruit wine production from Korodoi Assam's tropical and subtropical climate supports the growth of various fruit plants, including Kordoi, Leteku, and Poniol. However, These fruits are underutilized and generally get wasted due to their lack of economic value and market appeal. As these seasonal fruits contain essential nutrients like gallic acid, chlorogenic acid, caffeic acid, syringic acid, ferulic acid, and quercetin, which can help lower chronic degenerative diseases and manage weight, they are of utmost importance. The project focuses on developing fruit vinegar that retains their unique flavor, aroma, and beneficial compounds. Fruit vinegar aids digestion, metabolism of carbohydrates, provides



Korodoi (Star fruit)



Fruit wine production
from Korodoi

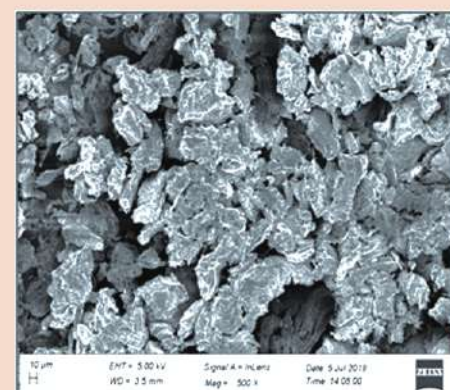
antioxidants like polyphenols, and contains beneficial bacteria that contribute to a balanced gut microbiome. The fermentation process is optimized for maximum yield and high quality, with fruit wine produced using yeast for fermentation. The physicochemical and sensory characteristics of the produced fruit vinegar will be thoroughly evaluated.

Defluorination of water by banana (*Musa sapientum*) peel

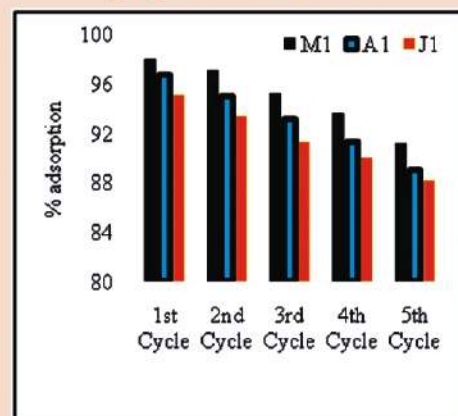
P.I.: Dr. Susmita Sen Gupta,
Associate Professor in Chemistry, B N College, Dhubri-783324
Co-P.I.: Dr. Dhruba Chakraborty,
Principal, B N College, Dhubri-783324

The study aimed to use waste banana peel as a potential adsorbent for removing fluoride from water. Three local banana peels were prepared from Atia kol, Jahaji kol, and Malbhog kol, and characterized using surface area measurements, IR, SEM, and EDX. The bio-adsorbents had an irregular shape and micro-rough texture, facilitating the adsorption process. Proteins and polysaccharides were observed inside the biomass cell cover. Adsorption parameters, such as pH, interaction time, bio-adsorbent dose, initial fluoride concentration, and temperature, were studied. The adsorption processes were more preferably followed by the second-order rate (rate constant: 4.7×10^{-3} to $5.9 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$) where the experimental values of F⁻ ion adsorbed per unit of bio-adsorbent were very much close to theoretical values. The bio-adsorbents prepared from banana peel showed very good Langmuir adsorption capacities, Malbhog kol (14.3-16.3 mg g⁻¹), Atia kol (16.3-18.6 mg g⁻¹) and Jahaji kol (16.8-20.4 mg g⁻¹) from the aqueous solution of Fluoride.

The regeneration study revealed that all the adsorbents can be a potential, efficient and cost-effective adsorbent for fluoride (F⁻) ion removal because of attractive regeneration performance. Thus, the study successfully converts the waste banana peel into an cost-effective, efficient fluoride (F⁻) ion removing bio-adsorbent which has a potential for industrial scale-up.



SEM structure of banana peel
prepared from atia ka



Reusability study of the adsorbent