



# Annual Report

2022- 2023



## BCSIR Chattogram Laboratories

P. O. - Chattogram Cantonment, Chattogram-4220, Bangladesh

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## Message from the Chairman

It gives me immense pleasure to know that the BCSIR Chattogram Laboratories, a leading research unit of Bangladesh Council of Scientific and Industrial Research (BCSIR) is going to publish its annual report for the fiscal year 2022–2023. This report is an evidence of their year-long activities. To diversify the research activities by exploring the natural resources particularly, medicinal and aromatic plants “National Drug Research and Development Institute (NDRDI)” was established in Chattogram in 1965. However, in 1973 NDRDI was renamed as BCSIR Chattogram Laboratories and functioning as a multi-disciplinary research unit.

At the beginning of my message, I express heartiest tribute to the greatest Bengali of all time, the poet of politics, the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, for whom we got the independency. I express my profound gratitude to our Honorable visionary leader, H.E. Sheikh Hasina for becoming the Prime Minister of Bangladesh for the 5th time.

BCSIR Chattogram Laboratories, although since its commencement is working to explore research on natural products chemistry but this year it has added a milestone to its credit. This unit has entered into the race of hydrogen production and has made us proud. Being the Chairman of BCSIR, I feel honored to be associated with such prestigious episodes. I extend my heartfelt gratitude to our Honorable Minister Architect Yeafesh Osman, Ministry of Science and Technology for his continuous support in materializing the ADP project on hydrogen energy. I also thank Mr. Md. Ali Hossain, Secretary, Ministry of Science and Technology, and his entire team for their untiring support and guidance for the development of this research unit.

The performance of BCSIR Chattogram Laboratories is praiseworthy. This unit not only accomplishes research and development (R&D) works but other activities e.g. analytical services, thesis supervision, and consultancy services also. In particular, their tremendous support in analytical services has contributed a lot to glorify the activities of this unit. Furthermore in tune with the government Smart Bangladesh initiative, SDGs, and 4th industrial revolution (4IR) programs, the unit is also progressing a lot.

I appreciate the dedication and effort of the Director of BCSIR Chattogram Laboratories along with all his workforces for their continuous hard work in flourishing this unit.

Joy Bangla! Joy Bangabandhu! May Bangladesh live long!

(Professor Dr. Md. Aftab Ali Shaikh)  
Chairman, BCSIR





## Message from the Director

It is my immense pleasure to inform you that the Annual Report 2022-2023 of BCSIR Chattogram Laboratories is finally ready for publication. The annual report will cover the overall activities of Chattogram Laboratories such as R&D activities, achievements of scientists, participatory cohorts in different conferences, workshop, training, research guidance to different university thesis students during 2022-2023.

A number of research divisions continuously working for ameliorating research and development activities in Bangladesh. All scientists, in a holistic way is providing a great contribution toward, a plethora of innovation including medicinal and aromatic plant research and conservation, basic and applied microbiological and chemical research, nanoparticles and pharmacological research and renewable hydrogen energy. A total number of 24 research articles were published in reputed international and national journals. In a multidisciplinary manner, at least 1000 analytical services of industrial and common interests were performed in a variety of research division by the concerned scientists. Scientists supervised 20 thesis students of various universities and arranged a science and industrial fair and a stakeholder meeting. Scientists took part of wide range of trainings, seminars and conferences. Scientists also provided trainings of other institution's scientists of BCSIR.

I would express my deepest gratitude to the Professor Dr. Md. Aftab Ali Shaikh, Chairman of BCSIR for his continuous encouragements and guidance for publishing this annual report. We sincerely acknowledge his keen interest in the research and development activities of BCSIR Chattogram Laboratories. I would also like to thank members of editorial committee, all the scientists, officers and staffs of this Laboratory for their support and kind cooperation.

**(Dr. Barun Kanti Saha)**  
Director (Additional Charge)  
BCSIR Chattogram Laboratories



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## Annual Report 2022-2023

### BCSIR Chattogram Laboratories

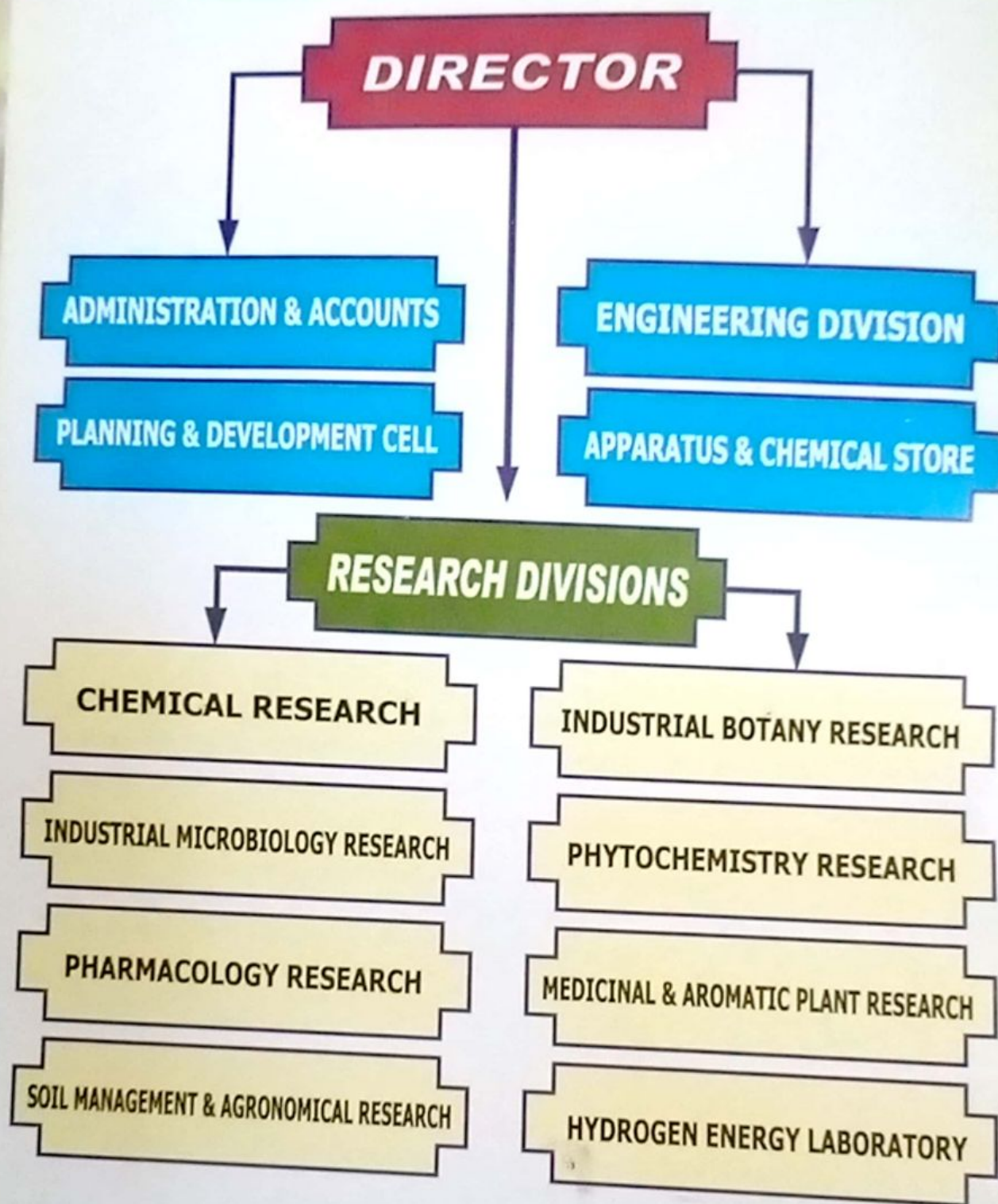
BCSIR Chattogram Laboratories was established in 1965 under the name "Natural Drug Research and Development Institute (NDRDI)", which was later renamed as BCSIR Chattogram Laboratories in 1973. It is a multi-disciplinary unit of Bangladesh Council of Scientific and Industrial Research (BCSIR) under the Ministry of Science and Technology. It is governed by Bangladesh Council of Scientific and Industrial Research (BCSIR) according to the Act 2013 of the Government of Bangladesh.

This research organization is headed by a Director and it consists of eight research division viz. Chemical Research Division, Medicinal & Aromatic Plant Research Division, Pharmacology Research Division, Industrial Microbiology Research Division, Phytochemistry Research Division, Soil Management and Agronomical Research Division, Industrial Botany Research Division and Hydrogen Energy Laboratory. The main activities of this research unit are included isolation, identification of active compounds of medicinal plants and isolation of different ingredients of essential oil extracted from aromatic plants, toxicity test of various products such as foods, drugs, cosmetics etc using animal model and development of different types of herbal products such as food, food supplements, and cosmetic products. Moreover, the activities of the Hydrogen Energy Laboratory are to produce hydrogen using an economic hydrogen production process, developing solid state hydrogen storage materials to store hydrogen safely and hydrogen fuel cell to produce power for stationary application.

The mission of this laboratories is to carry out, promote and guide scientific, industrial and technological research on various disciplines of pure and applied science that optimize the economic, environmental and social benefits for the people of Bangladesh.



## STRUCTURAL ARRANGEMENT OF BCSIR CHATTOGRAM LABORATORIES







## CITIZEN CHARTER

BCSIR Chattogram Laboratories provides the following services:

- Scientists of various research divisions conduct their approved R & D project and submit the research progress report on quarter yearly half yearly/ annual basis as well as publish research outputs in national and international journals.
- This research organization provides technical support to entrepreneurs for the industrial development of the country by leasing out industrial process development by the scientists of this laboratory.
- BCSIR Chattogram Laboratories renders analytical service through assuring quality checking of the products of various government (Custom house, BSTI etc.), autonomous (Port Authority, WASA etc.) and private companies and helps the government earning revenues.
- It conducts research activities especially on medicinal & aromatic plants as well as plays important role on cultivation, conservation, documentation, research and promotion of indigenous medicinal and aromatic plants.
- The scientists of this research organization supervise M. Sc., M. Phil & Ph. D students of different universities to enhance skilled human resources of the country.
- This research organization arranges training, conference, seminar, symposiums, workshops etc. regarding scientific research to create public awareness on various national issues.





## RESEARCH & DEVELOPMENT (R & D) ACTIVITIES

### Development of Portable Detection Kits for Ammonia, Iron and Sulfide Test in Water

Muhammad Abu Bakar, SSO (PL); A. J. M. Morshed, SSO,  
Sujan Kanti Das, SSO; Saidur Rahman, SSO and Dr. Mohammad Mostafa, CSO

Water testing kits are simple tools for determining the quality of water in indoor and outdoor place. Sometimes it is needed to check water quality instantly. For instance, fish farmers have to check the ammonia and oxygen levels in their ponds or fish tanks water regularly because fish become very weak or die due to the presence of ammonia and low level of oxygen. Some fish farmers use kits to analyze their water and get the results in a short time. As a result, they can immediately take action to control abnormalities in water quality. Many of them take analysis services from testing labs, but it is time-consuming and costly.

The safest level of ammonia in a fish tank should be 0 ppm. Ammonia level in the fish tank is considered as safe: from 0.001 to 0.02 mg/L, alert: from 0.02 to 0.05 mg/L, warning: from 0.05 to 0.2 mg/L, toxic: from 0.2 to 0.5 mg/L, dead: more than 0.5 mg/L.

Iron is an important test for monitoring natural and drinking waters. In industry, iron causes corrosion of plants and equipment. For corrosion control, it is needed to eliminate iron in water and waste water. Hydrogen sulfide is produced if the sulphur compound is reduced by the bacterial strain. This gas causes also severe corrosion of equipment, in particular piping. The safe level of iron, sulfide, and others contaminants in water should be maintained for our health. Testing kits are an easy solution to find these problems for everybody, especially in rural areas. A rapid test kit can support governments and communities to scale up water quality testing facilities. This will provide more knowledge about water quality. As a result, we can improve water quality and treat it especially in countries like Bangladesh, where water quality testing infrastructure is limited. So, the main goal of R & D is to resolve the problem and reduce the amount of foreign currency spent.

#### Objectives

- To seek an easy-to-use detection method that can determine ammonia, iron and sulfide in water
- To develop cost effective Water Quality Detection Kit (WQDK)

#### Work Progress

Ammonia and iron test kits have been developed and are following the shelf life. Our other sulfide test kit development is now under processing.





### A few features of the R & D project



Figure : Ammonia color intensity at different concentrations



Figure : Variation of color intensity

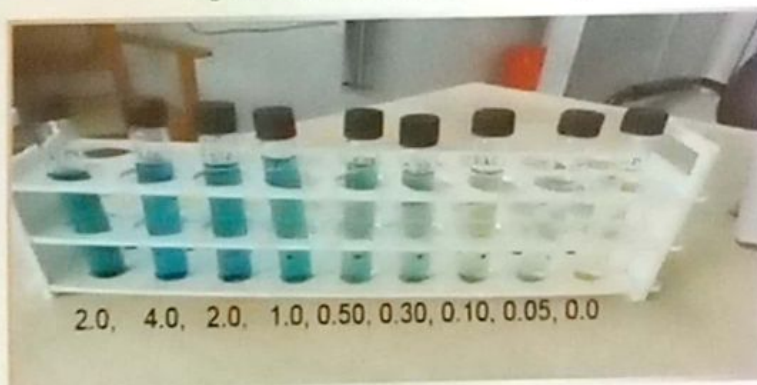


Figure : Our Targeted Sensitivity Scale

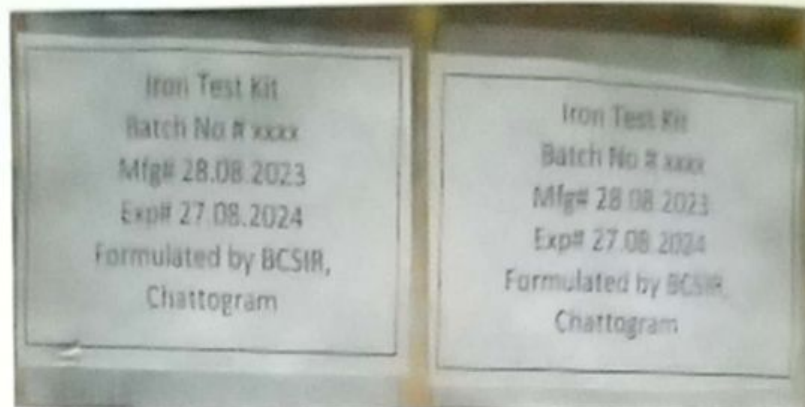


Figure : Different Iron concentrations' color intensity





Ammonia Test Kit



Iron Test Kit

Figure : Formulated test Kit

### Effects of silver nanoparticles on growth, microbial population and arsenic uptake of leguminous plants

Md. Saidur Rahman, SSO(PL); Prof. Dr. Md. Aftab Ali Shaikh, (Chairman, BCSIR); Dr. Saiful Islam, PSO; Md. Abu Bakar, SSO; Nemai Chandra Nandi, PSO and Prof. Dr. Mohammad Zabed Hossain (Dept. of Botany, University of Dhaka),

Nanotechnology has been an interesting field of research with widespread application and has gained much importance over the last two decades particularly in agricultural system. Different nanoparticles (NPs) are used in farming system for different purposes. Among them silver nanoparticles (AgNPs) have recently gained increasing interests because of the potential applications for plant diseases management. AgNPs display a strong inhibitory activity to microorganisms and subsequently reduce infection and increase plant growth and development. In comparison to other NPs, AgNPs is considered the most capable nanomaterials for fungicidal, bactericidal, and viricidal properties consisting to its wide-ranging effectiveness, low toxicity, ease of use, charge capacity, high surface-to-volume ratios, crystallographic structure, and adaptability to several substrates. In agricultural sector the potential of nanotechnology is huge, but a few issues such as risk assessment issues as well as lowering costs and increasing the production process scale are still to be addressed.

Arsenic (As) is considered a non-essential metal, which negatively effects plants. Millions of people in Asia are affected by consumption of As-contaminated drinking water and food. Therefore, it is necessary to maintain the intracellular level of As to avoid toxicity in plants. The effect of As contamination in plants has been studied at the physiological, biochemical and molecular levels. Due to the high surface area and surface area-to-volume ratio of NPs, they have been considered very effective in removing metal ion pollutants from soil compared to bulk-size particles of the same minerals. Tagging of NPs to agrochemicals or with other substances could reduce the damage in plants and balance the proper minerals into the environment.





A few works have been done on the interaction of NPs and As mitigation in plants. Iron oxide nanoparticles ( $\text{Fe}_3\text{O}_4\text{NPs}$ ) used in reducing the toxicity of As in Indian mustard (*Brassica juncea*) plant. Zinc oxide nanoparticles ( $\text{ZnONPs}$ ) relieved As stress in rice (*Oryza sativa*) germination and early seedling growth.  $\text{CuONPs}$  also decreased As accumulation in dehusked grains of Rice (*Oryza sativa japonica* 'Koshihikari'). As per available reported articles, till now no systemic research conducted for mitigation of As by using AgNPs in plants.

Leguminous plants are a valued crop in Bangladesh and rich source of protein, vitamins, minerals and fiber food for an expanding world and national population. Million tons of pulses are needed to fulfill the demand of world markets annually. In addition, the grain legume crop has potential health benefits, which include reducing cardiovascular, diabetic, and cancer risks. Considering the importance crop we selected legume plants as an ideal plant to conduct the research.

### Objectives

The main objective of the propose research is to explore the use of AgNPs in reducing As toxicity in soil as well as in plants. The specific objectives of this study will to determine the effects of AgNPs on the (a) growth parameters and yield of leguminous plants, (b) microbial (*Rhizobium* bacteria and *Arbuscular mycorrhizal* fungi) population (c) arsenic uptake by leguminous plants and its translocation to the plants parts.

### Work progress

One paper was published and other extensive work is going on.

### Development of immunity boosting bread using locally available indigenous plants' sources

Maksuda Begum, SSO (PL); Dr. Saiful Islam, PSO; Md. Saidur Rahman, SSO, Muhammad Abu Bakar, SSO; A. J. M. Morshed, SSO; Amena Kibria, SO and Md. Mahfuzur Rahman, SO

Functional food term was first used in Japan at 1980s. These foods provide important nutrients that have physiological benefits and also reduce the risk of chronic disease by adding new ingredients. Indigenous plants have great medicinal potentials. They are using worldwide for the management of several ailments and as nutritional supplements also. But in Bangladesh, research on functional foods and indigenous medicinal plants are lacking. Through this research, immunity boosting functional foods will be developed from locally available indigenous medicinal and aromatic plants. These immune based functional foods could be cost effective and will consume as a part of regular diet.

### Objectives

- To develop Functional foods for positive effect on health by adding new ingredients from indigenous plants as a part of regular diet.
- To reduce the risk of chronic diseases by consuming these types of foods.





### Work Progress

Sample collection and extraction have done. Evaluation of nutritional value of sample extract and formulation of product are ongoing.



### Mapping the ecosystem characteristics and nutritional quality of fish from two riverine ecosystems in Bangladesh

Md. Samrat Mohay Menul Islam, SO(PL); Md. Rezaul Karim, PSO; Dr. Md. Rakibul Hassan, SSO; Debabrata Karmakar, SO; Dr. Mohammad Moniruzzaman, PSO; Dr. Mohammad Mostafa, CSO

It is particularly evident in the riverine ecosystems which are rich in biodiversity and provides crucial fisheries resources. The rivers change longitudinally from fresh water ecosystem to dynamic estuarine ecosystem with moderate salinity, hence, changes the biological communities over space and time. In addition to natural changes, anthropogenic inputs on the rivers also vary greatly along the length of the rivers. Together, the natural and anthropogenic variables affect the ecosystem productivity and quality of the fisheries products obtained from the rivers. For instance, the community composition of phytoplankton and zooplankton in turn affects the species composition and their distribution through food web mechanisms (Koenraad et. al., 2003). On the other hand, fish species varies widely in their nutritional quality based on





the environmental they are living in. Moreover, the risk associated with consumption of fish from different parts of the riverine course differ as the level of contamination and community composition changes (Ref, multiple from Bangladesh). Therefore, in a sustainable and ecosystem-based fisheries management approach, the conventional fisheries management should be complemented with complete understanding of the relevant ecosystem. To understanding the ecosystem we should consider plankton composition, nutrient concentrations, physico-chemical characteristics, fish fatty acid as indicator of nutritional quality, heavy metal and bacterial as indicator of pollution. Riverine fisheries in Bangladesh contributes 7.4 % of total fish landings in the country (DoF, 2020). Among the hundreds of rivers, the Padma-Meghna, the Tetulia, the Baleswari and other major rivers are the major contributors. Tetulia river a flow of the lower Meghna river. Originating from the Meghna at north of Bhola district, the river flows over Tetulia, Nimdi, Kalaia and Purbamunia to fall into the Bay of Bengal at Rangopaldi of Galachipa upazila as the Buragouranga. The total length of the river is about 84 km and the average width is 6 km. The Baleswari River is located in Bangladesh, forming part of the eastern border of Bagerhat district and the western border of Barguna district. It borders on the east the largest mangrove forest in the world. In the Ganges-Brahmaputra delta, the Bangladesh part of which is set aside as the Sundarbans reserve forest. The Baleswar river flows south into the Haringhata river,

which flows into the Bay of Bengal. These rivers are habitats to diverse fish species which provide the animal protein and other vital nutrients to people all over the country. On a particular note, these rivers are widely known as the spawning grounds of the anadromous fish species Hilsa (*Tenualosa* spp.), which is the single most contributing species in the country with 12% of total inland fish capture (DoF, 2020). In order to maintain a sustainable fishery yield from these riverine habitats, comprehensive monitoring and regulation of the ecosystem health of these rivers are of immense importance. Although the most parts of these river systems are managed as two month long temporal no-take fish sanctuaries (DoF, 2020), there is no systematic and comprehensive management practice to monitoring the ecosystem health of fisheries resources and their environment. Raknuzzaman et. al., 2022 has reported presence of heavy metal in Hilsa from coastal regions of Bangladesh and Mohajira et. al., 2019 has compared hilsa Barisal, Bhola and Cox's Bazar hilsa compared to Patuakhali, Chandpur and Shariatpur Hilsa. Iqbal et al., 2017 has explored phytoplankton communities from the coastal waters of Bangladesh and on the other hand few studies have reported nutritional quality, presence of pollutants and phytoplankton community structure. However, these studies are mostly incomparable and incomplete due to their variable methodologies, lack of scientific rigor, limitation in sampling and data representation, etc. In this context, a complete mapping of major ecosystem parameters and nutritional qualities of fish species over space and time can provide a complete picture of the existing scenario. While it is imperative to have such a ecological mapping of all major rivers, the ecosystem characteristics and fish nutritional qualities of the Tetulia and the Baleswar River are largely unreported. Therefore, this study aims to assess the aquatic ecosystem and fish nutritional composition of Tetulia and Baleswar rivers. The findings of this study can provide valuable and ready to use information to the researchers, academicians and policy makers, hence, help in establishing appropriate fisheries management practice.

### Objectives

- To determine the physicochemical parameters of water column (Temperature, salinity, TSS, pH, DO) over space and time.
- To estimate the total chlorophyll concentration, phytoplankton load.
- To measure nutrient composition of water column over space & time.
- Fatty acid profiling of fishes over space and time





### Work Progress

Physico-chemical parameters of Tentulia river

Station	Secchi Depth	Depth	Temperature	Salinity	TDS/ppt	DO	pH	Filter volume
7-1	30cm	0.0 m	30.3	0.08	0.084	5.02	7.67	200mL filter
7-2		1.0m	29.7	0.08	0.084	5.16	7.68	200mL filter
7-3		3.0 m	29.6	0.08	0.084	5.1	7.69	200mL filter
6-1	30cm	0.0 m	30.1	0.08	0.83	5.09	7.4	200mL filter
6-2		1.0 m	30.06	0.08	0.83	4.92	7.68	200mL filter
6-3		3.0 m	29.82	0.08	0.83	5.08	7.68	200mL filter
5-1	25cm	0.0 m	29.92	0.09	0.91	5.07	7.81	200mL filter
5-2		1.0 m	30.27	0.09	0.91	5.2	7.89	200mL filter
5-3		2.0 m	30.7	0.09	0.09	5.1	7.83	200mL filter
4-1	25cm	0 m	30.86	0.09	0.089	5	8	200mL filter
4-2		1.0 m	30.16	0.09	0.088	5	7.87	200mL filter
4-3		3.0 m	30.13	0.09	0.087	4.88	7.83	200mL filter
3-1	25cm	0.0 m	30.53	0.05	0.049	4.8	7.9	200mL filter
3-2		0.75 m	30.16	0.05	0.048	5.1	7.87	200mL filter
3-3		2.25 m	30.12	0.01	0.009	5.28	7.85	200mL filter
2-1	25cm	0.0 m	31.72	0.13	0.124	4.76	7.91	200mL filter
2-2		0.75 m	30.8	0.14	0.137	5.15	7.9	200mL filter
2-3		2.25 m	30.52	0.089	0.09	5.54	7.91	200mL filter
1-1	20cm	0.0 m	31.31	0.4	0.38	5.06	7.9	200mL filter
1-2		0.75 m	30.68	0.35	0.34	5	7.92	200mL filter
1-3		2.25 m	30.58	0.55	0.48	5.2	7.9	200mL filter

### Physico-chemical parameters of Baleswar River:

Station	Secchi Depth	Depth	Temperature	Salinity	TDS	DO	pH	Filter volume
7-1	0.5	0.0 m	30.1	0.36	376	4	7.8	200mL filter
7-2		1.5 m	30.3	0.3	266	3.17	7.85	200mL filter
7-3		5.0 m	30.28	0.34	353	3.5	7.89	200mL filter
6-1	0.25	0.0 m	30.34	1.93	1850	3.3	7.75	200mL filter
6-2		1.0 m	30.12	1.02	1008	3.4	7.82	200mL filter
6-3		5.0 m	30.21	2.02	1933	3.45	7.82	200mL filter
5-1	0.5	0.0 m	30.5	4.13	3780	3.43	7.7	200mL filter
5-2		1.5 m	30.16	5.28	4741	3.5	7.98	200mL filter
5-3		5.0 m	29.96	7.56	6613	3.4	7.97	200mL filter

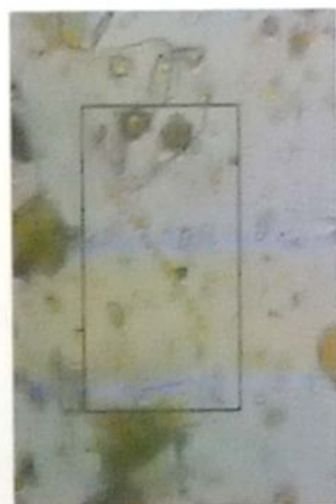




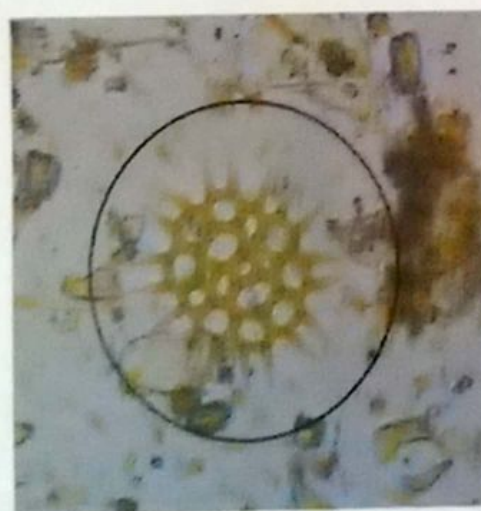
4-1	0.3	0 m	30.39	9.04	7812	3.4	8.05	200mL filter
4-2		1.0 m	30.25	9.18	7913	3	7.53	200mL filter
4-3		3.0 m	30.03	9.68	8312	3.23	7.95	200mL filter
3-1	0.5	0.0 m	30.17	9.79	8401	3.25	8.05	200mL filter
3-2		1.5 m	30.05	10.45	8916	3.42	7.95	200mL filter
3-3		5.0 m	30.02	10.61	9040	3.33	8.04	200mL filter
3-4		10.0 m	30.06	10.74	9140	3.8	8.08	200mL filter
2-1	0.75	0.0 m	30.17	10.46	8930	3.51	8.06	200mL filter
2-2		2.5 m	30.15	10.7	9105	3.58	8.07	200mL filter
2-3		6.0 m	29.99	11.25	9543	3.63	8.05	200mL filter
1-1	0.75	0.0 m	30.09	10.51	8958	3.36	8.07	200mL filter
1-2		2.5 m	29.95	11.68	9810	3.5	8.07	200mL filter
1-3		6.0 m	29.81	11.8	8880	3.6	8	200mL filter



*Closterium sps*



*Skeletonima sps*



*P. simplex*



*Melosira sps*





## Anti-diarrhoeal evaluation of Diterpene Lactones and Flavones from *Dioscorea bulbifera* extract

Md. Ashrafur Islam, SO, Dr. Sreebashi Chandra Bhattacharjee, PSO, Rasheda Akter, SSO, Md. Saddam Hossain, SO and Fahima Farhana, SO

*Dioscorea bulbifera* (commonly known as the Ban Alu, air potato, air yam is a species of true yam in the yam family, Dioscoreaceae). The tubers of *Dioscorea bulbifera* (Air potato) has been used as a folk remedy to treat ulcers, urinary discharge, diarrhoea, dysentery etc. Tuber contains steroidal saponins, diosgenin, Diterpene Lactones, Flavones, norditerpene etc. These phytochemical components have antimicrobial properties. Each year diarrhoea kills around 5,25,000 children in world and in Bangladesh about 45,000 under five. Rotavirus, *Escherichia coli*, *Shigella*, *Salmonella*, *Staphylococcus aureus* etc are major pathogens that cause diarrhoea. Generally, we use different antibiotics such as tetracycline, ciprofloxacin, amoxycillin, doxycycline, metronidazole which are very costly & it kills beneficial gut and mucosal micro-organism of our body. So if we use *Dioscorea bulbifera* as diarrheal medicine, it has no side effect on our body. Since *Dioscorea bulbifera* contains significant amounts of phytochemicals, antidiarrheal properties so it can be exploited as a potential source for nutrient food and herbal remedies for various diseases.

### Objectives

- To isolate Diterpene Lactones and Flavones from *Dioscorea bulbifera* extract.
- To evaluate anti-diarrhoeal activity of Diterpene Lactones and Flavones.
- To develop anti-diarrhoeal preparation from *Dioscorea bulbifera* extract.

### Work Progress

The preparation of herbal extract has been completed. An anti-diarrhea test has also been conducted. One paper is going to be ready for publishing.

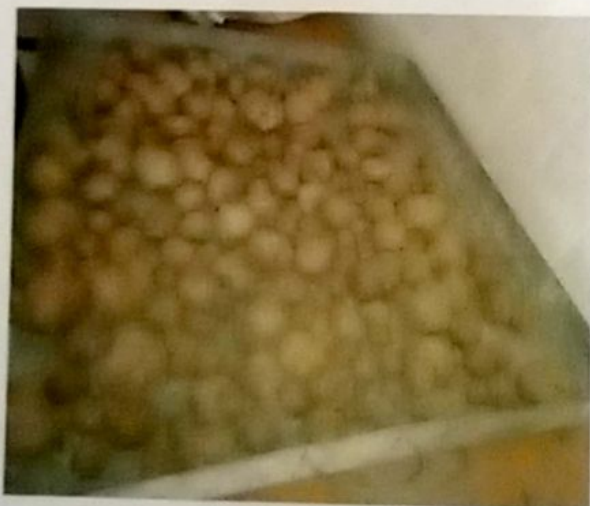


Fig. *Dioscorea bulbifera*



Fig. Solvent Extraction of *Dioscorea bulbifera*





## Molecular Characterization of multidrug resistant *E. coli* and effectiveness of essential oil and fungal secondary metabolites against *E. coli* isolates

Dr. Saiful Islam, PSO (PL); Rajib Sarkar, SSO; Saddam Hossain, SO; Farjana Showline Chaity, SO; Dr. Md. Salim Khan, CSO

Antimicrobial resistance has been emerged as a serious public health problem, increasing a considerable risk to human being. The irrational use of antibiotics results into evolution of new resistant bacteria which is more dreadful and lethal than the previous strain. When the bacteria become resistant to three or more antibiotic classes, then that condition is called multidrug resistance. *Escherichia coli*, a species from Enterobacteriaceae group is the causative agent of various diseases categorized to diarrheal diseases, peritonitis, colitis, bacteremia, infant mortality, and urinary tract infections that kill roughly two millions of people each year worldwide. *E. coli* is used as index species to monitor the prevalence, types and movement of resistant genes within and between clinical, farm, community and environmental settings. The most frequent genes encoding beta-lactamases are blaTEM, blaNDM, blaOXA, blaCTX-M, and blaCMY in Bangladesh. Among the non-beta-lactams, resistance to aminoglycosides (str, aad, aac, aph), fluoroquinolones (Oqx, qnr), phenicols (cmi, cat), sulfonamides (sul) and, tetracyclines (tet) are significant with varying ARGs.

In these terrific circumstances, as medicinal and herbal plants help to treat infectious diseases, plant essential oils (EOs) could be a very effective solution. Recently, EOs have been used as a source of natural products and become a matter of enormous interest because of its low adverse side effects, pharmacological activities and economic viability. Essential oils have great potential in the field of biomedicine as they effectively destroy several bacterial, fungal, and viral pathogens. The presence of different types of aldehydes, phenolics, terpenes, and other antimicrobial compound means that the essential oils are effective against a diverse range of pathogens. Another alternative solution is secondary metabolites from endophytic fungi. During the past decades, several novel compounds with diverse biological activities have been identified from fungi. Since the discovery of fungi-derived penicillin and related antibiotics, fungi have continued to be pivotal in the search for novel bioactive molecules.

### Objectives

- Molecular characterization of multidrug resistant (MDR) *E. coli* bacteria by whole genome sequencing
- To develop new antimicrobial agents.

### Work Progress

In the present study, we aimed to isolate multidrug-resistant (MDR) *Escherichia coli* from different wastewater samples which were characterized for their antibiotic resistant genes (ARGs). Moreover, we treated the MDR *E. coli* using plant essential oils (EOs). In our study, a total of 11 MDR *E. coli* isolates collected from different wastewater sources were selected for whole genome sequencing (WGS). After analyzing whole genome sequence data, 42 different ARGs were detected. Among these genes, blaCTX-M-15 which confers resistance to ampicillin and ceftriaxone was harbored by most of the isolates (n=8, 66.67%), followed by mph(A), sul1, aadA5, dfrA17, tet(A), blaTEM-1B, qnrS1 and, so on. Over and above, blaNDM-5 (for meropenem) and mcr-1 (for colistin) genes were also detected. The strains were then screened for the activity of 15 EOs in different concentrations (5, 10 & 15 µl) by disc diffusion assay followed by MIC and MBC assays. The current study shows that *Ocimum gratissimum* L. has the strongest inhibitory properties followed by *Cymbopogon osmastonii*, *Cinnamomum verum*



Presl, *Mentha viridis* L., and *Callistemon citronee*. Antibacterial activity of *Ocimum gratissimum* L. essential oil has shown to be most potential against all of the isolates with their zone of inhibition ranging from 24.5-37.3 mm in diameter with significant MIC and MBC values extending from 3.13µl/ml to 12.5µl/ml and 12.5µl/ml to 25µl/ml respectively. Conversely, *Pogostemon bengalensis* essential oil showed no significant inhibitory activity.

Another effort was driven to inhibit MDR *E. coli* using secondary metabolites extracted from fungi. 20 endophytic fungi were isolated and preliminary screened for their activity against MDR isolate. Three isolates were selected based on their positive result on preliminary analysis. Secondary metabolites were extracted from selected fungi following fermentation in Muller Hinton Broth for 21 days at 25°C. The extracts were preserved at 4°C for further analysis. Thus, the preliminary results suggest promising antimicrobial properties of plant essential oils and fungal secondary metabolites against antibiotic resistant bacteria indicating alternative treatment choice.

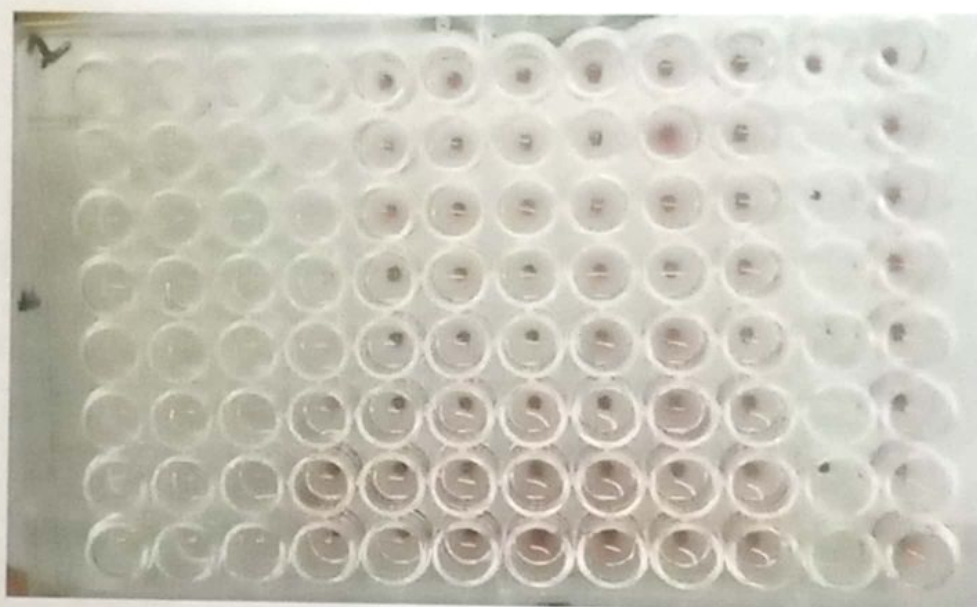


Figure 1: Minimum inhibitory concentration (MIC) result of essential oil in 96-well microtitre plate

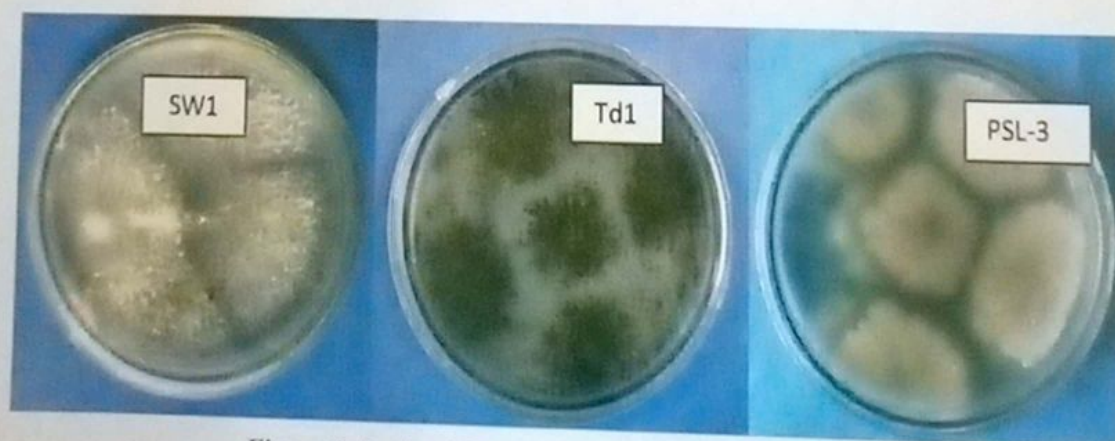


Figure 2: Isolated fungi for treatment of MDR *E. Coli*





Figure 3: Preliminary Screening of Antibacterial activity

### Development of multidrug resistant microorganism repository

Dr. Saiful Islam, PSO (PL), Rajib Sarkar, SO, Saddam Hossain, SO, Farjana Showline Chaity, SO

Antimicrobials are critical drugs that have significantly reduced disease mortality. However, their overuse in human medicine and animal production has resulted in an increase in antimicrobial resistance in recent years. Therefore, multidrug resistant bacteria are widespread and hence have become a public health issue that must be closely monitored in order to co-ordinate international responses.

Multidrug resistant microorganism repository is a curated repository of bacterial isolates with an assortment of clinically important resistance mechanisms that have been phenotypically and genotypically characterized. Its goal is to establish an isolate bank of resistant bacterial strains to facilitate development and evaluation of diagnostic tests and treatments. This resource would help diagnostic and pharmaceutical companies faced with the challenge of having limited access to isolates to develop rapid, innovative diagnostic tests and new antimicrobial agents that has already been started.

Federal Drug Administration (FDA) and Centre for Disease Control and Prevention (CDC) have started to develop the repository where they offered 14 panels comprising 496 unique isolates and had filled 486 orders from 394 institutions throughout the United States. New panels are being added regularly. Some panels provide challenge sets for the evaluation of diagnostic devices and new pharmaceutical agents and were used to provide data for FDA review. Organisms included in other panels have served as reference organisms for the verification and validation of new tests introduced into clinical laboratories and public health laboratories, including the CDC's Antibiotic Resistance Laboratory Network. Panels have also provided subject matter for advancing basic science research. In Bangladesh, such types of multidrug resistant microorganism repository have not yet developed. Therefore, the development of such a repository will facilitate many aspects of validation, verification, and regulatory review of new assays. It will also be helpful to evaluate the potency of new antimicrobial agents if necessary.

#### Objectives

- Isolation and identification of multidrug-resistant (MDR), extensively drug-resistant (XDR), and pan-drug-resistant (PDR) bacteria.
- Antibiotic resistance profiling of pathogenic bacteria by whole genome sequencing.
- To serve as a collection of multidrug resistant isolates that are accessible to government agencies, academic institutes and pharmaceutical industries etc. involved in development and evaluation new antimicrobial agents.



## Work Progress

A total of 105 clinical samples were collected from three different healthcare centers in Chattogram city, Bangladesh. Among them, 45 samples were from Cantonment General Hospital, 38 from Imperial Hospital Ltd. and 22 from Epic Healthcare Ltd. Different types of samples including urine (n=70), wound (n=14), blood (n=7), pus (n=6), throat swab (n=6) and sputum (n=2) were collected from 71 female and 34 male patients. Different presumptive isolates (*E. coli*-38, *Enterobacter spp.*-18, *P. aeruginosa*-17, *K. pneumoniae*-13, *A. baumannii*-11) were determined after observing morphological and cultural characteristics on different selective media. After molecular detection by PCR assay, 25 isolates of *E. coli*, 8 of *P. aeruginosa* and 5 of *K. pneumoniae* were confirmed. Antibiotic susceptibility patterns of the *P. aeruginosa* isolates were investigated by standard disk diffusion method of Kirby-Bauer following CLSI breakpoints, 2015 using 15 commercially available antibiotics namely Amikacin (30 µg), Amoxicillin-clavulanic acid (30 µg), Ampicillin (30µg), Cefotaxime (30µg), Ceftriaxone (5µg), Chloramphenicol (30µg), Ciprofloxacin, (5µg), Gentamicin (10µg), Imipenem (10µg), Meropenem (24µg), and Piperacillin-Tazobactam (30µg), Streptomycin(10µg), Tetracycline(10µg), Nalidixic acid(25µg), Trimethoprim-Sulfamethoxazole(25µg). Antibigram data of these isolates showed that 18 isolates of *E. coli* were multidrug resistant (MDR) whereas all (n=8) *P. aeruginosa* were MDR and 4 of *K. pneumoniae* were MDR.

## Isolation and Molecular Confirmation

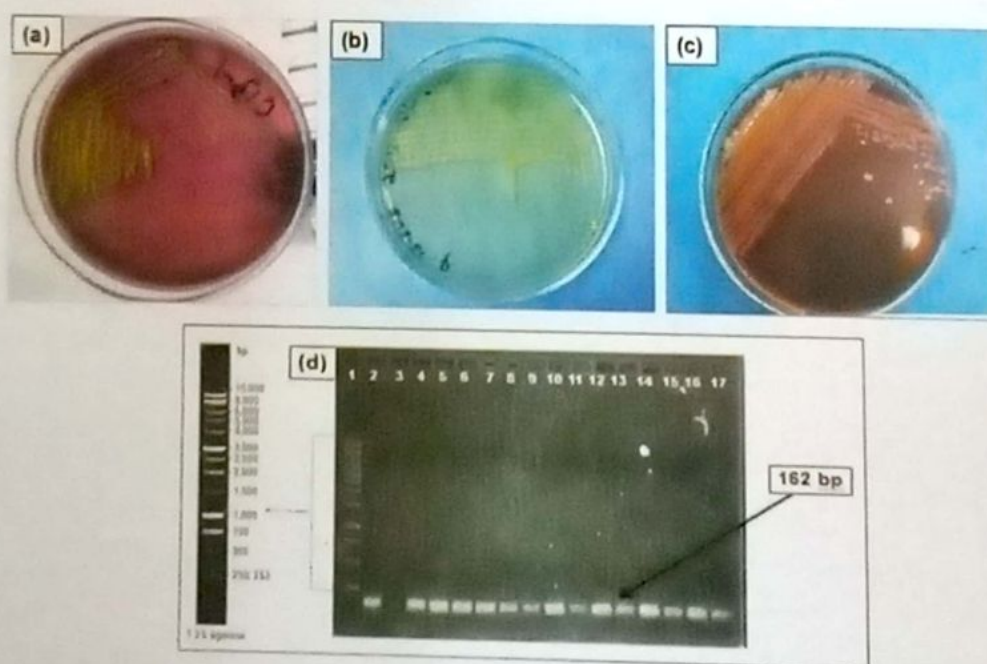
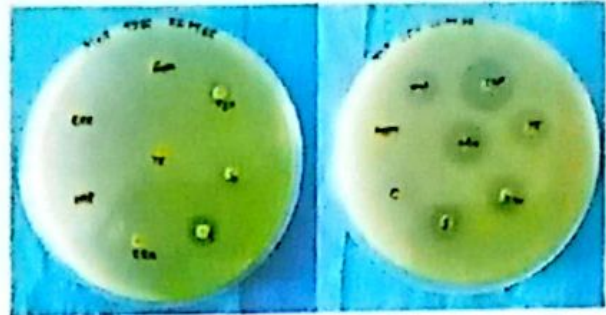
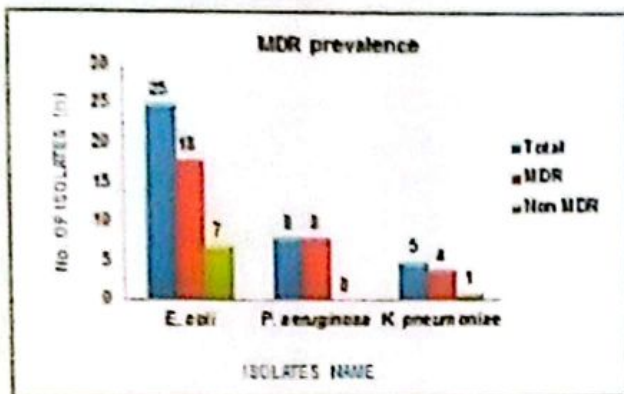


Figure 1: Colony morphology of (a) *E. coli*, (b) *P. aeruginosa*, and (c) *K. pneumoniae* on different selective media; whereas figure (d) shows the gel image for molecular confirmation of *E. coli* using *uidA* (162bp) gene. Lane 1: 1 kb DNA ladder, Lane 2: Pos. control, Lane 3: Neg. control, Lane 4-17: samples



## Multidrug-resistance prevalence



**Figure 2:** (a) Total number of MDR isolates and (b) antibiotic sensitivity pattern of the clinical isolates on MHA medium showing zone of inhibition as well as resistance pattern

## Effect of *Mesua nagassarium* seed oil on the gut microbiota and immunity of rats with antibiotic associated diarrhea.

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Antibiotics are the most commonly prescribed therapy among all medications to treat infectious diseases. Widespread and often irrational use of antibiotics results in numerous adverse events among which one of the most concerned issues is antibiotic associated diarrhea (AAD). Inappropriate use of antibiotics disrupts the ecology of normal intestinal microbiota which leads to overgrowth of pathogenic microorganism, decreased intracellular enzyme activity and atrophy of intestinal mucosa (Qu et al., 2021). All these factors interrupt the health and metabolism of an organism. To mitigate these detrimental effects, it is obligatory to develop new therapeutic regimens to find remedy for AAD.

*Mesua nagassarium*, a medicinally important tree of guttiferaceae family is well reputed for its diverse pharmacological and commercial attributes. Among different parts of this plant, seeds are considered as a rich source of lipid and protein (Abu Sayeed et al., 2004). Oil from seeds also contain a number of phytoconstituents like mesuol, mesuagin, mammeiginetc which are responsible for many of its phyto-pharmacological properties (Arora et al., 2019). Previously established report demonstrated diverse traditional uses of the *Mesua nagassarium* seeds. As a component of herbal formulations, seed oils or crushed kernels are used in India to treat a variety of complications including bleeding piles, cough, cardiovascular disorders, dysentery, headache, hiccup, itching, sweating, scabies, skin problems etc. (Asif et al., 2017). Chahar et al., 2012 revealed both the antioxidant and immunomodulatory capabilities of mesuol isolated from seed oil. Unripe fruit peel extract of nagassarium was found to reduce diarrhea by inhibiting peristalsis, gastrointestinal motility and castor oil induced enteropooling (Mazumder et al., 2019).

To maintain a healthy immune state of an organism, protecting its commensal gut microbial flora is of immense importance. Any imbalance in the gut microflora by unnecessary administration of antibiotics can be responsible for an organism to be immunosuppressant. It may also increase





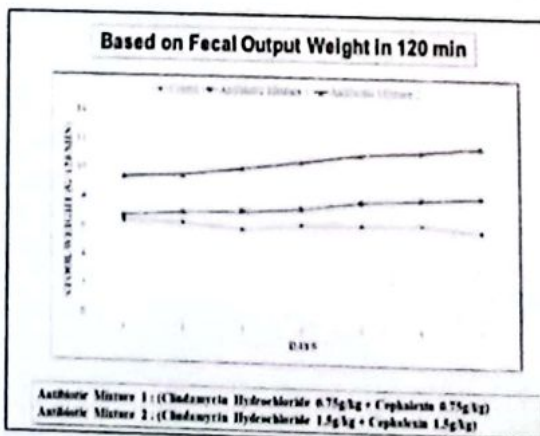
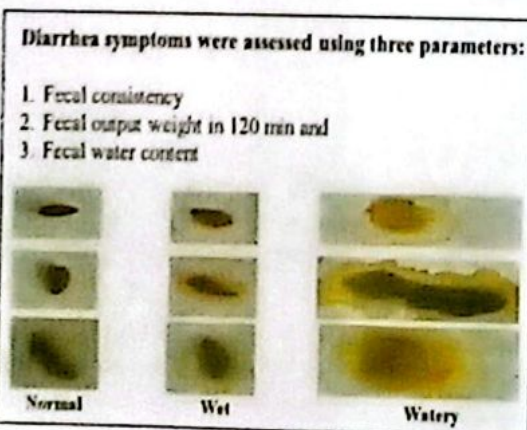
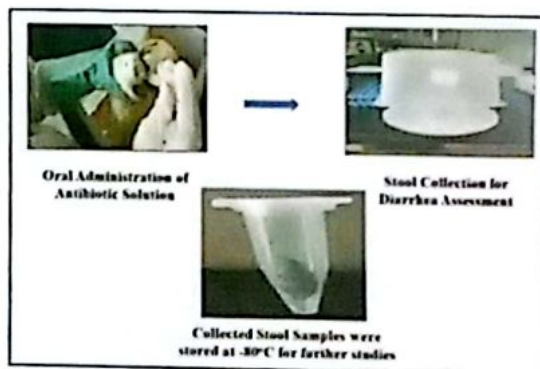
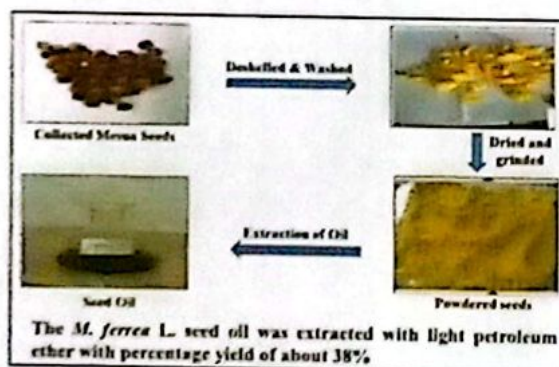
susceptibility to infectious disease by intestinal pathogens. So, it is one of the major concerns of the researchers worldwide to search for an effective natural remedy to treat AAD as well as to restore the native gastrointestinal environment. As it is evident from previous investigation that *Mesua nagassarum* works well against several infections (Arora et al., 2019; Asif et al., 2017; K. Chahar, 2013), we aimed here to study the potential of its seed oil to fight AAD. We hope to evaluate the effects of different doses of seed oil on gut microbiota recovery in animal models of antibiotic induced AAD. Studies in this regard will hopefully be useful to reveal potential applications of *Mesua nagassarum* seed oil for therapeutic purposes.

### Objectives

- To examine the anti-diarrheal potential of the seed oil.
- To evaluate the efficacy of the seed oil on restoring gut homeostasis.
- To analyze the expression of AAD related immune factors in the colon after administration of seed oil.

### Work Progress

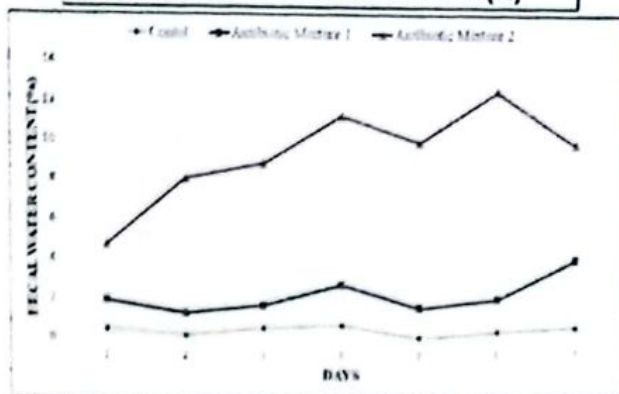
Seed oil is extracted from the dried seeds of *Mesua nagassarum* plants. To establish diarrhea in animal model several classes of antibiotics are selected. Among them clindamycin, ceftriaxone & ampicillin are used to administer in Wistar Albino Rats to establish diarrhea. Rats were grouped in 5 groups in which there were 5 rats in each group. To compare their fecal properties a group of rats was kept as control which were administered with only normal saline. After a period of one-week diarrheal symptoms were developed among them. Fecal consistency, number of defecations, pellet counts etc were the parameter to assess diarrhea. Treatment of diarrhea induced rats with seed oil and stool sample collection are ongoing for microbiome analysis.







Based on Fecal Water Content (%)



Formula for water content% =  $\frac{[\text{wet weight of the feces (g)} - \text{dried weight of the feces (g)}]}{\text{wet weight of the feces (g)}} \times 100\%$

### Green Synthesis of Silver Nanoparticles using leaf extract of *Justicia adhatoda* (Bashak) and Evaluation of its Antimicrobial, Antioxidant activity and Cytotoxicity.

Sreebash Chandra Bhattacharjee, PSO (PL); Dr. Dipankar Chakraborty, PSO, Suman Das, SSO, Rajib Sarkar, SO; Fahima Farhana, SO; Md. Ashraf Islam, SO

Green synthesis of metal nanoparticles has been an exploring research topic in recent days due to their unique optical, electrical and catalytic properties. Metal nanoparticles have a high specific surface area and a high fraction of surface atoms (Catauro et al., 1995). Among the various metal nanoparticles, silver nanoparticles have received substantial attention in the field of biological system, living organisms and medicine (Gupta K. et al., 2014; Rai M. et al., 2009). Many plants are reported to facilitate the formation of Ag/NPs and their potential applications (Chandran et al., 2006; Saxena et al., 2010; Waidha et al., 2015). Among them *Justicia adhatoda* (Bashak) is an important medicinal plant and belongs to the family Acanthaceae. Plants are the natural source of medicines used to treat a variety of diseases caused by micro-organisms such as bacteria and viruses in the body of an organism (Talid M. et al., 2002). The leaf and root extract of *Justicia adhatoda* (Bashak) is used as a medicine in the form of tablets (Jayant N D. et al., 1999). Medicinal plant-based nanoparticle synthesis has a number of biological advantages because it does not contain toxic chemicals (Garima et al., 2011). Green synthesized Ag/NPs having strong antimicrobial activity and they are widely used as an ingredient in the pharmaceutical industry for preparation of human health care medicines (Manach et al., 2004; Ali et al., 2008). Now a days Ag/NPs is currently used in a wide range of applications, such as: Biomedical engineering, drug delivery, food industry, antibacterial activity, textile industry, agriculture, water treatment (as an antioxidant), anticancer agents, pesticides, cancer cell therapy, ointment ingredients, etc. (Sinha S.N. et al., 2015). Although there are many medicinal plants in Bangladesh. To our best knowledge, there is no previous study on the biosynthetic capacity of silver nanoparticles from *Justicia adhatoda* (Bashak) in Bangladesh. In abroad, silver nanoparticle was synthesized from *Justicia adhatoda* (Bashak) and assessment on their antimicrobial activity but they used directly powder form of leaf of *Justicia adhatoda* (Bashak) not their extract (Bhumi G. et al., 2015; Nazeruddin G.M. et al., 2014; Bushra B. et al., 2020).

#### Objectives

- Green synthesis of Ag/NPs using leaf extract of *Justicia adhatoda* (Bashak) Morphological and Structural characterization of synthesized silver nanoparticles.
- Evaluation of antimicrobial activity, antioxidant activity and cytotoxicity of synthesized Ag/NPs.
- Observation of germination rate and production of diseases free of chick pea & green pea.



### Work Progress

The investigation into the bioactive components and antioxidant properties of *Justicia adhatoda*'s leaf extract, especially post the green synthesis of silver nanoparticles, offers promising insights. The synthesis process has shown the augmentation of antioxidant capabilities of the extract, potentially enhancing its therapeutic applications. This synergy between natural compounds and silver nanoparticles could have implications in fields such as medicine and biotechnology, suggesting a path for plant leaf mediated AgNPs is the main topic of the current investigation.

#### This research found:

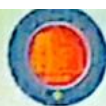
- The synthesis of AgNPs was confirmed by the UV peak at 466 nm in the UV-Vis spectra.
- FTIR analysis confirmed effective biomolecules and potential functional groups of amine, alcohol, aldehyde & ketone etc.
- The formation of AgNPs was verified by EDX testing. It also displayed the elemental composition (C, O, Ag) of AgNPs.
- TEM image revealed the average size of silver nanoparticles ( 34.42 nm ) approximately.
- In phytochemical analysis some of the bioactive compounds such as alkaloids, tannin, flavonoids, saponin, steroid, phenol are common in both the leaf extract alone and AgNPs capped leaf extract. Interestingly, few biocomponents such as coumarins, resin, terpenoid, oils & fat and reducing sugar are absent in the leaf extract containing AgNPs. Presumably, the missing bioactive components act as reducing as well as capping agents during the synthesis of AgNPs.
- A comparative analysis of antioxidant assays shows that the production of AgNPs led to an increase in antioxidant amount since the IC50 value dropped. Before AgNPs formation, the IC50 value of leaf extract was 6255.33 that reduced to IC50 value 892.86 after synthesis of AgNPs.

### Wastewater treatment from latex processing industry using biochemical techniques

Dr. Dipankar Chakraborty, PSO (PL); Dr. Mohammad Mostafa, CSO; Suman Das, SSO; Jewel Das, PhD, SSO

Rubber manufacturing industries consume large volume of water & organic acids to coagulate the latex. Generally, the wastewater of natural rubber latex processing is heavy polluted although most of the pollutants consist of biodegradable organic matter (95%) such as: volatile organic acid (acetic/formic acid), sugar, protein, lipids and mineral salts (Nguyen, 1999). Wastewater collected from rubber manufacturing industries has high concentration of ammonia, nitrate, BOD, COD, total solids and phosphorus (Watari et al., 2016; Rosman et al., 2014). Another serious threat of rubber wastewater towards environmental protection is high concentration of nitrogen in this effluent. It contributes to undesirable eutrophication, economic loss, methemoglobinemia in infants, increases oxygen and chemical demands and affects the paddy field. Application of sulphuric acid in the coagulation of skim latex results in production of high level of sulphate in the effluent of rubber processing factories. The high levels of hydrogen sulphide (H<sub>2</sub>S) will be liberated to the environment and cause malodour problems. The odours are detectable even at extremely low concentrations and make water unpalatable for several hundred miles downstream from the rubber processing factories (Rungruang and Babel, 2008). Therefore, treatment of rubber wastewater using effective methods for overcoming to these problems is needed. Several system have been developed to treat this wastewater such as Biological methods especially aerobic, anaerobic and facultative ponds are widely used for treatment of rubber wastewater. Mechanical treatments such as anaerobic filter beds, rotating





bio discs and aerated lagoons are currently being used where land is limited (Chua and Garces, 1992; Kolmetz et al., 2003; Kantachote and Innuwat, anaerobic cum facultative lagoon system, anaerobic aerated lagoon system, aerated lagoon system and oxidation ditch system (Rosman et al., 2013). Treatment of natural rubber latex concentration by stabilization pond in admixture with sewage is a common use (Madhu G, George KE, Francis DJ. Adsorption has been shown to be very effective for removal of pollutants from aqueous solutions (Adeleke et al., 2016). Activated carbon (Latiff et al., 2016), natural zeolite (Huang et al., 2010) fenton reagent are the most commonly used adsorbents due to high capability to adsorb organic compound. This project aimed to investigate an effective method for the treatment of wastewater of rubber industry.

### Objectives

- To develop an efficient and economically feasible wastewater treatment method for rubber latex industry wastewater.
- To develop a method for the recovery of uncoagulated latex from latex wastewater.

### Work Progress

- Physicochemical parameter such as pH, TDS, COD and BOD of rubber latex wastewater were evaluated. The values are pH= 3.5-4.2, TDS= 837-1095 mg/L, COD= 1557-2550 mg/L, BOD= 550-875 mg/L.
- Biochar from banana stuck bunch were prepared and characterized by iodine value and ATR.
- Wastewater treatment using biochar is going on.

### Anti-inflammatory and analgesic activity evaluation of *Mesua nagassarium*

Rasheda Akter, SSO (PL); Dr. Mohammad Mostafa, CSO; Nusrat Jahan Mouri, SSO; Tania Sharmin, SO (On Leave); Saddam Hossain, SO (On Leave)

Inflammation is a pathophysiological response of mammalian tissues to a variety of hostile agents including infectious organisms, toxic chemical substances, physical injury or tumor growth leading to local accumulation of plasma fluid and blood cells. The nonsteroidal anti-inflammatory drugs (NSAIDs) such as acetyl salicylic acid (aspirin), diclofenac sodium, ibuprofen and their new congeners, namely selective COX-2 inhibitors such as celecoxib exert their anti-inflammatory effects via inhibition of early steps in the biosynthesis pathway of prostaglandins and are widely used for managing inflammation and pain. However, the side effects of the currently available anti-inflammatory drugs including gastric injury and ulceration, renal damage, and bronchospasm and cardiac abnormalities especially for newer drugs such as rofecoxib and celecoxib has limited their use. Corticosteroids also have potent anti-inflammatory activity but again their multiple adverse effects limit their uses. Therefore, a need arises for the development of newer anti-inflammatory agents probably from the natural origin with more powerful activity and with lesser side effects to substitute the current chemical therapy. Therefore, this project aims to screen local medicinal plants which have been reported for traditional or tribal uses for decades but not extensively explored yet. The selected plant *Mesua nagassarium* has been commonly used for the treatment of rheumatism, skin diseases.





dysentery and bleeding piles. The whole plant is medicinal and contains compounds such as xanthenes, triterpenes, coumarins and glucosides. The xanthenes have been found to produce significant anti-inflammatory activity in rats by both intra-peritoneal and oral routes. Usually, the anti-inflammatory agents in clinical use exhibit analgesic and antipyretic properties along with ulcerogenicity and blood clotting impairment as side effects. But the xanthenes from medicinal plants did not show any such properties and thus leads to the possibility of developing safer anti-inflammatory drugs for future use.

#### Objectives

- To evaluate acute and chronic toxicity.
- To investigate anti-inflammatory and analgesic activity of the medicinal plant *Mesua nagassarium*
- To formulate herbal preparation.

#### Work Progress

Anti-inflammatory and analgesic activity, cytotoxicity, acute toxicity, phytochemical screening and anti-oxidant activity of n-Hexane extract of *Mesua nagassarium* bark and leaf have been done.

### Synthesis and Characterization of Proton Exchange Membrane for Hydrogen Fuel Cell

Dr. Md Abdus Salam, SPE (PL); Mirza Nusrat Sweetly, SO; Pabitra Chandra Barman, RC

The world's energy demand is rapidly increasing and will continue to do so in the future. It has brought two major challenges to the human society around the globe: the imminent depletion of fossil fuels and the unfavorable environmental impacts. These concerns must be handled from two perspectives: capturing "new" energy sources and improving energy efficiency. Efforts are going on all over the world to produce nonpolluting energy sources. Fuel cells are the most promising technologies for potential replacement. Among the five main types of commercially available fuel cells, proton exchange membrane fuel cell (PEMFC) is the most promising choice for clean energy source for automotive and portable applications. This is because of its high energy density, rapid response to varying load, relatively quick start up, low operating temperature, and approximately zero emissions that help in reducing air pollution and greenhouse effect. The electrochemical reaction occurs in the membrane electrode assembly (MEA), which is considered to be the heart of PEMFC. The key component of PEMFC is the membrane which enables proton transfer between anode and cathode. Current applications prefer Nafion (Chemours formerly known as DuPont), which consists of an aliphatic perfluorinated backbone with ether-linked side chains that end in sulfonated cation exchange sites that resemble Teflon membranes. This structural build-up provides the Nafion membrane with long-term stability in oxidative and reductive conditions. However, there are two significant drawbacks associated with the use of Nafion membrane. First, the cost of Nafion membrane is still too high for commercial applications. Second, it is not possible to operate at high temperatures with Nafion. Therefore, alternative PEMFC materials are a field, which worth's for searching on. To address this issue, efforts are concentrated on developing alternate membranes that are capable of operating at higher temperatures. Some of the most popular candidates are polyaromatic hydrocarbon polymers, especially Polyvinylidene fluoride (PVDF), Poly tetrafluoro ethylene (PTFE), poly (aryl ether ketone) (PAEK), poly(ether ether ketone) (PEEK), poly (ether sulfone) (PES), poly benzimidazole (PBI), poly aryl ether sulfone (PAES), etc.





due to its high thermal and mechanical stability, low price and improvable proton conductivity via post-sulfonation. Membrane proton conductivity depends on the degree of sulfonation (DS). However, the mechanical properties tend to deteriorate as the DS increases. Highly sulfonated polymers will swell significantly at high temperature and humidity. In this research, proton exchange membranes will be synthesized by using the most popular polymer candidates. Furthermore, these polymers membrane will be modified by the doping and sulfonation technique to improve their physicochemical properties, and characterization will be done to determine its use in fuel cells.

### Objectives

- To synthesize and characterize novel proton exchange membrane for hydrogen ( $H_2$ ) fuel cell.
- To investigate the hydrogen fuel cell performance using the synthesized proton exchange membrane (PEM).

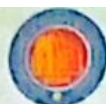
### Work Progress

GO doped PVDF membrane have been synthesized.



**Figure:** a) PVDF membrane (0.2mm thickness) b) Nafion/GO (0.5 wt%) membrane (0.2mm thickness)





## Research Achievements

### Publications

#### Paper published (2022 – 2023)

Ferdous, J., Hossain, S., Chaity, F. S., Sarkar, R., Bahar, A., Masud, H. A. A., & Islam, S. (2022). Draft Genome Sequence of a Multidrug-Resistant and Novel Sequence Type 6130 *Klebsiella quasipneumoniae* Strain C11S11\_BCSIR Isolated from Wastewater of a Tertiary Care Hospital in Chattogram, Bangladesh. *Microbiology Resource Announcements*, 11(10), e00654-22. Scopus Index Q3 Journal, Doi: 10.1128/mra.00654-22.

Alam, K., Mazumder, A., Sikdar, S., Zhao, Y. M., Hao, J., Song, C., Wang, Y., Sarkar, R., Islam, S., Zhang, Y., & Li, A. (2022). *Streptomyces*: the biofactory of secondary metabolites. *Frontiers in Microbiology*, 13. Scopus Index Q1 Journal, Doi: 10.3389/fmicb.2022.968053

Alam, K., Hao, J., Zhong, L., Fan, G., Ouyang, Q., Islam, M. M., Islam, S., Sun, H., Zhang, Y., Li, R., & Li, A. (2022). Complete genome sequencing and in silico genome mining reveal the promising metabolic potential in *Streptomyces* strain CS-7. *Frontiers in Microbiology*, 3751. Scopus Index Q1 Journal, Doi: 10.3389/fmicb.2022.939919.

Khanam, M., Moin, A. T., Ahmed, K. A., Patil, R. B., Khalifa, A. B. R., Ahmed, N., Bagchi, R., Ullah, M. A., Ferdoush, J., Islam, S., & Rudra, B. (2022). Computational modeling of potential milciclib derivatives inhibitor-CDK2 binding through global docking and accelerated molecular dynamics simulations. *Informatics in Medicine Unlocked*, 33, 101069. Scopus Index Q2 Journal, Doi: 10.1016/j.imu.2022.101069.

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### Paper submitted

Balah, T., Alam, D. and Morshed, AJM Evaluation of Water Quality Indexes and Heavy Metal Pollution Indexes of Different Industrial Effluents and Karnaphuli River Water in Chattogram, Bangladesh Environmental Quality Management

## Product List of BCSIR, Chattogram Laboratories

All products are ready to lease out

Sl.	Name	Sl.	Name
01	Aromatic oil from dry turmeric leaves.	21	Japanese Mint Oil
02	Herbal Mint Balm	22	Menthol Crystal from Japanese Mint Oil
03	Fruity Papaya	23	Protein concentrate from Shark Meat
04	Slow Releasing Fertilizer	24	Citronella Oil
05	Herbal Hair Tonic	25	Tea Cola
06	Green Bael Powder	26	Lemon Grass Oil
07	Scopolamine hydrobromide from <i>Datura fastuosa</i> leaves	27	Starch from <i>Musa paradisiaca</i> plant
08	Shark Liver Oil	28	Candy from Bamboo Shoots
09	Herbal Antidiabetic Tea	29	Shark Protein
10	Aromatic Oil from <i>Cymbopogon osmastonii</i>	30	Glucosamine hydrochloride from Lobster Shells
11	Chewing Ginger	31	Lemon Pickle
12	Kalomegh Tablet	32	Chalta Sauce
13	Palmarosa Oil	33	Herbal Turmeric Soap
14	Mosquito Repellent Body Oil	34	Patchouli Oil
15	Herbal Mouth Wash	35	Lamp Oil as Mosquito Repellent
16	Turmeric Paste	36	Triffala Health Drink
17	Perfume Oil from Eucalyptus	37	Aromatic Oil from <i>Ocimum clocimum</i>
18	Herbal Mosquito Repellent Cream	38	Stevia Product as Sweetener
19	Bergamot Mint Oil	39	Herbal Mosquito Repellent Refill
20	Instant Stevia Tea	40	Skin Care Jelly with natural ingredients.

## Academic Research Guidance/ Supervision

SL No.	Title of the Research	Research Category (M.S. Thesis/ M. Phil/ Ph D)	Name of the students	Name of academic Institution	Name & Designation of Supervisors in BCSIR
01	Estimation of microbial community of dry fish in response to the presence of heavy metal and pesticides	M.S.	Ifterkharul Isalm	Noakhali Science and Technology University	Dr. Saiful Islam, PSO
02	Phytoremediation Potential of <i>Acacia mangium</i> and <i>Swietenia mahagoni</i> seedling growing in artificially contaminated soil with industrial effluent.	M. S.	Kanij Fatema	Noakhali Science and Technology University	A. J. M. Morshed SSO





03	Isolation, identification and screening of soil Actinomycetes with potential antimicrobial activity	M.S.	Sumaiya Aktar	Noakhali Science and Technology University	Farjana Showline Chaity, SO
04	Unraveling Epigenetically Deregulated lncRNAs as High-risk Prognostic Markers in Lung Adenocarcinoma	M.S.	Mahafujul Islam Quadery Tonmoy	Noakhali Science and Technology University	Syed Muktedir Al Sium, SO
05	Inactivation of antibiotic resistant bacteria and its genes from urban wastewater through a novel disinfection process	M.S.	Md. Mahfujur Rahman	CUET	Dr. Saiful Islam, PSO
06	A Study of change of heavy metal concentration in sediment and sea water near the vicinity of ship breaking area, Sitakunda, Chattogram, Bangladesh	M.S.	Md. Bappy Hossain	University of Chittagong	A. J. M. Morshed SSO
07	Development of Food Products and Animal Feed from Suckermouth Catfish	M.S.	Md. Asifur Rahman	Chattogram Veterinary and Animal Sciences University	Syed Muktedir Al Sium, SO
08	Isolation of phosphate solubilizing rhizobacteria from rice field: their growth promoting activities in plants and tolerance to environmental stresses	M.S.	Abdullah Al Hasnat	University of Chittagong	Dr. Saiful Islam, PSO
09	Accumulation of hazardous elements in different organs of local and poultry birds in Chattogram, Bangladesh.	M.S.	Masud Rana	University of Chittagong	A. J. M. Morshed SSO
10	Chemical Properties and Toxic Metal Analysis of Synthetic and Herbal Skin Cream from Local Market of Chattogram, Bangladesh	M.S.	Jesmin Akther	Chittagong College	A. J. M. Morshed SSO
11	Inactivation of antibiotic resistant bacteria and its genes from hospital wastewater through photocatalysis process	M.S.	Akser Alam Siddiqua Maya	CUET	Dr. Saiful Islam, PSO
12	Evaluation of health hazards, physicochemical properties and detection of trace element in frequently utilized body soaps purchased from Chattogram local market, Bangladesh	M.S.	Elmul Jamal	University of Chittagong	A. J. M. Morshed SSO
13	Assessing the Effect of Industrial Sludge on Soil Properties, Physiological and Nutritional Responses of <i>Neolamareckia cadamba</i> and <i>Swintonia floribunda</i> seedlings	M.S.	Sk Abid Md Saad	Noakhali Science and Technology University	A. J. M. Morshed SSO
14	Isolation, identification and antimicrobial assessment of fungal isolates from Patenga sea beach flora: Exploring bioactive	M.S.	Md. Shahin Islam	University of Chittagong	Dr. Saiful Islam, PSO





### Scientists pursuing Ph D Course in abroad

01	<b>Name: Tania Sharmin</b> Designation: Scientific Officer Division: Pharmacology Research Division University: University of Wisconsin-Madison, USA	02	<b>Name : S. M. Zahid Hosen</b> Designation: Scientific Officer Division: Pharmacology Research Division University: University of New South Wales, Australia
03	<b>Name : Prabhangshu Kumar Das</b> Designation: Senior Scientific Officer Division: Chemical Research Division University: South Illinois University, Carbondale, USA	04	<b>Name : Sakia Ferdousy</b> Designation: Scientific Officer Division: Pharmacology Research Division University: South Illinois University, Carbondale, USA
05	<b>Md. Shahab Uddin</b> Designation: Scientific Officer Division: Hydrogen Energy Laboratory Florida State University, USA	06	<b>Md. Saddam Hosen</b> Designation: Scientific Officer Division: Industrial Microbiology Research Division State University of New York, Upstate Medical University, USA

## TRAINING, COFERENCE & INDUTRIAL TOUR

### IN-HOUSE TRAINING PROVIDED

Sl.	Instruments	Trainers	Duration/Period	Place/Organization
1	Atomic Absorption Spectrophotometer (AAS)	<b>Muhammad Abu Bakar</b> Senior Scientific Officer <b>A. J. M. Morshed</b> Senior Scientific Officer <b>Sujan Kanti Das</b> Scientific Officer	18 - 22 June 2023	BCSIR Chattogram Laboratories
2	Polymerase Chain Reaction (PCR)	<b>Dr. Saiful Islam</b> Principal Scientific Officer <b>Rajib Sarkar</b> Scientific Officer <b>Md. Saddam Hossain</b> Scientific Officer	18 - 22 Dec 2022	BCSIR Chattogram Laboratories
3	Measurement of uncertainty associated with qualitative results of microbial	<b>Dr. Saiful Islam</b> Principal Scientific Officer <b>Farjana Showline Chaity</b> Scientific Officer	13-14 June 2023	BCSIR Chattogram Laboratories
4	Bioinformatics and Molecular Biology hands-on training	<b>Syed Muktedir Al Sium</b> Scientific Officer	11-13 May 2023	Independent University, Bangladesh (IUB)
5	RT-PCR	<b>Dr. Saiful Islam</b> Principal Scientific Officer <b>Farjana Showline Chaity</b> Scientific Officer	28-29 May 2023	BCSIR Chattogram Laboratories
6	Measurement of uncertainty associated with qualitative results of microbial counts	<b>Dr. Saiful Islam</b> Principal Scientific Officer <b>Farjana Showline Chaity</b> Scientific Officer	13-14 June 2023	BCSIR Chattogram Laboratories



## PARTICIPATION OF IN-HOUSE TRAINING PROGRAM

Sl.	Subject/Instrument	Name & Designation	Duration/Period	Place/Organization
1	PCR	Rasheda Akter Senior Scientific Officer Nusrat Jahan Mouri Senior Scientific Officer Md. Samrat Mohay Menul Islam Scientific Officer Md. Afzal Hossain, Scientific Officer Md. Farhad Sarker, Research Pharmacist	18-22 December 2022	BCSIR Chattogram Laboratories
2	Training program on 'Dumas Protein Analyzer & Fat Extractor'	Syed Muktadir Al Sium Scientific Officer	04-08 December 2022	ITTI, BCSIR, Dhaka
3	RT-PCR	Sumaiya Islam Chowdhury Scientific Officer Syed Muktadir Al Sium Scientific Officer Md. Afzal Hossain Scientific Officer Md. Farhad Sarker Research Pharmacist	28-29 May 2023	BCSIR Chattogram Laboratories
4	Environmental Science and Toxicology	Md. Samrat Mohay Menul Islam Scientific Officer	01-03 December 2022	BCSIR, Dhaka
	Atomic Absorption Spectroscopy (AAS)	Md. Ashraful Islam Scientific Officer Dr. Dipankar Chakraborty Principal Scientific Officer Dr. Shreebhash Chandra Bhattacharjee Principal Scientific Officer Nusrat Jahan Mouri Senior Scientific Officer Md. Ashraful Islam Scientific Officer	18 - 22 June 2022	BCSIR Chattogram Laboratories
5	Training on "Liquid Chromatography Tandem Mass Spectrometry"	Md. Farhad Sarker Research Pharmacist	9-13 April 2023	Central Analytical and Research Facilities

## CONGRESS

SI	Subject	Name & Designation	Duration	Organization
01	BCSIR Congress 2022	Dr. Md. Abdus Salam, SPE Dr. Sreebhash Chandra Bhattacharjee, PSO Dr. Saiful Islam, PSO Rasheda Akter, SSO Suman Das, SSO Dr. Jewel Das, SSO Kawsar Ahmed, SO Md. Samrat Mohay Menul Islam, SO Sumaiya Islam Chowdhury, SO Md. Afzal Hossain, SO Syed Muktadir Al Sium, SO	01-03 Dec 2022	BCSIR, Dhaka
02	Poster Presentation in ICEPSD Conference 2022.	Md. Farhad Sarker, Research Pharmacist	2-4 September 2022	CIRDAP, Dhaka





## OFFICIAL INFORMATION, FACILITIES & MEMORABLE EVENTS

### *Name of the Directors and Duration*

Sl. No.	Name	From	To
01	Dr. Md. Kiamuddin	08.02.1965	10.02.1970
02	Dr. Md. Erfan Ali	11.10.1970	04.02.1972
03	Dr. Humayun K. M. A. Hye	05.02.1972	14.12.1973
04	Prof. N. A. Khan	15.12.1973	28.11.1978
05	Dr. Manzur-i-Khuda	29.11.1978	29.05.1986
06	Dr. Md. Nurul Alam	30.05.1986	02.07.1991
07	Dr. Shamim J. Ahmed	03.07.1991	25.05.1992
08	Dr. Md. Nurul Alam	26.05.1992	13.01.1997
09	Dr. Md. Nurul Islam	14.01.1997	12.03.1997
10	Dr. Md. Sayeedul Huq	13.03.1997	27.10.1998
11	Dr. Md. Fazlul Huq	28.10.1998	29.04.2000
12	Mr. Khandoker M. Ismail	30.04.2000	08.08.2002
13	Md. Abdul Karim	09.08.2002	30.12.2002
14	Dr. Mir Ezharul Hossain	31.12.2002	29.09.2005
15	Md. Enayetul Islam	30.09.2005	19.01.2006
16	Dr. K. M. Formuzul Haque	20.01.2006	21.11.2006
17	Mr. Kabir Ahmed	22.11.2006	15.07.2007
18	Dr. Mohammed Yusuf	16.07.2007	12.12.2007
19	Mr. Kabir Ahmed	13.12.2007	30.12.2008
20	Dr. Smarajit Kumar Biswas	31.12.2008	26.05.2009
21	Mr. Sudhangshu Kumar Roy	27.05.2009	31.01.2010
22	Dr. D. A. Nasima Chowdhury	01.02.2010	24.05.2010
23	Dr. Jaripa Begum	25.05.2010	09.01.2014
24	Md. Habibur Rahman Bhuiyan	10.01.2014	15.03.2014
25	Ferdousi Begum	16.03.2014	19.05.2014
26	Dr. Parvin Noor	20.05.2014	12.10.2014
27	Dr. Khandker Nesar Ahmed	13.10.2014	03.01.2016
28	Mahmuda Khatun	04.01.2016	10.07.2018
29	Dr. Mohammad Mostafa	11.07.2018	Continue





**Budget of BCSIR Chattogram Laboratories  
Fiscal Year 2022 - 2023**

AREA	ALLOCATION (TK)	EXPENDITURE (TK)
Salary	3,20,95,000/-	3,05,71,916/-
Allowance	2,02,21,000/-	1,72,55,449/-
Research & Development	37,00,000/-	36,94,839.98
Goods and Service	4,00,31,000/-	3,83,77,413.50
Others	18,95,000/-	18,86,272/-
Total	9,79,42,000/-	9,17,85,890.48

**Earning obtained from analytical service**

Providing analytical service to stakeholders, BCSIR Chattogram Laboratories has been earned 4,81,82,554 - (Four Crore Eighty One Lac Eighty Two Thousand Five Hundred and Fifty Four) Taka for fiscal year 2022- 2023.





## Some Stakeholders

Sl. No.	Name	Sl.No.	Name
01	Abul Khair Group	46	Legacy Fashion Ltd.
02	Apollo Seaing & Garments Limited	47	Loyaltex Ltd.
03	Azim Group	48	Loyal Apparels Ltd
04	Apparel Promoters Ltd	49	Mass Fashion Limited
05	Ark Sea Foods Limited	50	maf Footwear Limited
06	Arrow Jeans Pvt. Ltd.	51	Mark Fashion Wear (Pvt.) Ltd.
07	Asian Paints Bangladesh Ltd.	52	Masud Agro Processing Food Products Ltd.
08	Bangladesh Stadard and Testing Institute (BSTI)	53	Merim Co. Limited
09	Bangladesh Inland Water Transport Authority (BIWTA)	54	Men's Fashion Limited
10	Bangladesh Steel Re-rolling Mills (BSRM)	55	Montex Apparels Limited
11	Banoful & Co.	56	Meenhar Fisheries Limited
12	Bangladesh Spinner & Knitters	57	Moon Star Paints & Chemical Industries.
13	Belamy Textiles Ltd.	58	Nur Mohammed & Co. Ltd.
14	BM Energy (BD) Ltd.	59	Overseas Cargo Industries Ltd.
15	Brightex Washing Plant	60	Padma Wear Ltd
16	BASE Textile Limited	61	Power Development Board (PDB)
17	Bengal Sea Food	62	PHP Group
18	CPDL	63	Postlink Logistic Limited
19	Chattogram WASA	64	PRM Fashions Pvt. Ltd
20	Confidence Group	65	Premier 1888 Ltd.
21	Custom House, Chattogram	66	Priyam Garments Ltd.
22	Cargo Control BD Ltd	67	Progressive Apparels Ind. Ltd.
23	Chattogram Port Authority	68	RJM Foot Wear Limited
24	Chattogram Asian Apparels Ltd.	69	R. S. B. Industries Ltd
25	Coats Bangladesh Ltd.	70	S. A. Salt Industries Limited
26	Dah Yuan Bangladesh Ltd.	71	SAR & Co. Ltd.
27	Desh Garments Limited	72	Samdani Wash
28	Divine Design Ltd.	73	Santex Knitwears Ltd
29	Farzana Fashions World Ltd.	74	Sea Tex & Sea Blue Textile Limited
30	Farrokh Chemical Complex	75	Shah Amanat Knitting & Dyeing Industries Ltd.
31	Four H Group	76	Shodesh Chemicals
32	FAMILYTEX (BD) Ltd.	77	Shabnam Vegetable Oil Industries Ltd.
33	Fashion Watch Ltd	78	Suborna Garments Ltd
34	Fulkoli Bread & Biscuit Industries Ltd.	79	Smart Jeans Ltd
35	Finlays	80	S & S Swimwear Limited
36	GEODIS Bangladesh Limited	81	Summit Alliance Port Limited.
37	Goldmart Apparels (Pvt.) Ltd.	82	Sunman Textiles Limited
38	Glitter Fashion Ltd	83	Tadanta International Trade Organisation
39	Global Garments Ltd.	84	The Peninsula Chittagong Limited
40	Guangdong Power Engineering.	85	Toy Woods (Bd) Co. Ltd.
41	Hakkani Pulp & Paper Mills Ltd.	86	TOTAL Premier LP Gas Ltd
42	Heidelberg Cement Bangladesh Ltd	87	Unilever Bangladesh Limited
43	Intimate Apparels Limited	88	VALTEX International (BD) Ltd.
44	KDS Group	89	WHITEX Garments (BD) Pvt. Ltd.
45	Kenpark Bangladesh Appparel (Pvt.) Ltd.	90	Youngone Bangladesh Limited

BCSIR Chattogram Laboratories is committed to provide technical assistance and analytical services to all stakeholders.



## Sophisticated Instruments and Their Application



HPLC

**Function:**

Separation, identification and quantification of the component in mixture.

**Sample category:**

Vitamin, Protein, Antibiotics, Adulterated food etc.

**Function:**

Quantitative determination of different samples such as transition metal ions, organic compounds and biological macromolecules.

**Sample category:**

Color, water, sugar, organic compound etc.



UV-Visible Spectrophotometer



GC-MS

**Function:**

Identification and determination of volatile organic compounds in a mixture and investigation of unknown samples.

**Sample category:**

Volatile essential oil, Flavour, Hydrocarbons etc.



## Sophisticated Instruments and Their Application



Atomic Absorption Spectrometer

**Function:**

Quantification of metallic elements.

**Sample category:**

Water, Soil, Metallic Bar or Sheet, Alloy, Various types of crops, foods etc.

**Function:**

Selective DNA isolation, Amplification and quantification of DNA, diagnosis of diseases.

**Sample category:**

Plants and plant product (GMO), Animal products (Halal test, Porcine), Bird flu etc.



Polymerase Chain Reaction (PCR)



LC-MS

**Function:**

Separation, Identification and Quantification of a mixture.

**Sample category:**

Antibiotics, Protein, Vitamin, Adulterated food etc.



## Sophisticated Instruments and Their Application



LC-MS-MS

### Function:

Determination of masses of particles and elucidation of the chemical structures of molecules.

### Sample category:

Pharmaceutical drugs (e. g. Antibiotics, Vitamins), Pesticides etc.

### Function:

Imaging and documentation of nucleic acid and protein.

### Sample category:

Sample related to molecular biology.



Gel Documentation System



Flame Emission Spectrometer

### Function:

Quantitative determination of sodium, potassium and calcium.

### Sample category:

Water, Soil, Various types of foods & crops.





## Sophisticated Instruments and Their Application



Phase Contrast &  
Fluorescent  
Microscope

**Function:**

Bacteria detection, Motility testing, Antigen and Antibody detection.

**Sample category:**

Soil, Water, Food and Plant samples.

**Function:**

Extraction of essential oil from plants, microwave assisted synthesis.

**Sample category:**

Medicinal and aromatic plants and plant parts (Leaf, flower, bark etc).

Microwave Extraction



ELISA Reader

**Function:**

Detection for the presence of a substance, usually an antigen in a liquid or wet sample  
Detection of toxin like ochratoxins, aflatoxins etc.

**Sample category:**

Various types of food and crop.





## Memorable Events at a Glance

### National Mourning Day - 2022



### Victory Day - 2022



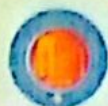




## International Mother Language Day - 2023







## Birth Anniversary of Father of The Nation Bangabandhu Sheikh Mujibur Rahman



## BCSIR Science & Industrial-Technology Fair 2023



Opening Ceremony



Inauguration Session



Stall Visiting Moments



Audience





Prize Giving Ceremony

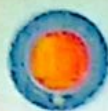
### Independence Day - 2023



### Stakeholder Meeting - 2023



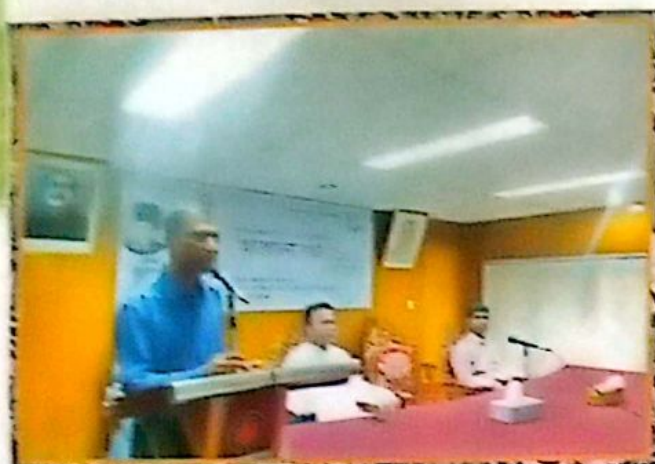




## Training on Fire Extinguish and Prevention



## Sheikh Russel Day - 2022



## Lab Visiting Program



Dr. Khastagir Govt. College

Juhangir Line High School

ANNUAL REPORT 2022-2023





## Training on Right to Information Rules and Regulation



Professor Dr. Md. Aftab Ali Shaikh, Chairman, BCSIR inaugurated the Bangabandhu Corner in BCSIR Chattogram Laboratories on 03-11-2022





Architect Yeafesh Osman Honorable Minister of Ministry of Science and Technology inaugurated the plantation program in BCSIR Chattogram Laboratories on 06 June 2023



### Learning Session on 4IR







## COMMITTEES

### House Allotment Committee

1. Dr. Dipankar Chakraborty, Principal Scientific Officer	- Convener
2. President Secretary of the Scientist Association	- Member
3. Md. Alimur Rahman, Sub-Assistant Engineer	- Member
4. President Secretary of the Union	- Member
5. Executive Officer	- Member Secretary

### Technical Committee (Vehicle)

1. A. J. M. Morshed	Senior Scientific Officer	- Convener
2. Md. Mahfujur Rahman	Scientific Officer	- Member
3. Md. Alimur Rahman	Sub-Assistant Engineer	- Member
4. Md. Asadur Rahman	Field Assistant	- Member
5. Sujan Kanti Das	Scientific Officer	- Member Secretary

### Tender Opening Committee

1. Rasheda Akter	Senior Scientific Officer	- Convener
2. Rajib Sarkar	Scientific Officer	- Member
3. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary

### Work Maintenance Committee

1. Dr. Dipankar Chakraborty	Principal Scientific Officer	- Convener
2. Md Saidur Rahman	Senior Scientific Officer	- Member
3. Executive Officer	Administration	- Member
4. President/Secretary of the Union		- Member
5. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary

### Integrity Committee

1. Dr. Saiful Islam	Senior Scientific Officer	- Convener
2. Rasheda Akter	Senior Scientific Officer	- Member
3. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary

### Tender Assessment Committee

1. Dr. Dipankar Chakraborty	Principal Scientific Officer	- Convener
2. A. J. M. Morshed	Senior Scientific Officer	- Member
3. F. M. Saiful Islam	Asstt. Executive Engineer, Cantt. Board	- Member
4. Shahazadee Khanam	Store Officer	- Member
5. Md. Alauddin	Inspector (vehicle), BRTA	- Member
6. Md. Alimur Rahman	Sub-Assistant Engineer	- Member
7. Md. Azim	Executive Engineer	- Member Secretary

### Condemnation Committee

1. Sreebash Chandra Bhattacharjee	Principal Scientific Officer	- Convener
2. Suman Das	Senior Scientific Officer	- Member
3. Executive Officer, Administration		- Member Secretary





### Auction Committee

1. Dr. Dipankar Chakraborty	Principal Scientific Officer	- Convener
2. Md. Azim	Executive Engineer	- Member
3. Md. Saddam Hossain	Scientific Officer	- Member
4. Executive Officer, Administration		- Member
5. Shahazadee Khanam	Store Officer	- Member Secretary

### Standing Committee for Purchase

1. Md Saidur Rahman	Senior Scientific Officer	- Convener
2. Shahazadee Khanam	Store Officer	- Member
2. Md. Sumon Miah	LDA	- Member
3. President/Secretary of the Union		- Member
5. Executive Officer, Administration		- Member Secretary

### Integrity Committee

1. A. J. M. Morshed	Senior Scientific Officer	- Convener
2. Sujana Kanti Das	Scientific Officer	- Member
3. Amena Kibria	Scientific Officer	- Member
4. Md. Alimur Rahman	Sub-Assistant Engineer	- Member
5. Executive Officer, Administration		- Member Secretary

### Lease Committee

1. Md Saidur Rahman	Senior Scientific Officer	- Convener
2. Shahazadee Khanam	Store Officer	- Member
2. Md. Sumon Miah	LDA	- Member
3. President/Secretary of the Union		- Member
5. Executive Officer, Administration		- Member Secretary

### Vigilance Team

1. Md. Azim	Executive Engineer	- Convener
2. Md. Sumon Miah	LDA	- Member
3. Md. Alimur Rahman	Sub-Assistant Engineer	- Member Secretary

### Innovation Sub-Committee

1. Dr. Saiful Islam	Senior Scientific Officer	- Convener
2. Suman Das	Senior Scientific Officer	- Member
3. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary

### Technical Sub-Committee

1. Dr. Saiful Islam	Senior Scientific Officer	- Convener
2. Suman Das	Senior Scientific Officer	- Member
3. Kawsar Ahmed	Scientific Officer	- Member Secretary

### Inspection Committee

1. Sreebhash Chandra Bhattacharjee	Principal Scientific Officer	- Convener
2. Muhammad Abu Bakar	Senior Scientific Officer	- Member
3. Indenting Officer		- Member Secretary





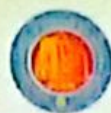
1. Sreebash Chandra Bhattacharjee	Principal Scientific Officer	- Convener
2. Md. Azim	Executive Engineer	- Member
3. Rasheda Akter	Senior Scientific Officer	- Member
4. Md. Abu Bakar	Senior Scientific Officer	- Member
5. A. J. M. Morshed	Senior Scientific Officer	- Member
6. Executive Officer, Administration		- Member
7. Shahazadee Khanam	Store Officer	- Member Secretary

1. Dr. Saiful Islam	Senior Scientific Officer	- Convener
2. Md. Saddam Hossain	Scientific Officer	- Member
3. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary

1. Director		- Convener
2. Dr. Saiful Islam	Senior Scientific Officer	- Member
3. Md. Azim	Executive Engineer	- Member
4. Executive Officer, Administration		- Member
5. Md. Nurul Islam	Senior Security Guard	- Member
6. Md. Asadur Rahman	Field Assistant	- Member
7. Md. Saidur Rahman	Senior Scientific Officer	- Member Secretary

1. Dr. Dipankar Chakraborty	Principal Scientific Officer	- Convener
2. Rasheda Akter	Senior Scientific Officer	- Member
3. Shahazadee Khanam	Store Officer	- Member
4. Sujan Kanti Das	Scientific Officer	- Member
5. Fajana Showline Chaity	Scientific Officer	- Member
6. Md. Alimur Rahman	Sub-Assistant Engineer	- Member
7. Md. Golam Robbani	Head Assistant	- Member
8. Md. Suman Miah	LDA	- Member
9. Amit Shil	LDA	- Member
10. Md. Asadur Rahman	Field Assistant	- Member
11. Bulbul Bin Shahid	Junior Technician	- Member
12. Md. Rasel Mia	Telephone Operator	- Member
13. Md. Salauddin	Driver	- Member
14. Md. Nurul Islam	Senior Security Guard	- Member
15. Md. Abul Kalam	Senior Security Guard	- Member
16. Md. Hanif	Security Guard	- Member
17. A. J. M. Morshed	Senior Scientific Officer	- Member Secretary





## List of the employees

Sl No	Name	Designation	Date of Birth	Joining Date
01	Dr. Mohammad Mostafa	Director (in charge)	31.12.1968	04.10.1994
02	Dr. Md. Abdus Salam	Sr. Principal Engineer	01.01.1974	25.06.2006
03	Nemai Chandra Nandi	Principal Scientific Officer	06.08.1963	31.12.1988
04	Dr. Dipankar Chakraborty	Principal Scientific Officer	21.12.1968	15.04.1999
05	Dr. Sreebhash Chandra Bhattacharjee	Principal Scientific Officer	05.03.1970	06.07.2002
06	Dr. Saiful Islam	Principal Scientific Officer	01.07.1980	11.06.2006
07	Meher Nigad Nipa	Principal Scientific Officer	06.06.1981	11.06.2006
08	Mohammad Azim	Executive Engineer	15.10.1978	12.07.2010
09	Rasheda Akter	Senior Scientific Officer	29.11.1978	15.06.2006
10	Suman Das	Senior Scientific Officer	12.08.1981	20.12.2009
11	Md. Saidur Rahman	Senior Scientific Officer	12.10.1981	12.07.2010
12	Muhammad Abu Bakar	Senior Scientific Officer	10.12.1977	09.07.2006
13	Maksuda Begum	Senior Scientific Officer	03.08.1974	09.07.2006
14	Abu Jahan Mohammed Morshed	Senior Scientific Officer	01.01.1975	25.06.2006
15	Dr. Jewel Das	Senior Scientific Officer	01.10.1982	30.06.2011
16	S. M. Zahid Hosen	Senior Scientific Officer	01.01.1986	03.02.2013
17	Nusrat Jahan Mouri	Senior Scientific Officer	12.02.1987	03.02.2013
18	Prabhangshu Kumer Das	Senior Scientific Officer	09.10.1983	03.02.2013
19	Sujan Kanti Das	Senior Scientific Officer	01.02.1989	15.03.2016
20	Shahazadee Khanm	Store Officer	20.01.1972	07.10.2001
21	Tania Sharmin	Scientific Officer	23.12.1989	10.10.2016
22	Rajib Sarkar	Scientific Officer	06.08.1991	13.10.2016
23	Kawsar Ahmed	Scientific Officer	15.03.1988	10.10.2016
24	Amena Kibria	Scientific Officer	09.12.1988	21.10.2018
25	Md. Saddam Hossain	Scientific Officer	25.06.1992	21.10.2018
26	Sakia Ferdousy	Scientific Officer	07.08.1989	21.10.2018
27	Md Sahab Uddin	Scientific Officer	16.09.1989	21.10.2018
28	Rajia Sultana Popi	Scientific Officer	29.12.1991	21.10.2018
29	Farjana Showline Chaity	Scientific Officer	05.03.1994	22.05.2019
30	Md. Ashraful Islam	Scientific Officer	24.09.1991	15.11.2021
31	Sumaiya Islam Chowdhury	Scientific Officer	17.12.1993	15.11.2021
32	Fahima Farhana	Scientific Officer	20.12.1992	15.11.2021
33	Syed Mazharul Hoque	Assistant Engineer	28.09.1970	07.11.1999
34	MAA Shofi Uddin Sarker	Scientific Officer	15.10.1987	07.11.2022
35	Pallabe Saha	Scientific Officer	02.01.1996	01.01.2023
36	Md. Nure Alam Siddik	Scientific Officer	13.11.1995	01.01.2023
37	Muhammad Irfanul Islam	Scientific Officer	30.12.1993	25.06.2023
38	Jesmin Akter	Scientific Officer	06.12.1993	25.06.2023
39	Ayesha Akter	Assistant Librarian	01.01.1981	11.09.2006
40	Md. Alimur Rahman	Sub-Assistant Engineer	28.12.1980	12.11.2018
41	Md. Sohel Ahmed	JTO	28.08.1982	30.06.2010
42	Md. Farhad Sarker	Research Pharmacologist	22.10.1995	29.05.2022
43	Pabitra Chandra Barman	Research Chemist	05.09.1996	01.02.2023
44	Md. Tariqul Islam	Research Chemist	05.08.1997	25.06.2023
45	Md. Golam Robbani	Head Assistant	01.01.1976	01.01.1996
46	Mohammad Mosharaf Hossain	Head Assistant	04.09.1987	15.03.2016
47	Ishrat Jahan	Head Assistant	12.01.1987	15.03.2016
48	Taslina Akter	UDA	01.01.1980	21.09.2006
49	Md. Abdul Khaleque	UDA	22.02.1984	24.09.2006
50	Md. Shoaib Ullah	UDA	01.05.1978	26.09.2006





81	Sumaiya Ahmed Asha	UDA	12.10.1995	18.05.2023
82	Mansur Alam	UDA	15.10.1990	20.12.2009
83	Md. Sumon Miah	LDA Computer Operator	21.04.1989	20.12.2009
84	Md. Abdullah Al Mamun	LDA Computer Operator	01.10.1979	20.12.2009
85	Md. Biplob Hossain	LDA Computer Operator	01.02.1989	30.10.2017
86	Md. Hasan Ahmed	LDA Computer Operator	22.01.1991	21.08.2017
87	Uma Das	LDA Computer Operator	08.03.1991	24.08.2017
88	Sarful Alam	LDA Computer Operator	16.12.1993	07.09.2017
89	Amit Shil	LDA Computer Operator	30.12.1997	30.08.2017
90	Abdullah Al Mamun	LDA Computer Operator	02.12.1998	23.08.2017
91	Ashiqur Rahman	LDA	05.07.1999	19.05.2022
92	Abdul Awal Khandaker	Technician	08.06.1968	29.01.1989
93	Md. Anwar Hossain	Junior Technician	01.01.1978	06.09.2001
94	Md. Hasibul Hossain	Junior Technician	02.05.1985	10.09.2006
95	Md. Ashadur Rahman	Field Assistant	01.09.1973	13.09.2001
96	Ahamed Nur Rony	Telephone Operator	08.09.1997	05.02.2018
97	Rasel Miah	Telephone Operator	06.05.1992	12.11.2018
98	Shahin Ullah Shahin	Junior Technician	25.05.1978	09.11.2006
99	Bulbul Bin Shahid	Junior Technician	31.12.1981	15.10.2006
100	Parvez Mahmud	Assistant Store Keeper	28.02.1988	10.10.2016
101	Mohammad Harun	Junior Mechanic	27.03.1983	21.08.2017
102	Mohammad Ali	Senior PP Attendant	01.01.1978	09.10.2006
103	Md. Shahin Hawlader	Junior Mechanic	10.03.1991	10.09.2017
104	Minoti Bala Sutrador	Senior Record Keeper	01.01.1965	05.12.1984
105	Md. Rasel Reza	Office Attendant	10.11.1988	19.05.2022
106	Md. Mir Hossain	Senior Gardener	01.01.1977	06.09.2001
107	Md. Ridwanul Bari	Senior Gardener	01.09.1981	06.09.2001
108	Md. Masum	Book Binder	09.10.1993	01.01.2018
109	Md. Salauddin	Driver	03.04.1990	03.04.2019
110	Md. Hafizur Rahman	Driver	10.12.1988	04.04.2019
111	S M Omar Faruk	Senior Lab Attendant	31.12.1996	07.09.2017
112	Devaroy Chakma	Lab Attendant	12.12.1990	24.08.2017
113	Md. Sazzadul Islam	Lab Attendant	15.12.1995	24.08.2017
114	Khandakar Rezaul Karim	Lab Attendant	28.12.1988	01.11.2017
115	Arafatul Islam	Lab Attendant	02.12.1995	21.08.2017
116	Sabina	Lab Attendant	22.05.1989	17.02.2019
117	Md. Hafizur Rahman	Lab Attendant	01.01.1997	17.02.2019
118	Md. Nazrul Islam	Senior Security Guard	16.09.1968	30.08.1993
119	Md. Sarwarul Alam	Senior Security Guard	01.09.1967	01.09.1993
120	Md. Ashadhus Jaman Talukdar	Senior Security Guard	07.12.1976	17.05.1995
121	Md. Nurul Islam Bhuiyan	Senior Security Guard	08.05.1972	31.01.2000
122	Md. Shah Alam	Senior Security Guard	10.10.1978	13.09.2006
123	Abdul Kader Mojumder	Senior Security Guard	10.05.1980	10.09.2006
124	Md. Alauddin	Senior Security Guard	27.11.1983	10.09.2006
125	Md. Elias	Senior Security Guard	01.01.1978	14.09.2006
126	Md. Abul Kalam	Senior Security Guard	10.03.1986	18.09.2006
127	Md. Sumon Sarker	Senior Security Guard	06.05.1988	17.11.2009
128	Md. Hafizur Rahman	Senior Security Guard	10.02.1980	19.11.2009
129	Md. Abdur Rahman Lal	Security Guard	08.02.1995	22.08.2017
130	Kamal Ahmed	Security Guard	19.12.1991	27.08.2017





101	Mohibur Rahman	Security Guard	15.03.1989	13.01.2019
102	Md. Hanif	Security Guard	08.12.1988	13.01.2019
103	Sabbir Miah	Security Guard	15.06.2001	11.02.2020
104	Md. Sohel Rana	Electric Helper	01.02.1997	01.01.2018
105	Md. Nazrul Islam	Office Attendant	12.03.1968	14.01.1989
106	Sittol Muna	Office Attendant	20.12.1974	11.10.2001
107	Md. Shafiul Alam	Office Attendant	01.07.1979	23.06.2008
108	Md. Helal Uddin	Office Attendant	20.12.1990	27.08.2017
109	Md. Alomgir Miah	Office Attendant	26.05.1988	23.08.2017
110	Md. Aminur Rahman	Office Attendant	15.01.1990	12.02.2018
111	Nasrin Sultana	Office Attendant	02.02.1989	30.10.2017
112	Md. Atiqur Rahman	Gardener	01.06.1991	17.11.2009
113	Md. Nasher Uddin	Gardener	10.11.1980	17.11.2009
114	Md. Kamal	Gardener	01.12.1988	22.08.2017
115	Md. Abdul Mannan	Gardener	05.03.1991	13.11.2018
116	Ranajeth Candar Nath	Sweeper	03.05.1978	09.11.2006
117	Titu Das	Sweeper	15.03.1990	01.01.2018
118	Mintu Das	Sweeper	09.01.1989	01.01.2018
119	Md. Abbas Uddin	Security Guard	15.03.1995	19.05.2022
120	Md. Imran Talukder	Plumber	08.04.1996	23.08.2017

### Central Lab Facilities







## Innovation Gallery



## BCSIR AT A GLANCE

### \*\* BCSIR SECRETARIAT BUILDING

### \*\* LABORATORIES

1. BCSIR Dhaka Laboratories
2. BCSIR Chattogram Laboratories
3. BCSIR Rajshahi Laboratories

### \*\* INSTITUTES

1. Institute of Food Science and Technology (IFST), Dhaka.
2. Institute of Glass & Ceramic Research & Testing (IGCRT), Dhaka.
3. Institute of Energy Research and Development (IERD), Dhaka.
4. Pilot Plant and Process Development Center (PP & PDC), Dhaka.
5. Institute of National Analytical Research and Services (INARS), Dhaka.
6. Leather Research Institute (LRI), Savar, Dhaka.
7. Institute of Mining, Mineralogy and Metallurgy (IMMM), Joypurhat.
8. Biomedical and Toxicological Research Institute (BTRI), Dhaka.
9. Institute of Technology Transfer and Innovation (ITTI), Dhaka.
10. Planning and Development Division (P & D)