Annual Report
2021-22

Bangladesh Council of Scientific and Industrial Research (BCSIR), Rajshahi Laboratories

Message from the Chairman

I am very glad to know that the Bangladesh Council of Scientific and Industrial Research (BCSIR), Rajshahi Laboratories is going to publish the annual report for the period 2021-2022. In this great moment, I remember, with profound respect, the architect of Bangladesh, dreamer of Sonar Bangla, Father of the nation, Poet of politics Bangabandhu Sheikh Mujibur Rahman.

BCSIR Rajshahi Laboratories was established in 1967 to fulfill the nation's desire of leading the advancement of scientific discoveries and technological innovation by using the natural resources available in the northern part of Bangladesh. The foremost responsibilities of this multi-disciplinary institute are to uphold industrial development, solve problems connected with the establishments and expansion of high-tech industries, and creation of knowledge in the field of natural science, and get the nation to prepare for harnessing the benefit. This labarotary is focusing on implementing high class modern research facilities and qualified personnel to meet the challange of 4IR. For this purpose this institute has re-equipped its research and laboratory by installing high-tech instruments like Ion chromatogram, Preparative HPLC, FT-IR, etc.

I express my gratitude to the Honorable Prime Minister of the Government of the Peoples Republic of Bangladesh, Sheikh Hasina for her dynamic leadership in achieving "Sonar Bangla", the dream of Bangabandhu Sheikh Mujibur Rahman. I am thankful to the Minister, Ministry of Science and Technology, Architect Yeafesh Osman for his continuous support and leadership to bring BCSIR to its desired height. I thank the Secretary of the Ministry of Science and Technology for his genius support and assistance provided to BCSIR to fulfill its mandate.

I would like to express my heartiest gratitude to the Director, Scientists, and all staff of BCSIR Rajshahi Laboratories for their sincere effort and hard work to achieve the goals. Also thanks to the editorial committee for their tireless effort in preparing the report. I wish the overall success of BCSIR Rajshahi Laboratories.

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

Message from Ex-Director

The annual report embodies the research and development (R&D) activities of Bangladesh Council of Scientific and Industrial Research (BCSIR), Rajshahi Laboratories for the fiscal year 2021-22. I am really obliged to take the opportunity to write few words on the annual report of the laboratory of last year.

BCSIR Rajshahi Laboratories is a renowned multidisciplinary research organization based on locally available raw materials of national interests and playing a vital role in research to find out ways to ensure best utilization of natural resources. At present BCSIR Rajshahi Laboratories has huge active young scientists to meet up the challenges of the Fourth Industrial Revolution and hopefully will fulfill the aspiration of the people.

Scientists made a good stride in their research project mainly in the field of edible vegetable oils, medicinal and aromatic plants, industrial microbiology, photochemistry, drugs and toxicology, development of herbal products, fish and poultry feeds, cosmetics, food products & supplements etc. I firmly believe that the concerted efforts of the scientists will enable to contribute more to achieve their aims and objectives in future to turn this Laboratories into a unique R & D organization in the country.

This annual report will reveal the research and development activities for the mentioned period in the form of published or accepted papers, accepted and leased out industrial processes, patent rights, participations in national and international conferences, seminars, workshops, industrial visits, in –house training and thesis guidance. In addition to R&D activities, the devoted scientists of the laboratory are also engaged in offering analytical and testing services to different Govt. organization and NGOs, public and private entrepreneurs and industrialist to solve their problems for the greater interest of the country.

I would like to express my sincere thanks and gratitude to the Chairman of BCSIR for his constant inspiration and generous support to bring out this report. I cordially express my appreciation to the editorial committee, scientists, officers and staff of this laboratory for their cooperation in collecting, compiling, binding as well as to publishing the final report successfully.

Dr. Barun Kanti Saha
Director (Additional– charge)
BCSIR Rajshahi Laboratories, Rajshahi-6206

Message from Present Director

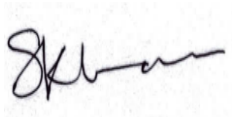
I am delighted to present the Annual Report of BCSIR Rajshahi Laboratories has been disclosed for the fiscal year 2021-2022. At the very beginning, I would like to show the honor to Father of the Nation Bangabandhu Sheikh Mujibur Rahman who led to freedom the nation.

Since the inauguration of BCSIR Rajshahi Laboratories in 1967, it has served the people of our country by developing various industrial processes through R&D activities. Presently, the laboratory is divided into seven research divisions based on their different research fields, where the scientists are working hard on their R&D projects. We have a well-equipped central laboratory that will help us to overcome the challenges of the 4^{th} industrial revolution in the future.

Including the laboratories history and organizational structure, this report focuses on overall activities and achievements related to R&D activities, contributions made by the scientists as published papers, approved processes, submitted patents, participation in national and international conferences, seminar workshops, industrial visits, in-house training, thesis student supervision, and analytical services provided to different government and private organizations by the worshipful scientists of the laboratory. I think that this report not only reflects these activities but also will be informative and effective for enthusiastic researchers, scientists, and entrepreneurs. We are proud to let all know that we are on the way to achieving ISO accreditation award for BCSIR Rajshahi Laboratories, which will improve the laboratory recognition as well as the testing procedures.

I express my deepest sense of gratitude to the honorable Chairman of BCSIR, Professor Dr. Md. Aftab Ali Shaikh, for his encouragement and invaluable guidance in research and development activities and his continuous support towards revealing this annual report.

I extend my appreciation to all the members of the editorial committee for their sincere efforts in bringing out this annual report successfully. Finally, I thank all members of the BCSIR Rajshahi Laboratories family for their cooperation and contributions in this regard.



Dr. Md. Salim Khan, CSO
Director (In-Charge)
BCSIR Rajshahi Laboratories,
Rajshahi-6206.

Message from the Convener

I have much delight in presenting the Bangladesh Council of Scientific and Industrial Research, BCSIR Rajshahi's annual report for the 2021-2022 financial year. It summarizes the Rajshahi Laboratories activities for the past year and gives an update on the research and development projects that were highlighted in the Council's future activities. This report presents our annual plan and to confirm our achievements throughout the past twelve months.

Including overall activities and organizational information like organogram, budget manpower etc., this report sketches research and development output and efforts from all seven research divisions viz. Applied Zoology Research Division, Fiber and Polymer Research Division, Drugs and Toxins Research Division, Fruits and Food Processing and Preservation Research Division, Natural Products Research Division, Applied Botany Research Division and Oil, Fats & Waxes Research Division. Over time, the laboratories have got published outstanding research articles in various national and international esteemed journals. At the same time, the researchers of laboratories got approval of invented industrial processes, participated in various national and international seminars as well as symposiums with cooperation by the laboratory authority. During the time, the authority also allocated funds for research, supervised infrastructure development activities, delegated decision making power, appointed resources personnel's to improve research quality.

The convener would like to express heartfelt appreciation to Honorable Chairman of BCSIR and Dr. Md. Salim Khan, Director of BCSIR Laboratories, Rajshahi for their assistance and tremendous cooperation in organizing, compilation, editing and publication of the report. The assistance and contribution of the editorial committee members are gratefully acknowledged. Furthermore, this laboratory's scientists, officers and staffs deserve special recognition and thanks for their ongoing inspiration and collaboration in making this report successful.

Dr. Mohajira Begum
Convener
Publication Committee 2022-23
BCSIR Rajshahi Laboratories,
Rajshahi-6206

Message from Member Secretary

I feel so privileged to have the honour of working as member secretary of editorial committee of annual report publication. I am also delighted to get a chance to share my opinions.

This annual report tells many stories about the overall activities of the laboratory during the fiscal year 2021-22. Research and development activities such as publication of research paper, development of process, patent, participation in conferences, seminar workshop, industrial visit, in-housetraining, thesis student's supervision etc. are reviewed in this report. I am grateful to Dr. Md. Salim Khan, Director, BCSIR Rajshahi Laboratories for his immense support to publish this annual report successfully. What I hope you sense through this report is the dedication, collaborative spirit and integrity of our BCSIR Rajshahi Laboratories scientists, officers and staffs. I want to thank them for their efforts, which have gone above and beyond our expectations, to deliver excellent and impactful annual report when it is needed most.

Lastly, I think that this annual report showcases an adaptive and responsive organization that will continue to deliver on its purposes and unlock a better future to build our "Sonar Bangla".

Firoz Ahmed
Member Secretary
Publication Committee 2022-23
BCSIR Rajshahi Laboratories
Rajshahi-6206, Bangladesh

Editorial Committee

Dr. Mohajira Begum,
Convener

Firoz Ahmed
Member Secretary

Dr. Mst.
SarminaYeasmin
Member

Nazim Uddin Ahmed,
Member

Subarna Sandhani Dey
Member

Md. Waliullah
Member

Sabbir Ahmed
Member

Annual Report Committee 2021-2022

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INTRODUCTION

The history of BCSIR Rajshahi laboratories dates back to 1967 when land was acquired by government order. Primarily, laboratory started to work in a small office of Silk and Lac Research-Cum-Training institute in 1968. After construction of residential building in 1969, laboratory was shifted there. The complete structure of present laboratory was accomplished in1973, subsequent to Great War of independence.

Until 1975, there were three Research Divisions (Lac Research Division; Oils, Fats &Waxes Research Division and Fibre Research Division) in this laboratory. Four more Divisions named Fruit Processing and Preservation, Applied Botany, Applied Zoology, and Drugs and Toxins were opened in 1976. At present, Rajshahi Laboratories has seven Research Divisions namely-

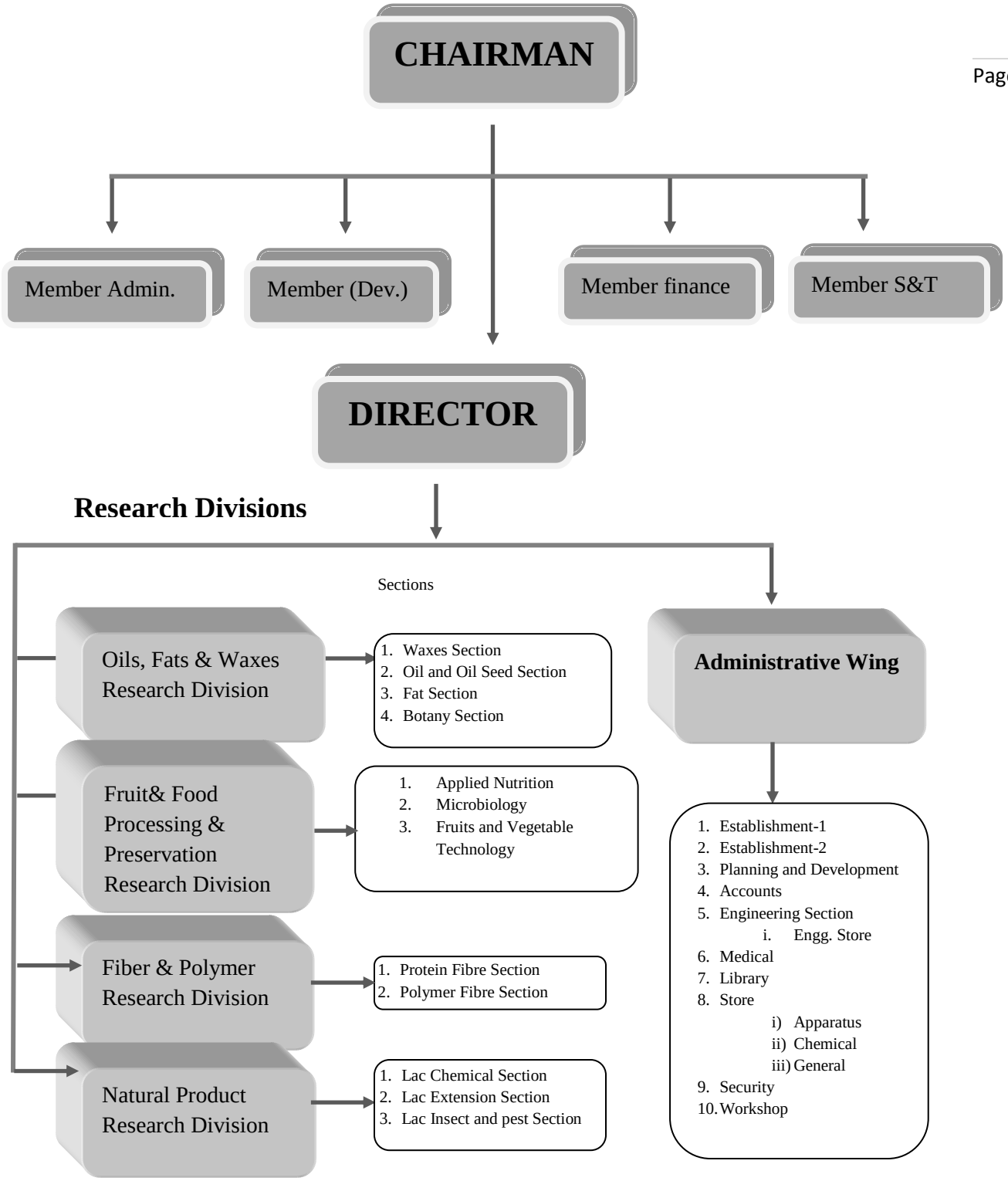
a. Natural Products Research Division.
b. Oils, Fats and Waxes Research Division
c. Fruits & Food Processing and Preservation Research Division
d. Applied Botany Research Division
e. Fibre and Polymer Research Division
f. Applied Zoology Research Division
g. Drugs and Toxins Research Division

BCSIR Rajshahi Laboratories is playing a vital role on R&D sector. At present scientists of seven divisions from different fields are pursuing R&D activities. It has ultra-modernmachine like RT-PCR, LC-MS, Ion-trap MS, GC-MS, Preparative HPLC, IC, Microbial Identification Station (Biolog), Chemiluminescence, Bioreactor, UV-Vis-NIR Spectroscopy which are used for research related and ad-hoc service oriented analysis.

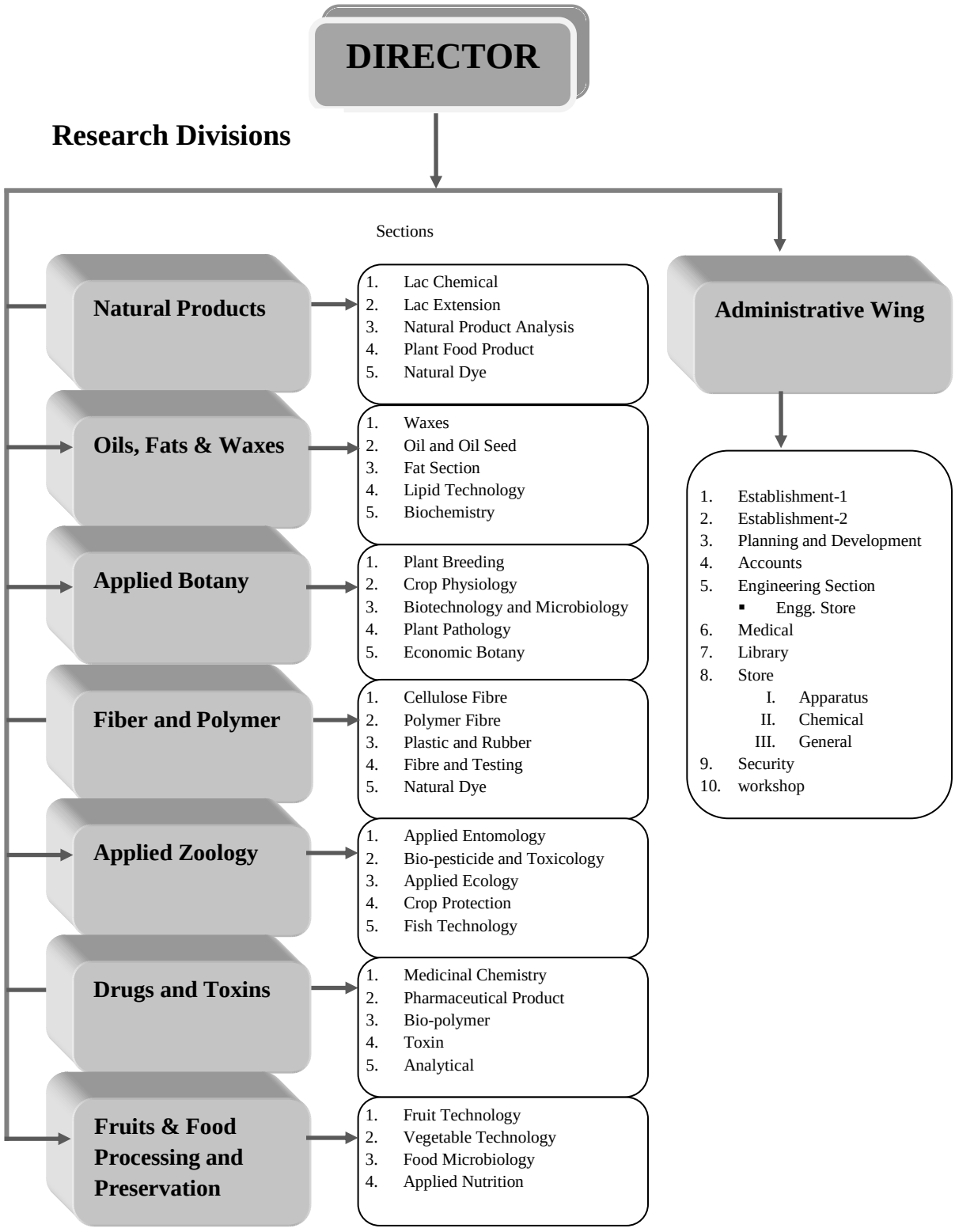
As a researcher of BCSIR Rajshahi Laboratories our mission is to develop a world-class research workforce to contribute in industrial and socio-economic development of the country by invention of technologies for effective utilizations of natural resources in Agriculture, Poultry sector and Crop protection, especially by using the agro base raw materials that are abundant in northern part of the country. Altering on this ideal spirit scientists are actively engaged in scientific and industrial research on various disciplines.

It is our credit to mention that during the period under report we have got published 16 research papers in the journals based in home and abroad, 10 seminars were presented and 1patenthas been submitted.

Approved Organogram of BCSIR Rajshahi Laboratories



Proposed Organogram of BCSIR Rajshahi Laboratories

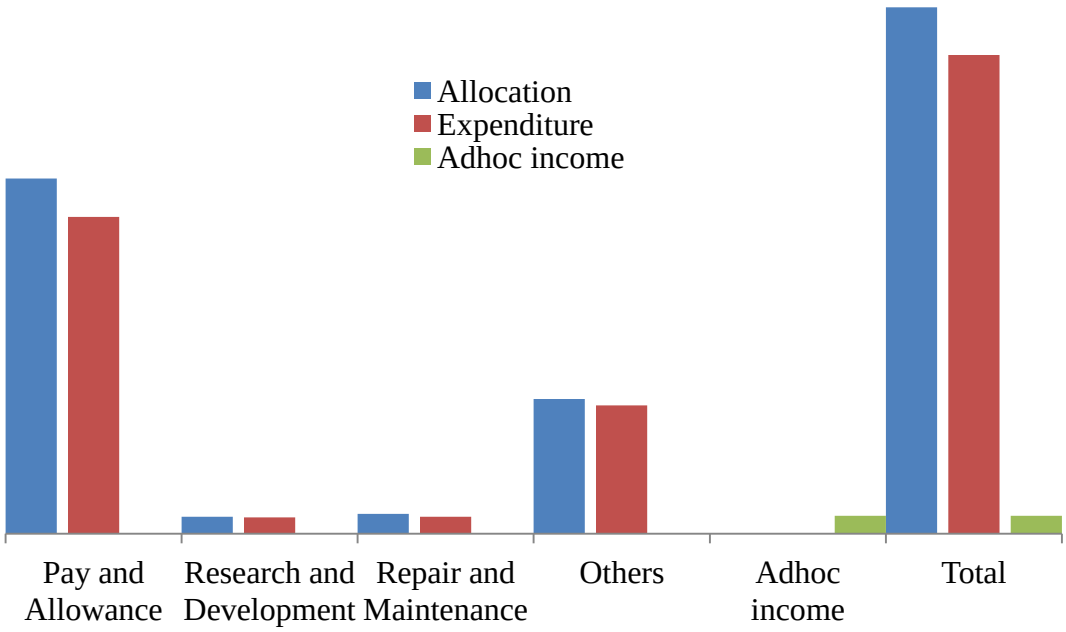


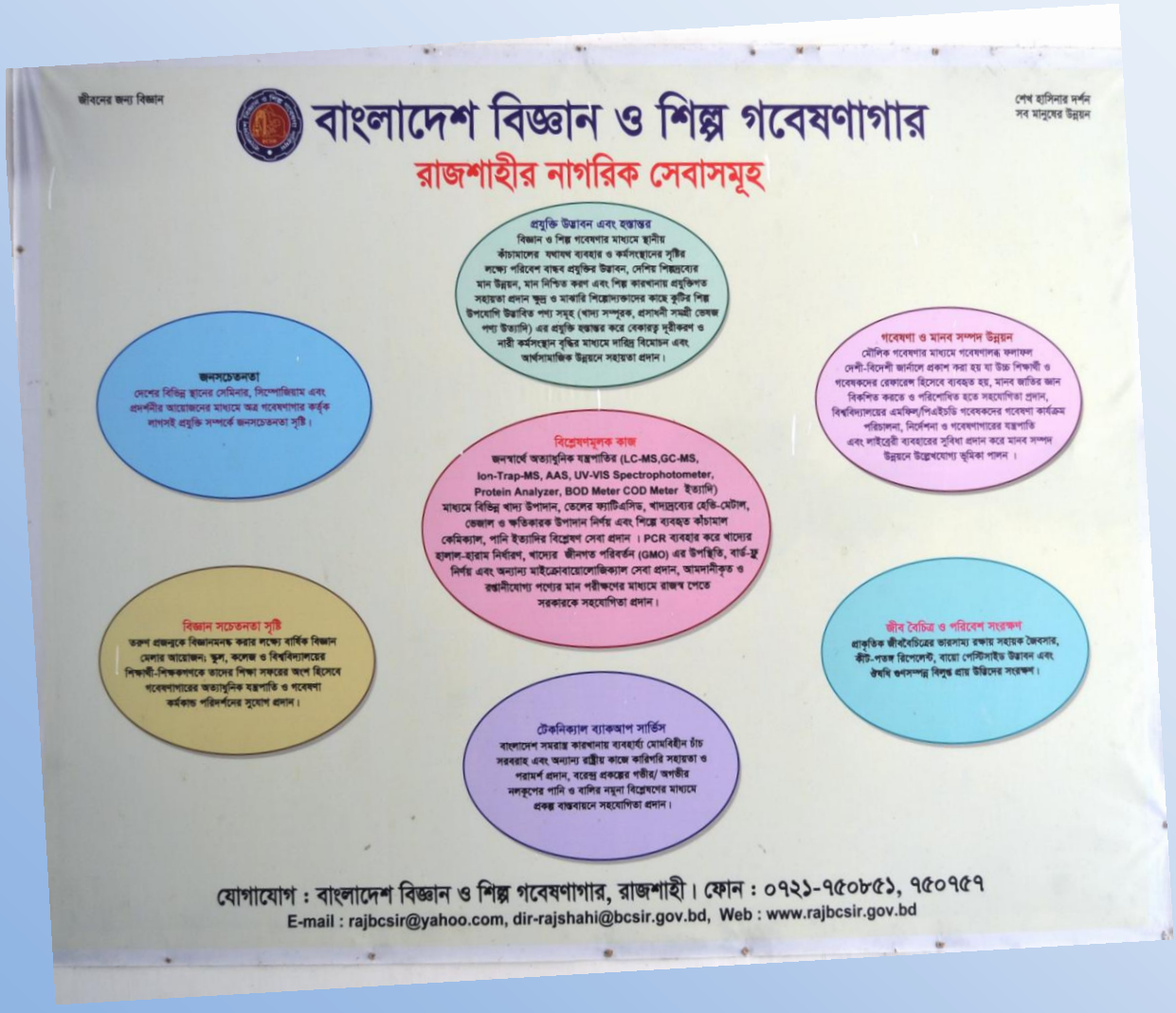
RESEARCH DIVISIONS WITH SECTIONS IN BCSIR RAJSHAHILABORATORIES

OIC & Research Divisions	Working Researchers	Research Sections
Dr. Md. Badrul Islam PSO Natural ProductsResearch Division	Dr. Md. Badrul Islam, PSO Mahci Al Bashera, SO Shyama ProsadMoulik, SO Md. Sabbir Hasan, SO Farhana Jahan, SO Md. Amin Hossen, SO Md. Waliullah, SO Md. Ariful Islam, SO (Attachment)	1. Lac Chemical 2. Lac Extension 3. Natural Products Analysis 4. Plant Food Products 5. Natural Dye
Dr. Mst. SarminaYeasmin**,** PSO Oils, Fats & WaxesResearch Division	Dr. Mst. SarminaYeasmin, PSO Md. Mahmudur Rahman, SO Ratan Kumar Biswas, SO G.M. Masud Rana, RC TahminaAkter Chowdhury, RC Md. Jasim Uddin, SO (Attachment)	1. Waxes 2. Oil & Oil Seed 3. Fat 4. Lipid Technology 5. Bio-chemistry
Dr. Arfatun Nahar Chowdhury, PSO Applied Botany Research Division	Dr. Arfatun Nahar Chowdhury, PSO Amit Kumar Dey, SO Md. Moniruzzaman, RC Sabbir Ahmed, RC Abu Kawser, RC	1. Plant Breeding 2. Crop Physiology 3. Bio-Technology & Microbiology 4. Plant Pathology 5. Economic Botany
Md. Ahasanur Rabbi, SSO Fiber& Polymer	Md. Ahasanur Rabbi, SSO Most. Halima Khatun, SSO Firoz Ahmed, SO Hurey Jahan Kadri, SO ShabibaPervinShondhi, SO Md. Al-amin, SO (Attachment) Bijoy Maitra, RC Md. Zia Uddin Rasel, RC	1. Cellulose Fiber 2. Polymer Fiber 3. Plastics and Rubber 4. Fiber Testing
Dr. Mohajira Begum, PSO Applied Zoology Research Division	Dr. Mohajira Begum, PSO LailatulFerdusi, SSO Supriya Ghosh, SO Md. Al-Amin Miah, RC	1. Applied Entomology 2. Bio-pesticide and Toxicology 3. Applied Ecology 4. Crop Protection 5. Fish Technology
Nazim Uddin Ahmed, PSO Drugs & Toxins Research Division	Nazim Uddin Ahmed, PSO Nasim Ahmed, SO Ali Ahsan Muzahid, SO Md. ShakhawatHossen, SO SafaetAlam, SO Kutub Uddin Ahamed, RC	1. Medicinal Chemistry 2. Pharmaceutical Products 3. Bio-polymers 4. Toxin 5. Analytical
Dr. BarunKantiSaha, CSO Fruits & Food Processing & Preservation Research Division	Dr. Md. Nurul Huda Bhuiyan, PSO Md. Jahidul Islam, SSO SubarnaSandhani Dey, SO Farhana Boby, SO Selim Reza, SO AnikSaha, SO Md. Zakaria Al Noman, SO	1. Fruit Technology 2. Vegetable Technology 3. Food Microbiology 4. Applied Nutrition

Budget and Allocation 2021-2022

	Allocation	Total Expenditure	Total Income
Pay and Allowance	58,081,157	55,142,163	
Research and Development	4,700,000	4,636,116	
Repair and Maintenance	3,520,000	3,291,155	
Others	26,610,000	26,096,095	
Adhoc income	-	-	2,361,300
Total	92,911,157	89,165,529	2,361,300




জীবনের জন্য বিজ্ঞান
বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণাগার
শেখ হাসিনার দর্শন
সব মানুষের উন্নয়ন
রাজশাহীর নাগরিক সেবাসমূহ
প্রযুক্তি উদ্ভাবন এবং হস্তান্তর
বিজ্ঞান ও শিল্প গবেষণার মাধ্যমে স্থানীয় কাঁচামালের যথাযথ ব্যবহার ও কর্মসংস্থানের সৃষ্টির লক্ষ্যে পরিবেশ বান্ধব প্রযুক্তির উদ্ভাবন, সেশিয় শিল্পদ্রব্যের মান উন্নয়ন, মান নিশ্চিত করণ এবং শিল্প কারখানায় প্রযুক্তিগত সহায়তা প্রদান ক্ষুদ্র ও মাঝারি শিল্পোদ্যক্তাদের কাছে কুটির শিল্প উপযোগি উদ্ভাবিত পণ্য সমূহ (খাদ্য সংপ্রক, প্রসাধনী সামগ্রী জেলজ পণ্য ইত্যাদি) এর প্রযুক্তি হস্তান্তর করে বেকারত্ব দূরীকরণ ও নারী কর্মসংস্থান বৃদ্ধির মাধ্যমে দারিদ্র বিমোচন এবং আর্থসামাজিক উন্নয়নে সহায়তা প্রদান।
জনসচেতনতা
দেশের বিভিন্ন স্থানের সেমিনার, সিম্পোজিয়াম এবং প্রদর্শনীর আয়োজনের মাধ্যমে অত্র গবেষণাগার কর্তৃক লাগসই প্রযুক্তি সম্পর্কে জনসচেতনতা সৃষ্টি।
বিশ্লেষণমূলক কাজ
জনস্বার্থে অত্যাধুনিক যন্ত্রপাতির (LC-MS,GC-MS, Ion-Trap-MS, AAS, UV-VIS Spectrophotometer, Protein Analyzer, BOD Meter COD Meter ইত্যাদি) মাধ্যমে বিভিন্ন খাদ্য উপাদান, তেলের ফ্যাটিএসিড, খাদদ্রব্যের হেভি-মেটাল, ভেজাল ও ক্ষতিকারক উপাদান নির্ণয় এবং শিল্পে ব্যবহৃত কাঁচামাল কেমিক্যাল, পানি ইত্যাদির বিশ্লেষণ সেবা প্রদান । PCR ব্যবহার করে খাদ্যের হালাল-হারাম নির্ধারণ, খাদ্যের জীনগত পরিবর্তন (GMO) এর উপস্থিতি, বার্ড-ফ্লু নির্ণয় এবং অন্যান্য মাইক্রোবায়োলোজিক্যাল সেবা প্রদান, আমদানীকৃত ও রপ্তানীযোগ্য পণ্যের মান পরীক্ষণের মাধ্যমে রাজস্ব পেতে সরকারকে সহযোগিতা প্রদান।
গবেষণা ও মানব সম্পদ উন্নয়ন
মৌলিক গবেষণার মাধ্যমে গবেষণালব্ধ ফলাফল দেশী-বিদেশী জার্নালে প্রকাশ করা হয় যা উচ্চ শিক্ষার্থী ও গবেষকদের রেফারেন্স হিসেবে ব্যবহৃত হয়, মানব জাতির জ্ঞান বিকশিত করতে ও পরিশোধিত হতে সহযোগিতা প্রদান, বিশ্ববিদ্যালয়ের এমফিল/পিএইচডি গবেষকদের গবেষণা কার্যক্রম পরিচালনা, নির্দেশনা ও গবেষণাগারের যন্ত্রপাতি এবং লাইব্রেরী ব্যবহারের সুবিধা প্রদান করে মানব সম্পদ উন্নয়নে উল্লেখযোগ্য ভূমিকা পালন ।
বিজ্ঞান সচেতনতা সৃষ্টি
তরুণ প্রজন্মকে বিজ্ঞানমনস্ক করার লক্ষ্যে বার্ষিক বিজ্ঞান মেলার আয়োজন। স্কুল, কলেজ ও বিশ্ববিদ্যালয়ের শিক্ষার্থী-শিক্ষকগণকে তাদের শিক্ষা সফরের অংশ হিসেবে গবেষণাগারের অত্যাধুনিক যন্ত্রপাতি ও গবেষণা কর্মকান্ড পরিদর্শনের সুযোগ প্রদান।
জীব বৈচিত্র ও পরিবেশ সংরক্ষণ
প্রাকৃতিক জীববৈচিত্রের ভারসাম্য রক্ষায় সহায়ক জৈবসার, কীট-পতঙ্গ রিপেলেন্ট, বায়ো পেস্টিসাইড উদ্ভাবন এবং ঔষধি গুণসম্পন্ন বিলুপ্ত প্রায় উদ্ভিদের সংরক্ষণ।
টেকনিক্যাল ব্যাকআপ সার্ভিস
বাংলাদেশ সমরাস্ত্র কারখানায় ব্যবহার্য্য মোমবিহীন চাঁচ সরবরাহ এবং অন্যান্য রাষ্ট্রীয় কাজে কারিগরি সহায়তা ও পরামর্শ প্রদান, বরেন্দ্র প্রকল্পের গভীর/ অগভীর নলকূপের পানি ও বালির নমুনা বিশ্লেষণের মাধ্যমে প্রকল্প বাস্তবায়নে সহযোগিতা প্রদান।
যোগাযোগ : বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণাগার, রাজশাহী। ফোন : ০৭২১-৭৫০৮৫১, ৭৫০৭৫৭
E-mail : rajbcsir@yahoo.com, dir-rajshahi@bcsir.gov.bd, Web : www.rajbcsir.gov.bd

Activities of BCSIR Rajshahi Laboratories

Birthday Celebration of Sheikh Russel

Prize Giving Ceremony

Tree Plantation at Birth Ceremony of Honorable Prime Minister

Fresher's Reception

In-house Training (IC & P-HPLC)

Closing Ceremony of In-house Training (IC & P-HPLC)

Activities of BCSIR Rajshahi Laboratories

Saline Preparation for Flood Affected People

Saline Preparation for Flood Affected People

ISO Training (Inauguration Ceremony)

ISO Training (Closing Ceremony)

Honorable Secretary's Lab Visit

Sheikh Russel Life Oriented Discussion

Honorary Laboratory Visit

Plantation by Honorable Secretary (MoST)

Honorable Secretary (MoST) Visiting Laboratory

Honorable Chairman Exchanging views on Overall Situation of the Laboratories

Honorable Chairman Visiting Laboratory

Honorable Member (S&T) Exchanging Views with Scientists

Scientists Exchanging Views with Honorable Member (S&T)

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Workshop with Stake Holders

“মুজিব জন্ম শতবর্ষে প্রতিশ্রুতি চতুর্থ শিল্প বিপ্লব বয়ে আনুক উন্নতি”

Honorable Guests of Workshop

Honorable Chief Guest (VC, RU) being Received

Honorable Special Guest (Member Development, BCSIR) being Received

Honorable Chief Guest (VC, RU) is being Given Crest

Honorable Special Guest (Member Development, BCSIR) is being given Crest

Delegates and Audiences in the Stakeholders Meeting

Science Fair 2022

Inauguration of Science Fair 2022

Honorable Guests of Inauguration Ceremony of Science Fair 2022

Stall Visiting by Delegates

Honorable Guests of Closing Ceremony of Science Fair 2022

Prize Giving Ceremony

Prize Giving Ceremony

Ongoing Research and Development activities

Research and development achievements at a glance

- No. of R&D Projects-16
- Paper Published-27
- Seminar presented-10
- In-house Training Conducted-06
- Process Submitted-02
- Process Accepted-03
- Patent Submitted-04

RESEARCH AND DEVELOPMENT PROJECTS DURING 2021-22

F&P
1. Extractions of Methyl Eugenol from Indigenous Sources and Its Application in Insecticide.

D & T
2. Isolation of alpha-linolenic acid from flaxseed.
3. Green Synthesis of Zinc Oxide/ Metal Nanoparticles for Insulin sensing Bio-sensor
4. Extraction, isolation, characterization of bio-active compounds from fruit seeds.

OF & W
5. Unique formulation of edible oil blended rice bran and other indigenous oil
6. Bio-composites from cellulose and shrimp chitosan for waste water treatment

AZ
7. Production of cost-effective fish and poultry feed from silkworm, black soldier fly and fish waste

NP
8. Extraction, Purification and Characterization of Natural Food Colorant from Different Fruits and Vegetables
9. Development of Cost-Effective Technology for the Isolation of Aleuritic Acid from Lac
10. Isolation of glycoside and terpinoids from Oldenlandiacorymbosa L. to find out the preventive activity of arterial dysfunction
11. Development of functional food from seeds and flowers of *Cucurbita maxima*
12. Development of Cost-Effective Recovering Technology of Useful Chemicals from waste PET Bottle

FFPP
13. Isolation and identification of bio-active compounds from the bark extract of *Annona muricata*
14. Isolation and Application of Prodigiosin in controlling Bacterial and Cancer cell proliferation
15. Production of different Fermented fruit Vinegars and exploring their potential health benefits

AB
16. Development Process of Omega-3 Fatty Acid Containing Suitable Algae

Fiber & Polymer Research Division

PROJECT TITLE

Extractions of Methyl Eugenol from Indigenous Sources and Its Application in Insecticide

INVOLVED RESEARCHERS

1. **Firoz Ahmed, SO(Project Leader)**
2. Md. Ahasanur Rabbi, SSO (Associate)
3. Hurey Jahan Kadri, SO (Associate)
4. Bijoy Maitra, SO (Associate)
5. Md. Zia Uddin Rasel, RC (Associate)

INTRODUCTION OF THE PROJECT:

Methyl eugenol (ME) (4-allyl-1, 2-dimethoxybenzene-carboxylate), a phytogenic bioactive component is frequently found in wide range of herbal plants possessing well defined biological and functional attributes. Prominent sources of eugenol are clove, cinnamon, tulsi, pepper, and so on. Various extraction methods have been practiced globally for the extraction of methyl eugenol and other nutraceutics from plants. The most extensively employed approaches in this regard include solvent extraction, hydrodistillation, supercritical carbon dioxide extraction, microwave and ultra sound assisted extraction, etc. ME is used as a flavoring agent in ice cream, cookies, pies, puddings, candy, cola soft drinks, and chewing gum, perfumes, as insect traps in insecticides. Among these, the use of methyl eugenol in insecticide is not exploited exhaustively. As a result, the application of it as a potential insecticide is still proclaimed as the priority of research.

OBJECTIVE OF THE PROJECT:

1. Development of green extraction method of methyleugenol extraction from indigenous sources.
2. Isolation and characterizations of extracted methyleugenol.
3. Potential applications of methyleugenol in insecticides.

PROGRESS ACHIEVED

- ❖ Experimental work running.

Drugs & Toxins Research Division

PROJECT TITLE

Green Synthesis of Zinc Oxide/Metal Nanoparticles for Insulin sensing Bio-sensor

INVOLVED RESEARCHERS

1. Nasim Ahmed, SO **(Project Leader)**
2. Nazim Uddin Ahmed, PSO (Associate)
3. Md. Ahasanur Rabbi, SSO (Associate)
4. Firoz Ahmed, SO (Associate)
5. Ali Ahsan Muzahid, SO (Associate)

INTRODUCTION OF THE PROJECT

Nanostructured zinc oxide (ZnO) particle is one of the most demandable and versatile nanomaterial with a wide band-gap energy (3.37 eV) and a large exciton binding energy (59 meV). The semiconducting properties have made it suitable for its widespread applications including ultrasensitive biosensor, gas sensor, UV sensor, photocatalyst, hydrogen storage material, UV shielding material, field emission displays, UV laser with low threshold, etc. Apart from these applications, toxicity of ZnO nanoparticles has also gained widespread interest. Moreover, the inherent cytotoxic property of ZnO NP facilitates the inhibition of cell growth in biological systems which could be an effective strategy to treat diseases. The ability to induce cellular oxidative stress by generating reactive oxygen species (ROS) and free radicals could lead to its cytotoxic response.

Green technique employs various widely available plant extracts, derivatives, and natural polymers for the preparation of ZnO nanostructures. The availability of amino and hydroxyl groups of naturally occurred biomolecules provides suitable coordination environment toward the stabilization of Zn^{2+} and maintain dispersion of ions that further prevent excessive aggregation.

OBJECTIVE OF THE PROJECT

The major objective of this study was to synthesize ZnO-NPs from zinc nitrate hexahydrate [$Zn(NO_3)_2 \cdot 6H_2O$] through a bio-inspired green technique using cow milk as a source of lactose and evaluating biological applications of the synthesized NPs, antibacterial activity against Bacillus cereus (gram-positive) and Pseudomonas aeruginosa (gram-negative) bacteria, cytotoxicity against Hela cell (a human cervical cancer cell) and BHK 21 (a baby hamster kidney fibroblast) cell.

PROGRESS ACHIEVED

One paper with title 'Cow milk lactose inspired fabrication of zinc oxide (ZnO) nanorods for bio-applications' has been published.

PROJECT TITLE

Extraction, isolation, characterization of bio-active compounds from fruit seeds.

INVOLVED RESEARCHERS

1. **Nazim Uddin Ahmed, PSO (Project Leader/Supervisor)**
2. Ali Ahsan Mujahid, RC (Associate)
3. Samia Sarmin, RF (Associate)

INTRODUCTION OF THE PROJECT

The genus citrus, belonging to the Rutaceae family, is characterized by evergreen small trees or shrubs, often spiny. The genus comprises about 150 genera and 1500 species. A considerable of which are available in Bangladesh. In this phase, following four fruit seeds with various medicinal importance were investigated: *C. sinensis L* (Malta) of Rutaceae family effective for the immune system and used in treating pneumonia, blood pressure, intestinal problem and disease related to Vitamin-C deficiency (Milind and Dev, 2012); *E. serratus* of Elaeocarpaceae family, a tropical fruit with nutritive and medicinal values and used traditionally to treat diarrhoea (Biswas *et al.* 2012); *Z. mauritiana* employed in pulmonary ailments, fevers and relieving vomiting and abdominal pains in pregnancy (Dahiru*et al*. 2006); *B. hispida* (chalkumra) used complications such as gastrointestinal problems, respiratory disease, heart disease, diabetes mellitus and urinary diseases (Aqilah *et al.* 2011).

OBJECTIVE OF THE PROJECT

- The objectives of the proposed project are to screen their fatty acid compositions and phytochemical components that can be used as a potential candidate of nutrient in the pharmaceutical and nutraceutical industries.

PROGRESS ACHIEVED

Two fruits were collected, seeds were isolated, grinded to powder, extracted with n-hexane, n-hexane-Chloroform (2:1) and Methanol extracts were subjected to GC-MS analysis. One paper on the obtained results has been submitted. (NB: In the previous year two research papers has been published.)

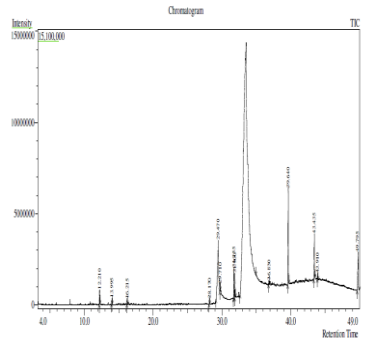
A. squamosa or Ata fruit

Ata Seeds

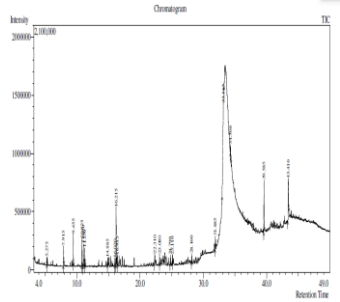
*C.lanatus*or Watermelon

Watermelonseeds

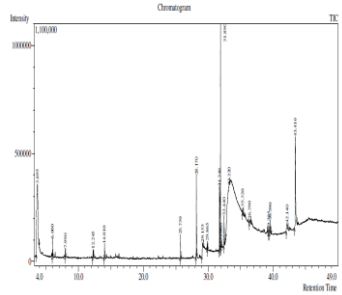
GC-MS Chromatogram of *A. squamosa* (Ata) fruits



Chromatogram of n-Hexane Ext. (13 Compounds detected)

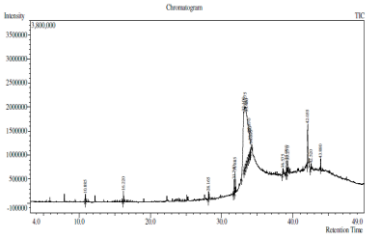


Chromatogram of n-Hexane-Chloroform (2-1) Ext.

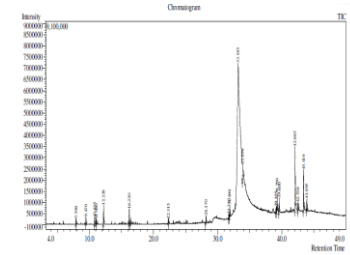


Chromatogram of MeOH Ext. (20 Compounds detected)

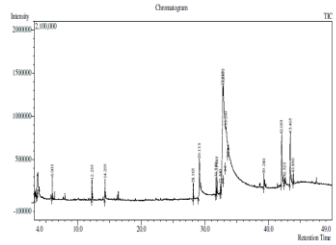
GC-MS Chromatogram of *C. lanatus*(watermelon) fruits



Chromatogram of n-Hexane Ext. (17 Compounds detected)



Chromatogram of n-Hexane-Chloroform (2:1) Ext.



Chromatogram of MeOH Ext. (16 Compounds detected)

OILS, FATS AND WAXES RESEARCH DIVISION

PROJECT TITLE

Unique formulation of edible oil blended rice bran and other indigenous oil

INVOLVED RESEARCHERS

1. **Dr. SarminaYeasmin, PSO (Project leader)**
2. G.M Masud Rana, RC (Associate)
3. Tahmina Akter Chowdhury, RC (Associate)
4. Lailatul Ferdousi, SSO (Associate)
5. Md. Mahmudur Rahman, SO (Associate)

INTRODUCTION OF THE PROJECT

Vegetable oil plays a variety of human nutrition due to its different fatty acids. But high intakes of saturated fatty acids (SFA) increase low density lipoprotein cholesterol (LDL-C) as well as cardiovascular diseases. On the other hand, unsaturated fatty acids have the opposite effects. To combat this fatty acid ratio problem, blending of vegetable oils is gaining popularity in the oil sector to satisfy consumer demands. Mixing of oil combines the potency of two or more edible oils and offers a balance of fatty acids.Two or more oils are mixed in a particular proportion to make the blended oil healthier than any of the individual oils. Blended oil prepared from various indigenous oil seed sources may be that potential sources by which LDL Cholesterol can be reduced as well as to increase antioxidant activity of the body.

OBJECTIVES OF THE PROJECT

1. To make LDL cholesterol lowering and HDL cholesterol increasing blended edible oil from indigenous oil seed sources.
2. To prepare antioxidant enriched blended oil with improve nutritional property

PROGRESS ACHIEVED

- Blended oils have been formulated and characterized
- One process has been accepted.
- One process has been submitted.
- Two papers have been published. One paper has been submitted.
- One patent has been submitted.

PROJECT TITLE

Bio-composites from cellulose and shrimp chitosan for waste water treatment

INVOLVED RESEARCHERS

Project Advisor: Professor Dr. Md. Aftab Ali Shaikh, Chairman, BCSIR

1. **Md. Mahmudur Rahman, SO (Project leader)**
2. Dr. Mst. SarminaYeasmin, PSO (Associate)
3. Mahci Al Bashera, SO (Associate)
4. Tahmina Akter Chowdhury, RC (Associate)
5. G. M Masud Rana, RC (Associate)
6. Dr. BarunKantiSaha, CSO (Associate)

INTRODUCTION OF THE PROJECT

Every year a colossal amount of banana rachis and shrimp/prawn shells are expelled out from processing zones in our country, but they are good source of valuable CNC and chitosan. CNC & chitosan are natural, esculent, nontoxic and 1st and 2nd largest natural biodegradable bio-polymer [M. Jorfi et al. 2015]. Every day a huge amount of waste water are discharge with toxic & carcinogenic dyes and hazardous organic and inorganic pollutants into our environment from textile industries (Rahman, O. et al., 2022). Some diseases such as cholera, diarrhea, dysentery, hepatitis A, etc. are directly linked to the unhygienic and contaminated potable water. It is appraised that per year more than 842,000 people die from diarrhea globally. According to the prediction of World Water Council about 3.9 billion people will live in territory of "water scarce" within 2030. So, it can be said that the treatment/purification waste water will be an urgent challenge to us. For this reason, we will need to build up a better water treatment technology with a very low cost. Here for this research work we want to use bio-nanofiltration process because both of the reinforcement and matrix were bio based have a tremendous adsorption efficiency [H. Jeong et al. 2003] against organic, inorganic and hazardous toxic pollutants. By this study, it will be tried to innovate how to use properly the agricultural wastage in the water and waste water treatment technology by very economical and easy way.

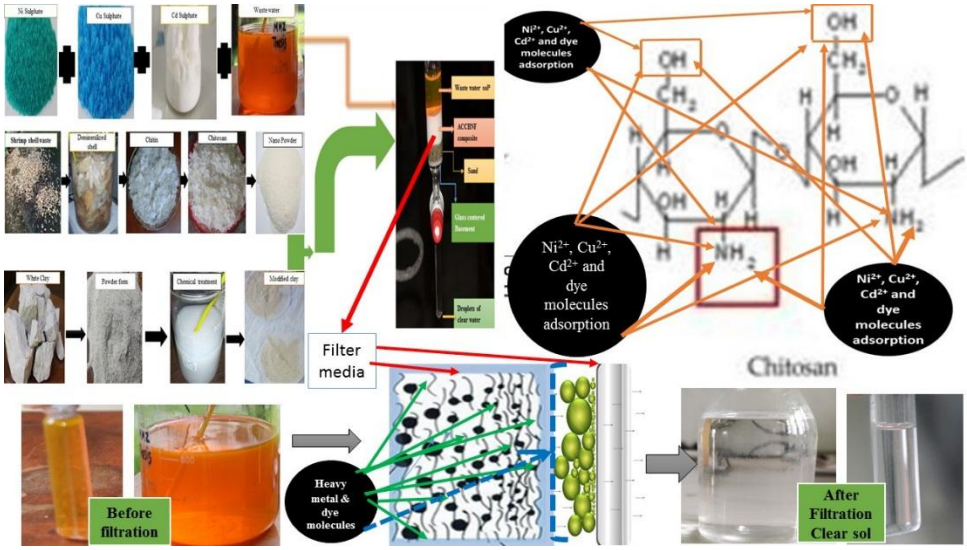
OBJECTIVE OF THE PROJECT

- To produce CNC from Banana Rachis Fiber (agro-waste).
- To extract chitosan from fish waste.
- To fabricate bio-degradable nano-composite.
- To establish a down flow fixed bed filter column
- To purify of industrial and domestic waste water for reuse.

PROGRESS ACHIEVED

- A fixed bed low cost down flow bio-nanofilter column has been successfully installed using prepared chitosan and other modified materials.
- Waste water sample have been purified by this filter and characterized.
- One paper has been submitted in a renowned international journal.

Graphical Abstract



Applied Zoology Research Division

PROJECT TITLE

Production of cost-effective fish and poultry feed from silkworm, black soldier fly and fish waste

INVOLVED RESEARCHERS

1. **LailatulFerdousi, SSO, (Project Leader)**
2. Dr. Mst. SarminaYeasmin, PSO, (Associate)
3. Md. Abu Bakar Siddique, SSO, (Associate)
4. Dr. Mohajira Begum, PSO,(Associate)
5. Jasim Uddin, SO,(Associate)
6. Md. Al-Amin Miah, RC, (Associate)

INTRODUCTION

The fish and poultry sub-sectors are considered as important avenue in fostering agricultural growth and reduce malnutrition for the people in Bangladesh. These are the integral part of farming system in Bangladesh and have created direct, indirect employment opportunity including support services for about 12 million people. These sub-sectors have proved as an attractive economic activity, thereby, indicating its' importance for the entire economy. The sectors account for 14% (poultry) of the total value of livestock output and 35% (fish) are growing rapidly. Poultry and fish contribute about 22-27% and 40-55% of the total animal protein supply respectively in the Bangladesh. For the production of fish and animals, several traditional feed components (e.g., soymeal, fishmeal and others) are commonly used which are of mostly plant origin. Some entrepreneurs in Bangladesh also producing fish and animal feeds from tannery waste containing very high concentrations of toxic chromium metal. These adulterated and low-quality feeds ultimately impose an adverse effect on human health via the food chain. The demand for the feeds is still increasing and consequently, their prices in the local

market are also rising. Traditional feeds may thus become narrow in this manner raising the requirement of alternative feed ingredients with high nutrition values for livestock, fish, and poultry. Fish meal is the conventional source of animal protein in fish diet and it has been valued for its balanced amino acids, vitamin content, palatability and growth factors. But the price of fish and animal feed is increasing gradually, as a result farmers are facing financial lose. Silkworm pupae, black soldier fly and fish waste are highly enriched with protein, fat and minerals. After collection of silk, silk worm pupae have been wasted in silk production industries in Rajshahi region. It is easy to collect the raw materials including silkworm pupae, black soldier fly and fish waste in northern part of Bangladesh. These protein sources have combinedly not used as animal feed. The aforesaid research is still an unexplored topic in Bangladesh and abroad. We want to produce high nutritive fish and poultry feed using silkworm pupae, black soldier fly and fish waste available in the northern region of Bangladesh. We will focus on production of linoleic and alpha-linolenic acid enriched feed through black soldier fly and fish waste. Thus, the goal of the proposed research is to help aquaculture and poultry feed industry development in future.

OBJECTIVE OF THE PROJECT

1. To develop cost-effective high-quality protein as well as fat enriched feed for fish and poultry feed.
2. To evaluate the effect of feed on growth performance of fish and poultry.
3. Bio-chemical characterization of feed and animals.

PROGRESS OF THE PROJECT

- Fish feed has been formulated and characterized.
- One paper has been submitted.

Natural Products Research Division

PROJECT TITLE

Extraction, Purification and Characterization of Natural food colorant from different fruits and vegetables

INVOLVED RESEARCHERS

1. **Shyama Prosad Moulick, SO (Project Leader)**
2. Dr. Md.Badrul Islam, PSO (Associate)
3. Md.Jahidul Islam, SSO (Associate)
4. Md.Sabbir Hasan, SO (Associate)
5. Mahchi Al Bashira, SO (Associate)
6. Mandira Saha, SO (Associate)
7. Sabbir Ahmed, RC (Associate)

INTRODUCTION OF THE PROJECT

Any dye, pigment or substance that imparts color when it is added to food or drink is called food coloring. The physical states of these coloring compounds may be

liquids, powders, gels, and pastes. Natural food colour is any dye, pigment or any other substance that can be found from various natural sources such as plants, fruits, vegetables etc. Food colouring is used both in commercial food production and in domestic cooking. Therefore, an extensive research project has under taken with a view to develop a easier process for the preparation of natural food colour which will minimize the shortage of food colour in our country.

OBJECTIVE OF THE PROJECT

- Isolation of Natural Food colorant from Fruits and Vegetables.
- To ensure food safety by alternative food color

PROGRESS ACHIEVED

- Curcumin has been isolated from Turmeric
- Two papers have been submitted related to the project.

PROJECT TITLE

Development of Cost-Effective Technology for the Isolation of Aleuritic Acid from Lac

INVOLVED RESEARCHERS

1. **Md. Sabbir Hasan, SO (Project Leader)**
2. Dr. Md. Badrul Islam, PSO (Associate)
3. Md. Jahidul Islam, SSO (Associate)
4. Shyama Prosad Moulick, SO (Associate)

INTRODUCTION OF THE PROJECT

Aleuritic acid is a unique acid containing three hydroxyl groups of which two are of adjacent carbon atoms. Aleuritic acid (9, 10, 16-trihydroxy-palmitic acid) is a major constituent acid (~35%) of lac resin (shellac) and has an important industrial application value. Shellac is well known as a wood finish but its principal modern-day use is as a coating for pharmaceutical tablets. Aleuritic Acid is isolated from the resin and mainly used in the perfumery industry, as a starting material for the preparation of "musk" aroma compounds as well as medicinal and bioactive compounds. Aleuritic acid is also an important raw material for the synthesis of the perfumery musk compounds. Aleuritic acid is a critical component in the synthesis of macrocyclic fragrance chemicals such as ambrettolide, iso-ambrettolide, civetone, dehydiocivetone, exaltone, glucose manoaleuritate and related lactones. Lac and Shellac has been used in industries such as paint, varnishes, pharmaceuticals, and confectionaries from centuries.

OBJECTIVE OF THE PROJECT

- To develop cost effective and eco-friendly green technology for the isolation of aleuritic acid from lac.

- To produce aleuritic acid derivatives (Civeton, Ambretollide, Iso-ambretollide, Exaltone) having potential industrial applications in perfumery.

PROGRESS ACHIEVED

- Aleuritic acid from lac has been isolated.

PROJECT TITLE

Isolation of glycoside and terpinoids from Oldenlandiacorymbosa L. to find out the preventive activity of arterial dysfunction

INVOLVED RESEARCHERS

1. **Mahci Al Bashera, SO (Project Leader)**
2. Dr. Md. Badrul Islam, PSO (Associate)
3. Farhana Jahan, SO (Associate)
4. Md. Mahmudur Rahman, SO (Associate)
5. Trissa Saha, SO (Associate)
6. Subarna Sandhani Dey, SO (Associate)

INTRODUCTION OF THE PROJECT

Sugar can be considered a silent poison to cell in high concentration. Recent study has revealed that pentose sugar e.g., pentoside reacts with body protein and form a glycation end product named as Advanced Glycation End (AGE) product. This complex affects the myoglobin of RBC, endothelial cell and fibroblast and collagen content of skin resulting in iron deficiency, atherosclerosis and skin aging respectively.

Oldenlandiacorymbosa L. is locally named as Khetpapra is a weedy plant that can be a source of natural antioxidant. Some scientific investigations has revealed the plant extract possessing anti-cancer, hepatoprotective, analgesic and anti-inflammatory effect. Now we want to isolate bioactive compounds that can inhibit arterial dysfunction so that in future along with some modification it can be used in case of diabetes along with cardiovascular complications.

OBJECTIVE OF THE PROJECT

- Isolation of bioactive compounds

PROGRESS ACHIEVED

- ✓ One paper related to the project has been submitted.

PROJECT TITLE

Development of functional food from seeds and flowers of *Cucurbita maxima*

INVOLVEDRESEARCHERS

1. **Farhana Jahan, SO (Project Leader)**
2. Dr. Md. Badrul Islam, PSO (Associate)
3. Mahci Al Bashera, SO (Associate)
4. Trissa Saha, SO (Associate)
5. Md. Mahmudur Rahman, SO (Associate)
6. Farhana Boby, SO (Associate)
7. Lailatul Ferdousi, SSO (Associate)
8. Shyama Prosad Moulick, SO (Associate)
9. Dr. Barun Kanti Saha, CSO (Associate)

INTRODUCTION OF THE PROJECT

Pumpkin belongs to the family Cucurbitaceae, is widely cultivated because of its high nutritional components which help to enhance the immune function and can alleviate the risk of diseases like heart diseases and cancer. An optimum alimentary diet which helps to improve the consumption of the foods that have a favorable effect on health can be defined as functional food, a concept widely accepted in the society. Pumpkin seeds and flowers may have the ability to receive considerable attention due to its health protective and nutritive benefits. They are a good source of calories, proteins, carotenoids, fiber, minerals, omega-3&6 fatty acids and phytosterols which contribute in regulating cholesterol, reducing depression and diabetes. Hence the present study is designed to prepare a functional food from seed and flower of pumpkin, evaluate the nutritive values and assessing its health beneficial measures.

OBJECTIVE OF THE PROJECT

- To find their nutritional characteristics and antioxidant properties
- To develop functional foods (such as bread, cake, soup and baby food) from seeds and flowers of *Cucurbita maxima*

PROGRESS ACHIEVED

- One paper related to nutritional profile of agro-waste of pumpkin has been submitted.

PROJECT TITLE

Development of Cost-Effective Recovering Technology of Useful Chemicals from waste PET Bottle

INVOLVED RESEARCHERS

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

1. **Dr. Md. Badrul Islam, PSO (Project Leader)**
2. Dr. Md. Nurul Huda Bhuiyan, PSO (Associate)

3. Shyama ProsadMoulick, SO (Associate)
4. Mahci Al Bashera, SO (Associate)
5. Md. Sabbir Hasan, SO (Associate)

INTRODUCTION OF THE PROJECT

PET, which stands for polyethylene terephthalate, is a form of polyester (just like the clothing fabric). It is extruded or molded into plastic bottles and containers for packaging foods and beverages, personal care products, and many other consumer products. Poly Ethylene Terephthalate (PET) is a widely used form of plastics to make bottles for mineral water, soft drink, ketchup, pickle, etc. The global production of PET is expected to increase from 42 million tonnes (2014) to 72 million tonnes by 2020. Specifically, the use of PET for drinking bottles has increased from 300 billion in 2000 to 480 billion in 2016 and it is expected that this growth will continue and the consumption will reach 583 billion bottles by 2021. The waste generated by PET packaging creates not only environmental issues but also disposal problems. Also, PET waste blocks drains leading to overflowing of drains and sometimes flooding. Over the past 50 years, plastic production and pollution have surged. Sardon et al. predicted that by 2050, the mass of plastic waste will be more than fish, because plastic waste keeps rising, combined with rapid disposal and poor mechanisms for recycling. All the findings imply that plastic pollution has already become a serious problem and the damage is much more than we thought. The use of large amount of plastic has created environment threats and thus it needs to be recycled. The recycling of plastic waste requires energy but the energy production with conventional sources depletes the natural resources and creates environmental degradation. Therefore, this study aims to develop cost effective and environment friendly technology for the recovery of industrially applicable chemicals from the PET plastic bottle waste to achieve environmental sustainability to some extent as well in Bangladesh.

OBJECTIVE OF THE PROJECT

- **Main objective:** To develop cost effective and environment friendly recovering technology of useful chemicals from waste PET bottle
- **Specific objective:**
  a) To prepare dimethyl terephthalate from waste PET bottle.
  b) To prepare dimethyl terephthalate derivative for industrial application.
  c) To prepare activated carbon (AC) adsorbent from waste PET bottles.

PROGRESS ACHIEVED

- Several chemical depolymerization techniques have been applied and recovered terephthalic acid as starting raw material for PET production.

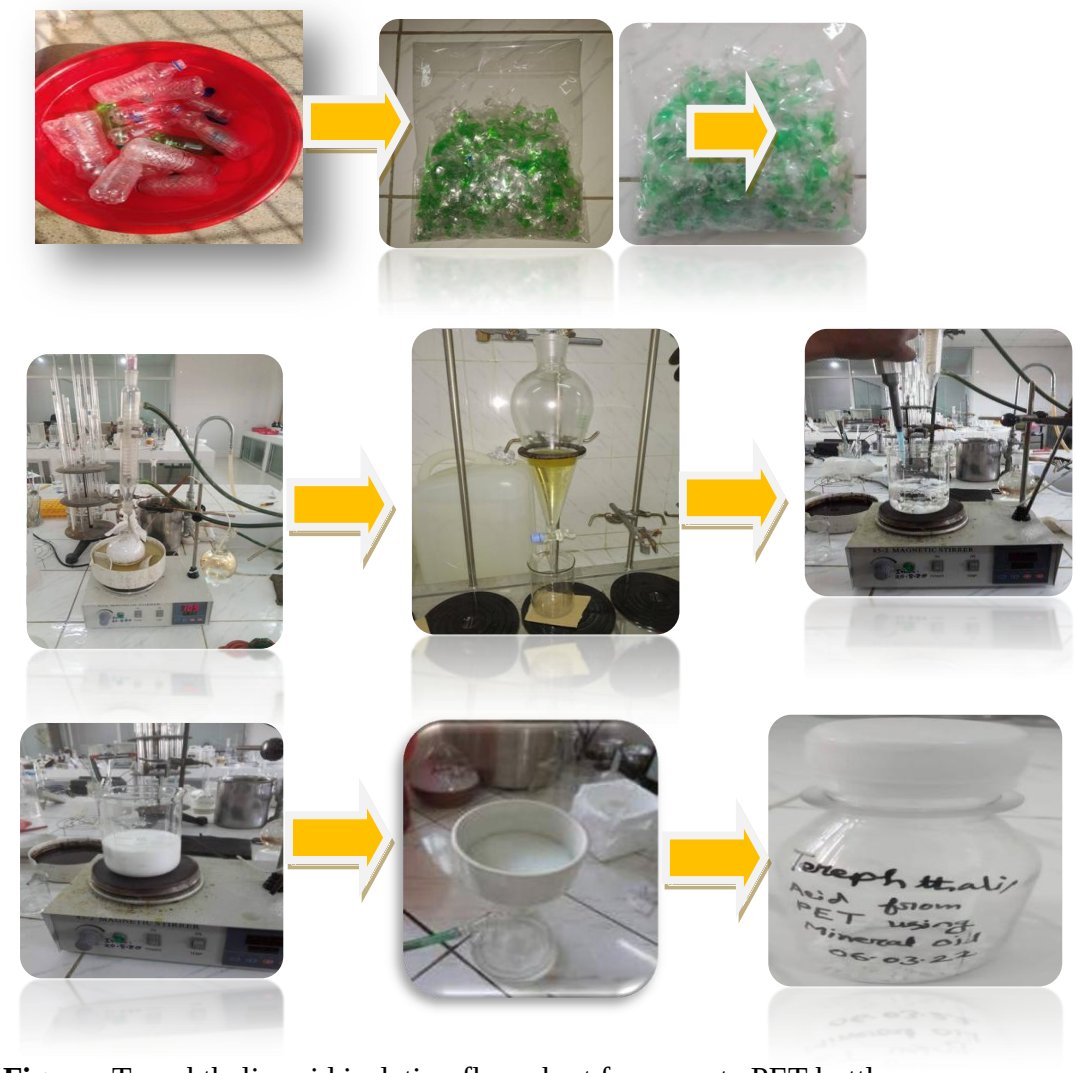


Figure: Terephthalic acid isolation flow chart from waste PET bottle.

Fruits and Food Processing and Preservation Research Division

PROJECT TITLE

Isolation and identification of bio-active compounds from the bark extract of *Annona muricata*

INVOLVED RESEARCHERS

1. **Subarna Sandhani Dey, SO (Project Leader)**
2. Dr. Md. Murshed Hasan Sarkar, SO (Associate)
3. Mahci Al Bashera, SO (Associate)
4. Firoz Ahmed, SO (Associate)

5. Shyama ProsadMoulick, SO (Associate)
6. Trissa Saha, SO (Associate)

INTRODUCTION OF THE PROJECT

Annona muricata tree belongs to the Annonaceae family, bears edible fruit which is known as soursop or graviola.The pseudoscientific practices (mostly known as homeopathic or naturopathic medicines) are using different parts of the *A. muricata* tree including leaf, steam, root along with the seeds of the ripe fruit to treat different type of diseases. Its effectiveness as anti-cancer, anti-inflammatory, anti-hyperglycemic, anti-hyperlipidemic, antimalarial, anti-parasitic, antibacterial, insecticidal, molluscicidal has already been listed. This study therefore aimed to determine the phytochemical composition, as well as toisolate and identify bio-active compounds from bark extract of *A. muricata* tree

OBJECTIVE OF THE PROJECT

- This research has been aimed to isolate and identify bio-active compounds from bark extract of *A. muricata* tree
- To search a noble compound from natural source that can be considered for designing a drug molecule.

PROGRESS ACHIEVED

Different solvent extract collected from the bark of local *A. muricata* plant contains Heneicosane, 13-Docosenamide, 1,2-Benzenedicarboxylic acid ester, DTBBQ, Ecosane, 9-mOctadecanamide, Stigmast-4-en-3-one etc. so, it can also be used as an alternative source of natural antimicrobial, anti-inflamatory, anticancer, hypolipedemic agent with pharmacological impact.

PROJECTTITLE

Isolation and Application of Prodigiosin in controlling Bacterial and Cancer cell proliferation

INVOLVED RESEARCHERS

1. **Farhana Boby, SO (Project Leader)**
2. Dr.Md. Murshed Hasan Sorkar, SSO (Associate)
3. SubarnaSandhani Dey, SO (Associate)
4. Mahci-Al-Bashera, SO (Associate)
5. Farhana Jahan, SO (Associate)
6. Trissa Saha, SO (Associate)

INTRODUCTION OF THE PROJECT

In recent years, the emergence and rapid spread of antibiotic resistance have become a matter of concern for the world health community. Therefore, scientists are continuously searching for potential natural sources to combat these problems and Prodigiosin, a secondary metabolite of bacteria has achieved great attention in these circumstances. It shows a broad spectrum of antibacterial activity against Gram-positive and Gram-negative bacteria as well as anti- cancer,

anti- fungal, anti- protozoal, anti- malarial, anti- larval, and immunosuppressive activity. So, the study has focused on utilizing prodigiosin as an antimicrobial agent against different pathogens associated with diseases along with their Minimum inhibitory and Minimum bactericidal dose. We also observed the antibiofilm activity of prodigiosin against these pathogens and assessed the site of action of prodigiosin on these pathogenic bacteria.

OBJECTIVE OF THE PROJECT

- Isolation and Identification of Prodigiosin producing *Serratia mercesence* from natural source.
- Media optimization, production, extraction and purification of prodigiosin from *Serratia mercesence.*
- Assessment of antimicrobial activity against Gram- positive and Gram- negative bacteria.
- Observation of anti-biofilm activity against opportunistic pathogens and determination of mode of action.

PROGRESS ACHIEVED

- A potential prodigiosin producing strainof *Serratia mercesence*has identified. Prodigiosin has been produced in optimized media, extracted and characterized. Antimicrobial and antibiofilm activity of prodigiosin against Gram-positive and Gram-negative bacteria have been evaluated.
- A research paper has submitted.

PROJECT TITLE

Production of different Fermented fruit Vinegars and exploring their potential health benefits

INVOLVED RESEARCHERS

1. **Md. Jahidul Islam, SSO (Project Leader)**
2. Dr. Md. Nurul Huda Bhuiyan, PSO (Associate)
3. Subarna Sandhani Dey, SO (Associate)
4. Farhana Boby, SO (Associate)
5. Anik Kumar Saha, SO (Associate)
6. Dr. Barun Kanti Saha, CSO(Associate)

INTRODUCTION OF THE PROJECT

According to FAO, 21.6% of the food produced in the world is wasted, starting from the post-harvest stage until its distribution. In recent years, fruit vinegars have been singled out as healthy drinks with potential health remedies which can simply be prepared by fermenting the fruits. Fruit vinegar are also strong Detoxifying and purifying agent. Apple cider vinegar and Coconut vinegar are two of the most popular and available fruit vinegars in the market place. Present study is designed to develop different fruit vinegars, comparing their nutrient content and exploring their potential health benefits.

OBJECTIVE OF THE PROJECT

- Developing different types of fruit vinegars at low cost than the available imported products at the market place.
- To study nutrient profile of the developed vinegar from different fruit source with health benefits like reducing glycemic index, weight loss, antimicrobial effect etc.source.

PROGRESS ACHIEVED

Vinegar has been prepared from both green and ripe mango. Optimization of the quality and other parameters are ongoing.

Applied Botany Research Division

PROJECT TITLE

Development of Feed Products Containing Omega-3 Fatty Acid from Algae

INVOLVED RESEARCHERS

1. **Md. Moniruzzaman , RC** (**Project Leader)**
2. Dr. Sabrina Naz, Professor, Department of Botany, Rajshahi University (Associate)
2. Dr. Arfatun Nahar Chowdhury, PSO (Associate)
3. Dr. Murshed Hasan Sarker, SSO (Associate)
4. Dr. SarminaYeasmin, PSO (Associate)
5. Nazim Uddin Ahmed, PSO (Associate)

INTRODUCTION OF THE PROJECT

Rajshahi City Corporation is enriched with numerous types of fresh water bodies such as, Tank, Pond, Canal, Rice Field and the Padma River. All these water bodies contain diversified types of algae. Algae are rich source of medicinal and chemical components, such as, Omega-3 fatty acid. Some of them are great industrial values. Except a patent from *Spirulina* potentiality of fresh as well as marine algae of Bangladesh are yet to be explored. Algae throughout the world now a days, is gaining booming importance as a source of human food, drink, pharmaceutical products, as cosmetics, toiletries as well as source of poultry feed, foliar fertilizer, bio-plastic, bio-fuel and fish-feed ingredients. Till now a meagre initiative had been undertaken to explore these potentialities from Bangladesh perspective.

The development of an efficient large-scale cultivation system for the commercial production of EPA and DHA would address a major global need. This is why the present study is undertaken.This research activity aims to develop the technique of isolation of Omega-3 fatty acid containing algae collected from different areas and their easy culture as well as harvesting methodology which will eventually help to build up eco-friendly industry.

OBJECTIVE OF THE PROJECT

- Isolation and Characterization of Omega-3 containing Algae**.**
- Optimization of isolated Algal culture in laboratory scale.
- To enhance nutritional value of edible oil with isolated algal oil.
- To produce food supplements.

PROGRESS ACHIEVED

- Manuscript of a paper has been written.

LIST OF SCIENTIFIC PAPERS PUBLISHED (JULY 2021 – JUNE 2022)

1. Qamruzzaman, M., **Ahmed, F.** & Mondal, M.I.H. (2022), An Overview on Starch-Based Sustainable Hydrogels: Potential Applications and Aspects. *J Polym Environ*, 30, 19–50. https://doi.org/10.1007/s10924-021-02180-9
2. Mondal M.I.H., Haque M.O., **Ahmed F.,** Pervez M.N., Naddeo V., Ahmed M.B. (2022), Super-Adsorptive Biodegradable Hydrogel from Simply Treated Sugarcane Bagasse. *Gels*, 8(3), 177. https://doi.org/10.3390/gels803017
3. **Khatun M.H.** & Mostafa M.G. (2022), Optimization of Dyeing Process of Natural Dye Extracted from Polyalthia longifolia Leaves on Silk and Cotton Fabrics. *Journal of Natural Fibers*, DOI: 10.1080/15440478.2022.2081281
4. **Al Bashera**, M., Mosaddik, A., El-Saber Batiha, G., Alqarni, M., Islam, M. A., Zouganelis, G.D., Alexiou, A., & Zahan, R. (2021). In Vivo and In Vitro Evaluation of Preventive Activity of Inflammation and Free Radical Scavenging Potential of Plant Extracts from *Oldenlandiacorymbosa* L. Applied Sciences, 11(19), 9073, https://doi.org/10.3390/app11199073
5. **Hasan, M. S**., Al Foisal, J., Khan, G. M. A., Jahan, R., Hasanuzzaman, M., Alam, M. S., Karim, M. M., Gafur, M. A., Khan, M. A., & Sabur, M. A. (2022). Microfibrillated Cellulose-Silver Nanocomposite Based PVA Hydrogels and Their Enhanced Physical, Mechanical and Antibacterial Properties. Journal of Polymers and the Environment, 30, 2875–2887. https://doi.org/10.1007/s10924-022-02406-4
6. **Hasan, M.S**., **Al Bashera, M**., **Jahan, F**., **Hossain, A.**, **Waliullah, M**., & **Islam, M. B**. (2022). Proximate composition of some commercially available fish and poultry feeds sold in the market of Bangladesh. International Journal of Biosciences, 20(4), 1-8. http://dx.doi.org/10.12692/ijb/20.4.1-8
7. **Mst. Sarmina Yeasmin**, **Tahmina Akhtar Chowdhury**, **G M Masud Rana**, **MD. Mahmudur Rahman and Lailatul Ferdousi**. Characteristics of Sesame oil (*Sesamum indicum* L) Seed Meal Grown in the Northern Region of Bangladesh. *Biomedical J Sci & Tech Res*, 38(1): 27167-27172, August 2021. DOI:10.26717/BJSTR.2021.38.006083
8. Obydur Rahman, **Md. Mahmudur Rahman** & Mohd Maniruzzaman: Removal of dye and heavy metals from industrial wastewater by activated charcoal-banana rachis cellulose nanocrystal composites filter, *International Journal of Environmental Analytical Chemistry*, 1-19, February 2022. DOI:10.1080/03067319.2022.2039647

9. **Lailatul Ferdousi**, Nahid Sultana,Ummey Hafsa Bithi, SharminAkter Lisa, Md. Rakibul Hasan, Md. Abu Bakar Siddique.Nutrient Profile of Wild Black Soldier Fly (Hermetiaillucens) Prepupae Reared on Municipal Dustbin's Organic Waste Substrate. Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci. *92*(2), 351-357. 2022.https://doi.org/10.1007/s40011-021-01340-0
10. **Jasim Uddin**, Md. Nuruzzaman, Bijan Mohon Chaki, Md. **Al-Amin Miah**, **LailatulFerdousi**, **Mst. SarminaYeasmin**, **GM Masud Rana**, **Mohajira Begum**. GC-MS analysis of bioactivecompounds in methanolicextract of bhat(Clerodendrumviscosum) leaves in Bangladesh. International Journal of Biosciences. 20, No. 5, p. 103-108, 2022
11. MrMuzahidul Islam, Dr Sadia Afrin, Mr Firoz Ahmed, **Dr. Braun KantiSaha,** Mr Md. Nur Hossain: Commercial milk quality and acceptability based on microbiological status: a comparative study: American Journal of Food Technology. 16 (1): 1-8(2021)
12. A. H. M. Golam Kibria,,Md Khalequzzaman, Fahmida Afroz Khan, Shahrin Emdad Rayna , Md Maruf Haque Khan, Md Mohammad Rashidul Alam, Thouhidur Rahman KM, **Barun Kanti Saha**, Md. Motalab , Syed Shariful Islam. Health Compromising Ingredients in Fizzy Drinks Available in the Markets of Dhaka City,: Bangladesh. Journal of Food Science and Nutrition Research: **4(1),** 057-065(2021)
13. Abdul Aziz, Abu Hassan[1], ShishirKumer Roy, Md. Zahurul Haque, **Barun Kanti Saha**, Salma Ahmed, Mahbubar Rahman, Liton Chandra Mohanta, Mashuk Ahmed. Nutritional Status of *Gracilariatenuistipitata*var.*liui*(Red seaweed) from Nuniachara, Cox's Bazar, Bangladesh. *Bangladesh Journal of Scientific and Industrial Research:* **56(1),** 39-46(2021)
14. A. Aziz1, S. K. Roy, A. Hassan, M. Z. Haque, U. F. Shahjadee , K. Mondal , L. C. Mohanta , O. F. Mashuk and **B. K. Saha**. Potential of *Ulva linza L*. and *Caulerpa racemosa var. uvifera* seaweeds from Cox's Bazar, Bangladesh as sea vegetable. *Bangladesh Journal of Scientific and Industrial Research:* **56(3),** 223-230(2021)
15. Motalab M., Mumtaz B, Mahajan S, **Saha B K** Jahan S. Heavy metals, trace elements, minerals and ascorbic acid content of occasionally consumed eight indigenous fruits in Bangladesh. Food Research, Accepted **on** 19.01.2022
16. Sha Md. Shahan Shahriar, **Md. Jahidul Islam**, Md. Abu Hanif, Sayed M A Salam1(February-2022), Level of Chromium and Zinc in Groundwater and Cows' Raw Milk in Rajshahi, Bangladesh International Journal of All Research Education and Scientific Methods (IJARESM), ISSN: 2455-6211 Volume 10, Issue 2
17. A. Arefin, M. S. Habib, **N. U. Ahmed**, M. A. Rahim , M. Ibrahim , S. C. Bhattacharjee, D. Chakraborty , S. Das , D. Karmakar , D. Bhowmik , S. Islam , M. S. Arefin Allergic rhinitis and importance of fexofenadine hcl sustained release microsphere as its treatment approach. *International Journal of Applied Pharmaceutics*, 14(1):13-17. 2022, ISSN-0975-7058
18. S. T. Sahil, A. T. Promi, M. K. Hossain, **N. Ahmad**, M. A. A. Muhit, S. C. Dey and M. Ashaduzzaman. Cow milk lactose inspired fabrication of zinc oxide (ZnO) nanorods for bio-applications. Inorganic and Nano-Metal Chemistry. Taylor & Francis (Web of Science and Scopus Index, IF: 1.712), DOI: 10.1080/24701556.2022.2034006
19. **Ahmed S**, **Chowdhury AN**, **Dey AK**, **Moniruzzaman M**, **Kowser A**. Isolation and Identification of Rhizosphere Soil Fungi from Papaya (*Carica papaya* L.) and Eggplant (*Solanum melongena* L.) at BCSIR Campus in Rajshahi, Bangladesh. International

Journal of Scientific and Research Publications (IJSRP) April 2022, 12(4):21. DOI: 10.29322/IJSRP.12.04.2022.p12404

PUBLISHED BOOK CHAPTER

20. **Ahmed F.,**Nuruzzaman M. & Mondal M.I.H. (2022), 10- Photo-responsive hydrogel-treated fabrics for smart drug delivery systems, Editor(s): Md. Ibrahim H Mondal, In The Textile Institute Book Series, 'Medical Textiles from Natural Resources', Woodhead Publishing, (**Scopus Indexed**). https://doi.org/10.1016/B978-0-323-90479-7.00024-5
21. Mondal M.I.H., **Ahmed F.,** Islam M.M, Pervez M.N. &Saha J. (2022), 11- Metal and metal oxides nanoparticles in healthcare and medical textiles, Editor(s): Md. Ibrahim H Mondal, In The Textile Institute Book Series, 'Medical Textiles from Natural Resources', Woodhead Publishing, (**Scopus Indexed**). https://doi.org/10.1016/B978-0-323-90479-7.00010-5
22. Saha J., **Ahmed F.,** Mahmud S.T. & Mondal M.I.H. (2022), 2 -Protective medical textiles for patients and health professionals, Editor(s): Md. Ibrahim H. Mondal, In The Textile Institute Book Series, 'Protective Textiles from Natural Resources', Woodhead Publishing, (**Scopus Indexed**).https://doi.org/10.1016/B978-0-323-90477-3.00007-9
23. Mondal M.I.H., Md Monirul Islam M.M, Haque M.I. &**Ahmed F.** (2022), 3- Natural, biodegradable, biocompatible and bioresorbable medical textile materials, Editor(s): Md. Ibrahim H Mondal, In The Textile Institute Book Series, 'Medical Textiles from Natural Resources', Woodhead Publishing, (**Scopus Indexed**). https://doi.org/10.1016/B978-0-323-90479-7.00023-3
24. Md. Nahid Pervez M.N., Hossain M.Y., Talukder M.E., Faisal A.M., Hasan K.M.F., Islam M., **Ahmed F.,** Cai Y., Stylios G.K., Naddeo V. & Mondal M.I.H. (2022), 3- Nanomaterial-based smart and sustainable protective textiles, Editor(s): Md. Ibrahim H. Mondal, In The Textile Institute Book Series, 'Protective Textiles from Natural Resources', Woodhead Publishing, (**Scopus Indexed**). https://doi.org/10.1016/B978-0-323-90477-3.00001-8

Published Conference Proceedings

25. **Kadri H.J.,** Mondal M.I.H., **Ahmed F.,** Qamruzzaman M. & Habib M.A. (2021), ZnO Nanoparticles Impregnated Starch/PVA Biocompatible Composite Hydrogel- An Advanced Wound Care Product. 2021 International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC4ME2), (**Scopus Indexed**). doi: 10.1109/IC4ME253898.2021.9768610
26. Nuruzzaman M., **Ahmed F.**& Mondal M.I.H. (2021), Removal of Reactive Brown Dye from Industrial Effluent by Chitosan-Sodium tri-poly Phosphate Nano-dispersion Adsorbent, 2021 International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC4ME2), (**Scopus Indexed**). doi: 10.1109/IC4ME253898.2021.9768537
27. Chakraborty S.C., Nuruzzaman M., **Ahmed F.**& Mondal M.I.H. (2021), Preparation of Chitosan-Coated Silica from Rice Husk and Its Application on Chromium Adsorption, 2021 International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC4ME2), (**Scopus Indexed**). doi: 10.1109/IC4ME253898.2021.9768482

LIST OF PATENTS SUBMITTED

1. "Green and Efficient Sono-Chemical Synthesis of Schiff's Base Compound and Applications Thereof" has been submitted on 18 July, 2021.
2. "Non-Greasy Moisturizing Composition Containing Aloe Vera and Preparation Thereof" has been submitted on 26 January, 2022.
3. A revised patent submitted for "A Process for the Production of dehydrated delicious ready to eat product from amla" on 16 June, 2022. Inventor, **Dr. Muhammad Badrul Islam**, PSO and Muhammad Abdul Jalil, PSO. Patent Appl. No. 12/2021/779 dt. 02.03.2022
4. A process for the "Production of cholesterol lowering edible blended oil using sesame and mustard seeds" by **Dr. Mst. Sarminayeasmin**, **G. M. Masud Rana**, **TahminaAkter Chowdhury**, **LailatulFerdousi**, **Md. Mahmudur Rahman**, **Ali Ahsan Muzahid** and **Raton kumar Biswas**. Ref. 39.02.8140.038.37.084.17.513 Date: 16/6/2022.

PROCESS ACCEPTED

1. A process for the "Production of cholesterol lowering edible blended oil using sesame and mustard seeds" by **Dr. Mst. Sarminayeasmin**, **G. M. Masud Rana**, **TahminaAkter Chowdhury**, **LailatulFerdousi** and **Md. Mahmudur Rahman**. Vida letter no. 39.02.0000.043.37.891.22/625 Date: 09.03.2022

2. A Process for The Production of "Ripe Jackfruit Powder for Instant Drink"; Md. Ibrahim, A. K. M. S Alam, **SubarnaSandhani Dey**, **Farhana Boby**, ParomaArefin: **Accepted on** 19/04/2022, **Ref. No**. 39.02.0000.43.37.793.20/1178
3. A process for the production of "Strawberry Juice Drink**"**: Sharmin Jahan, Md. Motalab, Bushra Mumtaz, **B. K. Saha**, Sadia Afrin: **Accepted on** 18/04/2022**, Ref. No**. 39.02.000.043.37.890.22/1154

PROCESS SUBMITTED

1. A Process for the "Production of nutro cake from fortified flour of defatted sesame meal" by **Dr. Mst. Sarminayeasmin**, **G. M. Masud Rana**, **TahminaAkter Chowdhury**, **LailatulFerdousi**, **Md. Mahmudur Rahman**. Ref no. 39.02.8140.038.48.002.17.858 Date: 11.01.2022.

2. A process for the facile synthesis of chitosan from tiger prawn (*Penaeus monodon*) head shell by **Md. Mahmudur Rahman**. Ref. 39.02.0000.043.37.857.21/367 Date: 05.05.2022

3. A Process for the Production and Preservation of Nutritious Flour from Ripe Jackfruit Seed"; Md. Ibrahim, A. K. M. S Alam,Subarna Sandhani Dey, Farhana Boby,Paroma Arefin. **Ref. No**. 39.02.8140.038.37.103.17/1233, Date: 27/01/2020

HUMAN RESOURCE DEVELOPMENT

SCIENTISTS PURSUING Ph.D

1. **Md. Ahasanur Rabbi**, Senior Scientific Officer, Fibre& Polymer Research Division, BCSIR Labs, Rajshahi, Name of Institute: Department of Chemistry, University of Rajshahi, Bangladesh under supervision of Professor Dr. Hasan Ahmed, Ph. D Research Title: "Preparation of Polymer Particles Derived from Natural Polymer and Their Application as adsorbents for Biomolecules and Toxic Metals".
2. **Most. Halima Khatun**, Senior Scientific Officer, Fiber and Polymer Research division, BCSIR, Rajshahi Laboratories, Rajshahi, pursuing Ph.D. degree from Institute of Environmental Science, University of Rajshahi Bangladesh under supervision of Professor Dr. Md. Golam Mostafa: "Application of natural dyes in textiles and their environmental sustainability".
3. **Hurey Jahan Kadri**, Research Chemist, Fiber and Polymer Research Division, BCSIR, Rajshahi Laboratories, Rajshahi, pursuing Ph.D. degree from Department of Applied Chemistry and Chemical Engineering, University of Rajshahi Bangladesh under supervision of Professor Dr. Md. Ibrahim H. Mondal: "Study of the Polysaccharide based Biocompatible Composite Hydrogel and Its Application".
4. **Md. Mahmudul Hassan Mondol**, Scientific Officer, Drugs and Toxins Research Division BCSIR labs, Rajshahi. Name of University's Department: Green Chemistry lab, Department: Chemistry, Kyungpook National University, South Korea. Title of the synopsis: Synthesis and characterization of different materials for the application of adsorptive and catalytic removal of toxic substances and sensing of biochemical as well as toxic chemicals for the environment.

RESEARCH FELLOW SUPERVISION

1. Shamsad Sarmin from University of Rajshahi is carrying out research at Natural Product Research Division of BCSIR, Rajshahi Laboratories as Professor Mofiz Uddin Ahmed Memorial research fellow under the Supervision of **Dr. Md. Badrul Islam, PSO**, Scientist-in-Charge, Natural Product Research Division of BCSIR, Rajshahi Laboratories.
2. Samia Sharmin is carrying out research as Professor Nurul Afsar Khan Post Graduate fellow with synopsis *Extraction, isolation, characterization of bio-active compounds from fruit seeds* under supervision of **Nazim Uddin Ahmed**, **PSO,** Scientist-in-Charge of Drugs and Toxins Research Division, BCSIR, Rajshahi Laboratories.

STUDENT SUPERVISION

Umme Habiba Sathi, from Institute of Environmental Science, University of Rajshahi is carrying out M.Phil. research with the title "Ecology and Biochemical Composition of Pila globosa" under the Co-supervision of **Dr. Md. Badrul Islam**, **PSO**, Scientist-in-Charge, Natural Product Research Division of BCSIR, Rajshahi Laboratories.

Md. Muhaimenul Haque, from Department of Biochemistry and Molecular Biology, University of Rajshahi is carrying out MSc research with the title "Study on the Antioxidant, Antidiabetic Potentiality and in-silico evaluation of Phylanthusacidus"under the Co-supervision of **Dr. Md. Badrul Islam**, **PSO**, Scientist-in-Charge, Natural Product Research Division of BCSIR, Rajshahi Laboratories.

Md. Mahmud Hasan, from Department of Fisheries, Univerersity of Rajshahi has completed thesis work entitled "Effect of total replacement of fish oil with mustard oil on growth performance, proximate composition and fatty acid composition in mono-sex tilapia, *Oreochromis niloticus"* under the co-supervision of **Dr. Mst.SarminaYeasmin**, **PSO** of oils, fats and waxes research division.

Md. Imran Miah from Department of Fisheries, Univerersity of Rajshahi has completed thesis work entitled "Effect of Fermented Mustard Oil Cake On Growth, Production And Proximate Composition of Common Carp*"* under the co-supervision of **Dr. Mst.SarminaYeasmin**, **PSO** of oils, fats and waxes research division.

Sabina Pervin from Department of Botany, Univerersity of Rajshahi has completed thesis work entitled "Extraction And Characterization of Moringa Oleifera Oil From Leaf And Seeds In Bangladesh" under the co-supervision of **Dr. Mst.SarminaYeasmin**, **PSO** of oils, fats and waxes research division (Co-supervisor)

Meghla Munshi from University of Rajshahi is carrying out MSc Thesis work with the title of "Pollution Assessment of Selected Heavy Metals in Irrigation Water in Rajshahi City of Bangladesh" under the joint supervision ofSha Md. Shahan Shahriar, Associate Professor, ACCE, RU and **Md. Jahidul Islam**, Senior Scientific Officer, BCSIR Rajshahi Laboratories.

SEMINAR PRESENTION

1. **Md. Ahasanur Rabbi**, **SSO**presented a seminar on "*Green Synthesis of Silver nanoparticles & their application as Advance coating agent*" at BCSIR Rajshahi.
2. **Firoz Ahmed**, SO presented a seminar on *"Quaternary Chitosan-Silane based Hybrid Formulation for the Development of Bacterially Anti-adhesive cotton Fabric*" at BCSIR Rajshahi.
3. **Md. Sabbir Hasan**, **SO** presented a seminar on "Development of Cost-Effective Technology for the Isolation of Aleuritic Acid from Lac" at BCSIR, Rajshahi Laboratories Auditorium on 18 January, 2022.
4. **Dr. Md. Badrul Islam**, **PSO** presented a seminar on "Advantage of Good Laboratory Practice" at BCSIR, Rajshahi Laboratories Auditorium on 23 February, 2022.
5. **Dr. SarminaYeasmin**, **SSO** presented a seminar on R & D project work held in October, 25th 2022 at BCSIR Laboratories, Rajshahi.

6. **Lailatul Ferdousi**, **SSO** presented a seminar on R & D project work held in 25th November, 2021 at BCSIR Laboratories, Rajshahi
7. **Farhana Boby**, **SO** presented a seminar on "Isolation and Application of Prodigiosin in Controlling Bacterial and Cancer Cell Proliferation" on 20th December 2021.
8. **Nazim Uddin Ahmed**, **PSO**, delivered seminar on *Right to Information (RTI)* at BCSIR Rajshahi Laboratories at 9th October, 2021
9. **Samia Sharmin**, **Research fellow**, delivered seminar on *Evaluation of IC_{50} and MUPE value of four different fruit seed oils and its' significance* at BCSIR Rajshahi Laboratories at 3rd January, 2022

PARTICIPATION IN IN-HOUSE AND INTERNATIONAL TRAINING

Md. Ahasanur Rabbi, **SSO** attended at the In-house training on X-ray Diffraction (XRD), held in 02-06 January, 2022 at IGCRD, Dhaka.

Most. Halima Khatun, **SSO** attended at the In-house training on X-ray Diffraction (XRD), held in 02-06 January, 2022 at IGCRD, Dhaka.

Most. Halima Khatun, **SSO** attended at the In-house training on Fourier-Transform Infrared Spectrophotometer (FTIR) & Universal Testing Machine (UTM), held in 08-12 May, 2022 at LRI, Saver.

Firoz Ahmed, **SO** attended at the In-house training on Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS), held in 10-14 October, 2021 at CARF, Dhaka.

Firoz Ahmed, **SO** attended at the In-house training on Fourier-Transform Infrared Spectrophotometer (FTIR) & Universal Testing Machine (UTM), held in 08-12 May, 2022 at LRI, Saver.

Hurey Jahan Kadri, **SO**attended at the In-house training on X-ray Diffraction, held in 02-06 January, 2022 at IGCRD, Dhaka

Farhana Jahan, **SO** has participated in an In-house training on 'Histopathological Techniques' held on 03-07 October, 2021 at BTRI, BCSIR, Dhaka.

Amin Hossain, **SO** has participated in an In-house training on "Ion Chromatography and Preparative High Performance Liquid Chromatography" during 05-09 June, 2022 at Central Analytical Research and Facilities (CARF) of BCSIR Rajshahi Laboratories.

Md. Sabbir Hasan, SO has participatedin an In-house training on "E-Governance and Innovation Action Plan" held on June20, 2022 held at IFST Auditorium, BCSIR, Dhaka. Scientists from different units of BCSIR participated in the program.

Dr. SarminaYeasmin, **PSO** attended In-house training on Ion Chromatography (IC) held in 5 to 9 June 2022 at BCSIR Laboratories, Rajshahi.

Dr. SarminaYeasmin, **PSO** attended In-house training on APAMS Software held in 28 December 2021 at BCSIR Dhaka.

Dr. Sarmina Yeasmin, **PSO** attended In-house training on e-Nothi Management held in 6 to 7 March 2022 at BCSIR Laboratories, Rajshahi.

G. M. Masud Rana, **RC** attended In-house training on GC held in 22 to 26 August 2021 at BCSIR Laboratories, Dhaka.

Tahmina Akter Chowdhury, RC attended In-house training on GC held in 22 to 26 August 2021 at BCSIR Laboratories,,Dhaka.

Md. Mahmudur Rahman, **SO**, attended In-house training on GC-MS/MS held in 21 to 25 November 2021 at IFST, Dhaka.

G. M. Masud Rana, **RC** attended In-house training on GC-MS/MS held in 21 to 25 November 2021 at IFST, Dhaka.

Tahmina Akter Chowdhury, RC attended In-house training on GC-MS/MS held in 21 to 25 November 2021 at IFST, Dhaka.

Md. Mahmudur Rahman, **SO** In-house training on TG/DTG/DTA/TMA held in January 2022 at BCSIR Laboratories, Dhaka.

LailatulFerdousi, **SSO** attended at the In-house training on "Histopathological Techniques" from October, 03 – 07, 2021 at BTRI, BCSIR, Dhaka.

Lailatul Ferdousi, **SSO** attended at the In-house training on "Ion Chromatography & Preparative High Performance Liquid Chromatography held in 05 to 09 June 2022 at BCSIR Laboratories, Rajshahi.

Lailatul Ferdousi, **SSO** attended at the In-house training on "ISO/IEC 17025:2017" held in 16 to 17 June 2022 at BCSIR Laboratories, Rajshahi.

Jasim Uddin, SO attended at the In-house training on "ISO/IEC 17025:2017" held in 16 to 17 June 2022 at BCSIR Laboratories, Rajshahi.

Md. Jahidul Islam, SSO attended at the In-house Training course on Operation and maintenance of UV- Vis-NIR Spectrophotometer held on 12-16 September, 2021 at BCSIR.

Subarna Sandhani Dey, SO attended the training program on RT-PCR held in 07-11th November 2021 at Genomic Research Laboratories, BCSIR Dhaka.

SubarnaSandhani Dey, SO attended the training program on X-Ray Diffractometer (XRD) held in 02-06th January 2022 in IGCRT, BCSIR Dhaka.

Farhana Boby, SO attended the training program on "Polymerase Chain Reaction (PCR)" held on 30th January to 3rd February 2022 at BCSIR Chittagong Laboratories.

Md. Jahidul Islam, SSO and Farhana Boby, SO attended the training program on"e-Governance and Innovation" held on 20th June 2022 at IFST BCSIR Dhaka.

Subarna Sandhani Dey, SO and Farhana Boby, SO attended the training program on ISO/IEC 17025:2017 held in 16-17th June 2022 at BCSIR Rajshahi Laboratories.

Nazim Uddin Ahmed, PSO took part in the in-house training on X-Ray Photoelectron Spectrometer (XPS) at IGCRT, BCSIR Dhaka during 19th -23th September, 2021

Nazim Uddin Ahmed, **PSO** took part in the in-house training on Rhiuometer, Ricroviscometer with Density model at BCSIR Dhaka Lab during 3rd -7th April, 2022

Nazim Uddin Ahmed, **PSO** took part in workshop on Right to Information (RTI) at IFST, BCSIR Dhaka 10th April, 2022

Nazim Uddin Ahmed, **PSO** took part in training program on E-Governance and Innovation Planning at BCSIR Dhaka 21st November, 2021

Nazim Uddin Ahmed, **PSO** took part in workshop on APAMS software training at BCSIR Dhaka on 28th December, 2021

Nazim Uddin Ahmed, **PSO** took part in workshop on Patent, Patent drafting, and Question and Answer format of patent examiners and Patent searching tools at BCSIR Rajshahi Laboratories 10th May, 2022

Amit Kumar Dey, **SO**, participated a training program on, "Polymerage Chain Reaction" held on 30January' 2022 to 03February' 2022 at BCSIR Chittagong Laboratories, Chittagong.

Md. Moniruzzaman, **RC**, participated a training program on, "Reverse Transcription Polymerase Chain Reaction (RT-PCR)" held on 30January' 2022 to 03February' 2022 at BCSIR Chittagong Laboratories, Chittagong.

SabbirAhmed, **RC**, participated a training program on, Operating and Maintenance of Gas Chromatography (GC) held on 22-26 August' 2021 at BCSIR Laboratories, Dhaka.

IN-HOUSE TRAINING CONDUCTED

Dr. Md. Badrul Islam (PSO), **Md. Sabbir Hasan (SO)** and **Farhana Jahan (SO)** have conducted an in-house training program on "Ion Chromatography and Preparative High Performance Liquid Chromatography" as trainer during05-09 June, 2022 at Central Analytical Research and Facilities (CARF) of BCSIR Rajshahi Laboratories. Ten Scientists from different units of BCSIR participated in the program.

Dr. Md. Nurul Huda Bhuiyan, PSO conducted a training on "Validation and Verification of Analytical Methods" held on 24th January 2022 at BCSIR Rajshahi Laboratories.

Dr. Barun Kanti Saha, Director (Additional Charge), CSO conducted a training session on "Good Laboratory Practices" to achieve ISO Accredited Laboratory, held on 25th January 2022 at BCSIR Rajshahi Laboratories.

Dr. Md. Nurul Huda Bhuiyan, PSO conducted a training session on "Good Laboratory Practices" to achieve ISO Accredited Laboratory, held on 25th January 2022 at BCSIR Rajshahi Laboratories.

Dr. Barun Kanti Saha, Director (Additional Charge), CSO conducted a training session on "Concept of Good Laboratory Practice" to achieve ISO Accredited Laboratory, held on 23rd February 2022 at BCSIR Rajshahi Laboratories.

Dr. Md. Nurul Huda Bhuiyan, PSO conducted a training session on "Implementation, Regulatory and Health to Good Laboratory Practice" to achieve ISO Accredited Laboratory, held on 23rd February 2022 at BCSIR Rajshahi Laboratories.

Dr. Md. Nurul Huda Bhuiyan, PSO conducted a training session on "Implementation of ISO/IEC and Quality control and quality assurance" under ISO/IEC 17025:2017, held on 16- 17th June 2022 at BCSIR Rajshahi Laboratories.

COMMITTEES

The following committees have been formed in connection with various functions relating to research and administrative work.

NATIONAL INTEGRITY, MORALITY AND RTI COMMITTEE

1. Dr. Badrul Islam, PSO (Convener)
2. Md. Jahidul Islam, SSO (Member)
3. Md. Mahmudur Rahman, SO (Member)
4. Mr. Nepal Chandra Dey, EO (Member)
5. Nazim Uddin Ahmed, SSO (Member Secretary)

TENDER EVALUATION COMMITTEE (Engineering)

1. Dr. Badrul Islam, PSO (Convener)
2. Dr. Md. Mizanur Rahman, SSO (Member)
3. Accounts Officer, (Member)
4. Md. Shaheen Iqbal ChowdhuryAsst. Eng.(Member)
5. Md. Ferdous Zaman (Member-Secretary)

TENDER OPENING COMMITTEE

1. Dr. Arfatun Nahar Chowdhury, PSO (Convener)
2. Mr. Nepal Chandra Dey (Member)
3. Dr. Mst. SarminaYeasmin, PSO, P & D in-charge (Member-Secretary)

TENDER EVALUATION COMMITTEE (P & D)

1. Dr. Badrul Islam, PSO (Convener)
2. Dr. Md. Alim Uddin, PSO (Member)
3. Md. Ahasanur Rabbi, SSO(Member)
4. Accounts Officer, (Member)
5. Dr. Mst. SarminaYeasmin, PSO, P & D in-charge (Member-Secretary)

ANNUAL REPORT COMMITTEE

1. Nazim Uddin Ahmed, PSO, (Convener)
2. Subarna Sandhani Dey, SO (Member)

3. Md. Sabbir Hasan, SO (Member)
4. Md. Mahmudur Rahman, SO (Member)
5. Firoz Ahmed, SO (Member-Secretary)

WEBSITE / ICT COMMITTEE

1. Md. Ahasanur Rabbi, SSO(Convener)
2. Shyama Prosad Moulick, (Member)
3. Atoll Goswami, SO (Member)
4. Md. Abdus Salam, LDA (Member)
5. Md. Mahmudur Rahman, SO (Member-Secretary)

MASJID COMMITTEE

1. Md. Jahidul Islam, SSO, (President)
2. G.M. Masud Rana, (Member)
3. Md. Nazrul Islam Tech. (Member)
4. Md. Saiful Islam J.Tech. (Cashier)
5. Md. Mahmudur Rahman, SO (Member-Secretary)

INNOVATION COMMITTEE

1. Nazim Uddin Ahmed, PSO, (Convener)
2. Amit Kumar Dey, SO (Member)
3. Ali Ahsan Muzahid, SO (Member)
4. Firoz Ahmed, SO (Member-Secretary)

PURCHASE COMMITTEE

1. Nazim Uddin Ahmed, SSO (Convener)
2. Mr. Nepal Chandra Dey, EO (Member)
3. Md. Mahmudur Rahman, SO (Member-Secretary)

SPECIFICATION COMMITTEE

1. Dr. Mst. SarminaYeasmin, PSO (Convener)
2. SubarnaSandhani Dey, SO (Member)
3. Firoz Ahmed, SO (Member Secretary)

VERIFICATION COMMITTEE

1. Md. Ahasanur Rabbi, SSO(Convener)
2. Subarna Sandhani Dey, SO (Member)
3. Md. Mahmudur Rahman, SO (Member)
4. Bijoy Maitra, SO (Member- Secretary)

MURAL COMMITTEE

1. Dr. Arfatun Nahar Chowdhury, PSO (Convener)
2. Dr. SarminaYeasmin, PSO (Member)
3. Md. Rafiqul Islam, Tech. Off. (Member)
4. Md. Moniruzzaman, RC (Member)
5. Md. Shahjahan Ali, BB, (Member)
6. Executive Engineer (Member- Secretary)

APA COMMITTEE

1. Nazim Uddin Ahmed, PSO (Convener)
2. Dr. Mst. SarminaYeasmin, PSO (Member)
3. Mr. Nepal Chandra Dey (Member)
4. Amit Kumar Dey, SO (Member)
5. Md. Jahidul Islam, SSO (Member Secretary)

ISO 17025 ACREDITATION COMMITTEE

1. Director, BCSIR Rajshahi Laboratories (Laboratory Manager)
2. Dr. Nurul Huda Bhuiyan, PSO (Quality Manager)
3. Lailatul Ferdoushi, SSO (Assistant Quality Manager, Technical Manager & Analyst)
4. Subarna Sandhani Dey, SO (Technical Manager & Analyst)
5. Tahmina Akhtar Chowdhuri, RC (Technical Manager & Analyst)
6. Farhana Jahan, SO (Assistant Technical Manager & Analyst)
7. Farhana Boby, SO (Assistant Technical Manager & Analyst)
8. G.M. Masud Rana, RC (Assistant Technical Manager & Analyst)
9. Shyama Prosad Moulick, SO (Analyst)
10. Md. Baizul Hossain, Lab Technician (Laboratory Assistant)
11. Md. Mirajul Islam, Lab Attendant (Laboratory Assistant)
12. Md. Mofijul Islam, Lab Attendant (Laboratory Assistant)

13. Mst. Ronzena Khatun,Lab Attendant (Laboratory Assistant)
14. Md. Helal Uddin, Junior Technician (Laboratory Assistant)
15. Md. Mahbub Alom, Lab Attendant (Laboratory Assistant)

MANPOWER

Name of the Researchers

Sl. No.	Name	Designation	Date of Birth	Date of Joining
1.	Dr. BarunKantiSaha	CSO	31.12.68	25.09.94
2.	Dr. Md. Selim Khan	CSO	10.12.68	05.06.97
3.	Dr. Arfatun Nahar Chowdhury	PSO	01.08.64	23.11.89
4.	Dr. Md. Badrul Islam	PSO	28.10.77	19.06.06
5.	Dr. Mohajira Begum	PSO	10.08.74	11.06.06
6.	Dr. Mst. SarminaYeasmin	PSO	24.02.80	11.06.06
7.	Nazim Uddin Ahmed	PSO	31.12.79	13.06.06
8.	Dr. Md. Nurul Huda Bhuiyan	PSO	01.10.79	11.06.06
9.	Dr. Md. Murshed Hassan Sarkar	SSO	07.01.86	30.06.11
10.	Md. Jahidul Islam	SSO	25.12.86	03.02.13
11.	Md. Ahasanur Rabbi	SSO	13.01.88	03.02.13
12.	Most. Halima Khatun	SSO	21.10.85	03.02.13
13.	LailatulFerdousi	SO	10.10.89	15.03.16
14.	Md. Mahmudul Hassan Mondol	SO	31.12.89	15.03.16
15.	Mrs. Fatama_Tuz_Zohra	SO		14.11.18
16.	Firoz Ahmed	SO	09.02.90	21.10.18
17.	Md. Zafar As Sadiq	SO	25.11.92	21.10.18
18.	Mahci Al Bashera	SO	30.12.92	21.10.18
19.	Shyama ProsadMoulick	SO	10.11.90	21.10.18
20.	SubarnaSandhani Dey	SO	14.01.94	14.11.18
21.	Md. Sabbir Hasan	SO	12.07.91	21. 05.19
22.	Md. Mahmudur Rahman	SO	24.07.92	22.05.19
23.	Nasim Ahmed	SO	31.12.93	22. 05.19
24.	Farhana Jahan	SO	05.10.93	22. 05.19
25.	Farhana Boby	SO	12.08.93	22.05.19
26.	Atoll Goswami	SO	01.01.94	26.05.19
27.	Trissa Saha	SO	12.10.90	12. 06.19
28.	Fatema TuzJubyda	SO	12.12.85	22.05.19
29.	Hurey Jahan Kadri	SO	12.12.85	15.03.16
30.	Ali Ahsan Muzahid	SO	21.10.85	15.03.16
31.	Amit Kumar Dey	SO	02.12.90	15.03.16
32.	Shabiba Parvin Shandhi	SO	04.02.95	15.11.21
33.	Md. Waliullah	SO	01.01.95	15.11.21

Sl. No.	Name	Designation	Date of Birth	Date of Joining
34.	Bijoy Maitra	RC	05.12.90	01.02.17
35.	Md. Zia Uddin Rasel	RC	31.12.89	21.10.18
36.	G.M. Masud Rana	RC	01.01.91	21.10.18
37.	Md. Moniruzzaman	RC	29.08.89	21.10.18
38.	TahminaAkter Chowdhury	RC	01.06.92	14.11.18
39.	Sabbir Ahmed	RC	12.10.92	21.05.19
40.	Md. Al-Amin Miah	RC	01.01.93	15.11.21
41.	Abu kowser	RC	16.11.94	15.11.21
42.	Kutub Uddin Ahmed	RC	15.09.94	15.11.21

NAME OF THE OFFICERS

Sl. No.	Name	Designation	Date of Birth	Date of Joining
1	Md. Ferdous Zaman	Executive Eng.	22.01.75	01.11.99
2	Mr. Nepal Chandra Dey	EO	15.01.65	08.10.88
3	Dr. Mirza Wazed Hossain Begg	Medical Officer		
4	Md. Rownok Ara Rayhan	Medical Officer	13.02.1994	30.12.20
5	Md. Shahidur Rahman	EO	01.01.65	26.12.88
6	Md.Nurul Huda Chowdhury	Islamic Teacher	10.08.1972	20.05.95
8	Md. Shaheen Iqbal Chowdhury	Asst. Eng.	10.01.80	14.09.06
9	Md. Sarowar Jahan Sarker	Superintendent	13.02.75	02.03.96
10	Mr. Shyamal Ch. Lodh Roy	Superintendent	01.05.64	30.10.88

Name of Staff

Sl. No.	Name	Designation	Date of Birth	Date of Joining
1.	Mrs. Shahan-Ara-Khatun	Head Astt.	30.03.76	06.10.98
2.	Binoy Kumar Ghosh	Head Astt.	31.08.74	08.01.96
3.	Sandwip Chandra Goswamy	LDA	02.09.87	20.12.09
4.	Naru Gopal Mohonto	LDA	28.12.86	20.12.09
5.	Most. Ayesha Khatun	LDA	21.02.84	12.07.10
6.	Md. Ripon Hossain	LDA	26.09.1996	22.08.17
7.	Md. Abdus Salam	LDA	30.12.1988	24.08.17
8.	J.M. Mehedi Hasan Joy	LDA	11.09.98	30.12.20
9.	RupkumarMondol	LDA		
10.	Md. Shahidul Islam	LA	29.08.70	21.05.95
11.	Md. Nurul Islam	Tech	07.12.89	23.01.19
12.	Md. Nazrul Islam	Tech	01.09.67	10.07.88
13.	Most. Monowara Banu	Jr. Tech.	27.02.68	20.05.95
14.	Md. Khybor Rahman	Jr. Tech.	01.07.90	23.08.17
15.	Basu Dev Bhowmik	Jr. Tech.	01.10.90	01.11.17
16.	Md. Saiful Islam	Jr. Tech.	31.12.74	10.09.06
17.	Md.Sajjadul Islam	Jr. Tech.		
18.	Md. Halal Uddin	Jr. Tech.		
19.	Md. Abdul Mazid	Sr. Plmb.	07.02.77	10.09.06
20.	Md. Mukul Ali	S. Carpenter	15.08.83	10.09.06
21.	Md. Baizul Hossain	Lab. Tech.	20.03.70	31.12.95
22.	Nur Mohammad	Lab. Tech.	01.07.70	02.01.96
23.	Md. Abdur Rahim	O. Astt.	01.05.69	23.05.95
24.	Md. Nazrul Islam	Rec. Keeper	12.03.68	14.01.89
25.	Md. Shahjahan Ali	Book Binder	11.05.91	16.07.16
26.	MukbulHossen	L. Att.	03.09.94	21.08.17
27.	Mst. Ronzena Khatun	L. Att.	03.04.88	24.08.17
28.	Md. Amazuddin	L. Att.	29.03.91	22.08.17
29.	Md. Mofijul Islam	L. Att.	11.06.87	23.08.17
30.	Sri Bidhan Chandra	L. Att.	25.06.87	31.10.17
31.	Md. Mirajul Islam	L. Att.	05.12.89	31.10.17
32.	Md. Shahin Ali	L. Att.	04.08.94	31.10.17
33.	Md. Mamnur Rashid	L. Att.	04.02.87	01.11.17
34.	Md. Masud Rana Talukder	L. Att.		
35.	Md. MahabubAlom	L. Att.	30.12.89	15.01.19
36.	Md.Kamal Hossen	Sr. Gardener	05.04.88	17.11.09
37.	Md.Atikur Rahman	Sr. Gardener		
38.	Md. Amir Ali	S.S. Guard	02.01.63	05.01.83
39.	Md. Badrul Islam	S.S. Guard	17.07.67	17.07.88
40.	Md. Abdul Malek	S.S. Guard	16.05.65	19.02.94

41.	Md. Shajahan Ali	S.S. Guard	21.08.67	19.02.94
42.	Md. Shahidul Islam	S.S. Guard	05.03.67	09.05.95
43.	Md.Mojammel Haque	S.S. Guard	25.01.68	09.08.93
44.	Md. Akhtaruzzaman	S.S. Guard	15.06.72	24.08.96
45.	Md. Moktar Hossain 1	S.S. Guard	10.03.73	19.02.94
46.	Md. Idris Ali	S.S. Guard	31.08.70	31.01.00
47.	Md. Moktar Hossain 2	S.S. Guard	10.08.83	10.09.06
48.	Md. Monju Mia	S.S. Guard	05.01.80	11.09.06
49.	Md.Karimul Islam	S. Guard	27.05.93	17.01.19
50.	Kagi Mamun Nor Rosid	S. Guard	24.02.84	18.11.09
51.	Md. Rasel Molla	S. Guard	12.11.1996	22.08.17
52.	Md. Selim Zowardar	S. Guard	05.05.1994	22.08.17
53.	Md. Mehedi	S. Guard	09.04.1998	21.08.17
54.	Md.Masud Rana	S. Guard	05.06.89	17.02.19
55.	Most. Nazma Khatun	O. Att.	01.01.1988	27.08.17
56.	Parimal Chandra	O. Astt.	05.05.1993	23.08.17
57.	Shohidul Islam	O. Astt.	15.11.1997	27.08.17
58.	Sukanthe Chandra Pal	O. Astt.	25.09.1989	22.08.17
59.	Md. Shagor Hossain	O. Astt.	31.12.1997	01.11.17
60.	Md. MohebbulAlam	O. Astt.	15.11.1994	20.01.20
61.	Md. Milton Hossen	O. Astt.	03.06.97	01.01.18
62.	Md. AehiaMondol	TC Helpar	12.01.67	14.01.89
63.	Md. Asadul Islam	Ele. H.	15.06.1986	14.02.18
64.	Md. Hedayetullah	Sweeper	18.09.77	10.09.06
65.	Sri. Parboti Rani	Sweeper	01.05.1996	03.01.18