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INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
VIGYAN PATH, PASCHIM BORAGAON, GARCHUK
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Foreword

nstitute of Advanced Study in Science and Technology IASST), a premier scientific academy in the North astern region has been carrying out research activities with a lot of dedications in some frontline areas of cience and technology over the last few decades. The whole fabric of modern research rests on qualified uman resources, work culture and infrastructure facilities. Despite its lack of facilities and financial con-traint, the Institute has amassed an impressive reward of achievements and is now well-known outside the tate for its research in various fields.

ince its inception in 1979, the Institute has chosen to focus on a few important areas of research with the oal of achieving a critical mass, although it is of modest size with only a few full-time faculty members and esearch students in its four divisions. The workers are always prepared to exert the maximum efforts in their ork for the development of the Institute.

he performance of research works is consistently good as indicated by the increasing number of sponsored rojects, consultancy projects, research publications and technology development. Some of the prominent ctivities undertaken by the Institute during 2006-2007, are highlighted in this report.

n Material Science Division, the Plasma Physics section has been involved in the study of discharge charac-eristics of radio frequency magnetron plasma for metal-oxide deposition. It is found that the formation of luminium oxide depends on Oxygen and Argon flow ratio under the optimum conditions of reactive mode or good film deposition. On the other hand, hardness of Titanium Nitride film on bell metal could be ncreased thirteen times by adjusting the deposition characteristics of DC reactive post-magnetron Sputter-ng discharge. In dusty plasma, charging process of the dust grains has been studied. Another important tudy is the influence of charged dust grains in the sheath region. In polymer section, nano-state conditions ave been developed in poly-vinyl borate-Iodine complex membrane, which has different types of applica-ions. Another important study is the synthesis, characterization and conductivity measurement of some omplex polymers e.g. Polyvinyl-pyridine. The most significant achievement is the development of Poly-crylamide by DC magnetron Plasma Polymerization method.

ome highlights of the research activities pursued in the Life Science Division are isolation, identification, haracterization and biochemical activities and screening of plant growth promoting rhizobacteria in iofertilizer section. Studies of symbiotic properties and dual inoculation of native fungi and native rhizobia re also some important areas of activities. In Seri-biotech section, development of better races of silkworm or increased productivity and control measure of flacheri-diseases of muga silk worm and study of its hysico-chemical properties, grainage-study are the main research activities. The Medicinal Plant sec-ion has been involved in the studies on lipid profile and lipid peroxidation, antioxidant activities and nti-inflammatory properties of different medicinal plants and fruits. These studies may help to prevent many diseases. Varities of medicinal plants are being planted in the garden of the Institute for experi-mental purposes.

The main research activities of the Resource Management and Environmental division are concerned with different studies of biodiversity, Fishery biology, Petroleum Crude oil and their degradation etc. Exploration of aquatic biodiversity in diverse ecosystem of Assam is also being carried out. Some vulnerable and endangered species have been recorded. Exploration of amphibian fauna of Assam, Manipur and Nagaland is being carried out. A detailed remediation study of soil polluted by crude oil shows that pollution of soils by petroleum hydrocarbons is hazardous for crop production. Degradation of petroleum hydrocarbons is being studied and remediation process has been developed.

The Mathematical Sciences Division has been carrying out research work on pure and applied Mathematics and Statistics. Some important fields of study are Sequence Space, Applied Stochastic Process, Distribution Theory etc.

A very brief review of the Institute's research activities over the last year (2006-2007) shows that significant progress has been made in all the divisions with better performance. I am confident that with the full support of DST, Government of India and Government of Assam, IASST will very soon reach the goal of creating a research center of excellence in North East India.

I thank all the members of the institute for their support and efforts in bringing out this annual report.

Joyanti Chutia
Director

IASST at a glimpse

Institute of Advanced Study in Science and Technology (IASST) is a premier scientific organization set up by the Assam Science Society and it was inaugurated by Nobel Laureate Dorothy C. Hodgkin on 3rd November in 1979. IASST was registered as a separate entity in 1991. It is an autonomous and multi disciplinary research Institute actively involved in carrying out advanced study and research activities in frontier areas of science and technology.

The main objectives of the Institute are to build up a research centre with facilities for fundamental and advanced studies in different fields, to promote original, applied and interdisciplinary investigations in the areas concerning the development and utilization of resources of the North Eastern Region. The aim of the research programmes is to obtain highly significant scientific results.

The Institute has been conducting research in four main areas

1. Material Sciences Division. (Plasma physics, Polymer Sciences)
2. Life Sciences Division. (Bio-fertilizer, Biochemistry, Medicinal plants, Seri biotechnology,)
3. Resource Management and Environment Division. (Biodiversity, Environmental Chemistry, Environmental Biotechnology)
4. Mathematical Sciences Division. (Mathematics and Statistics).

In Material Sciences Division, Plasma physics section has been involved in fundamental as well as applied research like non linear phenomena, waves and instabilities and plasma processing. Flow improvers, polymer foams and liquid crystalline polymers are the main field of research in the Polymer section.

In Life Sciences Division, major emphasis has been given to the areas on bio-fertilizer, medicinal plants, biodiversity, bioprospecting studies, herbal drugs and seribiotechnology (Eri, Muga Silkworm genetics study, bio-chemical basis of fiber production etc).

In Resource Management and Environment Division, areas of research are environmental pollution, exploration on flora and fauna of N. E. Region and eco-biological study of threatened organisms.

In Mathematical Sciences Division, research in applied stochastic process, distribution theory, functional analysis, sequence spaces and machine learning is being carried out.

The Institute has good number of sophisticated instruments and other infrastructural facilities.

4.0 Research and Development Activities

4.1 Materials Sciences Division

The Materials Sciences Division has two sections

(1) Plasma Physics Section

(2) Polymer Science Section

4.1.1 Plasma Physics Section

The Plasma Science Section has been engaged in few thrust areas of research in basic plasma physics as well as industrial application of plasma. The areas covered under the basic research program are: waves and instabilities, ion-acoustic solitons in normal two component plasma as well as in multi-component plasma with negative ions, ion beam interaction with waves and instabilities and collective processes in laboratory dusty plasma. Developments of diagnostics for dusty plasma environment and investigation on sheath properties in dusty plasma have been taken up actively in this division. In the plasma processing program, active research have been undertaken to achieve hard corrosion resistant metal oxide coatings on bell metal. Both the radio frequency discharge and direct current discharge have been used in planar and cylindrical magnetron configuration respectively for effective sputtering of metal atoms.

I. Study of the characteristics of radio frequency magnetron plasma on transition from metallic to reactive mode:

The experiment is carried out in a stainless-steel cylindrical chamber of 40 cm in diameter and 45 cm in length placed vertically. A schematic diagram of the experimental setup is shown in the Fig. 1. To perform the optical emission spectroscopic measurements, we use a monochromator (BENTHAM M300) bearing input focal length of 300 mm. An optical fiber is put on the glass window approximately 15 cm away from the target and fixed in a manner to detect maximum light emission and proper care is taken to avoid background radiation.

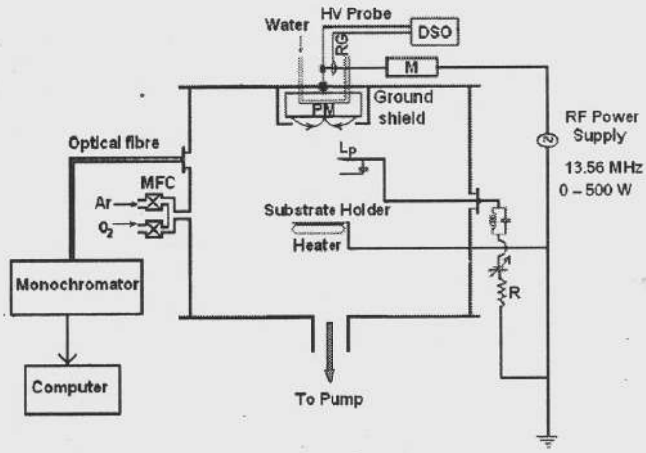


Fig.1. Schematic diagram of the rf planar magnetron sputtering plasma system. Lp – Self-compensated Langmuir probe, RG – Rogowski Coil, M – Matching network and DSO – Digitizing Storage Oscilloscope, MFC – Mass flow controller, PM – Planar magnetron.

The wavelengths of interest are 396.15 nm for Al (Aluminium) line and 484.2 nm for AlO (Aluminium Oxide) line. Fig. 2 shows the variation of Al atomic and AlO molecular line intensities with respect to oxygen flow rate at constant argon flow rate of 12 sccm and applied RF power of 100 W. The figure

clearly shows that the intensity of Al emission line in the discharge decreases with increase of the oxygen flow rate. This clearly indicates the decrease of Al sputtering rate with addition of oxygen. The sputtering rate decreases with increase of the oxygen flow rate due to the decrease of power transfer to the discharge and self-bias with addition of oxygen. The sputtered aluminium atoms react with the oxygen ions to form aluminium oxide, thereby decreasing aluminium line intensity as the oxygen flow rate increases. The figure also shows the transition of the discharge from the metallic mode to the reactive mode when the oxygen flow rate is increased above 4sccm, at which the Al line intensity tends to be minimum. The AlO line intensity first increases up to 6 sccm of oxygen flow rate and after that it decreases. At a flow rate of 6 sccm of oxygen, the sputtering rate balances the reaction rate between aluminium and oxygen ions. So, almost all the sputtered Al atoms react with the oxygen to form the aluminium oxide at this condition. At higher flow rate of oxygen above 6 sccm, i.e. in the reactive mode, the sputtering rate further decreases due to oxidation of the target. Thus, when the oxygen flow rate is more than 6 sccm, the AlO line intensity decreases. Therefore oxygen flow rate of 4 to 6 sccm is ideal for aluminium oxide formation with constant argon flow rate of 12 sccm at applied RF power of 100 W.

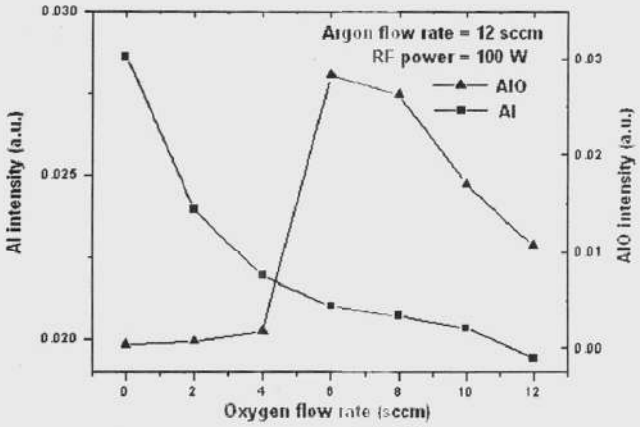


FIG. 2. Variation of intensity of Al and AlO line

The variation of Al and AlO line intensities has been measured for different total flow rate of oxygen and argon mixture. Fig. 3 shows the results for total flow rate of 16 sccm. As the oxygen flow rate is increased (the argon flow rate is decreased) there is a decrease of argon ion density in the discharge. Since the argon ions are mainly responsible for sputtering, hence the aluminium density decreases with the increase of oxygen flow rate. Therefore, Al line intensity decreases with the increasing oxygen flow rate. The formation of aluminium oxide depends on the oxygen flow rate. Hence at lower oxygen flow rate, the AlO line intensity has very low value which increases as oxygen flow rate increases. However, at higher oxygen flow rates as seen from the Fig. 3, AlO line intensity again tends to decrease due to decrease of the sputtering rate of aluminium. For a good quality thin film deposition, a low-pressure sustainable discharge is required and hence the ratio of 10 sccm to 6 sccm of argon and oxygen flow rate is chosen to be ideal from the above study.

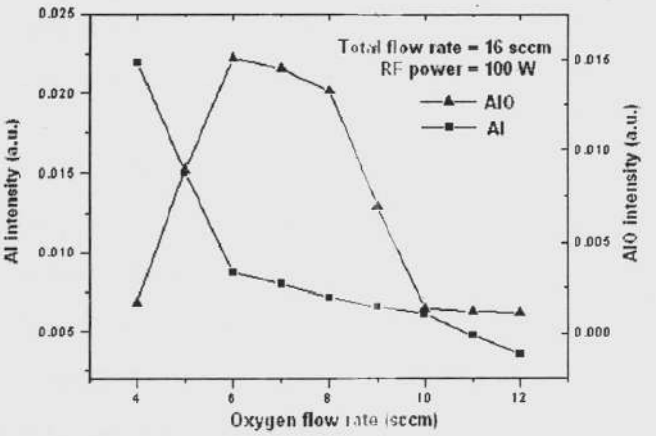


FIG. 3. Variation of Al and AlO line intensity

II. Hardness study of titanium nitride thin films deposited on bell metal by reactive post magnetron sputtering plasma:

Mechanical properties of the deposited titanium nitride (TiN) thin film coatings on bell-metal (an alloy of copper and tin) substrates, like hardness and Young's modulus has been studied using the nano-indentation

technique. For obtaining maximum hardness, the indentor's depth of penetration was about one tenth of the deposited film's thickness. This was done so that the calculated value was a true measurement of the coating hardness. A typical indentation depth profile done by the nano-indenter on the film coating can be seen in the "Few Visuals of Research Setup and Results of Material Sciences Division".

Fig. 4 shows the applied load versus the corresponding indentation depth profile for the deposition of TiN thin film coating at 50% Ar and 50% N_2 gas mixture. It is clearly seen that with increasing load there is a gradual deviation of the loading curve away from its initial position. This explains the property of plastic deformation wherein the material loses its elastic property. The deviation is found to be minimum at this deposition condition.

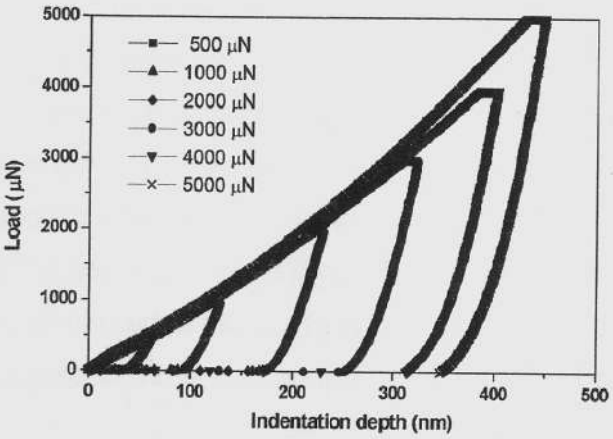


FIG. 4. Load vs indentation depth curves

The hardness, H of the deposited TiN thin films at different nitrogen percentages (25%, 50%, 75%) in the gas mixture has been calculated using the method of Oliver and Pharr (1992), according to the relation:

$$H = P_{max}/A \qquad (1)$$

where P_{max} is the peak indentation load and A is the indentation contact area, determined from the indenter shape function. Generally, loading data are influenced more by the material's plastic properties while the unloading data by the elastic properties. Hardness was calculated from the loading data of the curves. Generally, the hardness values determined by nanoindentation method are functions of surface roughness, chemical state of the surface layer and indenter size effect. Proper care is taken to minimize the influence of these effects on the hardness value. In Fig. 5, the variation of hardness and the Young's modulus with different N_2 percentage in the gas mixture is shown. It is found that the maximum hardness of the film is at 50% N_2 in the gas mixture. The TiN film coating at this condition increases the hardness of bell-metal by nearly 13 times. The Young's modulus value is also highest at 50% Ar and 50% N_2.

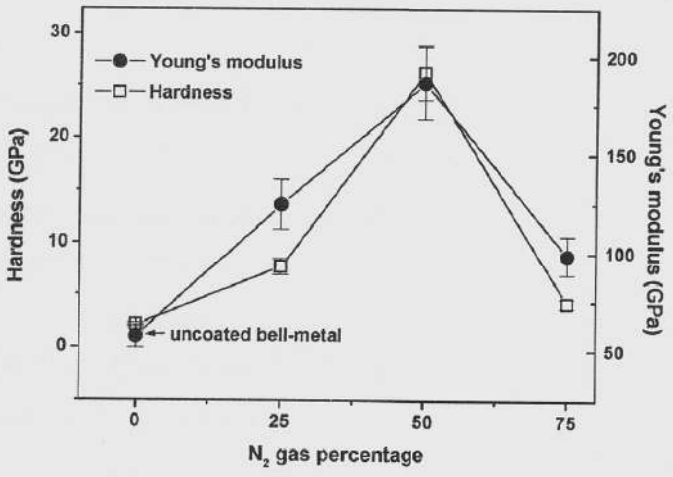


FIG. 5. Plot of Hardness and Young's modulus at different N_2% in the gas mixture

III. Investigation on collective processes in laboratory dusty plasma

Dust charging process in dc discharge plasma

Dusty plasmas have been actively studied in astrophysical situations such as planetary magnetosphere, comet environment, nebulas and earth space environment. Negatively charged particles are also encountered

in many laboratory experiments and plasma processing reactors such as low temperature dc and rf discharges, plasma etching and sputtering reactors and fusion plasmas. In recent years, a good numbers of theoretical investigations and laboratory experiments to understand the basic dusty plasma parameters, dust charging processes and wave propagation behavior have been carried out.

We have produced dusty plasma in a double plasma device, which is equipped with a dust dispersing setup. The dust dispersing setup consists of an ultrasonic vibrator coupled to a dust container with fine mesh grid at the lower end. Dust grains used for this experiment are glass microspheres of 8.8 micron average diameter. The ultrasonic vibrator is tuned to vibrate at a frequency 24 ~ 25 KHz using a continuous sinusoidal signal from a function generator and power amplifier. As the ultrasonic vibrator is tuned, dust grains from the dust reservoir falls freely through the mesh into the Ar Plasma. The dust density is directly dependent on the voltage of the sinusoidal signal applied to the ultrasonic vibrator. Dust density 10^3~ 10^4 cm^{-3} has been produced using this setup. Dust grains are charged due to collection of electrons and ions and attain a negative potential to maintain the zero surface current.

The charging process of the dust grains has been investigated with increasing dust density. Measured average dust charge reduces significantly with increasing dust density. Fig. 6 shows a comparison of the experimental result with the theoretical predictions of the phenomenon. It was shown theoretically that the average charge on each grain reduces when dust grains are closely packed in comparison to the cases when dust grains are placed well apart.

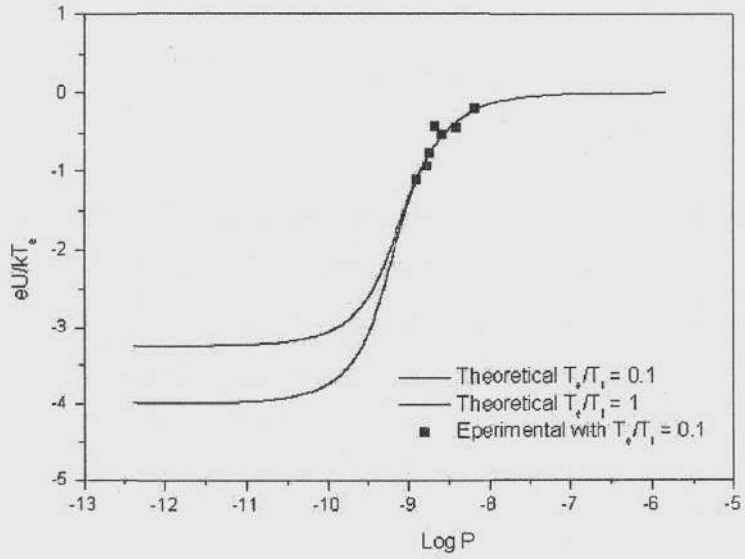


Fig. 6 : Dust Charge variation with dust density while other plasma perameters are kept constant

Modification of ion sheath by negatively charge dust grains

The influence of charged dust grains with the sheath region has been investigated. An ion sheath is produced by biasing a conducting plate to dc negative voltage and dust grains are allowed to fall through the dust region. An emissive probe (filament diameter ~ 0.01 cm) has been successfully used for the first time within a dusty plasma volume to measure the plasma potential and the structure of an ion sheath. The negative

plate bias voltage is found to have influence on the bulk plasma potential when dust density is low. The sheath thickness is found to increase initially with lower dust density and reaches a maximum at intermediate dust density (as shown in Fig. 7). With higher dust density, however, the sheath structure shows strong modification and the sheath thickness decreases considerably. The plate bias voltage variation shows a very little influence on the bulk plasma potential and on the sheath thickness at high dust density regime.

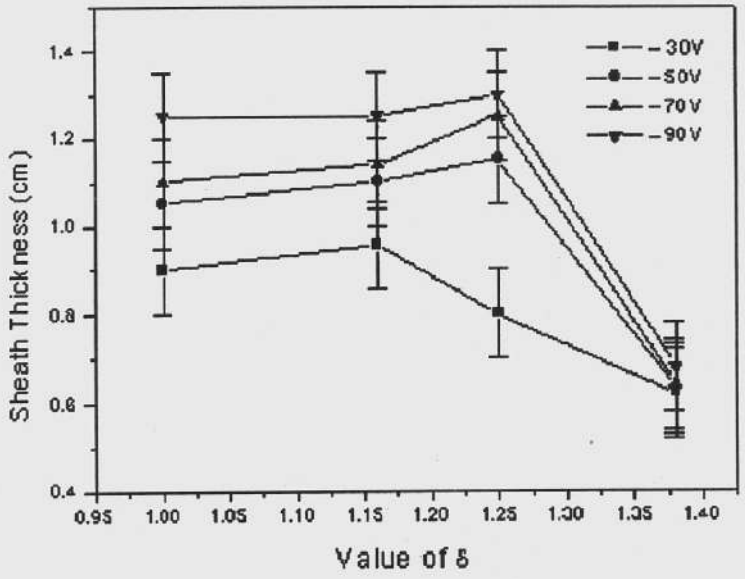


Fig. 7 : Variation of ionsheath thickness with dust density

IV. Basic experiment on multicomponent plasma with negative ions:

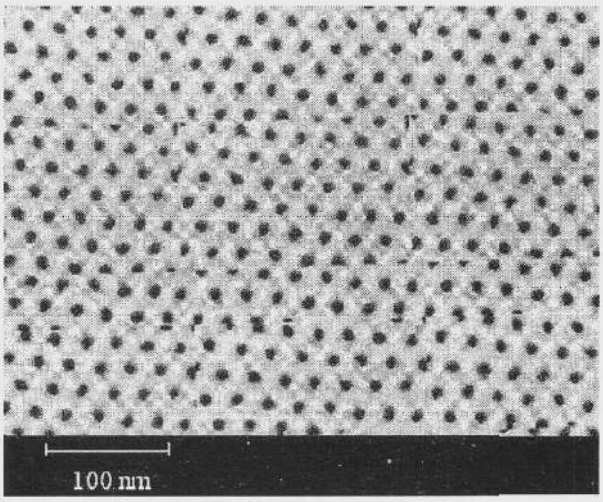
A new double plasma device with 55 cm in diameter and 110 cm in length has been installed for investigation of ion-acoustic wave propagation in multicomponent plasma with negative ions. The chamber have been designed at plasma physics laboratory, IASST and fabricated by the Hind High Vacuum Co. Pvt. Ltd. Bagnalore. Two magnetic cages with permanent magnets inside vacuum sealed rectangular stainless steel bars are used for surface plasma confinement. A stainless steel mesh grid of 80% transparency is used to separate the source and target section of the double plasma device. 12 numbers of tungsten filaments (1% thoriated) are used in each section for thermionic emission. Ar, He and SF_6 gases are used for plasma production. Plane Langmuir probe, emissive probe and ion energy analyzer are fabricated and installed in the system. Measured initial plasma parameters in the chamber are: electron density ~ $\frac{10^9}{cm^{-3}}$, electron temperature ~2-4 eV and ion temperature ~0.2- 0.4 eV.

4.1.2 Polymer Science Section

The aim and object of the Polymer Science Section of Material Sciences Division is to synthesize and develop high value polymers. The unit is working in the direction of producing new solid polyelectrolyte, flow improvers, viscosity index improvers, conducting polymers, polymer ionics, adhesives, polymer foams, liquid crystalline polymers and nano-polymers. Glimpses of the work carried out by this unit are:

I. Synthesis of poly vinyl borate-I_2 complex membrane in nano fine state

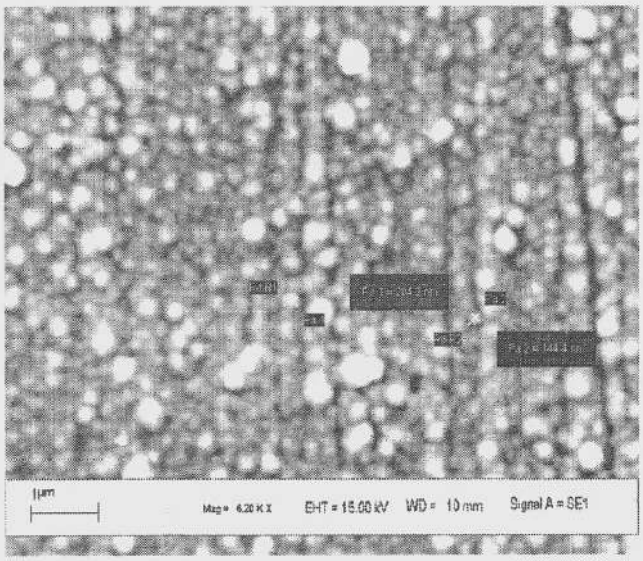
Poly vinyl alcohol and its derivatives hold a unique position in the field of polymer chemistry. So, chemists are paying more attention for synthesis, development and characterization of such polymers. Poly vinyl borate-I_2 complex membrane is prepared in Polymer laboratory by the interaction of Poly vinyl borate with Iodine in vapor state. The polymer complex membrane so formed is characterized by different techniques. The result indicates that PVborate-I_2 complex is in nano fine state and finds its uses in number of applications.



SEM photograph of PVBorate-I_2 in nano fine state

II. Synthesis, characterization and conductivity measurement of poly (2-vinyl pyridine) complex in nano fine state

Poly (2-vinylpyridine), P2VP and its derivatives like salts and complexes, use extensively in solid state batteries. Batteries with metallic electrodes like Li have a limited life-cycle due to the degradation of its outer surface. This results in the formation of lithium powder with a very high surface area at the interface between the metallic lithium and the electrolyte. This is undesirable because it reacts violently with moisture and air and resulting in downgrading the cell performance. Lithium alloy active materials have a relatively short cycle life due to mechanical degradation of the electrode. To overcome this problem, poly (2-vinylpyridine)-I_2 complex is used to prevent the degradation of electrode of metallic lithium in solid state batteries.



SEM photograph of P-2VP-I_2 complex in nano state.

However, the conductivity of P2VP-I_2 complex is not very high, typically 10^{-7} Scm^{-1} at 25°C. To increase its conductivity, the methods of preparation of P2VP-I_2 complex may be improved. Assuming that if P2VP-I_2 complex formed in nano fine state the problem may be solved. On the other hand, to prepare P2VP-I_2 complex in nano fine state the starting material P2VP must be in nano fine state. After a thorough research, the Polymer Unit of IASST synthesizes a new P2VP-I_2 complex in nano fine state by the interaction of nano P2VP with iodine in vapor state.

III. Coating of PAA on Al-foil by plasma polymerization method

Plasma polymerization is an important technique for synthesis of polymeric materials. Plasma processes provide a cost effective and environment friendly alternative to many important industrial processes because the method produces no unwanted waste products and in most cases exposes operators to no significant hazards. Plasma pretreatment is a vital process used for improving lamination, printing and adhesion. An attempt has been made in the Material Sciences Division to synthesize polyacrylamide, PAA from the monomer by plasma polymerization technique and coated on Aluminum foil. The PAA can be used as flocculants in mining, papermaking, metallurgy, light, food, coal, and oil industries.

4.2 Life Sciences Division

Life sciences division has three sections

(1) **Biofertilizer Section**

(2) **Biochemistry & Medicinal Plant Section and**

(3) **Seribiotech Section**

4.2.1 Biofertilizer Section

Research and development activities of Biofertilizer Section of Life Sciences Division have been continuing since the year 1991 with isolation, identification, characterization, biochemical activities and evaluation of native microbial strains/ species to be used mostly as biofertilizers and biopesticides in Integrated Nutrient and Pest Management (INM & IPM) programmes of Govt. of India and Govt.of Assam. Six native strains of Rhizobia have been evaluated on two test pulses (Black gram & Green gram) and found to have broad host range to the local pulses, acid tolerance up to soil pH 4, resistance against numbers of antibiotics, good nitrogenase & legheamoglobin activities and increased production up to 33% over the control. More over controlling of pests and diseases have been studied both *in vitro* and *in vivo* experiments. Species of *Bacillus* like *Bacillus thuringiensis* have been evaluated in controlling Rice Hispa in farmers field. Species of *Trichoderma* and Pseudomonas mediated induced resistance and biocontrol have been studied in controlling red root of sugarcane and Blast of rice, respectively.

Due attention has also been given to isolation; characterization, evaluation and screening of plant Growth Promoting Rhizobacteria (PGPRs). Interactions of potential symbiotic fungi with isolated PGPRs have been studied in respect of nitrogen fixation, phosphate solubilization/ mobilization, secretion of growth promoting substances and other biochemical activities. Studies on symbiotic properties of dual inoculation of native *Arbuscular mycorrhizal* fungi (AM fungi) and native *Rhizobia* provide a synergistic effect on growth and production of test pulses (Blackgram & Greengram) over the lone inoculation of *Rhizobia* and *AM* fungi. All these experiments have been conducted both *in vitro* (Laboratory) and in *vivo* (Farm/Farmers field).

Besides studies on microbial Diversity of Biosphere Reserves of Assam have been studied for isolation, characterization, identification and screening of novel and vigour strains of microbes for conservation of their biodiversity and preservation of their genetic resources for further biotechnological and nanobiotechnological applications for the development of competitive agriculture and industry in NE States and particularly in Assam.

All the experiments in respect of the above works have been conducted under specific time-bound adhoc projects sponsored by different funding agencies like Department of Biotechnology, GOI, Ministry of Environment and Forests, GOI and Assam Science, Technology and Environment Council, GOA. We pay our due respect to all the above funding agencies.

4.2.2 Biochemistry and Medicinal plant Section

The North Eastern region of India is considered to be a rich repository of valuable medicinal, Aromatic and Economically important plants. The ethnic people of Assam as well as other parts of this region use many of these plants as remedy for various ailments in one or the other form to get relief of many diseases. This valuable knowledge needs scientific documentation and systematic investigation for validation and standardization so that people can derive the benefits of these remedies.

On the above, we had started working on the survey, evaluation, standardization, and development of herbal remedies, which are most effectively used by the people of this region.

Presently, we are concentrating on the traditional / folk remedies used against the liver ailments, hyperglycemia, inflammatory problems, Skin ailments etc.

a) Plants are used in many anti-inflammatory drugs available in the present market. We had already undertaken investigation *Clerodendron colebrookianum* Walp for anti-inflammatory properties. The methanol extract of the leaves of this plant has shown excellent anti-inflammatory and anti-analgesic effects against carragenin induced rat paw oedema test, acetic acid induced writhing test, tail immersion tests (hot tail flick and cold tail flick tests). Work on the leaves of two more plants is in progress.

b) Work on the plants (SN-1 and UP-1), have been continuing and has collected data of encouraging hepatoprotective results against CCl_4, Paracetamol, and Galactosamine models and the work is in progress.

c) Development of remedies against Dermatophytic infections has been initiated. The in-vitro results of some selected plants extract show very encouraging prospects for undertaking in-vivo evaluation.

d) Crystallographic study of some compounds isolated from *Chesocheton paniculata* and *Cudrania javanensis* have been undertaken.

6α-acetoxy azadiron (white crystal, $CHCl_3$: MeOH (9:1), m.p. 193°C) was isolated and purified by careful chromatographic separation, which was identified by spectral analysis and comparison with authentic samples. The compound was subjected to Crystallographic analysis and the work is in progress. Two more compounds have been isolated from the fruits of *Cudrania javanesnis* (yellow solids, $CHCl_3$: MeOH (10:1), m.ps. 144°C and 174°C). These plants are used by many people as remedies against some major diseases. The compounds are now subjected to X-ray crystallographic analysis for confirming the absolute configurations of the compounds. Efforts have been made to modify and manipulate the structure of the isolated compounds to enhance the efficacies of these phyto-constituents. The work is being continued.

Studies on lipid profile and lipid peroxidation

The lipids are heterogeneous compound having important physiological property. Cholesterol is a lipid with very low solubility in water. This most abundant oily, yellowish compound is an essential component of cell membranes and give rise to bile acids, steroids hormones and vitamin-D.

The very high solubility of cholesterol in blood is due to the presence of proteins called plasma lipoproteins (mainly LDL and VLDL) that have the ability to bind and thereby solubilize large amount of cholesterol. When too much LDL is circulating in one's blood stream, it slowly starts to deposit within the walls of the arteries that feeds the heart, brain and the other tissues and results become fatal when that very target arteries supply blood to heart and brain.

Clerodendron colebrookianum Walp (CC, Verbenaceae) is one of the most important medicinal plants, mainly grows in the moist and waste places of the north-eastern region of India upto an altitude of 1700m and people of this region are using this plant as a home remedy against hypertension. Experimental evidences prove that there is a close relationship between hypertension and hyperlipidemia.

Available literature also suggests that hyperlipidemia depresses the antioxidant system of living being. Due to this interrelationship we had decided to investigate the hypolipidemic as well as antioxidant property of the different extracts of the dried leaves of the CC leaf on experimental animal model and found very encouraging results. The leaf extracts have ability to reduce hyperlipidemia and oxidative stress in experimental condition.

Study of antioxidant activity

Dietary deficiency of antioxidants might promote coronary heart disease through accumulation of oxidized LDL-C in macrophages, promotion of endothelial dysfunctions, smooth muscle cell proliferation, thrombosis and plaque rupture. Consumption of fruits and vegetables, olive oil, red wine and tea is inversely correlated with heart disease rate. These food items are particularly rich in natural antioxidant nutrients, including ascorbates (vitamin C), tocopherols (vitamin E), carotenoids and flavonoids Flavonoids and carotenoids

nhibit lipid peroxidation, promote vascular relaxation and help to prevent atherosclerosis. A sufficient supply vith antioxidants from diet might help to prevent or delay the occurrence of pathological changes associated vith oxidative stress.

Musa balbisiana (localy *Athia kol*), *Citrus grandis* (localy *Robab tenga*) and *Garcinia pedunculata* (localy *Borthekara*) are three different important and predominant fruits of N E region of India and people of this egion are the main users of these fruits for their diet and also as medicine. Available literature reveals that ery few research regarding the pharmacological activities of these fruits have been done on human as well is animal model in national/ international level. Keeping this view in mind we have started our work on evaluation of antioxidant property of these fruits of North East India with the following objectives

. To investigate the *in vitro* antioxidant activity of fresh fruit juices/pulps of *Musa balbisiana, Citrus grandis* and *Garcinia pedunculata*, each in three different doses.

2. To investigate the *in vivo* antioxidant activity of fresh fruit juices/pulps of *Musa balbisiana, Citrus grandis*, and *Garcinia pedunculata,* each *in* three different doses.

3. To investigate the extent of oxidative stress in stress induced experimental animals and the preventive effect of these fruit juices/pulps.

4. To investigate the presence of trace metals in these fruits and the importance of these trace metals as micronutrients.

Trace elements content of different medicinal plants/fruits of N E region of India has been detected by using Atomic Absorption Spectrophotometer. The Mg contents of some cardio protective plants are found to be very high in comparison with the other trace elements.

Medicinal plant garden

A medicinal plant garden has been set up at the new campus of the IASST where different types of medicinal plants are planting for our experimental purposes. Few of them are *Clerodendron colebrookianum, Clerodendron viscosum, Terminalia chebula, Vinca rosea, Eugenia jambolana, Punica granatum, Ocimum sanctum, Cuinamomum tamala, Murrya koenigii, Pepar longum, Rauwalfia serpentina, Terminalia arjuna etc*

4.2.3 Seri-biotech Section

Research and application of Biotechnology will profoundly influence the existing paradigm of conservation and utilization of precious bio resources like silkworm. Assam has the glory of producing all type of silk viz. Muga, Eri, tassar and mulberry silk since time immemorial which has been mentioned in Kautilya's arthasastra. Of these muga has the monopoly, contributing 99% of total production in all over the world .Eri silk of Assam is superior in quality. Rearing, weaving and wearing of silk garments is a traditions and heritage of the people of this region. The biosphere shapes and grooms the economy and culture, and sericulture act as a perennial source of livelihood for many people of Assam.

Use of advanced biotechnology for product and process development has considerable potential to generate more income and employment for the rural poor people involved in sericulture sector. With this view in mind some programme have been taken in Seri-biotech section under life sciences division.

Development of better races of silkworm for increased productivity:

Muga silkworm : The stocks of wild A. assamensis (muga silkworm) and the prevailing morph types viz. green orange and blue have been maintained at IASST and the phenotypic characterizations have been observed. Wing venation and morphometric analysis have been done using statistical analysis. The parameters related to taxonomic characterization have been analyzed including protein analysis using SDS-PAGE (Fig. 1).

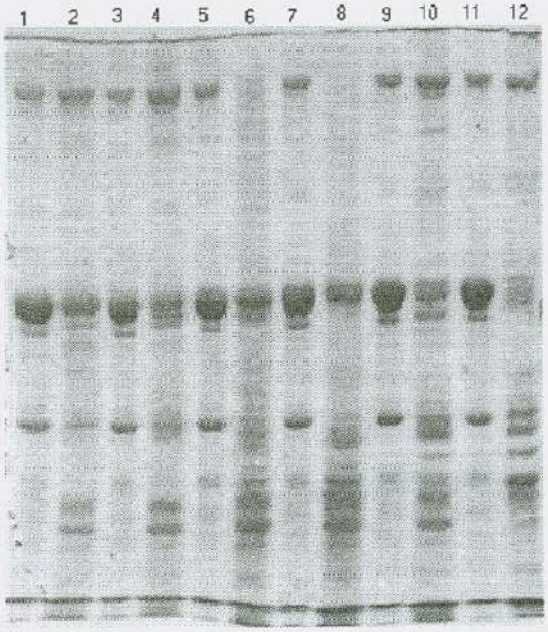


Fig. 1. SDS-PAGE Gel of Colour Morphs and Wildmorph of Muga Silkworm.

Eri Ecoraces: Program is going on for maintenance of eco races of Eri silkworm available in N.E. region. Determination of post cocoon parameters viz-tensile property, tenacity, hygroscopicity is in progress. Rearing performances in terms of food and seasons is carried out for evaluation of season specific varieties of eri silkworm.

Development of control measure for flacheri diseases of muga silkworm:

Some botanics have been tested against the bacterially expressed polypeptide protease of muga silkworm. It is observed that the garlic has the highest antibacterial activity to prevent the diseases .The experiment is on progress for effective dose selection.

Study on Grainage of Antheraea assamensis (Muga Silkworm)

There is shortage of muga seed production due to some problem i.e. non-synchronized and prolonged moth emergence, poor egg laying etc. Another factor of low seed production is non–utilization of unfertilized eggs. To address some of the problems the following experiments have been arranged and the experiment is under progress.

Induced Fertilization: The un-laid unfertilized muga egg have been used for induce fertilization by treating with hot water and acid.

Emergence of Moth: During grainage of muga silkworm, the male emerges out earlier than the female which results low coupling rate and poor egg laying. To synchronize their emergence the cocoons have been treated with photoperiodic effect. To treat with different light and dark phase, male and female larvae have been separated before spinning. Male cocoon has been treated with long dark phase (8hours light and 16 hrs dark period), which delayed their emergence resulting synchronized emergence of male and female moth.

Biochemical Estimation

The phenomenon of embryogenesis and egg shell in insect are highly complex and seem to be involved in several important functions. Understanding of phase of embryogenesis and chemical composition of early embryo and eggshell will lead us to formulate the physiological parameters of egg of A. assamensis for improvement of seed production. It is expected that response to the external stimuli will provide some clues for future studies for induction of diapause in the multivoltine A. assamensis, which is one of the major draw back for improvement of Muga silk industry in Assam.

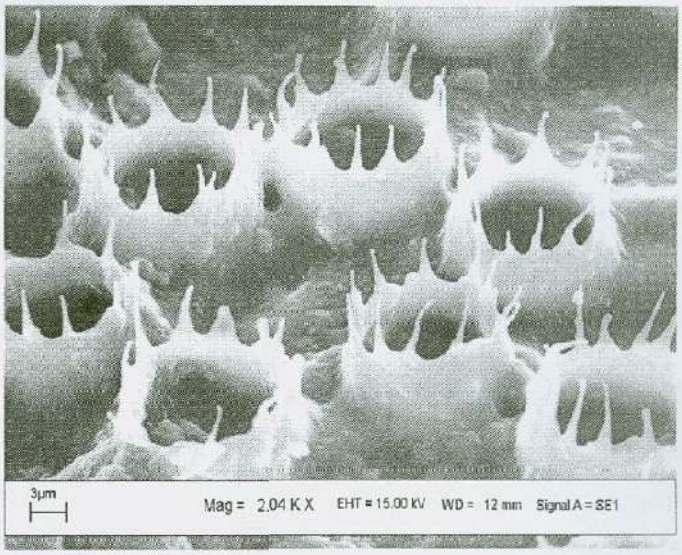


Fig. 2. SEM Structure of egg (outer) of Muga Silkworm

Protein, Carbohydrate and lipids are the main components of the egg and egg shell of muga silkworm. Estimation of these biochemical components has been done to formulate the physiological parameters of egg and eggshell by using the standard methods. SDS-PAGE Electrophoresis of the same has been carried out to study the protein profile. SEM observation has been made to understand the surface structure of eggshell (Fig. 2.).

Food plants : A som plant garden comprising 300 randomly selected plant collected from CSB, Boko has been raised at IASST 's campus and have been maintained. A mini garden comprising various food plants Viz- Solau, Som, Castor, Topica, Keseru, Mulberry, Mezankari, Dighaloti has been maintained as an ideal garden for silkworm.

Vermi compost : Unwanted biomasses like weeds, foliages and branches of plants generated within the IASST's campus have been transformed to organic manures using vermi compost technology. The seed of the verm have been collected from Central Silk Board, Boko center and allowing for degradation of biomass. The organic manure generated from this technique has been utilized for the food plants of the silkworm.

Studies on silk fiber

In all the species the silk bave is cylindrical into the silk gland and it is modified passing through the spinneret during the silk protrusion because it is compress when the fibroin is still soft before it becomes crystallization. The spinneret determines the stripes that can be observed on the longitudinal axis of the fiber. The first of the silk floss have the morphological features, which can be considered strictly collected with the species and are species specific.

Physical properties:

Cocoons from different species were degummed in autoclave at 120°C (to separate seircin from fibroin) and the silk bave and their section were observed in optical microscope and, after gold coating, with electron

microscope (S.E.M.). Samples were also analysed with infrared spectroscopy after inclusion of the samples in KBr. Differential scanning calorimetry (DSC-Mettler TA30) measurement were performed, from room temperature to 500°C, at a heating rate of 10°C/min on 2-3 mg samples. The open aluminium cell was swept with N2 during the analysis. The amino acid component of the fibroin and sericin was determined by acid hydrolysis with 6N HCL at 105 °C, for 24 h under vacuum. Free amino acids were analysed by HPLC chromatography (Water, Model 2695). Elutes was detected at 254nm.Samples were analysed in duplicate. The amino acid standard H kit (Pierce) was used for calibration. (Experiments have been conducted at textile institute. Milan Italy)

Tensile strength: Stress elongation and breaking load are studied in various fibres because strength and elongation test are used widely for assessing fibers degradation in Textile substances. In the present experiment, muga yarns treated with 10 different chemical solvent as well as normal were tested for tenacity, percentage elongation at break, initial modules and toughness on an universal Testing Machine (UTM) (model: 3343), from Instron Corporation, UK interfaced with a PC. The procedures described in ASTM D 2256 -80, Standard Test Method for Breaking Load (Strength) and elongation of yarn by Single Strand Method was used. Experiment is on progress.

Chemical properties:

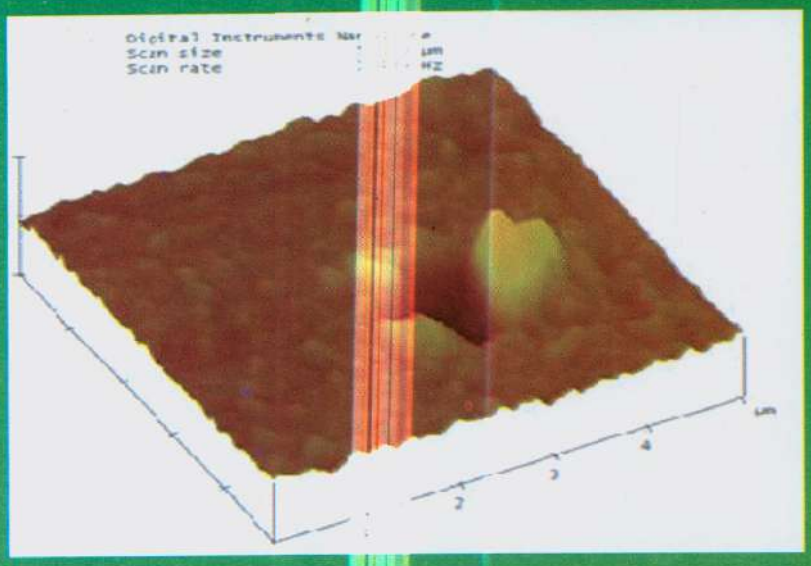
As a natural fibre silk is a protein, a fibrous biopolymer. It consists of polypeptide proteins fibroin and a glue protein sericin. These proteins may be expected to show intensive inter-chain secondary bonding through the CO and NH groups but the possibilities are considerably restricted by the side chains consisting of amino acids residue which occur so frequently.

Different methods have been used for proper degumming of muga fibre under laboratory condition. Na_2CO_3, NaOH, alkali from banana stem, alkali from plant seed etc. tried so far to find out the better one. It is also tried to degumme at high temperature (120^0 C) under high pressure in autoclave.

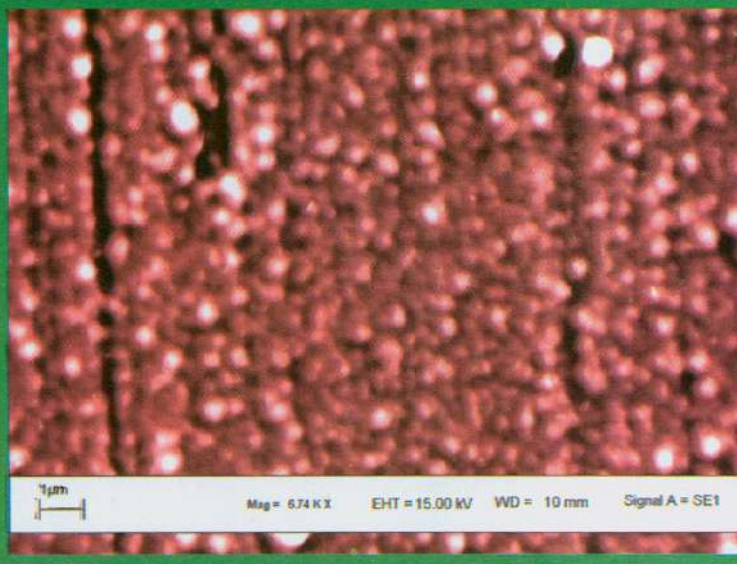
4.3 Resource Management and Environment Division

The resource management and Environment Division (RM&ED) of IASST is trying to address various environmental issues of North East region of India by undertaking different projects related to documentation of faunal wealth along with detailed ecobiological study of rare and endangered fauna recorded during our survey. Study on habitat characteristics, bio sulphurisation of sulphur rich crude oil, remediation and reclamation of polluted oil field soil. Phytoremediation of oil and heavy metal polluted soil of oil field, vermicomposting and projects related to augmentation of fish and fishery resources in the state of Assam, are some of the important fields where research is being carried out.

Few Visuals of Research Setup & Results of Material Sciences Divisio

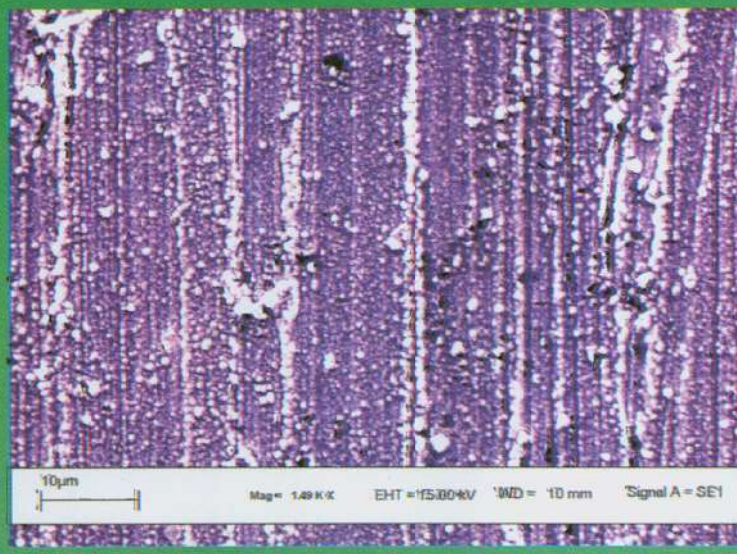


Indent profile on TiN sample

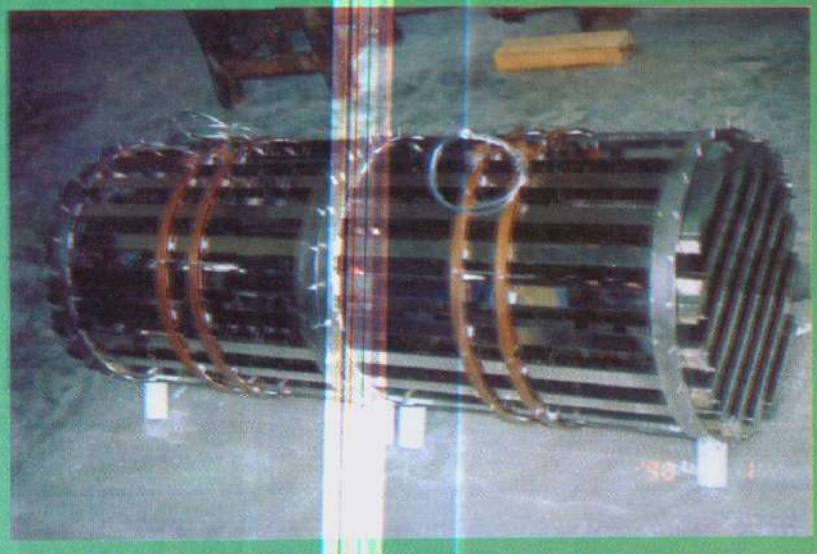


SEM of P_2VP-Br_2 complex in nano fine state deposited at Polymer lab.

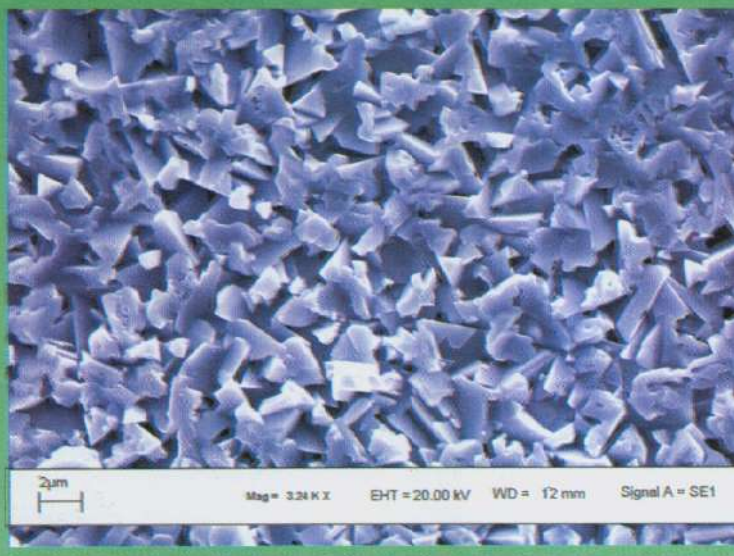
Medium size double plasma device installed recently in Plasma Physics lab.



SEM of P_2VP-Cr_2O_3 complex in nano fine state deposited at Polymer lab.



Magnetic cage of double plasma device



SEM of P_2VP-I_2 complex in nano fine state deposited at Polymer lab.

Few Visuals of Research Activities & Results of RM&E Division

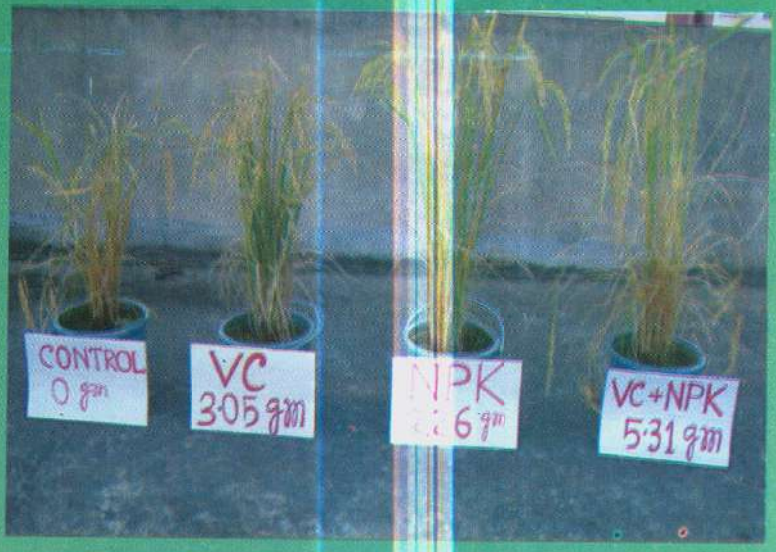
Rhacophorus htunwini (Wilkinson et al, 2005) collected by Nzano Humtsoe from Wokha, Nagaland

Production of vermincompost from different wastes

Scientist working in the Biodiversity laboratory

Vermicompost

A portion of Biodiversity museum



Experiment on impact of vermicompost and chemical fertilizer on general welfare of rice crop and soil physicochemical properties

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The RM&E Division has following sections

1) Biodiversity Section

2) Environmental Chemistry Section

3) Environmental Biotechnology Section

Besides these three sections, there are auxiliary units on Computer Application in Environmental Aspect and Environmental Information System Node (ENVIS) on Tea related matter, where respective research and activities are going on.

4.3.1 Biodiversity Section

Research work is being carried out in the following fields

a) Exploration of biodiversity

b) Fishery biology and fishery management

c) Exploration of fish and Amphibian fauna of Assam and Nagaland

a) Exploration of biodiversity

Inventorisation and monitoring biodiversity is a prelude for planning conservation measures to species at risk. Exploration of aquatic biodiversity is being carried out in diverse ecosystems of Assam, Nagaland and Manipur. Study related to habitat, and ecobiology has been taken up for species of conservational importance.

Documentation of Ichthyo faunal diversity of the wetlands of Hajo, Kamrup district, and wetlands of Goalpara district of Assam is in progress. Depletion of indigenous fauna has been hastened due to various environmental and anthropogenic causes. Available fish species in these wetlands have been documented. 70 species of fishes has been recorded from beels in Hajo and 53 species has been recorded from two beels in Goalpara district which includes 13 vulnerable and 4 endangered species.

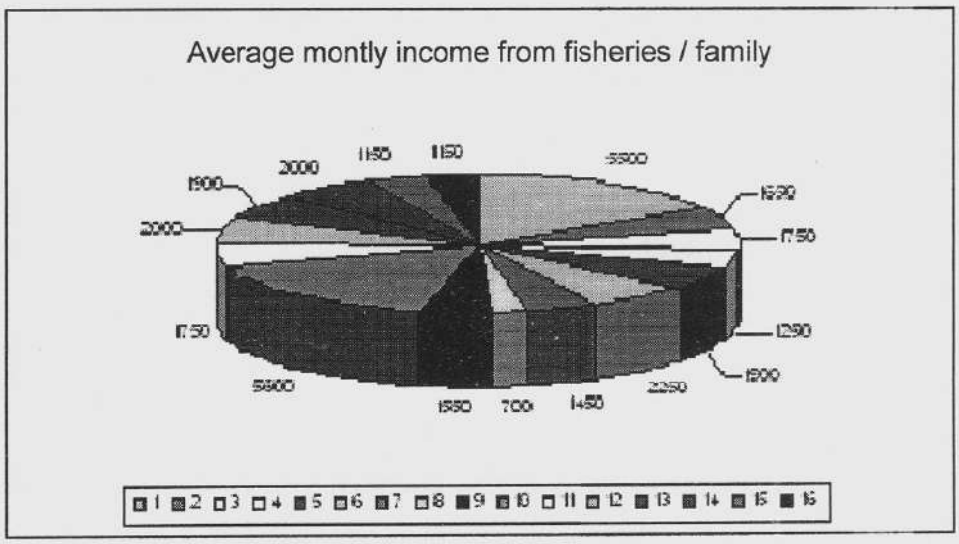
Extensive awareness programmes has been organized among the fisherman population in the villages of Hajo so that they strictly follow the prescribed guidelines of fishing during fish breeding season.

Hajo revenue circle under the control of a circle officer has 137 villages with a total population of about 1,98,151 people, covering an area of about 269459 bighas and 19 lechas of land. A total of seventy fish species belonging to 23 families and 9 orders have been recorded in the beels of Garjan. Out of these 4 are endangered (EN), 11 are vulnerable (VU). One indigenous species Puntius ornatus has been described as a new record from the Brahmaputra drainage of Assam.

Socio-economic survey was done among the fisherman families during our survey (On 12.9.06 and 26.2.07). Over exploitation during breeding season is one of the major causes of depletion of fishery resources in these beels. Govt. guidelines on fishing are present but they are not strictly followed. With a view to popularize

these guidelines among the fisherman community the awareness programmes were planned. Fishing is the main occupation and not much importance is given for education. Due to the increasing level of awareness campaign now they have started sending their ward to school though they dropout whenever there is need for income in the family.

Depending on season monthly income varies from Rs. 500-10,000. As per Govt. rules fishing is prohibited during pre-breeding and breeding seasons. This is not strictly followed because fishing is the only source of livelihood. Other sources of income generation are poultry farming, daily wage labourer, selling of gears and agriculture. The pie diagram shows average monthly income in 15 village units under study.



Fishery biology and fishery management

Ecobiological study of fishes of conservational importance is in progress. Fishes have been collected from these beels seasonally. Extensive awareness programmes has been organized among the fisherman population in the villages of Hajo so that they strictly follow the guidelines of fishing during breeding season of fish. We are helping the fisherman population in the fringe area of Deepar beel so that fish culture can be done by following prescribed methods and they can utilize the community ponds.

Exploration of Amphibian fauna of Assam, Manipur and Nagaland

Documentation of Amphibian fauna in the wetlands of Sibsagar district of Assam is in progress. So far 30 species of frogs has been documented from these wetlands. Eco biological study of some of these frog species is in progress. Amphibian fauna of Loktak Lake, Manipur has been surveyed and a total of 25 species has been identified so far. Detailed ecobiological study of certain species at risk is being carried out.

Documentation of Amphibian fauna and fish fauna in the torrential streams of Wokha district, Nagaland is in progress. So far 30 species of fishes and 10 species of frogs has been documented from these streams. Eco biological study of some of these frog and fish species is in progress. This is the first ever scientific documentation of fauna in these remote streams.

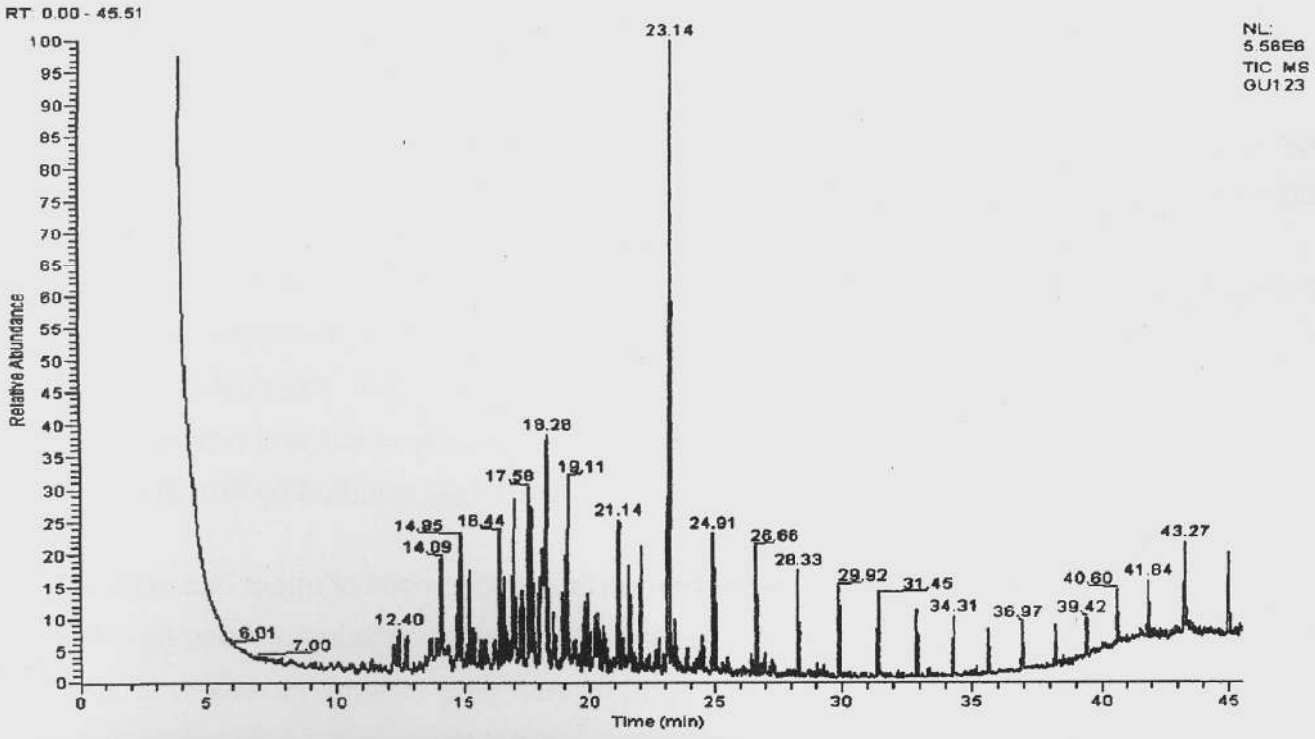
4.3.2 Environmental Chemistry Section:

Petroleum Crude oil pollution and their degradation Study

Petrochemical waste contains both organic and inorganic contaminants that can pollute soil and may pose significant ecological risk. Oil industry related sites have become contaminated due to the activities characteristic of this industry, such as oil exploration and production, refining, and petro-chemistry. Oil spills near production sites results in contamination of soil with both oil and salt. The pollution of soils by petroleum hydrocarbons results in unfavourable conditions and raises the question of their degradation if the affected soil is to be quickly rehabilitated for crop production. In oil-producing countries heavy metals are considered a major threat to the population. Metals such as lead, aluminum, manganese, nickel and cadmium may impact various organs of the body, and controlling their toxicity is crucial for individuals at risk.

On the basis of the above problem, a detailed remediation study was carried out with normal soil spiked with different amounts of crude petroleum oil under different conditions. Our emphasis was on chemical degradation of total petroleum hydrocarbons (TPH) at low cost. The degradation continued to improve with time and it was observed that TPH (Aromatic) continued to degrade more and more up to 180 days of controlled experiments.

The emphasis of the present work was mainly to determine the physicochemical characteristics including heavy metals of the soil near the five GGSs (2 under Rudrasagar and 3 under Lakowa oil fields) operated by the Oil and Natural Gas Corporation Limited and to estimate the contribution of the oil field operations to TPH and PAH contents of the soil samples. A large number of PAHs and their derivatives have been identified in the oil field soil with the help of GC-MS analysis in collaboration with the R & D laboratory of the Oil India Limited. A typical GC-MS analysis for the PAHs is given below:



The variations with direction, distance and depth in the soil properties have been reported and the impacts of the oil collection, treatment, storage and distribution on the soil quality have been discussed. The spread of contaminants with respect to direction from the GGS is different in different directions. No clear trend could be seen for variation with depth.

Significant variations among pH, electrical conductivity, chloride, sulphate, phosphate, sodium and potassium were found. Significant relationships among TPH, TOC and WHC were also found. Alaa El-Din et al. (1991) has shown similar results.

In general, it is found that the oil field soil has substantial contribution of all the nine heavy metals investigated in this work. Their distribution is non-uniform in different directions. The results have indicated that the heavy metals released by the oil field operations have spread into considerable distance affecting the soil quality. The accumulation of heavy metals and other contaminants including TPH in the soil near the GGSs is not surprising considering the discharge of the formation water and oil spill in to the nearby areas.

Knowledge of the total content of trace metals is not enough to fully assess the environmental impact of crude oil polluted soils. For this reason, the determination of metal species in solution is important to evaluate their behaviour in the environment and their mobilization capacity. Sequential extraction procedure was used to speciate four heavy metals (Pb, Cu, Ni and Zn) from four contaminated soils of Rudrasagar oil field into six operationally defined geochemical fractions, namely (i) water soluble, (ii) exchangeable, (iii) carbonate, (iv) Fe-Mn oxide, (v) organic and (vi) residual fractions.

4.3.3 Environmental Biotechnology Section:

Studies on efficacy of native verms for production of vermicompost

Bio-waste, which includes agricultural waste, household waste, farmwaste etc., is available in our state particularly in rural areas. In urban area it (specially household waste) cause serious problem by blocking drainage system, creating nasty odour, ultimately polluting the environment. Proper utilization of bio-waste for production of vermicompost manure will be helpful to solve the problem.

The process in which bio-wastes are converted into nutrient rich organic manure using earthworms is known as vermicomposting. Extensive use of chemical fertilizer is degrading top layer of soil besides, causing heavy damage to the adjacent aquatic body. Vermicompost manure is free from chemical input and has no side effect. It improves soil aeration,soil texure and water retention capacity of soil and promotes the root growth and nutrient absorption. The process is simple, free of cost and easily handled by farmers.

Indian subcontinent have very rich and diverse earthworm fauna comprises of about 365 species belonging to 10 families and 58 genera (5). Approximately 3,000 species of earthworm fauna are also reported in India and their use in various vermicultural practices also reported from time to time. However, all of them are not

suitable for vermicomposting. Earthworms with high rate of coccon production, short duration of life cycle, high ability to inhabit and feed upon high percentage of organic matter, high tolerance to disturbance is suitable for vermicomposting. So, the present investigation was carried out to study the efficiency of the native verms for production of vermicomposting.

Three species of verms namely *Perionyx* species-A, *Perionyx* species-B, and *Eudrilus eugeniae* were collected from dump of cowdung, bark of banana plant and Central Silk Board, Boko (Assam) respectively for investigation. Solid Kitchen wastes, Aquatic weeds and wastes of Citronella plants were taken as raw materials for the study. Period of decomposition, percentage of obtained manure, nutrient status (NPK) of the manure was evaluated. It was found that both *Perionyx* Species-A and *Eudrilus eugeniae* shows same efficiency in vermicomposting which is higher than the *Perionyx* species-B.

Computer application in environmental aspects

Biodiversity and eco-biological study of different species involves a good amount of statistical analysis for confirmation and presentation of data. The following statistical analysis work which are carried out includes statistical analysis of standard measurements and maturity cycle of different species of amphibians and fish using different test statistic like Mann Whitney test, t-test, chi square test for confirmation of species and for studying the differences of male and female of any species.

Moreover Ponderal index is also calculated to study the length-weight relationship of fishes both month-wise and size-wise. Gut content analysis of fish during breeding season is being studied.

Environmental Information System Node (ENVIS)

Envis node was sponsored by the Ministry of Environment and Forests from 2002 to 2007. Under this programme an extensive database has been generated in the website www.iasst.in. The website has links to:

- General articles on tea
- All the Tea Boards in the world
- All the Tea Associations in the world
- All the Tea Institutes
- All about tea production and area under cultivation
- Detailed information regarding pesticides used in the tea gardens
- Permitted and banned tea pesticides
- Status of organic tea, methods, procedures etc.
- News clippings
- Links to various online news, articles, published papers etc

Besides maintaining the web site a quarterly newsletter has been published. The first issue was published in October 2002. Since then 9(Nine) newsletters have appeared. The newsletter is circulated to all the ENVIS Centres and Nodes in addition to all the concerned Govt. Departments and agencies in the country.

4.4. Mathematical Science Division

Mathematical Sciences Division has following sections

(1) Pure Mathematics
(2) Statistics

4.4.1 Pure Mathematics

Work done on sequence spaces, series, summability theory and fuzzy mathematics

An Orlicz function M is mapping $M:[0, \infty) \rightarrow [0, \infty)$ such that it is continuous, non-decreasing and convex with $M(0) = 0$, $M(x) > 0$, for $x > 0$ and $M(x) \rightarrow \infty$, as $x \rightarrow \infty$.

Lacunary strongly summable sequence and *q*-lacunary almost statistical convergence.

A lacunary sequence is an increasing sequence $\theta=(k_r)$ of positive integers such that $k_0=0$ and $h_r=k_r-k_{r-1}\rightarrow\infty$, as $r\rightarrow\infty$. A sequence $x=(x_k)$ is called q-lacunary almost statistically convergent to ξ provided that for each $\xi>0$ $\lim_{r\rightarrow\infty} h_r^{-1}$ {The number of k; $k_{r-1}\leq k\leq k_r$; $q(t_{k,m}(x)-\xi)\geq\varepsilon\}=0$. The concept of q- lacunary strongly almost convergence with respect to an Orlicz function and q-almost statistical convergence has been introduced. Their different properties like solidness, monotonocity etc. are verified and some inclusion results have been proved. Some connections between q-lacunary strongly almost convergence and q-lacunary almost statistical convergence have been established. It is also shown that if a sequence is q- lacunary strongly almost convergent with respect to an Orlicz function, then it is q-lacunary almost statistically convergent.

Fuzzy real valued double sequence spaces

A fuzzy real number X is a fuzzy set on R, i.e. a mapping $X: R\rightarrow I$ (=[0,1]), associating each real number t with its grade of membership X (t).

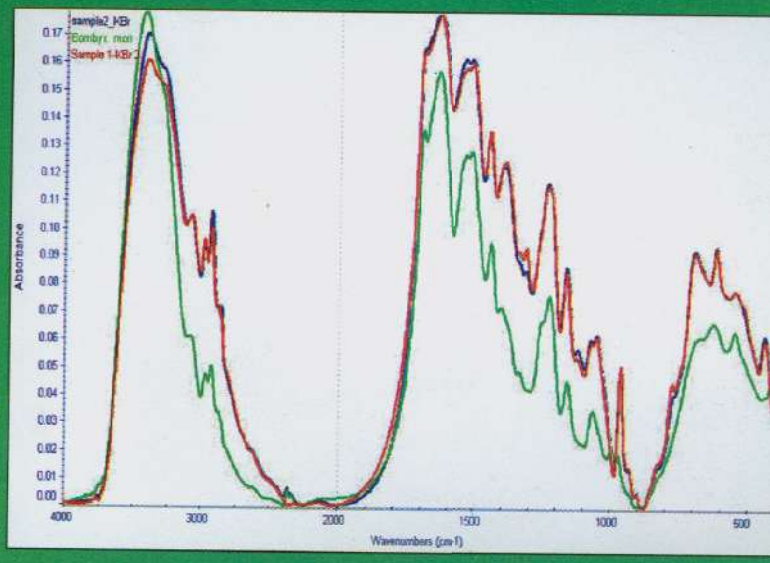
Different classes of fuzzy real valued double sequence spaces have been introduced. It is shown that these are closed under addition and scalar multiplications. It is shown that the class of bounded fuzzy real valued double sequences is a complete metric space.

Generalized difference paranormed sequence spaces defined by Orlicz functions in a locally convex space.

The generalized difference paranormed sequence spaces c $c(\Delta^n, M, p, q)$, $c_0(\Delta^m, M, p, q)$ and $\ell_\infty(\Delta^n, M, p, q)$ defined by Orlicz function over a seminormed sequence space have been introduced. These spaces generalize and unify many sequence spaces studied by some workers in the field of sequence spaces. Their different algebraic and topological properties like completeness, solidness, symmetricity etc. have been studied. Some inclusion results are also proved.

Few Visuals of Research Activities & Results of Life Sciences Division

Biochemical characterization of bacteria sps.



FT-Spectra of A. *assamensis* in red and blue and B. *mori* in green in colour

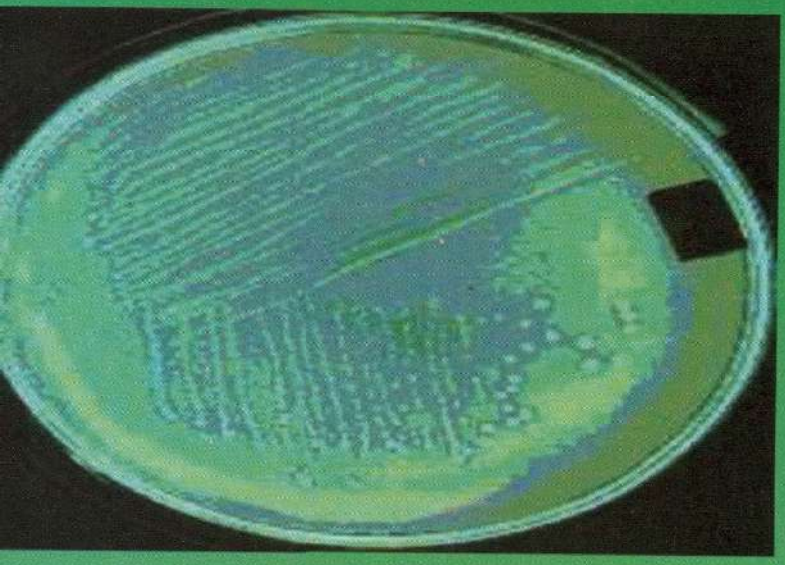
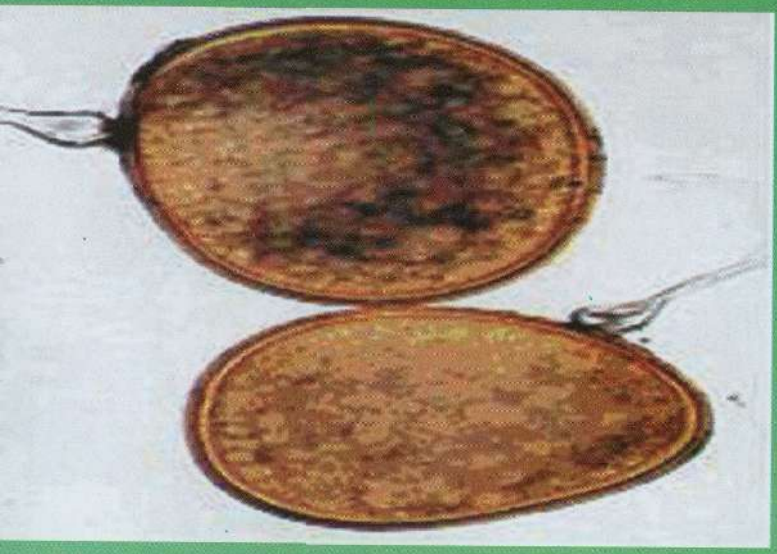
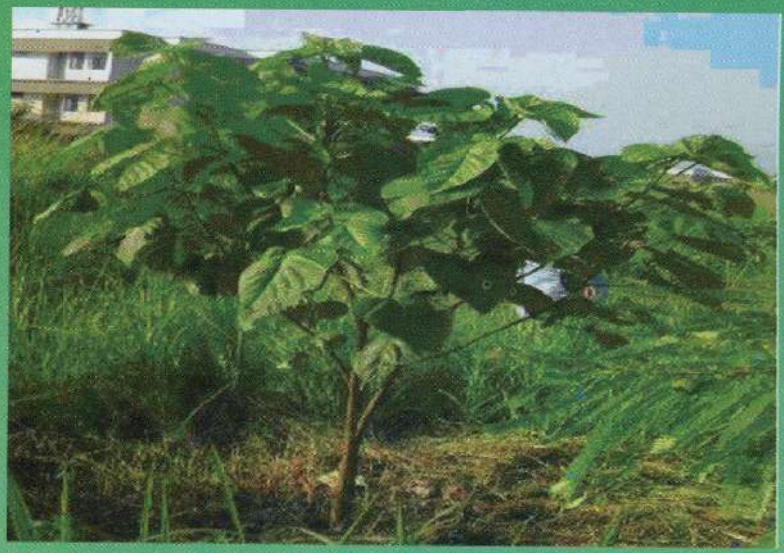


Plate culture of Pseudomonas sp.

Coupling of Muga Moth (Wild)



Microscopic view of Gigaspora sp. of VAM fungi



Nefafu (*Clerodendron colebrookianum*) plant from medicinal plant garden, IASST

Different Important Moments of Activities Captured in Camera

Prof. B.K. Bhattacharyya presenting the progress of his DST project in 3rd LPAC meeting

Members of the LPAC meeting of the data base project of DST, GoI

A view of motivation programme for school student.

Prof. Joyanti Chutia, Director addressing the press meet on Guwahati municipality garbage disposal near Deepor beel.

Awareness programme on fishing guidelines at Hajo, Kamrup District, Assam.

Workshop on identification of silk

Characterization of some matrix classes involving paranormed sequence spaces

For $p=(p_k)$ a sequence of bounded positive real numbers, different classes of matrices involving $m(p)$, $m_0(p)$, $c(p)$, $c_0(p)$ i.e. bounded statistically convergent, bounded statistically null, convergent and null paranormed sequences have been characterized. These results generalize and unify several existing characterization results.

Statistically convergent double sequence spaces defined by Orlicz function

Different classes of statistically convergent double sequences defined by Orlicz functions have been introduced. The notion of statistically convergent double sequences was introduced by B.C.Triapthy [Tamkang J. Math. 34(3)(2003), 231-237]. Their different algebraic and topological properties like solidness, symmetricity, denseness, completeness etc. have been examined. Some inclusion results have been proved.

On some classes of sequences defined by Orlicz functions

The $\Delta_{u_g}^{m}$-statistically convergent, $\Delta_{u_g}^{m}$-Cesaro summable sequences defined by Orlicz functions over a seminormed spaces have been introduced. The relationship between $\Delta_{u_g}^{m}$-statistically convergent and $\Delta_{u_g}^{m}$-Cesaro summability is obtained.

For $M=(M_k)$ a sequence of Orlicz functions, the generalized difference sequence spaces $w_1\left(M,\Delta^m,\bar{q},p,u,q\right), w_\infty\left(M,\Delta^m,\bar{q},p,u,q\right), w_0\left(M,\Delta^m,\bar{q},p,u,q\right)$ in seminormed space (X,g) are introduced. These spaces unify and generalize many sequence spaces studied earlier by different workers. Some of their algebraic and topological properties are studied. Some inclusion results have been proved.

Strongly almost $(V,\lambda)(\Delta^r)$-summable sequences defined by Orlicz functions

Let $\lambda=(\lambda_n)$ be a non-decreasing sequence of positive numbers such that $\lambda_{n+1}\leq\lambda_n$, for all $n\in N$, $\lambda_1 1=1$, $\lambda_n\to\infty$, as $n\to\infty$ and $I_n=[n-\lambda_n+1, n]$. The strongly almost $(V,\lambda)(\Delta^r)$-summable sequences with respect to Orlicz function are introduced, following the idea of Vallee-Pousin mean. Its different algebraic and topological properties are studied. Some inclusion results are proved. Different relations between DIr-statistically convergent sequences and strongly almost $(V,\lambda)(\Delta^r)$-summable sequences with respect to Orlicz function are established.

A new type of difference sequence spaces

A new type of generalized difference sequences is introduced as follows:

For $m\geq 0$, $Z(\Delta_m)=\{(x_k):(\Delta_m x_k)\in Z$, for $Z=c, c_0, \ell_\infty$, where $\Delta_m x_k = x_k - x_{k+m}$, for all $k\in N$. For $m=1$, it reduces to the difference sequence spaces studied by H. Kizmaz [Canadian Math. Bull., 24(1981), 169-176]. Different algebraic and topological properties of the spaces $c(\Delta_m)$, $c_0(\Delta_m)$ and $\ell_\infty(\Delta_m)$ are investigated.

On a class of statistically null vector valued sequences associated with multiplier sequences

The class of statistically null paranormed sequence spaces $c_0\{E_k,\bar{\Lambda},p\}$ associated with the multiplier sequence

$\Lambda=(\lambda_k)$ is defined, where E_k's are seminormed spaces, seminormed by f_k, for each $k\in N$. Some properties of this space like completeness, solidity, etc have been studied. Some inclusion relations have been established. Necessary and sufficient conditions have been obtained for the equalities of the inclusion relations.

4.4.2 Statistics

(A) Applied stochastic process

Queueing theory is the mathematical study of queue or waiting line. It provides a set of tools for the analysis of service systems. The various process relating to study of queues that concern sequence of events governed by probabilistic laws are called Stochastic Process. Again probabilistic service discipline is a simple method to make a service discipline controllable. A common property of probabilistic disciplines is that each of them assigns a set of user controllable parameters to queue in the system. The parameter assigned to a queue determines the extent to which the queue is served when it is polled by the server. The main advantage of the probabilistic disciplines is that the assigned parameters can be adjusted based on network feedback. By adjusting these parameters carefully, various performance criteria can be satisfied and thus the system performance may be optimized, see for example Ghafir and Silio [# IEEE Transection on Communications, 41, 1494-1506, (1993) #] and Jiang et.al [# European Transaction of Telecommunications, 13(6), 563-572, (2002) #].

Because of their wide applications, especially in computer networks, several probabilistic disciplines have been proposed and studied to date of literature: Cyclic polling systems with Bernoulli schedule by Keilson and Servi [# Journal of Applied Probability, 23, 790-802,(1986) #] , the Binomial- gated service discipline for cyclic systems by Levi [# IEEE Transaction on Communication, 39(4), 1341-1350,(1991) #], the Pi - persistent protocol for multi-access communications over unidirectional broadcast bus networks by Mukherjee and Meditch [# IEEE Transactions on Communications, 36(12), 1277-1286, (1988) #], the priority queue with Bernoulli schedule by Katayama and Takahashi [# Journal of Operational Research Society of Japan, 35(3), 231-249, (1992) #] . In this context first of all we have investigated a single server Poisson arrival queue with two phases of heterogeneous service along with a Bernoulli schedule vacation model, where after two successive phases service the server either goes for a vacation with probability or may continue to serve the next unit, if any, with complementary probability . Further the concept of multiple vacation policy is also introduced. Basically embedded Markov chain technique and method of regenerative process have been applied to obtain the queue size distributions at different epoch. Also we discuss some statistical inference related issues for this model. Secondly, by applying supplementary variable technique we generalized this model for the case of batch arrival system. For this model we carryout an extensive analysis for the queue size distribution at various epochs, busy period distribution and waiting time distribution. Further attempts have been made to unify the results of related batch arrival vacation models.

Control of queues is one of the most significant areas of research. As the number of published papers on this topic is extremely vast. For the sake of convenience we shall often refer to basic classified bibliography by Crabill et-al [# Operation Research,25, 219-232, (1977) #]. Based on their classification we have investigated following two control policies viz.

Queueing system under N-policy : A stationary N-policy is defined as one where the server is turned on when the total number of units in the queue reaches the threshold value 'N' and turned off when the system becomes empty, introduced by M. Yadin and P. Noar [# Operational Research Quart, 14, 393-404, (1963) #]. In this context we design an optimal management policy for a queueing system presenting many characteristics: batch arrival, bulk service, random setup time following an idle period, N-policy discipline and Bernoulli vacation schedule. In this system, customers arrive to the queueing facility in groups of random size and are served in groups of a fixed size. The server checks the queue at every service completion instant. Given two fixed threshold r and N , if more than r customers are in line., then the server picks a group of r customers and processes them in a single batch. If less than r customers are in line, then the server idles and waits for the queue to reach the value N. Once the level N is reached (or exceeded, because arrivals are in batches), then a group is picked and the r customers are served together. The prescriptive model of this type of system consists in designing an optimal management policy. We seek optimal values for the threshold levels r and N, i.e. the values that minimize the system's expected cost per unit of time. We analyze the model by the method of embedded Markov chain and semi- regenerative techniques.

Queueing system with restricted admissibility policy : According to this policy, not all batches are allowed to join the system at all times, in which 'p' (say) percent of arrival batches are accepted during busy periods and 'r' (say) percent of arriving batches are accepted during the vacation periods. This policy was introduced by Madan and Abu-Dayyeh [# ESSAIM: Probability and Statistics, 6, 113-125, (2002) #]. In this context we have investigated a two stage heterogeneous service batch arrival queue with a random setup time under Bernoulli schedule vacation, where after termination of a busy period, as soon a customer or a batch of customers arrives, the server needs a random setup time (or the warming up time) before actually starting service of the first customer. We carryout an extensive analysis for the queue size distribution of this model through well known supplementary variable technique. Further we unify results of several classes of related batch arrival queueing systems.

Finally we have investigated a queue with an optional of second vacation, where the server may take a second phase of optional vacation after the first phase of regular vacation. The motivation for this type of model comes from some digital communication systems, where the server may require two phases of vacations viz. Phase-I vacation (regular vacation) for usual overhauling and maintenance of the system and Phase-II vacation (optional vacation) may be necessary only if a specified team of engineers is required to correct a major fault in the system when the system is not in proper working conditions, which has direct applications in reliability engineering, Production systems, Satellite communication etc.

(B) Distribution theory

To estimate the parameters involved in a distribution function there are several known methods available for fitting curves. As would be expected of any general method, the method of moments (which is more popularly used) may give difficulty because

(i) the equations resulting from $\int_n^k x^n f(x,a,b,....)dx = \nu_n$

cannot be solved to find the constants a,b,... in $y = f(x,a,b,....)$ or

(ii) sufficiently accurate adjustments are not yet available in all circumstances for the statistical moments or

(iii) some of the moments are liable to such large standard errors as to make them unreliable. This last point can be exemplified by curves, within the Pearson system, which cannot be fitted satisfactorily by moments, e.g. $y = \frac{y_0}{(1+x^2)}$

The method of maximum likelihood:

This method is due to R.A. Fisher [Phil. Trans., A., Vol. 222, (1921) pp. 309-368]. The method of moments was regarded as efficient in fitting Pearsonian Curves, prior to 1921, when it was shown by Fisher, that its efficiency is restricted to a small region for which β_2 lies between the limits 2.65 and 3.42; and for which β_1 does not exceed 3.42. Later the same author pointed out that the goodness of fit test would not be accurate if the method of fitting employed is inadequate; that is, if the statistics used in the estimation of parameters are inconsistent or inefficient. A statistic satisfying the criterion of efficiency can be found by the method of maximum likelihood as shown by R.A. Fisher [Phil. Trans., A., Vol. 222, (1921) pp. 309-368].

Although the general theory, and the principle of its practical application, has thus been available for many years, the teaching and improvement etc. has lagged behind. This method has been successfully used to fit the parameters of Type I type of Pearsonian curve to data, truncated type III type, truncated gamma distribution, autoregressive process AR(1), a new class of families if distributions called W-type families, and grouped data like Weibull distribution and log normal distribution

The scoring method

The difficulty of using the method of maximum likelihood in general curve fitting is the same as that mentioned in connection with the least squares; the equations reached cannot be solved directly and the constants have to be found by approximation. Also it sometimes happens that the method leads to complicated equations so that the solutions cannot be obtained directly. In such cases, that is when explicit solution of the equation are not possible, we use the method suggested by Rao [Linear Statistical Inference and its Applications. Wiley Eastern Private Limited (1974)], i.e. the method of scoring for approximate calculation of maximum likelihood estimators. Here iterative methods are employed to get the solution. The estimator so obtained is often consistent but less efficient and, therefore, correction is to be applied to bring it nearer to the desired form.

The maximum likelihood estimators of the parameters are obtained by solving the following normal equations D.C. Nath [On some analytical Models for number of births and their applications. Ph.D. thesis, Banaras Hindu University 1984]:

$$\frac{\delta \log L}{\delta \theta_j} = \sum_{r=0}^{n} \frac{N_r}{P_r} \frac{\delta P_r}{\delta \theta_j} = 0, j = 1,2,...$$

So, the maximum likelihood estimates of the parameters are estimated from the following matrix equation:

$$A.\underset{\sim}{\delta\theta} = S$$

where $A = \{A_{st}\}, s,t = 1,2,...$

$$\underset{\sim}{\delta'\theta} = (\delta\theta_1 \ \ \delta\theta_2 .....), \quad S' = (S_1 \ \ S_2 .....)$$

and

$$A_{st} = N\sum_{r=0}^{n} \frac{1}{P_r} \frac{\delta P_r}{\delta \theta_s} \frac{\delta P_r}{\delta \theta_t},$$

$$S_s = \sum_{r=0}^{n} \frac{N_r}{P_r} \frac{\delta P_r}{\delta \theta_s}$$

The variance-covariance matrix of the estimators is the inverse of the information matrix A. The computation of the elements of the information matrix requires differentiation of the probabilities with respect to the unknown parameters.

The pilot values of parameters under different types, which are required for scoring method, are taken as the values obtained by the method of moments. A computer program has been written in 'C' language, for calculating probabilities, scores and the variance covariance matrix of the estimators. The method was successfully tested with three types of Pearsonian system of curves, viz. type II, III and VII.

(C) Database of R&D institutions by broad research areas in the N.E. region.

The broad objectives of the project is to prepare a Directory of the Institutions / Industries / NGO's involved doing research and supporting the institutions via Research & Development projects in any field of Science & Technology and to compile some specific details of all R&D projects those were 'Ongoing' or 'Completed' in these institutions during the Ninth Plan Period i.e. from1997-98 to 2001-02.

The third meeting of the Local Project Advisory Committee was held at the IASST Guwahati on 25-04-2006. The meeting was chaired by Professor Joyanti Chutia, Director, IASST, Dr. A.N. Rai, Scientist, PSO, NSTMIS, DST, Govt. of India was the DST representative. The other members were Professor J. Mehdi, Emeritus Professor, Gauhati University, Dr. H. Bailung, Regitrar, IASST, Sri D.N. Das, Principal Investigator, Dr. B. C. Tripathy, Co- Principal Investigator.

The project team made an analytical presentation of the data collected so far through the survey covering the following points:

(a) Position of the confirmed R&D institutions in the states of the North East region (b) State-wise position of response (c) Agency-wise support to extramural/intramural R&D projects in the North East region (d) Distribution of S&T institutions by the type in the states (e) List of industries doing R&D (f) Year-wise annual turnover of the industries (g) Industrial R&D investment by broad areas of research, were presented and discussed.

Meanwhile the data collected has been compiled in the software supplied by DST (GoI). The details have been sent to DST in a CD. The draft report of the completion of the project has been submitted to DST (GoI) for their comments and suggestion.

(D) The database project "Status of Science Teaching in Secondary Schools of Assam".

The Project is sponsored by the Department of Science and Technology (Govt. of India) for a period of 30 months. The Project became operative with effect from 1st February, 2005. The study covers secondary schools of the state. SEBA is mostly responsible for secondary education in the state. CBSE is an organization responsible for secondary education in the country. There are a good number of schools in the state following CBSE courses. SEBA has three types of recognized schools namely, Govt., Provincialised and Private. Similarly, CBSE also has three types of secondary schools, namely Kendriya Vidyalaya, Navodaya Vidyalaya and other CBSE schools. In the study both SEBA and CBSE schools are being considered.

Lists of High schools and Higher Secondary schools were collected from Board of Secondary Education, Assam (SEBA) and Higher Secondary Education Council, Assam. As per methodology stated in the sanctioned Project, schools were selected for data collection. List of CBSE schools was collected from CBSE Regional office, Guwahati. Schools were selected for data collection as per methodology stated in the sanctioned Project. Subsequently necessary permissions for data collection from selected schools were obtained from the Director of Secondary Education, Assam; Assistant Commissioner, Kendriya Vidyalaya Sangathan, Guwahati; Assistant Commissioner, Kendriya Vidyalaya Sangathan, Silchar and the Deputy Commissioner, Navodaya Vidyalaya Samiti, Shillong.

Schedules/Questionnaires were developed and pre-tested; it was also approved in the first LPAC meeting was held on 15th June 2005. One Questionnaire was developed for the students also to collect information from a random group of 10 students of class X. The progress of the project was presented in the second and third LPAC meetings held on April 25, 2006 and February 09, 2007 respectively for discussions and suggestions. The data collection work is over. The data collected has been analyzed and the preparation of the draft report of the project for submission to DST is going on. It is expected that the draft report will be submitted in due course of time to DST (GoI).

4.5 Library and Information Centre

The Library and Information Center of Institute of Advanced Study in Science & Technology (IASST) strives to evolve as a model and leading multidisciplinary science library in the field of Plasma physics, Polymer science, Mathematics & Statistics, Chemistry, Biology (Medicinal plants, Sericulture, Bio-prospecting, Bio-fertilizers,

Virology, Genetics, Physiology, Fishery etc.), Agriculture, Biotechnology, Environmental science, Nano science & technology, etc.

The Library and Information Center is primarily intended for the scientists, research scholars, students and staff members of IASST. Besides this, the library also opens for outside users.

The library automation activity using the SOUL integrated library software package has been continued during the year. A Server, 4 PCs, 1 Scanner, 1 Printer, CD-Drives is the part of the set up of library computerization. The electronic databases at the library cover books only and for other documents the process is going on.

The library subscribed for 59 scientific journals both Indian & Foreign and 7 newspapers. Out of 59 journals some are online accessibility. Besides this, library received the annual report, newsletter, bulletin, and progress report from different organizations as a gratis/exchange document.

Following are Library services and statistics.

1. New Additions

Books	**..... 46**
Reports	300
Thesis/Dissertations.	05
CD-ROMs	15

2. Other Activities

Visitors using the Library	**.....621**
Circulation of Books/Journals etc	448
Photocopying (No. of pages)	45200
Number of Annual Reports mailed	100
No. of INTERNET Searches provided	23
Current Awareness Service	55
Selective Dissemination Information Service	17
Referral Service	43

3.Total Library Collections

Books	7265
Journals (Bound Volumes)	115
Journals subscribed for 2007	59
Journals received (Gratis/Exchange)	10
Reports	1550

Reprints	05
Thesis/Dissertations	250
Current contents of Journals	12
Misc. CD's	517

5.0 Research Papers Published (2006-07)

1. H. Kakati, A. R. Pal, H. Bailung and J. Chutia, "Sheath and potential characteristics in rf magnetron sputtering plasma", J. Appl. Phys. 100, 083303 (2006).
2. H. Kakati, A. R. Pal, H. Bailung and J. Chutia, "Effect of oxygen on the characteristics of radio frequency (rf) planar magnetron sputtering plasma used for aluminium oxide deposition", J. Appl. Phys. 101, 083304 (2007).
3. P. Chetri, N.N. Dass and N. Sen Sarma, "Synthesis of Poly (vinyl propionate) from Poly (vinyl alcohol) in non-aqueous medium using ethyl nitrate dimethyl sulfoxide as a catalyst", Journal of Applied Polymer Science, 102(6), 5675-5679 (2006).
4. P. Chetri, N.N. Dass and N. Sen Sarma, "Conductivity studies of poly (vinyl alcohol)-iodine complex membrane", Polymer Bulletin, 58,489-494(2007).
5. P. Chetri, N.N. Dass and N. Sen Sarma, "Preparation and Ionic conductivity Measurement of poly (2-vinyl pyridinium) salts in solid state", Journal of Polymer Materials, 23, 397-401(2006).
6. P. Chetri, N.N. Dass and N. Sen Sarma, "Conductivity Measurement of Poly(Vinyl Borate) and its Lithium Derivative in solid state", Materials Science & Engineering B, 139, 261-264(2007).
7. P. Chetri, N.N. Dass and N. Sen Sarma, "Synthesis and characterization of poly(vinyl propional) with high acetalization rate", Macromol-An Indian Journal, 3(1), 27-30 (2007).
8. N.N. Dass, P. Chetri, H. Das and N. Sen Sarma, "Synthesis of poly 2-vinyl pyridinium salt as polyelectrolyte and water soluble foam", Journal of Polymer Materials, 24, 49-56 (2007).
9. R. Colak, B.C. Tripathy and M. Et, "Lacunary strongly summable sequences and q-lacunary almost statistical convergence", Vietnam Jour. Math., 34 (2), 129-138 (2006).
10. B.C. Tripathy and A. J. Dutta, "On fuzzy real-valued double sequence spaces", Soochow Jour. Math., 32(4), 509-520, (2006).
11. B.C. Tripathy; M. Et, Y. Altin and S. Mahanta, "Generalized difference paranormed sequence spaces defined by Orlicz function in a locally convex spac", Indian Jour. Math., 48(2), 187-199 (2006).
12. B.C. Tripathy and M. Sen, "On a class of statistically null vector valued sequences associated with multiplier sequences", International Journal of Sci. Tech., 1(1), 19-24 (2006).
13. B.C. Tripathy and M. Sen, "Characterization of some matrix classes involving paranormed sequence spaces", Tamkang Jour. Math., 37(2), 155-162 (2006).
14. B.C. Tripathy and B. Sarma, "Statistically convergent double sequence spaces defined by Orlicz functions", Soochow J. Math., 32(2), 211-221 (2006).
15. M.Et; P.Y.Lee and B.C. Tripathy, "Strongly almost $(V,\lambda)(\Delta')$-summable sequences defined by Orlicz function",

Hokkaido Math. Jour., 35, 197-213 (2006).

16. M. Et, Y. Altin, B. Choudhary and B. C. Tripathy, "On some classes of sequences defined by sequences of Orlicz functions", Mathematical Inequalities and Appl., 9(2), 335-342 (2006).
17. B.C.Tripathy and A. Esi, "New type of difference sequence spaces". International Journal of Sci. Tech., 1 (1), 11-14 (2006).
18. L.Tadj, G. Choudhury and C. Tadj, "A bulk quorum queueing system with a random setup time under N-policy and with Bernoulli vacation schedule", Stochastics: An international journal of probability and stochastic process, 78 (1), 1-11 (2006).
19. G. Choudhury and M. Paul, "A batch arrival queue with second optional service channel under N- policy", Stochastic Analysis and Applications, 24 (1), 1-21 (2006).
20. L. Tadj, G. Choudhury and C. Tadj, "A quorum queueing system with a random setup time under N- policy and with Bernoulli vacation schedule", Quality Technology and Quantitative Management, 3 (2), 145-160 (2006).
21. G. Choudhury and M. Paul, "A two phase queueing system with Bernoulli vacation schedule under multiple vacation policy", Statistical Methodology, 3 (2), 174-185 (2006).
22. G. Choudhury and K.C. Madan, "A batch arrival queue with Bernoulli vacation schedule under multiple vacation policy", International Journal of Management Science, 12 (2), 1-18 (2006).
23. K.C. Madan and G. Choudhury, "Steady State Analysis of an Queue with Restricted Admissibility and Random Setup time", International Journal of Information and Management Sciences, 17 (2), 33-56 (2006).
24. G. Choudhury, "An Queue with an Optional Second Vacation", International Journal of Information and Management Sciences, 17 (3), 19-30 (2006).
25. G.C. Das and K. Devi "Propagation of soliton and its radiation in inhomogeneous discharge plasmas" Indian J. Pure & Appl. Physics, 44, 31-38 (2006).
26. K. Devi, J. Sarma, G.C. Das and R.K. Roychoudhury, "Evolution of ion-acoustic solitary waves in magnetized plasma contaminated with varying dust charged grains", Planetary and Space Science, 55, 1358-1367 (2007).
27. G.C. Das and A. Nag, "Evolution of non-linear ion-acoustic solitary wave propagation in rotating plasma", Physics of Plasma,13(8), 082303 (2006),
28. N. Devi, R. Gogoi, G.C. Das and R.K. Roychoudhury, "Studies on the formation of large amplitude kinetic Alfven waves solitons and double layers in plasmas", Physics of Plasma 14, 12107-12111 (2007).
29. A. Deka and P. Azad, "Screening for efficient strains of Bradyrhizobium", Indian J. Pulses Res., 19(1), 79-82 (2006).
30. R. Saikia, K.D. Kumar, D.K. Gogoi and P. Azad, "Pseudomonas aeruginosa inducing rice Resistance Against rhizoctonia solani: Production of salicylic Acid and Peroxidases", Folia Microbial., 51(5), 375-380 (2006).
31. R. Kalita, A.K. Deka and P. Azad "Evaluation of Native RHIZOBIUM from acid soils of Assam", Legume Res., 29 (3), 157-162 (2006).
32. A.K. Deka and P. Azad "Isolation of Rhizobium strains: Cultural and Biochemical characteristics", Legume

Res., 29 (3), 209-212 (2006).

33. A.K. Deka, P. Azad and S.C. Patra, "Survival of Rhizobium in soil at different pH, Temperature and Moisture Levels". Environment, Ecology and Conservation, 12 (4), 751-754 (2006).
34. M. Ao, S. Bordoloi, A. Ohler and S. Grosjean, "Rana khare (Kiyasetuo & Khare, 1986), Present distribution, redescription of holotype and morphology of adults and tadpoles", Alytes, 24 (1-4), 22-39 (2006).
35. S.C. Bordoloi and A. Baishya, "Puntius ornatus a new record from the Brahmaputra drainage in Assam", ZOOS'PRINT Journal, 21(6), 2292-2294 (2006).
36. A. Baishya and S.C. Bordoloi. "An albino Anabas testudineus (BLOCH) in a wetland of Assam, India", ZOOS'PRINT Journal 21(7), 2332-2333 (2006).
37. S. Deka and S. Yasmin, "Utilization of lime sludge waste from paper mills for fish culture", Current Science, 90 (8), 1126-1130 (2006).
38. S. Deka, "Pseudomonas aeruginosa-a potential hydrocarbon degrading bacterial strain isolated from petroleum-contaminated soil of Assam", Asian Jr. Microbiol. Biotech. Env. Sc., 8 (1), 87-90 (2006).
39. P. K. Sarma, S. Deka and K. G. Bhattacharyya, "Phytoremediation of hydrocarbons from refinery sludge contaminated soil", J. Appl. Biosci. Biotech, 2(2), 21-25 (2006).
40. M. Kalita, H. Das, N. Khanikar, K. G. Bhattacharyya and A. Devi, "Assessment of pollution risks generated by Group Gathering Station - A case study in Lakowa Oil Field (GGS -1) of ONGCL" Enviro Spectra, 2(1), 52-59 (2007).

6.0 Other Publications

1. P. Azad, "Bio-inoculant Research in Assam", published in the Souvenir of National Workshop on Agriculturally Important Microorganisms of N. E. Region for Integrated Nutrient and Pest Management" held at Institute of Advanced Study in Science and Technology, Guwahati on Octobet 9-14, 2006. pp. 31-35.
2. A.K. Deka and P. Azad, "Effect of Rhizobium Inoculation on the growth and yield of cowpea (Vigna unguiculata (L.) Walp.) grown in organically amended soil". Proceedings of the National Seminar on "Biodiversity Conservation and Future Concern" held in Gauhati University, 48-54 (2006).
3. Anjali Baishya and Sabitry bordoloi "A study on environmental stress on the wetland and their impact on Fisheries", in the proceedings of Zoological Society of Assam technical session held at Rangia College, Rangia, 145-148 (2006).
4. S. Deka, "Biotechnological applications of microbes", published in the Souvenir of National Workshop on Agriculturally Important Microorganisms of N. E. Region for Integrated Nutrient and Pest Management" held at Institute of Advanced Study in Science and Technology, Guwahati on Octobet 9-14, 2006. pp. 36-37.

7.0 Research Papers Presented in Conference

1. "Investigation of instability in presence of E×B flow in a linear magnetized plasma device", A. R. Pal, N. C. Adhikary, H. Bailung and Joyanti Chutia, International workshop on Frontiers of Plasma Science, ICTP, Italy on 21st August to 1st September 2006.
2. "Titanium nitride nano-structure by DC magnetron sputtering plasma", S. M. Borah, A. R. Pal, H. Bailung and Joyanti Chutia; CMDAYS-06, presented in the National Symposium on Condensed Matter Science, Tezpur University, India on 29th to 31st August 2006.
3. "Morphological study of cylindrical magnetron sputtered titanium nitride thin films", Sankar Moni Borah, Arup Ratan Pal, Heremba Bailung and Joyanti Chutia; presented in the 21st National Symposium on PLASMA SCIENCE AND TECHNOLOGY, Malaviya National Institute of Technology, Jaipur, India on 18th to 22nd December 2006.
4. "Estimation of E×B drift velocity of electrons in a rf planar magnetron sputtering system", H. Kakati, A. R. Pal, H. Bailung and Joyanti Chutia, presented in National Symposium on Plasma Science and Technology, MNIT, Jaipur, India on 18th to 22nd December 2006.
5. "Investigation of the properties of Ar/O_2 radio frequency magnetron sputtering plasma", A. R. Pal, H. Kakati, H. Bailung and Joyanti Chutia, presented in the 5th Conference of Physics Academy of the North East, Gauhati University, Guwahati, India on 1st to 2nd March 2007.
6. "Experimental investigation of sheath structure in dusty plasma" Nirab Chandra Adhikary, Heremba Bailung, Y. Nakamura, Arup Ratan Pal and Joyanti Chutia, presented in the 5th Conference of Physics Academy of the North East, Gauhati University, Guwahati, India on 1st to 2nd March 2007.
7. "Hardness Study of Titanium Nitride Thin Films Deposited on Bell-metal by Cylindrical Magnetron Sputtering", Sankar Moni Borah, Arup Ratan Pal, Heremba Bailung and Joyanti Chutia, presented in the 5th Conference of Physics Academy of the North East, Gauhati University, Guwahati, India on 1st to 2nd March 2007.
8. "Emissive probe study of the potential structure inside the sheath in rf magnetron plasma", H. Kakati, A. R. Pal, H. Bailung and Joyanti Chutia, presented in the 5th Conference of Physics Academy of the North East, Gauhati University, Guwahati, India on 1st to 2nd March 2007.
9. "Evolution of Nonlinear Ion-acoustic Solitary Waves in Rotating Dusty Plasma" A. Nag and G. C. Das, 21st National Symposium on PLASMA SCIENCE AND TECHNOLOGY, Malaviya National Institute of Technology, Jaipur, India on 18th to 22nd December 2006.
10. "Fuzzy Real-Valued Convergent Double Sequence Spaces", B.C. Tripathy and Bipul Sarma, presented in the 22nd Annual Conference of the Banaras Hindu University Mathematical Society held at Banaras Hindu University Varanasi during December 15-16, 2006.
11. "Sequence Spaces of Fuzzy Real Numbers Defined by Orlicz Functions". B.C. Tripathy and B. Sarma, presented in the 22nd Annual Conference of the Banaras Hindu University, Mathematical Society held at Banaras Hindu University Varanasi during December 15-16, 2006.
12. "The Sequence Spaces m (f) F". B.C. Tripathy and S. Borgohain presented in the 22nd Annual Conference of the Banaras Hindu University Mathematical Society held at Banaras Hindu University Varanasi during December 15-16, 2006.

13. "A two phase queueing system with repeated attempts and Bernoulli vacation schedule" G. Choudhury and S. Kalita, presented in the 9th Annual Conference of the Society for Statistics, Computers and its Applications, held at Department of Statistics, Saurashtra University, Rajkot, during November 11-13, 2006.
14. "A two phase batch arrival retrial queueing system with Bernoulli vacation schedule" G. Choudhury presented in the International Indian Statistical Association Joint meeting and International Conference on Statistics, Probability and Related Areas, organized by Department of Statistics, Cochin University of Science and Technology and held at Hotel Renaissance, during January 2-5, 2007.
15. "Single crystal XRD structural elucidation of 6a-acetoxy azadirone", Jiban Kotoky, Mahendra Kalita, Gautam Kumar Sarmah and Babulal Das presented in the 52nd Annual Technical Session of Assam Science Society held on 18th March 2007 at Cotton College, Guwahati.
16. "Assesment of Risk due to intake of artificial colours used in food stuffs available in Kamrup District, Assam, Jiban Kotoky, Jitu Saikia and Gautam Kumar Sarmah presented in the 52nd Annual Technical Session of Assam Science Society held on 18th March 2007 at Cotton College, Guwahati.
17. "Impact of paper mill effluent on production of certain agricultural crops of Assam" U.J. Medhi, A.K. Talukder and S. Deka presented in the "National Seminar on Challenging Frontiers in Applied Zoology" held at Rangia College, Kamrup, Assam, Organized by Zoological Society of Assam and Department of Zoology, Rangia College, Rangia, Assam, during August 25-26, 2006.
18. "A Study of Efficacy of Native Verms for Production of Vermicompost" H. Deka and S. Deka presented in the "National Seminar on Challenging Frontiers in Applied Zoology" held at Rangia College, Kamrup, Assam, Organized by Zoological Society of Assam and Department of Zoology, Rangia College, Rangia, Assam, during August 25-26, 2006.
19. "A study on drinking water quality of south bank of extreme lower part of Assam". A. Hussain, S. Deka, and A.K. Talukdar presented in the "National Seminar on Environmental Degradation and Remedial Measures" Organised by Nabajyoti College, Kolgacia, Barpeta, held on February16-17, 2007.
20. "Environmental risk assessment due to oil exploration with special reference to the presence of heavy metals in agricultural soil: A case study in Rudrasagar Oil Field". M. Kalita, H. Das, N. Khanikar, S, Hoque and A. Devi presented in the "International Conference on Ecotoxicology and Environmental Sciences" (ICEES- 2007) held during 15-18 January, 2007 in the Scientific Session-VI at the Seminar Hall of the Indian Institute of Chemical Engineers (Jadavpur University Campus), Kolkata-700032, INDIA
21. "Variation of soil quality due to oil field operations at Lakowa, Assam (India)". S. Hoque, M. Kalita, H. Das, N. Khanikar and A. Devi presented at the "International Conference on Ecotoxicology and Environmental Sciences" (ICEES- 2007) held during 15-18 January 2007 in the Scientific Session-VI at the Seminar Hall of the Indian Institute of Chemical Engineers (Jadavpur University Campus), Kolkata-700032, INDIA.

8.0 Conference/Symposium/Workshop Attended

1. Mr. S.M. Borah, JRF, MSD attended "Condensed Matter Days-2006", National Symposium on Condensed Matter Science held at Tezpur University, 29-31 Aug, 2006.
2. Mr. S.M. Borah, JRF, MSD attended "PSSI-IPR workshop on National Fusion Program-ITER and Beyond" held at IPR, Ahmedabad, India, 8th to 10th November 2006.
3. Mr. H. Kakati, JRF, MSD attended "PSSI-IPR workshop on National Fusion Program-ITER and Beyond" held at IPR, Ahmedabad, India, 8th to 10th November 2006.
4. Dr. A.R. Pal, Assistant Professor, MSD attended International workshop on "The Application of Nanocrystalline Diamond like Carbon Materials (IWAncDLC-2006)", held at Saha Institute of Nuclear Physics, Kolkata, India, 28Nov- 1Dec, 2006.
5. Mr. S.M. Borah, JRF, MSD attended International workshop on "The Application of Nanocrystalline Diamond like Carbon Materials (IWAncDLC-2006)", held at Saha Institute of Nuclear Physics, Kolkata, India, 28Nov-1Dec, 2006.
6. Mr. S.M. Borah, JRF, MSD attended "National Symposium on Plasma Science and Technology-2006" held at MNIT, Jaipur, India, 18th to 22nd December 2006.
7. Mr. H. Kakati, JRF, MSD attended "National Symposium on Plasma Science and Technology-2006" held at MNIT, Jaipur, India, 18th to 22nd December 2006.
8. Dr. A. R. Pal, Assistant Professor, MSD attended "5th Conference of Physics Academy of the North East" held at Gauhati University, Guwahati, India, 1st to 2nd March 2007.
9. Mr. N. C. Adhikary, SRA, MSD attended "5th Conference of Physics Academy of the North East" held at Gauhati University, Guwahati, India, 1st to 2nd March 2007.
10. Mr. S.M. Borah, JRF, MSD attended "5th Conference of Physics Academy of the North East" held at Gauhati University, Guwahati, India, 1st to 2nd March 2007.
11. Mr. H. Kakati, JRF, MSD attended "5th Conference of Physics Academy of the North East" held at Gauhati University, Guwahati, India, 1st to 2nd March 2007.
12. Dr. (Mrs.) D. Devi attended the Conference of Zoological Society of Assam and National Seminar on "Challenging Frontiers in Applied Zoology" held at Rangia College, Rangia, Kamrup, Assam, 25th to 26th August 2006.
13. Mr. B. Talukdar, LSD has attended the National Seminar on "Value Addition to Bioresource of N.E. India, Post Harvest Technology and Cold Chain" organized by Department of Botany, Gauhati University and Assam Science Technology and Environment Council, Guwahati, 19th to 21st May 2006.
14. Mr. R. Nath, LSD has attended the National Seminar on "Value Addition to Bioresource of N.E. India, Post Harvest Technology and Cold Chain" organized by Department of Botany, Gauhati University and Assam Science Technology and Environment Council, Guwahati, 19th to 21st May 2006.
15. Dr. (Mrs.) R. Devi, LSD attended the 52nd Annual Technical Session of Assam Science Society held at Cotton College, Guwahati, 18th March 2007.

16. Dr. (Mrs.) R. Devi, LSD attended the Conference of Zoological Society of Assam and National Seminar on "Challenging Frontiers in Applied Zoology" held at Rangia College, Rangia, Kamrup, Assam, 25th to 26th August 2006.
17. Dr. (Mrs.) A. Devi, RM&ED attended the Workshop on HPLC organized by WATERS at Guwahati, 26th April 2006.
18. Dr. (Mrs.) A. Devi, RM&ED attended the "National Workshop on Chemistry Education: Past, Present and Future" organized jointly by Department of Chemistry, Gauhati University, The Society for Chemical Education Assam (SCEA) and Indian Association of Chemistry Teachers (IACT), 5th May 2006.
19. Dr. (Mrs.) A. Devi, RM&ED attended the "National Workshop on Computers in Chemistry" organized by Department of Chemistry, Cotton College, Guwahati, 5th to 7th June 2006.
20. Mr. Mukut Kalita, RM&ED attended the "National Workshop on Computers in Chemistry" organized by Department of Chemistry, Cotton College, Guwahati-781001, 5th to 7th June 2006.
21. Mr. N. Khanikar, RM&ED attended the "National Workshop on Computers in Chemistry" organized by Department of Chemistry, Cotton College, Guwahati-781001, 5th to 7th June 2006.
22. Ms. A. Dutta, RM&ED attended the "National Workshop on Computers in Chemistry" organized by Department of Chemistry, Cotton College, Guwahati-781001, 5th to 7th June 2006.
23. Mr. T.D. Goswami, Asst. Librarian attended a six day training program on "Information Resource Management Using IT", organized by National Institute of Rural Development- North Eastern Regional Center (NIRD-NERC), held at Guwahati, Assam, 6th to 11th November 2006.
24. Mr. T.D. Goswami, Asst. Librarian attended the National Seminar on "Problems and Prospects of Rural Libraries with Reference to North East India", jointly organized by Dept. of Library & Information Science, G.U and Central Reference Library (Kolkata), Dept. of Culture, Govt. of India held at Guwahati University, 27th to 28th March 2007.

9.0 Nominations/ Recognitions/ Achievements/ Memberships/ Honours

1. Dr. B.C. Tripathy is an Editorial Board member of the periodical "Far East Journal of Mathematical Sciences" (Pushpa Publishing House), Allahabad.
2. Dr. B.C. Tripathy is an Editorial Board member of the periodical "Journal of Indian Academy of Mathematics", Indore.
3. Dr. B.C. Tripathy is an Editorial Board member of the periodical "Global Journal of Applied Mathematics and Mathematical Sciences", New Delhi.
4. Dr. B.C. Tripathy is an Editorial Board Member of the journal "International Journal of Science and Technology", Turkey.
5. Dr. G. Choudhury is the Editorial Board member of "Far East Journal of Theoretical Statistics" (Pushpa Publishing House), Allahabad.
6. Dr. G. Choudhury is the Reviewer for "Mathematical Reviews" (American Maths. Society, U.S.A.).
7. Dr. S. Deka has been nominated as one of the members of the editorial board of " Journal of Applied Bioscience and Biotechnology" published by North East Biotechnological Association (NEBA), Gauhati University, for the Year 2005-2007.

8. Dr. S. Deka has been nominated as one of the members of the editorial board of Biannual Research Journal "ENVIRO SPECTRA" published by the Society of Environmental Protection and Research (SEPER), Gauahati University for the year 2006-07.
9. Dr. S. Deka has been selected as an executive committee member of "Botanical Society of Assam" for the year 2006-2008.
10. Dr. S. Deka has been selected as an executive committee member of SEPER for the session 2006-07.

10.0 Other Scientific Activities

1. Dr. B.C. Tripathy attended the 3rd joint meeting of the state Principal Investigators of the Database projects sponsored by Department of Science & Technology (Govt. of India) and presented the progress of our project "Database of R&D Institutions by Broad Research Area of North-East Region" held at Shimla during June 6-7, 2006.
2. Dr. B.C. Tripathy visited the Department of Mathematics, Utkal University, Bhubaneswar from 10-03-2007 to 17-03-2007 for have discussions and collaborations with Professor B.K. Nayak.
3. Dr. L.B. Mahanta Visited Indian Statistical Institute (ISI), Kolkata and Institute of Cybernetics Systems and Information Technology (ICSIT), Kolkata from 22.10.06 to 26.10.06 and had discussions with Dr. D. Dutta Majumder, Dr. S.B. Rao and Dr. Arunava Goswami of Biosciences Lab of ISI and some other faculties of ECSU unit of ISI.
4. Dr. P. Azad Attented the 7th R &D Session of Indian National Committee on Irrigation and Drainage (INCID) at NERIWALAM, Tezpur held on 26-27 February, 2007.
5. Dr. K.C. Baruah Co-Principal Investigator of the project "A systematic study of physico chemical properties of Muga silk fibre" had visited CSTRI laboratory. Bangalore from 2nd July to 7th July 2006. During his visit he had discussed various methodologies adopted by that nodal Institute in Physical and chemical Tenacity of different fibrs including Muga fibre. He had discussed about the on going project with Prof. T. H. Somesekhr Director of the Institute and a sericultural scientist of international fame.
6. Dr. (Mrs.) Dipali Devi has delivered an invited talk on "Quality of silk" at the 'awareness program on silk mark' organization of India (SMOI) sponsored by Central silk Board, Ministry of Textile, GOI held at Guwahati on 22/06/2006.
7. Dr. (Mrs.) Dipali Devi has delivered a talk on Identification of pure Silk-Muga, Eri, Tasar and Mulberry at the Auditorium of IASST on 22nd Nov. 2006 pertaining to the workshop on "Technical, Financial and Export Related Services for Members and Prospective Members of Silk Mark Organization of India in The North East" on November 22, 2006
8. Dr. (Mrs.) Dipali Devi has been associated to ASTEC, the nodal agency for registering of obtaining Geographical Indication (GI) of Muga Silk (Antheraea assamensis) on behalf of Govt. of Assam. As such she has participated as a resource person in the meeting of presentation before expert committee meeting held on 21st Feb 2007 at Patent office, New Delhi.
9. Dr (Mrs.) Dipali Devi and Ramesh Nath have visited Manas Biosphere reserve and have made preliminary survey on habitat of silk moth and butterflies of that biosphere extending up to Bhutan border during the month of Nov. 2006.

10. Dr. Sabitry Bordoloi delivered a talk on "Environmental Degradation and Loss of Biodiversity" on the occasion of World Environment Day on 5th June, 2006 in the Regional Science Centre, Khanapara.
11. Dr. Sabitry Bordoloi delivered a talk on "Anthropogenic Stress on Aquatic Biodiversity-A Case Study in Gojan Beel, Hajo" in the sensitization session on Science & Technology Communication for Water Resources and Ecosystem Management organized by ASTEC, Guwahati and sponsored by the Ministry of Science and Technology, GoI on 12.11.2006 at Institute of Engineers, Guwahati.
12. Dr. Sabitry Bordoloi delivered a talk on "Prospects of beel fisheries in Assam" in the Seminar cum Workshop in Assam Matsya Mahotsov, 2007 organized by Fishery Department, Assam in collaboration with CII, Assam from 6th-8th March, 2007 at Silpagram, Guwahati.
13. Dr. S. Deka attended the 1st. Task Force Meeting on Biotechnology for Conservation and Environment held at New Delhi on 18th.July 2006 and defended a project proposal on "Phytoremedation of Heavy Metal Contamination Soil".

11.0 Ph.D. Awarded

1. Mr. Santanu Baishya was awarded Ph.D. degree in Physics by the Gauhati University for his thesis "Some espects od non-linear phenomena in dusty plasmas" under the guidance of Prof. G. C. Das and Prof. Joyanti Chutia in the year 2007.
2. Mrs. Putul Kalita was awarded Ph. D. degree in Physics by the Gauhati University for her thesis "Some fetures of sheath formation in multicompound plasmas" under the guidance of Prof. G. C. Das in the year 2006.
3. Sri Bipul Sarma got the Ph.D. degree from the Gauhati University for his thesis "Studies on Some Vector Valued Sequence Spaces and Kothe Toeplitz Duals" under the guidance of Dr. Binod Chandra Tripathy in the year 2006.

12.0 Visit Abroad

1. Dr. A.R. Pal, Assistant Professor, MSD attended the "International Workshop on Frontiers of Plasma Science" held at the Abdus Salam International Centre for Theoretical Physics (ICTP), Italy during 21Aug-1Sept 2006.
2. Mr. N.C. Adhikary, SRA, MSD attended the "ICTP-INFN Advanced Training Course on FPGA Design and VHDL for Hardware Simulation and Synthesis" held at the Abdus Salam International Centre for Theoretical Physics (ICTP), Italy during 27 Nov-22 Dec 2006.
3. Dr. Suresh Deka, Associate Professor, Resource Management and Environment Division, Visited University of Ulster, Northern Ireland, UK under an overseas associateship programme of Department of Biotechnology, Govt. of India for Post Doctoral research on Biosurfactants and their industrial application during 5th February to 4th May 2007 and carried out research on the subject under the supervision of Professor I. M. Banat, Microbial Biotechnological Laboratory of the University.

13.0 Workshop/ Seminar/ Training Programme Organized

1) A six day National Workshop on "Agriculturally Important Microorganisms of N E Region for Integrated Nutrient and Pest Management", was organized during October 9 to14, 2006 and it was sponsored by the DST, & DBT, Govt. of India and ASTEC, Govt. of Assam. A total of 25 participants from different parts of North Eastern Region of India have participated in the workshop. Honourable Minister of Agriculture Mrs. Pramila Rani Brahma has inaugurated the workshop. Professor A. K. Verma, Director, Amity University, Noida, UP was present as Chief Guest of the meeting and inaugurated the Souvenir published on the occasion of the workshop. The meeting was presided over by Professor K.M. Pathak, the Chairman of the Council, IASST. Professor Joyanti Chutia delivered the welcome address and Dr. Padum Azad, Convener of the workshop explained the purpose of the workshop. The resource persons and their talks are mentioned below:

Sl. No.	Name of the resource persons	Title of the talk delivered
1.	Prof. A. K. Verma	Symbiotic Fungi (Piriformospora indica) of the Millennium
2.	Prof. G. D. Sharma, Former V. C. Nagaland University, Nagaland	Improvement of Growth by Mycorrhizal Fungus under Metal Polluted Environment
3.	Dr. N. C. Talukdar, Scientist and Head, Division of Microbial Resource, IBSD, Imphal, Manipur	Soil Plant Animal Human Health Continuum in Context of Food Security Soil Fertility and Integrated Nutrient Management
4.	Dr. R. Barua, Senior Scientist, Soil Microbiology, Department of Soil Science, Assam Agricultural University, Jothat	Important of Azolla in Integrated Nutrient Management
5.	Dr. T. C. Bora, Scientist E-II, Regional Research Laboratory, Jorhat	Microbial Resource of Indo– Burma Hot-Zone: Potentiality and Promise
6.	Dr. P. J. Handique, Reader, Department of Biotechnology, G.U.	Bioprospecting and Micropropagation of Medicinal Plants Using Elite Clone with reference to NE India
7.	Dr. Ratul Saikia Scientist C, Biotechnology Division, Regional Research Laboratory, Jorhat	Use of Molecular Tools to Study the Diversity of Agriculturally Important Fungi
8.	Dr. R. K. Barman, ASTEC, Guwahati	Patent Awareness

(2) A seminar cum awareness programme was organized by Shillong chapter of Indian Society of Analytical Society (ISAS) in collaboration with IASST &ASTEC Guwahati at the seminar hall of IASSDT on 10/1/07. Dr. Babul Bora, Chief Scientist, Proctor and Gamble USA, had delivered a talk on development of Modern Medicine with special emphasis to the orthopedic Medicine for women of postmenopausal period. Dr. Pratapjyoti Handique, Reader Department of Biotechnology delivered a talk on Medicinal plant of North Eastern region.

The seminar was presided over by Dr. K.C. Baruah, President Shillong center of ISAST and Dr. Jayanti Chutia welcome the guest to the seminar. The awareness programe was attended by local public also.

(3) A daylong training program on Identification of Silk was held at Seri biotech laboratory as a part of workshop on "Technical, Financial and Export Related Services for Members and Prospective Members of Silk Mark Organization of India in The North East" Sponsored by NABARD and Silkmark, organized by silk mark organization of India, Gauhati chapter on Nov 22nd 2006. Prof. Joyanti Chutia, Director, IASST delivered the welcome address and appreciated the role of Silkmark Organization for holding the programme. She expressed that proper identification of silk is very important to maintain the quality. Importance of Silkmark, labeling procedure of the mark, diverse Silkworm producing different types of Silk and various technique of identification of silk has been explained elaborately to the trainees. Various physical and chemical tests for identification of Silk fabric were demonstrated in the Seribiotech laboratory. Awareness generated through the training will help to maintain quality of silk goods to check the adulteration specially in Muga Silk.

14.0 Colloquium Organized

Name	Organization&Division	Title of the Talk	Date
Dr. Dipali Devi	Assistant Professor Life Science Division IASST	Silk and Scanning Electron Microscopic Study of Natural Fiber.	28th April,2006
Dr. Heramba Bailung	Associate Professor Material Science Division IASST	Basic Experiments in Dusty Plasma	12th May,2006
Mr. Sankar Moni Borah	JRF, Material Science Division IASST	Application of Plasma	26th May,2006
Dr. K.C. Baruah	Ex-Director, Forensic Science Laboratory & Honorary Scientist, IASST	Applications of Science in Forensic Sciences	15th Sept,2006
Dr. Joydeep Ghosh	Scientist, IPR, Ahmedabad	Spectroscopic Measurement in Aditya Tokamak	15th Sept,2006
Prof. Dhiraj Bora	Deputy Director General International Thermalnuclear Experimental Reactor, France	ITER-Indian perspective	22nd Dec, 2006

Dr. Arun Sarma	Deptt. of Applied Physics. Birla Institute of Technology Ranchi	Structuring of Nano ae crystalline Diamond Coating with Plasma Created Iron Beam	26th Dec,2006
Mr. Rubul Saikia	JRF, Life Science Division IASST	Microbial Diversity of Dibru Saikowa Reserve of Assam.	23rd Feb,2007
Mrs.Tutul Bartamuli	Tecaher Fellow Resource Management & Environment Division IASST	Study of Amphibia in Sivsagar District	30th Mar,2007

15.0 Motivational Programme for School Students

Institute of Advanced Study in Science & Technology (IASST), Guwahati had organized a five-day Science Motivation Programme, sponsored by the NCSTC, Dept. of Science & Technology, Govt. of India for selected talented, bright high school students of Assam from 30th May to 3rd June 2006 at IASST under the supervision of Dr. J. Kotoky and Dr. B.C. Tripathy as coordinator and co-coordinator respectively. In the programme efforts had been made to expose the young students to the activities and achievements in the world of science and to inculcate in them scientific temper and to motivate the students to take up science as career in future. In the programme the following objectives were taken into consideration.

a) To expose the young talented students of High School level and teacher participants to the activities and achievements in the world of science.
b) To inculcate in them scientific temper by demystifying science,
c) To instill in the young minds of students the sense of pride on the achievements of Indian scientists and
d) To motivate the students to take up science as career.

On 30th May 2006, Prof. K. M. Pathak, Chairman, Council, IASST presided over the inaugural function and internationally renowned Statistician Prof. J.M. Medhi participated as the chief guest in the function. Prof. Medhi distributed one of his popular books on mathematics amongst the student participants free of cost. Dr. Jibon Kotoky, Coordinator of the programme welcomed the participants at the beginning of the programme. Prof. Joyanti Chutia, Director, IASST addressed the students and others present in the function and hoped that the programme will benefit and help the students in selecting science as their future career. Thirty six students and twelve teachers from seventeen schools of Assam had participated in the programme. The Programme included inter alia, visits by the participants including the teachers of the participating schools to various laboratories of the Institute to have some light on the work and nature of scientific works in the laboratories. A Semi-extempore speech on pre-intimated science topics was also organized.

Dr. Dinesh Chandra Goswami, Scientist, RRL, Jorhat; Mr. Khiradhar Barua, HoD, Chem. Dept. Bishwanath College, Biswanath Chariali; Mr. Nripen Saikia, Lecturer, DIET, Lakhimpur; Mr. L. Medhi, Regional Science Museum, Guwahati; Prof. Soneswar Sarma, Biotechnology Dept., Gauhati University, Guwahati; Dr. Padum

Azad, IASST; Dr. S. Deka, IASST; Dr. Jibon Kotoky, IASST participated as resource persons and many of them demonstrated the scientific principles. Demonstration of various experiments of interest and experiments were organized inviting experts in these fields. Demonstrations explaining some common superstitions prevalent in the state were organized along with experiments of school curriculum science with participation of the students.

A very interesting item called 'Face–to-Face with scientists/personalities' was also organized during the programme period so that the participants can ask any question on any subject in non conventional way in the informal get together on a Brahmaputra safari over a huge well-decorated ship plying on the River Brahmaputra for three and a half hour in the evening time. Various topics with the Low cost–no cost science learning devices were also included in the programme and demonstrated by experts of this field with the full participation of the students and teachers accompanying the participants.

A planetarium show was organized at Guwahati Planetarium for the participants in one evening on the topics solar system and comets.

Visits to research institute, Academic Institutions and industries, natural heritage sites were also included in the programme during these five days. Valedictory function was held on 5th day where the Director of IASST, Prof. Joyanti Chutia presided over the function.

16.0 Foundation Day Celebration

The foundation day of IASST was celebrated at the IASST auditorium on the 3rd day of November 2006 with a day long programme.

The function, which was presided over by Prof. Joyanti Chutia, Director of the institute, was started with a chorus presented by the Research Scholars and employees of the institute. Dr. Jibon Kotoky, convener of the foundation day celebration committee delivered the welcome address. IASST decided to felicitate one scientist or educationist, who had remarkable contribution in establishing the institute from this year onwards. Professor Jamini Mohan Choudhury, Founder Chairman, IASST council and former V.C. of Gauhati University had been felicitated in a conventional way by the Institute.

Prof. Aparajeeta Borkotoky, Dean of Faculty of Sciences & Head of the Department of Zoology, Gauhati University attended the function as the guest of Honour. She stressed on the research on basic as well as applied subjects, which can give benefits to the society.

Two illuminating Foundation day lecturers were delivered by Dr. Pranab Goswami, Head, Department of Biotechnology, IIT, Guwahati and Prof. N. N. Dass, former Director, IASST, Guwahati, on topics of Life Sciences and Polymer Sciences respectively.

Prof. Joyanti Chutia, Director of IASST expressed her satisfaction in her presidential address to the gathering at the progress of the Institute in the R & D field in spite of the limited facilities.

The laboratories of the Institute were kept open for visit and interaction with the scientists to the students and public for the whole day. Local students visited the labs and interacted with the scientists during the day.

17.0 Ongoing Projects

Sl. No.	Project Title	Funding Agency	Total Fund (in lakh) & Period	Research Group
1.	Study of post magnetron discharge Plasma	DST, Govt. of India,	30.2 2004-08	Prof. J. Chutia, PI Dr. H. Bailung, Co-PI Dr. A.R. Pal
2.	Basic experiments on multicomponent plasma with negative ions	DST, Govt. of India	32.0 2005-08	Dr. H. Bailung, PI Prof. J. Chutia, Co-PI Ms. Sumita K. Sarma, JRF Ms. Kabita Devi, JRF
3.	Investigation on collective processes in laboratory dusty plasma	ISRO, Department of Space, Govt. of India	13.5 2006-09	Dr. H. Bailung, PI Prof. J. Chutia, Co-PI
4.	Conductivities of polymeric materials in solid state	DST, Govt. of India,	13.46 2004-07	Dr. N. Sen Sarma, PI Prof. N.N. Dass, Co-PI Dr. P Chetri, RA
5.	Study of Polymeric Foam and their uses in Laser-Plasma Experiment	DAE, Govt. of India, BARC, Mumbai,	28.90 2005-08	Prof. N.N. Dass, PI Prof. J. Chutia, Co-PI Dr. N. Sen Sarma, Co-PI
6.	Development of Liquid Crystalline Polymers	MIT, Govt. of India,	20.73 2006-09	Dr. H. Das, RA Dr. N. Sen Sarma, PI Prof. J.Chutia, Co-PI Samiul Hoque, JRF
7.	A systematic study of physico chemical properties of Muga Silk (Anthraea assama Ww) fibre produced in the north eastern region of India	DST, GOI, New Delhi	20.85 2005-08	Dr.(Mrs.) D. Devi, P.I Dr. K.C. Barua, Co-PI Prof. N. N. Dass, Co-PI Mr. B. Talukdar JRF
8.	Grainage of *Antheraea assama* Ww (Muga Silkworm) using indoor rearing technique	ASTEC, Govt. of Assam.	1.74 2006-08	Dr.(Mrs.) D.Devi, P.I Prof. D.K. Sharma, Co-PI Ms. Phulmoni Choudhury, JRF
9.	Evaluation of antioxidant property of some selected fruits of North East India - a biochemical approach	DST, GoI, New Delhi.	12.45 2007-10	Dr. (Mrs) R. Devi, PI Prof. D.C. Deka, Co-PI Ms. Tiluttoma Mudoi, JRF
10.	Study of the effect of leaf extracts of *Clerodendron colebrookianum* Walp (Nefafu) on lipid peroxidation, lipid profile and antioxidant status in cholesterol fed rat".	ICMR GoI, New Delhi.	7.98 2007-10	Dr. (Mrs.) R. Devi, PI Prof. D .K. Sarma, Co PI Mr. D. Baruah, SRF

11.	Microbial diversity of Dibru-Saikhowa and Manas Bio sphere reserves of Assam	Ministry of Environment and Forest, GOI, India	10.00 2004-07	Dr. P. Azad, PI Dr. S. Deka, Joint-PI Dr. G. Sarma, GU, Co-PI Mr. R. Saikia, JRF Mr. K. Das, Tech Asst.
12.	Rehabilitation of Degraded soils of Upper Assam Due to Excessive Mining of Coal	Ministry of Environment and Forest, GOI, India	12.21 2005-08	Dr. P. Azad, PI Prof. A.K. Verma, JNU, Co-PI Ms. N. Nesha, JRF
13.	Assessment of risk due to intake of artificial colours used in food stuffs available in Kamrup District, Assam	ASTEC, Govt. of Assam	0.71 2005-06	Dr. Jibon Kotoky, PI Mr. J. Saikia, Proj. Asstt.
14.	Environmental Information System Node on environment and tea garden	Ministry of Environment & Forests, Govt. of India	7.95 2002-07	Dr. (Mrs.) S.C. Bordoloi, Co-ordinator Mr. U Kalita-IT Assistant
15.	Assessment of oil field soil (with special reference to poly aromatic hydrocarbons) for their eventual remediation and reclamation.	Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi	18.48 2004-07	Dr.(Mrs.) A. Devi, PI Dr. K.G. Bhattacharyya, Co-PI Dr. A. Kumar, Co-PI, ITRC, Lucknow Mr. M. Kalita, SRF Mr. N. Khanikar, JRF Mr. S. Hoque, JRF
16.	Ichthyofaunal diversity and fishery potential in the wetlands of Hajo, Kamrup district, Assam and study of socioeconomic status of fisherman community	G.B. Pant Institute of Himalayan environment and Development, Kosi-Katarmal, Almora, Uttaranchal	7.09 2004-07	Dr. (Mrs.) S.C. Bordoloi, PI Mrs. A. Baishya, SRF
17.	Nonlinear Waves Studying the Coherent Structure of Solution Radiation, Spikes and Shock Phenomena in Plasma	University Grants Commission, New Delhi	3.77 2003-06	Prof. G.C. Das, PI Dr. N. Devi, Co-PI Ms. S. Sarma, PF
18.	Database of R&D Institutions by Broad Research Area of North East Region and Research Activities in S&T in Assam	Department of Science and Technology (Govt. of India), New Delhi.	9.54 2004-07	Mr. D.N. Das, PI Dr. B.C. Tripathy, Co-PI Mr. K. Deka, RI Mr. J. K. Bora, RI
19.	Status of Science Teaching in Secondary Schools of Assam	Department of Science and Technology (Govt. of India), New Delhi.	14.4 2005-07	Prof.B.K.Bhattacharya, PI Mr. S. K. Sinha, RI Mr. K.J. Barkotoki, RI Mr. B. Kakati, RI Mr. N. Mohmad, RI Mr. D. Chakravorty, RI
20.	Fuzzy Real-Valued Convergent and Statistically Convergent Sequences Defined by Orlicz Functions	University Grants Commission, New Delhi	4.21 2005-07	Dr. B.C. Tripathy, PI Dr. P. Rajkhowa, Co-PI Ms. S. Boragohain, PF

21.	Fuzzy Real-Valued /-Convergent Sequences	Council of Scientific and Industrial Research, New Delhi	5.31 2005-2008	Dr. B.C. Tripathy, PI Dr. B. Sarma,SRF(Extended)
22.	Studies on Some Retrial Models With Two Phase of Services	Department of Science and Technology (Govt. of India), New Delhi.	7.74 2006-09	Dr. G. Choudhury, PI Dr. S. Kalita, Co-PI Ms. S. Biswas, JRF Mr. Kandarpa Deka, JRF

18.0 Consultancy Projects

1. Three consultancy projects were carried out under the supervision of Dr. B.K Bhattacharyya, Mathematical Science Division, funded by Axom Sarba Siksha Abhijan Mission. The projects are as follows:

(*a*) "5% Sample Checking of DISE data, 2005-06". **Axom Sarba Siksha Abhijan Mission** collects a variety of data on Primary education in the state. Sarba Siksha Mission has the target of Universal education i.e. education for all. The policy followed now is to get the data collected by Sarba Siksha Mission through its own staff, checked by a third party for confirming genuinity of the collected data. **Axom Sarba Siksha Abhijan Mission** entrusted the above study to the IASST as consultant and taking Dr. B K Bhattacharyya, Honorary Professor of Mathematical Sciences Division as the Principal Investigator. The study was scheduled for the period November1 to December30, 2006. The study has been duly completed and Final Report submitted.

(*b*) **Axom Sarba Siksha Abhijan Mission** sanctioned a Research Project entitled, "**Impact Assessment Study of Convergence Programme under early Child hood Education with Focus on Its Effectiveness in Ensuring Enrolment in Class I**" with Dr. B.K. Bhattacharyya as the PI and the IASST as the Consultant Agent. The study was for a short period of three months, namely March 1 to May 31, 2007. The objective of the study is to see if the convergence programme undertaken by **Axom Sarba Siksha Abhijan Mission** has any impact on retention and continuation of studies by children enrolled in Pre-Primary class (Ka-Sreni). The data collection work is over and the Final Report will be submitted soon.

(c) The third study allotted by **Axom Sarba Siksha Abhijan Mission** to the Institute as the consultant Agency and Dr. B.K. Bhattacharyya as the PI, is the "5% Sample Checking of DISE data 2006-07". The study was earmarked for the period 20th March, 2007 to 20th May, 2007. The objective of the study is to find out deviations, if any, of the DISE data from the Survey data. The data collection work is over and the Final Report will be submitted soon.

2. A consultancy project related to Alternative fishing management in the fringe area of Deepar Beel, Kamrup district, Assam funded by **Assam Science Technology and Environment Council, Guwahati,** Assam under the supervision of Dr. (Mrs) Sabitry Bordoloi, Resource Management and Environment Division is in progress. The area abounds in many unproductive water bodies. Utilization of these water bodies for proper fish culture can improve their family income. We are providing them technical guidance for taking up fish culture in these water bodies.

19.0 Research Collaboration

Dr. Heramba Bailung Material Science Division	Prof. Y. Nakamura Institute of Space and Astronautical Science, Japan	Dusty Plasma, Plasma Diagnostics
	Prof. Rabindranath Pal Saha Institute of Nuclear Physics Kolkata, India	Plasma Processing Microwave Technique for Plasma diagnostics
Prof. Narendra Nath Dass Material Science Division	Prof. Aradhana Dutta Polymer Science, Deptt. of Chemistry, Dibrugarh University, Assam, India	Polymer Science
	Prof. Ravi K. Khardekar Centre for Advanced Technology, Indore, India	Laser Polymer
	Prof. K.G. Bhattacharyya Gauhati University, Guwahati, India	Physical Chemistry
	Prof. H.C. Pant Visiting Scientist, BARC, Mumbai	Laser Polymer
	Dr. M. Sukla, Scientist, Purnima Lab, BARC, Mumbai	Laser Polymer
Dr. Padum Azad Life Sciences Division	Prof. A.K. Verma Amity University, Noida, UP, India	Microbial Biotechnology
	Prof. A.K. Yadav Director, National Centre of Organic Farming, Kamala Nehru Nagar, Gaziabad, India	Microbial Biotechnology
	Prof. K.B.V.R. Tilak Osmania University, Hyderabad, India	Microbial Biotechnology
	Prof. D.K. Arora, Director NBAIM, UP, India	Microbial Biotechnology
Dr. Jibon Kotoky Life Sciences Division	Dr. V. Jagdeesan Dy. Director Food and drug Toxicology research Center, National Institute of Nutrition, Hyderabad, India	Development of Drug and Toxicology study

	Dr. Mukul Das Rastogi Dy. Director and Head Food Toxicology Research Division, Industrial Toxicology Research Center, Lucknow, India	Toxicological assessment of Artificial colours in Foodstuffs
	Dr. R.B. Raizada Scientist F and Head, Pesticide Toxicology Division, ITRC, Lucknow	Drug Toxicology
	J. Bora Scientist, Biotechnology Department, DRL, Tezpur, Assam	Dermatophytic infection
	Dr. G. Sarma, Deparment of Botany, Gauhati University, Guwahati, India	Ethno-botany
	Dr. J. Kalita, Deparment of Zoology, Gauhati University, Guwahati, India	Hepatoprotective Drug development
	Dr. A. Saikia, Department of Chemistry, IIT(G), India	Crystallography of compounds
	Prof. Mohendra Bora Former Head, Department of Physics, Gauhati University	X-ray Crystallographic study
	Dr. P.K. Petal Scientist, Analytical Division ITRC, Lucknow	Pesticide Analysis in Medicinal Plants
	Dr. P.K. Sukla Scientist, Medical Mycology Lab. Ferm. Tech. Division, CDRI, Lucknow	Drug Development
Dr. Dipali Devi Life Sciences Division	Prof. K.P. Gopinathan Department of Cell Biology and microbiology IISc, Bangalore, India	Silkworm Molecular Biology
	Dr. J. Nagarju Scientist S DNA fingerprinting and Diagnostic Centre, Hyderabad, India	Silkworm Molecular Biology
	Prof. Shimada Toru Head, Department Entomological Sciences, Tokyo University, Japan	Protein Analysis

	Prof. D.K. Sharma Department of Zoology, Gauhati University, Assam, India	Proteins and Enzyme of silkworm
	Prof. M. Turchetto Department of Biology Paduva University, Italy	Entomology and Insect Protein Chemistry
	Dr. Sisiro Farago Textile Institute, Milan, Italy	Fibre Technology
	Dr. S, Cappellozza Institute of Sericultutre, Padova, Italy	Bilogy and Breeding of Silkworm
Dr. Rajlakshmi Devi Life Sciences Division	Dr S.K. Maulik Additional Professor Department of Pharmacology AIIMS, New Delhi	Medicinal plant and Cardiovascular desease
	Dr A.K. Dinda Additional Prof Department of Pathology AIIMS, New Delhi	Histopathology
	Dr Biju Dutta Department of Physiology Gauhati Medical College Guwahati	Human Physiology
	Prof. D.C. Deka Department of Chemistry Gauhati University Guwahati	Organic Chemistry
Dr. Sabitry Choudhury Bordoloi Resource Management and Environment Division	Prof. Alain Dubois, Director Department of systematique UMS 0602,25 rue Cuvier 75005 Paris, France	Amphibian Taxonomy
	Prof. Annemarie Ohler Department of systematique UMS 0602,25 rue Cuvier 75005 Paris, France	Amphibian Taxonomy
	Prof. Ptrick David Department of systematique UMS 0602,25 rue Cuvier 75005 Paris, France	Ophidian Taxonomy

Dr. Suresh Deka Resource Management and Environment Division	Professor I.M. Banat University of Ulster, Northern Ireland, UK.	Microbiology, Molecular Biotechnology, Biosurfactant
	Dr. T. Chakraborty Scientist, Institute of Microbial Technology, Chandigarh India	Molecular Biology
	Prof. K.G. Bhattacharyya Department of Chemistry, Gauhati University, India	Environmental Chemistry, Physical Chemistry
	Dr. A. Talukdar Department of Chemistry Gauhati University, India	Environmental Chemistry
	Dr. H.P. Sarma Department of Environmental Science, Gauhati University, India	Environmental Chemistry
	Prof. A. Dutta Department of Zoology, Gauhati University, India	Ecology, Fishery etc.
Dr. Arundhuti Devi Resource Management and Environment Division	Dr. Ashwani Kumar Director, Industrial Toxicology Research Center, Lucknow, India	Environmental Biotechnology
	Prof. K.G. Bhattacharyya Department of Chemistry, Gauhati University, India	Environmental Chemistry
Dr. Binod Chandra Tripathy Mathematical Science Division	Prof. Rifat Colak, Prof. Mikil Et ; Dr. Yavuz Altin & Dr. M. Isiki Firat University, Turkey	Orlicz sequence Spaces, Difference sequence space, Fuzzy sequence spaces
	Prof. Ayhan Esi Inonu University, Turkey	Orlicz sequence Spaces, Difference sequence space
	Prof. P.Y. Lee Nanyang Technological UniversitySingapore	Orlicz sequence spaces
	Prof. B. Choudhary University of Botswana, Botswana	Orlicz sequence Spaces, Difference sequence space, Fuzzy sequence spaces
	Dr. Pranjal Rajkhowa, Gauhati University, India	Fuzzy Sequences
	Prof. S.K. Mishra Tribhuban University, Nepal	Matrix Transformations

Dr. Gautam Choudhury Mathematical Science Division	Prof. K.C. Madan Ahila University Monama Kingdom of Bahrain, Bahrain	Brenauli vacation models
	Prof. L. Tadj King Saud University of Riyadh Saudi Arabia	Control of queues
	Prof. C. Tadj Ecole dc Tecnologie Superiure, Canada	Control of queues

20.0 Press Meet on Municipal Solid Waste Dumping

Guwahati Municipal Corporation (GMC) selected a site very near to the IASST campus for disposal of Municipal Solid waste (MSW) generated in the Guwahati City. Garbage dumping was started from July 7th, 2006. Since then the inhabitants of the area are living in a polluted environment with obnoxious smell emanated from the garbage dump.

In order to make people aware of this problem through the mass media a press meet was organized at IASST auditorium to highlight the nuisance created by dumping of Municipal Solid waste by Guwahati Municipal Corporation. Dr. Sabitry Choudhury Bordoloi Head (i/c), Resource Management and Environment Division, convened the Press Meet.

Professor K.M. Pathak, Chairman of The Council of IASST Expressed his concern about the deteriorating condition of the area. Professor Joyanti Chutia, Director of the Institute spoke at length about the problem faced by the scientists of the institute and the inhabitants of the area. Prof. N.N. Dass, former Director of the institute addressed the press meet. Dr. K.C. Barua, honorary scientist IASST expressed his views and Shri Mrityunjay Shukla Headmaster, Pragjotish English Medium School spoke about the problem faced by the young pupil of his school.

Dr. (Mrs) S.C. Bordoloi gave presentation on "MOE&F, GOI guidelines and organic pollution level in and around MSW dumping site". Dr. S. Deka stressed on microbiological analysis of the samples collected from GMC garbage dumping site near Deepar beel area and Dr. (Mrs.) Arundhuti Devi explained the "Impact of garbage dumping on physico chemical quality of water'.

All the speakers highlighted the threat caused to the immediate environment and the future of the Deepar beel which is a Ramsar Site of international importance.

Representatives of Guwahati Doordarshan, The Assam Tribune, Amar Asom, The Sentinel and The Telegraph attended the Press Meet and gave wide coverage of the problem.

21.0 Personnel Profile (as on 31st March 2007)

Director

Prof. (Ms) Joyanti Chutia, MSc., Ph.D., F.N.A. Sc.

Scientists & Supporting Staff

Name, Qualification and Designation

Material Science Division

Heremba Bailung, M.Sc., Ph.D.	Associate Professor& Head (i/c)
N.N. Dass, M.Sc., Ph.D., DIC	Honorary Professor
Neelotpal Sen Sarma, M.Sc., M.Tech., Ph.D.	Assistant Professor
Arup Ratan Pal, M.Sc., Ph.D.	Assistant Professor
Nirab Ch. Adhikary, M.Sc.	Sr. Research Assistant
Prafulla Chetri, M.Sc. Ph.D.	Research Associate
Hitesh Das, M.Sc. Ph.D.	Research Associate
Hemen Kakati, M.Sc.	JRF
Sankar Moni Borah, M.Sc.	JRF
Kavita Devi, M.Sc.	JRF
Sumita Kumari Sarma, M.Sc.	JRF
Samiul Hoque, M.Sc.	JRF
Krishna Kanta Swargiari	Mechanic

Life Sciences Division

Padum Azad, M.Sc., Ph.D.	Associate Professor & Head (i/c)
K.C. Baruah, M.Sc., Ph.D.	Honorary Scientist
Jibon Kotoky, M.Sc., Ph.D.	Assistant Professor
Dipali Devi, M.Sc., Ph.D.	Assistant Professor
Rajlakhmi Devi, M.Sc., Ph.D.	Assistant Professor
Bijit Talukdar, M.Sc.	JRF
Rubul Saikia, M.Sc.	JRF
Nasimun Nesa, M.Sc.	JRF
Phulmoni Choudhury, M.Sc.	JRF
Ramesh Nath, M.Sc.	Teacher Fellow (UGC)
Mahendra Kalita, M.Sc.	Teacher Fellow (UGC)
Jitu Saikia, M.Sc.	Project Assistant
Bedabati Dasgupta, M.Sc.	Project Assistant
Kumud Das, M.Sc.	Technical Assistant
Julee Bordoloi, B.Sc.	Lab. Assistant
Subrata Goswami, B.Sc.	Lab. Assistant

Resource Management & Environment Division

Sabitry Choudhury Bordoloi, M.Sc., Ph.D.	Associate Professor and Head i/c
Suresh Deka, M.Sc., Ph.D.	Associate Professor
Arundhuti Devi, M.Sc., Ph.D.	Assistant professor
Aparna Dutta, M.C.A.	Assistant Professor
Anjali Baishya, M.Sc	SRF
Mukut Kalita, M.Sc	SRF
Nirupam Kataniar, M.Sc	JRF
Nzano Humtsoe, M.Sc	JRF
Tutul Bortamulee, M.Sc.	Teacher Fellow (UGC)
Utpal Kalita, B.Tech	IT Asstt.
Manomohan Huzuri, B.Sc.	Lab. Asstt.

Mathematical Sciences Division

Jyoti Prasad Medhi, M.Sc., D.Sc.	Honorary Professor
Dhirendra Nath Das, M.Sc.	Honorary Scientist
Ganesh Chandra Das, M.Sc., Ph.D.	Honorary Professor
Basanta Kumar Bhattacharyya, M.Sc., Ph.D.	Honorary Professor
Binod Chandra Tripathy, M.Sc, Ph.D.	Associate Professor and Head i/c
Gautam Choudhury, M.Sc., Ph.D.	Assistant Professor
Lipi B. Mahanta, M.Sc., Ph.D.	Assistant Professor
Bipul Sarma, M.Sc.	SRF Extended
Smritimala Sharma, M.Sc.	Project Fellow
Stuti Borgohain, M.Sc.	Project Fellow
Soma Biswas, M.Sc.	JRF
Paritosh Chandra Das, M.Sc.	Teacher Fellow (UGC)
Kandarpa Deka, M.Sc.	Research Investigator
Jayanta Kumar Bora, M.Sc.	Research Investigator
Sanjib Kumar Sinha, M.Sc.	Research Investigator
Kanchan Jyoyi Barkotoki, M.Sc.	Research Investigator
Bhaskar Kakati, M.Sc.	Research Investigator
Nur Mohmad, M.Sc.	Research Investigator
Dhrubajyoti Chakravorty	Research Investigator

Library & Information Centre

Tarini Dev Goswami, B.Sc, M.L.I.Sc.	Asst. Librarian
Niranjan Bhagobaty M.Sc.(IT), PGDCA	Sr. Instructor
Kumud Baishya	Library Asst.

Administrative Staff

Heremba Bailung, M.Sc., Ph.D.	Registrar (i/c)
Rajesh Sharma, B.A.	PRO
Juri Pathak, MCA.	Instructor
Prabodh Ch. Deka, B.A.	UDA
Rabin Kalita, B.Sc.	LDA
Dwijen Deka, B.A.	LDA
Prabhat Barma	LDA
Saraswati Bora	LDA
Diganta Das	LDA
Binoy Choudhury	Messenger
Madhu Ram Kalita	Electrical Helper

Engineering Cell

H.K. Saikia, B.E.	Civil Consultant
Montu Deka, B.E.	Junior Engineer
Munindra Singh	Console Operator

Accounts Section

Ganesh Ch, Bhuyan, M Com.	Finance & Accounts Officer
Suresh Sarma, B Com	Accountant
Ramen Mahanta, B Com	Jr. Accountant

Laboratory Helper/ Watcher

Tarun Talukdar	Lab. Attendant
Madan Kalita	Lab. Attendant
Gora Gupta	Lab. Attendant
Bolin Das	Field Attendant
Ratul Baishya	Messenger
Srikanta Baishya	Field Attendant
Kabindra Deka	Lab. Attendant
Niren Sarma	Lab. Attendant
Nripen Ch. Goswami	Messenger
Sabin Kalita	Animal Keeper

Supporting Staff

Nimai Hazam	Driver
Phatik Baishya	Driver

Babul Deka	Messenger
Bipul Kumar Das	Messenger
Madhabi Das	Cleaner
Haren Medhi	Night Chowkidar
Lakhi Saud	Night Chowkidar
Satish Das	Day Chowkidar
Balabhadra Pathak	Watcher
Umesh Ch Deka	Messenger
Munna Basfor	Sweeper

Annual Accounts of 2006-07

Project Division wise summary of Receipt and payment accounts of the IASST for the year ended 31st March 2007 (2006-07)

Sl No.	Head of Account	Opening Balance as on 1st April 06	Receipt During the year 2006-07	Total Amount Received	Payment During the year 2006-07	Closing Balance as on 31st March 07
1	Microwave reflectometry for plasma density measurement in Tokomak Plasma	-403779	0	-403779	0	-403779
2	Study of metal deposition processes by RF magnetron sputtering (BRNS)	-99950	99950	0	0	0
3	Study on some batch arrival queuing models with vacations	-99012	0	-99012	0	-99012
4	Nonlinear Waves- in Plasma.	-93557	0	-93557	84736	-178293
5	Database of R&D Institution. Assam	-90706	350000	259294	364042	-104748
6	Studies on Native VAM Fungi	4259	0	4259	235768	-231509
7	Development of Herbal Remedies for liver ailments	-37107	0	-37107	0	-37107
8	Utilization of lime sludge wastes of Jagiroad Paper Mill for Fish culture	-63504	63504	0	0	0
9	Studies on some retrial models ...of services	300000	0	300000	250620	49380
10	Development of Plasma physics Div.	-69715	69715	0	0	0
11	Phytoremediation of Oil and Heavy metal polluted soil and water	-9801	0	-9801	0	-9801
12	ENVIS problems in Tea Gardens	-57900	0	-57900	0	-57900
13	Ichthyofaunal diversity and fishery potential in the wetlands of Hajo	-47	0	-47	69434	-69481
14	Assessment of oil field soil for their eventual remediation and reclamation	79936	396000	475936	270028	205908
15	Conductivities of polymeric materials in solid state	52713	250000	302713	280102	22611
16	Status of Science teaching in secondary school of Assam	-68626	700000	631374	626924	4450
17	Rehabilitation of Degraded soils of Upper Assam due to excessive mining of coal	-155783	0	-155783	224735	-380518
18	Fuzzy real valued convergent and statistically convergent sequences defined by orlicz function (U G C)	23653	0	23653	88779	-65126
19	Study of Post Magnetron Discharge Plasma	-196622	200000	3378	390230	-386852
20	Microbial Diversity of Dibru-soikhowa biosphere	-303358	0	-303358	199200	-502558
21	Study of polymeric foam and their use in laser plasma experiments	61643	174823	236466	236466	0
22	Food Colour	-3812	0	-3812	0	-3812
23	Upgrading IASST	8385562	0	8385562	3364221	5021341
24	Entry of polycyclic...Soil from Oil...degradation	-17091	0	-17091	0	-17091
25	General Management	-11231719	2530000	-8701719	9524751	-18226470
26	IASST General Fund	11540805	177968	11718773	481657	11237116
27	Land and Building	1436010	0	1436010	1376387	59623
28	O' Level (EGTS) to North East	-59160	0	-59160	0	-59160
29	A systematic study of physico-chemical...Muga silk fibre	3084	500000	503084	472878	30206

30	Meeting for the project 'Development of Plasma Physics Division'	-5132	0	-5132	0	-5132
31	CSIR (Fuzzy real)	26763	106017	132780	204321	-71541
32	CSIR (A. Choudhury)	9	0	9	0	9
33	CSIR (Plasma)	0	0	0	0	0
34	Education	-26	150000	149974	150150	-176
35	National and International Workshop	0	0	0	0	0
36	Motivation programme for talented school students.	0	92500	92500	128692	-36192
37	Design synthesis and Characterization of Side chain liquid crystalline Polymers.	0	0	0	0	0
38	Evolution of Antioxidant property of some selected fruits of NE India	0	500000	500000	0	500000
39	Queuing system and applications	0	170000	170000	26607	143393
40	Investigation on collective processes in laboratory dusty plasma	0	948000	948000	0	948000
41	Installment for 5% sample checking survey of DISE data	0	217600	217600	11900	205700
42	Organization National workshop on Agriculturally Important Microorganisms of NE Region.	0	193600	193600	218625	-25025
43	Preparation of Blue print for alternative fishing management in the Northern side of Deepor beel.	0	28800	28800	16790	12010
44	Basic Experiments on Multi component Plasma with negative ions.	0	2100000	2100000	881420	1218580
45	Development of liquid crystalline polymers	0	1569000	1569000	975508	593492
46	Grainage of Antheraea assama Ww .Muga silk worm using indoor rearing technique	0	100000	100000	36190	63810
47	Assam Sarba Siksha Aviyan Mission	0	90000	90000	0	90000
48	Estimation of Parameters in pearsonian sytem of curves and development of computer Algorithms for fitting	0	40000	40000	49970	-9970
	Total	**8848030**	**11817477**	**20665507**	**21241131**	**-575624**
36	Reserve Fund (Fixed Deposit)	1968568	0	1968568	0	1968568
37	Corpus Fund for leave salary encasement	255520	55520	311040	0	311040
	Grand Total	**11072118**	**11872997**	**22945115**	**21241131**	**1703984**

Different Important Moments of Activities Captured in Camera

naugural speech by Hon'ble Minister of Agriculture
s. Pramila Rani Brahma on the occasion of National
Workshop on Agriculturally Important Microorganism.

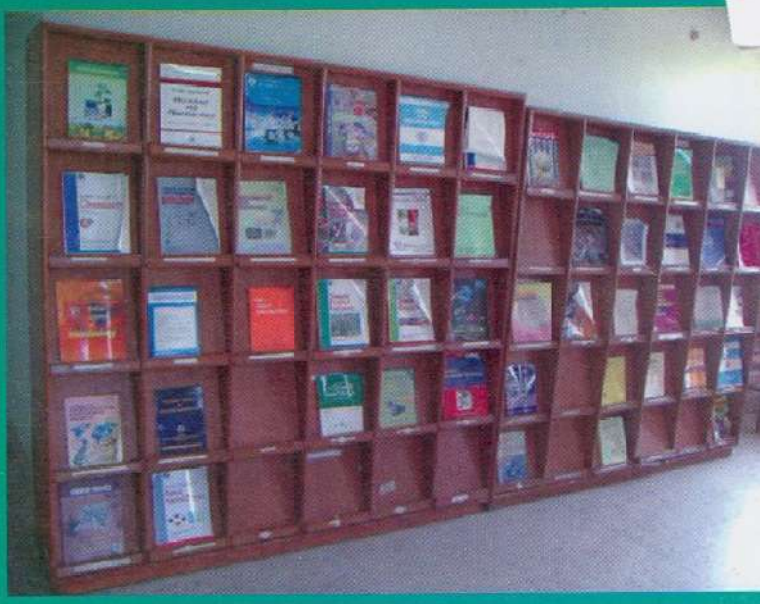
Professor Ajit Verma releasing the Souvenir published on the occasion of National Workshop on Agriculturally Important Microorganism.

ssor K. M. Pathak delivering his Presidential address on
he occasion of National Workshop on Agriculturally
Important Microorganism.

Professor Joyanti Chutia, Director, IASST delivering her Welcome address on the occasion of National Workshop on Agriculturally Important Microorganism.

t of the audience of the Inaugural Function of National
orkshop on Agriculturally Important Microorganism.

Professor Jamini Mohan Choudhury, Founder Chairman, IASST council and former V.C. of Gauhati University had been felicitated by Prof. Joyanti Chutia on the occasion of Foundation day, IASST



A view of the Library

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