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APRIL 2001 - MARCH 2002

INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI
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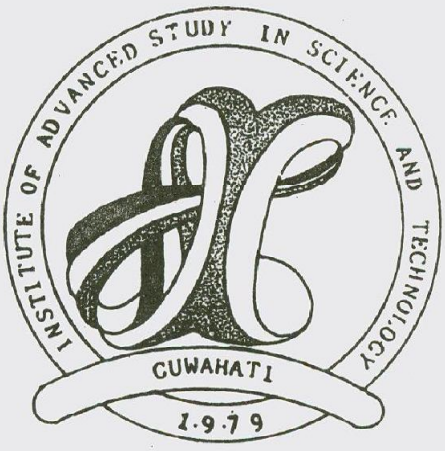
INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

JAWAHARNAGAR, KHANAPARA, GUWAHATI - 781022

April 2001 - March 2002



Edited by:

PROF. JOYANTI CHUTIA
Head, Material Sciences Division

PROF. G.C. DAS
Head, Mathematical Sciences Division

PROF. NIREN DEKA
Head, Life Sciences Division

DR. S. DEKA
In-charge, Resource Management and Environment Division

MR. A. BARMAN
In-charge, Computer Science Division

PUBLISHED BY
Dr. M.K. Kalita
Ragistrar, IASST

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FOREWORD

The Institute of Advanced Study in Science & Technology (IASST), Khanapara, Guwahati cam
nto being as a part of a vision of the Assam Science Society. It is now acting as an independer
ntity and has the blessings of the Department of Science & Technology, GoI and GoA in terms c
rants, help and good wishes. We have a set of good academic, administrative, financial, enginee
ng and library staff. A lot is still to be done if we dream to make the IASST a Centre of Excellence
n the vast emerging research field no one can work in isolation. Fruitful deliberation, healthy com
etition and productive exposure can help us a lot. Interaction of the scienctists of different division
s well as with scientists of other institutions is absolutely necessary to make our institute nationa
not international. The future of the research institute hinges on the success of the faculty and it i
oped they will bring laurels to the institute through their *scientific works, discipline* and *hard labou*
his is equally true for administrative, financial and library staff also. I do appreciate the good work
lready done by the faculty and staff, though the working space and facilities are limited. We d
onestly believe that these constraints will be removed as soon as we move to the new constructio
ite at Paschim Boragaon, Guwahati-781033.

We express our gratitude to the chairman of the Council of the IASST, Professor K.M. Pathal
ormer Vice-Chancellor, Tezpur University and the Hon'ble members of the Council for their muc
eeded advice, help and suggestions. It would have been extremely difficult to solve so man
notty problems of the institute without their good wishes. Thanks to the Ministry of Science an
echnology, GoI for their grant for an amount of Rs 9.55 crore towards the development of infra
tructure of the Institute including the construction of its buildings, laboratories and boundary walls
he construction of the complex is going on smoothly at the permanent site of IASST and it
xpected that the construction of the 1st phase of IASST Campus will be completed by the end
he year, 2003. We are indebted to the Department of Science, Technology & Environment, Govt.
ssam for providing recurring grants in aid for the maintenance of the Institute.

We are optimistic, the IASST shall be a model research institute in the coming years with th
ood wishes of the Hon'ble Chief Minister, Assam and the Hon'ble Minister for Science & Techno
gy, Govt. of India.

We hope, we shall be on the right spot in right time with the blessings and co-operation of a

Prof. N.N. Dass
Director, IASST.

INSTITUTE OF ADVANCED STUDY IN SCIENCE & TECHNOLOGY
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Ms. S. Bora	LDA

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S. Das	Messenger
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B. Pathak	Watcher (at the construction site)

DIVISIONS OF IASST:

During the period under review, the R&D activities in all the four divisions, namely, the materials sciences (Plasma and Polymer), the Life Sciences (Biochemistry, Biotechnology, Bio-fertilizer and Sericulture), the Resource Management and Environment and Mathematical Sciences (Mathematics and Statistics) are progressing well. Presently, the institute has been conducting research and academic activities in the following areas:

1. ***Material Sciences (Plasma Physics and Polymer Science)***

2. ***Mathematical Sciences (Mathematics and Statistics)***

3. ***Life Sciences (Medicinal Plants & Biodiversity and Bio-prospecting, Sericulture & Bio-fertilizer).***

4. ***Resource Management and Environment***

5. ***Computer Science***

1. MATERIAL SCIENCES DIVISION

Faculty

Name:	Field of interest
Dr. J. Chutia,	Plasma Physics Professor & Head
Dr. G.C. Das, Professor	Plasma Physics (Theoretical)
H. Bailung, Asstt. Professor	Plasma Physics (Experimental)
Dr. N.N. Dass, Director	Polymer Science

Material Sciences Division, formerly known as Plasma Physics Division has been carrying out research since 1984. The group in the division is conducting the research works on Plasma Maser effect, Soliton, Double layers, Nonlinear waves in space plasmas, Dusty Plasmas, Multi-component plasmas, Chaotic phenomena and Sheath phenomena. Plasma enhanced physical vapor deposition by magnetron\ sputtering has been attempted.

Polymer Science is the new added area of research of the IASST since January 2002. Efforts are made to develop flow improver, ionics, adhesives, liquid crystalline polymers and Plasma polymerisation.

1.1 Plasma Physics:

1.1. 1 Experimental Research:

The areas where experimental investigations have been carried out are as follows:-

(a) Study of sheath in magnetized plasma.
(b) D.C. Magnetron discharge.
(c) R.F. Plasma discharge.

(a) Study of sheath in magnetized plasma.

Experimental observation has been carried out to see the effect of magnetic field and grid biasing voltage in controlling the sheath thickness in a magnetized plasma system. The experiment is carried out in a stainless steel chamber, which is divided into two regions by a mesh grid, via the source region and the diffused region. The characteristic behaviour of the ion rich sheath formed across the grid under the various conditions of the applied magnetic field and grid biasing voltage has been investigated. It has been observed that at both conditions of increasing magnetic field and grid biasing voltage, sheath width expands in the source region, whereas in the diffused region, no such noticeable variation has been found (Fig.1, 2).

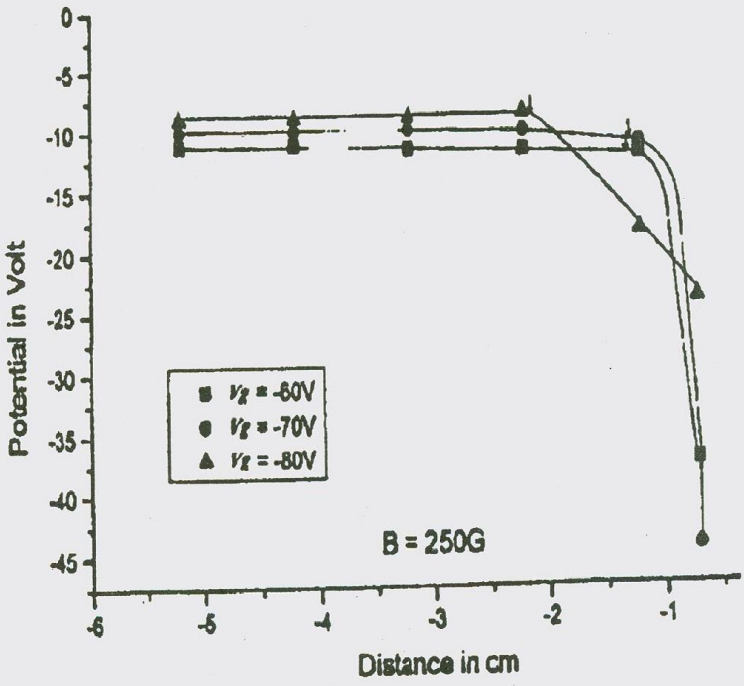

Fig. 1 : Sheath thickness variation in the source region with varying $-V_g$ and at constant B. The downward arrows indicate the sheath edge.

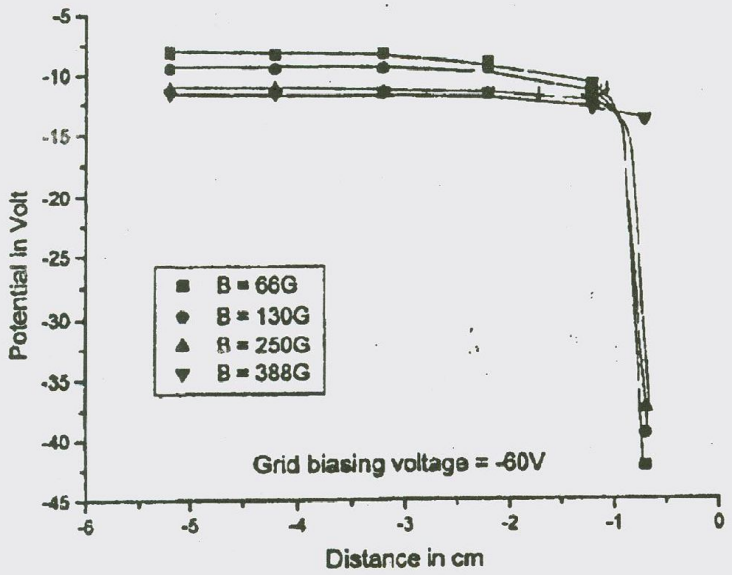

Fig. 2 : Sheath thickness variation in the source region with varying *B* and at constant - V_g. The downward arrows indicate the sheath edge.

The control of electron temperature due to the grid bias and the external magnetic field is also being affected by the typical structure of the sheath. Such electron temperature control in weakly ionized plasma used for many kinds of material processing where various electron temperature dependent chemical processes are involved.

Observation of sheath and magnetic pre-sheath over an oblique metallic plate in presence of magnetic field has also been observed. The plate has been deployed in the plasma environment, making some finite angle with the externally applied magnetic field as shown in the Fig. 3.

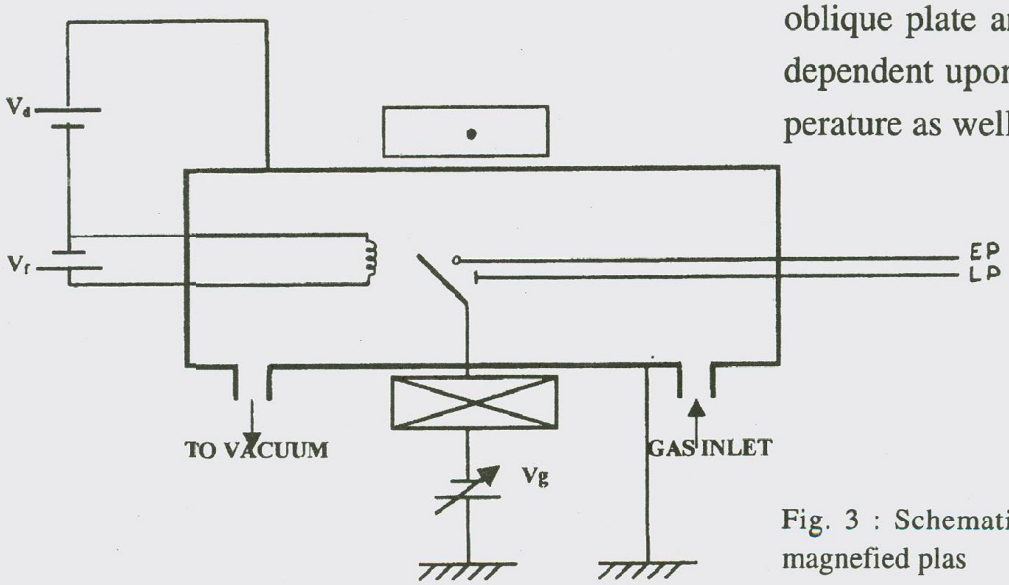

Fig. 3 : Schematic Diagram of oblique mat..plate in magnefied plas

Studies have been carried out for various angles, magnetic field gradients and plate biasing voltages as well. The magnetic pre-sheath thickness increases while the angle is varied from minimum to maximum whereas, the reverse happens in case of sheath thickness (Fig.4).

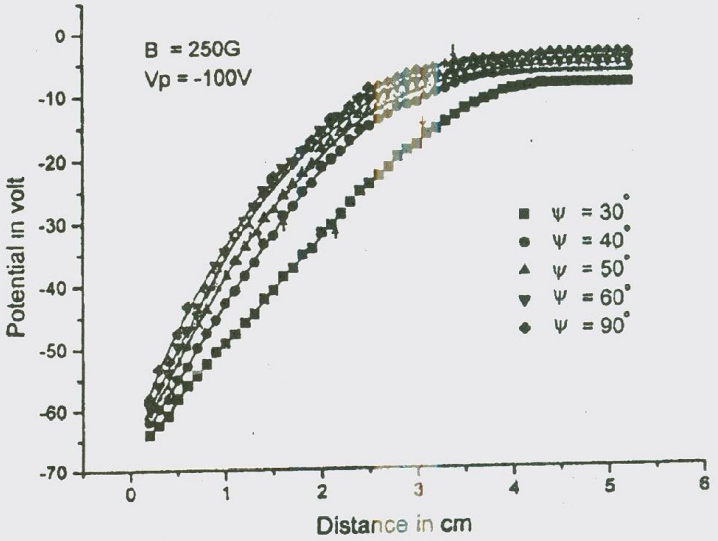

FIG. 4 Plasma potential variation near the plate for various angles at *B*=2540 G and *Vp* = - 100 V. The upward arrows indicate the sheath edge and the downward arrows indicate the magnetic presheath edge.

A comparative study between the experimental and theoretical measurement of the magnetic presheath width is found to yield approximate agreement to each other. It has also been revealed that the variation pattern of the electron temperature influences the formation of sheath and magnetic presheath. Moreover, the potential drop between the oblique plate and the bulk plasma is found to be dependent upon magnetic field and electron temperature as well.

Discharge Voltage = 65V
Discharge current = 50 mA
Base pressure = 2 x 10^{-6} mb
Working pressure = 2.6 x 10^{-4} mb
LP = Langmuir probe
EP = Emissive probe

(b) Gas discharge in D.C. Magnetron Plasma.

Direct Current magnetron plasma is essentially a glow discharge with a magnetic field applied perpendicular to the electric field. Such a configuration acts as a magnetic trap for the charged particles, mainly for electrons at lower magnetic fields. As a consequence, the ionization rate at the cathode region is greatly enhanced and the resulting large ion flux hitting the cathode leads to a high sputtering yield. Post magnetron discharges are the class of discharges used extensively for magnetron sputtering in a cylindrical geometry. Magnetron plasma sources are widely used for sputtering and thin film deposition applications.

Experimental arrangement:-

The experimental setup consists of a stainless steel cylindrical chamber (Fig. 5) 20 cm in diameter and 100 cm in length. Another stainless steel cylinder of 4cm diameter and 34 cm in length is placed co-axially inside the chamber. This smaller cylinder acts as a target-cathode. Two circular rings (A. A.) with inner diameter 12cm and outer diameter 16cm acts as anodes. The rings and the chamber are grounded. There are two disk type plates 5cm in diameter, which are connected to the end of the cathode to protect the end losses of electrons. An axial magnetic field of 0–550 Gauss is applied by passing 0–25 amperes current through two sets of coils wound round the body of the chamber.

The chamber is evacuated up to mbar using a combination of rotary and diffusion pump. Argon gas is used for plasma production and the working gas pressure is mbar.

A Langmuir probe is used for measuring voltage-current characteristics. These characteristics are recorded for different values of magnetic field and pressure. The plasma density and electron tempera-

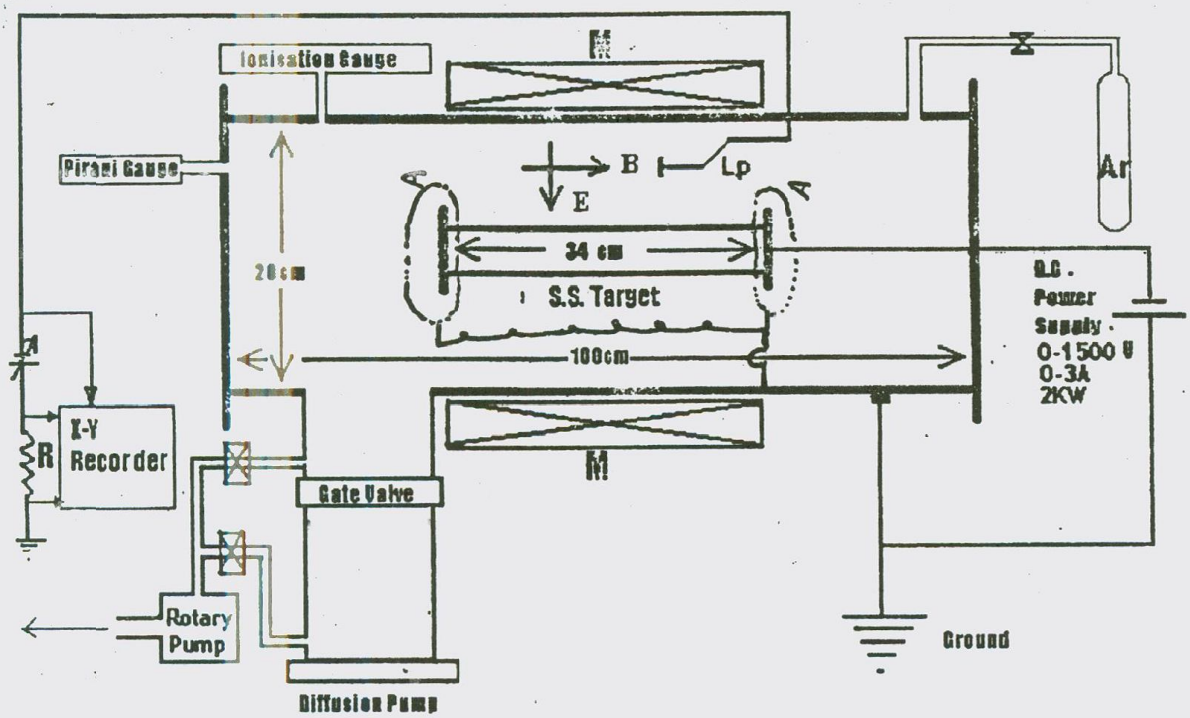

Fig. 5 : Schematic Diagram of Post-Magnetron Sputtering System

ture were measured from these characteristics. Since in a magnetron, magnetic field is perpendicular to the electric field, magnetized electrons in this confined plasma and also those liberated directly from the target will therefore experience a drift. This constitutes a hall current in the azimuthal direction, which may be many times larger than the discharge current. There exists an anomalous transport of electrons in the radial direction, which may give rise to high frequency instability. Investigations of these instabilities are being carried out.

(c) R.F. Plasma discharge:

The presence of R.F. fluctuations on the plasma potential will cause an R.F. potential to appear across the sheath of a D.C. Langmuir probe. Such time varying potential modify the current sampling by the probe and lead to a shift in the floating potential and cause the change in the shape of the characteristic *I–V* curves. So the measurement was made by using a self-compensating Langmuir probe.

The plasma device is a cylindrical stainless steel vacuum chamber of length 40cm and diameter 30cm, which is evacuated by a combination of rotary and diffusion pump to obtain a base pressure of 10^{-5} Torr (Fig.-6). Inside the vertically placed chamber, there are two circular plates of 10cm diameter. The lower plate can be displaced up and down and it is connected to the grounded chamber. A radio frequency (13.56 MHz) Power supply is connected to the other electrode through a matching network for production of capacitively coupled R.F. discharge plasma. The *I–V* characteristics in discharge have been taken for different parameters such as R.F. power, pressure, distance of the electrodes etc. From these characteristics plasma density, temperature, potential were calculated.

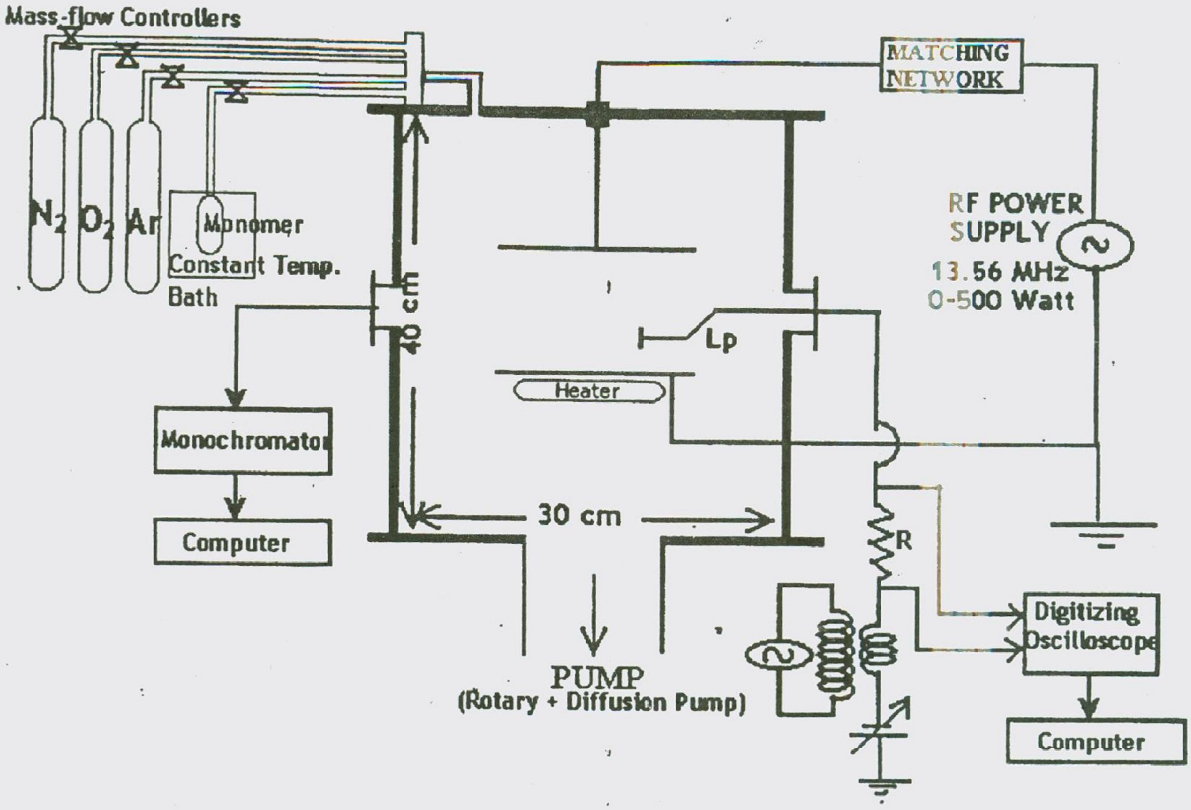

Fig. 6 : Capacitatively Coupled RF Plasma Processing Device with Plasama Diagnostics Systems

1.1.2 Theoretical Plasma Research:

Our ongoing research programmes deal linear and nonlinear waves in plasmas embedded by an magnetic field with the view to study the Alfven waves and soliton propagation in plasma processed in partially ionized plasmas as well as in space plas-

mas. Some basic studies on the effect of ambipolar diffusion arising due to ion-neutral drift in propagation of Alfven waves have been undertaken to understand the novelty to explain some natural phenomena observed by the Scientific Satellite and other space crafts. Many heuristic features on nonlinear waves dynamics in relation to laboratory and space plasmas have been highlighted through the augmentation of different approaches. Investigations yielded the nonlinear waves as soliton dynamic, derived in homogeneous medium, are quite unable to relate fully with the exact observations in ionosphere, magnetosphere as well as many astrophysical plasmas and so attention has been given to what exactly could be observed in space and its surrounding atmospheres. Further attention has been given to study the soliton radiation, which are to be linked in waves dynamic in heliospheric region and to study by wave theory the inherent features of solar radio burst, soliton radiation etc. The soliton dynamics in space shows the formation of high intensifying electric field along with depression in waves as a result the formation of high intensifying electric field along with depression in waves. On the basis of these results some basic phenomena can be explained. The observations have been analogized with radiating solitons emitted in solar flares as well. Again, the configuration of plasma-acoustic mode with the interaction of an ambient magnetic field might cause some times to turn down the soliton formation and consequently higher order dispersinvess effect has to consider as similar to those studied earlier with the variation of nonlinearly. The investigations have been concluded that the nonlinear effect is not only the root cause to exhibit different solitons in nature rather the dispersinvess supports equal responsibility to all natural phenomena in plasmas. A new approach, called sine Gordon method, has been employed to generate the observation from the nonlinear plasma-acoustic waves successfully.

Another versatile area of studying the nonlinear acoustic wave, is about dusty plasmas. Dusty plasmas have the quite common plasma configurations in space and astrophysical environments as well as in laboratory. The dusty plasma exists in astrophysical bodies and space environments such as commentary tails, planetary ring, interstellar and circumstellar clouds, asteroid zones. The ubiquitous nature of dusty plasma and its importance in plasma environment have spurred many researchers in our group.

Among all the studies, nonlinear phenomena in plasma dynamics have been developing also through the augmentation of plasma-sheath formation around a solid body and the problem on plasma sheath needs further study as it could be interesting and too important in plasma technology and fusion research. Much attention has been focussed on the configurations and thereby, on the conditions based on the static magnetic field in the dynamical system. We have considered the relevant plasma model with an aim that the study could be a thrust area and interest to the experiments in surface, and thus it could be found around dust too. After knowing the characteristic feature of sheath formation in plasma, the dynamic of levitated dust grains and its interaction with the sheath have been studied. The physics of the impact processes the manner, in which dust is produced, to know its behavior. Finally, interest would be continued with constant

dust grains along with the effect of continuous dust charging process.

Thrust areas of Research

- Waves and Instabilities.
- Sheath Phenomena
- Basic Plasma Properties
- Plasma Processing.
- Polymeric Materials

Facilities:

- Double Plasma Device
- Magnetised Plasma System
- RF Plasma Magnetron System.
- Post Magnetron DC Plasmas.

Future Plan:

- Plasma Processing Systems.
- Surface Modification of bell Metals.
- Polymer Division: This division has been started in January 2002. Work on development of materials like flow improver, plasma polymerization and ionics are contemplated.

Project submitted to DST, Govt. of India

- To study the Discharge Mechanism of post DC Magnetron Device which is widely used in sputtering deposition process.

2. MATHEMATAICAL SCIENCES DIVISION:

Faculty

Name:	Field of interest
Dr. G.C. Das, Professor & Head	Applied Mathematics
Dr. B.C. Tripathy, Associate Professor	Pure Mathematics
Dr.(Mrs) M.R. Agrawal (on leave), Assistant Professor	Pure Mathematics
Dr. G. Choudhury, Assistant Professor	Statistics

The Mathematical Sciences Division has the main motivation to streamline the divisional research activities under the three major branches of Advanced Mathematics.

2.1 Pure Mathematics:

This group is now very much inclined to do research in pure mathematics with the Fuzzy sets theory, Group theory and their applications to some kinds of problems along with the threshold activities studying the sequence spaces, summability theory. Some of the research scholars have been doing the works related to the fuzzy real valued sequence spaces, generalised sequence spaces and matrix operators as well as with the related subjects.

Research works have been continuing with few part time scholars named Mr. Bipul Sarma, Mr. Paritosh Ch. Das, and Ms. Sabita Mahanta. Some ongoing research problems have been carrying out as an inter-institutional Collaborative Research works with distinguish Professor P. Chandra, Patna University, with whom a part of the work has been published in internationally repute journals. Again some Collaborative Research works have been done with Professor E. Mikail and Professor Y. Altin of Firat University, Turkey. A part of this collaborative work is communicated for publication. Some other collaborative research work has also been done with Professor Salàt and Professor M. Ziman of Comenius University, Slovakia. The findings are communicated for publication. Based on this frame work, some studies have been carried out with the basic notion of statistical convergence of sequences introduced by H Fast [*Coloq. Math.* **2** (1951) 241 – 244] and I. J. Schoenberg [*Amer. Math. Monthly* **66** (1959) 361 – 375] independently. The idea depends on the notion of *density* of subsets of the set N of natural numbers. A subset E of N is said to have density

$\delta(E)$ if

$$\delta(E) = \lim_{n\to\infty} \frac{1}{n}\sum_{k=1} \chi_E(k) \text{ exists,}$$

where is the characteristic function of E. A sequence is said to be statistically convergent to L if for any $\varepsilon > 0$, $\delta(\{k \in N : |x_k - L| \geq \varepsilon\}) = 0$, written as $x_k \xrightarrow{stat} L$.

The notion of paranormed sequence spaces was proposed by H. Nakano [*Proc. Japan Acad.* **27** (1951) 508 – 512] and S. Simons [*Proc. London Math. Soc.* **15**(3) (1965) 422 – 436]. This has open

a new direction for studies on Sequence Spaces. For $p = (p_k)$ a sequence of positive real numbers, the following sequence spaces have been introduced

$$\bar{c}(p) = \{(x_k) : |x_k - L|^{p_k} \xrightarrow{stat} 0 \ , \ as \ \ k \to \infty$$

for some L}

$$\bar{c}_0(p) = \{(x_k) : |x_k|^{p_k} \xrightarrow{stat} 0 \ , \ as \ \ k \to \infty \ \}$$

called as the *statistically convergent* and *statistically null paranormed* sequence spaces respectively

The decomposition theorem is proved and the results indicate that the decomposition results proved by J. A. Fridy [*Analysis*, 5 (1985), 301 – 313], J. S. Connor [*Analysis*, **8** (1988) 47 – 63] and T. Šalàt [*Math. Slovaca*, **30** (1980) 139- 150] are equivalent and their results can be obtained as a particlular cases of this result. It is proved that the class of bounded statistically null paranormed sequences is a closed subspace of the bounded paranormed sequence spaces. Different inclusion results have been obtained. A result obtained by us gives the necessary and sufficient condition for the equality of bounded statistically convergent paranormed sequence space and the bounded statistically convergent sequence space. The crucial result obtained shows that the class of bounded statistically convergent sequences is not separable.

Let denote the set of all subsets of N, those do not contain more than s elements. Let be a non-decreasing sequence of positive numbers such that The research group has introduced the sequence space

$$m(\phi, p) = \left\{ (x_k) : \|x\|_{m(\phi,p)} = \sup_{s \geq 1, \sigma \in \wp_s} \frac{1}{\phi_s} \left\{ \sum_{n \in \sigma} |x_n|^p \right\}^{\frac{1}{p}} < \infty \right\},$$

This generalizes the earlier sequence space (which can be obtained from the above definition on taking $p = 1$) introduced by W. L. C. Sargent [*Jour. London Math. Soc.* **35** (1960) 161 – 171].

It is proved that the space $m(\phi, p)$ is a *BK*-space. The space $m(\phi, p)$ is symmetric as well as normal (solid) sequence space is established. It is shown that Further some results have been proven based on those given necessary and sufficient conditions for the equality of these inclusions. The relationship of the space $m(\phi, p)$ with other sequence spaces is established.

2.2 Applied Mathematics:

Applied Mathematics group focuses their attention to develop the application of applied mathematics to solve the nonlinear differential equation as similar to

$$\frac{\partial \phi}{\partial t} + A\phi \frac{\partial \phi}{\partial x} + B \frac{\partial^3 \phi}{\partial x} = 0 \qquad (1)$$

which has been derived in various branches of physics. In order to find the physical meanings of its solution, in relation to the observations of nonlinear plasma acoustic-wave dynamics, we, along with the research scholars (Part-time Researcher Dr. J. Sarma), succeeded to employ the tanh-method in generating the acoustic modes of the nonlinear wave equation in the form of a soliton propagation. Further investigations have been done in nonlinear plasma wave dynamics to relate many observations augmented through the scientific satelite in space and its surrounding atmospheres. Recently it has been observed that the nonlinear wave, propagating in inhomogeneous media,

changes into the following form

$$\frac{\partial \phi}{\partial t} + A\phi\frac{\partial \phi}{\partial x} + B\frac{\partial^3 \phi}{\partial x} + C\phi = 0 \qquad (2)$$

where A, B, C are the functions of physical parameters.

The well-known steady state method fails to explain the desired observations. However, some observations to have the solution by using the steady state method from equation (2) but not able to yield the results what exactly expected in laboratory and space plasmas. It has shown that the earlier method could be used to have the nonlinear wave solution for which it needs to use drastic mathematical manipulation, due to which some salient observations are missed. That is why, a new approach, called sine Gordon method, has been developed to herald the nonlinear wave solution and becomes turning features in showing the precursor of acoustic modes as similar to those solitons found in laboratory plasmas. Further, another method known as balance method, could be used successfully too to solve such type nonlinear wave equation (2) and the method found new to plasma dynamics in finding the observation. We are convinced on the methods for their success in getting the exact observations of the nonlinear interaction on plasma-acoustic modes. We have developed parallely another mathematical procedure known as Pseudopotential analysis in literature to study the nonlinear wave of having arbitrary amplitude. The dynamical system has been focussed to derive the well known Alfven wave propagation which along with the interaction of nonlinear phenomenon gives rise to solitary kinetic Alfven wave. Some failure cases arise, and then attention has been developed towards the computational mathematics to the nonlinear wave equation. Investigations highlight many inherent salient features of nonlinear wave and could be of interest in laboratory and space plasmas. Most of the works are the output of Inter-Institutional collaborative research activities among the scientists named Prof. C. Uberoi at Indian Institute of Science, Bangalore; Prof. R.K. Roychoudhury at PAMU, Indian Statistical Institute, Kolkata and Dr. N. Devi, Department of Mathematics, Cotton College at Guwahati as well as one of our research scholars Ms. K. Devi (She is a part-time Research Scholar). We have again derived different nonlinear wave equations, but because of their complex form in nonlinearity, the solution process have been continued by the use of numerical method based on FORTRAN language. Here we have taken the nonlinear equation of the form

$$\frac{1}{2}\left(\frac{d\phi}{dx}\right)^2 + V(\phi, x) = 0 \qquad (3)$$

derived in space plasmas. The equation has been derived in magnetised plasmas. The usual Pseudopotential method fails to derive above equation to study the formation of soliton and its propagation in plasma environments occur in nature, and thus an alternate method has been employed for the derivation. The equation (3), under small amplitude wave approximation, could be modified to the result obtained by equation (1). This well known equation is known as sheath equation too. The nonlinear wave equation has been solved to predict the formation of dust atmosphere around the solid body emerged in plasmas as similar to the observations around the surface of the moon and is

confirmed by the Scientific Satellite. This work has been continued in collaboration of Material Sciences Division at IASST.

2.3 Statistics:

Parallel to other subjects, Mathematical Sciences Division has been looking forward to find the thrust areas in statistics to be developed in the division. At present, the Division has focussed the attention to the problems on queueing theory and its applicability in vacation process as well as in industrial mathematics. Based on the grand vacation process, researchers investigated the steady state behaviour of an M/G/1 queue with generalized vacation (that includes the single as well as multiple vacations) under a threshold schedule, where the server has taken a sequence of vacations till it returns to find some pre-specific number of units observed after each vacation. For this model, a simple technique has been developed to obtain the probability generating functions for the queue size distributions at different points of time. Development has been further on some important particular cases and important performance measures of this type of queueing system.

Later on some operating characteristics of M/M/1 queue with an exponential setup time under N-policy have been studied. In this model, the server turns off the system when the system becomes empty and turned on again as soon as the queue size becomes N($\geq$1). Researchers also obtained the probability distribution of the queue size at different epoch. One of the important findings in this model is that the additional queue size distribution caused by the idle period is the convex combination of the queue size distribution due to the buildup period (i.e. the period required to start a setup period) and the queue size distribution due to setup period. Moreover, we have obtained the factorial moments of the queue size distribution. Further attention has been given to a simple procedure based on residual life analysis to obtain the expected delay of the system.

We again study the steady state behaviour of an $M/M^{(k)}/1/K$ queueing system,

where the units are served in batches of maximum size equal to the system capacity 'K'. It is also assumed that whenever the service station is not full, an arriving unit, if any, is obtained into the system. Following this model, the system size distribution along with some important system performance has been measured.

Further investigation is to be made for a single server Markovian queueing system with compound Poisson arrivals of batches of random size under a single vacation policy, where the server takes exactly one vacation of random length between two successive busy periods. We have obtained the steady state distribution of the additional queue size, additional delay caused by the vacation period and queue waiting time distribution.

We have taken so far different models and a part of the works has been done as a collaborative research work with Professor A. Krishnamoorthy, Cochin University and the out come of work has been communicated for publication. Further, some works have been taken as a Ph. D. programme and Ms. Sangeeta Kalita, a former research scholar has been working in the programme for her Ph. D.

3. LIFE SCIENCES DIVISION:

Faculty

Name:	Field of interest
Dr. N. Deka, Professor and Head	Biochemistry and virology
Dr. P. Azad, Associate Professor	Biofertilizer and biocontrol
Dr. J. Kotoky, Assistant Professor	Herbal Medicine
Dr. D. Devi, Asstt. Professor	Sericulture

The research activities of this Division are divided into the following sub-areas of Life Sciences:

1. (a) Biodiversity and Bioprospecting studies of Medicinal Plants endemic to North Eastern Region of India.
   (b) Study of Viral diseases of Muga Silk Worm
2. Biofertilizer
3. Sericulture and
4. Biochemistry of Medicinal plants

3.1. (a) Biochemistry and virology Unit

Biodiversity and Bioprospecting studies of Medicinal plants endemic to North Eastern Region of India

This area of research was started from September 2000.Biological diversity is increasingly being recognized as a vital parameter to assess global and local environmental changes and sustainability of developmental activities. The genes, species and ecosystems of the world are the products of 3000 million years of evolution and the basis for survival of our own species. Biological diversity encompasses all plants, animals and microorganisms and the ecosystems of which they are part. India with 2.4% of the world area has 8% of the world's total biodiversity and is one of the 12-mega biodiversity outlets of the world. It has 2 of the 18 identified hot spots in biodiversity of the world. They are the Western Ghats and the Eastern Himalayas. The entire northeastern region of India belongs to the Eastern Himalayas. India is a mega diversity country and total of 125,000 described and 400,000 undescribed species exist in this country.

The field of studying biodiversity of species through use of DNA molecular marker is very new and it has been widely applied in various branches of biology. The identification of taxonomic units and determination of uniqueness of species is essential information for conservation. One of the main objectives of the bioprospecting studies is the collection, documentation and molecular characterization of economically and medically important endangered plant species. The molecular DNA marker techniques are capable of differentiating between species, sub-species, hybrid or race In this area, modern molecular biological techniques such as DNA fingerprinting, RAPD (Random amplified polymorphic DNA), AFLP (Amplified fragment length polymorphism) analysis have become very useful to document and characterize species at molecular level.

3.1. (b) Study of Viral diseases of Muga Silk Worm

The production of Muga has dwindled over the

years due to a number of factors such as infection by virus and bacteria, invasion by virus and bacteria, invasion by birds, reptiles and environmental pollution.

Preliminary experiments were done to infect the muga larvae in the indoor rearing facility of the IASST. For that approximately 600 larvae were hatched and reared in the indoor rearing facility. Out of these approximately 70% have completed the life cycle. In an experimental set up the fourth instar larvae were divided into two groups: one was fed with normal *Som* plant leaves and the other group was fed with leaves impregnated with water or with juice of dead fifth stage larvae (suspected to be infected) collected from the Basic Muga farm, Khanapara. The dead muga larvae have been collected and preserved in -20°C freezer for further analysis. Furthermore more samples of infected muga larvae are being collected to prepare stock virus for infection of fresh larvae.

3.2 Biofertilizer Unit

The Biofertilizer Unit of The Life Sciences Division has been started in April, 1994 with a project "Studies on Rhizobium Biofertilizer for improvement of pulse production in Assam", sponsored by the DBT., Govt. of India, New Delhi. The project was completed in September, 1998 but the extension work with dual inoculation of Rhizobia and VAM fungi for enhancing pulse production in the N.E. Region has been continuing in collaboration with the Regional Biofertilizer Development Centre (RBDC), Imphal, Manipur and School of Life Sciences, JNU, New Delhi.

In April, 1996 this Unit has initiated a new area of research on certain important crop diseases and pest of N E Region particularly of Assam and their control with biotic agents, with a project on "Survey, collection and study of phytopathogenic fungi on cultivated crops of Assam", sponsored by the Assam Science, Technology and Environment Council, Govt of Assam, Guwahati. The project was completed in March 1999. However, the works on Pseudomonas mediated induced resistance and biocontrol of blast of rice and studies on Hispa rice pest and its biocontrol are continuing.

To supplement the chemical fertilizers mostly the phosphorus and nitrogen with bio-inoculants *VA Mycorrhiza* and *Rhizobia* respectively, works on native *VAM* fungi and their combined application with efficient *Rhizobia* for enhancing pulse production in NE States, are continuing in collaboration with Regional Biofertilizer Development Centre (RBDC), Montripukhuri, Imphal, Manipur for sustainable pulse production in the Region. Strains of native *Rhizobia* and *VA Mycorrhiza* have already been isolated and preserved for further study. A programme for pilot trial in the farmers' field for effective dual inoculation is being prepared with the RBDC, Imphal and is waiting for the financial sanction from the DBT, GoI, New Delhi.

In other works twelve strains of *Pseudomonas fluorescens* have been isolated and preserved to study the *Pseudomonas* mediated Systemic Induced Resistance (SIR) and biocontrol of blast of rice caused by *Pyricularia oryzae*. Isolates of native *P.oryzae* have already been isolated and ratings of the isolates for different strains within the species are being investigated. Further studies on *Pseudomonas* mediated biocontrol of *P.oryzae*, the incident of blast of rice, both *in vitro* and *in vivo*,

have been initiated. A project proposal to this effect has already been submitted to DBT, GOI, New Delhi.

Besides, works on rice Hispa considered to be the most devastating pest of rice in Assam, caused by *Dicladispa armiera* has been taken up for epidemiological and host insect interaction studies with special reference to control the insect and the pest under the ecological conditions of Assam, with biological agents for integrated approaches. A project proposal is being prepared to this effect to be submitted to the Indian Council of Agricultural Research (ICAR), GOI, New Delhi.

Fig. 7 : Growth and development of Blackgram & Greengram in Leonard jar experiment

Fig. 8 : Preparation of Leonard jars for experiment.

Fig. 9 : Prof. A.K. Varma of JNU, New Delhi at the National Workshop on "Microbial Biodiversity" (Oct' 15-19, 2001) held at IASST.

3.3 Sericulture Unit

The main objective of this Institute is to explore the various resources available in this region providing proper research and development support. As such Muga and Eri have got the priority as these silkworms are the indigenous species and the seri-

ulture is a unique cottage industry of this region. Silk comprises 1% of the total fabrics of the orld used as dress material. India, the second larg-st producer of silk is the only country to name for roduction of all the four types of natural silks. ericulture industry has been playing a vital role in e socio- economics of rural population. More than million people are deriving their livelihood from is cottage industry and the country is earning valu-ble foreign exchange through export. 97% of the tal silk production of India is mulberry silk *Bombyx mori*) and the rest part is comprised of on-mulberry silk i.e. Muga, Eri and Tasar.

The Brahamputra valley, has been the home of erecigenous fauna & flora from time immemorial. hough this region is recognized as a home of all ur types of silks, the production has not shown y progress. On the contrary it is reported to have een declining. Assam, the only state producing uga silkworm is enjoying best climate, soil and ater, yet this ideal condition has not been fully xploited for the expansion of sericulture. Further, dvanced technologies are also not being adopted the farmers.

As the demand for silk is increasing rapidly, the eed to improve the production has been felt. As entioned above, favorable climate of this region grow plenty of food plants for silkworm all roughout the year and in turn rearing of silkworm boost up the industry is possible. Keeping this dvantageous position in mind, the sericulture unit as started under the life sciences division in 1991.

The sericulture unit has given more emphasis n improvement of Muga and Eri silkworm. The following strategies have been considered for development of sericulture as a viable and sustainable industry for the socio-economic development of the state as well as country.

1. Enumeration of merits and demerits of the existing practices and to analyse constraints.
2. Listing out of new technologies to be adopted for higher production (in terms of flora & fauna).
3. Identification of potential area (non traditional) for silkworm rearing (Muga & Eri).
4. Listing out of backward and forward linkages for each activity and plan to develop infrastructure facilities.

Muga culture:

Two crops of muga silkworm have been successfully harvested using indoor-rearing technique and the seeds were treated to obtain disease free laying (DFL's). Apart from the routine test for the pebrine disease the seeds have been treated applying different photoperiodic regime for uniform emergence of the moths for better coupling. It was also attempted to introduce artificial parthenogenesis.

The experiments were conducted as follows:

Different photoperiodic regime has been considered for incubation of cocoon at 26° C and R.H. 85% under BOD condition for initiation of experiment for emergence of moth.

Treatment: -

T1=L:D	08:16	$T_{1,5}$ – Treatment 1,5
T2=L:D	12:12	
T3=L:D	16:80	L – Light Phase
T4=L:D	24:00	
T5=L:D	00.24	D – Dark Phase

Each treatment has been considered into 3 repli-

1. Dr. Dipali Devi, Principal Investigator
2. Dr. D.K. Sharma, Co-investigator
3. Jayanta Deka, JRF
4. Dilip Talukdar, Field Assistant

Instruments Procured:

Gel documentation Unit (*Image master VDS, Pharmacia Biotech*). Procured on 2001& installed on 2/7/2001. Funded by DST, Govt. of India. Costing amount Rs.8.5lakhs.Image Master VDS is a self-contained electrophoresis documentation system integrating a camera, 312nm Tran illuminator, video monitor and hard-copy printer. A light-shielded viewing chamber eliminates the need for a dark-room. The standard configuration is intended for use with ethidium bromide-stained nucleic acid gels. With accessories, it becomes a full-featured system for photographing gels and autoradiographs by transmitting or reflected white light. Unlike most similar systems that use an intermediate monitor signal for printing, Image Master VDS camera drives the printer directly, assuring the highest print resolutions.

A Gene Amp PCR system 2400 machine(Applied Biosystems, USA) and a Sorvall high speed centrifuge were procured in 2001 through a fund from the DST, Govt. of India.

4. RESOURCE MANAGEMENT AND ENVIRONMENT DIVISION:

Faculty

Name:	Field of interest
1. Dr. S. Deka, Asstt. Professor and In-charge of RMED	Environmental biology (biodegradation and waste management)
2. Dr. A. Baruah, Asstt. Professor	Environmental Biotechnology (Phytoremediation and Bioremediation)
3. Dr. (Mrs) A. Devi, Asstt. Professor	Environmental Chemistry (Heavy Metals and hydrocarbons)

During the year 2001-2002, the studies on management of paper mill effluent and refinery sludge are going on.

(a) "Agro potentiality study of Jagiroad paper mill waste"

Pulp and paper mill of Jagiroad produces 448 ton solid waste (lime mud) and 60,000 m^3 liquid wastes per day. The solid wastes of the mill have been creating disposal problem due to limitation of space and violation of environmental norms. Disposal of tremendous volume of waste water is another difficult problem. The waste water is generally very alkaline and is of high biological and chemical oxygen demand. Thus effluent discharged to the water system make the water unfit for use and creates health hazards. This problem has posed a great challenge and serious attention has been drawn for solution of the problem for management of paper mill waste of Jagiroad. In this connection, a study was conducted to investigate the waste (both solid and liquid) for use in agriculture. Solid wastes were mixed with agricultural soil of Khanapara at 10, 20, 30, 40, 50, 60, 70, 80 and 100 percent. For each concentration, 3 kg of above solid waste mixed soil were taken in earthen pots in three replications. For liquid waste, 3 kg of agricultural soil of Khanapara, Guwahati have been taken in earthen pot with two replications and different concentration of liquid waste (viz 10, 20, 30, 40, 50, 60, 70, 80 and 100 per cent) was applied constantly till harvest. In both the experiments, one reference set without sludge and liquid waste was maintained as control to compare the effect. Rice seedlings of mashuri (Aijong) were raised in the pots. The physico-chemical characteristics of soil at the beginning of the experiment and after harvest were analysed and different parameters of plant growth were recorded.

The following results have been obtained from the experiment

(i) Sludge mixed soil (with NPK, without NPK) after harvest of rice showed a gradual increase in soil pH from 5.6 to 9.28. Other parameters like conductivity, water-holding capacity, Sodium, Potassium were also increased with increasing the concentration. However, percentage of organic carbon gradually declined.

(ii) Liquid waste mixed soil, after harvest showed a gradual increase in soil pH (i.e 5.7 to 6.3 and conductivity (i.e 0.100-0.209 mS/cm) but decreased in water holding capacity. (i.e 58.11 to 53.97 per cent). At 20 to 30 percent lime sludge mixed soil of paper

cations and 100 nos. of cocoons have been taken in each replication.

Data of emergence had been recorded day to day in each treatment along with control. Treatment T2 and T3 has been found suitable. The experiment will be continued to get the optimum emergence of moth.

Artificial parthenogenesis:

The method for inducing artificial parthenogenesis was followed as described by Astourov. The unfertilized eggs had been extirpated from ovarian tubules. Then the eggs were immersed in 46° C hot water for 15, 18 and 20 min. Maximum 50% development has been obtained at 20min immersion as against 82% at 18 min. reported by Astourov in case of mulberry silkworm. Result is awaited regarding sex differentiation because Astourov reported developing parthenogenetically all larvae is female in case of *Bombyx mori*.

Eri culture:

A germ plasm bank for eri silkworm has been established at the IASST and nine ecoraces/stocks namely; Borduar, Dhanubhanga, Mendipathar Khanapara, Nongpoh, Sillie, Titabor, Haflong and Coch Behar has been preserved at present. Castor leaves have been used as food plants.

Amylase and esterase isozyme have been analyzed among the seven ecoraces as mentioned above other than Haflong and Cooch Behar. Observati on morphological and isozyme analysis indicate th there are four genetically variants viz. i.) *Bordu* ii) *Dhanubhanga*, iii) *Khanapara*, *Nongpo* *Mendipathar*, iv) Sillie and Titabor. Hybridizati may be attempted among these four groups for b ter quality of eri silk yield.

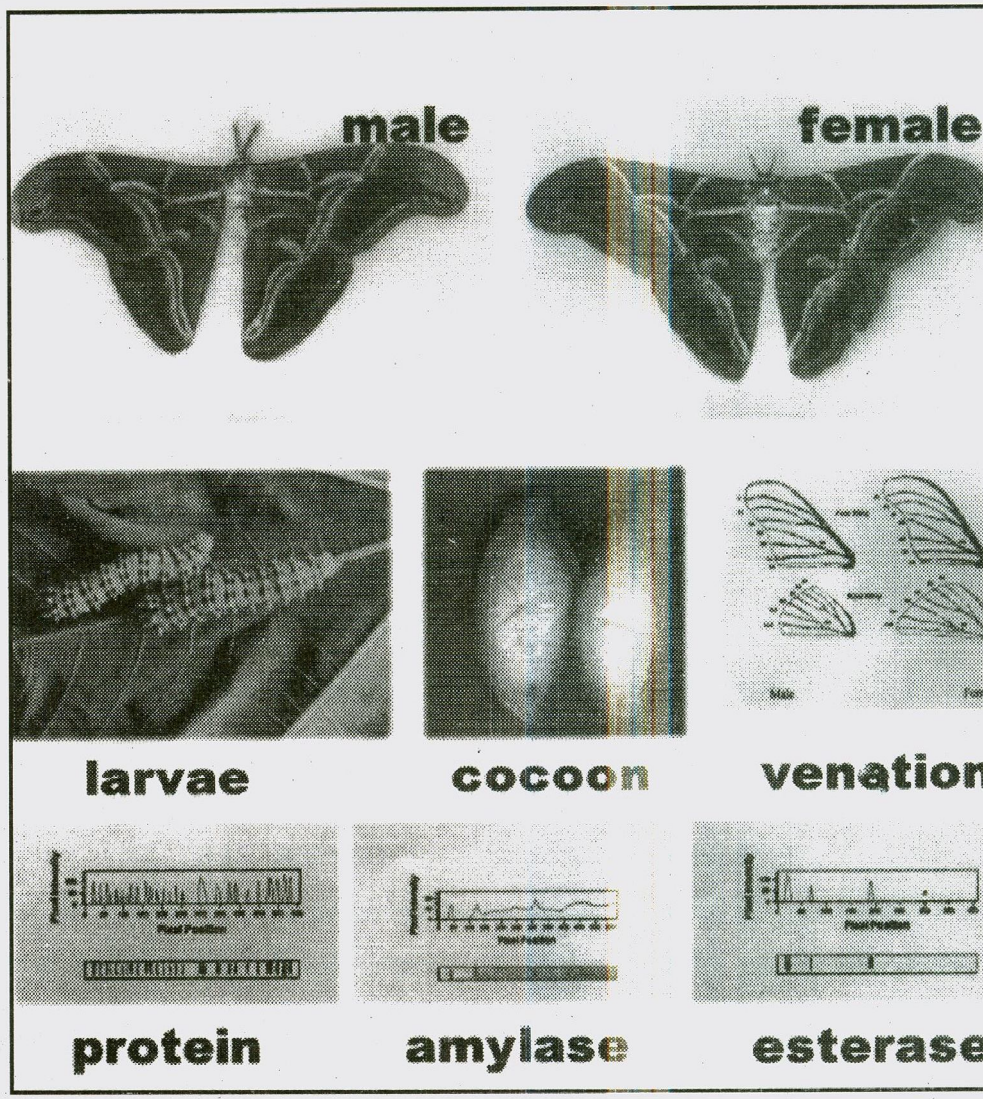

Fig. 10 : Morphotype and isozyme analysis of Philosamia ricini

3.4 Biochemistry of Medicinal Plants:

Medicinal plants now a days play a vital role curing many diseases. Many ethnic people of t region primarily depend upon the plant-based re edies only. Many such remedies practised by the people have got miraculous effects in curing so

diseases, many of which the modern medicine cannot cure. This valuable knowledge needs scientific documentation and systematic investigation for validation and standardization so that all people can derive the benefits of these remedies.

The North-Eastern Region is full of medicinal and economic Plants. Most of these plants are used by the local, indigenous people of Assam as well as other ethnic people of this region as remedy for various ailments in one or the other form to get relief from the diseases

Keeping in mind this aspect, we had started working on the investigation, evaluation, standardization, and development of herbal medicine, which is most effectively used by the people of this region.

We have documented some practitioners of some areas of Kamrup district for future reference and record and had interacted with the herbal practitioners. A few plants had been selected in different seasons of the year from these areas with the help of these people. We have focused our attention on the plants of these areas, namely *Leucas lavendulaefolia, Vitex negundu, Costus speciosus, Sida cordifolia, Clerodendron colebrookianum and Malastoma malabathricum* which have been claimed to be effective in the treatment of liver disorder and hypertension etc.

We are concentrating presently on the folk remedies used against the liver ailments, natural antioxidants and hyperglycemia.

Sida cordifolia, one potent plant for hepatoprotective activities as claimed by the traditional practitioners in this region had been taken for investigation for evaluating the efficacy against the liver ailments. It was studied against rats intoxicated with carbon tetrachloride and was challenged by feeding orally the root extract of the plant. In the reporting year it was conclusively established that the methanol extract protects the liver from the damage by the CCl_4.

Also, we had taken up a few plants like, *Sida cordifolia, Leucas lavendulaefolia, Costus speciosus,,Malastoma malabathricum and Vitex negundu* for the study of the antioxidant potentials of these plants. It has been observed that *cordifolia,* and *Leucas lavendulaefolia* have shown encouraging results in respects of antioxidants properties. This is a joint work with Dr. V. Jagdeesan, Sr. Grade Deputy Director, National Institute of Nutrition, Hyderabad. The work is in progress.

One indigenous plant and mineral based folk remedies (DIAJIV-I) practised by the traditional practitioners in certain areas to cure hyperglycemia has been undertaken for study on experimental animals and the work is in progress.

Besides these, the trace element study in different medicinal plants, which are very effective against many diseases and available in N E region of India, is in progress.

Studies on hypolipidaemic potentiality of *Clereodendron colebrookianum* in currently in progress and further studies on dose variation and development of herbal formulation from the plant are planned.

Project completed:

"Developing Isozyme marker for different stocks of eri silkworm" sponsored by the Department of Biotechnology, Govt. of India.

mill had showed good response for general welfare of the crop. However, crop growth parameters were more at a concentration level of 50 to 70 per cent of liquid waste of paper mill applied soil.

(b) "Utilization of lime sludge waste of Jagiroad paper mill for fish culture"

The state of Assam, situated in the North Eastern region of the country, is endowed with vast and varied fishery resources in the form of ponds and tanks (0.25 lakh ha,) floodplain wetlands (beels) and swamps (1.12 lakh ha) and the rivers Brahmaputra and Barak with their numerous tributaries (combined length 4,820 km) covering about 33.45 lakh ha (updated from Bhatacharjya and Varghese, 1990). However, it is stated that the growth and development of fishes are not to the mark due to acidic nature of the water in most of the fisheries of the state and therefore, it is difficult to achieve the target of fish production (unpublished report of the Directorate of Research, Assam Agricultural University, Jorhat). Phytoplankton (base of autotrophy food chain in an aquatic ecosystem) growth in water with low alkalinity is often limited by inadequate carbon dioxide and bicarbonate ions. Some waters of low alkalinity are acidic that fishes do not survive or grow well. Muds in ponds with low total alkalinity are acidic and strongly adsorb the phosphorus added in fertilizer (Boyd, 1984). Soil pH in the range of 6.5 to 7.5 and water pH in the range of 6.5 to 9.0 are considered to be optimal for fish production (Das et al 1996). Soil of the state are acidic ranging from 4.6 to 6.8 (Bhagawati and Barua, 1992), which is below the optimal range. Thus, in order to achieve optimal fish production, the fishponds of the state need adequate liming. Lime increases the pH of bottom muds and makes phosphorus more available besides increasing the pH and total hardness of pond water. However, addition of large quantities of lime increases the cost of fish production. For example for correcting acidity of soil in the range of 6.0 to 6.5 a dose of 1,000 kg/ha/yr of quick lime (CaO) is required (Anon, 1997) putting an additional financial burden of Rs. 6,000 (at current prices). Thus application of lime in fishponds becomes very costly but unavoidable management option for the poor and marginal fish farmers of the state. Therefore, it has become imperative to search for a cheaper alternative to pure lime for application in fish culture ponds. Limes sludge waste of the Jagiroad Paper Mill (HPC) may be one such alternative as it contains high amount of lime (Medhi et al. 1997)

The Hindustan Paper Corporation (HPC) mill located at Jagiroad, Morigaon district in Central Assam generates large quantity of lime sludge every day (940 ton/day). Disposal of this solid waste has become a problem as it causes abnormal increase in soil alkalinity causing damage to the vegetation in the vicinity of the dumping ground. Utilization of this waste for fish culture will hopefully, serve the dual purpose of pollution abatement as well as reducing the cost of fish culture operation in the state. However, before applying the waste in to fishponds, it should be ascertained whether it has any chemical toxic to fishes or fish food organisms. Preliminary studies conducted by the IASST indicated the lime sludge has none of the probable toxic substance in significant quantities. Against this background, it is proposed to carry out extensive

field and laboratory studies on utilization of lime sludge waste of the HPC paper mill at Jagiraod for fish culture.

During the year 2001-2002, the water and soil samples were collected from the selected fishponds Govt. fish farm and beels of Kamrup, Nalbari, Ngaon and Morigaon district of Assam. The collected water samples were tested for pH, total alkalinity, total hardness, dissolved oxygen, free carbon dioxide, dissolved organic matter, specific conductivity, Phosphate, Nitrate, Cl^- etc. Physico chemical characteristics of collected soil samples viz-pH, water holding capacity, organic carbon, available phosphorous, available calcium were ascertained by analytical methods.

(c) Studies on the microbial degradation of hydrocarbons of refinery sludge and their application for controlling environmental pollution.

Sludge is black, semisolid and sticky heterogeneous mixture of soil, water and inorganic substance. This sludge has been creating disposal problem due to space limitation and stringent environmental norms. This intrinsic problem has invited challenge and we have ventured to solve the tricky problem. So an investigation entitled "Studies on the microbial degradation of hydrocarbon of refinery sludge and their application for controlling environmental pollution" has been undertaken.

At first sludge sample of Guwahati refinery were collected. They were characterized and the physico-chemical parameters were ascertained. It contains 25 to 59% oil and grease content depending upon the sludge. Heavy metals viz. Lead, Manganese, Copper, and Nickel were also found to be present in all the samples collected from the Guwahati refinery.

A bacterial strain named *Pseudomonous aeroginosa* isolated from the oil field soil of Moran, Assam was identified by Institute of Microbial Technology (IMTECH), Chandigarh has been used to study the biodegradation potentiality of refinery sludge. It was revealed from our earlier study that the strain is potent hydrocarbon degrader. In the present investigation also, this bacterial strain has been used to study the potentiality of degradation of hydrocarbons from refinery sludge, so that this strain of bacteria can be used to bioremediation study of refinery sludge of Assam. It is revealed from laboratory-conducted experiment that the strain can degrade more than 60 p.c. of hydrocarbon from refinery sludge within one month of time period. Moreover, the strain produces a surfactant, an emulsifying agent which can emulsify some amount of hydrocarbons present in sludge samples in the water. The characterization of surfactant and degraded hydrocarbons are in progress.

(d) Entry of polycyclic aromatic hydrocarbons into soil from oil field effluents and their natural degradation:

The upper Assam oil fields have been in operation far more than one hundred years and two public sector undertakings, Oil and Natural Gas Commission and Oil India Limited have been operating the oil fields. The crude oil contains normal paraffin, cycloparaffins, aromatics, asphaltins and a large number of compounds containing all possible elements. During drilling and subsequent operations in the oil fields a lot of these compounds find their

way into the neighboring areas through the process of leaks, oil spills, solid waste disposal etc. A part of hydrocarbon in put may consist of polycyclic aromatic hydrocarbons (PAH) containing two or more benzene rings, which are potentially carcinogenic. These PAHs may undergo natural degradation in the soil due to action of microorganisms and can enter into the food chain through fruits and vegetables grown in the contaminated soil. Such investigations have been rare in the oil fields of Assam in the Northeastern India. The present work has been therefore taken up with view to identifying the PAHs entering into soil due to the oil field operation.

In this investigation, Rudrasagar oil field belonging to the ONGC has been selected for carrying out the work. Soil samples were collected from near each of the four GGSs of Rudrasagar. Altogether fifty-six soil samples from four GGS of Rudrasagar oil field have been collected. First batch of soil samples were collected during January 2001 and second batch of the samples were collected in February2002 for analysis.

The PAH fractions of the organic carbon in the soil samples were extracted and identified by using GC-MS. From the Gas Chromatographic observation, it was found that Chromatogram of oil extracted from different soil samples showed seven to sixteen Polycyclic Aromatic Hydrocarbons. Hence, it proves that the PAHs have undergone changes when they are in contact of the soils. It is known that certain hydrocarbons of petroleum origin get degraded under the influence of the various bacteria present in soil sample itself. Therefore, the nature and concentration of these hydrocarbons, which are extracted from different soil samples, may not have same types of hydrocarbons always. It depends on various factors like time of collection and other atmospheric conditions.

5. COMPUTER SCIENCE DIVISION:

Faculty:

Academic:

A. Barman, B.E., M.S.	Assistant Professor and In-charge of CSD
Mrs. L. B. Mahanta, M. Sc., DCA.	Assistant Professor
Ms. A. Dutta, MCA.	Assistant Professor

Non-Academic

N. Bhagobaty, B.Sc., PGDCA.	Sr. Instructor
B. Bhuyan, B.E., M.Tech.(On leave)	Instructor
B.P. Bhagabati, B.Sc. DOEACC 'A' Level	Instructor
Ms. J. Pathak, MCA	Instructor

During the year 2001-2002, the Computer Science Division of IASST has imparted computer training to research scholars and students of the institute through the following courses:

The Computer Science Division has extended INTERNET facility to all the divisions of IASST and students of the institute through its own Local Area network (LAN) under the supervision of Sri A. Barman, Asstt. Professor and In-charge of CSD. Altogether 50 computers have been connected to the LAN to access the Internet connection.

The CSD has also extended its service to computerize the IASST Library. Also, around 1000 Information Technology related books have been

Sl. No.	Name of the Course	Total Intake	Examination Status	No. of passed students
1.	DOEACC "CCC"	a) Jun 2001: 18 b) Sep 2001 : 36 Total : **54**	Feb 2002 **45** appeared	**15**
2.	DOEACC "O" Level (First Batch started in Jul 2002 under the EGTS project)	Batch-I Jul 2001 **32** Batch-II Jan 2002 **21**	Jul 2002 1st & 2nd sem: **32** to appear Jul 2002 1st semester: **21** to appear	—— ——
3.	DOEACC "A" Level (New second batch started from Jan 2002)	Batch-I Jul 2001 **40** Batch-II Jan 2002 **40**	Jan 2002 1st semester: **33** appeared Jul 2002 1st semester: **40** to appear	33 ——
4.	PGDCA Course	Feb 2000-Mar 2001 **39** Feb 2001-Mar 2002 **43**	April 2001 **28** appeared April 2002 **32** appeared	**28** **13**

procured by the CSD for the students and research scholars of IASST. The CSD has been maintaining its computer hardware on its own since 1996 and no Annual Maintenance contract (AMC) has been signed with third parties. This year turnover of CSD from training activities is thirteen lakhs.

Mrs. L. B. Mahanta, Asstt. Professor and Ms. Aparna Dutta, Asstt. Professor had attended a workshop on "Spring School on Soft Computing, Data Mining and Image Processing" from March 12-16, 2001 sponsored by Machine Intelligence Unit, ISI, Kolkata at the Department of Physics, Gauhati University.

Mrs. L. B. Mahanta, Asstt. Professor and Ms. Aparna Dutta, Asstt. Professor had attended the International workshop on "Technology Developments in Indian Languages" from March 26-30, 2001 sponsored by CVPR Unit at ISI, Kolkata.

Ms. Aparna Dutta, Asstt. Professor had attended the first National Workshop on "Soft Computing and Intelligence Systems" from September 13-15, 2001 sponsored by Machine Intelligence Unit, ISI Kolkata at Tezpur University.

Apart from the above, the CSD has extended its consultancy services to the Gauhati University, Indira Gandhi National Open University, College of Vety. Science, etc for various purposes viz., project evaluation, paper examination, statistical analysis, etc.

6. LIBRARY AND INFORMATION CENTRE

The Library and information centre of the Institute of Advanced Study in Science and Technology is concentrating on collection of printing & non-printing documents like books, booklets, journals, publications, reports, compact disk in the discipline of Plasma Science, Material Sciences, Computer Science & Technology, Mathematics & Statistics, Life Sciences including, medicinalplants, biotechnology, sericulture, bioprospecting, biofertilizer, virology, immunology, agriculture, microbology, pathology, genetics, physiology etc. The library is also collecting books, reprint of Environmental Science pertinent to liquid wastes, environmental pollution & pollutants, ecology, sewers, pollution control and its related aspects.

With the addition of 281 books during the financial year April 2001-March 2002, the total number of books available in the Library becomes 6271. Library has subscribed for 73 journals both Indian &Foreign in the subjects of Plasma Physics, Material Sciences, Ecology & Environment, Mathematics & Statistics, Computer & Information Technology. Besides this a number of review popular scientific journals, Newspapers, magazines etc. are collected for the faculty and staff.

The Library has continued to provide classified information services such as Current Awareness Service (CAS), Selective Dissemination of Information Service (SDI), Indexing, Reference & Information Service, Referral Service, Reprographic Service, Computerized Information Service, where database search service (SOUL) and Internet Search Service and also E-mail Service, Circulation Service and Inter Library Loan to the users.

At present the collection of the Library is Books 6271, Current Journals 73 (including Foreign & Indian), Bound Periodicals 579, Thesis & Dissertation 135, Research Papers 122, Bulletin, Annual Report, Newsletter etc. 421. Library is also receiving some valuable documents from renowned personalities as complementary and gratis copies.

Library automation is going on. The catalogue entries are being prepared by the SOUL software. It is planned to prepare a computerized database of S&T documents available in NE India for Scientists and Technologists. Moreover, the process is going on to prepare database of science reading materials available in greater Guwahati.

Apart from scientists, research scholars, students of the Institute, researchers academicians of other Institutes are also available some of the Library facilities. Students from various Educational Institutions, Universities are also visiting the Library.

7. RESEARCH PUBLICATIONS IN SCIENTIFIC JOURNALS

1. Bornali Singha, A. Sarma and Joyanti Chutia, Influence of magnetic field on plasma sheath and electron temperature, *Review of Scientific Instruments*, **72** (2001) 2282-2287.

2. Bornali Singha, A. Sarma and Joyanti Chutia, Experimental observation of sheath and magnetic re-sheath over an oblique metallic plate in the presence of magnetic field, *Physics of Plasma*, **9** (2002) 683-690.

3. G.C. Das and Shuvam Sen, Evolution of Radiating Solitons Plasma, *IEEE- Plasma Sci.*, (2002) 380-383.

4. B.C.Tripathy and M. Sen, On genaralized statistically convergent sequences, *Indian J. Pure Appl. Math,* **32** (2001) 1689 – 1694.

5. B. C. Tripathy and M. Sen , On a new class of sequences related to the space

   Tamkang Jour. Math., **32** (2002) 167 – 171 .

6. G. Choudhury, and A Borthakur, Heuristic approach to M/M/1 queue with generalized vacation under a threshold schedule, *Recent Development in Operation Research*, (2001) 79-87.

7. G. Choudhury, Operating characteristic of an M/M/1 queueing system under N-policy with exponential setup time, *Electronne Modelirovanie*, **23** (2001) 93-100.

8. S. Kalita and G. Choudhury, Some results of a batch service queue with finite waiting space, *Stochastic Modelling & Applications*, **4** (2001).

9. G. Choudhury and S. Kalita, Analysis of a batch arrival Poisson queue under single vacation policy, *Calcutta Statistical Assoc. Bull.*, **51** (2001).

10. J. Kotoky and P.N. Das, Hepatoprotective Activities of Sida cordifolia root against Carbon tetrachloride intoxicated rats, *J. Med. Arim. Plant Sc.*, **22** (2001) 104-109.

11. Rajlakshmi Devi and D.K. Sharma, Changes in blood protein and lipid level due to administration of leaf juice and extract(s) of *Clerodendron colebrookianum, J. Neo-Botanica*, **10** (2002).

12. S. Deka, Bacterial strains, degrading crude oil from petroleum polluted soil of Assam. *Pollution Research*, 20 (2001) 517-521

13. S. Deka, A. Devi, H.P Barthakur and L.C. Kagti, Impact of oil exploration on micro flora in rice field soil of Assam. *Assian J. of Micro. Biot. And Env.*, 3 (2001) 217-222

8. RESEARCH PAPERS PRESENTED IN CONFERENCE /SEMINAR:

1. H. Bailung, A.R. Pal and D. Barua, Influence of Ion Beam on Sheath characteristics in Plasma. Pro. 16th National Symposium on Plasma Science and Technology, CPP (2001).
2. D. Barua, P. Kikani, P.M. Raole, S.K. Nema, Joyanti Chutia and P.I. John, Study of Corrosion Resistance Coating on Copper based metal surface by Plasma Polymerization. Proc. 16th National Symposium (2001).
3. H. Bailung, Experiments on Ion-Acoustic Waves in Dusty Plasma Devise. Proc. 16th National Symposium (2001).
4. P. Kalita, and G.C. Das, Characteristic Behavior of Dust Grains in sheath formed in Plasma with Negative Ions. Proc. 16th National Symposium (2001).
5. Karabi Devi, G.C. Das, J. Sharma, and R. Roy Chaudhary, Nonlinear Wave Phenomena in Magnetized dusty Plasma with varying Dust-Charge Grain, Proc. 16th National Symposium (2001).
6. Nirupoma Devi, and G.C. Das, Large Amplitude Solitary Wave in Multicomponent Magnetized Plasma, Proc. 16th National Symposium (2001).
7. S.K. Baishya and G.C. Das, Dynamics of Dust particle in Magetized Plasma, Proc. 16th National Symposium (2001).
8. Bornali Singha, Aparajita Mukherjee, D. Rathi and D. Bora, Wave Field Measurement in CCRF Discharge Plasma, Proc. 16th National Symposium (2001).
9. A.R. Pal, P.I. John and K.V.D. Prasad, Investigation of the properties of positive and negative Space modes in Post Magnetron Discharge, Proc. 16th National Symposium (2001).
10. Putul Kalita, Characteristic Behavior of Dust Grains in sheath formed in Plasma with negative ions, Poster session, Plasma, (2001).
11. A. Baruah, The next in bioremediation in coal mine area of Upper Assam, Seminar on Environmental protection, sustainable development and pollution created by public sector enterprises of Coal, Oil and Paper of Assam, December 30-31 (2001) Digboi.
12. S. Deka, Impact of coal mining activities on environment and management of mine spoil, Seminar on Environmental protection, sustainable development and pollution created by public sector enterprises of Coal, Oil and Paper of Assam, December 30-31 (2001) Digboi.
13. D.K. Sharma and Depali Devi, Glucose-6 –phosphates activity in the larval haemolyph of non mulbery silkworm Ww. Proceedings of the 46th Annual Technical Session, Assam Science Society (2001).
14. J. Kotoky, Investigation of Trace Elements in Plants: Part II Its Relation to Certain Diseases, proc. Annual session of the Indian Science Congress Association, held at Lucknow from 3rd to 7th January (2002).
15. J. Kotoky, Ethno-medico-botanical investigation of hepatoproctective plants in some tribal dominated pockets of Kamrup district of Assam, India, Proc. National Research Seminar on Herbal conservation, cultivation, Marketing and Utilization with special emphasis of chhattisgarh, the Herbal State held at Raipur organised by SHRITI Herbal Academy and Research Institute, Raipur for December 13th and 14th (2001).
16. D.K. Sharma and R. Devi, Effect of methanol extract and fresh juice of Clerodenfdron colebrookianum leaves on serum and liver transminase activity of rats. *Proceeding of Assam Science Society.* (2000) (Journal published in 2001).

9. WORKSHOP ATTENDED:

1. Dr. (Mrs.) Dipali Devi attended the workshop on sericulture for development of rural economy sponsored by Ministry of Rural development, Govt. of India held at Guwahati on 16th to 18th May, 2001.

2. Dr. (Mrs.) Dipali Devi attended the workshop on "Development of Muga and Eri silk Industry" sponsored by United Nations Development Program, organized by Shanti Sadhana Ashram, Guwahati-28 in collaboration with Central Silk Board, Govt. of India and the Department of Sericulture, Govt. of Assam on 20th to 23rd November, 2001.

3. Dr. J. Kotoky, Asstt. Professor, participated and presented a project in a workshop on "Prospective Principal Investigators on Himalayan Eco-development Programme", held at Itanagar from 21-23rd February, 2002, organised by Arunachal University and sponsored by the G.B. Pant Institute of Himalayan Environment Development.

4. T.D.Goswami, Asstt. Librarian attended the workshop "Use of Audio Visual Materials for Libraries And Information Services and their Promotion" organised by Indian Association of Special Libraries and Information Centre (IASLIC) in collaboration with Technical Teachers Training Institute (TTTI), Kolkata held during September 18-22,2001.

5. Training Programme Attended: T.D. Goswami, Asst. Librarian attended the Regional Training Programme on Library Automation using SOUL, organised by Information and Library Network Centre(INFLIBNET), Ahmedabad at the Deptt. of Library and Information Science, Gauhati University, held during Novmber 19-22,2001.

6. Mrs. L.B. Mahanta, Asstt. Professor and Ms. Aparna Dutta, Asstt. Professor attended a workshop on "Spring School on Soft Computing, Data Mining and Image Processing", from March 12-16, 2001 sponsored by Machine Intelligence Unit, ISI, Kolkata at the Department of Physics, Gauhati University.

7. Mrs. L.B. Mahanta , Asstt. Professor and Ms. Aparna Dutta, Asstt. Professor attended the International workshop on "Technology Developments in Indian Language", from March 26-30, 2001 sponsored by CVPR Unit at ISI Kolkata.

8. Ms. Aparna Dutta , Asstt. Professor attended the first National Workshop on "Soft Computing and Intelligence Systems", from September 13-15 sponsored by Machine Intelligence Unit ISI Kolkata, at Tezpur University.

10. PH. D./ FELLOWSHIP/AWARDS.

(i) Basanta Kr. Sarma was awarded Ph.D. degree for his thesis "Study of Chaotic Phenomena in Ion-Beam Plasma System" by the Gauhati University under the guidance of Prof. Joyanti Chutia, on 22/9/2001.

(ii) Jyanjyoti Sarma was awarded Ph.D. for his thesis "Some studies on Nonlinear wave propagation is Plasma" in December, 2001 under the supervision of Prof. G.C. Das.

(iii) Ratul Saikia was awarded Ph.D. degree for his thesis "Studies on Colletotrichum falcatum, Went, the incitant of red-rot of Sugarcane with Special reference to bio-control" by the Gauhati University under the guidance of Dr. P. Azad on 12/10/2001.

(iv) Dibyajyoti Barua was awarded PSSI Fellowship for thee months with effect from 1st September, 2001.

(v) Arup Ratan Pal was awarded PSSI fellowship for thee months with effect from 15th September, 2001.

11. DISTINGUISHED VISITORS

Dr. Sukumar Maiti, Retd. Professor, Material Science Centre, IIT, Kharagpur visited IASST on April 11, 2001. Professor Maiti is a well known polymer scientist of India and is the Editor of International Polymer Journal, J. Polymer Materials. He delivered a talk on "Self reliance in S&T in India Perspective". The subject matter is self explanatory. He stressed on the point on generating funds by research organisation. The scientists should have their own vision regarding the research problem before venturing into field. The research scholar should be in a position to pin point the research problem before counting on the help of his guide.

Professor Sir Arnold Wolfendale, FRS and lady Wolfendale visited the Institute on 20th January, 2002. Professor Wolfendale is presently an Emeritus Professor of Physics, University of Durham and a Professor of Experimental Physics of great Britain. He has mostly devoted his research activities in the field of cosmic rays for five decades now. His work in this field enabled him to discover various new properties of cosmic radiation. He was taken around our laboratories and then gave a talk on " The Role of Research Institutes".

He talked about (1) Purpose of research (2) European Physical Society (3) Interaction between research institute and university and (4) Interaction between research institute and funding agencies both Public and Private.

Elaborating the 1st point he dwelt in length regarding production of trained manpower, stimulation of the young scientists, enhancement of national prestige, contribution to knowledge and providing skills to enable technology imported to be utilised.

Regarding the activities of European Physical Society he discussed about the Malvern Seminar held in 1999, its recommendations, funding, teaching and presentation of papers, application of nuclear energy and brain drain. Regarding brain drain, he suggested adequate compensation to the country for bearing the burden of expenditure for training the persons.

Regarding the interaction between research institutes and universities he stressed on the continuity of research from institute to university and vice versa, rapid response from both sides during the solution of the problem and working together for local needs.

Prof. K.P. Gopinathan, Eminent Scientist and one of the pioneer molecular biologists of Indian Institute of Science, Bangalore visited the IASST, Khanapara on 13th February 2002. He delivered two lectures. The first lecture was on "**Application of Biotechnology in general and specially to the field of Sericulture in India**". He put emphasis on development of Muga and Eri of the N E region through biotechnology. His second lecture was on core molecular biology "**Silkworm as a molecular model system" (Bomby mori)**. Prof. Gopinathan told that lots of works are yet to be carried out on the indigenous Muga and Eri silkworms and the scientists of the N E region centering the IASST should take up the research programme for development of silk industry in Assam. He emphasized on developing the IASST into a standard level to meet the national aspiration of the scientific community of Assam. He expressed happiness on the performance of researchers of the institute and assured of extending all possible help and co-operation for strengthening the silkworm division of the IASST.

Prof. A.K. Varma, School of Life Sciences, Jawaharlal Nehru University, New Delhi delivered lecture on the topic **"Biotechnological Application of Piriformospora indica-I"** in the workshop **"Microbial Biodiversity Prospecting for PGPRs of NE Region for sustainable Agriculture"** held at the IASST during October 13-19, 2001.

Prof. G.D. Sharma, Vice-chancellor, Nagaland University delivered talk on the topic **"Application of Mycorrhiza in the increase of crop productivity in NE region"** in the workshop on**" Microbial Biodiversity Prospecting for PGPRs of NE Region for sustainable Agriculture"** held at the IASST during October 13-19, 2001.

Prof. A.K. Dubey, Netaji Subhash Institute of Technology, New Delhi delivered a lecture on the topics **"Purification and characterization of Hepatitis C protein in enveloped protein" and "Structural and functional analysis of Cytocin DNA Methyl Transferase in MSPI and IV ST"** in the workshop on **"Microbial Biodiversity Prospecting for PGPRs of NE Region for sustainable Agriculture"** held at the IASST during October 13-19, 2001.

Dr. Nutan Kaushik, Principal Scientist, Tata Energy Research Institute, New Delhi, delivered a lecture **"Methods & infrastructure necessary for studying biodiversity & bioprospecting of medicinal plants"** on April 21, 2001.

Professor Santikam Hazarika, Director, Assam Institute of Management visited the IASST on March 26, 2002. He met the faculty members of the IASST and discussed with them about the scientific achievements of the IASST, divisionwise. He also discussed with them their future plan regarding research and development. Later Professor Hazarika submitted the vision document of the IASST.

Dr. Mahendra N.D. Goswami, 53 Rue De L' Amiral Mouchez, 75013, Paris, France visited the laboratories of the IASST on March 8, 2002. He

has been doing research on biochemistry, nutrition and cancer. He discussed about food habit and its relation with cancer. He stressed on nutritious food as a preventive method.

Dr. Jagadish Goswami, Chemist 16, Capital Court Wood Chemistry, New City, New York 10956, USA visited the IASST on March 8th, 2002. He explained the method of transforming soft wood into hard timber by treatment of phenol derivative, sulphur and S_xCl_x. The wood can be seasoned by the interaction of wood cellulose with phenol derivatives.

Sri Pradyut Bordoloi, Hon'ble Minister of State for Science Technology and Environment, Govt. of Assam visited the site of new construction of the IASST, at Paschim Boragaon, Guwahati and gave various suggestions for making the IASST a Centre of Excellence for research and development. He suggested the plantation of trees around the campus. The plantation has already been started.

Other visitors are Prof. Rabindra Nath Pal, Saha Institute of Nuclear Physics, Kolkata, Prof. D.K. Choudhury, Gauahati University, Prof. Paramananda Mahanta, Dibrugarh University, Prof. R.K. Roychoudhury, Indian Statistical Institute, Kolkota,Prof. G. Baruah, IIT, Guwahati. Dr. B.D. Acharya, Head, ESS Division, DST, GoI, Dr. Praveer Asthana, SERC Division, DST, GoI, Dr. Nirmal Chaudhury, Ex. V.C., G.U. , Prof. J. Medhi, Emeritus Professor, G.U., Prof. B.V.Rao, India Statistical Institute, Kolkata, Dr. K.C. Baruah, Director, Forensic Science Lab. Shillong , Dr. Deepak Chakravorty , Retd Prof. IIT, Bombay, Dr.Pranahari Talukdar, Gauhati University, Dr. Prabitra Sarma, Retd. Professor, Gauhati University.

12. ON GOING PROJECTS:

1. **Development of Plasma Physics Division, IASST, sponsored by the Department of Science & Technology, Govt. of India.**

Total assistance Rs. 77,02,128.00 (Rs Seventy seven lakh, two thousand one hundred eighty two) only.
Period: From 1st May 1997 to 31st October, 2002

Research group:

(i) Prof. Joyanti Chutia, Principal Investigator
(ii) Prof. G.C. Das Co-Investigator
(iii) Dr. H. Bailung, Co-Investigator
(iv) Ms. Barnali Singha, SRF.
(v) Dibyajyoti Barua, JRF.
(vi) Arup Ratan Pal, JRF.
(vii) Ms. Putul Kalita, JRF.

2. **"Developing Isozyme Marker for Different stock of Eri Silkworm" sponsored by the Department of Biotechnology, Govt. of India.**

Total assistance Rs. 7,33,000.00 (Rs Seven lakh, thirty three thousand) only.
Period: From 1st January, 1998 to 30th November, 2001

Research group:

(i) Dr. Dipali Devi, Principal Investigator
(ii) Dr. D.K. Sharma, Co-investigator
(iii) Joyanta Deka, JRF.
(iv) Dilip Talukdar, Field Assistant.

3. **"Low Frequency Wave in Magnetised partially ionized Plasma" (Application to Heliopause & Interplanetary space Plasmas)**

Total assistance Rs. 6,60,000.00 (Rs Six lakh sixty thousand) only.
Period: From 5th July 1999 to 31st December, 2001.

Research group:

(i) Prof. G.C. Das, principal Investigaror.
(ii) Prof. C. Uberoi, Co-Investigator
(iii) Shuvam Sen, RA.
(iv) Mrs. Ajanta Dutta, RA.

4. **"Entry of Polycyclic aromatic hydrocarbons into from oil field effluents and their natural degradation" sponsored by DST, Govt. of India under young scientist scheme.**

Total assistance Rs. 2,22,000.00 (Rs Two lakh twenty two thousand) only.
Period: From Oct. 2002 to 30th September, 2002.

Research group:

Dr. Arundhuti Devi, Principal Investigator.

5. **Silk Industry in Sualkoshi Cluster, sponsored by Techno-Economic Development Finance Corporation, G.S. Rd, Guwahati.**

Total assistance Rs. 1,37,000.00 (Rs One lakh thirty seven thousand) only.
Period: From 1st Jan. 2002 to 30th Sept. 2002.

Research group:
Prof. Prabin Baishya, Principal Investigator.

6. **Upgrading the IASST.**

Total assistance Rs. 9,55,00,000.00 (Rs Nine crores fifty five lakh) only.
Period: From 9th April 1999 to 31st March, 2004.
Transaction: Through Director, IASST.

7. **Employment Generation Training Scheme (EGTS) for North East and SC/ST/OBC's.**

Total assistance Rs. 15,00,000.00 (Rs Fifteen lakh only).
Period: From 1st April, 2001 to 31st March, 2006.

Investigation group:

Anupam Barman, Principal Investigator.

8. **"Utilization of lime sludge waste of Jagiroad paper mill for fish culture, sponsored by ICAR, New Delhi.**

Total assistance Rs. 9,34,144.00 (Rs Nine lakh, thirty four thousand one hundred forty four) only.
Period: From 13th July, 2001 to 12th July, 2004.

Research group:

(i) Dr. S. Deka ,Principal Investigator.
(i) Dr(Mrs.) A. Devi, Co-P.I.
(ii) Sasanka Deka, JRF
(iii) Ms. Shabeena Yasmin, JRF.

9. **I-STEP project funded by Govt. of India under the Principal Investigator, Prof. G.C. Das completed on December, 2001.**

13. OTHER SCIENTIFIC ACTIVITIES:

1. Prof.. Joyanti Chutia conducted the Ph. D. viva voce examination of Mr. Dipak Kr. Gupta, FCIPT, Institute for Plasma research under Gujrat University June, 21, 2001.
2. Prof. Joyanti Chutia chaired the last technical session of the 16th National Symposium on Plasma Science and Technology, Plasma 2001.
3. Prof. Niren Deka became the Member of the Scientific Advisory Committee of the Institute of Bioresources & Sustainable Development, Department of Biotechnology, Government of India.
4. Prof. Niren Deka became a member of the Society for Biological Chemists, India.
5. Prof. Niren Deka became a Member of the Committee on The post-graduate courses and studies in Biotechnology, Dept. of Biotechnology, Gauhati University.
6. Prof. Niren Deka became a Member of the Sigma Xi, USA
7. Dr. P.Azad, Associate Professor, Biofertilizer Unit of Life Sciences Division visited Prof. A.K.Varma and his laboratory at School of Life Sciences, JNU for 10 days with effect from 25th August to 3rd September, 2001, with a view to studying the prospect of collaborative study of Molecular taxonomy of microbes and its application in NE Region of India, which Prof.Varma agreed.
8. Dr. J. Kotoky visited Laboratories of Dr. Nutan Kaushik, Tata Energy Research Institute, New Delhi, on 18th December, 2001, for discussion on collaboration in research.
9. Dr. J. Kotoky visited Laboratories of Dr. S .K. Khanna, Senior Grade Deputy Director, Industrial Toxicological Research Center, Lucknow on 20th December, 2001, for discussion on collaboration in research.
10. Dr. J. Kotoky visited Laboratories of Dr. Rakesh Tuli, Sr. Deputy Director of National Botanical Research Institute, on 21st December 2001, for discussion on higher training in cryo-preservation.
11. Dr. J. Kotoky participated and presented a research paper in "National Research Seminar on Herbal conservation, Cultivation, Marketing and utilization with special emphasis on Chhattishgarh, the Herbal State" held at Raipur organize by SHRITI Herbal Acad-

emy and Research Institute, Raipur from December 13 to 14, 2001.

12. Professor N.N. Dass, Director, IASST an ex-Cottonian and ex-Lecturer of Cotton College was felicitated on 20.01.2002 by cotton college centenary celebration committee in HBR Hall, cotton college. Later he inaugurated the Industrial Science Exhibition held in and around the Arts building and Physics building of Cotton College.
13. The morphotype and isozyme analysis of Philosamia ricini done by Dr. Dipali Devi appeared in the annual report of Department of Biotechnology, Govt. of India.
14. The fundings of the project 'Development isozyme variation for different stocks of Eri silkworm of N.E. region' are reported in the annual report 2001-2002 (p. 51) of the Department of Biotechnology, GoI, New Delhi.
15. Dr. A. Baruah delivered a talk on " Microbial enhanced oil recovery" held on May15, 2001 at Molecular Biology and Biotechnology Division of Tezpur University.
16. Dr. A. Baruah delivered a talk on " Petroleum biotechnology and environment" held on May 16 2001 at Molecular Biology and Biotechnology Division of Tezpur University.
17. Dr. A. Baruah delivered a talk on "The next steps in bioremediation in coal mine area of upper Assam" held on December 30-31, 2001 at Digboi in the seminar on 'Environmental protection, sustainable development and pollution created by public sector enterprises of Coal, Oil and Paper of Assam'.
18. Dr. S. Deka delivered a talk on "Impact of coal mining activities on environment and management of mine spoils' held on December 30-31, 2001 at Digboi in the seminar on 'Environmental protection, sustainable development and pollution created by public sector enterprises of Coal, Oil and Paper of Assam'.
19. Dr. Heremba Bailung delivered an invited talk on 'Ion Acoustic wave in Dusty Plasma' in Plasma 2001, national conference.
20. Dr. J. Kotoky participated and presented a research paper in 'Brainstorming Session on Biodiversity and Bioprospecting studies on Herbal, Medicinal and Horticultural Plants of North Eastern Region of India', sponsored by the Department of Biotechnology, Govt. of India and held at the IASST on April 21, 2001.
21. Prof. Niren Deka delivered the key-note address in the 'Brainstorming Session on Biodiversity and Bioprospecting studies on Herbal, Medicinal and Horticultural Plants of North Eastern Region of India', sponsored by the Department of Biotechnology, Govt. of India and held at the IASST on April 21, 2001.
22. Dr. B.C.Tripathy became the Editorial Board Member of the periodical "Far East Journal of Mathematical Sciences".
23. Ms. Bornali Singha, SRF, gave a talk on 'Wave-field Measurement in CCRF Discharge Plasma' in her oral presentation in Plasma -2001.
24. Dibyajyoti Barua, JRF, gave a talk on 'Study of Corrosion Resistant coatings on copper based Metal Surface by Plasma Polymerization' in Plasma-2001.
25. Arup Ratan Pal, JRF, gave a talk on 'Investigations of the properties of space-charge modes in post Magnetron discharge' in Plasma –2001.
26. Dr. Dipali Devi visited laboratories of Prof. K.P. Gopinathan Indian Institute of Science, Bangalore July 2001. She discussed the problem of muga silkwoman and formulated of project proposal under the gaidence of Prof. Gopinathan.

14. EQUIPMENT /INSTRUMENT, AVAILABLE AT THE IASST:

Name of Equipment	Make & Model	Funding Agency
1. Phase contrast Microscope	Leica Leitz biomed	DBT, Govt. of India
2. U.V. Spectro photometer Japan, UV- 1601	Shimadzu corporation	Institute Fund
3. Atomic Absorption Spectrophotometer	Shimadzu – 850	Institute Fund
4. GLC	CHEMITO,8510	Institute Fund
5. HPLC	Waters, 600E	Institute Fund
6. Microwave digester	Prolabo, Ethas 900	Institute Fund
7. FTIR	Bruker, Veetar 22	Institute Fund
8. Electrophoresis Gel Documentation	Pharmacia Biotech	Institute Fund
9. Cold centrifuge	Sorvall Rc 26 plus	Institute Fund
10. Deep Freeze (quickfreezer)	Remi, UDF-165	Institute Fund
11. Auto analyser	Merck, Microlab 100	Institute Fund
12. M300 Monochromator Model: M300	Bentham, UK	DST Project , GoI
13. RF & D.C. Sputtering Unit Model: MSPT 12"	Hind High Vacuum, India	Upgrading, DST, GoI
14. LECROY Lectroy, USA Model: LT264.	LT 264 DSO	DST, Project, GoI.

The CSD has altogether 25 computer with present market value about three lakhs. The computers are Intel 486 (one) Pentium 233 MH_z (Five), Intel 466 MHz (Five), Intel P-III (four), Intel P-IV (One), Intel 500 MHz (nine).

15. SYMPOSIUM/ SEMINAR ORGANIZED BY IASST:

1. Brain-storming Session on "Biodiversity and bioprospecting of medicinal and horticultural plant of North Eastern region of India"

A comprehensive list of medicinal plants endemic to the northeastern region is still lacking. Recently on April 21, 2001 a brain storming national level symposium sponsored by the Dept. of Biotechnology, Govt. of India on 'Biodiversity and bioprospecting of medicinal and horticultural plant of North Eastern region of India' was convened by Prof. Niren Deka, Head, Life Sciences Division, IASST at the IASST. Experts from Tata Energy Research Institute (TERI), New Delhi, M.S. Swaminathan Research Foundation (MSSRF), Chennai, The universities of Gauhati, Tezpur, and the Regional Research Laboratory, Jorhat participated in this symposium.

Recommendation:

It is jointly recommended that a comprehensive list of medicinal plants from the northeastern region is to be prepared. The experts suggested a comprehensive work plan to identify active principles/ compounds and to formulate herbal medicines from medicinal plants involving the IASST as the nodal center.

Follow up action:

The IASST has initiated collaboration with TERI, N. Deka and MSSRF, Chennai on the proposed topics of research in the areas of Biiodiversity and Bioprospecting of N.E. Region.

2. Meeting on "Industrial Application of Herbal Plants available in the Northeastern India"

Northeastern region of India is one of the hotspot areas in the world in terms of its biodiversity. But very little work has been done on industrial application of bioresources especially medicinal and herbal plants from this region. Keeping this in view, the IASST organized a meeting on Industrial application of herbal plants available in the Northeastern India on 5th January 2002. Experts in this field such as Prof. Padmeswar Gogoi, D.R. College, Golaghat, Dr. M. Ahmed, NEDFi, Dr. R. Majumdar, RRI, CCRAS, Guwahati, Dr. J. Kotoky, IASST, Dr. P.J. Handique, Guwahati University and Professor N. Deka, IASST attended the meeting which was chaired by Prof. K.M. Pathak, Chairman, IASST council.

Recommendation:

The speakers opined that R&D works on plants are to be herbal data based and a museum is to be established in the IASST. Importance was placed on establishment of a quality control and standardization facility for herbal products at the IASST.

Follow up action:

The IASST has already applied to the Govt. of India through Govt. of Assam for assistance for

tting up a medicinal plant garden in the new ASST Complex at Paschim Boragaon, uwahati-33.

3. Workshop on **" Microbial Biodiversity Prosecting for PGPRs of NE Region for sustainable griculture"**

A five day National Workshop on **"Microbial odiversity Prospecting for PGPRs of NE Reon for sustainable Agriculture"** sponsored by e Department of Biotechnology, Govt. of India d Assam Science Technology & Environment ouncil, Govt. of Assam was organized by the ofertilizer Unit of Life Sciences Division, IASST, uwahati during October 15-19, 2001. The workop was convened by Dr. P. Azad, Associate Prossor, Biofertilizer Unit of the Life Sciences divion.

Nine reputed scientists of the country, working biodiversity of PGPRs and their application for stainable agriculture participated at the workshop resource personnel and twenty four trainee participants from different central and State Institutes/ niversities/colleges of NE region attended the orkshop. They represented Arunachal Pradesh, anipur, Nagaland and Assam.

ecommendation:

At the end of the workshop the resource persons commended for establishment of a special centre Molecular Systematic and Taxonomy of Soil icroorganisma with special emphasis on root asciated phytopromotional Bacateria (PGPRs) and ngi. The center may be established at the IASST, uwahati. This special centre will seek the technical support from the active scientists from the North Eastern Region, other parts of India and Internationally established microbiology Institute and Universities.

Follow up action: Preparation of a project proposal on the above recommendation involving Prof. A.K. Varma of JNU and Prof. G.D. Sarma, V.C. Nagaland University has already taken up to submit the same to DBT, Govt. of India, New Delhi.

Internal Seminar organized:

The IASST has been organising seminar internally for last few years. Dr. Suresh Deka is the organising secretary. Five such seminars were organized during (2001-2002).

1. Dr. Sukumar Maiti, Rtd. Professor, IIT, Kharagpur delivered a talk on "Self reliance in S&T in Indian perspective" held on April 11, 2001
2. Dr. A. Baruah, Assistant Professor Resource Management & Environment Division, IASST, delivered a talk on "Resource and Environmental management, North East and IASST" held on April 18, 2001.
3. Dr. Arun Sarma, Research Associate, Plasma Physica Division, IASST delivered a talk on " Dusty Plasma from layman to Plasma Physicist" held on July 20,2001.
4. A. Barman, Assistant Professor Computer Science Division delivered a talk on " Developing interactive data bases for the lan and internet" held on December 21,2001.
5. Dr. K.M. Pathak, Ex. V.C. Tezpur University delivered talk on " Cosmic Radiation" held on March 22,2002.

16. CONSTRUCTION OF IASST CAMPUS:

The infra-structure development of the IASST at allotted 60(sixty) bighas of land at Paschim Boragaon, Guwahati-33 on financial assistance from the department of Science and Technology, Govt. of India, under the scheme "**Upgrading the IASST**" with the sanctioned amount of Rs. 650 lakh in building components was undertaken by the IASST with the establishment of the Engineering Cell and constitution of the Building Works Committee consisting of members from DST, Govt. of Assam, CPWD, APWD, finance department, prominent technical members and Ex-officio members of the IASST. The tender sub-committee was constituted by the BWC.

The project site has been located in a very low-lying area and on the fringe of Deeper Beel, a vast stretch of water body on the southern periphery of grater Guwahati City.

The approach road of about 350 Mtr needed to be built to launch the project on the ground. The plot of land was divided into two sectors; 40 bighas of land for Academic Cum Administrative Complex with residential and other facilities and 20 bighas earmarked for ecological park for Bio-techno and allied research projects. After deciding the methodology of project implementation, the bidding process, allotments of jobs for approach road, boundary walls, earthwork filling were completed between November/99 to January/2000 and all works started almost simultaneously and mostly completed within 2000-2001. The Academic cum Administrative building, Research scholar hostel, Deep Tube well, Overhead Reservoir were taken up simultaneously during 2001-2002 and overall progress is about 70% and is well within the scheduled time for building and other components of project construction. The building projects with its internal and external services are expected to be completed by the year 2004.

17. COUNCIL OF THE INSTITUTE OF ADVANCED STUDY IN SCIENCE & TECHNOLOGY (2001-2002):

1. Prof. K.M. Pathak,
   Chairman, Council of IASST,
   Guwahati 781 022.

2. Prof. N.N. Dass,
   Director, IASST, Guwahati 781 022.

3. Prof. Asis Datta,
   Vice-chancellor,
   Jawaharlal Nehru University,
   New Delhi 110 067.

4. Dr. R.C. Srivastava,
   Ministry of Sci. & Tech.,
   DST, Govt. of India, Technology Bhavan,
   New Mehrauli Road, New Delhi-110 016.

5. Ms. T.Y. Das,
   Commissioner & Secretary
   to the Govt. of Assam,
   Deptt. of Science, Technology and Evironment,
   Dispur, Guwahati 781 006.

6. Prof. P. Sen .
   Saha Institute of Nuclear Physics,
   1/AF, Bidhan Nagar, Kolkata 700 064.

7. Prof. Paramananda Mahanta,
   Physics Department,
   Dibrugarh University, Dibrugarh 786 004.

8. Prof. H.C. Pant,
   Head, Laser Plasma Division,
   Centre for Advanced Technology,
   Indore 452 013.

9. Dr. G. Barua,
   Prof. & Head, C.S.E., IIT Guwahati,
   North Guwahati, Guwahati 781 039.

10. Dr. P.C. Deka,
    Dean, Faculty of Agriculture,
    Assam Agricultural University,
    Jorhat 785 013

11. Prof. Kulendu Pathak,
    Vice-chancellor,
    Dibrugarh University, Dibrugarh 786 004.

12. Prof. B.C. Kalita,
    Deptt. of Mathematics,
    Gauhati University, Guwahati 781 014.

13. Dr. Anup Kr. Talukdar,
    General Secretary,
    Assam Science Society,
    Latasil, Guwahati 781 001.

14. The Director,
    Regional Research Laboratory,
    Jorhat 785 006.

15. The Director,
    Assam Science, Technology
    & Environment Council, Govt. of Assam,
    City Co-operative Bank Building,
    3rd Floor, U.N. Bezbaruah Road,
    Silpukhuri, Guwahati 781 003.

16. Sri J.K. Borooah,
    Baruanagar Tea Estates Pvt. Ltd.,
    Maniram Dewan Road,
    Chandmari, Guwahati 781 003.

17. Prof. G.C. Das,
    Head, Mathematical Sciences Division,
    IASST, Khanapara, Guwahati 781 022.

18. Dr. (Ms.) Joyanti Chutia,
    Professor and Head,
    Material Sciences Division,
    IASST, Khanapara, Guwahati 781 022.

19. Dr. M.K. Kalita,
    Registrar, IASST, Khanapara,
    Guwahati 781 022.

Project Division wise summary of Receipt and payment Account of the Institute for the year ended 31st March, 2002(2001-2002)

Head of Account	Opening balance as on 1st April,2001	Receipt during the year 2001-02	Total Amount	Payment during the year 2001-02	Closing balance Ma
lopment of Plasma Physics Division	1,21,377.90	10,00,000.00	11,21,377.90	4,84,177.00	6,
al Medicine	(-)38,088.50	21,250.00	(-) 16,838.50	———	(-)
lopment of Isozyme Marker ifferent stock of Eri silkworm	6,235.00	1,25,000.00	1,31,235.00	1,31,235.00	
on the performance of students of niversities in N.E. region in ted National eligibility Test.	(-) 2,51,604.00	3,00,000.00	48,396.00	2,26,336.00	(-)1,
frequency waves in magnetised lly ionized plasma project.	1,00,518.00	99,000.00	1,99,518.00	2,00,054.00	
ading the IASST	(-) 17,88,609.00	1,50,00,000.00	1,32,11,391.00	1,75,35,905.00	(-)43,
of polycyclic aromatic hydrocarbons he soil from oil field effluent and their al degradation.	1,16,312.00		1,16,312.00	1,41,220.00	(-)
ral Management	(-) 74,16,796.48	40,00,000.00	(-)34,16,796.48	48,73,059.00	(-) 82,
ation & Library	(-) 44.00	5,00,000.00	4,99,956.00	5,00,613.00	
T General Fund	94,30,013.49	21,16,954.32	1,15,46,967.81	6,60,132.00	1,08,
& Building	11,23,356.00		11,23,356.00		11,
Level Employment Generated Training me(EGTS) for North East.	9,57,958.77		9,57,958.77	9,56,482.77	
sation of Lime Sluge waste of oad paper mill (Morigaon) for culture.		4,22,700.00	4,22,700.00	2,39,862.00	1,
.R.		75,248.00	75,248.00	75,248.00	
storming session on versity & Bioprospecting cinal & horticultural Plant e N.E. Region of India (Seminar)	——-	32,935.00	32,935.00	45,959.00	(-)
obial biodiversity prospecting GPRs of NE Region for sustainable ulture (Seminar)	——-	77,000.00	77,000.00	1,06,795.00	(-)
es on some Batch Arrival Queuing ls with vacation.		1,08,500.00	1,08,500.00		1,
ndustry		68,500.00	68,500.00	4,667.00	
	14,02,670.41	2,49,05,046.09	2,63,07,716.50	2,62,11,594.77	
rve fund	7,06,00.00	4,48,800.00	11,54,800.00		11,
d total	21,08,670.41	2,53,53,846.09	2,74,62,516.50	2,62,11,594.77	12,