Biotech Live

Biotech Hub Newsletter

(April, 2018 - May, 2019)

Jawaharlal Nehru College, Boko

Fourth Edition

In this Newsletter:

Editorial Board:

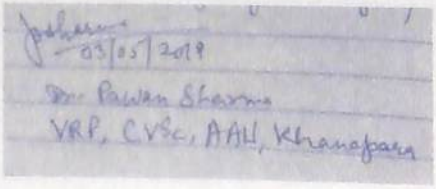
- *Dr. Nripen Goswami, Principal & Chairman, J.N.C, Boko*
- *Dr. Tapan Dutta, Co-ordinator, Biotech Hub, J.N.C, Boko*
- *Dr. Susanta Kumar Bhuyan, Co-coordinator, Biotech Hub, J.N.C, Boko*
- *Jayashree Goswami, SRF, Biotech Hub, J.N.C, Boko*

From the Desk of an eminent personality associated with Biotech Hubs

"Excellent college, serving under-privileged communities/tribal communities in a very commendable way. Inspiring leadership at the top (Principal), dedicated and committed staff and enthusiasm of students make this college and island of excellence in a remote region. Biotech Hub plays critical role in strengthening the high end biotechnology education. Very well done. Best wishes for greater glory in the future."

*(*as written by him in the college Biotech Hub visitor's book)*

Signature



Workshops/ Training/ Seminar/ Outreach/ Popular Talk/ Invited Lecture Programmes:

Since 8th April, 2018 till Mid May, 2019, the Biotech Hub of the college has so far organised **Three training programmes, One seminar cum Awareness Programme, One Awareness Programme, One outreach programme, One workshop, Three Popular Talks** and **One Field Visit**. The Biotech Hub also sponsored **research scholars** for attending **Two Invited Talks, One Workshop, One Training Programme** organized at other Institutions/organizations and **Two Lab Visits** to different laboratories. The **research scholars** were also sponsored and encouraged for **Paper Presentations** at various National/International seminars. The research scholars of the hub presented **Six** such papers at various National/International seminars. Along-with that the Biotech Hub of the college also arranged **Two Student Exchange programmes** to encourage knowledge sharing. Also the Coordinator of the Adv. Biotech Hub of this college attended **One Coordinators' Meet.** The Adv. Biotech Hub also organized programmes to celebrate **World Environment Day and National Science Day** in order to promote awareness for environment related issues and scientific thinking. The Hub also successfully organized a **National Seminar** in the college during this period and will soon be organizing a **Workshop** on **"Preparation for entry to the Services"** from 27th May, to 2nd June, 2019.

List of Trainings & Student Exchange Programmes conducted:

1) **Five-day long** Summer Hands-on-Training Programme:
   Date: 25th June – 29th June, 2018
   Topic: "Karyotyping and Basic Instrumentation"
   Resource Persons: Dr. Bhaben Tanti, Professor in Molecular Biology, Dept. of Botany, Gauhati University, Guwahati, & **Dr. Aniruddh Sarma**, Assistant Professor, Dept. of Biotechnology, Pandu College, Guwahati.

Miscellaneous I:

- **Research activities undertaken by the Biotech Hub this year:**
  - Antioxidant and antimicrobial properties of five edible species of Araceae family (completed)
  - Phytochemical and pharmacological investigation of two ethnomedicinal plants used in diabetes and traditional bone setting practice by Rabha Tribes (completed)
  - Nutraceutical Evaluation of some ethnomedicinal plants available in Rabha Hasong Autonomous Council Area (completed)

- **On the progress:**
  Two books – A lab guide book & A detailed collection of the flora life around the college - by the Hub members

- **Coordinators meet:**
  Date: 13th October, 2018
  Organised by: The Biotech Hub, B. P. Chaliha College, Nagarbera, to discuss various issues related to biotech hub.
  Attended by: Dr. Tapan Dutta, Coordinator of this Hub

- **Paper published by Hub members**
  Title: "Traditional Bone Setting Practice of Rabha People of Assam"
  Journal: *Asian Journal of Pharmaceutical and Clinical Research*, Vol 12, Issue 1, 2019; Pp 81-83
  Authors: Tapan Dutta, Pinaki Kumar Rabha, Rekha Bora, Jayashree Goswami, Seema Khakhalary

- **Total number of activities since its inception = 91**
  i. Workshops: 14
  ii. Field/Lab visits: 6
  iii. Seminars: 7
  iv. Trainings: 14
  v. Awareness programmes: 5
  vi. Popular Talks: 10
  vii. Outreach programmes: 11
  viii. Research scholar/ Faculty benefit programmes: 13
  ix. Others: 12

Participated by: UG 3rd sem major students of botany and zoology.

2) **Six-day long** Hands-on-training:
Date: 1st to 6th October, 2018
Topic: "Basic Microbiological Techniques"
Resource Person: Dr. Prabodh Borah, Professor in Molecular Biology, CVSc, Khanapara and Coordinator, Advanced State Level Biotech Hub, Assam, **Mr. Debasish Borborah,** Asst Professor in Biotechnology Department, Gauhati University, and **Dr. Jintu Rabha,** Asst Professor in Microbiology Department, Gauhati University
Participated by: All Major 3rd and 5th semester students of Botany department
In collaboration: Dpt. of Botany, J. N. College, Boko.

3) **Five-day long** Hands-on-training programme cum Student Exchange Programme:
Date: 19th - 23rd February 2019
Topic: "Basic Bioinformatics"
Resource Person: Dr. Pranjan Barman, Assistant Professor, Department of Biotechnology, Gauhati University, **Dr. Nabajyoti Goswami,** Research Associate, BIF, College of Veterinary Science, Khanapara, Ghy-22 & **Dr. Manisha Chowdhury,** Research Associate, Bioinformatics Facility (BIF), Gauhati University, Ghy-14
Participated by: 6th sem Major students of the host college and Dudhnoi College, Dudhnoi.

4) **One-day** Student Exchange Programme:
Date: 10th October, 2018

Miscellaneous II:

Papers presented by the support of Biotech Hub:

i. Presented paper (oral) at the "Annual General Meeting of Botanical Society of Assam (BSA) & National Seminar on Exploration and Utilisation of bio-resources of NE India", held at Rangia College, organized by Botanical Society of Assam (BSA), on 28th to 29th October, 2018
Topic: "Ethnomedicinal uses of some plants in treatment of Jaundice by the Garo people residing in Rabha Hasong Autonomous Council Area"
Presented by: Seema Khakhalary, JRF

ii. Presented paper (oral) at the "Assam Botany Congress (ABC-01) and International Conference on Plant Science" organised by Botanical Society of Assam, Department of Botany, Gauhati University, Department of Botany, Cotton University, on 4th to 6th February, 2019
Topic: " Investigation on Anti-diabetic plants used by the Garo tribe of Assam"
Presented by: Dr. Rekha Bora, Research Associate

iii. Presented paper (oral) at the "Assam Botany Congress (ABC-01) and International Conference on Plant Science" organised by Botanical Society of Assam, Department of Botany, Gauhati University, Department of Botany, Cotton University, on 4th to 6th February, 2019
Topic: "Ethnomedicinal uses of some plants for the treatment of Malaria by the Rabha Tribe residing in the Rabha Hashong Autonomous Council Area"
Presented by: Seema Khakhalary, JRF.

iv. Presented paper (oral) at the National Seminar held at JNC, Boko, on 3rd to 4th May, 2019, organized by Adv. Level Biotech Hub & Participating Departments under DBT Star College Scheme, J. N. College, Boko
Topic: "Comparative study of the effect of various cooking methods on the antioxidant properties of two edible aroid leaves belonging to *Xanthosoma* genus foundf in Boko area"
Presented by: Jayashree Goswami, SRF.

v. Presented paper (oral) at the National Seminar held at JNC, Boko, on 3rd to 4th May, 2019, organized by Adv. Level Biotech Hub & Participating Departments under DBT Star College Scheme, J. N. College, Boko
Topic: Qualitative Phytochemical Profiling & Evaluation of In-vitro Antioxidant activity of an ethno-medicinal plant, *Meyna spinosa.*
Presented by: Dr. Rekha Bora, RA

vi. Presented paper (oral) at the National Seminar held at JNC, Boko, on 3rd to 4th May, 2019, organized by Adv. Level Biotech Hub & Participating Departments under DBT Star College Scheme, J. N. College, Boko
Topic: "Preliminary Phytochemical Screening and Antioxidant activity of the wild edible food plant, *Zanthoxylum oxyphyllum*"

Visiting College: Bikali College, Dept. of Botany

Degree Students from Bikali College, visited the hub and the SRF briefed them about the principles, methodology, precautions etc. of all the instruments available in the hub along with demonstrations.

Seminar and Awareness Programmes conducted:

1) **One-day long** Seminar cum Awareness Programme:
   Date: 26th February, 2019
   Topic: "Awareness and Prevention of Communicable diseases"
   Resource Person: Dr. Mohitosh Benerjee, SDM & HO, Boko
   Venue: Mohila Samiti Vaban, Jarapara, a village near to college
   In collaboration: Women Cell, J. N. College, Boko
2) Spot verification & Awareness meeting:
   Date: 16th May, 2019
   Topic: "Anti-witch Hunting Campaign"
   Venue: Dogaon, Boko
   In collaboration: Assam Science Society, Boko Branch, Aryabhatta Science Centre.

Outreach programmes conducted:

1) **One-day** Outreach Programme:
   Date: 20th March, 2019
   Venue: Dudhnoi College, Dudhnoi
   Topic & Delivered by: "Genetic Engineering" by Dr. Tapan Dutta, Coordinator &
   "Plant Tissue Culture" by Jayashree Goswami, SRF
   Participated by: Degree students from Dept. of Botany and Zoology, Dudhnoi College.

Workshop Conducted:

1) **Two-day long** Workshop:
   Date: 17th to 18th August, 2018
   Topic: "Chromatography and its Application"
   Resource Person: Dr. Dibakar Deka, Professor, Dept. of Chemistry, Gauhati University
   Participated by: All Degree Major students of the college
   In collaboration: Dept. of Botany & Chemistry, J.N. College, Boko

Popular Talks Conducted:

1) **One-day long** Popular Talk:
   Date: 5th June, 2018, on the occasion of **World Environment Day**
   Topic: "Polymer – A multi-faceted material and Environment"
   Resource Person: Dr. Harekrishna Deka, Centre In-Charge, Central Institute of Plastic Engineering and Technology (CIPET), Guwahati
   Participated by: Local people in & around the college, Students, Teachers and Research Scholars of the college.
   In collaboration: Aryabhatta Science Centre, Boko Block
2) A **one-day long** Brain Storming Popular Talk session:

Date: 29th June, 2018
Topic: "Career Opportunities in Bioscience"
Resource Person: Dr. Prabodh Borah, Professor in Molecular Biology, CVSc, Khanapara & Coordinator, Advanced State Level Biotech Hub, Assam
Participated by: HS and UG level students of the college

3) A **one-day long** Popular Talk session:
Date: 13th September, 2018
Topic: "The Art of Becoming a Scientist: Journey of a Lifetime"
Resource Person: Prof. Uday Kishore, Dept of Bioscience, Brunel University, London
Participated by: All the students, teachers and research scholars of the college
In collaboration: Participating departments under DBT Star College Scheme

Field Visit conducted:

1) A **one-day long** Field Trip:
Date: 11th October, 2018
Venue: Guwahati Biotech Park Incubation Centre (IIT, Guwahati) and Horticultural Research Station, Kahikuchi
Participated by: 62 students from Botany & Zoology 1st & 3rd Sem, 2 faculty members and 1 research scholar

Research scholars training/ Workshop/ Invited Talk/ Lab visits sponsored:

1) **One-day long Invited Talk** session attended:
Date: 31st May, 2018
Organized by: Department of Biotechnology, Gauahti University, as part of the Silver jubilee year celebration of the dept.
Topics & Resource Persons: "System level understanding of host-specific immune dynamics in Fusarium disease" by **Dr. Subhra Chakraborty**, Scientist VII, NIPGR, New Delhi
And
"Defining the proteomic landscape of mitochondria: new insights into stress adaptation" by **Dr. Niranjan Chakraborty**, Scientist VII, NIPGR, New Delhi
Attended by: Dr. Tapan Dutta, Coordinator, Adv. Biotech Hub, J.N.C, Boko
And **Jayashree Goswami**, SRF, Adv. Biotech Hub, J.N.C, Boko

2) Another **One-day long "6th Prof. H.K. Baruah Memorial Lecture"** session attended:
Date: 27th August 2018
Organized by: Department of Botany, GU in collaboration with Botanical Forum, G.U. and NERIM Group of Institutions
Topic: "Understanding of Ethno-microbiology to Genomic Sequencing of Ethnic Fermented Food and Beverages"
Resource Person: Professor Jyoti Prakash Tamang, Vice Chancellor, Sikkim University
Attended by: Dr. Tapan Dutta, Coordinator, Adv. Biotech Hub, J.N.C, Boko
Dr. Rekha Bora, Research Associate, Adv. Biotech Hub, J.N.C, Boko
Jayashree Goswami, SRF, Adv. Biotech Hub, J.N.C, Boko
And **Seema Khakhalary,** JRF, Adv. Biotech Hub, J.N.C, Boko

3) **Two lab visits,** for research work purpose, were arranged:

a. To **Guwahati Biotech Park Incubation Centre (IIT, Guwahati):**
Date: 2nd November, 2018
Visited by: Dr. Rekha Bora, Research Associate, Adv. Biotech Hub, J.N.C, Boko
Jayashree Goswami, SRF, Adv. Biotech Hub, J.N.C, Boko

b. To **Regional Sericulture Research Station, CSB, Boko, Kamrup:**
Date: 2nd January 2019
Visited by: Dr. Rekha Bora, Research Associate, Adv. Biotech Hub, J.N.C, Boko
Jayashree Goswami, SRF, Adv. Biotech Hub, J.N.C, Boko
And, **Seema Khakhalary,** JRF, Adv. Biotech Hub, J.N.C, Boko

4) **10-day long training programme** attended:
Date: 28th November – 7th December, 2018
Topic: "Techniques in Genomics and Proteomics"
Organized by: State Biotech Hub (Assam), College of Veterinary Sciences, A.A.U., Khanapara, Guwahati
Participated by: Jayashree Goswami, SRF, Adv. Biotech Hub, J.N.C, Boko

5) **One-day long Author Workshop** attended:
Date: 5th April, 2019
Organized by: Springer Nature & UGC-HRDC, Gauhati University
Speaker: Aninda Bose, Senior Editor, Springer Nature India
Topics: How to choose the best journal for paper, What is the submission process, How to prepare manuscript, What peer review is and how to handle review comments, etc.

National Seminar organized:

Theme: "Science, Society and Sustainable Development (SSS – 19)"
Date: 3rd & 4th May, 2019
Organized by: ADVANCED LEVEL BIOTECH HUB, JAWAHARLAL NEHRU COLLEGE, BOKO
Participating Departments under DBT Star College Scheme, JNC, Boko
Supported by: Assam Science Technology and Environment Council (ASTEC)
Department of Science and Technology, Govt. Of Assam
In collaboration: Aaranyak
Botanical Society of Assam (BSA)
Zoological Society of Assam (ZSA)
UGC-HRDC, Gauhati University
Assam Academy of Mathematics
Sponsored by: DBT, GOVT. OF INDIA
Dignitaries: Dr. Mridul Hazarika, Vice-Chancellor, Gauhati University; Prof. B.N. Reddy, former HOD, Dept. Of Botany, Osmania University; Dr. Pawan Sarma, Former Senior Scientist, ICGEB, New Delhi; Dr. Arup Kr Misra, Director, ASTEC; Dr. Swaroop Nandan Borah, Professor, IITG; Dr. Partha Pratim Baruah, Secretary, BSA; Dr. Partha Jyoti Das, Organising Secretary, Aaranyak; Dr. Jogen Kalita, Director, UGC-HRDC; Dr. Surendra Ghaskadbi, Development Biologist, MACS-Agharkar Research Istitute, Pune; Prof. Mrigendra Mohan Goswami, President, Governing Body of this college, Dr. Nripen Goswami, Principal of this college.
Research Papers received: 110
Presented Papers: 93

Hosted by: Dr. Tapan Dutta, Organising Secretary & Jayashree Goswami, SRF, Adv. Biotech Hub of this college.

Celebration of National and International Events:

1) **World Environment Day** celebration:

Date: 5th June, 2018

Events organized: * **Popular Talk** by Dr. Harekrishna Deka, Centre In-Charge, Central Institute of Plastic Engineering and Technology (CIPET), Guwahati, on "Polymer – A multi-faceted material and Environment"

* **Inter-school concept writing competition** on "Innovative ways to beat plastic pollution" among class VIII-X.

In collaboration: Aryabhatta Science Centre, Boko Block

2) **National Science Day** celebration:

Date: 28th February, 2019

Events organized: **Speech Competition** on the Science day theme of the year 2019, i.e. "Science for the people and people for science"

In collaboration: Aryabhatta Science Centre, Kamrup District

Miscellaneous III:

Present Manpower of the Biotech Hub:

1. **Research Associate:** Dr. Rekha Bora, PhD (Ecology & Environmental Science, AU), BEd (GU)
2. **Senior Research Fellow:** Mrs. Jayashree Goswami, M.Sc. (Biotechnology, GU)
3. **Junior Research Fellow:** Miss Seema Khakhalary, M.Sc. (Botany, GU)
4. **Lab Assisstant:** Kangkan Kalita, B.A (Anthropology, J.N.C, Boko), PGDCA

Few Snapshots

Trainings & Student Exchange Programmes Conducted

❖ ***"Karyotyping and Basic Instrumentation"***

❖ *"Basic Microbiological Techniques"*

❖ *"Basic Bioinformatics" training cum student exchange programme:*

❖ ***Student exchange programme, Bikali College:***

Spot verification cum Awareness meeting:

Seminar cum Awareness Programme Conducted:

❖ *"Awareness and Prevention of Communicable diseases"*




Outreach Conducted

❖ *At Dudhnoi College, Dudhnoi on "Genetic Engineering" & "Plant Tissue Culture"*




Workshop Conducted:

❖ *"Chromatography and its Application"*

Popular Talks Conducted:

❖ *"Polymer – A multi-faceted material and Environment"*

❖ *"Career Opportunities in Bioscience"*

❖ *"The Art of Becoming a Scientist: Journey of a Lifetime"*

Celebration of National and International Events:

❖ *World Environment Day, 2018*

❖ *National Science Day, 2019*

Field Visits:

❖ *To Guwahati Biotech Park:*

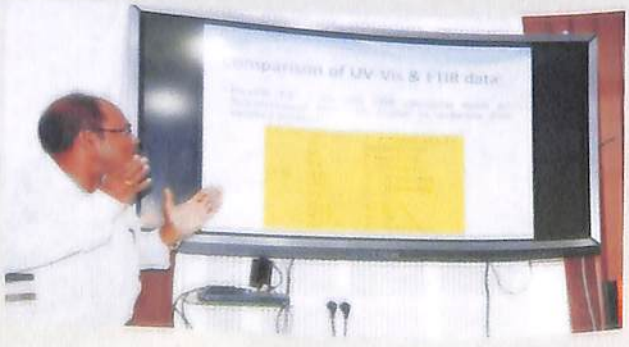
❖ ***To Horticultural Research Station, Kahikuchi***

National Seminar, 2019:

❖ ***Inauguration***

❖ ***Dignitaries address note:***

❖ ***Technical session:***



❖ ***Prof. B.N. Reddy & Dr. Pawan Sarma visit to the Biotech Hub:***

❖ ***Release of College Annual Magazine "Jawaharjyoti" for session 2017-18:***

GENOME EDITING AND CRISPR/CAS9 SYSTEM

Genome editing (also called gene editing) is a group of technologies that give scientists the ability to change an organism's DNA. These technologies allow genetic material to be added, removed, or altered at particular locations in the genome. Several approaches to genome editing have been developed. To date, 3 main types of engineered nucleases have been developed for genome editing- Zing Finger Nuclease (ZFN), Transcription activator like Effector Nuclease (TALEN), and the most recent one is known as **CRISPR-Cas9**, which is short for clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9. The CRISPR-Cas9 system has generated a lot of excitement in the scientific community because it is faster, cheaper, more accurate, and more efficient than other existing genome editing methods.

These are the Segments of prokaryotic DNA containing short, repetitive and palindromic sequences where each repetition is followed by short segments of spacer DNA from previous exposures to foreign DNA (a virus or plasmid). CRISPR loci typically consist of several non-contiguous direct repeats separated by stretches of variable sequences called spacers and are often adjacent to *cas* genes (CRISPR associated).

These repeats were initially discovered in the 1980s in *E. coli*. But their function was confirmed by **Barrangou and colleagues** (Science, 2007) which demonstrated that *S. thermophilus* can acquire resistance against a bacteriophage by integrating a genome fragment of an infectious virus into its CRISPR locus.

The CRISPR-Cas9 system consists of two key molecules that can introduce a change into the DNA-

* A guide RNA (gRNA) ~ 20 bases long located within a longer RNA scaffold.
* Cas9 - acts as a pair of 'molecular scissors' that can cut the two strands of DNA at a specific location in the genome.

The scaffold part binds to DNA and 'guide' Cas9 so that the Cas9 enzyme cuts at the right point in the genome. The system is a part of bacterial adaptive immunity. **CRISPR/Cas9** system can be used for genome editing which may have far reaching implications in- food industry, molecular medicine, crop productivity, livestock breeding, and engineer new antimicrobials and control disease-carrying insects with gene drives. Together with improvements in mutation efficiency and gene targeting using CRISPR/Cas9, such systems would contribute to further molecular breeding to generate desired traits.

Mehzabin Rahman
JRF, IBT Hub
B. P. Chaliha College, Nagarbera

Entrepreneurship As A Career- With an Introduction to Bioentrepreneurship

Choice of careers is one of the most difficult tasks a student faces once they clear their board exams. Mostly the choices are influenced by the society and strong desires of parents rather than a student's own desire. If we go through the interviews of students, we generally come across a few highly chosen career- Doctor or Engineer, a very few opt for being a teacher. Of late there is a craze for Civil Services and Scientists. NDA being another choice of students after 10+2. This leads to tremendous pressure on a child and we generally come across reports of suicides. Even if the students had made up their mind for a particular career there are ample chances of missing it as they might not go through the entrance examinations. This in turn disheartens a child and he is forced to select a

branch in which he has the least interest. Their dream gets shattered at a very young age. Little do they think that there are many more unread pages of life, many more opportunities to be unveiled. Success or failures in tender age is never permanent, many medicos and engineers become dropouts and there are instances of students who failed to clear the entrance examinations shine in their life. It is always wiser to treat a failure as a stepping stone to success and not feel that success is permanent- as failures and successes both walk hand in hand.

It is a general perception that business is for those people who cannot excel in studies. And this gives a negative impact on the persons mind to venture. The society is oriented in such a way that everybody prefers a Government job after the completion of studies, raising the number of unemployed youths every year. We never hear the word *Entrepreneur* from a topper of Board examinations.

A French economist **Jean-Baptiste Say** first coined the term entrepreneur, but its actual definition appeared in *Essai sur la Nature du Commerce en Général*, or *Essay on the Nature of Trade in General* by an Irish-French economist **Richard Cantillon**. While Say defined entrepreneur as a planner, Cantillon considered an entrepreneur as a risk taker who can make decisions about obtaining and using resources as well as admit the risk of the enterprise.

The process of designing, inducting and operating a new business such as Startup Company is traditionally termed as entrepreneurship. The people who construct the business are called entrepreneurs. The definition of entrepreneurship recently (in 2000s) has been expanded which explains why some individuals or groups identify opportunities, weigh them up as viable and decide to exploit them whereas some others do not, and how the opportunities are used by entrepreneurs to develop new products or services, start new firms or set up new industries and create wealth. Stress has been also laid on the uncertainty of the entrepreneurial process because although the opportunities exist, prior to their actualization into profit it cannot be discovered or identified. A real opportunity ex ante might be actually a non opportunity or one that cannot be actualized by entrepreneurs who lacks business skills and financial capital.

The basic characteristics of entrepreneurial spirit include innovation and risk taking and are an essential part of a nation's ability to succeed in a dynamic and competitive global marketplace, Moreover its wide open possibilities makes entrepreneurship a good career choice. The economies throughout the globe like India Brazil Dubai, U.S or Kenya gives ample rooms for entrepreneurship. There are opportunities in wealth creation in industries involving IT, Personal care, media, engineering, healthcare, agriculture, textile etc.

An entrepreneur requires a special type of personality which can be inculcated by working on oneself, grow and understand how to express the traits. The following traits are generally considered to be useful in carving out a successful entrepreneur.

1. First and foremost trait of an entrepreneur is that they should always be self motivated and always willing to push himself.
2. Entrepreneurs are generally problem solver who considers problems as opportunities.
3. To be a successful entrepreneur one has to take calculated risks, the potential risks should be evaluated and then through hard work, dedication and strategic planning the risks should be minimized.
4. One should be passionate enough, he has to think out of the box and be a visionary with being perseverant.

Bioentrepreneurship- As defined by Persidis (1996) Bioentrpereneurship is the accumulation of wealth by the application of bioscience to the business context. It is is relatively new to the world outside USA. It is said that Bioentrepreneurship took its birth in the US many years ago before the development of IT giants like Microsoft, Sun, Cisco etc. The Companies like Greentech and Amgen expanded through their research programs competing and collaborating with the most important

Pharmaceutical companies. Bioentrpreneurs generally harness the commercial value using the technologies they apply in conducting research in the field of Biotechnology.

In case of traditional entrepreneurship generally the entrepreneurs are of business background but bioentrepreneurs are from scientific background. They are generally Masters or PhD with or without MBA whereas traditional entrepreneurship engages mostly MBAs . In case of traditional entrepreneurship the entrepreneurs generally are involved with development and marketing but Bioentrepreneurs should also need to pay attention to the research and development as well as the ethical issues and hence carries in depth knowledge of the products.

With the advent of recombinant DNA technology the ability to harness biological processes became easier. These technology lead to the creation of new therapeutics, engineer crops and produce transportation fuels as well as chemicals for industrial manufacturing. Various new methods to detect, treat and prevent diseases at the molecular level helped a lot in the practice of medicine. In the field of agriculture the biotech crops can increase the yields as well as nutritional values and thus can boost up environmental and economic benefits. The livestock production can be increased and improved with the help of biotechnology. Renewable fuels, renewable chemicals etc which are considered to be key components of an emerging biobased economy are produced by Biorefineries.

A diverse array of products from therapeutics to biofuels, and from diagnostics to herbicide-tolerant soybeans is created within divergent sectors throughout the industries each product depending on similar biotechnology tools and methods for their innovation and product creation. But the sectors have different product development costs and different times required for commercialization. Thus entrepreneurs working in biotechnology industries should have functional knowledge of the various product sectors due to the possibilities of cross-applications between sectors. The entrepreneurs should bear creative ideas and find solutions from the juncture of the disciplines.

There is a need of individuals who have entrepreneurial ambitions to come up with new biotechnology enterprises. The industries might also require teams of individuals with specialized expertise to build manage and lead, including support professionals to serve the company. Educational institutions should conduct certain teaching strategies to improve the entrepreneurial intention and self –efficacy, besides the traditional ones. Kuratko, (2005), stated that participation in entrepreneurial training program is connected to changes in attitudes and intentions towards entrepreneurship and they need proper teaching strategies compatible with student-centered approach.

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Plant biotechnology as a tool to conserve urban wildlife: A new perspective for research

A number of wild mammals and birds have adapted to urbanization and learnt to co-exist with the human society; examples include monkeys, squirrels, sparrows etc. Such wild species have developed ways that enable them to efficiently utilize urban ecosystems, and become important components of these environments. Once, they have established themselves, the animals begin to render important ecosystem services such as seed dispersal, scavenging etc. It is thus, necessary to take initiatives to shape cities and towns into habitats that could sustain such wildlife. Under current circumstances it often becomes difficult to prevent destruction of wild habitats due to human population growth and development. An acceptable alternative in this regard is to make urban areas

suitable enough to harbour species that could adapt. This could also be an effective step to compensate the loss of biodiversity arising from habitat destruction. For this, it is pertinent to conserve potential breeding, foraging and dwelling sites of wild species and take necessary action against threats.

Generation of garbage is an important characteristic of urban areas and the consequent issue is its disposal. Inappropriate disposal leads to several environmental problems, like ground water contamination, effects on plants etc. depending upon the constituents of the waste. In several cases, it has also been found that a particular neighborhood has a specific site at which its residents dump their garbage, which is later collected by the workers of their respective municipalities for final disposal and handling at a central facility. The sites of waste disposal are often regarded as unsuitable and the general public prefers not to go to their vicinity. But, such sites occasionally serve as important foraging grounds for certain wild species (e.g. birds) living in urban habitats; indicting their importance in conserving such fauna. However, this depends upon the type of waste released into such sites, which in turn depends upon the community that dumps the waste. The location of the grounds is thus important in this regard. If proper steps are taken, the potential of these grounds to render benefits to wildlife can easily be harnessed. For this, adequate planning and research are required. An important example in this context is the Mahim Nature Park, Mumbai. A latest article published by the Free Press Journal on March 23 2018, has elaborately described the success of the park in conserving biodiversity and well highlighted the fact that it was actually a dumping ground in the past.

Another important variable is urban vegetation, which provides refuge and shelter to wildlife. It is well known fact that trees and vegetation are often cleared in urban areas in order to make way for greater economic development. At times, such clearing becomes inevitable and at the same time, it is also not possible to plant trees inside cities and towns as it has its own repercussions in terms of feasibility and space constraints. A related aspect is the species of trees to be planted. Establishment of parks can also be a viable solution. In fact, if suitable plants are planted near dumping sites, it can easily contribute to decrease the certain negative effects of such sites and also help in supporting wild species. The vegetation can provide shelter, whereas the dumping sites can serve as foraging grounds. In this way, the negative effects of garbage disposal sites can be nullified to some extent and the positive aspects can be coordinated and synergized. This is in fact an important hypothesis for future research.

Plant biotechnology can play an important role in this context because its techniques have the potential to adapt plants for specific needs and opportunities. Such techniques hold great promise to improve varieties of crop varieties. But when combined with ecological characteristics of tree species to fulfill specific needs, they can efficiently be applied to conserve urban wildlife in coordination with dumping grounds.

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