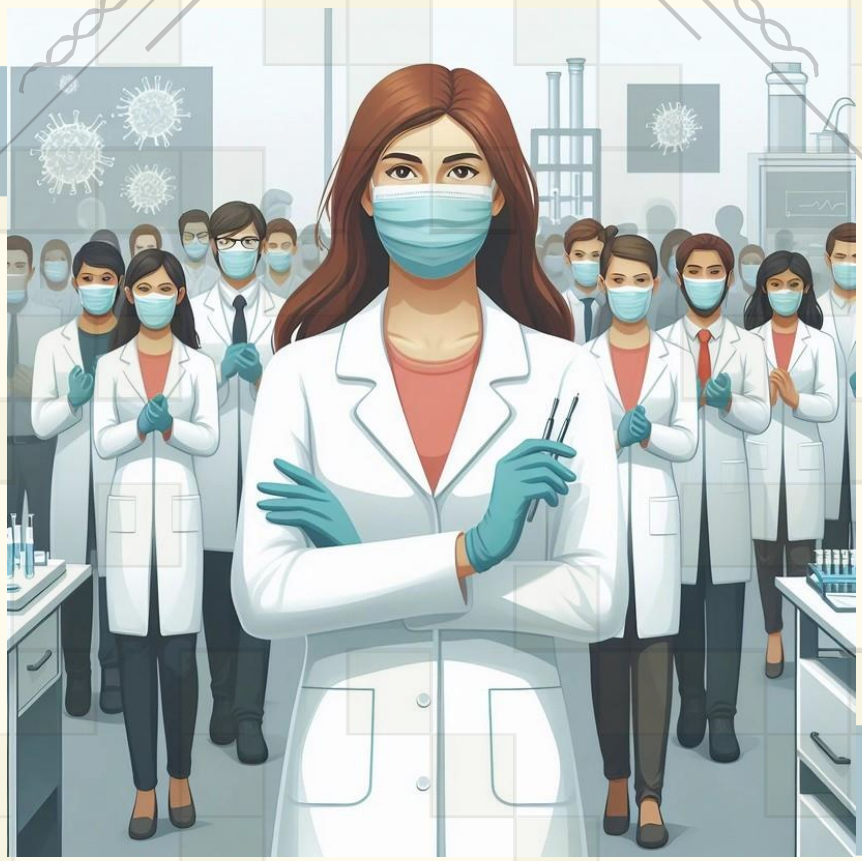
DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology
AN AUTONOMOUS INSTITUTE

GENOMIC GAZETTE



A Technical Magazine by

THE DEPARTMENT OF BIOTECHNOLOGY

January 2025

DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

AN AUTONOMOUS INSTITUTE

Vision of The Institute

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of The Institute

M1- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.

M2- To provide facilities and services to meet the challenges of Industry and Society

M3- To facilitate socially responsive research, innovation and entrepreneurship

M4- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

AN AUTONOMOUS INSTITUTE

Department of Biotechnology

Vision of The Department

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of The Department

M1- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
M2- To provide facilities and services to meet the challenges of Industry and Society
M3- To facilitate socially responsive research, innovation and entrepreneurship
M4- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Program Education Objectives (PEO)

- Develop Biotechnology graduates as human resource with technical competencies and strong foundation of basic science and engineering.
- Acquire fundamental knowledge of mathematics, Biosciences and engineering to analyze, design and implement solutions to the Biotechnological problems.
- Understand emerging concepts and trends in the field of Biotechnology.
- Apply software tools to develop innovative computational systems used for Biomaterial and processing
- The students are encouraged to develop the habit of lifelong learning to face the challenges.

Department of Biotechnology

Program Outcomes

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and software tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes

PSO-1: Ability to apply the acquired knowledge and recent techniques to come up with ideas in the domains of Bioprocess Engineering, Bioinformatics and Biopharmaceuticals.

PSO-2: Ability to utilize their proficiency and skills in solving real life problems in Diagnostics Genetic Engineering and Fermentation Technology using recent technologies.

PSO-3: Analyzing the impact of Biotechnology Engineering solutions in the societal and human context to create productive human resource for the country.

About TGPCET

Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) was established in the year 2007 by Vidarbha Bahu-uddeshiya Shikshan Sanstha (VBSS), a registered society. It is a self financed Private Engineering College, which is affiliated to Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) Nagpur and is approved by All India Council for Technical Education, New Delhi. Also college is approved by Directorate of Technical Education (DTE), Mumbai, Maharashtra State. The Institute is Accredited with A+ (3.32 CGPA) by NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC). An Autonomous Institute affiliated to RTM Nagpur University, Nagpur. TGPCET offers Eight PG programs in engineering such as Computer Science and Engineering (CSE), Integrated Power System (IPS), Structural Engineering (SE), Electronics Communication Engineering (ECE), Artificial Intelligence & Machine Learning (AIML), Mechanical Engineering Design (MED) Aeronautical Engineering (AE), Electric Vehicle Technology (EVT) and also offers Two years PG programs in Master of Business Administration (MBA) as well as Two years Master in Computer Application (MCA) The College offers four years UG programs in Nine disciplines of engineering such as Bio-Technology (BT), Aeronautical Engineering (AE), Computer Science and Engineering (CSE), Computer Science and Engineering (Data Science), Information Technology (IT), Electronics and Communication Engineering (ECE), Mechanical Engineering (ME), Civil Engineering (CE) and Electrical Engineering (EE). The institute also offers four diploma courses in Mechanical Engineering (ME), Civil Engineering (CE), Computer Science and Engineering (CSE) & Electrical Engineering (EE).

TGPCET

Message from HOD Desk

Dr. Rohit Kalnake

The Biotechnology Department at our esteemed institution has introduced a pioneering venture in response to the evolving needs of the industry. Recognizing the transformative potential within the Engineering & Technology discipline, it is the commencement of a new specialized areain Under Graduate Engineering & Technology education. Recognizing theunique demands of the biotechnology sector, we are committed to providing specialized education that aligns with industry needs.

Commencing in the academic year 2020-2021 with an initial intake of 60 students, this program has received approval from the All India Council of Technical Education (AICTE), New Delhi, and operates under the esteemed Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur.

As we navigate this exciting journey, our focus is on delivering a curriculumthat not only meets academic excellence but is also attuned to the specific requirements of the biotechnology field. We are dedicated to preparing our students with the skills and knowledge needed to excel inthis dynamic and rapidly advancing sector.

Prologue

Step into the world of Biotech Insights, your window into the fascinating realm of biotechnology. In these pages, we've gathered a handful of insightful articles that highlight the dynamic intersections of biology and technology, penned by students and enthusiasts eager to share their discoveries.

From coloured cotton and silver nanoparticles to wastewater treatment advancements and the potential of Artificial Neural Networks, each piece in this magazine reflects the curiosity and innovation that define our biotech community.

Join us as we take a glimpse into the exciting developments within the field, showcasing how simple ideas can lead to significant breakthroughs. So, flip through these pages, explore the stories, and let this magazine spark your curiosity. Welcome to a world where biotechnology unfolds its wonders, one insight at a time.

Index

TGPCET

1. Faculty Articles

Unleashing the Potential: The Pivotal Role of AI in Bioprocess Industries

-Prof. Anup Bagade

Bioprocess industries, including pharmaceuticals, biopharmaceuticals, and biofuels, are undergoing a transformative evolution with the integration of Artificial Intelligence (AI) technologies. This article explores the multifaceted role of AI in revolutionizing bioprocess industries.

Data-driven Decision Making: AI excels in handling vast amounts of data, a characteristic well-aligned with the data-intensive nature of bioprocesses. By leveraging machine learning algorithms, AI can analyze historical data, predict trends, and optimize various stages of bioprocessing. This data-driven approach enhances decision-making, leading to more precise and efficient processes.

Process Optimization and Control: One of the primary contributions of AI in bioprocess industries is the optimization of manufacturing processes. Machine learning algorithms can analyze real-time data from sensors and actuators, allowing for the adjustment of parameters to achieve optimal production conditions. This not only improves yield but also ensures consistency and quality in the final products.

Bioprocess Monitoring and Quality Control: AI facilitates continuous monitoring of bioprocess parameters. Smart sensors integrated with AI systems can detect deviations from the norm and trigger corrective actions in real-time. This proactive approach enhances the overall quality control of bioprocesses, minimizing the risk of batch failures and ensuring compliance with regulatory standards.

Contd...

Unleashing the Potential: The Pivotal Role of AI in Bioprocess Industries

-Prof. Anup Bagade

Predictive Maintenance: AI-powered predictive maintenance is instrumental in preventing equipment failures and downtime in bioprocess industries. By analyzing historical performance data and identifying patterns indicative of potential issues, AI systems can predict when equipment is likely to fail. This enables timely maintenance, reducing operational disruptions and minimizing associated costs.

Bioprocess Design and Optimization: AI algorithms are revolutionizing the design and optimization of bioprocesses. Through computational models and simulations, AI can explore a vast design space, identifying optimal conditions and configurations for specific bioproduction goals. This accelerates the development of new processes and the optimization of existing ones.

Drug Discovery and Development: In biopharmaceuticals, AI plays a crucial role in drug discovery and development. Machine learning models analyze vast datasets related to molecular structures, genomics, and biological interactions, assisting researchers in identifying potential drug candidates and predicting their efficacy. This accelerates the drug development pipeline, leading to faster and more cost-effective discoveries.

The integration of AI into bioprocess industries marks a paradigm shift in how these industries operate. From optimizing processes and ensuring quality to accelerating drug discovery, the applications of AI are diverse and impactful. As technology continues to advance, the role of AI in bioprocess industries is poised to expand, unlocking new possibilities and driving innovation in the quest for more sustainable and efficient bioproduction.

TGPCET

Next-Gen Wastewater Treatment Using Rotating Biological Contactor Technology

-Dr. Rohit Kalnake

In the dynamic landscape of wastewater treatment, the evolution of Rotating Biological Contactor (RBC) technology stands as a beacon of progress towards more robust and sustainable purification processes. A stalwart in wastewater treatment, RBCs have undergone a metamorphosis, embracing innovative features that redefine their role in the relentless pursuit of pristine water. This discourse unravels the narrative of Rotating Biological Contactor technology's transformation and its revolutionary impact on wastewater treatment.

Modern RBCs harness advanced aeration strategies to maximize oxygen transfer efficiency. This turbocharged approach accelerates microbial degradation of pollutants, fostering a swifter and more comprehensive treatment process. The upshot is an expanded treatment capacity and the ability to navigate diverse influent conditions with finesse.

Enter the era of innovative modular designs, gifting RBC systems newfound flexibility and scalability. The compact footprint not only facilitates efficient space utilization but also renders them adaptable for both fresh installations and retrofitting existing wastewater treatment plants. A testament to versatility catering to the diverse needs of municipalities and industries alike.

The construction playbook for RBC discs has evolved, embracing advanced materials for heightened durability and corrosion resistance. This not only extends the equipment's lifespan but also ushers in cost-effective maintenance practices, adding to the economic viability of wastewater treatment facilities.

Contd...

Next-Gen Wastewater Treatment Using Rotating Biological Contactor Technology

-Dr. Rohit Kalnake

The symphony of sensors orchestrates a new age of smart RBCs. Real-time monitoring of pivotal parameters such as dissolved oxygen levels, microbial activity, and system performance empowers proactive management and swift responses to shifting conditions. This real-time awareness ensures optimal treatment efficiency and heralds a new era in resource conservation.

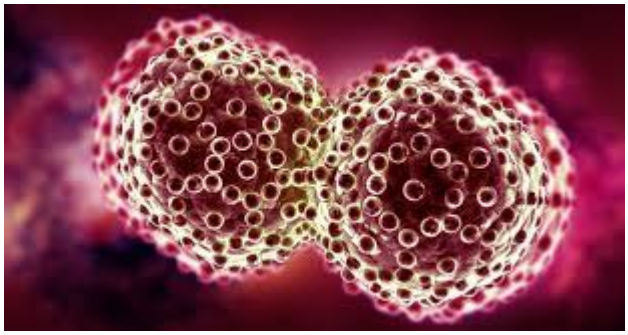
A green ethos permeates the heart of new-age RBCs with energy-efficient drive systems. This strategic thrust curtails power consumption, resulting in lower operational costs and a diminished environmental footprint. The integration of renewable energy sources further amplifies the overall sustainability quotient of wastewater treatment processes.

The horizon of RBC advancements extends beyond organic pollutant removal. Forward-thinking systems are engineered to facilitate enhanced nutrient removal, addressing the pressing concerns tied to nitrogen and phosphorus compounds. This evolutionary step aligns with stringent regulatory demands and fosters a conscientious approach towards minimizing the environmental impact of treated effluent.

With refined aeration, modular aesthetics, avant-garde materials, sensor symphonies, energy-efficient propulsion, and an extended foray into enhanced nutrient removal, contemporary RBCs take center stage in the narrative of sustainable water purification. As municipalities and industries chart their course towards cleaner and more efficient wastewater treatment solutions, the avant-garde features of these new-age RBCs position them as trailblazers, reshaping the contours of water resource management in the years to come.

Understanding Cancer

Prof. Sakshi Zade



Cancer is a collective term for a group of diseases characterized by the uncontrolled growth and spread of abnormal cells within the body. Under normal circumstances, human cells grow, divide, and die in an orderly fashion. However, when this process malfunctions, cells can proliferate uncontrollably, leading to the formation of masses known as tumors. These tumors can be benign (non-cancerous) or malignant (cancerous). Malignant tumors have the potential to invade nearby tissues and metastasize to distant organs through the bloodstream or lymphatic system, complicating treatment efforts. The development of cancer is multifactorial, involving a combination of genetic predispositions and environmental exposures. Lifestyle factors such as tobacco use, excessive alcohol consumption, poor diet, and physical inactivity significantly contribute to cancer risk. Environmental exposures, including radiation and certain chemicals, also play a role. Additionally, some infections are linked to specific cancers; for example, human papillomavirus (HPV) is associated with cervical cancer. Understanding these risk factors is crucial for prevention and early detection.

Symptoms of cancer vary widely depending on the type and location of the disease. Common signs include unexplained weight loss, persistent fatigue, changes in skin appearance, and the presence of lumps or masses. However, many cancers remain asymptomatic in their early stages, underscoring the importance of regular screenings and medical check-ups. Early detection through methods such as mammograms, colonoscopies, and Pap smears can significantly improve treatment outcomes.Treatment options for cancer are diverse and tailored to the individual patient, considering factors like the type and stage of cancer, as well as the patient's overall health. Common treatments include surgery to remove tumors, radiation therapy to destroy cancer cells, chemotherapy to target rapidly dividing cells, immunotherapy to boost the body's natural defenses, and targeted therapy that focuses on specific genetic mutations within cancer cells. Advancements in medical research continue to enhance these treatments, offering hope for improved survival rates and quality of life for cancer patients. Prevention strategies are vital in reducing the global cancer burden. Adopting a healthy lifestyle by avoiding known carcinogens, maintaining a balanced diet rich in fruits and vegetables, engaging in regular physical activity, and participating in recommended screening programs can significantly lower the risk of developing cancer. Public health

initiatives aimed at education and awareness are essential components in the fight against this complex group of diseases. In summary, cancer encompasses a wide range of diseases linked by the common feature of uncontrolled cell growth. Through continued research, public health efforts, and individual commitment to healthy living, progress can be made in prevention, early detection, and effective treatment, ultimately reducing the impact of cancer on individuals and society.

Vaccination: A weapon to end the pandemic

Prof. Soham Deshpande

Vaccination is one of the greatest public health accomplishments of the 20 th century, by its virtue of reducing morbidity and mortality. Vaccines are substances that are introduced in the body to prevent infections or control diseases caused by bacteria, viruses and other pathogens. They contain either live/dead microbes or information in the form of DNA/RNA about a specific disease and teaches our body's immune system to produce antibodies against that disease (also called immune response) thus, preventing re-infection. Vaccination is the most effective and cheapest means of controlling infectious disease-related morbidity and mortality.

Immune system: How it works

The immune system in our bodies works in a similar way as we remember people. Often, we can tell who's who by looking at their face or any specific characteristics (like a big beard or the way they walk etc). The immune system also recognizes pathogens similarly, by the specific characteristics on them. The immune system is made up of components like white blood cells, antibodies and other mechanisms which tackle the microbes. The activity of the immune system in response to the bugs results in the symptoms we all see, like fever, rash and headache. This is when the body is waging war against infections (also known as immune response).

The immune system identifies molecules called antigens on the surface of viruses and bacteria and generates antibodies which are used to kill or neutralize the pathogens. However, one does not always need to get sick to generate an immune response. Vaccines are an excellent example of agents that activate the immune system without the person getting sick

What a vaccine does:

The way our immune system can identify a pathogenic organism like a virus or bacteria is by identifying proteins on the surface of these germs. Proteins that are specific to these bacteria/viruses are identified by the immune system in a complex mechanism that is composed of antigen presenting cells (APCs), B cells (white blood cells) and T cells (that can retain the memory of past infections and generate antibodies when needed). When the real pathogen enters the body APCs recognize it

and display information of the antigen on their surface. Similarly, when a vaccine is injected in our body, the immune system can recognize the specific protein on the vaccine and can trigger an immune response, while also keeping this pathogen in memory, in case the same infection happens again. The goal of vaccination is to produce memory of vaccine antigen via memory cells. When we have a cut, we take a Tetanus vaccine, to prevent infection.

Types of covid vaccines available in India right now:

1. Live attenuated vaccine: Attenuated means “weakened”. These vaccines are literally weakened versions of the live/functional pathogens which we want to protect from. The way they work is that by injecting them in our bodies, our immune system is able to generate antibodies and offer protection against further infections of the same disease. The pathogen or virus is so weak, that it cannot cause the disease, but can incite an immune response. An example of common live attenuated vaccines is the MMR (Measles, Mumps, and Rubella) vaccines. In terms of COVID vaccines, Covishield is a live attenuated vaccine.

2. Inactivated vaccine: These vaccines contain whole germs (virus or bacteria)

that have been killed, thus making them unable to replicate and cause any disease. These vaccines also cause the immune system of our bodies to identify the pathogens and generate antibodies against them. A good example of inactivated vaccines is the polio vaccine, which has saved many lives. For COVID-19 infections, Covaxin is an example of inactivated vaccine.

3. mRNA vaccines: mRNA is a type of genetic material which tells your body how to make proteins. Once inside the body, these mRNA vaccines help to make proteins that target specific components of the bacteria/virus. We know that vaccines cause an immune system response to identify the pathogen and generate protective action against the bacteria/viruses. mRNA vaccines help to create what are called memory cells in our immune system. These vaccines have a copy of the genetic code (like a blueprint) which helps the immune system to recognize the virus and by activating the memory cells, can produce specific antibodies which act against the pathogen. The difference between mRNA vaccines and other vaccines is that instead of exposing the body to a live/dead virus, we simply expose it to a small part of the genetic code of the virus. Common examples of mRNA vaccines are Rabies vaccine, Zika virus vaccine and now the Coronavirus vaccine as well.

Benefits

Benefits of mRNA vaccines over conventional approaches are

o Safety: RNA vaccines are not made with pathogen particles or inactivated pathogen, so are non-infectious. RNA vaccines are degraded once the protein is made.

o Efficacy: early clinical trial results indicate that these vaccines generate a reliable immune response and are well-tolerated by healthy individuals with few side effects.

Nanobiofertilizers: A New Approach towards the Smart and Sustainable Agriculture

Prof. Anuradha Khade

The use of nanobiofertilizers in agriculture ushers in a new era in crop sustainability. The use of nanoparticles enhances plant growth and stress tolerance. Another agricultural strategy being researched is the inoculation of biofertilizers. Nanobiofertilizers are created by combining nanoparticles and biofertilizers, which are more cost-effective, potent, and environmentally friendly than nanoparticles or biofertilizers alone. Biofertilizers encapsulated in nanoparticles make up nanobiofertilizers. Biofertilizers are plant-based carriers containing beneficial microbial cells, whereas nanoparticles are microscopic (1-100 nm) particles with numerous benefits.Silicon, zinc, copper, iron, and silver nanoparticles are commonly used in the formulation of nanobiofertilizer. Green synthesis improves the performance and properties of these nanoparticles. Nanobiofertilizers perform better and long lasting results than the common salts ,previously used in agriculture to boost crop production. It improves soil structure and function,as well as plant morphological, physiological, biochemical, and yield characteristics. The development and application of nanobiofertilizer is a practical step toward smart fertiliser that boosts crop growth and yield. There is a scarcity of literature on the formulation and application of nanobiofertilizers in the field. This product deserves attention because it can reduce the use of chemical fertiliser while also improving the health of the soil and crops. This review focuses onthe formulation and application of nanobiofertilizer on various plant species, as well as how nanobiofertilizer promotes plant growth and development. It discusses the role and current status of nanobiofertilizers in agriculture. There is discussion of the limitations and future strategies for developing effective nanobiofertilizer.

TGPCET

2. Students' Articles

Exploring the Biotechnological Marvels of Colored Cotton

-Vaibhav Zade

In the dynamic realm of biotechnology, an exciting and transformative innovation is unfolding—the cultivation of coloured cotton. As a dedicated B.Tech Biotechnology student, my journey into this realm has been a fascinating exploration of the intricate intersection between agriculture, biotechnology, and sustainable fashion. This article aims to illuminate the promising prospects and scientific ingenuity behind the cultivation of cotton in an array of vibrant hues.

Traditional cotton, known for its characteristic white fibres, has long been the staple of the textile industry. However, the emergence of coloured cotton varieties has ignited a wave of interest. The cultivation of naturally coloured cotton involves genetic modifications, enabling cotton plants to produce pigments within the fibres and eliminating the need for post-harvest dyeing processes.

As a biotechnology enthusiast, witnessing the application of genetic engineering to imbue cotton fibres with colour has been a remarkable experience. Introducing genes responsible for pigment production, derived from sources like bacteria or other plants, into the cotton plant's genetic makeup holds potential not only for enhancing the visual appeal of cotton but also for environmentally conscious practices by reducing reliance on synthetic dyes.

The convergence of coloured cotton with sustainable fashion seamlessly aligns with the ethos of biotechnology. Sustainable agricultural practices, including reduced water usage and minimized chemical inputs, are inherent in the cultivation of coloured cotton. This harmonious blend of science and fashion underscores the transformative impact that biotechnology can have on multiple facets of industry and agriculture.

Contd...

Exploring the Biotechnological Marvels of Colored Cotton

-Vaibhav Zade

Coloured cotton is not merely an aesthetic enhancement; it also brings functional advantages. The pigments naturally present in colored cotton may possess inherent properties such as UV resistance and insect repellence. This potential reduces the need for additional treatments or chemical applications, aligning with the principles of eco-friendly and sustainable agriculture.

While the journey towards colored cotton is promising, challenges persist. Balancing the enhancement of color vibrancy with maintaining the desirable qualities of cotton fibers requires ongoing research. Additionally, addressing concerns related to market acceptance and scaling up production are areas where the collaborative efforts of biotechnologists, agronomists, and fashion industry stakeholders become crucial.

From a student perspective, the exploration of colored cotton exemplifies the dynamic potential of applying scientific knowledge to address real-world challenges. It underscores the importance of interdisciplinary collaboration, ethical considerations, and a forward-thinking mindset in shaping the future of agriculture and fashion.

We can say that the potential for sustainable practices, reduced environmental impact, and vibrant fashion choices offers a glimpse into the multifaceted contributions that biotechnology can make to our world. This technicolour revolution in cotton cultivation is not merely a trend; it is a testament to the innovative spirit and the limitless possibilities that lie at the intersection of biotechnology and agriculture.

Synthesizing Silver Nanoparticles Using Neem Leaf Extract

-Darshana Charde

Embarking on the challenging yet invigorating journey of my 5th semester at B.Tech Biotechnology, I, along with my dedicated colleagues Nikita Chawle and Pravesh Chouvhan, delved into a microproject that transcended the confines of textbooks and classrooms. Our mission: to synthesize silver nanoparticles using Neem leaf extract, a venture that seamlessly wove together traditional knowledge, cutting-edge biotechnology, and a commitment to sustainable practices.

The prospect of exploring nanobiotechnology ignited a spark of curiosity within us. Guided by our seasoned professors, we set out on a quest to understand and apply the principles of nanoparticle synthesis using biological entities. Neem, a repository of bioactive compounds with potential nanotechnological applications, emerged as the focal point of our investigation.

Our process unfolded through a series of meticulous steps. Gathering Neem leaves, washing them diligently, and extracting the aqueous solution set the stage for a transformative journey. This extract served as both the reducing and stabilizing agent in the synthesis of silver nanoparticles. The controlled introduction of silver nitrate initiated a cascade of reactions, leading to the formation of these nanoparticles.

The transition from a simple Neem leaf extract to a solution aglow with silver nanoparticles was nothing short of artistic. Observing the subtle change in color – from a pale yellow to a profound brown – marked the successful synthesis of these nanoparticles.

Contd...

Synthesizing Silver Nanoparticles Using Neem Leaf Extract

-Darshana Charde

What sets our microproject apart is the inherent eco-friendliness of the synthesis process. Traditional methods often involve the use of hazardous chemicals and energy-intensive processes. Leveraging the natural compounds present in Neem leaf extract not only sidesteps harmful substances but also aligns with the ethos of sustainable and green nanotechnology.

The silver nanoparticles we synthesized hold immense potential across various domains, from medicine to catalysis and materials science. As we look ahead, our microproject opens doors to exploring the applications of Neem-synthesized nanoparticles in antibacterial treatments, drug delivery systems, and a myriad of other possibilities.

Embarking on this microproject has been a journey of scientific discovery, innovation, and environmental consciousness. The synthesis of silver nanoparticles using Neem leaf extract is a microcosm of the vast possibilities at the intersection of biotechnology, nanotechnology, and sustainable practices. As a B.Tech Biotechnology student, this venture has not only enriched my academic experience but has ignited a passion for unlocking the untapped potential of nature in shaping the future of technology. Our microproject stands as a testament to the transformative power of biotechnology when coupled with the wisdom of traditional knowledge and a commitment to sustainable practices.

Artificial Neural Networks and Biotechnology

-Janhavi Admane

Embarking on the exciting journey of Biotechnology, I find myself at the crossroads of science and technology, witnessing the fusion of Artificial Neural Networks (ANNs) with the vast potential of biotechnological applications. As a B.Tech Biotechnology student, the convergence of these fields is nothing short of revolutionary, promising to reshape the landscape of drug discovery, genomics, and personalized medicine. Let's delve into this fascinating blend of biology and computational prowess from the perspective of a biotechnology enthusiast.

Decoding the Basics of Artificial Neural Networks: As budding biotechnologists, we often find ourselves navigating complex biological landscapes. ANNs, inspired by the human brain, have become our allies in this journey. Picture a network of artificial neurons working in harmony to make sense of intricate biological data, paving the way for novel discoveries.

Drug Discovery: A Faster Lane with ANNs: In the realm of drug discovery, where time is of the essence, ANNs are our accelerators. High-throughput screening of compounds becomes a breeze as these networks predict potential drug candidates' efficacy and safety, catapulting us towards ground breaking pharmaceutical breakthroughs.

Genomics Unveiled: Genomics, with its labyrinth of data, finds a guiding light in ANNs. For us, unravelling the mysteries of genetic markers, gene expressions, and predicting disease susceptibilities has never been more thrilling. ANNs bring genomics to life, turning DNA sequences into invaluable insights.

Contd...

Artificial Neural Networks and Biotechnology

-Janhavi Admane

Proteins in 3D: A Technicolor World: As we grapple with understanding proteins and their functions, ANNs emerge as the artists painting a vivid picture of the 3D protein structures. The predictions provided by these networks open new avenues for targeted therapies and drug design, making our studies more dynamic and exciting.

Tech-Infused Bioprocesses: In the realm of bioprocesses, ANNs take center stage, optimizing conditions and controlling bioreactors like the maestros of a symphony. For us, this means enhanced efficiency, higher yields, and a glimpse into the future of sustainable bioproduction.

Facing the Challenges: A Student's Dilemma: As students navigating this technological frontier, we grapple with the challenges too. The thirst for quality and quantity in our datasets is real. The 'black-box' nature of ANNs sometimes leaves us pondering the intricate decisions they make. Ethical considerations, too, find a place in our discussions as we explore the boundaries of data privacy and consent.

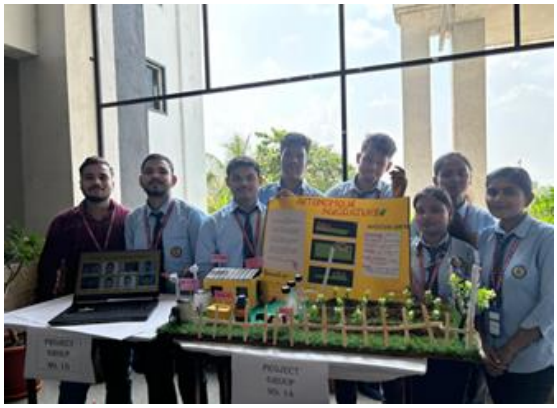
Looking Ahead: A Student's Dream: Despite the challenges, the prospect of integrating ANNs into our biotechnological toolbox excites us. The potential for ground breaking discoveries, the thrill of optimizing bioprocesses, and the promise of personalized medicine propel us forward. As students, we envision a future where the marriage of ANNs and biotechnology becomes second nature, shaping a new era of precision and efficiency in our chosen field.

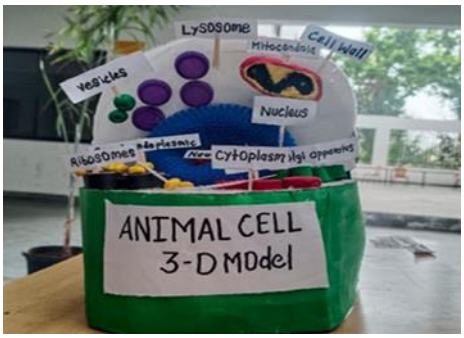
3. Students' Participation

3. Students' Participation

Special Appreciation Award to Mr. Himanshu Mahajan
for successfully coordinating "G20 University Connect"
For Engaging Young Minds
at RTMNU, NAGPUR and RIS New Delhi

3. Students' Participation





ENGINEER'S DAY

Our students showcased their creativity and scientific understanding by participating in a

"Model making" and "Waste-o-Craft"

TGPCET

4. Best Student Projects

Synthesizing Bioplastic from Tapioca Starch

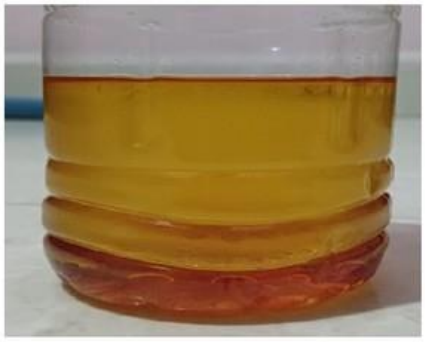
-Ankit Borkar

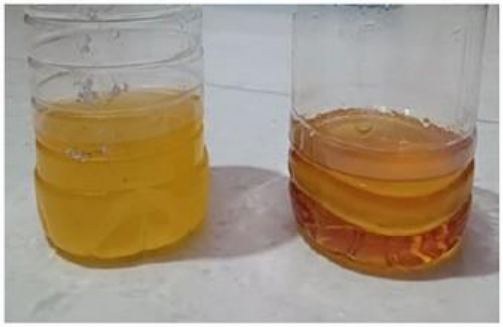
The synthesis of bioplastics using tapioca starch is a renewable and eco-friendly resource derived from cassava roots. Motivated by the escalating environmental concerns associated with traditional plastics, the study aims to showcase the feasibility of producing biodegradable alternatives by extracting, processing, and modifying tapioca starch. The methodology involves preparing a tapioca starch solution, incorporating glycerol as a plasticizer, heating, and forming a bioplastic film, subsequently subjected to tests evaluating flexibility, strength, and biodegradability. The results affirm the successful formulation of bioplastics, which exhibit promising tensile strength, flexibility, and accelerated biodegradability under specific conditions. The outcomes of this research contribute valuable insights into the potential applications of tapioca-based bioplastics, aligning with global initiatives for sustainable and responsible material alternatives. The paper concludes by outlining the project's benefits, skills developed, and proposing future directions, emphasizing the importance of these findings in fostering environmental responsibility and sustainable practices.

TGPCET

Production of Biodiesel by Waste cooking oil

-Chinmay Halge



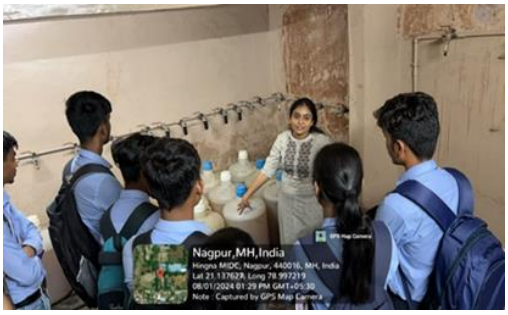


This project focuses on the production of biodiesel from waste cooking oil through the transesterification process using methanol and a nano-sized calcium oxide catalyst. The objectives include evaluating biodiesel as a clean-burning substitute for petroleum diesel, with potential benefits in energy security, air quality improvement, and environmental sustainability. The course outcome aligns with green biotechnology and pollution abatement, emphasizing biodiesel production as a green technology. The methodology involves a laboratory-scale transesterification reaction, and the results indicate increased biodiesel production with higher reaction temperatures. The project contributes to skills development in chemistry, laboratory techniques, and knowledge of safe chemical use and disposal. The benefits encompass environmentally friendly biodiesel production, recycling waste cooking oil, and reducing petrochemical oil imports, while the future scope highlights the continued significance of biodiesel in sustainable transportation and energy security.

TGPCET

5. Events

5. Events



Industrial Visit

- Mitrasena-Biowall Agri health Pvt. Ltd
- Haldiram Foods International Pvt. Ltd

5. Events

The students were guided by Dr. Arti Shanware,

Head of the Biotechnology Department,
Rajiv Gandhi Biological Technology, LITU, Nagpur

Dr. Gaurang Deshpande, Chief Scientific Officer
Spandan Heart and Research Institute, Nagpur.
The lecture, focused on "Animal Models in Cardiovascular Research,"