Intramural Research Scheme
Minor Research Projects Sanction Year: 2022-2023
Final List for Certificate

S. No.	File No.	Principal Investigator/s	Title of Project	Student Details	Sanction Order Details and Date of Start (DOS)
1.	MRP/2022 -2023/0001	Dr. Neena Khanna (Dept. of Chemistry) Dr. Parveen Gahlyan (Dept. of Chemistry)	Synthesis of rhodamine based chemosensors and their application in detection of toxic metal ions	1. Garv Gupta 2. Sakshi Bhardwaj 3. Yogita 4. Garv Gaur 5. Gunit Manaktala All from B.Sc (H) Chemistry	SH/Adm./2175/23 Dated 31/01/2023 DOS: 02/02/2023
2.	MRP/2022 -2023/0002	1. Dr. Neetu Rani (Dept. of Mathematics)	'Mathematical Modelling for Volume Estimation of Guava (Psidium Guajava L.)'	1. Raghav Anand Nath 2. Vaibhav Bhatt 3. Sneha Bhatt 4. Shashvat Kumar Mishra 5. Ishita Mishra All from B. Sc. (H) Mathematics 6. Saloni B.Sc. (H) Botany 7. Nitesh Saini B. Sc. Physical Science with Computer Science 8. Sourabh Sharma B. Sc. (H) Physics	SH/Adm./2295/23 Dated 03/03/2023 DOS: 05/03/2023
3.	MRP/2022 -2023/0003	**1.** Dr Kiran Bamel (Dept. of Botany) **2.** Dr Seema Talwar (Dept. of Botany)	"Impact of Elevated Temperature on the Seed Germination of Medicinal plants (*Catharanthus roseus* and *Trigonell a foenum-graecum)*"	**1.** Ankit (Roll No. 22/09005) B. Sc. (H) Botany **2.** Tribeni (Roll No. 22/09022) B. Sc. (H) Botany **3.** Palak (Roll No.22/23052) B.Sc. (Prog.) Life Sciences **4.** Shorya (Roll No.22/23071) B.Sc. (Prog.) Life Sciences **5.** Gautam (Roll No.22/23065) B.Sc. (Prog.) Life Sciences	SH/Adm./2296/23 Dated 03/03/2023 DOS: 05/03/2023

4.	MRP/2022 -2023/0004	1. Dr Preeti Tiwari (Dept. of Geography) 2. Ms Ekta Raman (Dept. of Geography)	Impact Assessment of Swachh Bharat Mission in Raghubir Nagar	1. Sonia Borana (Roll No. 22/31050) B.A. (H) Geography 2. Maseera Siddiqui (Roll No. 22/31029) BA(H) Geography 3. Ayush Yadav B.A. (H) Geography 4. Ashish Kumar B.A. (H) Geography 5. Vedanshi Singh B.A. (H) Geography	SH/Adm./2297/23 Dated 03/03/2023 DOS: 05/03/2023
5.	MRP/2022 -2023/0005	1. Dr Jayita Thakur (Dept. of Biochemistry) 2. Dr Usha Yadav (Dept. of Biochemistry)	Comparative analysis of the effects of dietary supplements on Drosophila melanogaster	1. Sayena Simron B.Sc. (H) Biochemistry (Roll No. 21/06055) 2. Sanjana Gupta B.Sc. (H) Biochemistry (Roll No. 21/06007) 3. Anusha B.Sc. (H) Biochemistry (Roll No. 21/06034) 4. Sahil Anand B.Sc. (H) Biochemistry (Roll No. 21/06031) 5. Shivangi Aggarwal B.Sc. (H) Biochemistry (Roll No. 21/06030) 6. Vandana B.Sc. (H) Biochemistry (Roll No. 21/06047) 7. Debdatta Chatterjee B.Sc. (H) Biochemistry (Roll No. 22/06009) 8. Khushi B.Sc. (H) Biochemistry (Roll No. 21/06051) 0. Ayush Sachan B.Sc. (H) Biochemistry (Roll No. 21/06015) 10. Tushar Gupta B.Sc. (H) Biochemistry IV Roll No. 22/06032	SH/Adm./2298/23 Dated 03/03/2023 DOS: 05/03/2023

6.	MRP/2022 -2023/0006	**1.** Ms Nimita Kant (Dept. of Zoology) **2.** Dr Jitendra Kr. Chaudhary (Dept. of Zoology)	Developing insights into stem cell therapeutic potential for hematological disorders based on analysis of National Institute of Health (NIH)'s clinical trials repertoire	**1.** Priya Roy (Roll No.21/22020) B.Sc. (H) Zoology **2.** Akanksha (Roll No. 21/22021) B.Sc. (H) Zoology **3.** Supriya Bhardwaj (Roll No. 21/22054) B.Sc. (H) Zoology **4.** Lakshay Bhardwaj (Roll No. 21/22064) B.Sc. (H) Zoology **5.** Priya Talwar (Roll No. 21/22069) B.Sc. (H) Zoology	SH/Adm./2299/23 Dated 03/03/2023 DOS: 05/03/2023
7.	MRP/2022 -2023/0007	**1.** Dr Lalita Rana (Dept. of Geography) **2.** Ms Rashmi Singh (Dept. of Geography)	Urban Sprawl Modelling & Commuting Pattern- Delhi Gurgaon Corridor: A Sustainable Growth	**1.** Inika Garg (Roll No. 22/31020) B.A. (H) Geography 2. Jhilmil Verma (Roll No. 22/31021) B.A. (H) Geography 3. Aneesh Tiwar (Roll No. 22/31011) B.A. (H) Geography 4. Nivedita Sharma (Roll No. 22/31033) B.A. (H) Geography 5. Dildar Ali (Roll No. 22/31017) B.A. (H) Geography 6.Kajal Chowdhary (Roll No. 22/31022) B.A. (H) Geography 7. Srishti Maini (Roll No. 22/31051) B.A. (H) Geography	SH/Adm./2300/23 Dated 03/03/2023 DOS: 05/03/2023

Convener,
College Research and Innovation Cell.

(Intramural Research Project: File Number: MRP/2022-2023/0006)

Title: "Developing insights into stem cell therapeutic potential for hematological disorders based on analysis of National Institute of Health (NIH)'s clinical trials repertoire".

Sanctioned by: College Research Cell, Shivaji College, University of Delhi.
Start date: 05/03/2023
End date: 31/03/2024
Duration: 1 year
Fund: ₹ 30,000/-

Name of the principal investigators:

1. Ms. Nimita Kant, Associate Professor, Dept. of Zoology
2. Dr. Jitendra Kumar Chaudhary, Assistant Professor, Dept. of Zoology

Number of beneficiaries: 05

Details of the beneficiaries:

S. No	Name	Course/Semester	Contact No./Email
1.	Priya Roy	B.Sc. Zoology(H) IVth sem	priyaroy62762@gmail.com 9557348020
2.	Akanksha	B.Sc. Zoology(H) IVth sem	akankshajitenderkumar308@gmail.com 9211575914
3.	Supriya Bhardwaj	B.Sc. Zoology(H) IVth sem	supriyab166@gmail.com 8368670450
4.	Lakshay Bhardwaj	B.Sc. Zoology(H) IVth sem	bhardwajjilakshay6028@gmail.com 9466137032
5.	Priya Talwar	B.Sc. Zoology(H) IVth sem	prtalwar3@gmail.com 9871696533

The following Objectives were achieved:

• Developing theoretical understanding about stem cells by exploring various empirical studies.

• Exploring and understanding ClinicalTrials.gov resource (Home | ClinicalTrials.gov) curated by the U.S. National Library of Medicine.

• Collecting data regarding noncancerous and cancerous hematological disorders and interpretation thereof.

Learning Outcomes:

Experience and exposure to the Research community by the way of Paper or Poster Presentation

List of paper presentation in Conferences:

1. Akansha, Priya Roy, Priya Talwar, Lakshay Bhardwaj, Supriya Bhardwaj, Nimita Kant*,

Jitendra Kumar Chaudhary*. National Seminar on Artificial Intelligence in Biological Sciences,

convened by Bionomie from February 27 to 28, 2024 at ARSD, DU, Delhi. Presentation titled, "Assessment of NIH's clinical trials repository with respect to stem cell therapeutic potential for treating hematological disorders".

POSTER PRESENTED IN THE ABOVE CONFERENCE

Assessment of NIH's clinical trials repository with respect to stem cell therapeutic potential for treating hematological disorders

Akansha, Priya Roy, Priya Talwar, Lakshay Bhardwaj, Supriya Bhardwaj, Nimita Kant*, Jitendra Kumar Chaudhary*

Department of Zoology, Shivaji College, University of Delhi, India. 110027

**Corresponding authors; Email: nimitakant@gmail.com ; jnujitendra@gmail.com*

Abstract

Incidences and mortalities owing to the hematological cancer is quite considerable worldwide. In US alone, cumulative estimated new cases and death for the year 2023 owing to the lymphoma, myeloma, and leukemia are 186,720 and 57368, respectively[1]. Stem cell-based therapies have remarkably succeeded in treating above-mentioned hematological disorders (HDs). These studies, highlighting the beneficial effects, are available as National Organ Donation (nod.hrsa.gov) and international repositories (ClinicalTrials.gov). Careful consideration of such repositories reveal that the allogeneic HSCT remains a well-established treatment for both non-cancerous HDs — anemia, sickle cell disease, and thalassemia — and cancerous HDs — leukemia, lymphoma, and myeloma, among others. Advances in gene editing are also enabling the development of more targeted and customized therapies. Until recently, there have been around 10968 clinical trials with regard to Hematological disorders, of which 2068 involved stem cells as therapeutic intervention. Amongst various categories of stem cells, bone marrow resident stem cells (BZS) have been used more often. Moreover, stem cells are also combined to effectively treat hematological disorders. Stem cells offer multiple mechanisms to treat these disorders, including mobilization to the injured and/or degenerated tissue site and differentiating into specific cell types. In addition, they secrete a myriad of growth and rejuvenation factors, thereby alleviating pathological symptoms and associated diseases. The mechanism underlying stem cell mobilization and growth factor secretion relies upon a comprehensive signaling pathway.

Results

1. Global frequency of clinical trials for various disease involving stem cells and other relevant interventions

As of 2023, nearly 45992 clinical trials for various diseases and health-related conditions have been reported worldwide. Of this, nearly 9682 (1.67%) used stem cells, hoping to find prospective therapeutic modalities. Furthermore, of 9682 clinical trials using stem cells, around 2065 (20.84%) clinical trials were carried out for hematological disorders with differential rates of success (Fig. 1).

Figure 1. Frequency of clinical trials for various disorders/diseases.

1. Global frequency of clinical trials for hematological disorders

There are two broad categories of HDs — non-cancerous (benign), which primarily include anemia, sickle cell disease, and thalassemia; and cancerous (malignant) — Leukemia, Lymphoma, and Myeloma.

- Sickle cell disease (SCD) is a genetic blood disorder that affects the red blood cells, predominantly in African and other tropical countries. In India, SCD is prevalent in certain states, especially in tribal and rural populations. The exact prevalence varies by region. As of May 2023, around 968 clinical trials have been reported globally regarding sickle cell disease (SCD), of which nearly 110 (13.42%) relied on stem cells as therapeutic intervention.
- Thalassemia is a genetic blood disorder characterized by abnormal production of hemoglobin, the protein in red blood cells that carries oxygen, requiring frequent blood transfusions to keep up the hemoglobin levels. As of May 2023, around 441 clinical trials have been reported regarding thalassemia, of which nearly 96 (21.76%) relied on stem cells as therapeutic interventions.
- Anemia is characterized by a condition with a reduced number of red blood cells or hemoglobin concentration within them, resulting in a decreased capacity of the blood to carry oxygen to the body's tissues. As of May 2023, around 4218 clinical trials have been reported regarding global anemia, of which nearly 406 (9.57%) relied on stem cells as therapeutic interventions.

Figure 2. HDs and stem cell-based clinical trials completed worldwide

- Leukemia is a group of blood cancers that affect the bone marrow and blood. In leukemia, there is an uncontrolled growth of abnormal white blood cells (leukocytes). As of 2023, 7827 clinical trials have been reported globally regarding leukemia, of which nearly 1482 (18.93%) relied on stem cells as therapeutic interventions.
- Lymphoma, cancer of the lymphatic system, begins when healthy cells in the lymphatic system (B and T Lymphocytes, lymph nodes, lymphatic organs, and lymphatic vessels) change and grow out of control. As of May 2023, 8668 clinical trials have been reported globally regarding lymphoma, of which nearly 1381 (16.86%) relied on stem cells as therapeutic intervention.
- Multiple myeloma, often referred to simply as myeloma, is a type of cancer that affects plasma cells in the bone marrow. As of May 2023, 3334 clinical trials have been reported worldwide regarding Myeloma, of which nearly 868 (25.95%) relied on stem cells as therapeutic interventions. (Fig. 2)

2. Age-specific categorization of clinical trials for hematological disorders

Clinical trials for hematological disorders, which affect the blood and blood-forming tissues, often involve patients of different age groups. The categorization of these trials by age is important because the nature of hematological disorders can vary by age, and treatment approaches may differ accordingly. In other words, the age-specific categorization of clinical trials helps ensure that treatments are tailored to the unique needs and characteristics of patients within different age ranges. It also facilitates the collection of age-specific data on treatment outcomes and safety profiles, which can inform clinical practice and improve patient care. Moreover, several clinical trials use patients of all age groups as long as they meet the other standard inclusion criteria of the trials (Fig. 3).

Figure 3. Age-specific frequency of clinical trials for hematological disorders

4. Categories of stem cells used for clinical trials

Stem cells are a versatile type of cell that can differentiate into various specialized cell types, and they hold significant promise for regenerative medicine and clinical applications. Stem cells used in clinical trials can be broadly categorized into several types based on their source and properties. Here are some of the main categories of stem cells used in clinical trials for HDs. For instance, mesenchymal stem cells, often obtained from bone marrow, adipose tissue (fat), or other sources like umbilical cord tissue, are Multipotent, capable of differentiating into a limited range of cell types, including bone, cartilage, and fat cells. Used in a variety of clinical trials for their regenerative potential and immunomodulatory properties. Similarly, hematopoietic stem cells (HSCs), found in bone marrow and blood, are responsible for the formation of blood cells. Other stem cells are cord blood stem cells, and peripheral blood stem cells, amongst others (Fig. 5). In recent times, induced pluripotent stem cells have also been used in clinical trials for hematological disorders, showing great promise for the future.

Figure 4. Categories of stem cells

3. Transplantation of stem cells used for clinical trials

Stem cell transplantation involves several steps, depending on the type of stem cell is used and the specific condition being treated. Pre-transplant evaluation: Before undergoing stem cell transplantation, the patient undergoes a thorough medical evaluation to assess their overall health and suitability for the procedure. This evaluation includes medical history, physical examination, blood tests, imaging studies, and other specialized tests as needed. Donor selection: For allogeneic stem cell transplantation (using stem cells from a donor), a suitable donor needs to be identified. This can be a matched sibling, an unrelated volunteer donor, or umbilical cord blood from a public cord blood bank. Donor compatibility is determined based on human leukocyte antigen (HLA) typing to minimize the risk of rejection. Stem cell mobilization and collection: In HSCT, hematopoietic stem cells are typically collected from the donor's bone marrow or peripheral blood. Before collection, the donor may undergo stem cell mobilization, which involves administering growth factors or chemotherapy to stimulate the release of stem cells from the bone marrow into the bloodstream. Peripheral blood stem cells are then collected through a process called apheresis, where blood is drawn from the donor, stem cells are separated from the blood using a machine, and the remaining blood components are returned to the donor. Conditioning regimen: Prior to stem cell transplantation, the patient may undergo a conditioning regimen, which involves high-dose chemotherapy, radiation therapy, or a combination of both. The goal of the conditioning regimen is to destroy cancer cells (in the case of cancer treatment) and suppress the recipient's immune system to prevent rejection of the donor stem cells. Stem cell infusion: Once the conditioning regimen is completed, the donor stem cells are infused into the patient's bloodstream through a central venous catheter, similar to a blood transfusion. The infused stem cells travel to the bone marrow, where they engraft and begin to produce new blood cells.

Engraftment and recovery: Engraftment refers to the successful establishment of the donor stem cells in the recipient's bone marrow and the production of new blood cells. During this time, the patient is closely monitored for signs of engraftment, infection, and other complications. Recovery: following stem cell transplantation can be a lengthy process, often requiring weeks to months. Hospitalization and follow-up care.

Post-transplant care: After discharge from the hospital, patients continue to receive close monitoring and supportive care to manage complications, prevent infections, and support the recovery of the immune system and other organs. This may include medications to prevent graft-versus-host disease (in allogeneic transplantation), antibiotics, antifungal medications, and supportive therapies such as blood transfusions and nutritional support.

5. Transplantation of HSCs for restoration of Hematopoiesis

A. Exposure of mice to radiation
B. Transplantation of MSCs following irradiation
C. Colony formation Assay (Giemsa Staining)
D. Morphology of cells in colonies
E. Size of colony
F. Quantitation of colonies following transplantation
G. Quantitation of colony size

7. Proposed mechanism of regenerative potential of stem cells

Basic mechanism involving secretion of stem cell activation factors from injured tissue, activation and mobilization, secretion of growth and differentiation factors & aiding the bone marrow MSC-mediated tissue repair.

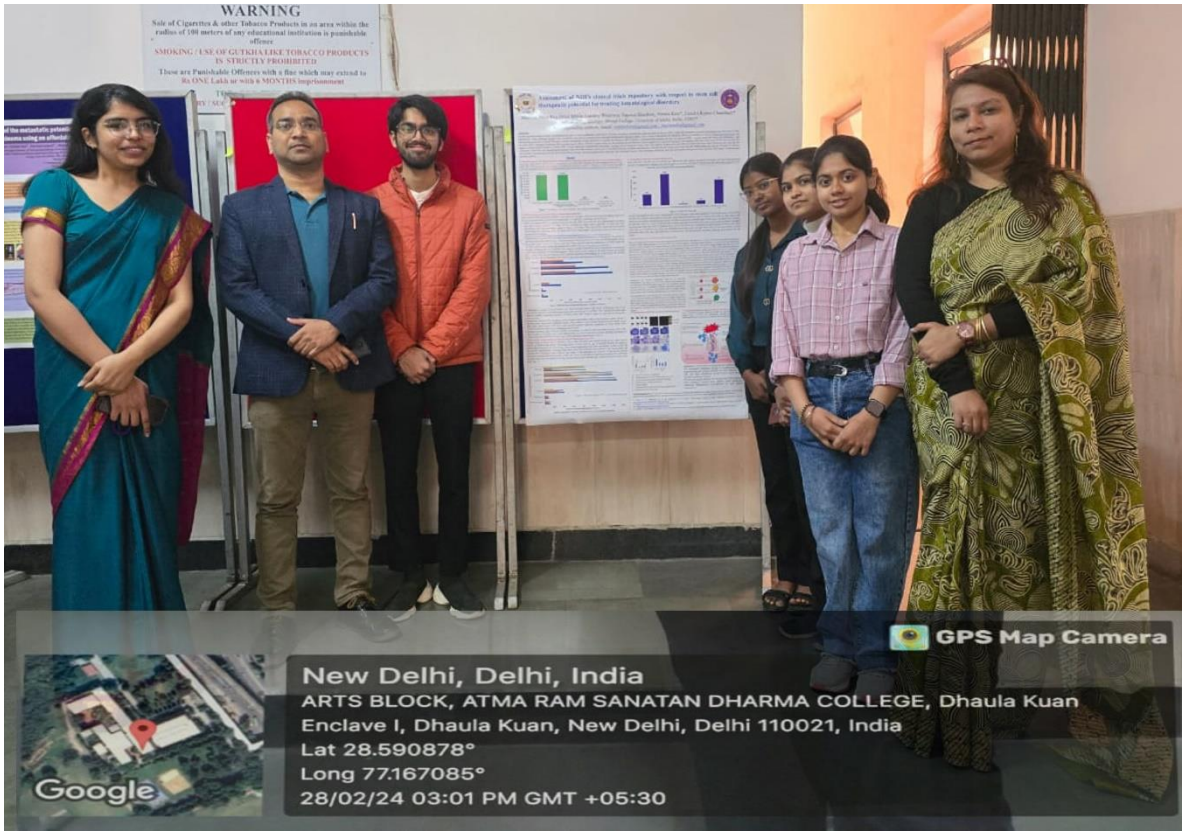
Conclusion: Clinical trials are paving the way for development of new therapeutic modalities, aiming at complementing and/or supplementing the existing treatment for HDs. Moreover, stem cells and stem cell-derived growth factors may constitute standalone treatment in future.

We have also shown that stem cell transplantation following whole body irradiation restores bone marrow tissue architecture, supporting hematopoiesis accomplished via bone marrow regeneration.

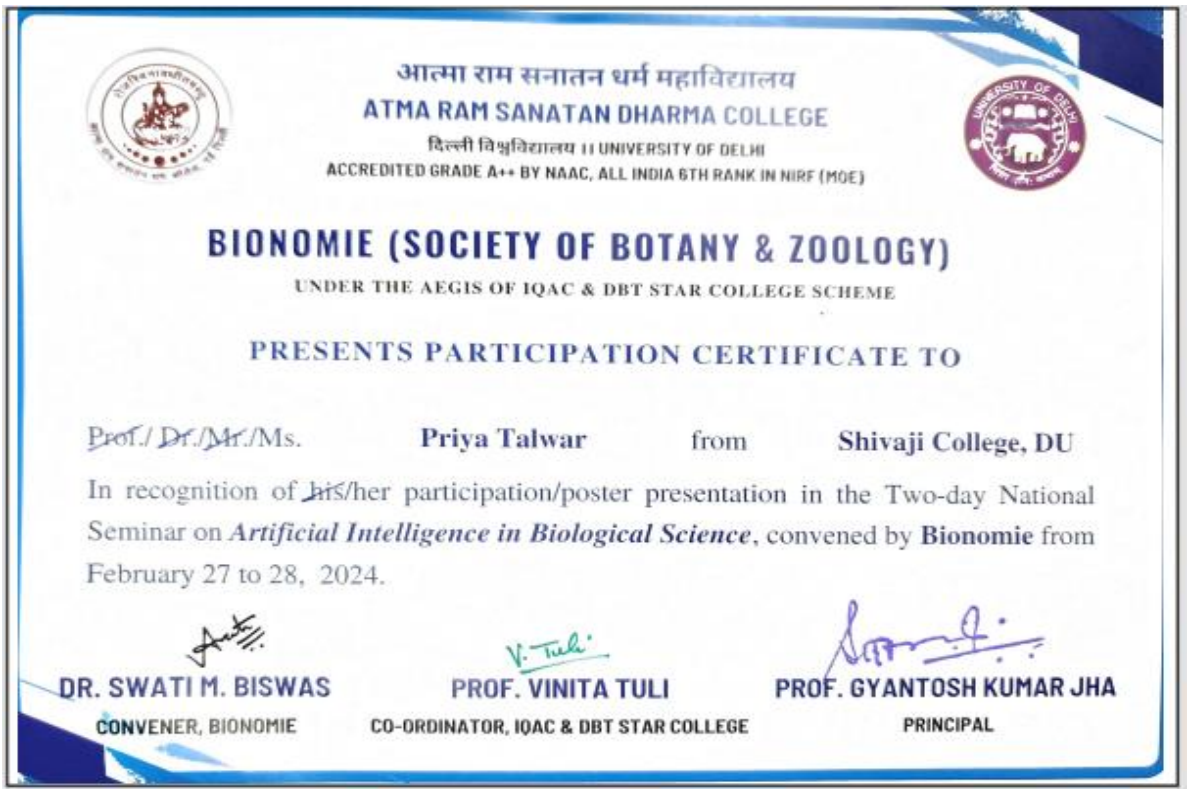
Acknowledgement: We would like to acknowledge intramural funding by the Research cell, Shivaji College, University of Delhi. We also greatly appreciate and acknowledge NIH for making all the clinical trial data available as open access digital repository for benefit to researchers.

1. Tsitsi, A. T., Stuchenoff, D. J., & Coppelliti, M. D. (2018). Thalassemia. *Lancet (London, England)*, *391*(10116), 155–167. https://doi.org/10.1016/S0140-6736(17)31822-6
2. Whiteley, A. E., Price, T. T., Cantelli, G., & Sipkins, D. A. (2021). Leukaemia: a model metastatic disease. *Nature reviews. Cancer*, *21*(7), 461–475. https://doi.org/10.1038/s41568-021-00355-z
3. Laurenti, E., & Göttgens, B. (2018). From haematopoietic stem cells to complex differentiation landscapes. *Nature*, *553*(7689), 418–426.

GEO TAGGED PICTURE OF THE ABOVE CONFERENCE



CERTIFICATE



आत्मा राम सनातन धर्म महाविद्यालय

ATMA RAM SANATAN DHARMA COLLEGE

दिल्ली विश्वविद्यालय | UNIVERSITY OF DELHI

ACCREDITED GRADE A++ BY NAAC, ALL INDIA 6TH RANK IN NIRF (MOE)

BIONOMIE (SOCIETY OF BOTANY & ZOOLOGY)

UNDER THE AEGIS OF IQAC & DBT STAR COLLEGE SCHEME

PRESENTS PARTICIPATION CERTIFICATE TO

~~Prof./ Dr./Mr./~~Ms. **Priya Talwar** from **Shivaji College, DU**

In recognition of ~~his~~/her participation/poster presentation in the Two-day National Seminar on ***Artificial Intelligence in Biological Science***, convened by **Bionomie** from February 27 to 28, 2024.

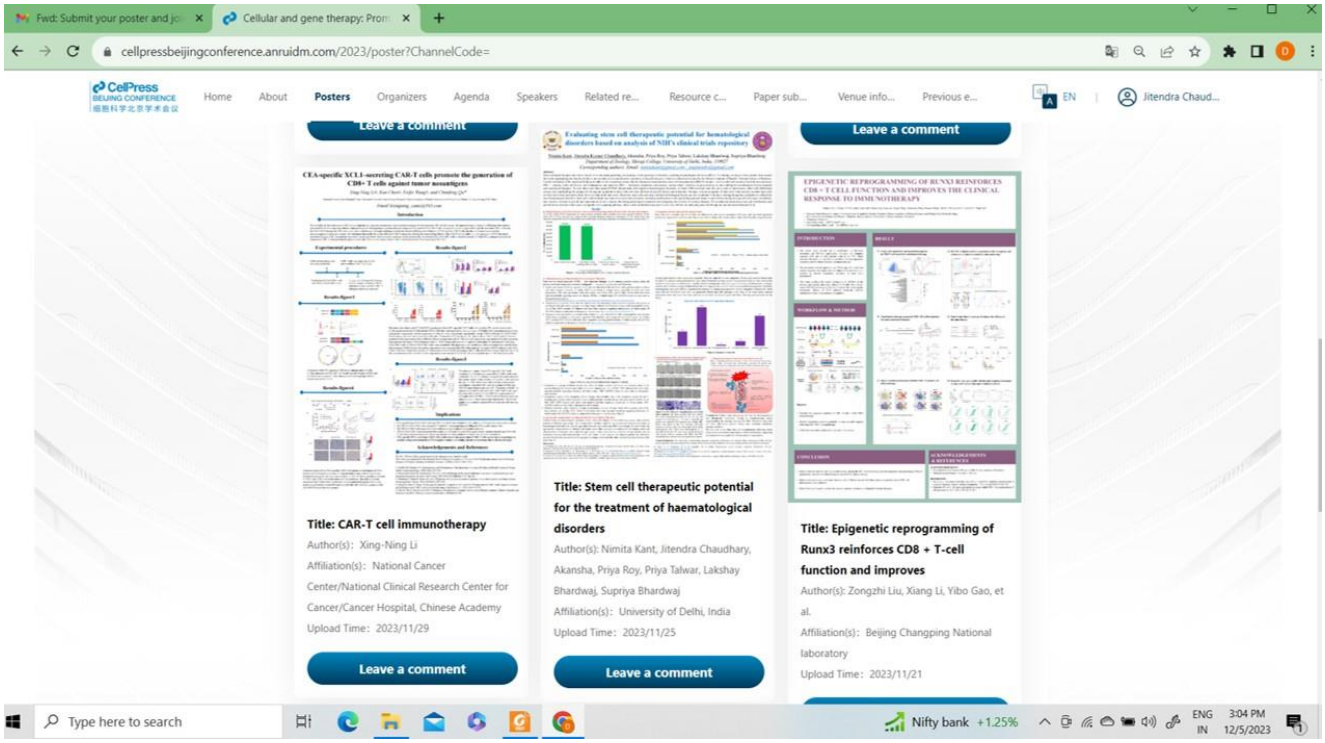
DR. SWATI M. BISWAS
CONVENER, BIONOMIE

PROF. VINITA TULI
CO-ORDINATOR, IQAC & DBT STAR COLLEGE

PROF. GYANTOSH KUMAR JHA
PRINCIPAL

2. Nimita Kant, Jitendra Chaudhary, Akansha, Priya Roy, Priya Talwar, Lakshay Bhardwaj, Supriya Bhardwaj (2023). Evaluating stem cell therapeutic potential for hematological disorders based on analysis of NIH's clinical trials repository. International conference hosted by Cell Press and Beijing Municipal Science and Technology Commission, Administrative Commission of Zhongguancun Science Park. "Cellular and gene therapy: Promises and challenges", on December 07, 2023. Cellular and gene therapy: Promises and challenges (anruidm.com)

POSTER PRESENTED IN THE ABOVE CONFERENCE



Project Completion Event:

POSTER OF THE CRC EVENT

GEO-TAGGED PHOTO OF THE EVENT

CERTIFICATE

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ
College Research & Innovation Cell
शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)
Shivaji College (University of Delhi)
नई दिल्ली - ११० ०२७/New Delhi – 110 027

विकसित भारत अभियान

CERTIFICATE OF APPRECIATION

Awarded to

Priya Roy, B.Sc (H) Zoology, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0006

Project Title: Developing Insights into Stem Cell Therapeutic Potential for Hematological Disorders based on Analysis of National Institute of Health (NIH)'s Clinical Trails Repertoire

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

SUBMITTED BY:

MS. NIMITA KANT

ASSOCIATE PROFESSOR

DR. JITENDRA KR. CHAUDHARY

PRINCIPAL INVESTIGATOR(S)

Shivaji College

UNIVERSITY OF DELHI

College Research and Innovation Cell

1. PROJECT FILE NO.: MRP/2022-2023/003

2. PROJECT TITLE : Impact of Elevated Temperature on the Seed Germination of Medicinal Plants (*Catharanthus roseus* and *Trigonella foenum-graecum)*

3. PRINCIPAL INVESTIGATORS (NAME, DEPARTMENT, EMAIL, PHONE NO.):

NAME OF THE P.I.	DEPARTMENT	EMAIL	PHONE NO.
Dr. Kiran Bamel	Department of Botany	kbamel@yahoo.in	9871821477
Dr. Seema Talwar	Department of Botany	seematalwar2014@gmail.com	9990426595

4. STUDENTS INVOLVED IN THE PROJECT (NAME, DEPARTMENT, EMAIL ID AND PHONE NUMBER)

NAME OF THE STUDENTS	DEPARTMENT	EMAIL	PHONE NO.
Ankit	Botany(H) IV sem	ankittiwary88598@gmail.com	9650216468
Gautam S.	Life Sc. IV sem	gautastiko1612@gmail.com	9445773735
Palak	Life Sc. IV sem	palak.krishnaz@gmail.com	9821454881
Shaurya	Life Sc. IV sem	shaurya54@gmail.com	7976057667
Tribeni	Botany (H) IV sem	sharmatribeni2021@gmail.com	9085652712

ABSTRACT BOOK

Annual National Conference
on

ADVANCES IN PLANT BIOLOGY (APB 2024):

Innovations and Strategies for Sustainable Agricultural Productivity for Viksit Bharat @2047

Saturday, February 10th, 2024
Venue: Pt. Madan Mohan Malaviya Auditorium,
Hansraj College, University of Delhi

Organised by:
Department of Botany, Hansraj College
in collaboration with
Mahatma Hansraj Malaviya Mission Teacher Training Centre
(MH-MMTTC)

Impact of Nano Particles in Combating the High Temperature Stress in Crops

[1]Gautam, [2]Tribeni, [1]Shaurya, [2]Ankit, [1]Palak, [2]Seema Talwar* and [2]Kiran Bamel
[1]Department of Life Science, Shivaji College, University of Delhi
[2]Department Of Botany, Shivaji College, University of Delhi

*Email: seematalwar@shivaji.du.ac.in

Indian agricultural system is under tremendous pressure due to the climate change. The anthropogenic interferences have accelerated the earth's surface temperature, causing abiotic stress to the plants which results in the loss of plant growth and productivity. The various types of abiotic stresses like salinity, high or low temperature, flooding or drought are known to curb the growth and productivity of plants (Hayat et al., 2023). Many promising techniques have been adopted to overcome these negative effects of climate change, i.e., the practising of tolerant genotypes, application of different plant growth regulators, and the use of organic fertilizers. These adverse effects of climate change have been seen to be counteracted by the use of these nanoparticles making the crops more resilient and stress tolerant. Nanotechnology promises to increase crop yield by improving plant tolerance mechanisms under abiotic stress conditions. Selenium nanoparticles reduced the impact of heat stress in sorghum (Djanaguiraman *et al. 2018)*. The application of biological selenium NPs at 100 µg/mL increased plant productivity by improving plant growth, photosynthetic rate, and gas exchange at elevated temperatures in *Triticum aestivum* L. (El-Saadony et al., 2021). Similarly, the application of ZnO and TiO_2 also improved membrane stability and antioxidant defense mechanism in root and shoot parameters in wheat (Thakur et al., 2021). The ability of nano-ZnO NPs to regulate osmotic potential and reduction in thylakoid damage by activating antioxidant defense, ensured higher plant production.In mungbean, also the application of nano-ZnO NPs at elevated temperature increased chlorophyll activity, gas exchange parameters, and enzymatic balance, which resulted in an increase in pod number, size, and total grain yield (Kareem et al. 2022).

The nano particles help the plant to evade the stress at biochemical, molecular and physiological levels (Al-Khayri et al., 2023). Therefore, this study investigates the application of nanoparticles in seeking sustainable agriculture and lessening the adverseeffects of abiotic stress.

Annual National Conference on

Advances in Plant Biology

(APB 2024)

Innovation and Strategies for Sustainable Agricultural Productivity for Viksit Bharat@2047

HANSRAJ COLLEGE, NEW DELHI, INDIA

Certificate for Poster Presentation

This certificate is awarded to Gautam Tribeni for presenting a poster on Impact of Nano Particles in Combating the High Temperature Stress in Crops authored by Gautam Tribeni, Shaurya, Ankit, Palak, Seema Talwar, and Kiran Bamel in the Annual National Conference on Advances in Plant Biology (APB 2024), themed "Innovation and Strategies for Sustainable Agricultural Productivity for Viksit Bharat@2047," held on Saturday, February 10, 2024, at Hansraj College, New Delhi, India.

Dr. Pooja Jha Maity	Dr. Savita	Dr. Ashutosh Yadav	Prof. Vijay Rani Rajpal	Prof. (Dr.) Rama
Convener, Assistant Professor Hansraj college	Convener, Assistant Professor Hansraj college	Coordinator, MH-MMTTC Hansraj College	Teacher incharge Vice Principal Hansraj College	Principal Hansraj College


Impact of Nano Particles in Combating High Temperature Stress in Crops

Youth Environment Summit
(18th & 19th April, 2024)

Impact of Elevated Temperature on Seed Germination in Methi (*Trigonella*)

Shaurya[1], Ankit[2], Gautam[1], Tribeni[2], Palak[1], Seema Talwar[2], Kiran Bamel[2]
[1]*Department of Life Science, Shivaji College, University of Delhi*
[2]*Department of Botany, Shivaji College, University of Delhi*
**Correspondence: seematalwar@shivaji.du.ac.in*

Abstract

Biodiversity loss is one of the most serious concerns worldwide as the survival of many species is at the risk due to the alterations in temperature. Agriculture sector is facing the impact of these weather fluctuations that has the drastic reductions in crop yield and productivity. It has become the challenge especially in those countries where agriculture is an integral part of their economy. The change in climate is not only posing a threat to the amount of available food but also to the nutrients laden in the food items which is another grave concern in feeding the ever-increasing population. A large number of the world's population, depends on herbal medicine to prevent and cure diseases, and most of the synthetic drugs are also getting manufactured from medicinal plants. Fenugreek is traditionally used in India, especially in the Ayurveda and Unani systems. It is a plant that has been extensively used as a source of antidiabetic compounds, from its seeds, leaves and extracts in different model systems. In the present investigation the effect of control (room temperature) and elevated temperature was studied on the seed germination percentage and it was concluded that though seed germination was enhanced at higher temperature than room temperature, but chlorophyll, carotenoid and protein content in leaves and number of root nodules have been adversely affected.

CERTIFICATE

OF PARTICIPATION IN
YOUTH ENVIRONMENT SUMMIT 2024:
NATIONAL CONFERENCE ON ROLE OF YOUTH LEADERSHIP IN ENVIRONMENT AND SUSTAINABILITY

This is to certify that ~~Dr.~~/~~Ms.~~/Mr. ***Ankit Kumar*** has successfully presented oral/poster paper titled ***Impact of Elevated Temperature on Seed Germination in Methi (Trigonella)*** at National conference on role of youth leadership in Environment and Sustainability held on 18-19th April 2024 held during the Youth Environment Summit organized by University School of Environment Management at Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi.

Prof. Varun Joshi Dean,USEM	Dr. Pamposh Organizer, USEM	Dr. Sumit Dookia Organizer, USEM

CERTIFICATE

OF PARTICIPATION IN
YOUTH ENVIRONMENT SUMMIT 2024:
NATIONAL CONFERENCE ON ROLE OF YOUTH LEADERSHIP IN ENVIRONMENT AND SUSTAINABILITY

This is to certify that ~~Dr.~~/~~Ms.~~/Mr. ***Shaurya*** has successfully presented oral/poster paper titled ***Impact of Elevated Temperature on Seed Germination in Methi (Trigonella)*** at National conference on role of youth leadership in Environment and Sustainability held on 18-19th April 2024 held during the Youth Environment Summit organized by University School of Environment Management at Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi.

Prof. Varun Joshi
Dean,USEM

Dr. Pamposh
Organizer, USEM

19.4.2024

Dr. Sumit Dookia
Organizer, USEM

CERTIFICATE

OF PARTICIPATION IN
YOUTH ENVIRONMENT SUMMIT 2024:
NATIONAL CONFERENCE ON ROLE OF YOUTH LEADERSHIP IN ENVIRONMENT AND SUSTAINABILITY

This is to certify that ~~Dr.~~/Ms./~~Mr.~~ ***Tribeni Sharma*** has successfully presented oral/poster paper titled ***Impact of Elevated Temperature on Seed Germination in Methi (Trigonella)*** at National conference on role of youth leadership in Environment and Sustainability held on 18-19th April 2024 held during the Youth Environment Summit organized by University School of Environment Management at Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi.

Prof. Varun Joshi	Dr. Pamposh	Dr. Sumit Dookia
Dean,USEM	Organizer, USEM	Organizer, USEM

CERTIFICATE

OF PARTICIPATION IN
YOUTH ENVIRONMENT SUMMIT 2024:
NATIONAL CONFERENCE ON ROLE OF YOUTH LEADERSHIP IN ENVIRONMENT AND SUSTAINABILITY

This is to certify that ~~Dr./~~Ms./Mr. ***S. Gautam*** has successfully presented oral/poster paper titled ***Impact of Elevated Temperature on Seed Germination in Methi (Trigonella)*** at National conference on role of youth leadership in Environment and Sustainability held on 18-19th April 2024 held during the Youth Environment Summit organized by University School of Environment Management at Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi.

Prof. Varun Joshi Dean,USEM	Dr. Pamposh Organizer, USEM	Dr. Sumit Dookia Organizer, USEM

CERTIFICATE

OF PARTICIPATION IN
YOUTH ENVIRONMENT SUMMIT 2024:
NATIONAL CONFERENCE ON ROLE OF YOUTH LEADERSHIP IN ENVIRONMENT AND SUSTAINABILITY

This is to certify that ~~Dr.~~/Ms./~~Mr.~~ ***Palak*** has successfully presented oral/poster paper titled ***Impact of Elevated Temperature on Seed Germination in Methi (Trigonella)*** at National conference on role of youth leadership in Environment and Sustainability held on 18-19th April 2024 held during the Youth Environment Summit organized by University School of Environment Management at Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi.

Prof. Varun Joshi	Dr. Pamposh	Dr. Sumit Dookia
Dean,USEM	Organizer, USEM	Organizer, USEM

19.4.2024


University School of Environment Management
Guru Gobind Singh Indraprastha University, New Delhi
is organising
Youth Environment Summit 2024
on
18th-19th April 2024
9.30 am onwards | E-Block Auditorium, GGSIPU
E-BLOC

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ
College Research & Innovation Cell
शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)
Shivaji College (University of Delhi)
नई दिल्ली - ११० ०२७/New Delhi – 110 027

विकसित भारत अभियान 1947 TO 2047

CERTIFICATE OF APPRECIATION

Awarded to

Ankit, B.Sc (H) Botany, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0003

Project Title: Impact of Elevated Temperature on the Seed Germination of Medicinal plants (Catharanthus roseus and Trigonell a foenum-graecum)

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ

College Research & Innovation Cell

शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)

Shivaji College (University of Delhi)

नई दिल्ली - ११० ०२७/New Delhi – 110 027

CERTIFICATE OF APPRECIATION

Awarded to

Tribeni, B.Sc (H) Botany, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0003

Project Title: Impact of Elevated Temperature on the Seed Germination of Medicinal plants (Catharanthus roseus and Trigonell a foenum-graecum)

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ

College Research & Innovation Cell

शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)

Shivaji College (University of Delhi)

नई दिल्ली - ११० ०२७/New Delhi – 110 027

CERTIFICATE OF APPRECIATION

Awarded to

Gautam, B.Sc. (Prog.) Life Sciences, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0003

Project Title: Impact of Elevated Temperature on the Seed Germination of Medicinal plants (Catharanthus roseus and Trigonell a foenum-graecum)

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ

College Research & Innovation Cell

शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)

Shivaji College (University of Delhi)

नई दिल्ली - ११० ०२७/New Delhi – 110 027

CERTIFICATE OF APPRECIATION

Awarded to

Shorya, B.Sc. (Prog.) Life Sciences, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0003

Project Title: Impact of Elevated Temperature on the Seed Germination of Medicinal plants (Catharanthus roseus and Trigonell a foenum-graecum)

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

महाविद्यालय अनुसंधान एवं नवाचार प्रकोष्ठ
College Research & Innovation Cell
शिवाजी कॉलेज (दिल्ली विश्वविद्यालय)
Shivaji College (University of Delhi)
नई दिल्ली - ११० ०२७/**New Delhi – 110 027**

विकसित भारत अभियान

CERTIFICATE OF APPRECIATION

Awarded to

Palak, B.Sc. (Prog.) Life Sciences, Shivaji College

for working in the Minor Research Project sanctioned in the academic session 2022-2023 under the Intramural Research Scheme of the college.

Project Reference No.: MRP/2022-2023/0003

Project Title: Impact of Elevated Temperature on the Seed Germination of Medicinal plants (Catharanthus roseus and Trigonell a foenum-graecum)

Dr. Prabuddh Kumar Mishra
Convener

Prof. Virender Bhardwaj
Principal

National Conference on

'ADVANCES IN PURE AND APPLIED MATHEMATICS'

22nd September, 2023

BOOK OF ABSTRACTS

'MACMAS 23'

Organised by

PG & Research
Department of Mathematics

Malankara Catholic College

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamilnadu)

Mariagiri, Kaliakkavilai, Kanyakumari District - 629153
Tamil Nadu, India

Accredited by NAAC with B+ in 2004, ISO 9001-2000 certified

Editors
Dr. M. Regees
Dr. C. David Raj
Dr. K. Vijila Dafini
Dr. S L Victoria Jayafin Nisha
Mr. R. Ribin Christal

MACMAS'23 – 42

Non-Linear Regression Model for Fruit Volume Estimation

[1*]Neetu Rani, [2]Savita Garg, [3]Nitesh Saini and [1]Sneha Gupta
[1]Department of Mathematics, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
[2]Department of Mathematics, Mukand Lal National College, Yamuna Nagar-135001, Haryana, India.
[3]Department of Computer Science, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
*Corresponding author: anresearch2023@gmail.com

Abstract : With remarkably rising fruit demands today, the volume of fruits is playing a crucial role from accurate yield prediction to sales. The presented study elucidates a non-destructive technique and algorithm employed for fruit volume estimation through a non-linear regression model. This mathematical model reflects the existence of non-linear relationships between a fruit's physical attributes and its volume, based on its four diameters: equatorial, axial, top, and bottom. This model predicted coefficients of diameters for respective equations. The accuracy of this model was compared with the experimental results and thoroughly evaluated, considering potential overfitting and its generalisation capability to new data. This model holds significant value for both scientific and practical applications. Future work may involve continuous monitoring and model updating to address seasonal and fruit variations. This study underscores the importance of data quality and model evaluation, accounting for the ever-evolving research sector, thereby providing a robust model.

MACMAS'23 – 43

Meta Study of Non-Destructive Mathematical Modeling Methods for Fruit Volume Estimation

[1*]Neetu Rani, [2]Savita Garg, [1]Shashvat Kumar Mishra, [3]Saloni
[1]Department of Mathematics, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
[2]Department of Mathematics, Mukand Lal National College, Yamuna Nagar-135001, Haryana, India.
[3]Department of Botany, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
*Corresponding author: anresearch2023@gmail.com

Abstract : Lately, the international fruit trade has seen growth propelled by augmented profits and a heightened emphasis on wellness-consciousness associated with fresh edibles. Accurate fruit volume estimation is crucial for predicting harvests, improving productivity, and refining sorting/packaging. Non-destructive techniques enhance sustainability by reducing fruit loss during evaluation. This study employs a comprehensive investigation and meta-analysis to explore various non-destructive methods and algorithms for fruit volume measurement through mathematical models. It reveals statistical and geometric modeling approaches, showcasing method effectiveness through comparative analyses of various metrics and parameters.

MACMAS'23 – 44

Non-Destructive Fruit Volume Prediction Using Linear Modeling Algorithms

[1*]Neetu Rani, [2]Savita Garg, [3]Kiran Bamel, [1]Raghav Anand Nath, [1]Ishita Mishra

[1]Department of Mathematics, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.

[2]Department of Mathematics, Mukand Lal National College, Yamuna Nagar-135001, Haryana, India.

[3]Department of Botany, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.

*Corresponding author: anresearch2023@gmail.com

Abstract : As the demand for fruits continues to rise, accurately measuring fruit volume has become increasingly important for predicting yields and developing effective sales strategies. In this study, a non-destructive approach using a Linear Model to estimate fruit volume has been proposed. By establishing connections between various dimensions of the fruit (such as equatorial, axial, top, and bottom measurements) and their respective volumes, the model incorporates dimension-specific coefficients. To ensure the reliability of the findings of the study, a rigorous evaluation of the model's accuracy has been conducted by comparing it against experimental data. Concerns regarding overfitting have also been addressed and its potential applicability to new datasets has been examined. The study underscores the importance of data quality, comprehensive model evaluation, and practical usefulness in determining accurate fruit volume measurements. Moving forward, future research could focus on continuously monitoring and refining the model to consider seasonal variations and specific differences in fruits. This ongoing work underscores the ever-changing nature of research and its valuable contributions to developing a strong and versatile model with practical applications in various real-world scenarios.

MACMAS'23 – 45

Analysis of Non-destructive Methods for Fruit Maturity Assessment

[1*]Neetu Rani, [2]Savita Garg, [3]Kiran Bamel, [1]Vaibhav Bhatt, [4]Sourabh Sharma
[1]Department of Mathematics, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
[2]Department of Mathematics, Mukand Lal National College, Yamuna Nagar-135001, Haryana, India.
[3]Department of Botany, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
[4]Department of Physics, Shivaji College (University of Delhi), Raja Garden, Delhi – 110027, India.
*Corresponding author: anresearch2023@gmail.com

Abstract : With rising consumer awareness, the assessment of fruit maturity plays a pivotal role in determining the ideal harvest time for achieving maximum quality and extending shelf life of fruits. The influence of environmental factors and inconsistency of outcomes underscores the complexity of fruit quality assessment. The conducted study presents a meta-analysis of research articles published in recent years, shedding light on techniques and algorithms used for fruit quality grading. Upon reviewing the articles, machine vision and spectroscopy, among other approaches, were identified as key categories. Heterogeneity analysis indicated substantial diversity among these categories which suggested the need for further exploration to identify potential sources of variation. To assess the risk of publication bias, statistical tests were conducted which provided no strong evidence in favor of it. Effect measures based on accuracy of the studies were also calculated for different categories to evaluate the relationship between categories and their predictive strength.

MACMAS'23 – 46

On M-projective curvature tensor of Sasaki-Kenmotsu manifolds admitting Zamkovoy connection

[1]Pavithra R C and [2]H G Nagaraja

Department of Mathematics, Bangalore University, Jnana Bharathi, Bengaluru-560056, Karnataka, India,

e-mail: [1]Pavithrarc91@gmail.com, [2]hgnraj@yahoo.com

Abstract: The purpose of this paper is to study some properties of a Sasaki-Kenmotsu manifold admitting the Zamkovoy connection. We prove that M-projectively flat Sasaki-Kenmotsu manifold admitting the Zamkovoy connection is an η-ω-Einstein manifold. Further if $\bar{R}(X,Y)\cdot\bar{S}=0$, then the Ricci tensor $\bar{S}$ with respect to Zamkovoy connection has three different non-zero eigen values, moreover, if the manifold admits Zamkovoy connection then under infinitesimal contact transformation, the Ricci tensor of the manifold remains invariant.

MALANKARA CATHOLIC COLLEGE

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamilnadu)
Mariagiri, Kallakkavilai, Kanyakumari District - 629153
Tamil Nadu, India
Accredited by NAAC with B+ in 2004, ISO 9001-2000 certified
PG & RESEARCH DEPARTMENT OF MATHEMATICS

MACMAS 23

"National Conference on ADVANCES IN PURE AND APPLIED MATHEMATICS"

CERTIFICATE

This is to certify that ~~Mr/Ms/Dr~~ Ishita Mishra, Student, Shivaji College, University of Delhi, Delhi has presented a paper entitled Non-Destructive Fruit Volume Prediction Using Linear Modelling Algorithms in the National Conference on "ADVANCES IN PURE AND APPLIED MATHEMATICS" organized by PG & Research Department of Mathematics, Malankara Catholic College held on 22nd September 2023.

Head & Convener

Organizing Secretary

Principal i/c