SRI VENKATESWARA COLLEGE

Novel learning approches **(14 March, 2024)**

Dr. Manoj Thakur
Assistant professor
Department of Botany

Seminar by students on " Fundamentals of presenting scientific topics "

The students enrolled in the second semester of the Botany (Hons.) program expressed interest in acquiring foundational skills and knowledge related to presenting scientific topics. In response to their curiosity, a classroom session was conducted to discuss the fundamental principles of creating effective PowerPoint presentations, with help of exclusive tools such as font styles, sizes, color themes, animations, and other relevant features . Additionally , the topic of Microbial application in various field (Applied microbiology) was introduced and explored in detail. The class was divided into six groups , with each student assigned a specific subtopic within the broader theme of Applied microbiology.

General guidelines were provided to assist students in preparing their presentations and appropriately referencing sources. A five-week time frame was allotted for the students develop. Subsequently, a one-day seminar titled " Microbial applications in various fields " was organized on March 14, 2024 in the Botany Department's Honours Lab. The seminar was aligned with the curriculum of their DSC-4 (Microbiology and plant-microbe interactions) subject.

Each student's individual slides were compiled into a PDF document and appended to the report for reference. Overall, these initiatives aimed to empower students with essential presentation skills and deepen their understanding of scientific concepts related to Applied microbiology.

Figure 1 : Group 1 participants (Shruti, Atul, Aayushi) while presenting

Group 1 (Shruti, Aayushi, Atul) participants discussed about the economic importance of viruses and their role in research.They firstly represnt brief introduction of virus then, they discussed how viruses play key roles in medicine, serving as vectors for gene therapy and as tools in vaccine production. Gene therapy involves modifying cells to treat diseases discussed in detail. Viral vectors, like adenovirus and retrovirus, are commonly used in gene therapy. Applications of viruses in research and beneficial use in bio-pesticides.In role of viruse in diagnosis they disscused ligase chain reaction which is almost similar to polymerase chain reaction. It amplifies the probe. Bacteriophage typing method disscused in which bacteriophage virus is used to detect and identify single strains of bacteria. At last, they disscused the plant diseases which is caused by the viruses.

Group 2 (Aryan, Kritika) participans discussed about the virus role in medicine and diagnostics. They discussed the role of viruses in vaccine formation is multifaceted. Viruses aid in antigen presentation, triggering immune responses and antibody production. Vaccines utilize weakened viruses to train the immune system, providing long-term protection without causing illness. Additionally, common viruses are crucial in diagnosing infections through rapid tests and specific identification, enabling disease surveillance and targeted interventions. In medicine, viruses serve as both disease agents and tools for treatment and research, including gene therapy and diagnostics. Common viruses like adenoviruses, influenza, and retroviruses are commonly used in various medical applications, showcasing their diverse utility in healthcare.

Figure 2 : Group 2 participants (Kritika, Aryan) while presenting

Group 3 (Anjali, Gauri, Debraj, Vibhore, Neiphretuonuo kire, Shristi)participants discussed about the role of virus in agriculture.The text emphasizes the brief account on virus, types of plant viruses, and crop diseases and economic impact. Further they discussed the importance of reducing reliance on chemical pesticides in agriculture to minimize environmental pollution, protect biodiversity, and safeguard human health. It discusses the advantages of genetically modified crops like Bt cotton in reducing insecticide use and promoting biodiversity. Additionally, it addresses the management of plant viruses through various methods and explores the application of RNA interference (RNAi) technology. Finally, it discusses the challenges in developing resistant crop varieties due to genetic diversity among pathogens and pests, highlighting the need for extensive screening and breeding programs.

Figure 3 : Group 3 participants (Anjali, Gauri, Debraj, Vibhore, Neiphretuonuo kire, Shristi) while presenting

Figure 4 : Group 4 participants (Aman, Tarita, Nivisha, Sakshi) while presenting

Group 4 (Nivisha, Aman, Tarita, Sakshi) participants discussed about the role of bacteria in agriculture. This group discussed that Bacteria are essential in agriculture, aiding in soil health, plant growth, and disease control. Harmful interactions involve pathogenic infections causing diseases like root rot and leaf spot. Understanding these interactions is crucial for sustainable farming practices and food security. Bacteria applications include nitrogen fixation, phosphorus solubilization, disease suppression, biocontrol, plant growth promotion, endophytic associations, and nutrient cycling, leading to increased crop yields and a more sustainable agricultural system.

Further they discussed the case study of *Sphingomonas melonis* and ongoing research in the field of bacterial agriculture. At the end, they conclude bacteria aid plant growth and soil health in agriculture, reduce the need of external fertilizers, and promoting ecological balance.

Figure 5 : Group 5 participants (Deepak, Jagrati, Danish) while presenting

Group 5 (Deepak, Jagrati, Shweta, Siddharth, Danish) participants discussed about the role of bacteria in fermentation.Fermentation transforms carbohydrates into alchol or acids, vital in food production. Key steps in fermentation include substrate utilization, glycolysis, fermentation pathways, end product formation, and energy production. Microbial fermentation plays a crucial role in breaking down complex biomolecules, releasing chemical energy, and preserving foods. While fermentation offers numerous benefits, such as improved taste and texture, it also has limitations, such as lower energy yield compared to aerobic respiration. Overall, fermentation is a diverse and essential process that contributes to the production of a wide range of food and beverage products. The food industries, alcoholic beverages industries etc. would not exist without the fermentation.

Group 6 (Sreelakshmi, Sahil, Riya, Aksh, Rishika) participants discussed about the role of bacteria in medicine.They presented about Beneficial bacteria which known as probiotics who support human health by maintaining digestive balance, enhancing immune function, and potentially improving mental well-being. Bacterial therapeutics offer targeted treatments in which clostridium difficile infection treatment discussed, while biotechnology harnesses bacteria for various beneficial purposes used. Genetically modified crops have brought significant economic and environmental benefits, but antibiotic resistance remains a significant concern. Vaccines, crucial for disease prevention, work by stimulating the immune system. Although generally safe, vaccines may cause mild side effects.

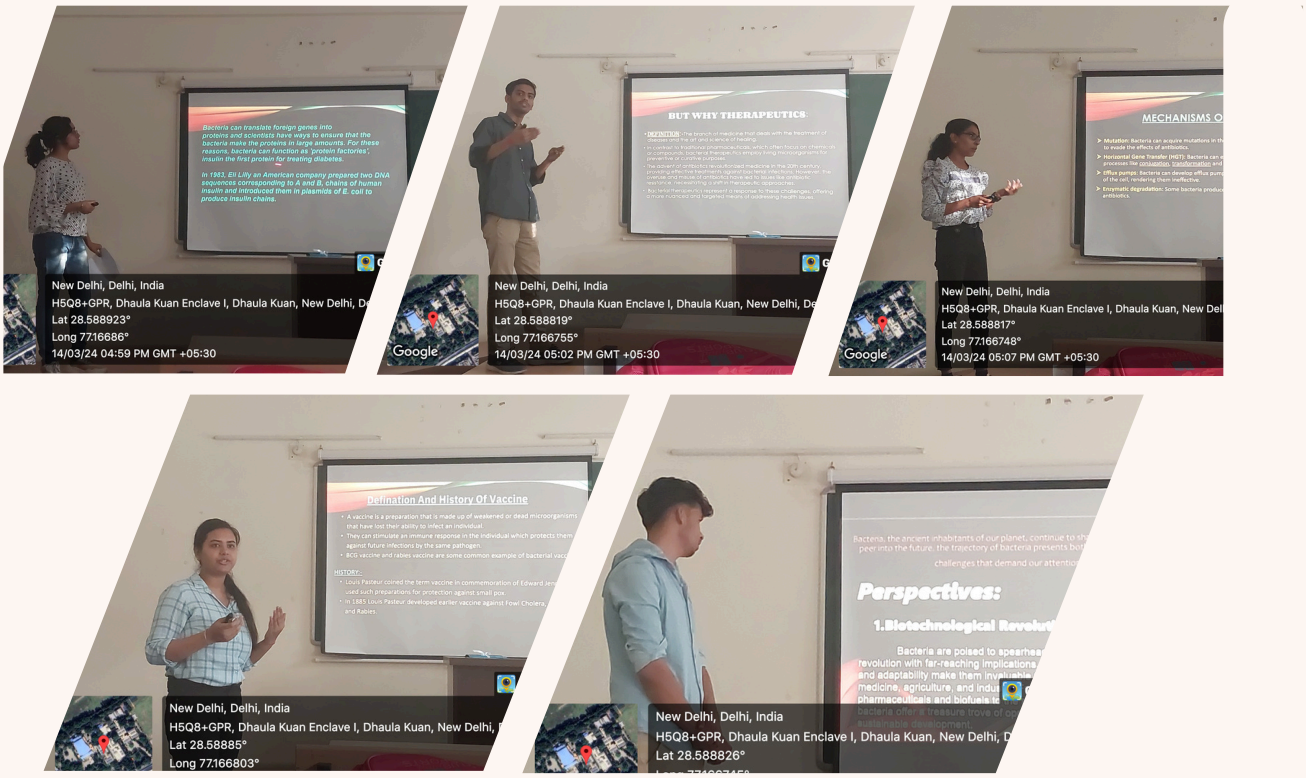

Figure 6 : Group 6 participants (Rishika, Sahil, Sreelakshmi, Riya, Aksh) while presenting

Conclusion and learning outcomes

The session was concluded by Pragati Gupta (one of the student) where she stated that the roles of viruses and bacteria in various fields such as medicine, agriculture, and food production. It highlights the importance of viruses in gene therapy, vaccine production, and disease diagnosis. Bacteriophage typing method used to identify and classify bacteria based on their susceptibility to specific bacteriophages, which are viruses that infect and replicate within bacteria. The discussion on plant viruses and crop diseases underscores the economic impact and the need for sustainable agricultural practices.

In agriculture, bacteria play essential roles in soil health, plant growth promotion, and disease control. Understanding the interactions between bacteria and plants is crucial for sustainable farming practices. The case study of *Sphingomonas melonis* exemplifies ongoing research in bacterial agriculture and its benefits for crop production.

Fermentation is a vital process in food production, transforming carbohydrates into alcohol or acids. It plays a key role in breaking down complex biomolecules, preserving foods, and enhancing taste and texture. It also touches upon the significance of beneficial bacteria, known as probiotics, in supporting human health by maintaining digestive balance and enhancing immune function.

Overall, the text underscores the diverse and essential roles of viruses and bacteria in various aspects of science and industry, highlighting their contributions to healthcare, agriculture, and food production.