DEPARTMENT OF MICROBIOLOGY under DBT Star College Scheme

Report on

Additional Practical's Introduced to S.Y. BSc students

Objectives of the Additional Practical's Introduced:

- To enhance the quality of the learning and teaching process to stimulate original thinking through '***hands–on***' exposure to experimental work and participation in summer schools
- To increase capabilities of core instrumentation resources by procuring new equipment and upgrading existing facilities
- To provide access and exposure to students to research laboratories and industries in the country
- To help in devising standard curricula and Standard Operating Procedures (SOP's) / kits for practical's.

The Star College Scheme was initiated by DBT in 2008 to support colleges and universities offering undergraduate education to improve science teaching across the country. The program is organized for improving critical thinking and encouraging 'hands on' experimental science at undergraduate level in basic science subjects. This program provides support for developing infrastructure for academics and laboratory activities. This support is in turn expected to invigorate teaching and provide unique exposure of students to experimental science. The Star College Scheme acts as a gateway and provides exposure to students. The scheme also acts as a catalyst in igniting young minds (faculty and students) to engage in networking, exposure visits to research institutes and industries and apply for research grants in order to prepare them for future challenges after the successful completion of their undergraduate courses.

The total strength of BSc II year (S.Y.BSc.) students was 213. All the students were encouraged and engaged during these additional practical sessions.

Following experiments were conducted during their IV semester

1. **Agarose gel electrophoresis**
2. **Restriction Digestion of DNA**
3. **In Vitro DNA Ligation**
4. **Plasmid DNA Isolation**

These practicals were conducted during the day-to-day practical sessions during the month of July and August 2022.

The first experiment conducted was Agarose gel electrophoresis which is one of the most common electrophoresis techniques relatively simple and straightforward to perform but possesses great resolving power. Agarose gel electrophoresis is a powerful separation method frequently used to analyze DNA fragments. Students were given hand's on knowledge to perform Agarose Gel Electrophoresis effectively.

The second experiment was Restriction Digestion of Substrate DNA. Restriction digestion can result in the production of blunt ends (ends of a DNA molecule that end with a base pair) or sticky ends. Restriction digestion is usually used to prepare a DNA fragment for subsequent molecular cloning. The results of a restriction digestion were evaluated by gel electrophoresis, in which the products of the digestion were separated by molecule length (based on the negative charge of DNA molecules) in a polymer gel to which an electric field has been applied.

The next experiment was In Vitro DNA ligation which is the final step in the construction of a recombinant plasmid which is connecting the insert DNA (gene or fragment of interest) into a compatibly digested vector backbone. This is accomplished by covalently connecting the sugar backbone of the two DNA fragments. This reaction, called ligation, is performed by the T4 DNA ligase enzyme. The ligated samples were separated and observed using agarose gel electrophoresis.

The last experiment performed was isolation of plasmid DNA- this experiment was designed such a way that students get all the information about principle and the reagent preparation for the experiment.

Out Come of the Program:

- Engaging students in pre-preparation of the experiments to increase their knowledge for preparation of chemicals and reagents
- Increase in the number of practical's being conducted individually by the students.
- Introduction of "hands on training" to enhance conceptual clarity for topics taught previously by theoretical approach.

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