

# THE LEADING LIGHT

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*Editor: Dr. P. Cheena Chawla*

## FOUNDER'S MESSAGE



Hundreds of thousands of students studying Biotechnology are often confronted with the challenge of comprehending correctly the basic principles of various biotechniques. Without such knowledge, young scientists would undoubtedly find it very difficult to troubleshoot the routine problems faced at bench level. Moreover, as these biotechniques find applications in

diverse fields namely, Agriculture, Medicine and Industry, students need to be well versed in the effective usage of these laboratory methods.

In the light of the above, students pursuing undergraduate/postgraduate degree courses in biotechnology from various Universities are offered Dissertation/Internship programmes for durations ranging from one to six months, under which they are guided on a specific research topic. Emphasis is given both on the theoretical aspects of the research study as well as the hands-on/practical aspects by designing experiments that help to find solutions to the subject in focus.

Documentation is yet another important aspect of any research study. Stemming from the findings of these short research programmes, especially designed for college students, technical reports and research papers are written for publication in peer-reviewed journals. Students learn how to present their findings by writing such research papers/reports that would immensely benefit them in their scientific career.

*Dr. P. Cheena Chawla*

## *Story of the Month*

Three students of M.Sc. Biotechnology completed Six-month Dissertation Programme, in tune with the requirement of University Degree Course in Biotechnology

World Health Trust completed six-months Dissertation Programme in collaboration with Chimera Gentec Pvt. Ltd. for three students of M.Sc. Biotechnology from Mangalmay College, Greater Noida. A brief Summary of their Projects is given below:

### **1. Production of Tetanus Vaccine Using Meat Free Media**

Tetanus is a life-threatening disease. For prevention of neonatal tetanus, tetanus toxoid is recommended for immunization of pregnant women. This disease occurs in all parts of the world but is most frequent in hot and wet climates where the soil contains a lot of organic matter. It is caused by the infection with a bacterium, *Clostridium tetani*. This bacterium generally enters the body through a break in the skin such as a cut or puncture wound by a contaminated object.

For the prevention of various forms of contamination and bacterial growth, meat free and blood free media was used. In the process, tetanus toxin was produced in a production medium that did

not contain animal derivatives. The tetanus toxin was then harvested and its antigenic content determined by Flocculation test.

## **2. Enhancing the Thermostability of Formulated Tetanus Vaccine by Using Different Stabilizers**

Preserving quality of the biological macromolecules like vaccine, enzymes, antigens, antibodies and so forth is one of most important but difficult tasks as potency and stability of biological molecules are lost in a temperature and time-dependent fashion. Maintaining strict cold chain during manufacture, storage, transportation, and field utilization of these biological macromolecules is necessary for getting optimal effect. Harsh field environment due to high ambient temperature and extensive power shortage generally make the task more challenging. Various formulation strategies to enhance the temperature stability of vaccines and adjuvants are being explored in different laboratories across the globe. All vaccines lose potency over time and the rate of potency loss is temperature dependent. Therefore, cold-chain systems have been established to ensure that the potency of vaccines is maintained by storing them under refrigerated condition (in most cases between 2 and 8°C) until the point of use.

The cold chain account for 80% of the financial cost of vaccination and is estimated to cost vaccine programs \$200–300 million per year. Deficiencies in the process frequently occur even in industrialized countries. It is also apparent that, despite best efforts, cold chains do not always function as intended for many reasons, such as improperly maintained or outdated refrigeration equipment, loss of power or lack of fuel to operate the equipment, poor compliance with the cold chain procedures, inadequate monitoring and poor understanding of that vaccines in the cold chain are sometimes accidentally subjected to temperatures both higher and lower than the target range.

Therefore, it is important that thermostability is given priority early in the development of new vaccines to increase the chance that stability improvements can be incorporated into the final products. Employing high-throughput formulation and freeze-protection methods (in the case of vaccines containing an aluminum adjuvant) should facilitate the development of thermostable formulations without incurring extra cost and time to the product development process. It is especially important against diseases with high morbidity and mortality that will be used in low-

resource settings, including malaria, HIV, tuberculosis, pandemic influenza, and bacterial and viral diarrheal diseases, so that introduction of these vaccines in thermostable formulations has the maximal impact.

### **3. Effects of Culture Media Supplemented with Various Growth Regulators on *in vitro* Regeneration of lentil (*Lens culinaris medik.*)**

Lentil is a good source of cholesterol-lowering fiber edible pulse and an essential source of inexpensive protein in many parts of the world, especially in West Asia and the Indian subcontinent, which have large vegetarian populations. Lentils also help in managing blood-sugar disorders since their high fiber content prevents blood sugar levels from rising rapidly after a meal. The low levels (5%) of Readily Digestible Starch (RDS) and high levels (30%) of Slowly Digested Starch (SDS) make lentils of great interest to people with diabetes. Lentil is often a preferred crop in the water deficient areas because of its drought-tolerant nature.

In India production of lentil production is reducing every year due to both biotic and abiotic stresses. Pod borer, aphids, cutworm, powdery mildew, rust and wilt are the major pests and diseases affecting lentil production, besides low fertility of soil, unpredictable environmental conditions, drought and heat stress reduces the seed yields by 50%. In addition, salinity and alkalinity of soils which is high both in semi-arid tropics and in the Indo-Gangetic plains, poor drainage/water-logging during the rainy season causes heavy losses to plant production.

This study was aimed to establish a protocol for enhancing shoot proliferation during the regeneration of lentil cultivar and also to demonstrate that pre-culturing of seedlings stimulates production of multiple shoots from cotyledonary nodes and shoot tips of Lentil cultivar. To increase rooting percentage of regenerated shoots, different concentration of Auxins (IAA, IBA and NAA) in culture media was optimized.



On completion of my six months project on tetanus vaccine production, I would like to thank World Healthal Trust and Chimera Gentec Pvt. Ltd. for their guidance to clarify all fundamental techniques of Microbiology and Vaccine Production. I am pleased that I got very positive and helping environment which encouraged me to



I would like to thank World Healthal Trust and Chimera Gentec Pvt. Ltd for their assistance and guidance during my project work on plant tissue culture. During my six months project work I had learned various PTC techniques and handling of different instruments which will helped me a lot in the long run.

Kanchan Kumar



I wanted to take the time to say Thanks to World Healthal Trust and Chimera Gentec Pvt. Ltd. for all their guidance and support during my six months dissertation program. I had a good experience and it helped me a lot to learn about various instruments and techniques. It has also made me a lot more curious about knowing stability of vaccines.

Neeraj Kumar Shukla