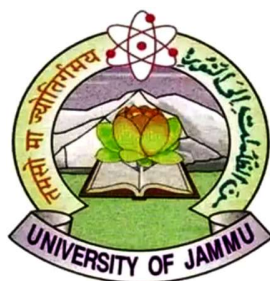


A training session report on
**Atomic Absorption Spectroscopy (AAS) and
Polymerase Chain Reaction (PCR)**

Under STUTI program funded by DST



In association with
Indian Institute of Technology, Gandhinagar
(Project Management Unit)



Coordinated by
Prof. Seema Langer
Department of Zoology
University of Jammu, Jammu and Kashmir, India

14th to 20th November 2022

Acknowledgement

We convey gratitude for the encouragement and support received from multiple sources during the execution of this training since its beginning. First and foremost, we want to express our sincere appreciation to the IIT Gandhinagar (PMU) and Department of Science and Technology (DST) for entrusting us with this project. The workshop was coordinated by Prof. Seema Langer and other faculties namely, Dr. Rakesh Panjaliya and Dr. Arti Sharma. The workshop was conducted on the '*Atomic Absorption Spectroscopy (AAS) and Polymerase Chain Reaction (PCR)*' on the instrument funded by the FIST program. Organizing team acknowledge the contributions of the committee, in the implementation and the execution of the program to achieve the objectives of the project, particularly, **Dr. Ravindra Kumar** (Principal Scientist and HOD, Molecular Biology and Biotechnology Division, NBGFR, Lucknow, U.P.) and **Prof. S Jithender Kumar Naik** (Department of Zoology, University College of Science, Osmania University, Hyderabad).

I also acknowledge all the teaching and non-teaching staff of Jammu University for their contributions, without which these could not have been possible.

Dr. Seema Langer

Coordinator

Summary

The purpose of this seven-day workshop is to introduce students, faculty and scientists to the potential of atomic absorption spectroscopy (AAS) and polymerase chain reaction (PCR) through a week-long training workshop. The workshop was held at the Department of Zoology, University of Jammu from 14th to 20th November 2022 consisting of series of lectures and hands-on training sessions. This initiative is funded by Department of Science & Technology under the program ***STUTI*** (*Synergistic Training Program Utilizing the Scientific and Technological Infrastructure*). This workshop aimed to provide an insight into the basic principles, functioning, sample preparation, analysis of different samples (Water, Sediments and Fish) in AAS and its utilization in pharmaceutical, agricultural, and biological sciences. The participants were also introduced to the basic concepts of DNA isolation, DNA amplification by PCR technique and later visualization via., *Agarose* gel electrophoresis. The focus of this workshop was "*to provide practical training on instruments such as AAS (Atomic Absorption Spectroscopy) and PCR (Polymerase Chain Reaction) as well as theoretical knowledge and their applicability in various fields.*"

Introduction

Department of Zoology, University of Jammu conducted 7-day long workshop on DST- FIST funded instruments “Atomic Absorption Spectroscopy (AAS) and Polymerase Chain Reaction (PCR)” workshop in its campus for participants from various backgrounds such as Professors, Scientists, Ph.D. Fellows were invited (**Annexure 1**). The following workshop's activities took place from 14th to 20th November, 2022 (**Annexure 2 & 3**). This report provides a quick overview of both the lecture and technical sessions.

- Lecture Sessions:

Prof. Ravindra Kumar (Principal Scientist and HOD, Molecular Biology and Biotechnology Division, NBGFR, Lucknow, UP) explained all of the essential principles, methodology, types, applicability and technical aspects of PCR technique, which made it easier for participants to understand the procedure while doing hands-on activities. **Prof. BD Joshi** (Department of Zoology, Gurukula Kangri University) gave a detailed lecture on the topic “Sacred Ecosystems”. Wherein he focused on the role of rural people in managing our environment and also gave an overview of traditional ecological knowledge and its role in conservation and ecology. **Dr. Sawarkar Sharma** (Department of Biotechnology, Shri Mata Vaishno Devi University, Jammu) discussed key elements of primer designing via utilization of various online tools such as BLAST, Primer 3 web and NCBI primer. **Dr. Arti Sharma** (Department of Zoology, University of Jammu) gave a comprehensive presentation on Atomic Absorption Spectroscopy (AAS) including its principle, functioning, preparation sample and its applicability in various fields such as agricultural, pharmaceutical, food, drug and petroleum industries, in pathology, biomonitoring etc. **Dr. Rakesh Kumar Panjaliya** (Department of Zoology, University of Jammu) gave a presentation on DNA extraction protocol and principle and procedure of Polymerase Chain Reaction (PCR) and Agarose gel Electrophoresis. **Prof. S Jithender Kumar Naik** (Department of Zoology, Osmania University, Hyderabad) addressed the audience regarding the topic “Toxicology”.

- Technical Session

On the **first** day, Inauguration ceremony was carried out in seminar hall of Department of Zoology, University of Jammu with key note speakers **Dr. Ravindra Kumar** (Principal Scientist and HOD, Molecular Biology and Biotechnology Division, NBGFR, Lucknow, UP) and **Prof. S Jithender Kumar Naik** (Department of Zoology, University College of Science, Osmania University, Hyderabad). On **second** day, **Dr. Arti Sharma** (Department of Zoology, University of Jammu) began the training session by giving a detailed presentation on Atomic Absorbance Spectroscopy (AAS). **Ms. Radhika** and **Ms. Isha** (Ph.D Scholars, University of Jammu) demonstrate the protocol of standard solution and sample preparation (Water, Sediment and Fish). Later, all participants prepare the stock solution as well as standard heavy metal solution and digest the sample for analysis in AAS. At the end of the day, blood samples were taken from all the participants for DNA extraction to be carried out in next session. On **Third day**, during morning session analysis of various samples were done using AAS with the assistance of **Ms. Neha Badyal**, **Ms. Neha Jamwal** and **Ms. Bandhana** (Ph.D Scholars, University of Jammu). The second half of the day was started by a detailed presentation given by **Dr. Rakesh Kumar Panjaliya** (Department of Zoology, University of Jammu) on DNA extraction protocol and all the participants started DNA extraction procedure from their own blood. In the **fourth** day's of the session, the workshop started with the continuation of DNA extraction procedure started on the previous day and in the evening session all the participants had hand on technique on Agarose Gel Electrophoresis with the assistance of **Mr. Ankush**, **Ms. Charul**, **Ms. Indu** and **Ms. Neha** (Ph.D Scholars, University of Jammu). On the **fifth day**, all participants were taken for field visit to *Ramsar site- Mansar and Surinsar* and where demonstration on collection of water sample and sediments from these aquatic ecosystems. The **sixth day** session included an invited lecture given by **Dr. Sawarkar Sharma** (Department of Biotechnology, Shri Mata Vaishno Devi University, Jammu) on PCR- principle, working and primer designing via., Primer 3 and BLAST software. In second half of the session, the participants set up PCR for amplification of desired segment. The **seventh day** was a concluding session in which PCR product analysis was carried out with the assistance of Dr. Rakesh Kumar Panjaliya and Ms. Shivalika followed by valedictory function.

- Types of samples tested

- 1. For AAS (Atomic Absorption Spectroscopy)**

During the technical session, samples from various sources like Water, Sediments and Fish muscle were analysed for various heavy metals through AAS.

- 2. Polymerase Chain Reaction (PCR)**

During the technical session for PCR, blood samples from all of the participants were utilized for analysis.

Outcomes of the Workshop

The STUTI workshop brought together participants from 25 different institutes (**Figure 1**). About 31 participants enrolled and attended the Atomic Absorption Spectroscopy (AAS) and Polymerase Chain Reaction (PCR) training sessions. The purpose of this advanced training event was to bring together participants from different disciplines and raise awareness of the advanced facilities of the Institute. At the end of all the technical sessions, participants were able to prepare standard stock solution of various heavy metals, digestion of various samples (water, sediments and fish muscle) for heavy metals analysis in AAS. The participants were also able to extract DNA from blood sample and amplification of desire product through PCR techniques. The major questions asked by the participants were regarding applicability of AAS in biomonitoring, wastewater analysis and in pathogenicity. Regarding PCR, designing of primer and handling of BLAST, Primer 3 and web NCBI primer software were the foremost queries. Finally, the feedback from the participants was considered in the evaluation of the workshop (**Annex 4**). The majority of the participants were pleased with the training session and suggested that more workshops be held in the future.



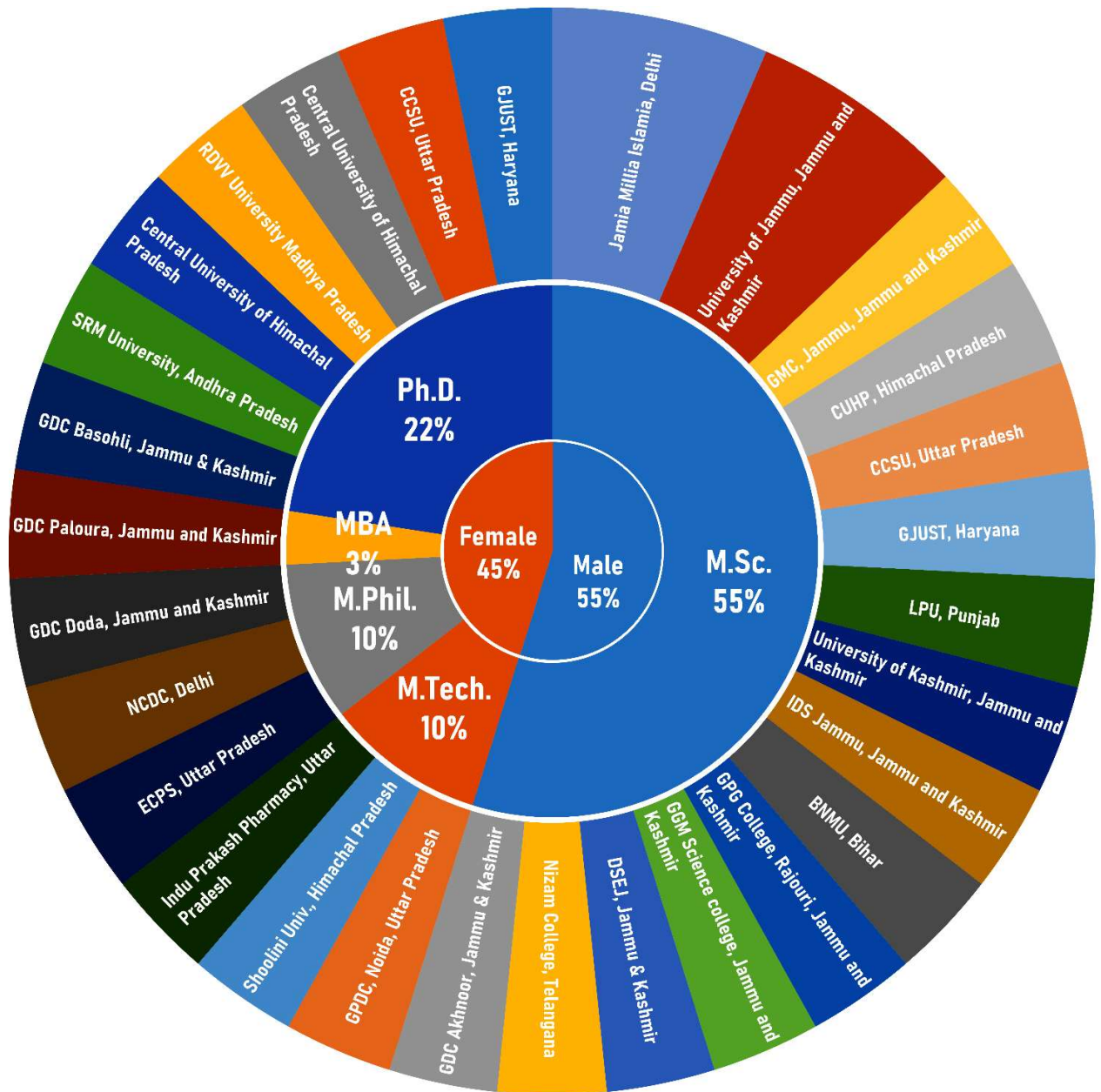


Figure 1. Participants registered workshop from different institutes.

Annexure 1: Brochure for the program

Invited Speakers



Dr. Ravindra Kumar: Principal Scientist and HOD, Molecular Biology and Biotechnology Division, NBGFR, Lucknow, UP
His current area of research focuses on physical chromosome map development, whole genome/transcriptome sequencing, genomic resource databases development/maintenance, cell line development/maintenance for conservation and sustainable use of the genetic resources.



Prof. S Jithender Kumar Naik
Department of Zoology,
University College of Science,
Osmania University, Hyderabad

He has vast experience in the fields of Environmental Biology, Toxicology, Genetics, Reproductive Biology, Occupational Health Hazards, Fisheries and Limnology.

Coordinator of the program:
**Prof. Seema Langer, HOD Zoology
and Dean, Life Sciences,
University of Jammu**

Organising Committee:

Organising Secretary: Dr. Arti Sharma
Sr. Assistant Professor, Zoology, JU
Co-organising Secretary: Dr. Rakesh Kumar
Assistant Professor, Zoology, JU

Registration & Contact Details

Interested candidates **must** register and only selected candidates will be invited for the workshop.

For selected candidates, registration fee, local travel, boarding and lodging will be covered by Department of Zoology, University of Jammu.

Registration for the workshop can done through the following link.
<https://forms.gle/SEav4fbUE86VvFsg8>
Registration Deadline: 5th of Nov. 2022.
Shortlisted candidates will be intimated by email, latest by 7th November 2022.

Eligibility Criteria

- Minimum qualification: Post Graduation in Life sciences.
- Professor/Scientists/College faculty/Post Docs/PhD fellows/Industry persons.
- Not more than 03 people from one institute.

For more Information:

Email: hodzooluniversityofjammu@gmail.com
Mobile: 09906027016, 9419131914
Address: Department of Zoology, University of Jammu, Jammu, J&K, 180006

Acknowledgements:



Department of Science & Technology (DST)

funded

Training workshop under STUTI
(Synergistic Training Program Utilizing the Scientific and Technological Infrastructure)

7 Day Workshop on

Atomic Absorption Spectroscopy (AAS) and Polymerase Chain Reaction (PCR)

14th Nov. To 20th Nov. 2022
Department of Zoology,
University of Jammu, Jammu



Annexure 2: List of registered participants for the workshop.

Sr. No.	Candidate Name	Gender	Educational Qualification	Email address	University/Institute
1	Mohit Kumar	Male	M.Tech. (Environmental)	mhtbrr@gmail.com	Guru Jambheshwar University of Science and Technology, Hisar, Haryana
2	Beby Panwar	Female	M.Sc. (Botany)	bebypanwar4@gmail.com	CCS University Meerut, Uttar Pradesh
3	Amit Kumar Sharma	Male	M.Sc. (Zoology)	dr.amitkv@gmail.com	Central University of Himachal Pradesh
4	Ekta Jain	Female	M.Sc. (Biotech.)	jainekta80@yahoo.com	Rani Durgavati Vishwavidyalaya, Jabalpur, Madhya Pradesh
5	Danish Mahajan	Male	M.Sc. (Zoology)	danisharushi@gmail.com	Central University of Himachal Pradesh
6	Saranya	Female	M.Sc. (Microbio.)	saranya_shekharan@srmmap.edu.in	SRM University, Andhra Pradesh
7	Shiv Kumar	Male	Ph.D. (Biological Science)	kumarshiv11387@gmail.com	GDC Basohli, Jammu & Kashmir
8	Sanjay Kotwal	Male	Ph.D. (Zoology)	Sanjaykotwal1979@gmail.com	Govt. Degree College, Paloura, Jammu and Kashmir
9	Ajaz Ahmed Wani	Male	M.Sc. (Wildlife Management & Conservation)	aahilajaz@gmail.com	Govt Degree College Doda, Jammu and Kashmir
10	Suman Shekhar	Male	M.Tech (Biomedical)	sshekhar9542@gmail.com	National Centre for Disease Control (NCDC), Delhi
11	Amitabh Shad	Male	Ph.D. (Zoology)	dramitabhshad@gmail.com	Ewing Christian Public School, Prayagraj, Uttar Pradesh
12	Sunil Chaudhary	Male	M.Phil. (Pharmaceutics)	sunil.chaudhari2@gmail.com	Indu Prakash Pharmacy College, Mau, Uttar Pradesh
13	Shailja kumari	Female	M. Sc. Biotechnology	shailjasharma4321@gmail.com	Shoolini University, Himachal Pradesh
14	Dharmendra Kumar	Male	M. Sc. Bioscience	kumar.dharm20@gmail.com	Government Post Graduate College Noida, Uttar Pradesh
15	Rohit Bhardwaj	Male	Ph.D. (Zoology)	dr.rohitbhardwaj85@gmail.com	Govt. Degree College Akhnoor, Jammu & Kashmir
16	Anusha C Pawar	Female	Ph.D. (Zoology)	dranushanaik3@gmail.com ; anusha_pawar77@yahoo.com	Nizam College, Osmania University, Telangana
17	Deepu Pandita	Male	M.Phil. (Biotechn.)	deepscholar22@gmail.com	Directorate of School Education, Jammu, Jammu & Kashmir
18	Gurpreet Kour	Female	Ph.D. (Cytogenetic)	gksasan7@gmail.com	GGM science college, Jammu, Jammu and Kashmir
19	Shiraz Ahmed	Male	Ph.D (Zoology)	shirazahmed1976@gmail.com	Govt. P.G. College, Rajouri, Jammu and Kashmir
20	Arti Kumari	Female	M.Sc. (Zoology)	artinandan95@gmail.com	Bhupendra Narayan Mandal University, Madhepura, Bihar
21	Malvika Singh	Female	MBA (Dental Surgery)	singhmalvika4@gmail.com	Institute of Dental Sciences, Jammu, Jammu and Kashmir
22	Kanak Mahajan	Female	M.Sc. (Human Genetic)	Kanak.293@gmail.com	University of Jammu, Jammu and Kashmir
23	Shiny Singh	Female	M.Sc. (Botany)	Shinysingh63@gmail.com	
24	Hilal Ahmed	Male	M.Sc. (Zoology)	hilalahmed1991@gmail.com	
25	Shikha Bharti	Female	M.Sc. (Zoology)	shikha.02012@gmail.com	Lovely professional University, Phagwara, Punjab
26	Swati	Female	M.Tech (Biotech)	jaast414@gmail.com	Guru Jambheshwar University of Science and Technology, Hisar, Haryana
27	Nida Ziyaul	Female	M.Sc. (Botany)	nidaziyaul83@gmail.com	CCS University Meerut, Uttar Pradesh
28	Kushal thakur	Male	M.Phil (Zoology)	Kushalthakur18@gmail.com	Central university of Himachal Pradesh
29	Isha Sharma	Female	M.Sc. (Zoology)	Parishaks91@gmail.com	SMGS Hospital, GMC, Jammu, Jammu and Kashmir
30	Vikar Ahmed	Male	M.Sc. (Zoology)	vikarahmed77@gmail.com	Jamia Millia Islamia, Delhi
31	Syed Ahmed Rizvi	Male	M.Sc. (Biochemistry)	s.a.rizvi08@gmail.com	

Annexure 3: Schedule date and activities during the workshop

Day 1		
14th Nov 2022	9:30 -11:00 AM	Registration
	11:00 - 1:00 PM	Inauguration
	1:00 - 2:00 PM	Lunch Break
	2:00 - 3:00 PM	Introduction to participants
	3:00 - 4:00 PM	Sampling for DNA extraction
	4:00 PM onwards	Visit to Labs
Day 2		
15th Nov 2022	10:00 -11:00 AM	Introduction to AAS
	11:00 -11:15 AM	Tea Break
	11:15 - 1:00 PM	Sample Processing
	1:00 - 2:00 PM	Lunch Break
	2:00 PM onwards	Standard Preparation
Day 3		
16th Nov 2022	10:00 – 1:00 PM	Analysis of sample
	1:00 - 2:00 PM	Lunch Break
	2:00 PM onwards	DNA extraction Part - 1
Day 4		
17th Nov 2022	10:00 -11:00 AM	DNA extraction Part - 2
	11:00 -11:15 AM	Tea Break
	11:15 - 1:00 PM	DNA extraction Part - 3
	1:00 - 2:00 PM	Lunch Break
	2:00 PM onwards	Electrophoresis
Day 5		
18th Nov 2022	9:00 - 5:00 PM	Field Trip/ Collection Trip to Mansar Lake and Surinsar
Day 6		
19th Nov 2022	10:00 -11:00 AM	Introduction to PCR techniques
	11:00 -11:15 AM	Tea Break
	11:15 - 1:00 PM	Set up of PCR reaction
	1:00 - 2:00 PM	Lunch Break
	2:00 PM onwards	Electrophoresis of PCR products and analysis
Day 7		
20th Nov 2022	10:00 -11:00 AM	Review and Feedback
	11:00 AM onwards	Valedictory
	1:00 PM	Lunch Break

Annexure 4: Feedback summary.

Sr. No	Content	% Rating
1	Overall grading of the program with reference to relevance of course, module/ content etc.	98% Rated on or above 8 points
2	Overall grading of the facilities provided by the institute, i.e., Hostel, Mess, Classrooms, Transport/infrastructure etc.	99% Rated on or above 8 points
3	Overall grading of the faculty members conducting the training	98% Rated on or above 8 points
4	How do you rate the overall training methodology	100% Rated on or above 8 points
5	How far the field visit is relevant and related to your research study	99% Rated on or above 8 points
6	Usefulness of this training in your current role	98% Rated on or above 8 points
7	Usefulness of this training in future work/job you may handle	98.5% Rated on or above 8 points
8	How far have you benefitted from interaction with the fellow participants of the training	97% Rated on or above 8 points
9	How far the course material supplied relevant and related to the training curriculum	95% Rated on or above 8 points
10	Overall grading of the process of training	96.5% Rated on or above 8 points
11	Your recommendation to your peers/ colleagues for the training Program	98% Rated on or above 8 points