SUMMER INTERNSHIP REPORT

One Month Internship at the International Rice Research Institute (IRRI) - South Asia Regional Centre

Varanasi, Uttar Pradesh, India

Submitted by

Vaishnavi Singh

B.Sc.(Hons.) Agriculture 4th year

Mahayogi Gorakhnath University Gorakhpur

Under the guidance of

Dr. Ajay Kumar Mishra

Associate Senior Scientist - Soil Science, ISARC

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Acknowledgement

I would like to express my sincere gratitude to Dr. Vimal Kumar Dubey, Dean, Faculty of Agriculture, for providing me with this valuable opportunity to enhance my academic and practical learning. and I am sincerely grateful to be a part of this reputed institution.

A special note of thanks to my mentor, Mr. Ajay Kumar Mishra, for his constant encouragement, insightful mentorship, and patient guidance during every phase of my learning experience.

Grateful to IRRI Education for providing a valuable learning experience.

I sincerely thank the entire IRRI team and supporting staff at ISARC, Varanasi, for their warm hospitality, technical support, and collaborative spirit throughout the internship period. Special thanks to the scientists, lab technicians, and field experts who shared their experiences, provided training, and made the learning journey both informative and enjoyable.

Sincerely,

Vaishnavi

Executive Summary

This internship at IRRI-ISARC, Varanasi, offered a unique exposure to global agricultural research and practices. My placement allowed me to participate in hands-on field trials, laboratory analyses, and innovative experiments, including soil testing, greenhouse gas sampling, biochar preparation, and exploring alternative fertilizers like human hair-based compost.

I learned to handle instruments such as EC meters, refractometers, ORP meters, and tools used in soil physical, chemical, and biological analysis. This practical exposure enhanced my technical skills, problem-solving ability, and scientific curiosity.

Key tasks included soil and plant sampling, weed dynamics analysis, operating crop decision support tools like Rice-Wheat Crop Manager, and attending training on sustainable agriculture practices. I developed better communication, collaboration, and scientific observation skills.

Introduction to Internship

About ISARC and Its Work-

The International Rice Research Institute – South Asia Regional Centre (IRRI-SARC), located in Varanasi, is a premier agricultural research hub focused on sustainable farming systems, especially rice-based cropping systems. It supports advanced research on soil health, water use, climate resilience, and modern crop management.

Purpose and Relevance of the Internship-

This internship was designed to provide undergraduate students practical exposure to current agricultural research and on-field experimentation. It aims to bridge theoretical knowledge with real-world application in areas such as greenhouse gas mitigation , soil testing, and sustainable input management.

Department Placed In-

I was placed in the Soil Science Unit, where I worked closely with the team on soil health evaluation, sustainable cropping, weed dynamics, and biochar experimentation.

My Role and Expected Learning Outcomes-

My role was to assist in lab and field activities, collect and process soil samples, record field observations, interact with scientists, and contribute to ongoing experimental plots. I expected to gain hands-on experience in modern analytical tools, data collection methods, and sustainable agriculture.

Objectives of the Internship

- To enhance technical knowledge in soil and crop management.
- To gain practical exposure to field trials, lab instruments, and research techniques.
- To develop communication, observation, and documentation skills.
- To contribute to ISARC's ongoing research projects and field experiments.
- To understand the impact of new technologies in agriculture.

Description of Activities Undertaken

1. Orientation and Introduction to IRRI-ISARC

The internship began with an orientation session on the mission and ongoing projects of IRRI-ISARC. We were introduced to key team members and research facilities.

2. Field Visits to Different Agricultural Trials

We visited trial plots under various farming systems:

1. Organic Farming
2. Natural Farming
3. Biochar-based Trials
4. Conventional Farming
5. Regenerative Agriculture

These trials demonstrated comparative results in crop performance, weed suppression, and soil health.

3. Greenhouse Gas (GHG) Sampling

I participated in methane and nitrous oxide sampling from paddy fields using static chamber methods. The GHG sampling contributes to climate-resilient rice strategies.

4. Rice-Wheat Crop Manager (RWCM)

We learned how RWCM software helps in site-specific nutrient and input recommendations. It supports decision-making for maximizing yield while minimizing environmental impact.

5. Soil and Plant Analysis Instruments

I was trained in handling tools like:

1. EC meter (Electrical Conductivity)
2. pH meter
3. Green Seeker
4. Refractometer
5. ORP meter (Oxidation Reduction Potential)

6. Soil Collection and Sampling

We learned the process of collecting representative soil samples from trial plots. Proper labelling, moisture content management, and handling were taught for accurate analysis.

7. Oil Extraction and Filtration

Oil was extracted from rice bran using local techniques. This module showed value addition in farm produce.

8. Biochar Preparation

We prepared biochar from crop residues using pyrolysis. Biochar improves soil fertility, enhances water retention, and acts as a carbon sink.

9. Weed Dynamics Study

We identified weed species (like *Echinochloa colonum Cyperus rotundus, Cyperus irri, Barnyard grass)*) and recorded data on density, biomass, and growth stages. An Excel sheet was created for statistical analysis.

10. Soil Physical Properties Analysis

- Soil Texture – Determined by feel method and hydrometer.
- Bulk Density – Used core method through pycnometer
- Water Holding Capacity – Assessed gravimetrically.

11. Soil Chemical Properties Analysis

Soil Organic Carbon – Evaluated using Walkley-Black method.

Available Nitrogen, Phosphorus, and Potassium (NPK) – Using alkaline $KMnO_4$, Olsen P, and flame photometer methods respectively.

12. Soil Biological Properties

Soil Respiration – Measured CO_2 evolution from soil.

Dehydrogenase Activity – An indicator of microbial activity and soil health.

13. Human Hair Fertilizer Experiment

We tested human hair as a slow-releasing nitrogen source. 200g of hair was mixed with 50g of KOH and 400 ml of water to extract nutrients, contributing to circular bioeconomy.

Learning Outcomes

Technical Skills

Gained insights into GHG monitoring, soil health parameters, and use of agronomic software.

Trained in laboratory techniques and data entry related to soil fertility.

Field Exposure

Understood real-world challenges in agriculture.

Participated in sustainable farming and organic trial plots.

Research and Communication

Learned to work with scientists, record observations accurately, and present findings in group discussions.

Personal Growth

Improved time management, adaptability, and team collaboration.

Boosted confidence in applying scientific knowledge practically.

Contribution to ISARC

- Assisted in field trials and collected soil, weed, and plant samples.
- Contributed to weed dynamics data recording and Excel sheet maintenance.
- Helped in GHG sampling and field setup for biochar experiments.
- Supported demonstrations related to the Rice-Wheat Crop Manager.

Reflections and Experience

This internship was a turning point in my academic journey. The work culture at ISARC was disciplined, encouraging, and collaborative. Working with passionate scientists was inspiring.

The most memorable experience was seeing how crop trials are planned scientifically and the importance of detailed documentation. Handling advanced tools made me feel confident and equipped.

Challenges included time constraints and complex lab procedures, but with proper mentorship, I learned to overcome them. This experience aligns with my goal of becoming a research-based agricultural professional.

Conclusion:

This internship broadened my perspective on sustainable agriculture. I gained firsthand experience in soil and plant sciences, data collection, and climate-smart practices. The technical knowledge, field exposure, and mentorship received will help me excel in higher studies and future research endeavours.

Annexures