Arbeitsgemeinschaft Tropische und Subtropische Agrarforschung (ATSAF) e.V.
Council for Tropical and Subtropical Agricultural Research

**ATSAF Academy**
Academy for International Agricultural Research for Development

# Junior Scientists Tandems
# Final Report

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| **Name of student:** Anusha Chenimeni |
| **German Research Institution (GRI):** |
| **Supervisor at German Research Institution (IARC):** |
| **National University (Country):** Germany |
| **Supervisor at National University:** Dr. Mutez Ahmed |
| **International Agricultural Research Center (Country):** India |
| **Supervisor at IARC:** Dr. Sunita Choudary |
| **Start and end date of stay at IARC/ GRI:** 01.10.25 to 31.03.26 |
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As an ATSAF research fellow, I had the opportunity to work at the International Crop Research Institute for Semi-Arid Tropics for Research project titled "Comparative Drought Analysis of Sorghum and Pearl Millet". As I am in middle of my experiment in this report I am going to write about my experiences, learnings, challenges, professional growth I have gained until now in these 3 months period stay in ICRISAT.

**Initial experiences**

As India is my home country where I was born and raised, returning here through this fellowship has been an extremely meaningful opportunity for me. Although I visited India a few times after moving to Germany, this visit felt completely different because this time I came not as a student on vacation, but with the purpose of conducting a research project, something that has been one of my biggest dreams, especially the opportunity to work at ICRISAT. My interest and curiosity about ICRISAT began during my bachelor's degree, when I had the chance to visit the institute as part of an academic study program. On that day, I promised myself that I would return and work here, even if only for a few months.

When I later came across the ATSAF research scholarship, I immediately felt that it could turn my dream into reality. I succeeded in convincing my professors at TUM to support my plan, and after nearly a year of discussions and preparations, I was delighted to receive the scholarship that enabled me to pursue my project at ICRISAT.

I started my project in the middle of September, and it took around 15 days to prepare the cylinders and establish the setup for the experiment. During that initial period, I had time to understand the work culture at ICRISAT and to get to know the staff in the Crop Physiology department. Those early days helped me adjust smoothly, build professional relationships, and prepare myself for the work ahead.

**Experimental setup and challenges**

Once the cylinders for lysimeters were prepared, I gradually settled into my daily research routine. Each day unfolded as a blend of scientific responsibility and collaborative effort. The lysimeter experiment demanded both precision and physical work, and I quickly realized the importance of teamwork in ensuring smooth progress. My colleagues and department staff were extremely supportive, especially during labor-intensive activities such as weighing, weeding, and taking coordinated measurements. Their willingness to guide and include me in ongoing tasks made me feel comfortable and professionally welcomed.

With time, I became more independent and confident in handling my responsibilities. I was trusted to manage critical tasks without supervision, which strengthened my sense of accountability. The work environment at ICRISAT encouraged discipline, attention to detail, and punctuality, all of which helped shape my work habits. I also learned how communication and cooperation play a central role in scientific work, as every task in a large field experiment affects multiple team members and the overall accuracy of the study.

The supportive way in which staff interacted with me had a significant impact on my growth. People were approachable, patient, and always ready to share their knowledge and experience. Whether it was receiving technical instructions, clarifying doubts, or discussing improvements for the experiment, I always felt respected and encouraged. This culture of openness increased my confidence to ask questions, take initiative, and contribute actively to group discussions.

As the drought phase of the experiment began, the workload and responsibility increased significantly, and this brought several challenges that became important turning points in my learning journey. The first challenge was the uneven germination in some genotypes, which required additional attention and created uncertainty in the early stage. The red-soil lysimeters also experienced higher weed pressure, demanding extra manual labor, especially during hot days. In addition to field-related issues, the unpredictable weather, high temperatures on some days and sudden rains on others, made it difficult to maintain perfect drought control. These conditions tested not only the experimental setup, but also my ability to stay prepared, calm, and quick in decision-making.

Week after Sowing

15 days after sowing

Senescence in Dry down

At times, the combination of physical workload, environmental unpredictability, and responsibility created emotional pressure. However, these moments ultimately played a major role in my personal development. I learned to be patient while working toward long-term results, even when progress felt slow. I became more adaptable and mentally stronger, understanding that field research will not always go as planned, and flexibility is a part of the process. I also learned to accept mistakes as part of learning rather than something to fear. With time, I developed the resilience to handle demanding days with a positive mindset, and I started to take pride in my ability to face challenges without losing motivation.

**Learnings and Predicted Outcomes**

Throughout the course of the experiment, I gained significant insights into how drought gradually influences plant growth and development, which helped strengthen my understanding of crop physiology from a practical perspective rather than just theory. Observing the plants every week allowed me to clearly see how even small changes in water availability can impact visible plant traits. For example, I learned how drought first affects leaf expansion, followed by reductions in canopy area and a gradual decline in transpiration as the stress progresses. These visible symptoms gave me a deeper appreciation of how plants internally regulate water use under limited moisture conditions.

Another major learning experience for me was understanding how different genotypes respond uniquely to the same drought conditions. Although all plants were exposed to similar stress, the tolerance level varied visibly across the genotypes. I observed that some plants maintained greener leaves for a longer duration, continued to grow slowly, and kept their canopy upright, while others reduced growth much earlier and showed signs of rolling and withering. This highlighted the importance of genetic variability in drought response — something I had learned during my academic studies, but witnessing it directly in the field made it much more meaningful.

The experiment also helped me learn how to interpret plant behavior from a physiological perspective. Weekly weighing of lysimeters to calculate transpiration allowed me to connect numerical values with actual visual changes in the crop. I started noticing patterns, such as how certain genotypes reduced transpiration earlier as a strategy to preserve water, while others continued losing water quickly, making them more vulnerable later. Over time, I became more confident in predicting how the plants would behave in the following weeks based on their early responses.

Based on the trends I have observed so far, I expect that the drought-tolerant genotypes — R16 in sorghum and PRLT in pearl millet — will likely show better yield stability at the time of harvest. These genotypes appear to conserve water more efficiently without completely compromising growth, whereas the sensitive genotypes seem to exhaust their water reserves more quickly and show earlier signs of stress. Therefore, the final yield may reflect the trade-off between water-use efficiency and growth maintenance. Although the harvest is still pending, the visual and physiological patterns give a preliminary indication that tolerant genotypes will outperform sensitive ones under drought stress in terms of both biomass and grain yield.

Overall, this experiment has taught me how to connect plant physiology theories with real field observations, how to interpret slow and gradual changes, and how to expect certain outcomes based on patterns of stress response. These are learnings that cannot be gained from textbooks alone, and they have improved my ability to observe plants scientifically, interpret results thoughtfully, and predict outcomes with confidence.

**Conclusion**

This fellowship experience has deeply influenced my academic direction and future goals. The exposure to real-world drought research strengthened my interest in crop physiology and plant–soil interactions far beyond theoretical knowledge. The skills I gained — including teamwork, responsibility, time management, and problem-solving — have naturally integrated into my thesis work and given me confidence in scientific writing, data handling, and experimental planning. Most importantly, working in a professional research environment helped me visualize my future career more clearly. I now have a stronger ambition to continue my research in the field of abiotic stress physiology and to contribute toward climate-resilient agriculture.


Crop Physiology department