

Council for Tropical and Subtropical Agricultural Research

# ATSAF - CGIAR++ Junior Scientists Program Final Report

Name of student: Siva Nnarayana Reddy Vantipenta

**University: University of Hohenheim** 

**Supervisor at University: Tobias Wurshum** 

International Agricultural Research Center: International Maize and Wheat Improvement Centre

**Country: Mexico** 

Supervisor at IARC: Velu Govindan

Start and end date of stay at IARC: September 2022 – January 2023

Title: Genetic analysis of grain size in Wheat

Funded by the German Federal Ministry for Economic Cooperation and Development (BMZ)







Council for Tropical and Subtropical Agricultural Research

### Background :

I participated at the CGIAR++ Junior Scientists Program of ATSAF e.V. to write my master thesis on "Genetic analysis of grain size in Wheat." This took place with the kind support of my professor Prof. Dr. Tobias Wurshum at Institute for Crop Science, University of Hohenheim, Stuttgart, Germany and with Dr.Velu Govindan at the International Maize and Wheat Improvement Centre (CIMMYT), Mexico.

Wheat is the staple crop for 35 % of the population worldwide (IDRC,2010). Furthermore, 66% of total wheat produced goes for food consumption, and about 20% is used for animal feed. Therefore, wheat is the most important cereal grain crop in the world. Grain size is one of the domestication-related traits and is a component of yield in wheat. My project is to identify QTLs associated with seed size in spring wheat and pinpoint the major effect of QTLs through genetic analysis and also how seed size influenced by seed parameters and correlated with plant agronomic characteristics and final grain yield.

#### How It Started?

In my third semester, I was searching for a master's thesis and had a keen interest in topics related to breeding in international organizations. I believed it would provide me with valuable experimental exposure. A senior who was already working on his thesis at CIMMYT suggested applying for a thesis. I Sent an email to Dr. Ravi Prakash Singh, Head of the Global Wheat Programme at CIMMYT in Mexico. He forwarded my email to Dr. Velu Govindan, a fellow scientist, who responded positively, agreeing to do my thesis at CIMMYT. From then on, we discussed what am I interested in. How would my interest fit in his breeding project? What we can do as a master project? So, Dr. Velu and I came to a decision on a topic of interest to work on. Later I planned to write a proposal to ATSAF and fortunately, I received acceptance from them. Following this, I applied for a Mexican Visa, received approval, booked my ticket to Mexico, and eagerly awaited the day of my journey.

#### New Journey:

After a 12-hour flight, I landed in Mexico City around 10 pm. I want to express my gratitude to CIMMYT and Dr. Velu Govindan for arranging a vehicle to pick me up from the airport. I reached CIMMYT around 12 am, I went to the reception to get my keys, just like we planned. A friendly car driver helped me with my luggage and took me to my room. However, there was a little mix-up, and the driver dropped me off at the wrong apartment. I tried to open the door, but it wouldn't. I looked around, and no one was there to help. I felt a little lost and spent around for about 30 minutes, trying to find the right address. Luckily, I found my room—it was next to the apartment where I was dropped off. I was surprised to find some meals waiting for me in my room. It turned out to be a bit of an adventure. Because of jet lag, I had difficulty sleeping that night. It took nearly a week for me to adjust to the new sleep timings. In the morning, I met my supervisor, Dr. Velu Govindan. Excited about my first day.



Council for Tropical and Subtropical Agricultural Research



1st Day at CIMMYT infront of Norman Borlaug Statue

### Thesis :

After a couple of days, Dr. Velu introduced me to the Quality Lab Head, where I was to perform the phenotypic trait analysis for my thesis. Using a seed count image analysis system, I carefully performed my analysis. From grain yield to thousand kernel weight (tkw), grain width, grain length, and protein content, I conducted analyses using seed count image analysis. In addition to my thesis work, I also had the opportunity to learn about the processes and steps involved in the quality of bread making. In the Quality Lab, surrounded by advanced equipment and experienced workers, I gained valuable insights into the practical applications of my academic studies. This first hand experience not only to develop my understanding of phenotypic trait analysis but also improved my knowledge in the steps involved in bread making.



Council for Tropical and Subtropical Agricultural Research







Phenotypic Trait Analysis in Lab



Council for Tropical and Subtropical Agricultural Research

I met Indian scientists from ICAR, who came to CIMMYT for vocational training. We went to another research station at Toluca where seed selection for the next generation was taking place. I actively participated in the process. We spent around two weeks and I observed how complex was the process of seed selection with Dr. Velu. It was fascinating to see how each seed played a crucial role in shaping the future generation of crops. Visiting this research station benefited for both research and recreation.



Dr. Velu Govindan Explaining about Seed selection for next generation



Speed Breeding in Greenhouse at Toluca



Council for Tropical and Subtropical Agricultural Research

Additionally, I had the chance to work in the Molecular Breeding Lab, where I learned the process of extracting DNA from plant parts. This helped us identify the molecular markers linked to specific traits we were interested in. I learned how to prepare microplates for PCR technique, dilute the markers, and store the extracted DNA.PCR technology, plays an important role in identifying, amplifying, and analyzing the DNA sequences associated with the desired traits. After using PCR, we ran the amplified DNA samples through agarose gel to make the bands visible. Later, we compared these bands to a standard DNA to understand the characteristics of our samples.

This practical experience in the Molecular Breeding Lab not only added exciting new skills but also helped to understand the complexity of DNA and genetics.



Preparation for Gel electrophorosis in Molecular lab

#### Few Moments :

During evening times along with scientists I played football and volleyball. Every Saturday I will go to market along with my supervisor to buy vegetables or groceries in car.

On the occasion of Diwali, Scientists organized an event .Most of scientists, dressed in traditional clothing, Scientists clicked pictures for their memories of the wonderful occasion and the environment was filled with happy faces. We had some cultural events. In between the songs, they talked about their ideas, thoughts, and their research. The celebration ended in evening with a magnificent fireworks.



Council for Tropical and Subtropical Agricultural Research



#### At Diwali Celebrations

CIMMYT hosted a Christmas and New Year celebration, providing me with the opportunity to taste a variety of Mexican dishes. While I was at CIMMYT, my supervisor was superb. He wasn't just a supervisor; and treated me like family member. It was a special and fortunate experience for me.

### Conclusion :

This ATSAF program has given me a good opportunity to work on my thesis with my university and the International Maize and Wheat Improvement centre (CIMMYT). My time in Mexico went by quickly. I learned a lot and saw the world from a whole new viewpoint. Doing research in an international center was exciting, and I gained valuable knowledge from their extensive experience. This Program helped me to focus more on my thesis research by helping financially. I am truly grateful for the financial support I received from ATSAF. It eased my financial problems and provided opportunities for research.

Finally, thank you again for giving this oppurtunity and for ATSAF Program.