Arbeitsgemeinschaft
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Council for Tropical and Subtropical Agricultural Research

ATSAF - CGIAR++ Junior Scientists Program
Final Report

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Country: Mexico
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Start and end date of remotely supervised project: -
Title: Genetic analysis of grain zinc and iron concentration in CIMMYT spring wheat germplasm

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Junior Scientist Program (JSP) – ATSAF:

It is a great opportunity and my privilege to receive the ATSAF- Junior Scientist Program (JSP) scholarship for my master's thesis at CIMMYT, Mexico.

Firstly, I would like to express my sincere thanks to ATSAF (Arbeitsgemeinschaft für Tropische und Subtropische Agrarforschung e.v.) funding sponsors and all the selection committee members for accepting my application and granting me the funding under the Junior Scientist Program. I feel very honored to be an ATSAF scholarship holder for my master thesis.

I would also like to convey my deepest gratitude to Dr. Velu Govindan, Senior Scientist from CIMMYT who has given me this great opportunity to work on the project "Wheat Biofortification" at CIMMYT, Mexico. I would also be thankful to my university supervisor Prof. Dr. Tobias Würschum at the University of Hohenheim, who has supported me a lot during the writing part of my thesis and guided my thesis work. It is my pleasure to extend my gratitude to Dr. Deepmala Sehgal who has contributed her valuable time by guiding me during the data analysis along with my supervisor Dr. Velu Govindan.

Thesis progress in times of the pandemic:

It is a great opportunity to work in one of the renowned International Agricultural Research Center (IARC), CIMMYT, which comes under the Consultative Group for International Agriculture Research (CGIAR) institutes. CGIAR is a great global partnership that integrates all the International Institutes, whose research is engaged in global food security. Wherein CIMMYT is a non-profit organization that develops improved varieties of wheat and maize with the aim of contributing to food security, and innovates agricultural practices to help boost production, prevent crop disease, and improve smallholder farming community.

Although my work had to be performed at CIMMYT, Mexico in physical presence, due to the COVID-19 pandemic, my work has been done remotely under the supervision of my scientist and guidance of university supervisor. My thesis entitled "Genetic analysis of grain zinc and iron concentration in CIMMYT spring wheat germplasm" has given me enough opportunity to practically visualize my theoretical knowledge learnt through various modules at the University of Hohenheim through my plant breeding master's program.

Related to my topic, CIMMYT has been considering biofortification as a major aspect in improving wheat cultivars. As part of my thesis, activities such as literature review, data collection, DNA sampling, data analysis are included. However, as I was unable to visit the CIMMYT, Mexico due to the covid situation, I received all the required phenotypic and genotypic data from my CIMMYT supervisor. In this regard, I would like to convey my sincere thanks to all the technicians at CIMMYT, who helped me indirectly by collecting the required phenotypic data.

Though I missed a great opportunity to visit the CIMMYT institute, I really enjoyed the distant mode of learning. Personally, I feel, weekly review meetings and reports helped me a lot to complete my work successfully. With this, I became capable of managing the tasks distantly and gained a new skill set of collaborating with other scientists/ research people at other institutes and I hope it will have a great impact on my further professional career. I could not have acquired this distance learning skill this soon, if not for the pandemic situations. It is because of these online zoom meetings, I happened to do a lot of literature research on my own and in this process my approach to the thesis work has improved significantly.

Key Findings of my Thesis Research:

Five QTLs were identified for Grain Zinc Concentration (GZnC) on 3D, 6B, 6D, 7A, and 7D Chromosomes explaining phenotypic variation explained (PVE) range from 3.1 to 12.8%. Of these five QTLs three of the QTLs were found stable. The QTL identified on Chromosome 6D is pleiotropic for Thousand Kernal Weight (TKW), thus suggesting for simultaneous improvement of both GZnC and yield. Five QTLs were also identified for Grain Iron Concentration (GFeC) on 2B, 2D, 3A, and 5B chromosomes with PVE ranging from 2.5 to 3.5%. Two of these five QTLs were found to be stable. The QTLs identified on chromosome 2D and 3A are also pleiotropic for TKW indicating simultaneous improvement of both GFeC and yield. The QTLs thus identified for both GZnC and GFeC can be used for increasing the zinc and iron micronutrient concentration in kernel of bread wheat without compromising on yield.

Problems Experienced and Solutions:

It is during the time from May to July that I have faced the dilemma either to perform my thesis work in CIMMYT, Mexico in physical presence or via online in the University of Hohenheim under the guidance of both supervisors. It was

totally a confusing situation if I can be given permission from CIMMYT to travel to Mexico and continue my thesis work there. At last, I have given up the hope of travelling to CIMMYT upon suggestions from my supervisor Dr. Velu about the pandemic situation in Mexico. I then started to accept the things and focused on working my thesis online.

I have also missed the opportunity to gain more experience from the field visits because of the online thesis work. I myself had to take collect a part of the data required for my thesis work. But, because I did not have the chance to work at CIMMYT, my supervisor has sent me the data that is required for data analysis of my thesis. A part of this inexperience has been compensated by the experience I gained from field visits in my modules.

Also, one of the major problems I encountered is, not having a chance to establish personal touch in the connections I got to encounter throughout my thesis work. Had I got the chance to work at CIMMYT institute, I could have established much more healthier connections from various research groups, which is very much useful for my further professional career. Also, this loss of personal touch was partly compensated by having regular zoom meetings with the supervisor and other data analyst tutor from CIMMYT.

Impact of ATSAF funding:

The ATSAF JSP program has provided me an opportunity to collaborate my thesis work with my university and International Agriculture Research Center. Working with CIMMYT has improved my exposure to international scientists and focus on global research areas. This great opportunity to work in an international environment will help me in shaping my professional career in further global collaborations. I hope it will also boost my chances of getting selected to other funded research studies in the time to come.

It is my desire as an international student to work with the international research institutes, but this desire could have been held back because of the costly expenses involved in it. Because of the ATSAF funding, I have had less financial pressure and so I could concentrate more on my thesis research. Otherwise, it would have become necessary for me to earn my monthly expenses from the part-time job which could have had a negative impact on my academics.

Finally, thank you for giving me this wonderful opportunity.