



ATSAF Academy
Academy for International Agricultural Research for Development

Junior Scientists Tandems

Final Report

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Country: Mozambique

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Title: The effect of potassium fertilizer on the physiological and morphological response of field-grown sweet potato to salinity stress

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This report summarizes about my research stay and experience at the International Potato Centre (CIP) in Maputo, Mozambique where I was part of the ATSAF- CGIAR's Junior Scientists Tandem (JST) program that lasted for 6 months from April 2023 – September 2023. The research was part of the project of PhD candidate Johanna Volk on, “Model-supported identification of phenotypic traits and development of a field-based screening tool for salinity tolerant sweet potato clones“, supervised by Prof. Dr. Folkard Asch and Dr. Maria Andrade. The internship gave me a wonderful opportunity of discovering the possibilities of career exploration and conducting research in another country.

Arrival in Maputo

We arrived in Maputo on the first week of April and we checked in our private accommodation (that we booked online from Germany) in the afternoon. Along with our colleague, Ms. Johanna Volk, we took the first few days to get familiarize with the living situation in Maputo. We went to visit the International potato center (CIP) the following week and we also visited the field in Nwalate (Boanae district), 35km from Maputo where our field trial was set up. Our working hours were usually from 8 AM to 4PM but during the days we travelled to field, it was usually 7AM to 5PM as we had to travel 2 hours by car to get to the field. We went approximately 3 times a week to the field but during the sampling days, around 4 days a week was spent in the field. We also had the opportunity to visit the field with the Dr. Maria Andrade and Mr. Godwill, which gave us lots insights about the other trails and sweet potato varieties that took place on the farm. We also gained some insights on the breeding process of the sweet potato varieties. We took the first 2 weeks to adjust to the schedule and preparing the plant cuttings and the materials for the field trail. While Johanna was preparing the schedule for setting up of the field and the sampling dates, my colleague Dhruv and I were working in the lab analyzing the soil samples last year which gave us an opportunity to get familiarize with the methods necessary to use for our master theses as well.

About the work

The research consisted of two trails – 1. Screening Trail that was mainly focused on observing the salinity tolerance of sweet potato varieties in terms of yield components. 2. Physiology trail that was done to study the mechanisms involved in the salt tolerance of sweet potato in different developmental stages. Thirty varieties that were contrast in color, shape and place of origin were taken for the trail and 6 of those varieties were chosen for the physiology trail. This year, along with the freshwater and the saltwater treatment, an added saltwater treatment with the addition of potassium fertilizer was also added to observe the tolerance of the crop under the influence of the fertilizer. Two varieties were taken for this treatment. The research will be written as a joint thesis along with the Dhruv Patel, M.Sc Agriculture Sciences in the Tropics and SubTropics, University of Hohenheim whereas my topic will mainly focus on the physiological and morphological responses of the sweet-potato under the influence of

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potassium fertilizer. We used a drip irrigation system for the whole field where it was made of two pumps to separate the freshwater tank from the saltwater.



Figure 1: panting cuttings in the field

According to that, the field was divided into two parts – Freshwater and saltwater part and they were subdivided into the physiology and screening trail.

We spent the first few weeks to prepare the field, propagate the plant cuttings and to fix the irrigation pipes. The drip irrigation lines were set up during the first year of the trial by two other master students that worked on the same project the year before. Thanks to them, we found it easier to set up the field and to plan the

sampling pattern and dates. We first checked for the number of plants for all the varieties to see if there are enough numbers for the trial. We propagated the varieties that was low in number for multiplication in the field that helped me to learn how the crop is usually planted.

However, it took more time than expected to set up the field because there were some damages to the pipes as they were stored outside in the field without any use. Therefore, a few weeks was spent to fix the holes in the pipes and to replace the damaged ones with a new pipes. The weeding and the ridge- making was done by the local women who were employed by the CIP office.



Figure 2: Fixing irrigation pipes

There was always some problems with the pumps or unexpected rainfall but we managed to positively set up the field and by the third week of June, we planted vine cuttings with the help of local workers. We planted the varieties for saltwater and the freshwater trial and the part with potassium fertilizer was planted in the later days. We let the plants grow for a few weeks and we started our first sampling date by fourth week of June.

Data collection

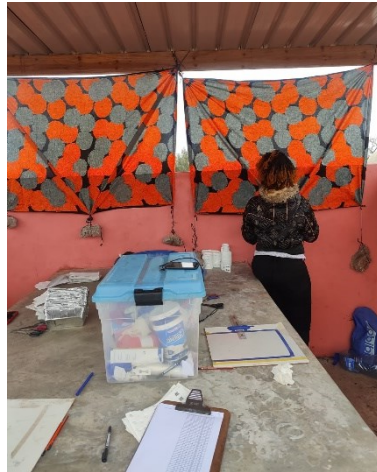


Figure 3: sampling set up



Figure 4: Training with the students

To observe the effects of the salt treatment, destructive and non-destructive sampling was taken every ten days. As I mentioned before, due to the previous experience of the first – year trial, the sampling for the second year was quite efficient and effective, also due to the support from the agriculture students from the University Eduardo Mondlane. Before the initial sampling, we took a day of training from Ms. Johanna and Mr. Gonzaga, to learn about different sampling methods.

Due to enough help from the students, we managed to stay on schedule most of the time during our sampling days. We faced some interruptions due to unexpected rainfall or technical issues with the pump which was very often but it helped me to learn about the challenges that one could face while managing the field. With Ms. Johanna and with the help of the technical team, we were able to troubleshoot the problems quite well. We planned 5 sampling schedule and Dhruv and I were present for 4 sampling dates after which we had to come back to Germany. The rest of the sampling schedules was carried out by Ms. Johanna and the students.

Interaction with the staff

During the internship, I had a wonderful opportunity to meet with the staff of CIP and IIAM in Maputo. We had our first meeting with Dr. Maria Andrade and Ms. Ligia Langa, who made us feel welcome from the very beginning and helped us with the organization and documentation work. We also worked with field assistants from CIP, Mr. Covele and Ms. Aura who helped us in setting up the field and layout.



Figure 5: On the field with the students



Figure 6: With the staff at CIP office

We also worked with Mr. Gonzaga and Mr. Arlindo, who were also with us in the field during the sampling days. Mr. Gonzaga is a very kind and intelligent person and he was very helpful to us whenever we faced issues with the pumps or the process in the field. Since we also spent some days in the lab, it gave us an opportunity to bond with the people at the office and at the soil lab, IIAM. Mr. Arlindo was very accommodating to us at the lab who helped us to get all the right lab materials on time. Working with the students at the field was especially very fun as they are really easy-going and joyful which made the work at the field easier. It was also nice to listen to their different background stories and it gave me also an opportunity to learn to initiate and build my team-working skills. I also had some interactions with the local seasonal workers which also helped me in improving my Portuguese skills. A special thanks to Ms. Johanna Volk, PhD student who guided us in every step and helped us inside and outside the work life.

Conclusion

Overall, my experience in Mozambique was a wonderful opportunity where I made so many good memories and met some great people along the way. I have never had a field experience before and as an intern, I learnt a great deal about setting up a field trail, irrigation system and how to face the unexpected challenges that can arise during the growing season of the crops. I also developed a strong liking towards sweet potato and I gained some knowledge about the crop growth, quality and different benefits about sweet potato on managing Hidden Hunger.

Moving from one country to another can always be very challenging but I was able to adapt to Maputo very quickly as it was very similar to my home. The experience also made me very independent and I learnt to handle certain life situations on my own. We did face some few

problems with the accommodation in the beginning but we met some people that made the situation easier. The people of Mozambique are very welcoming and open- hearted that made the place feel like home. I made some local friends there who welcomed me into their family and showed me around interesting places. We also travelled to some beautiful beaches around and I got to enjoy some of the water sports and the nature there. I got really integrated into the Mozambican culture and language.

The only difficulty was that the city in itself was very expensive to live in and as students, it was quite hard for us to manage our finances. Other than that, I'm so grateful for ATSAF for giving me the opportunity to have an experience living in another country that helped me improve my technical and life skills.

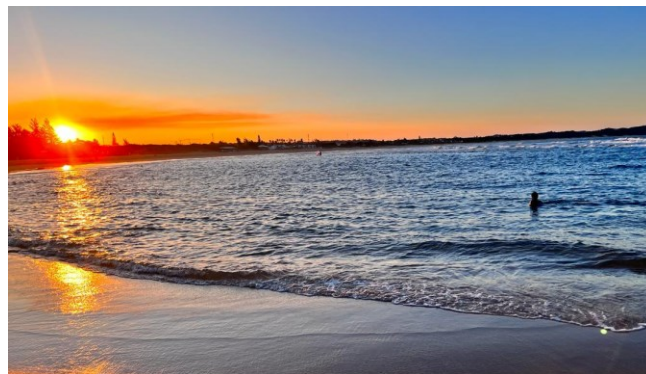


Figure 7: Sunset at Ponta beach, Mozambique