

ATSAF - CGIAR++ Junior Scientists Program

Final Report

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Start and end date of remotely supervised project: -

Title: Phenology effects on the responses of field-grown sweet potato varieties to root zone salinity kinetics

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Description of the project and the trial

I spent six months in Maputo, the capital of Mozambique, for the ATSAF JSP program. Another master student and I were taking part in Johanna Volk's PhD research on "Model-supported identification of phenotypic traits and development of a field-based screening tool for salinity tolerant sweet potato clones". The research is a collaboration with the International Potato Center (CIP).

The CIP is a CGIAR center founded in 1971 with its headquarters in Lima, Peru. It is present in more than 20 countries in Africa, Latin America and Asia and focusses on research on potatoes, sweet potatoes, Andean roots and tubers (CIP, n.d.).

The trial was conducted on a trial area of 6,237 m² on a field about 35 km south-west of Maputo. There were two sub-trials, the screening and the physiology trial. Both were divided into a fresh water (FW) and a salt water (SW) irrigation section. Both trials were designed with two treatments (FW and SW irrigation) and three replications per treatment.

I am going to write a joint master thesis with the other master student based on the data obtained from the physiology trial. The goal of this trial was to research the detailed effects of salinity on different varieties and potential mechanisms of salt stress tolerance in sweet potatoes. Therefore, on the physiology side of the trial, regular destructive and non-destructive sampling as well as soil sampling was conducted.

The irrigation was performed with a drip irrigation system. The FW was pumped from a nearby river into a FW reservoir. For SW irrigation, the FW was mixed with concentrated salt solution in separate tanks.

The scope of the research is highly connected with current challenges in agriculture and nutrition like salinization of soils, climate change adaptation and nutrition security. This was a big motivation for me to contribute to this project.

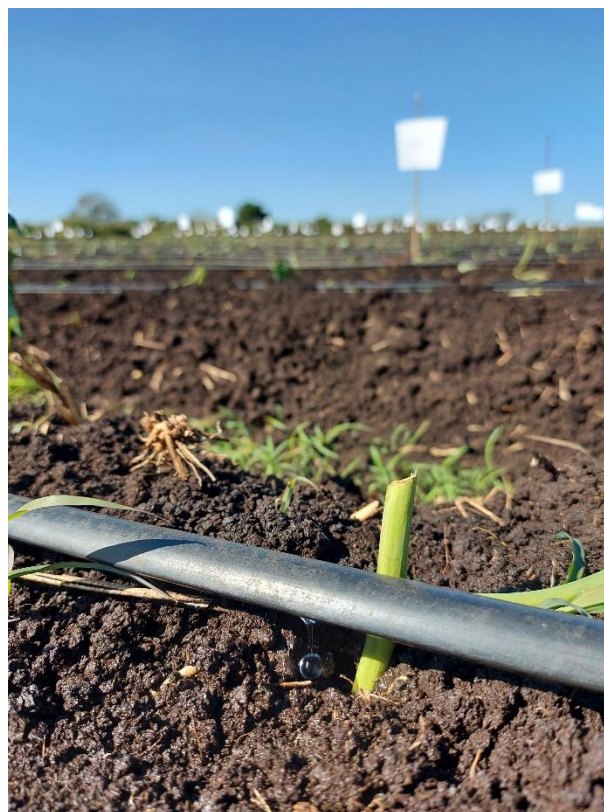


Figure 1 Drip irrigation shortly after planting the sweet potato cuttings

Project activities

| Activity | 2022 | | | | | | | |
|---|------|-----|-----|-----|-----|------|-----|---|
| | Apr | May | Jun | Jul | Aug | Sept | Oct | |
| Literature research | ■ | ■ | | | | | | |
| Multiplication of plant material | ■ | ■ | ■ | ■ | | | | |
| Establishment of trial design | | ■ | ■ | ■ | ■ | | | |
| Planting | | | | ■ | | | | |
| FDR tube installation | | | | ■ | | | | |
| Finalizing and testing of irrigation system | | | | ■ | ■ | ■ | | |
| Sampling | | | | | | ■ | ■ | ■ |

In April due to continued rainfall ploughing was not possible which needed to be done before establishing ridges and installing the irrigation system. Due to the weather we used April mainly for reviewing literature.

Upon arrival we also found that there was not sufficient planting material of the 30 varieties that should be included in the trial. Accordingly, we made cuttings and planted them for multiplication. Getting the field ready for planting took us much longer than expected and was quite laborious and complex. We were facing problems with the material provided for the drip irrigation system as well as visa issues.

In the second half of June, we planted the trial which has in total about 20,000 plants in a few days with the help of local women. After planting we installed FDR tubes for inserting a FDR probe to measure soil humidity and tested the irrigation system. Due to the considerable trial area and the different pumps and tanks involved, developing an irrigation schedule after planting was the main challenge.

In mid of August, we finally began sampling. On the physiology side of the trial, we were usually on the field for six days in a row to do destructive and non-destructive sampling as well as soil sampling, soil humidity measurements and vine marking. Six days of field work were usually followed by two free days and about four office days. Then we repeated the sampling cycle. We managed to complete five sampling events until end of September, whereas fourteen sampling events were planned for this time. Non-destructive sampling included for example counting leaves, measuring vine length and tracking side branches (see Figure 2). Destructive sampling included cutting whole plants and separating leaves, stems and petioles of different growth periods of the plant. Furthermore, we took pictures of the leaves to analyze leaf area development with ImageJ (see Figure 3).



Figure 2 Non-destructive sampling



Figure 3 Photo of sweet potato leaves for analysis of leaf area

Experience with colleagues and the team

There was unfortunately not much interaction with the other scientists at the CIP office. This is partly because we spent so much time at the field that we hardly had any office days. On the other hand, there were no regular meetings or a canteen/cafeteria which would have facilitated exchange. Towards the end of the project, I was more in touch with staff working in the soil lab and the quality lab because we were collaborating in storing and processing samples. However, everybody was very helpful at the office. Especially the support for visa matters, finding an accommodation as well as imports and exports was priceless.

In the beginning we were working mostly alone on the field. For some jobs like establishing ridges, weeding, and planting we were working together with local women which were employed on a daily basis. Later we hired a field assistant that was with us about two days a week. He was a great help for organizational matters as well as due to his experience with field trials. When sampling began, we noticed that the workload was way too high for the three of us. We found some agricultural students from the local university which were willing to work with us for an internship or their thesis work (see Figure 4). Having some more students on the field was fun and a great opportunity to practice Portuguese.

Not being able to separate work life and private life was challenging for me. I worked and lived with the same two people. Especially due to very high workload we hardly got time apart from each other. For next years' students I wish that they won't be as overworked as we were.



Figure 4 Training how to take soil samples with agriculture students



Figure 5 Our field assistant discussing the weekly schedule with the students

Learning experience

I had never participated in a field trial before. This internship enabled me to accompany a field trial from planning and preparations until sampling. This experience also allowed me to learn about experimental designs in an applied way and get an understanding how field trials work. Furthermore, I learned how to set up and handle drip irrigation. The other master student and I were also strongly involved in creating the sampling sheets and schedule. Generally, we got some insights into breeding, sweet potato quality and the work of scientists at a CGIAR center.

Apart from the hard skills I believe that the soft skills I learned and the life experience I gained are even more important for me. The intercultural experience taught me a lot about intercultural competences. After an initial culture shock, I adapted well, got to love the country and met some amazing people. Also, my resilience and problem-solving abilities were tested. We faced regular problems which needed quick solutions. I learned to go step by step and stay calm.

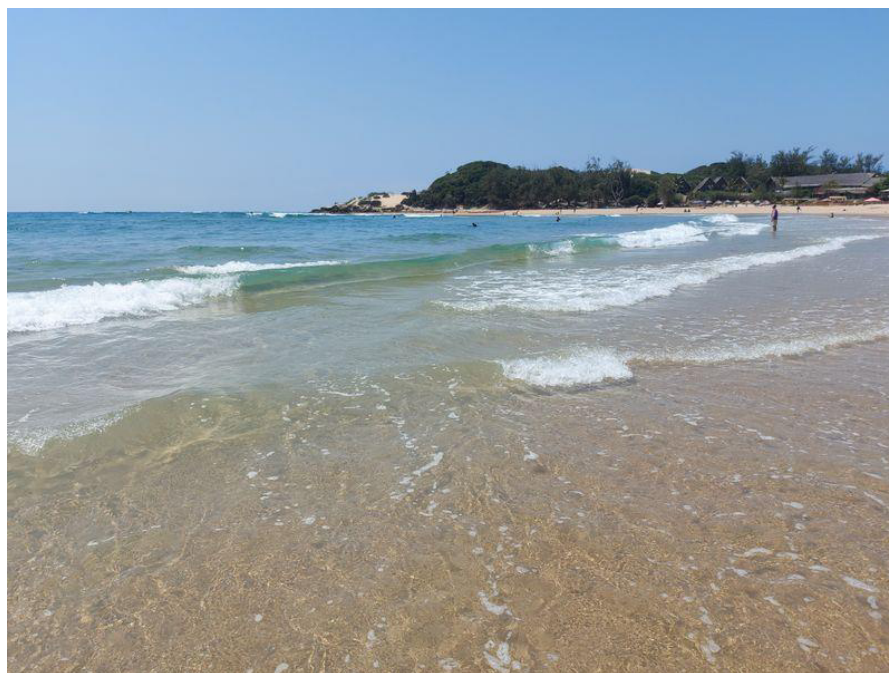


Figure 6 Tofo Beach in Mozambique

Even though we had quite a lot of stress I am very happy that I decided to participate in the project. Next to work we also had the opportunity to do a bit of travelling in Mozambique and South Africa. Mozambique has incredible beaches and I got to enjoy some of them. 😊

Sources

International Potato Center (n. d.); Mission, vision and values (last accessed on 22/10/2022); URL: <https://cipotato.org/about/>