



ATSAF Academy
Academy for International Agricultural Research for Development

Junior Scientists Tandems

Final Report

Name of student: Annabelle Heid

German Research Institution: Justus-Liebig University Giessen

Supervisor at German Research Institution: Prof. Dr. Michael Frei

National University (Country)

Supervisor at National University:

International Agricultural Research Center (Country): The Alliance Bioversity & CIAT, Kenya

Supervisor at International Agricultural Research Center: Dr. Boaz Waswa, Dr. Michael Kinyua

Start and end date of career exploration stay: Mar 2024 – Sept 2024

Title: Effect of foliar applications of a seaweed-extract on drought resistance of amaranth (*Amaranthus* spp.) and cowpea (*Vigna unguiculata*) using different cropping systems

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In 2022 I started my Master's programme in Crop Science at the Justus-Liebig-University in Giessen. Already during my practical bachelor thesis I gained insight into independent project planning, implementation and evaluation, and since my stay in South Africa it has been a dream of mine to use my studies to support people in less developed and disadvantaged areas. I was particularly interested in the challenges facing crop production, especially the global impact of climate change on crop production, and the global inequalities in food security related to hunger and malnutrition. Therefore, in early 2023, I contacted Prof Dr Michael Frei, Professor of Plant Production at Giessen University, to find an interesting and meaningful project in which I could be involved for my Master's thesis.

After getting in touch with Dr Boaz Waswa, Dr Michael Kinyua and Dr Irmgard Jordan from the CGIAR++ Centre Alliance Bioversity International and CIAT in Nairobi and Prof Dr Tsanko Gechev in 2023, I attended several meetings of the HD4A (Healthy diets for Africa) project. Soon, an idea for my Master's project emerged and an outline was created. Things really took off when I applied to the ATSAF Academy's Junior Scientists Tandems programme for 2024, which would allow me to set up and run a field trial at the Kenya Agriculture and Livestock Research Organisation's (KALRO) Kiboko Research Station and participate in research activities on Healthy Diets for Africa in Kenya. As the planning and organisation for my time in Kenya had already started before I heard back from ATSAF, and we needed to start the trial with the March/April rains, I was very relieved when I finally got the news that my application had been accepted and nothing stood between me and Kenya. Nothing except getting my research licence, finding a place to live in Nairobi and at the research station and getting my eTA (electronic travel authorisation). But soon everything was sorted and in March 2024 I boarded a plane to Jomo Kenyatta International Airport in Nairobi. Although I was a little sad to leave my family and friends behind, I was excited and looking forward to my time in Kenya, wondering what would await me there.

I spent the first few weeks in Nairobi, the capital of Kenya, getting to know the Alliance Bioversity International and CIAT offices on the icipe campus and planning the rest of my project. I met many people working for the Alliance and other international organisations on the campus, all of whom were very welcoming. I had a good time networking with them and there was also time to explore parts of Nairobi that surprised me in many ways. Although crowded, full of people and cars, often noisy and, at least during my first few weeks, dusty, it also has many green areas, parks and quieter parts. The city has many different faces depending on where you go, when you go and what you like to do. I personally enjoyed hiking in Karura forest and visiting the Nairobi National History Museum, as well as seeing the Sheldrick Wildlife Trust baby elephants in Nairobi National Park, the only national park in the world located in a capital city.

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There is something for everyone and I quickly learned that Nairobi is a place of diversity and contrasts. I have never been to a place where I have seen the city, its people and living conditions change so quickly between rich and poor. Where you can go from luxurious houses and areas to informal settlements and dirty and poor places in an instant and where poverty is visible almost everywhere you go. Especially the fences around many houses and gated communities and the many guards that guard most of these places created a constant feeling of awareness in me. Being confronted with all these things every day reinforced my thoughts about inequality, fairness and guilt, which was not easy at first.



Figure 1: Impressions from Karura forest; Elephant in the Sheldrick elephant orphanage Nairobi national park

As well as exploring Nairobi, I planned further details of my project, which was to investigate the extent to which a mixed cropping system and the bio-stimulant SuperFifty® Prime can help reduce drought stress in amaranth (*Amaranthus spp.*) and cowpea (*Vigna unguiculata*), and in the meantime collect data for my Master's thesis. The plan was to conduct a field trial at Kiboko Research Station in Makueni County, which is part of KALRO (Kenya Agricultural and Livestock Research Organisation), which I was very excited about. The trial was timed to coincide with the rains, which usually occur in March/April, for a good start to the growing season in this semi-arid area. Rain was forecast with a high probability every day, but we waited and waited and there was still no sign of rain. With time running out on our limited time frame for the trial, we decided we could not wait any longer. Especially as parts of Makueni County, including the area where the research station was located, have been struggling with unpredictable and unreliable rainfall in recent years. Getting the timing right for a good start to the study was just the first of many challenges I would face in Kiboko. Excited and a little nervous about my time in the field, I packed all my luggage, seeds and fertiliser and we drove along the Mombasa Road to the research station. The following months were not how I had imagined the trial or my time there. Although I had worked on field trials before and spent three months in another African country, this experience was very different.

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Figure 2: Gate of KALRO Kiboko research station; Field trial after plant establishment

Water and irrigation was a challenge throughout, with little rainfall, power cuts and damage to pipes and water pumps. This led to challenges with plant germination and crop planning and implementation throughout the trial. Extreme weather events also caused damage, particularly to the amaranth. We also had to contend with a lot of insects and pests throughout the period, resulting in almost empty plots and sub-plots. However, I viewed this with both a smile and a tear in my eye, as very cute monkeys, baboons, mongooses, other small rodents and many colourful birds were among the unwanted troublemakers. I also had to improvise and experiment a lot during harvesting, sample preparation and storage. This meant that I spent most of my time in Kiboko, as the situation in the field was constantly changing and unpredictable, which was a bit lonely at times.



Figure 3: Dead cowpea plant; Stem borer in amaranth; Improved pre drying of leaves after harvest.

But all the while I was very grateful for the support of my colleagues at the field station. They shared their knowledge and experience, and colleagues from CIMMYT and ICRISAT always had an open ear, time for field visits and discussions. They also showed me some of their trials and experiments and, when I had time, involved me in planning and discussing their projects.

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So I was able to return some of their hospitality through my own ideas and experiences. Although the circumstances were not always easy, I learned a lot and had many new experiences. In addition, the workers who helped me with data collection and harvesting were a joy to work with, as they had many stories to tell. Although communication was not always easy, with many speaking little English, we had a good time and I eventually learned to understand their language quite well. As Kiboko is a small village and the nearest town was not easy to get to, I stayed there for most of the trial. As a result, I got to know many different people, buying fresh fruit and vegetables from local farmers at the market and stopping for a chat on the street. Most people were very welcoming and interested in my story, sharing parts of their own. I am grateful that I was able to experience and participate in their daily lives, an experience I might not have been able to have without the distance to Nairobi or a less challenging work environment.



Figure 4: Threshing of cowpeas and data collection; Weeding on the trial

Despite the ups and downs, I was able to successfully complete the field trial and collect most of the planned data. And once I had finished, I headed back to Nairobi, where I spent my last week organising the licence I needed to transport the samples back to Germany. It felt great to be back in such a big city after spending the last few months in a rather remote place in the field. Although it was a bit sad to leave the place and the people I got to know there, it also felt good to move on and focus on other things. I even had the opportunity to take some time off after the months in the field and was able to travel to other parts of Kenya that I had not seen before. This is also an experience I am very grateful for as it gave me the chance to see Kenya from a different perspective and meet different people, for example from the Coast and Northern Kenya. Two other memorable events that happened during my stay in Kenya were the heavy rainfall and flooding in Nairobi and other parts of the country and the "Gen Z demonstrations" as Kenyans called them. Although I had many contacts in Kiboko, I was grateful for the good internet connection where I was staying.

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I could easily keep in touch with family and friends back home and had someone with my cultural background and upbringing to talk to. The good internet connection, even in remote areas, and the mobile payment system "mpesa" are things I will miss back in Germany.

My last weeks in Kenya flew by and soon it was time to say goodbye. But when I finally left the country, I did not fly to Germany, but to Vienna. ATSAF had invited the current students of the Junior Scientist Tandem Programme and the PhD students to the Tropentag 2024 in Vienna. It was a great event and it was nice to meet other people from the programme and share experiences. What a great way to end my journey with ATSAF.



Figure 5: Flowering amaranth; Established intercrop; Cowpea beans; Flowering cowpea

Not only did I gain practical experience in development-oriented agricultural research and make a small contribution to knowledge in the fight against climate change and food insecurity, but the international collaboration also gave me the opportunity to make valuable contacts and, more importantly, to get to know another culture. This intercultural exchange has allowed me to bring back enriching impressions and many stories to tell in Germany. Although I won't miss the heat of the research station, I will definitely miss all the fresh tropical fruit, the beauty of Kenya's diverse landscape and wildlife, and most of all the warmth and friendliness of its people. I will especially remember the quality of seeing good in bad or challenging things, the willingness to share and the quality of never giving up or losing hope.

I am very grateful for the support of ATSAF and also Fiat Panis, without whose funding I would not have been able to carry out my experiment. Many thanks also go to my supervisors in Germany Prof Dr Michael Frei and Dr Johanna Krippner, in Kenya Dr Boaz Waswa and Dr Michael Kinyua as well as Prof Dr Tsanko Gechev, Dr Irmgard Jordan and Helmut Jordan without whose commitment and support I would not have had this opportunity. Last but not least, I would like to thank my family and friends who have always stood by me despite the distance.
