

Report on my ACES-OIP International Research Trip

Awardee: Ikechukwu Nnaji

Research Country: Nigeria



Ikechukwu Nnaji

Two years into my doctoral research at the University of Illinois at Urbana-Champaign, I finally found an incredible opportunity to make some contribution to food security intervention in my home country, Nigeria. A disturbing reality is the inability of Nigerian food systems, and most African crop improvement programs to produce enough food to feed her growing population. This motivated me to apply for a graduate position in the Department of Crop Sciences, focusing on strategies to improve the yield of soybean in Africa. My research tries to improve photosynthetic efficiency of African soybean varieties, which would result in yield increase in the field. This international research grant, sponsored by the ACES Office of International Program was an opportunity for me to contribute to efforts at closing the soybean yield gap between Africa and the highest producing regions. I had conducted some initial research on the improvement strategies on the photosynthesis efficiency of African soybean, but these studies were carried out in Illinois, a region not ideal for the growth African soybean. It would be ideal to repeat this research in a tropical environment where most African soybean varieties are grown.

When the call for the proposal was announced, I immediately informed my advisor, Prof. Stephen Long, who was very encouraging and ready to put in a recommendation. My proposal was successful, and I was awarded the research grant.



International Institute of Tropical Agriculture (IITA), Nigeria.

The journey to Nigeria was smooth and full of anticipation. I looked forward to conducting my research at the International Institute of Tropical Agriculture (IITA), Ibadan Nigeria. IITA is the leading crop improvement research institute in Africa. With the characteristic sunlight and humidity, IITA Nigeria (7.34°N , 3.95°E) was indeed the perfect place for my tropical research. IITA boasts of excellent scientists such as Dr. Abush Tesfaye who was my host/supervisor on my research visit. He was willing to supervise my research activities in Nigeria. My original proposal was to investigate the natural variation in photosynthetic efficiency of selected African soybean varieties. Our interaction would later become the foundation of more collaborative research projects.



Research field established in IITA, Nigeria

With the support of Dr. Tesfaye's staff, I established my research fields in Nigeria in early August 2024 and waited for about a month to collect the necessary data and leaf samples for laboratory analysis. During the waiting period, I was privileged to attend seminars and tours that exposed me to soybean breeding pipeline in IITA, Nigeria. I also visited the greenhouses and crossing blocks for soybean in IITA.



IITA Research support staff trained in high throughput physiological phenotyping

My research activities in Nigeria can be termed both exciting and rewarding. For example, the method I employed in one of my objectives required cutting the leaves off the plant before they are exposed to sunlight each day. I had to get into the fields pre-dawn to collect soybean leaves. Stories were told of researchers often running into some wild animals when they visited research fields too early in the morning. Disappointingly, I did not run into any wildlife in my early morning sample collection trips.



Early morning leaf sample collection

While I planted out a few African varieties of soybean and evaluated the natural variation that exists in the photosynthetic efficiency, I visited research fields where large germplasm of soybean were planted out. This visit elicited some questions that may have a significant impact in soybean production in Africa.

- How does the size of the germplasm affect the phenotyping and selection for important traits in soybean?
- Are there faster methods of phenotyping for physiological traits?

To answer this question, I set out to screen existing soybean germplasm in IITA. This also afforded me the opportunity to train some technicians on the use of high throughput phenotyping tools such as the porometer-fluorometer (LI-600). From our research, there is huge potential in employing high throughput phenotyping tools to measure physiological traits especially in experiments involving large germplasm.

To conclude my visit, I presented a seminar to IITA research scientists on the importance of integrating physiological traits into climate resilience research in tropical crops. My findings on this trip indicate that there is considerable natural variation in the photosynthetic traits of African soybean that can be utilized in breeding for better yield in soybean. Also, training of research staff on fast screening of germplasm will enhance selection accuracy in soybean screening in Nigerian breeding programs.

I would like to thank the office of the International Program at ACES for this opportunity, my supervisory committee Prof. Brian Diers, Prof. Lisa Ainsworth and Dr. Jessica Rutkoski for their priceless support and advice during this research trip. I am most grateful to Bill and Mary Lee Dimond and the Arlys Conrad Estate for funding this trip.



Phenotyping on the field

A Zoom meeting invitation card. At the top, it features the logos for IITA (International Institute of Tropical Agriculture) and CGIAR. Below the logos is a yellow banner with the text "KNOWLEDGE CAFE". The main title of the talk is "Integration of Physiological Traits for Climate Resilience Research". The meeting is scheduled for "08 October 2024" at "9 am (WAT)". A small portrait of the speaker, Iyke Nnaji, is shown on the left. Below the portrait, his name "Iyke Nnaji" and his affiliation "PhD student, University of Illinois" are listed. The card has a clean, professional design with a mix of yellow, brown, and white colors.

Research Talk in IITA