

## Agricultural Education and Training Good Practices: Leveraging field experiments to reinforce student learning in Senegal

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### Background

Education & Research in Agriculture (ERA) is a USAID Feed the Future Initiative currently being implemented in the West African nation of Senegal. The project aims to reinforce Senegal's higher education institutes and human capacity potential in agricultural disciplines. Under the management of Virginia Tech's Office of International Research, Education, and Development, this initiative aims to facilitate an overall increase in food security and future agricultural exports.

### Approach

In an effort to improve student learning and potential in Senegal, a two-year conservation agriculture research project was implemented and leveraged to reinforce agricultural training conducted in the classroom.

Field experiments were located on the campuses of two of Senegal's agricultural institutions, and were implemented by a U.S. graduate student working in Senegal. The research project was focused on improving Senegal's millet-cowpea production systems through the use of basic conservation agriculture techniques. The field experiments served the dual roles of 1) providing a venue for hands-on student training in the field, and 2) providing data aimed at improving the livelihoods of local smallholder farmers.

A student begins harvesting a plot of Cowpeas



Assessing plant vigor using the NDVI Greenseeker



### Beyond the Classroom and Into the Field

While completing an undergraduate degree at a higher education agricultural institution in Senegal the typical student will spend many hours in the classroom, and very little time in the field. General agricultural practices are covered in the classroom, but are seldom demonstrated in any sort of hands-on environment.

The students involved in these field experiments all agreed that they had very little experience putting into practice the concepts they had learned in the classrooms.

Many of the students would readily volunteer themselves to help with data collection in the field, simply to take advantage of the opportunity to work in the field. Many of the students were enthusiastic about working with different agronomic tools, and were excited to work with, and learn from, the U.S. graduate student.

## The Benefits of Involving Students

There are multiple benefactors stemming from the inclusion of students in research projects. The students are the obvious benefactors, as they were provided with many opportunities not previously made available to them. All of the students working in these conservation agriculture experiments had the opportunity to collect data using various agronomic tools. Students were taught how to use handheld NDVI Greenseekers, digital cameras used in overhead ground-cover imaging, and the calibration and use of soil moisture probes. Local students worked alongside the U.S. graduate student in the field and aided in the collection of basic soil samples, plant height measurements, and final yield components at harvest.

Aside from the labor demands of data collection and maintenance of the experimental plots, many opportunities arose in the field to reinforce knowledge learned in the classroom. For many students, this was the first time they had seen statistics and experimental design put into practice. They had the opportunity to see the use and importance of randomization and blocking of plots. Some even had the opportunity to use the data to meet their final thesis requirements, if they agreed to assist in taking daily measurements and maintaining plots. These students benefitted from not having to seek opportunities outside of the universities to participate in agricultural research projects, which are sometimes required to graduate, and often difficult to identify.



### Learning how to calibrate the soil moisture probe



An additional benefactor in this arrangement was the primary researcher, in this case the U.S. graduate student, and the broader research objectives at hand. This particular project could not have been completed without the help of the local students, and their involvement was crucial in the success of the project. In the end, the local university students played a significant role in helping to identify agronomic practices that could help local smallholder farmers combat food insecurity in their communities. Local professors and instructors must not go unmentioned in this assessment, as they too play a critical role in these efforts. Professors and instructors at these particular institutions can benefit substantially from future field experiments such as these, as they provide much needed opportunities to get their students out into the field.

## Increasing Student Field Exposure in the Future

The current demand for additional field exposure within these universities is substantial, and provision of increased opportunities would undoubtedly be met with enthusiasm. The students in this study *all* agreed that more research opportunities would be welcome on their campuses. "I like the idea of students being involved in different research projects here on our own campus. I wish there were more experiments like this that I could work with" said Achille, a third year agronomy student. Only masters and doctoral students at these universities are currently required to engage in independent research endeavors. Moving forward, there are hopes that undergraduate students will be recruited, or even required, to participate in the field experiments of masters, doctoral, and post-doctoral students. The students that participated aided a U.S. graduate student in field experiments, similarly arrangements can be made with local graduate students currently engaged in field research.