



2014 AWARD Fellow  
**Esperança Tiago Sabino  
Michaque**

While pursuing a BSc in Agriculture at ISPM, Michaque began to understand some of the factors behind the crop failures in her country.

Position	Assistant Lecturer
Institution	Higher Polytechnic Institute of Manica (ISPM)
Country	Mozambique
BSc	Agriculture, ISPM, 2011
Mentor	Angela Manuel Manjichi, Director, Business Incubator Department, ISPM
Research Area	Improvement of maize yields of smallholder farmers by combining organic and mineral N fertilizers in selected soils.

Esperança Tiago Sabino Michaque recalls frequent childhood visits to the large farms owned by her grandfather and uncle in southern Mozambique, where they produced tomato, sugar cane, banana, sweet potato, watermelon, and other crops. However, as she grew older, she saw the crop yields dwindle, along with the size and output of her relatives' farms.

While pursuing a BSc in Agriculture at ISPM, located in a market town in western Mozambique more than 1,000 kilometers from the capital city of Maputo, Michaque began to understand some of the factors behind the crop failures in her country.

"Low soil fertility and nutrient depletion are the main causes of low yields," says Michaque, who was introduced to soil science during her second year of studies. "They result from problems such as erosion, leaching, removal of crop residues, and overuse of the land for cultivation without proper fallowing or fertilization."

The appropriate application of chemical nitrogen fertilizers helps restore soil fertility, but the cost is prohibitively high for resource-poor farmers. Michaque is searching for an affordable, accessible, and effective solution to replenish the soil and improve crop yields.

Michaque is studying organic fertilizers, as part of the research she is conducting to complete a master's degree in integrated soil fertility management from Kenyatta University in Nairobi, Kenya. Her studies are funded by a scholarship from the Alliance for a Green Revolution in Africa's Soil Health Program.

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**AWARD is a career-development program that equips top women agricultural scientists across sub-Saharan Africa to accelerate agricultural gains by strengthening their research and leadership skills through tailored fellowships. AWARD is a catalyst for innovations with high potential to contribute to the prosperity and well-being of African smallholder farmers, most of whom are women.**

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“Poultry manure is a good fertilizer,” she says. “It is rich in nutrients, even more than cow manure, and it is abundant in central Mozambique, where more than 70 percent of smallholder farmers keep chickens. But farmers don’t know how to use the chicken manure or understand its value. They burn it or dispose of it in other ways.”

In contrast to inorganic fertilizer, chicken manure adds organic matter to the soil. The result improves soil structures, nutrient retention, aeration, soil moisture-holding capacity, and water infiltration.

Michaque is analyzing the nitrogen equivalence of poultry manure compared to the same quantities of inorganic fertilizer. Because the organic poultry manure has less nitrogen than the chemical versions, she also is investigating the complementary use of poultry manure with smaller amounts of chemical nitrogen fertilizer. She is testing the effect of this method on soil properties and yield levels of maize (*Zea mays L.*), which is the region’s primary staple crop. The hope is to boost yields and the food production capacity of smallholder farmers.

“Population growth and climate change are driving reductions in per-capita food production,” says Michaque. “To increase access to food, improve nutrition, and reduce rural poverty, we must transform Mozambique’s subsistence-oriented agricultural sector into a more productive one—and soil science is part of the answer.”

Mozambique has few soil scientists, and Michaque aspires to lead the development of more of them. ISPM is setting up a soil fertility lab, with the plan for it to become a full-scale department. Her goal is to be part of the team that builds the department into a leading, income-generating center for soil analysis. Ultimately, she hopes to become dean of the department, continuing to promote advances through her laboratory work while also training future soil scientists.

Michaque says that few women are conducting agricultural research in Mozambique. She draws inspiration from her AWARD Mentor and friend, who is an AWARD Fellow alumna. As an AWARD Fellow herself, she looks forward to expanding her scientific skills, leadership capacity, and cross-national networks. She also sees being an AWARD Fellow as an opportunity to help hone her ability to better involve women and vulnerable groups in her research activities.

“Soil fertility must be addressed to achieve food security. The participation of farmers, and especially rural women, is essential to define priorities and increase the uptake of strategies to fight against hunger and poverty within their households, and across the country.”