

# K-State Agronomists Help West African Farmers Increase Sorghum and Pearl Millet Production

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Grain sorghum is an important crop not only to farmers in Kansas, but to farmers in many countries in Africa.

Some of the production challenges are the same, but many challenges are different or more severe in West African countries, said Vara Prasad, assistant professor of agronomy at K-State. West African farmers battle against drought, soil infertility and parasitic weeds.



**Vara Prasad Holding the Panicle of a High Yielding Sorghum Variety in Niger**

In October, Prasad and Scott Staggenborg, associate professor of agronomy, traveled to several countries in West Africa to kick off the beginning of a four-year program funded by the United States Agency for International Development and collaborating organizations in the U.S. and in host countries. The program is managed by the Sorghum, Millet and Other Grains CRSP (INTSORMIL) located at the University of Nebraska-Lincoln.

The Global INTSORMIL program involves 17 U.S. scientists at six universities (Kansas State University, Purdue, Texas A&M, West Texas A&M, Ohio State University and University of Nebraska-Lincoln), the USDA and 23 host country national research programs. The INTSORMIL mission is to use collaborative research to overcome constraints to sorghum, millet and other grains (fonio, tef and finger millet) production and utilization for the mutual benefit of agriculture in the U.S. and developing countries in West, East and Southern Africa and Central America.



**INTSORMIL Regional Project Sites in Africa**

The purpose of INTSORMIL is to find ways to improve production practices in those countries. West African farmers face serious problems of a localized and volatile market, the agronomists said.



**Harvested Sorghum Heads in Bundles**



**Stack of Pearl Millet Heads**

"We traveled to Mali, Niger, Ghana, and Burkina Faso. Everything in those countries is done by hand; sowing, weeding, fertilizing and harvesting," said Prasad. He and Staggenborg, who is a cropping systems specialist with K-State Research and Extension, will work to increase the water-use efficiency of the farmers' cropping practices to better cope with drought conditions.



**Scott Staggenborg and Collaborators Jesse Naab (Ghana) and Hamidou Traore (Burkina Faso) in Burkina Faso**

The K State scientists observed great diversity in the cultivars of sorghum grown in West Africa.



**Sorghum Heads Showing Diversity in Head Form and Color**

Prasad and Staggenborg observed the "zai" systems that many farmers there use to conserve water. "They dig numerous shallow holes in the ground, wait for rain, then plant one seed in each water-filled hole," said Prasad.

A new "half-moon system" is being used on an experimental basis in some fields. "In this system, a series of crescent-shaped mini-terraces is constructed on a sloped field to create a series of small catch-basins to collect water as it flows down the field. The seeds are planted in these half-moon shaped basins with rock walls to conserve water. A form of

terracing to complement this half-moon system is also being researched, and we are trying to extend both of these technologies to a number of villages," said Prasad.



**Sorghum in Niger Growing in Half-Moon Shaped Basins with Rock Walls to Conserve Water**

"Fertilizer is not as readily available in Africa as it is in the United States, mostly for financial reasons", added Staggenborg.

"To make the infertile soil more suitable for crops, farmers can purchase smaller, more affordable bags of fertilizer to divvy up among the plants. Farmers usually have only one or two acres," the agronomist said.

"Those who own goats and cattle have the option of mixing the fertilizer with organic manure so they can apply more over a larger area. There is also potential for composting", said Prasad, though it is not yet being practiced.

Leaving crop residues on the fields would help put nutrients back into the soil, but residues are often used for other purposes, he said.

"People use the sorghum and millet grain for their own consumption, but the residues are gathered or sold for livestock fodder. Because of its financial value, it is difficult for farmers to leave the residues on their fields. Also, any abandoned residues might be stolen."



**Sorghum Field in Niger**



Another problem they are working on is striga, a parasitic weed that saps the crops' resources during stress conditions. "Potential solutions for this are crop rotations and herbicide-treated seeds, which are being developed at K-State", Prasad said.



**Striga in Niger**

"The West African market for grains is extremely sensitive. In the U.S., demand may shift from one crop to another as prices go up and down, but in Africa, a price increase directly affects a large area because of their lack of efficient transportation", Staggenborg said.

Prasad and Staggenborg visited universities in several countries, and will work with the faculty to help improve their curriculum and to get information on sorghum and pearl millet production technologies to more farmers. "West African farmers are eager to learn; getting the knowledge to them will be the key", the scientists said.

