Agriculture Department
Food and Agriculture Organization
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Sweet sorghum in China

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Although sorghum *(Sorgum bicolor)* is best known as a grain crop, the sweet type is used mainly as livestock fodder: its high rate of photosynthesis produces leafy stalks up to 5 metres tall that make excellent silage. The stalks are also rich in sugar, which can be processed into jaggery or distilled to produce ethanol. Sweet sorghum has also been called "a camel among crops", owing to its wide adaptability, its marked resistance to drought and saline-alkaline soils, and tolerance to waterlogging.

All of these characteristics interest China. First, adverse soil conditions and water scarcity inhibit cultivation of sugar cane in 20 provinces along the valleys of Yellow and Yangtze Rivers, forcing China to import up to two million tonnes of sugar each year. "Farmland in those same provinces is highly suited for sweet sorghum," says Peter Griffee, an agronomist with FAO's Crop and Grasslands Service. "Its water requirement is one-third that of sugarcane, and its growing period is short enough to allow harvesting twice a year. While sugarcane is propagated from stem cuttings, sweet sorghum is sown with seed - just 4.5 kg is enough for a hectare of land, compared to 4,500-6,000 kg of sugarcane cuttings." Sweet sorghum's potential as an energy crop - it produces up to 7,000 litres of ethanol per hectare - makes it highly attractive for countries like China, which is expected to exhaust its economically recoverable petroleum reserves by 2016.

China's agricultural planners also see *Sorghum bicolor* as a key crop for sustainable agricultural development in farming areas that suffer from aridity and saline/alkaline soils. In the Huang Huai Hai region and Northwest China, where the total area of saline-alkaline and salinized land is estimated at more than 170,000 sq km, plants germinate with great difficulty, grow slowly and produce poor harvests, if not complete crop failures. This lack of agricultural development is the cause of poverty in many rural areas and a threat to China's long-term food security.

That is where FAO came in. Through its Technical Cooperation Programme, FAO is helping China's Ministry of Agriculture set up

pilot farms in Shandong and Shaanxi provinces to demonstrate and develop sweet sorghum production and transfer it for use in livestock farming and processing industries in the arid and saline-alkaline regions. Partners in the project are several Chinese institutes that have been introducing and breeding new varieties of sweet sorghum for over 30 years. However, Peter Griffee says, there are still some gaps in agronomic and processing technology. To help fill them, FAO is providing the services of specialists in sweet sorghum agronomy and agro-industrial processing, as well as Brazilian experts in ethanol production.

As part of the project, sweet sorghum plots were established to test six high-yielding varieties, and harvested sorghum used in ensilage and feeding animals trials. Meanwhile, national experts have been sent to the USA to study sugar refining and alcohol production technologies, and will put their training into practice in a pilot alcohol production plant and a syrup and sugar refinery. The project is also exploring techniques for producing fungi and mushrooms with the residues remaining after processing.

"By December 2002," says Griffee, "we plan to have trained about 100 agricultural technicians

in sweet sorghum production and utilization in two arid, saline-alkali regions, set up two five-10 hectare demonstration sites showing sweet sorghum production, processing and livestock farming, and transferred the most successful techniques to more than 200 farmers.

"This will lay the groundwork for a an agro-ecological system of sweet sorghum that will promote livestock farming and processing industries, provide many new jobs and protect the environment." Drawing on the project's outputs and findings, China's Ministry of Agriculture and the Ministry of Science and Technology will consider launching a major programme in 2003-2005 to promote sweet sorghum cultivation on up to half a million hectares of farmland in the Western Regions.

In snacks, cattle feed, wallboard...

World production of sorghum trails far behind that of the "Big Four" cereals (rice, maize, wheat and barley, in that order). But it is agriculture's leading minor grain crop, with the harvest in year 2000 estimated at some 60 million tonnes. About 90% of the area planted to sorghum lies in developing countries, mainly in Africa and Asia, where it is grown generally for food by low-income farmers. The remaining 10% is made up of large-scale commercial farms, most of them in the developed world, which produce sorghum mainly for livestock feed and account for more than 40% of global sorghum output.

As a food for humans, sorghum is well suited for use in the cereal, snack food, baking and brewing industries. Sorghum is also used in the production of wallboard for the housing industry and in biodegradable packaging materials.

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