

Monsanto Developing Countries Team

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A few years ago, Monsanto Company began refining its agricultural vision. Abundant food and a healthy environment were two characteristics of a future world that the company wanted for everyone.

Diverse products in crop protection chemicals and biotechnology are strengthening the company's position in the food production business. One objective set as part of the framework for the vision was to explore ways Monsanto could contribute to improving food production technology in several developing countries by the year 2000.

The vision is moving toward reality.

Monsanto's Developing Countries Team, made up of volunteers across the world to address and achieve that mission, has initiated projects in Ghana, Senegal, Kenya, Mexico and Tanzania. A similar successful project in Indonesia serves as a guide in these countries.

The focus of these endeavors is on the smallholder farmer. These local landowners are the ones who implement and benefit from the projects, with Monsanto and its nongovernmental organization (NGO) partners providing the technology and expertise. The goal is to help these farmers improve their productivity in ways that are environmentally sound and sustainable. This will lead to more food and income for them and ultimately, to food security and improved economies for their countries.

Establishing partnerships with appropriate NGOs is key to the success of these projects. These partners help define opportunities for Monsanto's technology and knowledge based on local needs. Local scientists, extension agents and farmers are brought into the project to demonstrate technological fit and help educate farmers who can benefit from the technology, know-how and products. For the projects to be sustainable, commercial distribution channels need to be developed that will operate at a profit in the future.

But in the beginning, there is little or no profit to drive the project on its own. The true test of success will be whether resource-poor farmers enter and remain viable in the market economy.

"We're not here just to sell products," says Rob Horsch, research and development director for Monsanto. "Ultimately, our success depends on whether our technologies can help farmers become more productive and profitable."

A description of each project follows:

GHANA

On the west coast of Africa is Ghana, a country suffering from declining rural population. Lack of labor is a problem because traditional farming practices are extremely labor-intensive. Time and manpower are two precious elements critical to a successful crop in an area where weeds are pulled by hand.

The crops, primarily maize, sorghum and cassava, are limited due to this lack of manpower. And with the population growing at nearly triple the rate of agricultural productivity, there are

UNIDO 2-2-2-2

serious problems keeping up with the demand. The situation is compounded by the fact that smallholder farmers are competing with subsidized food from the United States and Europe and this, combined with low productivity, make farming a losing proposition.

Ultimately, waves of young men and women are moving from rural to more populated areas, swelling the ranks of the urban poor.

Enter Monsanto and its partner, Sasakawa-Global 2000 Agricultural Projects in Africa, or SG2000. The NGO is a partnership between the Sasakawa Africa Association, founded by Japanese philanthropist Roichi Sasakawa, and Global 2000, former U.S. president Jimmy Carter's organization. Global 2000 is led by Norman Borlaug, the Nobel Prize-winning agronomist and one of the chief architects of the "Green Revolution."

The Monsanto/SG 2000 partnership, with assistance from the Crop Research Institute, has helped bring the successful no-till farming revolution to Ghana. No-till involves leaving the residue from the previous crop on the ground and planting directly into it.

Rather than plowing crop residues and weeds, farmers have been taught to use a dry formulation of Roundup®, a broad spectrum weed herbicide. Roundup and its active ingredient, glyphosate, are widely known for their low toxicity and favorable environmental characteristics. Glyphosate is registered for use in more than 100 countries throughout the world. The dry formulation is a significant technological breakthrough for African projects because it doesn't have the economic, storage and disposal concerns associated with large liquid containers for smallholders.

Roundup dry, pre-measured and individually packaged, is simply poured into backpack sprayers filled with water and is ready to use.

"One of the major problems in rural Africa is that there aren't enough people to cultivate the land," says John Hebblethwaite, a former Monsanto Developing Countries Team member who now works as executive director of the Conservation Technology Information Center. "We saw how Roundup dry could help by replacing tilling in that farmers can plant more acres and maintain the productivity of the soil."

The value of the technology includes less labor to prepare the fields, more timely planting to catch the maximum amount of moisture, reduced soil erosion and a higher potential for multiple crops in a single year. Ghana has become a model project for Monsanto and is expanding in scope.

SENEGAL AND TANZANIA

In Senegal, Monsanto has formed a partnership with U.S.-based Winrock International and the Institut Senegalais de la Recherche Agronomique (ISRA) to determine the technical and economic fit of Roundup dry as a weed control tool for smallholder rice growers.

The goal is identical to the Ghana project: Increase crop yields and reduce input costs and the amount of manual labor required in annual crop production through conservation tillage and effective weed management in irrigated rice. Preliminary results indicate that significant economic benefits exist in replacing tillage practices with Roundup dry.

Tanzania features a similar program targeted at smallholder

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maize and sorghum systems with SG 2000 as the partner. Roundup dry is used to control weeds prior to planting maize in both irrigated and non-irrigated regions. Opportunities to initiate a similar project in Zimbabwe are under evaluation.

INDONESIA

Monsanto has instituted a highly successful project in Indonesia, where rice is the most important food staple supporting a population of nearly 200 million people.

Indonesia is an agricultural country in which 80 percent of the population lives in rural areas and 70 percent of the workforce is active in agriculture. The Indonesian government has given high priority to the production of rice to achieve and maintain self-sufficiency.

Prior to the 1980s, Indonesia was the single largest importer of rice in the world. At one time its rice imports represented 25 percent of the entire world exports. Under the leadership of President Suharto, who comes from a farming family, Indonesia achieved self-sufficiency for the first time in 1984.

This self-sufficiency in rice is presently being threatened by a population growth which is outstripping the country's rice production. The situation is further aggravated by rapid industrialization and urbanization, which has reduced the acreage of arable land and the availability of labor and fresh water.

Since the early 1990s, Monsanto in Indonesia has implemented a no-till farming system in rice-growing regions. Polaris[™] herbicide, a glyphosate-based product developed by Monsanto, has become a significant part of the weed control element of this system.

The adoption of no-till production has increased productivity and allowed farmers to manage up to three times more land with the same amount of labor used in the past. Water needed to produce a rice crop has been reduced by one-third and yields are consistently higher than conventional rice systems. The income of the farmer has increased because the time he has saved using Polaris instead of plowing can now be used to establish a higher-value third crop.

KENYA

The sweet potato is the sixth-largest subsistence food crop in the world. Grown by poor, small-scale farmers for family consumption, the crop is able to survive in difficult conditions without a lot of moisture. However, the average yield of the sweet potato in Africa is less than half the world's average, due in large part to the sweet potato feathery mottle virus (SPFMV). This degenerative disease can reduce crop yields by 50 percent or more.

In 1991, Monsanto partnered with the United States Agency for International Development (USAID) and the Kenyan Agricultural Research Institute (KARI). With funding assistance from USAID, KARI loaned Dr. Florence Wambugu, one of its most promising researchers on sweet potato virus diseases and plant tissue culture, to Monsanto for training and to begin work on the project. The ultimate goal of this project is to add virus resistance to locally adapted African sweet potato varieties grown by African subsistence farmers.

Dr. Wambugu came to Monsanto in 1992 and began training in

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UNIDO 4-4-4-4-4

plant transformation methodology. Early that year, she started the technical development of virus resistant sweet potatoes. In 1993, KARI sent another one of its scientists, Daniel Maingi, to train with Dr. Wambugu at Monsanto. Dr. Wambugu and Maingi's body of work has been world class in this area. They have developed methods for regenerating sweet potato plants from African varieties and for introducing virus resistance genes into the sweet potato.

In 1994, Dr. Wambugu left the project to become director of the African office of the International Service for the Acquisition of Agri-Biotech Applications (ISAAA). She continues to support the virus resistant sweet potato project in Africa.

Maingi has continued on at Monsanto and has been working toward developing a reproducible method for producing transgenic sweet potato plants. His goal of producing plants containing a gene for resistance to SPFMV may be reached by the end of 1995.

The sweet potato project will ultimately be a major contribution to food security for some of the poorest farmers in the world.

MEXICO

Food viruses are not limited to potatoes in Africa. In 1991, Monsanto and the Center for Advanced Studies (CINVESTAV) - a government research laboratory in Irapuato, Mexico - embarked on a cooperative project to transfer technology for virus resistance in potatoes from Monsanto to CINVESTAV. The ultimate goal was to develop PVX (Potato Virus X) and PVY (Potato Virus Y) resistance in varieties of potatoes grown by resource-poor Mexican farmers.

The partnership was funded by NGO the Rockefeller Foundation and facilitated by ISAAA. The partnership involved having two CINVESTAV scientists work with Monsanto scientists. These scientists learned how to conduct potato transformation, the method of which was then applied to the most widely grown potato variety in Mexico, known as Alpha.

The impact on yields of the virus resistant potatoes can be significant. In fact, when the transformed locally-adapted varieties are grown by subsistence growers, they can expect to see a potential yield increase of 10 to 15 percent.

All of the work with transgenic plants has been done in accordance with local regulations to produce the highest-quality transgenic plants.

The project represents one of the first successful efforts to deliver the benefits of biotechnology to a developing country.

As these programs illustrate, through establishing powerful partnerships with governments and NGOs, Monsanto is making a difference in improving the world's food production and preserving its natural resources.

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