

## Support for Improved Technologies through Large-Scale Field Demonstrations in Ghana

The strategy of the SG 2000 program was to set up large and dynamic field demonstration programs of improved technologies for two or three of the country's most important food crops. Key lessons include:

- The lack of programs to ease the transition from public to private agricultural services negatively impacted on the effectiveness of SG 2000 in Ghana.
- Macroeconomic instability, particularly exchange rate instability, posed major difficulties for private fertilizer importers.
- The program was too narrowly focused on maize production and biological potential, and too insensitive to smallholders' resource endowments and risk capacity.

**Name of project or program:** SG 2000 Project in Ghana

**Initiation date:** May 1986

**Completion date:** December 2003

### 1. Description of project, program, or approach

The Sasakawa-Global 2000 agricultural program in sub-Saharan Africa, funded by the Nippon Foundation of Japan, began operations in Ghana and Sudan in 1986, and then expanded to Tanzania, Benin, Togo, Nigeria, Ethiopia, Eritrea, Mozambique, Uganda, Mali, Burkina Faso, Guinea, and Malawi. The SG 2000 Ghana project was a forerunner for other country projects and officially ended in 2003 although selected research and development activities are still partially supported for quality protein maize (QPM), conservation tillage (CT), post-harvesting and agro-processing technology, and agricultural college and university training for mid-career extension workers. Seven country projects remained active in 2005.

The SG 2000 program strategy was to organize, in collaboration with ministries of agriculture, large and dynamic field demonstration programs of improved technologies for two or three of the most important food crops. Agro-ecologies best suited for agricultural intensification were given priority. Improved technology was based on recommendations from national research organizations, although SG 2000 country staff also participated in extension recommendations. Plots were large, initially 0.4 to 0.5 ha, and farmers were provided the recommended inputs (i.e., fertilizer, improved seed, and in some cases, pesticides for post-harvest grain storage) on credit provided by SG 2000. Extension officers managed the delivery of inputs to participating farmers in the demonstration programs and were responsible for loan collection. On-farm training in recommended technologies was built around crop growth cycles.

### 2. Implementation details

The Ghana project began with the promotion of improved maize technology in the southern and central zones of the country, and improved sorghum technology for the

drier northern portions. Recommended technologies came from Ghana's Crop Research Institute (CRI), CIMMYT,<sup>1</sup> and IITA.<sup>2</sup>

The scale-up of the one-acre production test plot (PTP) field program was rapid -- from 40 in 1986 to 1,500 in 1987 to 15,000 in 1988 to 76,000 in 1989. Maize and sorghum PTP yields were impressive, averaging nearly three times higher than national yield averages. The demonstration plots also served as seed increase plots for the rapidly expanding PTP program, and many participating farmers sold seed to SG 2000.

The PTP maize package included recently released open-pollinated varieties that carried resistance to maize streak virus. In sorghum, a red-seeded, short-stature, relatively high-yielding variety was promoted. Fertilizers readily available in Ghana were used--mainly ammonium sulfate. Later, urea was substituted, since no field response to K was observed. During 1986-1990, fertilizers were supplied by Ministry of Food and Agriculture (MOFA), and parastatal farm input distribution organizations were established through a World Bank agricultural services loan. Post 1990, fertilizers were supplied by private companies.

Beginning mid 1980s, the Government of Ghana (GoG) embarked on far-reaching structural adjustment and political reform programs. In 1989, the parastatal Ghana Seed Company was closed, and national seed policy called for the development of a private seed sector. Simultaneously, the GoG announced the end of fertilizer subsidies and government involvement in procurement and distribution. Foreign exchange markets were liberalized, and the national currency, the *Cedis*, began a continuing slide, with major devaluations lasting more than a decade. Inflation rates exceeded 25% annually for most of the 1990s. Agricultural credit was liberalized, with interest rates ranging between 30 to 40%.

PTP loan recovery during 1986 and 1987 was above 90%, but began to falter in 1988, as the numbers grew. In 1989, unaware of the faltering 1988 loan recovery, the Minister of Food and Agriculture committed MOFA resources (mainly fertilizer stocks) to target 80,000 PTPs country-wide (mainly maize). The size of the 1989 program overwhelmed the national extension service and SG 2000. The rigorous process for selecting PTP farmers, providing on-farm training, and PTP monitoring all suffered, and in some cases drastically. Loan recovery dropped to 44%. In response, the Board of Directors cut the field budget significantly in 1990. However, the SG 2000 Ghana staff and MOFA officials persuaded Ghana's Agricultural Development Bank (GADB) to authorize input loans for 20,000 PTP farmers. Again, 1990 loan recovery was a dismal 45% and eventually SG 2000 had to reimburse GADB for the losses.

In collaboration with MOFA, a major redesign of the SG 2000 program was carried out in 1990-1991. Extension officers would no longer have responsibility for input distribution or loan recovery. SG 2000 hired a seed specialist to work with MOFA's National Seed Service and the Ghana Seed Inspection Unit to develop a network of private seed producers, and a program was initiated to promote the development of input dealers.

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<sup>1</sup> International Maize and Wheat Improvement Center

<sup>2</sup> International Institute of Tropical Agriculture

The PTP program was renamed the Extension Test Plot (ETP) program, scaled back to roughly 5,000 plots, diversified to add more crops (i.e., cassava, cowpeas, soybeans, and rice). An on-farm grain storage extension program was added, and in 1994 new conservation tillage (CT) practices developed with CRI and Monsanto began to be actively promoted.

A new credit scheme was established in 1991 involving GADB, some emerging new input dealers, and registered farmer associations. Extension officers helped farmer groups prepare application forms, get photographed, and submit loan requests to GADB local offices for approval. Approved farmers received ETP inputs from approved suppliers, who were then paid by GADB. After harvest, farmer groups were responsible for repaying their loans to GADB. SG 2000 underwrote many of the transaction costs needed to set-up this triangular arrangement and monitor it. This program ran from 1991 to 1999. During the first 4-5 years, loan recovery was above 85%, but began to falter as underwriting by SG 2000 of the associated transaction costs declined.

In the late 1990s, SG 2000 played a key role in backstopping government efforts to develop a national soil fertility restoration and management plan, along with the World Bank and the International Fertilizer Development Center (IFDC). By 1999, a national plan had been formulated with considerable input from a broad range of national stakeholders. It called for broader use of green manures and agro-forestry to improve fallows, in addition to the use of manufactured fertilizers. Funding to help implement this plan, however, did not materialize and little of the plan was ever implemented.

Between 1986 and 2003, SG 2000 spent about US\$ 20 million for program operations in Ghana. Figures on the amount spent by MOFA and CRI in SG 2000-related activities was not tracked, but is likely to exceed the SG 2000 contribution.

## **Results/Impact**

Over a 17-year period, SG 2000 helped support more than 150,000 extension demonstration plots throughout the country, ranging in size from 0.2 to 0.4 ha, with two-thirds focused on improving maize production, and the remainder covering a range of crops, including sorghum, cassava, cowpea, soybeans, and rice. Nearly 1,000 frontline MOFA extension staff received training, mainly hands-on training, in the recommended technologies. SG 2000 estimates that 70,000 farm families grew demonstration plots and another 600,000 attended on-farm training sessions or field days, held at different growth stages of the crops. More than 10,000 IITA/FAO-style on-farm drying cribs and patios have been constructed by farmers.

*Crop production:* Ghanaian farmers have obtained important production gains in maize, cassava, cowpea, and rice (FAOSTAT). National maize production grew 2.5 times between 1986 and 2002 but average national yields only increased by 26 percent. Most of the maize production increases have come from areas expansions. Rice production increased more than threefold, and national yields doubled. National cassava production has doubled and yields increased by 40%. A CRI-CIMMYT study in 2001 estimated that smallholder farmers have adopted CT technology on 100,000 ha of their farmland.

*Improved seed:* Several high-yielding, streak-resistant open-pollinated maize varieties have been popularized through the SG 2000 program and are grown on

300,000 ha of land, including the QPM variety Obatanpa, which, today, is grown on 200,000 ha. A private seed supply system began to take form in the early 1990s, built on public sector germplasm (released by CRI) and private sector production, with MOFA, SG 2000, and later GTZ and IITA playing important development roles. In 2002-2003, about 2,500 mt of seed was produced annually, including nearly 2,000 mt of maize seed (mainly Obatanpa). A network of private input dealers has developed in the country, with some companies, such as Aglow, achieving a fairly broad national coverage.

*Fertilizer use:* Consumption of manufactured fertilizer has been highly variable over the past two decades, although it has finally begun to recover. Several private fertilizer companies now supply the market. Total consumption in 2002-2003 was approximately 31,000 nutrient tons, four times higher than 1985-87 (FAOSTAT). Consumption on staple food crops is low, and is primarily destined for export-oriented crops. Most participants in the PTP/ETP demonstration programs did not continue using recommended fertilizer levels once the credit programs, which were provided by SG 2000, ended.

### **Lessons learned**

- (i) *Too much of a narrow focus:* SG 2000 demonstration campaigns were too focused on maize production, too fixed on biological potential alone, and too insensitive to smallholder resource endowments and capacity to take on risk. The primary field demonstration activities (1986-1990) occurred during a period of far-reaching institutional changes under government structural adjustment programs. Parastatal seed, fertilizer, and crop marketing organizations were disbanded, input subsidies were eliminated, and foreign exchange and financial markets liberalized. Programs to ease the transition from public to private agricultural services were not put into place. The national maize production campaign in this liberalized economy led to significant drops in maize prices, when supply exceeded commercial demand. SG 2000 and MOFA were slow to diversify the range of crops included in the demonstration program, continued to focus on maize production for commercial markets when demand signals suggested crop diversification, and never really came up with a range of technological options. The farmer was therefore left to choose the technological package most suited to her or his economic circumstances.
- (ii) *A "one-size-fits-all" fertilizer recommendation was inappropriate:* While maize fertilizer recommendations were scaled back, new components were added to the package, especially herbicides for conservation tillage. This boosted the cost of the maize inputs package to US\$ 120-140/ha. For many smallholder farmers, mobilizing this sort of cash resources was very difficult, and generally required borrowing. The nominal cost of borrowing for smallholders during most of the SG 2000 period ran above 30% per year at GADB, and ran much higher in informal markets. A single country-wide fertilizer recommendation per crop also did not consider farmers' varying access to resources, the planting history of the plot (fallow/continuous planting history) or its inherent soil productivity.
- (iii) *Greater attention to the impacts of macroeconomic shifts was needed:* The instability of the Ghanaian currency, the *Cedis*, posed major difficulties for private fertilizer importers throughout the 1990s and into the new century.

Devaluations reached 100% in some years. Fertilizer importers had few financial instruments to hedge against such monetary instability, and thus built significant margins into their *Cedis*-denominated pricing structure to help assure repayment of hard currency lines of credit. This, in turn, created “price shocks” for Ghanaian farmers, who evaluated the new inflated current season fertilizer prices against previous season grain prices, and led many farmers to discontinue fertilizer use on food crops destined for domestic consumption.

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Information for this case study was provided by Chris Dowswell, SG2000.