

SASAKAWA AFRICA ASSOCIATION



ANNUAL REPORT 2003-2004



ABOUT SASAKAWA-GLOBAL 2000

Agricultural projects of Sasakawa Global 2000 are operated as joint ventures of two organizations—Sasakawa Africa Association (SAA) and the Global 2000 programme of The Carter Center in Atlanta. SAA, whose president is Dr Norman E Borlaug, serves as the lead management organisation for the SG 2000 projects in Africa. Working through The Carter Center's Global 2000 programme, former US President Jimmy Carter and his advisers provide policy advice to national political leaders in support of programme objectives. Funding for SG 2000 projects comes from the Nippon Foundation of Japan.



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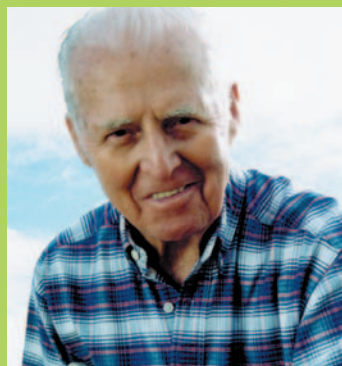
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PRESIDENT'S REPORT



Norman E. Borlaug

Meeting the Millennium Goal of Halving Hunger

The Millennium Development Goal on Hunger calls for halving the proportion of chronically hungry by 2015. In 1996, FAO estimated that there were 190 million the chronically hungry people in sub-Saharan Africa. Sadly, rather than declining, hunger in Africa has expanded, and now affects 200 million people.

During 2003-04, World Food Prize laureates M.S. Swaminathan and Pedro Sanchez co-chaired a blue-ribbon panel, called the Millennium Development Project Hunger Task Force (HTF), which has endeavored to make recommendations on how best to achieve the MDG on Hunger. SAA's Christopher Dowsell was a member of the HTF, one of ten MDP task forces under the leadership of Columbia University Professor Jeffrey Sachs and the sponsorship of UNDP. Task Force findings were presented to UN Secretary General Kofi Annan in early 2005.

The HTF concluded that, from a technological standpoint, Africa could meet the millennium development goal of halving hunger by 2015. Achieving it is more a matter of political choice than anything else; it will require greater capacity of governance and much larger capital investments in infrastructure, institutions, and people.

The Hunger Task Force endorsed the central thesis of FAO's anti-hunger strategy, which calls for raising smallholder agricultural productivity for those food insecure people with the means to increase food production and instituting safety net programs to ensure food security for those unable to produce food for themselves.

Since its inception in 1986, SG 2000 has been working with national ministries of agriculture and African farmers to raise the productivity of resources devoted to food crop production, focusing principally on getting agriculture moving in the lands best suited to produce surpluses. From a technical standing, farmers in more than two million demonstration plots have shown that they can double and triple yields, using relatively modest packages of improved seeds, fertilizers, and good management practices. And yet, average national yields for maize, sorghum, and millet have not improved appreciably, as farmers have found it difficult to adopt these improved packages of practices due to high input prices especially for fertilizer, and volatile market prices for grains.

RAISING AGRICULTURAL PRODUCTIVITY

Needed for Africa's major agroecological zones are different agricultural production strategies that better take into account risk factors. Central to all strategies, however, is the need to restore soil fertility. After more than 30 years of nutrient mining, African soils are the most seriously degraded in the world. Unless agricultural soils are restored with plant nutrients, using inorganic and organic fertilizer sources, there is little hope of achieving the MDG on hunger. The HTF has recognized this fact, and made restoration of soil fertility the number one agricultural development objective. Increased use of manufactured fertilizers is central to HTF and SG 2000 agricultural productivity strategies, where this is the lowest-cost delivery option.

On the more-favored lands, agricultural production systems need to be intensified. Essential to intensification strategies should be the use of fertilizers and modern plant varieties, and conservation tillage systems. Investments in the market infrastructure—including transport—are essential.

In marginal lands—where at least half of Africa's 200 million hungry people live and farm—the nature of the agroclimatic stresses and remoteness from commercial

markets call for lower-cost, lower-risk technologies. Yield dependability is especially important. Greater use of improved varieties and livestock breeds can be extremely beneficial. Water resource development and management should receive a major priority.

SAFETY NETS

While necessary, economic growth alone is not sufficient to eliminate hunger, since so many of the hungry live beyond the reach of markets—in deep poverty traps—where the benefits of growth do not reach. Thus, public safety net programs are needed.

The HTF recommends nutrition-feeding programs, as needed, for orphans, the sick and the aged, to ensure food security in the short-run, combined with other health and education interventions.

The HTF proposes large “productive safety net” programs, such as school meals and food and cash for employment in public works and eco-rehabilitation. Underemployed hungry people are provided with part-time work. The natural and economic resource base of the rural area is enhanced through public works investment programs.

MAKING MARKETS WORK FOR THE POOR

In most African countries, less than one third of domestically produced food enters commercial marketing channels beyond the local area. Because of deep poverty traps, many African families find themselves unable to purchase the quantities of food needed for adequate nutrition. Greater government purchases of domestically-produced foods for distribution through safety net programs proposed by the HTF could double demand in commercial markets, helping to stabilize and improve farm gate and market crop prices.

The HTF also recommends programs of targeted subsidized vouchers to help food-insecure families purchase enough fertilizer and seed to produce sufficient food to cover their nutritional needs.

Seed Supply—Over the past 15 years, most governments in sub-Saharan Africa have shut down their money-losing public seed companies, with the idea that private sector enterprises would fill this void. In some crops and countries, private seed companies have come in, especially to serve the smallholder farmers located in favored environments with relatively good infrastructure, and for crops, such as hybrid maize, where profit margins are the greatest. However, for many basic food crops, farmers continue to look to public research systems to supply their needs for improved seed. Many outstanding varieties of staple food crops have been developed by national and international agricultural research institutes over the past 20 years. But in most countries and for most crops, seed of these improved varieties are not reaching smallholder farmers with the desired regularity, quality, and quantity. This barrier must be overcome with new seed supply strategies that more effectively link public sector research institutions with private seed growers and farmers.

Fertilizer and Agrochemical Supply—Input supply to smallholder farmers is still a major bottleneck to agricultural intensification. All too often, farmers have to travel far, only to find that the fertilizers and crop protection chemicals they require are the wrong type, packaged in inappropriate sizes, not readily available, and often very costly.

Largely because of high transportation costs, the price of fertilizer at the farm gate in Africa is often double—and sometimes triple—what a farmer in an industrialized country would pay. Similarly, the price at the farm gate for produce is often as low as 50 percent of the market price in urban centers.

INFRASTRUCTURE

Efficient transport is needed to facilitate production and enable farmers to bring their products to market, and intensive agriculture is particularly dependent on vehicle access. But today, most agricultural production in Africa is generated along a vast network of footpaths, tracks, and community roads where the most common mode of transport is “the legs, heads, and backs of women.” Indeed, the largest part of a household’s time expenditure is for domestic transport.

The conditions of the main highways in Africa have improved somewhat, even though the densities of paved roads remain among the lowest in the world. However, the condition of local roads is poor and generally worsening, as the volume and weight of traffic increases. Large donor-funded projects have helped governments to finance rehabilitation. The World Bank alone has 32 projects in the transport sector, with a total commitment of US\$ 2.4 billion.

The Millennium Development Project (MDP) report and NEPAD’s Comprehensive African Agricultural Development Plan (CAADP) have estimated that the road infrastructure needs for SSA between 2005 and 2015 are on the order of US\$ 150 billion, or US\$ 15 billion per year.

National governments, inter-regional associations, such as ECOWAS and COMESA, and large international donor organizations have important roles to play in the future planning, financing, and managing of integrated and coordinated systems. However, small- and medium-sized private entrepreneurs and local governments and communities must also be involved in the development and management process.

Not only will improvements in transport systems and other rural infrastructure (especially potable water and electricity) greatly accelerate agricultural production and rural economic growth, they will also reduce rural isolation, thus helping to break down tribal animosities and establish rural schools and clinics in areas where teachers and health practitioners have heretofore been unwilling to settle.

Finding a way to provide effective transport infrastructure in sub-Saharan Africa underpins all other efforts to reduce poverty, improve health and education, and secure peace and prosperity.



RESOURCE MOBILIZATION

The New Partnership for Africa’s Development (NEPAD) has estimated that sub-Saharan Africa needs to invest at least US\$ 300 billion in agriculture and rural development over the next 15 years. A significant portion must come from the nations of Africa themselves. In response, African leaders have pledged to double—on average—state support to agriculture over the next five years. Greater funding must also come from the international donor community, especially to finance the large requirements for infrastructure development and eco-rehabilitation.

In return for increased foreign aid, African leaders have pledged to meet higher performance standards in their use of public funds, and to conduct “peer reviews” of each other. In exchange for meeting higher performance standards, African governments want greater autonomy in planning their development programs and a pledge of increased aid from OECD nations, where Millennium Development Goals are met.

While more external official development assistance (ODA) is certainly required, African governments themselves have recognized that the national resources going into agriculture have been inadequate. Under NEPAD, African governments have pledged to increase national budgetary allocations for agriculture to 10 percent. With greater external debt relief promised by creditor nations, meeting this goal becomes much more feasible. In addition, African governments should also review agricultural policy, especially to stimulate private sector investment, so necessary for input supply, output marketing, agro-industries, and export promotion.

REGIONAL DIRECTOR'S REPORT, 2003-04



Marco A. Quiñones

During 2003-04, a number of important organizational and programmatic changes began to take place within SAA. First was a decision by the SAA Board to concentrate its human and financial resources on a smaller number of project countries, in hopes that such a concentration of resources would result in increased impact on raising agricultural productivity and improving farmer incomes. While the SAA Board is not expected to make its final selection of "focus countries" until its October 2005 meeting, it is likely that SAA will operate less than half the number of SG 2000 country projects in 2006 than it did in 2005.

During 2003-04, SAA brought SG 2000 country projects in Ghana (2003), Tanzania, and Guinea (2004), to an official conclusion, although SAA continues to support selected activities in these countries through its regional programs. Bringing country projects to a conclusion is never easy. SAA has enjoyed excellent working relationships with national ministries of agriculture, extension departments, and national agricultural research institutions. Each SG 2000 country budget has been relatively small (averaging less than US\$ 500,000 annually), and the agricultural intensification challenges it has set out to address with national colleagues and smallholder farmers have been formidable and not quickly remedied. In no case can SAA staff say that they have left a project country feeling that the job they originally set out to accomplish has been completed.

At the same time, SAA can take pride that it has worked in a highly action-oriented, flexible mode in each SG 2000 project country for at least seven years, and in most cases, for more than a decade. Much productive work has been accomplished during these periods, and the bonds of collaboration and friendship continue, albeit in a less intensive way.

SAA's organizational challenge now is to find a cost-effective way to maintain professional and programmatic ties in former SG 2000 project countries so as to maintain selected lines of support and collaboration with the extensive network of extension workers, agricultural researchers, policy makers and farmers. SG 2000 staff believes that such programmatic and professional ties should be maintained through the SAA regional programs that have been growing in strength and number over the past decade.

EXPANDING REGIONAL PROGRAMS

SAA's first two "regional programs" that worked across project countries were the Sasakawa Africa Fund for Extension Education (SAFE) and its Agro-Processing Program, both of which were established in the early 1990s.

SAFE has developed BSc extension programs with eight agricultural universities in SG 2000 project countries. More than 1,200 frontline extension workers have benefited from this program, with 700 already graduated. In 2003, SAFE was legally separated from SAA, and now is a free-standing non-profit association under Swiss law, with its own Board of Directors and budget resources. Programmatically, however, SAFE continues to work closely with SG 2000 country staff in the selection of candidates for the BSc programs and with the collaborating universities in curriculum development and thesis research practicums.

In 1993, SAA established a regional agro-processing program, which was jointly operated for 10 years with the postharvest engineering unit of the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria. Initially, the country focus was Ghana and Benin, but later expanded to other SG 2000 project countries. In 2002, Toshiro Mado, program officer in charge, shifted his base of operations to Addis Ababa, thus expanding his collaborative ties with SG 2000 project countries in Eastern and Southern Africa.

In 2003, SG 2000 established a new regional program for quality protein maize (QPM), which includes the backstopping of SG 2000 country projects in research and development and seed production. Wayne Haag, former SG 2000 country director in Ghana and later in Mozambique, who was instrumental in re-introducing QPM in sub-Saharan Africa, leads the QPM/Seed Production regional program, providing technical and financial support to more than 10 current and former SG 2000 project countries.



Rice is experiencing the fastest growing demand among Africa's cereals. SAA has established a regional rice program to work in selected SG 2000 project countries. Postharvest quality issues will receive special attention.

The SAA Board, at its October 2004 meeting, decided to establish a new regional program in rice, primarily to expand its work to promote the New Rice for Africa (NERICA) developed by scientists at the Africa Rice Center (formerly WARDA), and national collaborators in Guinea and a growing number of other African countries.

SG 2000 COUNTRY PRIORITIES ARE CHANGING

Over the years, the SG 2000 country projects have increasingly expanded their activities associated with helping farmers to find markets for their increased crop production. This has included helping individual farmers to organize into groups for collective bargaining with grain traders and agro-processing industries, as well as encouraging farmers to set up farm enterprises such as livestock feeding and small-scale agro-processing to add value to their primary crop production.

Greater emphasis has also been given in agricultural extension education programs to post-harvest technology, such as mechanized threshing and improved storage, to protect the physical quality of the grain produced by farmers participating in SG 2000 programs. The SG 2000 emphasis on QPM also reflects efforts to improve food quality.

Helping smallholder farmers produce crops for the market has priority in SAA's technology transfer work. Post-production storage, grain quality, and value-addition are important issues.



Finally, in its growing emphasis on market demand, SG 2000 has encouraged greater crop diversification in the field demonstration programs. Today, in addition to maize, improved production technology for rice, field beans, cowpeas, pigeon peas, and sesame is also promoted.

SG 2000 has also expanded its expertise in small-scale water resource development, spearheaded by staff based in the Ethiopia project. Various low-cost water harvesting technologies to capture and store run-off and simple drip irrigation systems for high-value crops have been demonstrated to frontline extension staff and farmers. The SG 2000 Ethiopia team is helping to spread this technology to other SG 2000 project countries through technical assistance exchange visits, training, and demonstrations.

PARTNERSHIPS

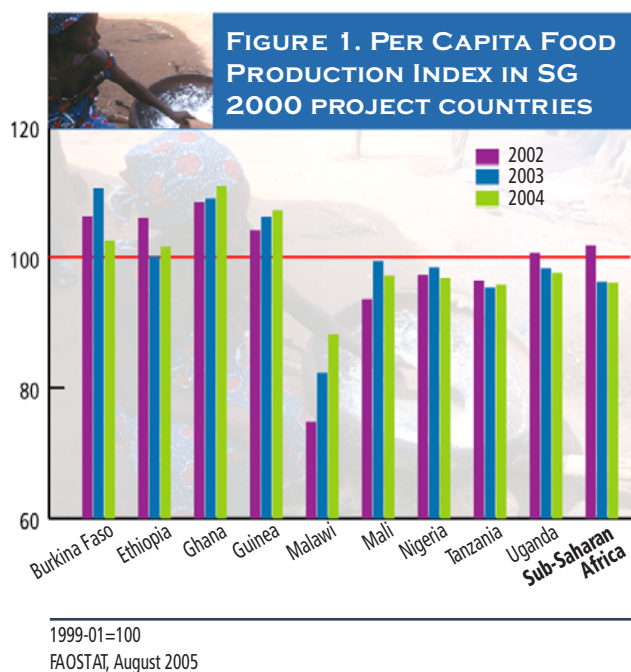
SG 2000 partnerships with CGIAR centers, especially CIMMYT, IITA, WARDA, ICRISAT, and ICRAF, have been strengthened in recent years. Memoranda of understanding have been signed with many of these centers to improve coordination.

SAA/SG 2000 has strengthened its ties with the World Bank and NEPAD. Following an international workshop co-hosted with NEPAD in December 2002 in Johannesburg, SAA staff assisted the NEPAD secretariat in the development of project proposals on soil fertility restoration and enhancement and maize promotion for NEPAD's Comprehensive African Agricultural Development Program (CAADP).

2003-04 MONITORING AND IMPACT ASSESSMENT

FOOD PRODUCTION TRENDS

Food production in SG 2000 project countries in 2003 and 2004 generally kept pace with population growth over the past four years (Figure 1). Malawi suffered a worrisome drop in 2002 due to drought. Per capita food production improved in 2003 and 2004. Ghana experienced the greatest gain in food availability, due in part to increasing fertilizer consumption. Guinea also showed strong growth, as the new NERICA rice varieties continue spreading.



Rice—Rice production in SSA continues at a rapid pace, recording year over year growth of 5 percent in 2003 and 2004. Total production nearly reached 13 million tons in 2004, although imports account for more than one-third of total consumption. After wheat, rice is the second-largest food import in SSA, averaging 7.5 million tons during 2003-04.

Significant production jumps were achieved in Nigeria and Mali, as both governments actively promoted adoption of productivity-enhancing rice technology. New NERICA varieties from WARDA are contributing to stronger production growth rates.

Maize—Record maize production of 28 million tons was achieved in sub-Saharan Africa in 2003 (Table 1). Production in SG 2000 countries remained steady during 2003 and 2004, with gains in national yield levels most noteworthy in Ethiopia and Ghana. Maize production in Uganda has nearly doubled since 1997. Quality protein maize (QPM) was grown in all SG 2000 countries, covering around 400,000 ha in total. Greater stability in maize prices has been observed in some countries, especially Ethiopia, as markets and market information systems develop further, and governments take a more proactive stance in trying to avoid price collapses after harvest.

TABLE 1. NATIONAL MAIZE PRODUCTION (IN 000 TONS) IN SG 2000 PROJECT COUNTRIES

	2002	2003	2004
Burkina Faso	653	666	595
Ethiopia	2,826	2,800	2,744
Ghana	1,400	1,289	1,158
Guinea	103	107	90
Malawi	1,557	1,983	1,733
Mali	364	365	365
Mozambique	1,236	1,248	1,248
Nigeria	4,688	4,779	4,779
Tanzania	2,705	2,550	2,800
Uganda	1,217	1,207	1,350
Sub-Saharan Africa	25,945	28,182	27,624

FAOSTAT, August 2005

TABLE 2. NATIONAL RICE PRODUCTION (IN 000 TONS) IN SG 2000 PROJECT COUNTRIES

	2002	2003	2004
Burkina Faso	89	95	95
Ethiopia	16	16	16
Ghana	280	239	242
Guinea	842	900	900
Malawi	93	88	50
Mali	710	938	877
Mozambique	168	200	201
Nigeria	3,192	3,373	3,542
Tanzania	640	650	647
Uganda	120	109	140
Sub-Saharan Africa	11,501	12,099	12,718

FAOSTAT, August 2005

Fertilizer—Fertilizer use in SG 2000 project countries has continued to expand in SSA over the past four years. The latest figures available from FAO reported here only go up to 2002 (Table 3). The higher growth trend continued in 2003 and 2004, and we estimate that total SSA fertilizer consumption in 2004 was 1.6 million metric tons of nutrients. Fertilizer sector growth has been especially strong in Nigeria, Ghana, Mozambique, and Uganda.




TABLE 3. NATIONAL FERTILIZER NUTRIENT CONSUMPTION (IN 000 TONS) IN SG 2000 PROJECT COUNTRIES

	2000	2001	2002
Burkina Faso	34	32	32
Ethiopia	157	207	191
Ghana	12	31	31
Guinea	3	3	3
Malawi	50	27	193
Mali	44	42	42
Mozambique	16	27	27
Nigeria	188	221	166
Tanzania	22	12	9
Uganda	7	7	9
Sub-Saharan Africa	1,236	1,237	1,384

FAOSTAT, August 2005

Seed Systems—Smallholder seed systems continue to be weak in SSA, especially in West Africa. Nearly 4,000 tons of QPM seed was produced in SG 2000 countries during 2003 and 2004, sufficient to plant 200,000 ha, or half the QPM area each year with fresh seed. Several QPM hybrids are being grown in SG 2000 project countries. CIMMYT has also developed some excellent open-pollinated varieties with drought tolerance and nitrogen use efficiency, which are being grown on 500,000 ha in southern African countries.

Water Resource Development—SSA has the lowest percentage of arable land under irrigation, among the regions of the world. The presence of large populations that are food- and water-insecure in Africa has led to growing priority in agricultural development plans to water resource development. Simple water capture and storage systems, coupled with drip irrigation, are being promoted in many countries. The SG 2000 Ethiopian project has spearheaded SAA's work in water resource development. The government has launched a massive program and requested SG 2000's assistance in the small-scale water resource development training and demonstration components. SG 2000 is complying, and its experiences in Ethiopia are being transferred to other project countries.

AGRICULTURAL FUNDING IS INCREASING

African governments have formed the New Partnership for Africa's Development (NEPAD) and pledged to double public funding of agriculture over the current average of 5 percent. The ambitious Comprehensive Africa Agricultural Development Program (CAADP) calls for national governments to pay for 60 percent of \$300 billion needed for the next 10 years.

OECD countries have accepted a target of 0.7 percent of their GNP as the future level for official development assistance (ODA). A number of European countries have already achieved this target; Norway has surpassed it.

World Bank funding for rural projects increased by 50 percent in FY 2003 to approximately US\$ 7.6 billion, representing 41 percent of total lending. The International Development Association (IDA), that part of the World Bank which provides grants and interest-free loans to lowest per capita income countries, committed 52 percent of its total funding (\$3.7 billion) to rural areas; sub-Saharan Africa received 45 percent of this funding. Investments in the infrastructure sector increased to 33 percent of lending to rural areas, a jump from 27 percent in FY 2002.

In SG 2000 countries, new World Bank-funded rural development projects were initiated in Ethiopia, Ghana, Guinea, Malawi, Nigeria, and Tanzania during 2003-04.

BURKINA FASO

In 2003/04, Burkina Faso was the first among Sahelian countries to produce a cereal surplus of more than one million metric tons, which is more than a quarter of all cereals produced by the nine member nations of the *Comité Permanent Inter-États de Lutte Contre la Sécheresse au Sahel* (CILSS). Burkina also accounted for nearly 65 percent of the maize produced in the CILSS countries. According to SG 2000 country director Marcel Galiba, an artificial rains program, a small-scale irrigation scheme, plus the use of improved varieties and soil fertility management practices all contributed to the abundant harvest.

“The downside was that about the same time, cereal prices slumped, with maize hitting a low of around 10 cents a kilo, which did not even cover farmers’ production costs,” comments Galiba. “Burkina will have to learn to deal with bumper crops based on how it manages shortages.”

An economic analysis was conducted to calculate production costs with a break-even point related to external inputs. Prices of maize, cowpea and sweet potato, the three commodities analyzed, were based on prices paid in 2003 to producers in Bazega, Nahouri and Zoundweogo. Sweet potato, which is largely traded across the border with Ghana, had the lowest production costs per ton and generated more income for farmers than maize or cowpea (see table).

The income-generating capacity of maize, a basic component of the national diet, did not compare well with cowpea, widely sown in Burkina, where close to 640,000 mt were produced in 2004. Farmers rely on cowpea because it is well adapted to the low rainfall and poor soils that prevail in the region. Between 2001 and 2003, the cowpea area harvested in the country grew by 33 percent, while national production rose by 50 percent.

The results of the analysis should shed light on how to handle the situation. “There is an urgent need to learn to manage abundance and avoid hunger periods,” comments Galiba. “Adequate measures must be taken to buffer cereal price drops such as the one we’re experiencing now.”

Although total cereal production in the 2004-05 season was 14 percent lower than in 2003-04, the country is nonetheless expected to produce a surplus of around 565,000 mt.

BOOSTING RICE PRODUCTION

Rice production is currently being emphasized in Burkina to meet rising consumption levels. At present Burkina produces only 100,000 mt of paddy rice a year and has to import almost 98,000 mt, at a cost of nearly US\$ 50 million, to satisfy domestic demand. Encouraging farmers to adopt higher yielding rice varieties is considered an efficient way of raising rice production. To acquaint farmers with new varieties, 33 rice entries from the

WARDA Bouaké series were tested on the Tiebele Plain. Ten farmers hosted the trials and 41 took part in participatory varietal selection. At the end, two entries were identified as outstanding, with yields above 5,000 kg/ha. They should be of great interest to rice producers.

PROMOTING QPM

In November 2004, the first “Masongo Day” was held to discuss Masongo, a QPM cultivar. Farmers from agricultural regions all over Burkina participated in a forum where they discussed such topics as the need for good quality seed, input availability and small agroprocessing units. A variety of dishes, including a type of yoghurt, was prepared using Masongo. The idea behind the event was to expand the use of QPM through the introduction of new products.

“Maize is replacing sorghum and millet in the Burkinabé diet,” says Galiba, “and we need to produce better quality maize to ensure food security. Using QPM is by far the most effective, economical way of doing this.”

Dr. Sanou Jacob, leader of the Traditional Cereals Program at INERA and member of the WECAMAN maize network, believes the answer lies in planting “Espoir,” an open-pollinated QPM variety derived from CIMMYT/IITA Population 66 SR, which is rich in beta-carotene, a precursor of vitamin A, and in the essential amino-acids lysine and tryptophan. According to Jacob, “Because of its nutritional content, Espoir could play a significant role in the fight against a form of child malnutrition called kwashiorkor. It may also help compensate for the nitrogen deficit observed in normal maize. Another of Espoir’s advantages is that it can be boiled or roasted without losing its nutritional properties.”

Espoir’s shorter cycle and high yield (6.5 t/ha) make it ideal for intensive farming. It is adapted to 900 mm rainfall or irrigation and is resistant to diseases common in the country, such as *helminthosporium*, rust, *curvularia* and streak. Espoir produces good forage because of its “stay-green” trait, and its grain makes good animal feed.



Farmer participants at QPM Masongo Day.

Average yields and costs for maize, cowpea, and sweet potato, 2003			
	Maize	Cowpea	Sweet potato
Input costs/ha (\$)	137	63	147
Production costs/ha (\$)	406	219	678
Yield (kg/ha)	3,268	929	32,767
Cost of one ton (\$)	124	236	21
Average producer price/ton (\$)	186	350	182

Ethiopia in 2004 produced an abundant harvest the likes of which had not been observed in years. Farmers harvested more than 14 million tons of food grain, which is 24 percent higher than the 2003 harvest (11.5 million tons) and 21 percent higher than the latest five-year average, according to a report released by FAO and the World Food Programme. The report attributed the steep rise in production to good rainfall and the increased use of fertilizer and improved seeds, especially of maize and wheat.

Ethiopia's estimated annual food grain needs currently stand at around 12.5 million tons. "A bumper crop of more than 14 million tons means we have a surplus of more than 1.5 million tons," says Dr. Tesfaye Tesemma, SG 2000 acting national coordinator in Ethiopia. "The UN report estimates Ethiopia's emergency food requirements to be around 390,000 million tons, which should be procured within the regions that produced a surplus in order to assist domestic markets."

An abundant harvest is excellent news in a country that suffers chronic food insecurity. Ethiopia's food insecurity is caused by structural problems dating back many generations that produced entrenched poverty among the rural population. Depleted soils, an inefficient marketing system, and continued use of low-yield technologies also contribute to food insecurity, especially given the country's high population growth.

DEMONSTRATIONS

Demonstrations during 2004 totaled 859 on-farm plots that included conservation tillage trials on quality protein maize (QPM) and tef, the most popular cereal in Ethiopia (see table). The plots were concentrated in 15 districts of the Oromiya, Amhara, and Southern regions. Conservation tillage increases the amount of organic matter in the soil and reduces farmers' production costs.

Another focus of the on-farm plots was testing the effectiveness of broad bed makers, farm implements used to create raised beds that are ideal for growing wheat and



SG 2000 Ethiopia is leading SAA's efforts to identify and promote appropriate technology in water harvesting and micro-irrigation.

other crops. Raised beds are particularly effective on waterlogged clay soils because they allow excess water to drain away, thus improving the soil environment. Other demonstration plots showcased the advantages of fertilizer application methods on tef in clay soils and of "push-pull" technology, a biological control method used to curtail stem borer populations in maize fields.

HARVESTING WATER FOR DRIP IRRIGATION

SG 2000 is actively involved in improving crop production through the introduction of water harvesting technologies. The efficiency of these technologies is being demonstrated through 30 small-scale irrigation projects with the capacity to irrigate up to 500 m² of land per household. Most water harvesting structures have been completed, and some farmers have already started producing high value vegetables using drip irrigation. The idea is to replicate these structures in other areas where the Ethiopian government is introducing water harvesting extension programs.

"This year we strengthened the water harvesting pilot project located in the moisture-stressed Rift Valley," comments Dr. Tesemma. "We also added a dairy component aimed at further diversifying the small farmer's sources of income." More specifically, SG 2000 partnered with the International Livestock Research Institute (ILRI) to provide 12 farmers with pregnant heifers to be used for milk production. Participating farmers previously received training on horticultural crops and dairy production.

SG 2000 has also started working with the World Agroforestry Center (ICRAF) and the Ethiopian Agricultural Research Organisation (EARO) to disseminate high value fruit trees, improved fodder trees for cattle, and legume trees and shrubs that regenerate soil fertility. These measures are expected not only to increase household income, but also to improve people's nutrition and restore farm productivity.

Average tef yields, 2003

Region	Zone	Average production				Total income		Net income	
		CT	Non-CT	CT	Non-CT	CT	Non-CT	CT	Non-CT
Oromiya	East	1.3	1.1	916.6	1,123.2	2,729.2	2,379.1	1,801.5	1,253.9
	Wollega								
	Arsi	1.4	1.4	1,147.9	1,301.6	2,884.0	2,949.3	1,736.1	1,647.7
	West	0.8	0.8	549.0	546.0	1,665.0	1,504.5	1,116.0	958.5
Amahara	East	1.4	1.3	1,090.9	1,292.2	2,743.4	2,566.8	1,652.6	1,272.2
	Gojam								
SNNPR	Hadiya	1.2	1.1	958.0	1,114.9	2,034.7	1,850.0	986.5	735.0

CT: Conservation tillage
Non-CT: Conventional tillage

In 2003, SG 2000 Ghana focused mainly on strengthening groups of farmers, especially members of the old Farmers' Production Plot (FPP), and developing self-sustaining, business-oriented Farmer-Based Organizations (FBOs), which are also a major component of the Ghanaian government's Agricultural Services Sector Investment Program (AgSSIP). From April to June 2003, 238 individuals from 23 farmers' groups completed three modules of an agribusiness course (see table). According to SG 2000 project coordinator Benedicta Appiah Asante, "The positive effects of the course are already in evidence. Farmers are showing increased commitment to their groups, and the repayment of loans has improved."

The new emphasis on agribusiness has increased profits for smallholders and is expected to have an impact on their uptake of improved technologies. As a result of the agribusiness course, farmer groups have become more formalized and farmers themselves are demonstrating their new-found appreciation for basic business principles by applying them in their farming activities.

Other training activities in 2003 included a postharvest technology demonstration organized in the three regions of Ghana where SG 2000 is active: the Ashanti, Central, and Upper West Regions. A total of 192 farmers from 11 districts attended the demonstrations on postharvest management practices, including the use of Actellic Super for treating grain. In Central Region, where many farmers own oil palm plantations, SG 2000 Ghana joined forces with SG 2000's Agroprocessing Program to demonstrate value-adding agroprocessing techniques.

As the SG 2000 Ghana program draws to a close, SG 2000 has been collaborating with other locally active NGOs to ensure the sustainability of its work. With the Adventist Development and Relief Agency (ADRA) it trained 160 farmers groups from 40 communities in zero tillage methods and team building and management, among other subjects. Partner for Humanity, which aims to facilitate marketing access to farmers, has acquired silos from the defunct Food Distribution Corporation and plans to assist smallholders by purchasing their grain. SG 2000 is helping to identify groups that might benefit from this program.

Summary of agribusiness training by region

Region	Districts (no.)	Groups (no.)	Farmers (no.)
Ashanti	6	7	105
Central	4	7	33
Upper West	3	9	100
Total	13	23	238



Mrs. Benedicta Appiah-Asante served as SG 2000 national coordinator between 1997 and 2003. She gave special attention to strengthening farmers' associations and promoting training in rural agribusiness development.

Over its 16-year history in Ghana, "SG 2000 achieved many milestones," commented SAA President Norman Borlaug. "The Ghana project was where we developed program components that later spread to other SG 2000 project countries, such as quality protein maize (QPM), conservation tillage and the SAFE and agroprocessing programs. We owe a debt of gratitude to our in-country staff, government officials, researchers and extension workers, farmers, agribusiness entrepreneurs, and donors."



Between 1986 and 2003, maize production in Ghana more than doubled—from 559,000 to 1.3 million tons. Over this same period, cassava and rice production tripled. It is estimated that maize streak virus-resistant maize varieties are planted on more than 500,000 ha, with QPM varieties occupying about 250,000 ha. It was estimated in a CIMMYT-CRI research report in 2003 that more than 100,000 ha were planted using conservation tillage (no-till) technology.

With the assistance of the SAFE program, more than 300 extension workers obtained BSc and Higher Diplomas through Cape Coast University and Kwadaso Agricultural College, and another 130 were enrolled and well on their way to completion.

In the agroprocessing program, by mid 2004 more than 1,700 sets of equipment—mostly related to producing fermented cassava flour—had been purchased by farmers' groups and individuals.

SAA regional programs in QPM, rice and agroprocessing are continuing some activities in Ghana, and the SAFE program also continues to collaborate with two agricultural education institutions.



Guinea celebrated the International Year of Rice in September 2004.

A major activity of SG 2000 in Guinea is the promotion of NERICA, the new rice for Africa developed by the Africa Rice Center Development Association (WARDA). According to WARDA experts, the area dedicated to NERICA production is growing rapidly, with an estimated 58,000 hectares planted to the new rice in 2003.

Starting in 2003, SG 2000 joined diverse partners in initiating a pilot project as well as multiple experiments using NERICA. Focused on developing an agro-industry based on NERICA, the project is specifically targeting a number of issues such as gender (over 80 percent of participants are women), the environment, seed production, and soil fertility management. The project objective is to significantly increase the productivity of upland rice from current low levels by working closely with farmer organizations.

SG 2000 supported experiments on fertilizer dosage, mostly on NERICA, and studies on soil fertility amendment with rock phosphates, conducted at four research centers and at the College of Agriculture of the University of Faranah. Results show that, just like their lowland counterparts, NERICA varieties respond well to higher fertilizer doses. Other SG 2000-sponsored studies on crop rotations using cereals (rice and maize) and legumes (cowpea, soybean, and mucuna) confirmed that rice and maize yields can double by rotating them with either cowpeas or soybeans.

THE INTERNATIONAL YEAR OF RICE

In September 2004, Guinea celebrated the International Year of Rice by hosting a series of events organized by the Ministry of Agriculture, in conjunction with UNDP, FAO, the Embassy of Japan, and SG 2000. Participants in the celebrations visited NERICA experimental and production plots, and observed agro-processing activities in the region of Faranah. Says SG 2000 country director Tareke Berhe, "During this extremely successful visit, the delegation inaugurated a model postharvest and agro-processing center financed by SG 2000."

NATIONAL AND REGIONAL TRAINING

In 2003-04, the Guinea program continued its human capacity building activities. In 2003, 63 Guineans of both sexes took courses on QPM seed production, agro-processing, and the manufacture of postharvest machines, conducted both in Guinea and the sub-regional collaborating countries Ghana, Ethiopia, and Uganda. In

2004, the program trained a total of 79 women in improved methods of parboiling rice, and 6 technicians and 19 farmers were taught to operate postharvest machines. "In connection with the machine building courses, 185 students from the School of Agriculture in Mamou helped to construct a model hangar for the machines," says Tareke Berhe.

Also in 2004, SG 2000 helped give a course on soil fertility to 24 field technicians working for AFRICARE, an American NGO. Training for SG 2000 staff included an IFDC (International Fertilizer Development Center) course on integrated soil fertility management in Togo, as well as several rice workshops held in Côte d'Ivoire and Ghana.

NATIONAL, REGIONAL, AND INTERNATIONAL PARTNERSHIPS

At the national level, SG 2000 continues to collaborate and to develop new partnerships with the Ministry of Agriculture's Research and Extension department, as well as with agricultural schools of the Ministry of Higher Education, and with the Ministry of Health. In an example of cooperation with the MOA, SG 2000 has begun working with *Dynamisation des Filières Vivrières*, a newly established unit for the modernization of crop production and postharvest technologies.

"We continue to strengthen our collaboration with a mix of partners," explains Berhe. "SG 2000 is currently involved in soil fertility studies sponsored by AFRICARE International, the *Projet Élargie de Gestion des Ressources Naturelles*, and the University of Faranah. We're also engaged in joint activities with FAO, UNDP, UNICEF, Helen Keller International, and the Embassy of Japan." On a regional level, SG 2000 Guinea works with other SG 2000 country programs and with the International Institute of Tropical Agriculture (IITA) and WARDA.



Field activities, 2004

	Seed production (ha)	Training (persons)		Technology promotion	
Rice (NERICA)	110	Food processing	79	Postharvest machines	3 *
Maize (QPM)	26	Hangar construction	185	Narrow-cribs	2
Soybeans	5	Narrow-crib construction	38	NERICA PTPs **	25
Cowpeas	5	Machine manufacturing	6	Soil fertility demonstration	10
Mucuna	2.5	Machine operation	25	Soybean & cowpea	3
		SAFE	3	Hangar construction	1
Total	148.5		236		44

* Three sets consisting of multi-crop thresher, parboiler and rice polisher

** Production test plot.

MALAWI



Faced with maize production levels that lag far behind domestic demand, Malawi's Ministry of Agriculture (MOA) is accelerating the transfer of SG 2000 maize production technologies to farmers as a way of closing the supply-demand gap. Malawi, one of the largest per capita maize consumers in the world, remains an importer of its principal food staple. SG 2000 maize technologies have had major impact on improving food security for participating farmers despite the adverse weather conditions that have plagued the country since 2000.

Rains during the 2003-04 season were late in starting and remained low and erratic throughout the cycle, causing prolonged dry spells. Total maize production fell to 1.7 million tons, with a 467,000 ton deficit. "To reverse the situation, it is crucial to step up crop diversification, introduce drought tolerant varieties, and teach farmers how to take advantage of the water at their disposal," says SG 2000 country director José Antonio Valencia. "Also, people need to change their eating habits and reduce their dependence on maize. Malawi has plenty of groundnuts, cassava, sweet potatoes, and other cereals that could supplement maize."

TRAINING ACTIVITIES

In conjunction with the campaign aimed at facilitating the rapid transfer of SG 2000 technologies, MOA senior extension officers have attended relevant training courses that include fertilizer management, zero-till techniques, conservation agriculture, QPM production, rain-water harvesting, and postharvest methodologies. A total of 172 senior staff from all 8 MOA Agricultural Development Divisions (ADDs) have attended the course, during which participants are asked to formulate concrete plans for their individual ADDs to implement the new technologies.

One key area of the project is to promote the improved technologies to small-scale farmers through the Farmer Field Schools, working closely with ADD's field assistants and facilitators. The Schools provide the opportunity to explain and discuss the technological package, the importance of land preparation and conservation tillage, planting dates, and recommended maize production practices. The course also covers soybean, pigeon pea, rice, and wheat production technologies as a way of encouraging farmers to diversify their cropping systems.

Water harvesting is an ingenious way for farmers to combat drought. In June 2004 around 30 MOA staff participated in a water harvesting course that focused on teaching water harvesting methods and developing efficient smallholder irrigation systems. Rainwater is collected and stored in ponds, basins, or tanks, and then siphoned away to supply water to fields, livestock, and households, among others. Since the course, 20 water tanks have been built using the technology.

TRIALS AND DEMONSTRATIONS

Today Malawian farmers consider quality protein maize (QPM) an important crop due to its high nutritional value. The MOA has initiated studies on human and animal nutrition with the objective of establishing QPM's superiority over "normal" maize. In 2003 SG 2000 donated two tons of QPM to be used in the studies, and in 2004 a total of 37 tons of QPM seed were produced for distributing to farmers.

Marco Quiñones, SG 2000 regional director for Africa, visited farmers' fields in March 2004, along with the director of Malawi's Agricultural Extension Service. Both officials were impressed to see the number of management training plots (MTPs), zero tillage trials, and postharvest structures that were in place. "In 2004 we expanded our operations to include the Karonga ADD and will plant nearly 6000 MTPs. Of these, nearly 5000 will be QPM; the rest will be on zero tillage," explains Valencia.



In 2003, a series of field days were organized across the country and supervised by the Farm Field School. Farmers and field workers compared traditional maize production practices to conservation agriculture technologies and were encouraged to participate in discussions aimed at finding solutions to the problems they observed. Conservation agriculture is proving increasingly popular with Malawian farmers as a way to tackle problems of soil fertility and water conservation.

QPM demonstration results, 2003/04

ADD	Area (ha)	Number of farmers	Total production (kg)	Range (t/ha)	Yield per RDP* (kg/ha)
Blantyre	62.2	622	271,769	0.250-9.820	4,369
Machinga	54.0	540	235,886	0.270-9.800	4,368
Lilongwe	56.5	565	253,337	1.000-9.000	4,484
Salima	25.6	256	118,122	0.030-9.360	4,614
Kasungu	11.3	113	74,119	2.000-10.000	6,559
Mzuzu	42.0	420	227,205	1.010-11.500	5,409
Total/average		2,516	1,180,438		4,692

* Rural Development Programme



Malian rice farmers need to address post-production harvesting and processing challenges to compete more fully in the growing domestic urban marketplace for rice.

Overall results in Mali in 2003-04 were positive: a surplus of close to 200,000 tons of cereals were produced, putting the country in fourth place among the nations of the *Comité Permanent de Lutte contre la Sécheresse au Sahel* (CLISS), a regional initiative aimed at combating drought.

The most serious problem in Mali in 2004 was the swarms of locusts that invaded a good portion of the agricultural lands in the country. A swarm may contain 5 billion insects, cover 100 km², and advance 100 km per day. The widespread devastation caused by these voracious pests can force desperate people to emigrate to other areas or countries in search of work.

The locust invasion has not elicited an adequate response from the international community. The Food and Agriculture Organisation of the United Nations (FAO) estimates that US\$118 million are necessary to control the pests and overcome the losses they caused, but only US\$37 million have been raised. Commenting on the seriousness of the situation, SG 2000 director for Mali, Marcel Galiba, pointed out, "If the insects are not stopped, the bumper harvests gathered in the Sahel over the past five years will melt away, and food security in 2005 may be compromised." Mali's Ministry of Agriculture estimates that 450,000 tons out of an expected 3.1 million tons of harvested grain may be lost as a result of the pests.

ADVANCES IN QPM

The QPM cultivar Denbanyuman, introduced in 1997 by SG 2000, is making great progress in Mali, where it is flourishing in all maize growing areas. To reduce dependency on seed imported from Ghana, the National Maize Research Program produced QPM breeder's seed for the first time in 2004. The SAA Regional QPM Program, headed by Wayne Haag, collaborated by sponsoring a course on QPM seed production for regional scientists in Kumasi, Ghana.

A SAVINGS AND LOAN BANKING INITIATIVE

Financial cooperatives known as CREPs (*Caisse Rurale d'Épargne et de Prêt*, Rural Savings and Loan Association), first established in Benin by Marcel Galiba, have taken root in Mali. Today a total of 15 CREPs in four regions of Mali include 2,614 members, 902 of whom are women. In 2003 there was a 13 percent increase in savings, and fixed term deposits reached nearly US\$30,000. Loans totalled US\$60,000, of which 51 percent were for agriculture, 44 percent for commercial purposes, and 5 percent for livestock.

"The CREPs encourage people in rural areas to save their money, which can then be lent out to further agricultural development and improve the welfare of members," explains Galiba. The associations have played a major role in supporting input dealers, seed producers and others through grain inventory credit schemes. A strong partnership with BMS (*Banque Malienne de Solidarité*, Malian Solidarity Bank) allowed the CREPs access to US\$38,000 in 2003, and US\$46,000 in 2004.

OPENING NEW REGIONAL MARKETS

The Millet-Sorghum Initiative (MSI) is a region-wide project aimed at developing market outlets for locally produced cereal grain in five countries of West and Central Africa (Burkina Faso, Chad, Mali, Niger, and Senegal). The project is being sponsored by IFAD, the French Ministry of Foreign Affairs and SG 2000, which is also the implementing agency.

SG 2000 country director Marcel Galiba also leads the MSI. The project is being implemented in two phases. During the first phase stakeholders will be mobilized through National Stakeholders Focus Groups (NSFGs), which will conduct stock-taking exercises, national workshops, and regional fora to identify market development opportunities. In the second phase the NSFGs will be actively involved in the implementation of development projects, market surveys, technology testing, and training for stakeholders, among other activities.

"The idea is for stakeholders to take over MSI's activities at the end of the project," says Galiba.

Average national grain prices (CFA francs)

	Maize		Millet		Sorghum	
	2003	2004	2003	2004	2003	2004
March	101	45	134	55	125	51
April	97	54	134	55	124	57
May	102	56	135	54	125	59
June	97	52	135	54	116	55

MOZAMBIQUE



In Mozambique erratic or low rainfall can threaten food security of small-scale farmers, who have not yet adopted modern agricultural technologies. Their vulnerability is intensified by non-environmental factors, such as inadequate fertilizer and seed supplies, and the unavailability of credit. Low productivity and widespread poverty are real impediments to the sustainable use of natural resources.

Recognizing agriculture as the primary engine of economic growth, the national government has doubled its agricultural development budget since

1999. In 2004 Mozambique completed the first stage of the National Agricultural Development Programme (PROAGRI). In December 2003, a commission of government officials and donor representatives (from the World Bank, IFAD, USAID, DANIDA, and ADB) found PROAGRI I satisfactory and approved stage II to span the next five years.

The long-term goal of the Ministry of Agriculture and Rural Development (MADER) and PROAGRI II is to develop an integrated, sustainable agricultural sector that is competitive and diverse, among other things. PROAGRI II will contribute to improving food security and alleviating poverty mainly by supporting the efforts of smallholders, the private sector, and governmental and non-governmental organizations to increase productivity and ensure the sustainable use of natural resources.

SG 2000 is one of PROAGRI's partners. Explains Carlos Zandamela, SG 2000 project coordinator for Mozambique, "The number of donors supporting the PROAGRI program has been increasing, as has its funding, which since 1999 has grown from US\$ 202 million to US\$ 272 million."

PROAGRI II will focus on marketing, providing financial and investment services, conducting applied research, and creating a business-enabling environment. It will concentrate its interventions on smallholders, the commercial agricultural sector, and natural resources management. A special area of concentration will be attaining self-sufficiency in rice, an important staple crop for rural and urban populations in Mozambique.

Mozambique imports two-thirds of the 300,000 metric tons of rice it consumes each year. To stimulate domestic rice production, the government invited the International Center for Soil Fertility and Agricultural Development (IFDC) to assist in designing and implementing a project to improve the rice production chain, including input supply and credit, farm production practices, marketing, and milling. The three-year project will target seven provinces that account for 97.5 percent of Mozambique's rice production.

A Consultative Group on Rice (CGR) was established as part of the initiative. It is made up of producers, millers, traders, input suppliers, government agencies, and NGOs. Zandamela, who has more than 20 years' experience in rice research and technology transfer, was appointed to the executive secretariat of the CGR. "The CGR will focus on reducing production costs and creating a more competitive rice production industry," explains Zandamela. "In particular, it will center on giving farmers access to inputs, credit, and technical assistance, and on establishing linkages with both national and regional markets."

QPM FEEDING TRIALS

Pigs, the second most important source of meat (after poultry) for Mozambicans, are raised mainly on maize. However, non-QPM varieties lack the essential amino acids, which significantly affects the productive and reproductive functions in pigs. To demonstrate the difference that QPM can make to pork producers, SG 2000, in a joint program with Mozambique's *Instituto Nacional de Investigação Agronómica* (INIA) ran pig-feeding demonstrations at the *Estação Zootécnica da Chobela* from December 2003 to March 2004. The results: pigs fed QPM gained much more weight than those fed normal maize—81.4 kg compared to 56.6 kg in males, and 84.6 kg compared to 57.3 kg in females.

DEMONSTRATIONS

More than 6 million tons of cassava are harvested in Mozambique every year, but consumption is restricted to rural areas due to the lack of proper processing and conservation strategies. Working with the National Directorate for Rural Extension, the National Institute for Agronomic Research, Eduardo Mondlane University, farmer associations, and the media, SG 2000 is collaborating on conducting demonstrations to promote cassava products and introduce them into formal markets.

"We are focusing on postharvesting as a key way to translate yields into marketable products," says Zandamela, "and working in particular with processing cassava and the QPM variety Sussuma." A working group tested bread made from a flour mixture containing 10 to 15 percent cassava flour that proved to be just as popular as bread made from pure wheat flour.

QPM seed production, 2003/04

Variety	Foundation seed (kg)			Total
	Umbeluzi	Chókwè	Sussundenga	
QS 7705 (hybrid)	2,200	-	-	2,200
Sussuma (OPV)	1,703	1,750	900	4,353
Pop 62 Q SR (OPV)	200	-	-	200
Line P28 (parent of QS 7705)	150	-	-	150
Total	4,253	1,750	900	6,903



Ahmed Falaki honored in
Bauchi State.

Even when blessed with sufficient rainfall, Nigerian farmers' harvests can be crippled by the lack of fertilizer, a result of poor planning by both the federal and state governments. During the 2003 season, most state governments in Nigeria neglected to procure enough fertilizer to supply the farmers. "In 2003 only the state of Bauchi procured enough fertilizer before the season started," says Ahmed Falaki, SG 2000 project coordinator for Nigeria. "However, SG 2000 farmers had been forewarned of the impending shortage and were able to buy enough fertilizer in time for the wet season."

Producers all over the country were affected not only by the unavailability of fertilizer, but also by adverse weather. "The wet season in 2003 brought the heaviest rains recorded in 30 years," says Falaki. "The rainstorms caused severe flooding that washed away several hundred thousand hectares of farmland, houses, and livestock."

The devastation was offset in part by donors' positive reaction to the good results of the latest external evaluation of SG 2000 Nigeria, which took place in 2002. "We are now receiving increased support for consolidating and expanding our activities and also for laying the foundation for sustainability efforts," says Falaki. SG 2000 began strengthening its partnerships with relevant stakeholders to improve the productivity of small-scale farmers. "Besides expanding conservation tillage work with Monsanto/Candel in the states of Bauchi and Kaduna, we plan to work with USAID on making rice production more sustainable in Federal Capital Territory, Bauchi, and Niger."

Rainfall in 2004 was above average and uniformly distributed. This gave farmers cause to hope for a good harvest, especially in the states of Bauchi, Kano, and Zamfara, which made arrangements for farmers to receive sufficient good-quality fertilizer before the onset of the wet season.

TRAINING

Having laid by enough fertilizer, SG 2000 project farmers established numerous management training plots (MTPs) during the 2003 wet season on crops as diverse as maize (both normal hybrids and QPM varieties), rice, millet, sorghum, cowpea, soybean, and sesame. They also evaluated conservation tillage practices. After harvest, the superiority of the tested varieties became clear: average hybrid maize and QPM yield was 4.9 t/ha, more than three times the national average of 1.6 t/ha. For the maize conservation plots, the average yield was 3.6 t/ha, with a production cost of US\$ 285 and net income of US\$ 191 per hectare.

"Training extension staff and farmers is a high priority for SG 2000," says Falaki. "During the 2004 wet season, some 1,230 extension staff and no fewer than 32,500 farmers in Nigeria received hands-on training courses with the support of local and state governments." Extension outreach is gaining considerable momentum. The states of Kano and Zamfara have each funded the training of 10,000 farmers. They also lent each farmer enough inputs (seed, fertilizers, and agro-chemicals) to plant one hectare with a crop of their choice. To facilitate supervision of the MTPs, both Kano and Zamfara distributed new motorcycles to extension workers.

The state of Sokoto provided similar support to 250 farmers and 20 extension staff in 2004. Local governments in Kaduna (Lere, Zaria, and Soba) and Katsina (Chiranchi, Sandamu, and Zango) are now fully funding their training and MTP demonstrations.

The states of Bauchi, Gombe, Jigawa, and Kaduna are establishing MTPs in selected schools and prisons in an innovative approach for reaching students and prison inmates. "In the case of students, the aim is to supplement the food they eat while staying in hostels. As for the inmates, we hope that when they leave prison they'll apply their newly acquired agricultural skills and perhaps not break the law again," says Falaki.

PROMOTING QPM

The QPM variety Obatanpa is about to be released in Nigeria with the cooperation of Ahmadu Bello University and the Central and West Africa Maize Network. Six hectares are being planted to satisfy the demand for seed of the new variety. The United Nations Children's Fund (UNICEF), the National Animal Production Research Institute, and Helen Keller International have joined SG 2000 in promoting QPM for feeding infants and fattening livestock.

Hybrid maize/QPM MTPs, wet season 2003

State	Area (ha)	Average cost	Gross income (US\$ per ha)	Average prod.	Av. grain yield (t/ha)
Bauchi	549.50	295	562	267	4.2
Gombe	222.30	327	693	366	5.5
Jigawa	120.50	385	666	281	4.3
Kano	128.19	367	676	309	4.6
Katsina	195.60	268	807	539	5.7
Kaduna:					
Lere Zone	75.75	432	686	254	5.5
Maigana Zone	43.00	356	544	188	4.3
B/Gwari Zone	53.25	398	651	253	5.2
Average cost/ Traditional yield	1,388.09	354	661	307	1.2

Exchange rate: US\$ = 135 Naira.

TANZANIA



Hune Nega from the Ethiopian Ministry of Agriculture conducts a water harvesting training course in Same district.

Agriculture in Tanzania is mainly rainfed—that is, farmers' only source of water for their crops is rain. This, coupled with the fact that too few Tanzanian farmers make use of modern production technologies, means there is a chronic risk of food shortages in the country. In the 2003-04 season, most of Tanzania, but especially the northeastern and central regions, received insufficient rainfall, which translated into an overall food deficit of around 10 percent.

Irrigation has the potential to stabilize crop production and reduce the risk of food shortages. "When one talks about irrigation, people immediately think of large-scale schemes that require substantial investment," says Jiro Aikawa, SG 2000 representative in Tanzania. "But there are small-scale alternatives that can be built and managed at the community and household levels, at minimum cost, and with little technical expertise."

One such alternative is to catch and store rainwater that smallholders can use for crop irrigation, livestock raising, and even some domestic purposes. Effective use of rainwater can increase and stabilize crop production from year to year, thereby improving rural livelihoods in less favored areas. But first farmers must be taught water-harvesting techniques that will enable them to save and use rainwater instead of letting it drain away.

TEACHING FARMERS TO HARVEST RAINWATER, NOT JUST CROPS

In 2004, SG 2000 organized and sponsored a training course aimed at teaching farmers to harvest rainwater and build underground storage tanks. The course was held in the village of Makanya, Same District, in collaboration with the Ministry of Agriculture and Food Security (MAFS), through the Participatory Agricultural Development and Empowerment Project (PADEP).

"A total of 12 people from the district councils in Babati, Hai, Hanang, Iramba, Karatu, Kiteto, Same, Singida, and Uyui, plus MAFS staff, participated in the course," says Aikawa. "It was taught by Hune Nega, from the Ministry of Agriculture in Ethiopia, an excellent example of regional cooperation." After the course, participants are expected not only to apply their newly acquired skills, but also to demonstrate the technology in their respective districts.

COLLABORATION WITH PADEP

PADEP, a five-year project run by MAFS with funding from the World Bank, will support a range of agricultural activities with the aim of improving food production and increasing income generation in Tanzania without damaging the environment. SG 2000 is cooperating in identifying new technologies that enhance productivity and help conserve resources. PADEP will be implemented in 26 districts of mainland Tanzania and the islands of Zanzibar, and is expected to reach 500,000 small-scale farmers in about 840 villages. Each village will have at least one community-based investment sub-project and four farmer-group investment sub-projects that will be prepared, implemented, monitored, and evaluated by the participants themselves. The estimated total cost of PADEP is around US\$ 70 million.

Lishe H1 (QPM) yields in Mbeya Rural, 2003

Village	Yield (kg/ha)
Izyra	2,150
Iwala	2,778
Songwe	3,000
Mshewe	3,550

DEMONSTRATIONS

In 2003, SG 2000 continued to show farmers soil fertility restoration techniques and initiated QPM demonstrations in farming communities in preparation for PADEP activities. Field days were regularly scheduled to demonstrate the techniques to farmers, researchers, and other stakeholders. "The farmers' response to the demonstrations has been extremely positive," said Aikawa. During PADEP implementation SG 2000 will continue to collaborate with MAFS in showing farming communities resource conserving and income generating methods.

PROMOTING QPM

In 2004 SG 2000 and the Tanzania Food and Nutrition Centre (NFNC) coproduced a QPM promotional video designed to help increase the demand for the highly nutritious grain all over the country. Farmers, researchers, and government officials were interviewed to gather testimonials on the advantages of QPM over normal maize both as food and as feed. Mrs. Eshimedhi A. Lema, a farmer who has fed QPM to her pigs commented, "I am surprised at the big difference in pig growth between normal maize and QPM. QPM can help us increase our income through livestock breeding." To broaden its accessibility, the video will come out in Swahili, Tanzania's national language.





The Uganda government seeks to expand national rice production for domestic consumption and export.

Food security in Uganda was diminished by the unusually low rainfall in the first season of 2004 (February-July). Crop production dropped by an estimated 30 percent, but there were no widespread food deficits. Hardest hit were lower-income families, which had more limited access to food. Also affected were humanitarian programs in eastern and central Africa, which normally purchase maize grain for food relief programs from Uganda.

PROGRESS OF ONE STOP CENTERS

The idea behind the One Stop Center (OSC) approach is to give rural populations access to agricultural services through farmer-owned and farmer-managed associations. Established in Uganda by SG 2000, OSCs made rapid progress in 2004: they currently have more than 200 paid-up member groups that bring together a total of 5,539 farmers, 60 percent of whom are women.

Reports Abu Michael Foster, SG 2000 country director, "Ten districts are already participating under the OSC approach, and seven of a total of 20 associations were established just in the first two years of the five-year program." Courses on capacity building and enterprise development have been held in the seven associations, and members are now implementing programs aimed at building capacity in their own associations.

Two of the seven associations have merged the OSC approach with the National Agricultural Advisory Services (NAADS) program, part of the government's Plan for the Modernisation of Agriculture, which helps develop institutional arrangements that integrate and support production, agroprocessing, and marketing. "SG 2000 has entered into an agreement with the Private Sector Foundation program of the UNDP to co-fund and implement another OSC in Pallisa," adds Foster.

NERICA RICE

In 2003, a farmer-to-farmer seed production campaign increased seed of two upland rice varieties. SG 2000 expanded the campaign to seven new areas using 10 mt of seed recovered through the OSC network in the Iganga district. The new, improved rice varieties have a shorter cycle and are higher yielding than the older varieties. Producers also benefit from rice's higher and more stable price, which generates greater profit than maize cropping. Farmers in Iganga, Bugiri, Pallisa, and Tororo districts rapidly expanded production. "Over 130 mt of seed of upland rice has been produced and sold in partnership with commercial enterprises," notes Foster, "which, in turn, has driven the expansion of upland rice production in parts of

western and northern Uganda, outside the project area. Momentum for upland rice is growing in this country, and SG 2000 has spearheaded the effort."

In March 2004 Uganda's President Museveni launched a multi-stakeholder initiative to make the country self-sufficient in rice. SG 2000 has program interventions in 32 percent of the 34 districts involved in the initiative. SG 2000 is also partnering with USAID's Agricultural Productivity Enhancement Program to provide training and create seed banks to ensure the purity of NERICA seed production.

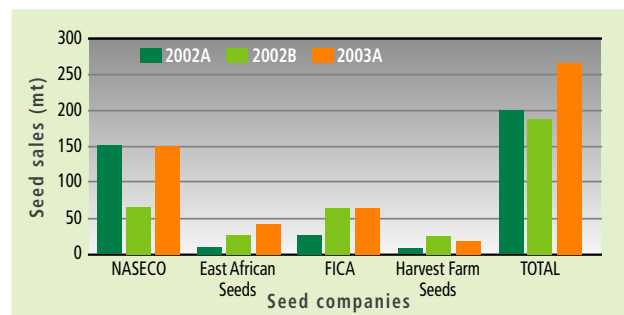
VOUCHER-ASSISTED DEMONSTRATIONS

SG 2000 held voucher-assisted demonstrations (VADs) in 2004 with the participation of 554 farmers who have been made vulnerable by HIV/AIDS. VAD kits are used during group training sessions, giving the resource-poor participants the opportunity to attend and/or host the demonstrations. VADs helped to improve the beneficiaries' food and income security and, at the same time, boosted sales of the dealers who delivered inputs against the vouchers.

LEGUMES TO BUILD UP SOIL FERTILITY

According to a recent study, less than eight kilograms per hectare in total mineral nutrients are added to the soil in Uganda. Local farmers can ill afford to buy chemical inputs, so rotating nitrogen-fixing legumes with cereals makes a lot of sense. To encourage rotation or intercropping of legumes on a more extensive scale, SG 2000 has continued to create substantive seed banks of legume crops. Unfortunately, the high cost of legume seed is restricting the dissemination of this soil-building strategy.

To promote production of pigeon pea, a legume, SG 2000 is coordinating the Uganda chapter of a regional consortium involving ICRISAT, NAADS, Catholic Relief Services, Technoserve, and other rural NGOs. So far an estimated 680 ha have been planted using pigeon pea seed supplied by SG 2000. The ICRISAT regional office is promoting intercropping the legume with maize and has provided enough funding to purchase, clean, and pack over 4 mt of pigeon pea seed. Participating farmers are expecting to harvest a total of 514 mt, which is enough seed to launch a pigeon pea/maize intercropping campaign.



REGIONAL PROGRAMS

QPM/SEED



Initiated in January 2003, the SG 2000 Regional QPM/Seed Program aims to support and complement existing efforts to develop and expand the use of quality protein maize (QPM) in Africa and strengthen seed systems in SG 2000 project countries.

Several partners are involved at the national and sub-regional levels: the International Maize and Wheat Improvement Center (CIMMYT), the International Institute of Tropical Agriculture (IITA), and the national agricultural research systems (NARSs) in Ethiopia, Ghana, and Mozambique. Other NARSs are recommitting to QPM improvement, and private-sector QPM improvement efforts are underway in Zimbabwe and South Africa.

SG 2000 has been a strong advocate of investing in the conversion of elite normal maize hybrids to QPM. Although breeding QPM is similar to breeding normal maize, there are some additional skills required for handling QPM's opaque-2 gene and its modifiers. These skills are particularly needed by breeders involved in converting normal maize to QPM.

In response to this need, SG 2000 recruited Dr. Surinder Vasal, renowned maize breeder who in 2000 won the World Food Prize for his pioneering work on QPM at CIMMYT, as a consultant to help strengthen the normal maize/QPM conversion process by advising on grouping and recombining existing QPM germplasm, and facilitating the formation of new elite QPM hybrids and open-pollinated varieties (OPVs). Dr. Vasal worked with breeders and support staff from CIMMYT, IITA, the NARSs in Ethiopia, Ghana, Kenya, Mozambique, and Nigeria, and the private sector. "Besides strengthening breeders' skills, Dr. Vasal is facilitating more QPM germplasm exchange among maize breeders," says Dr. Wayne Haag, regional coordinator of the QPM/Seed Program.

Over the past four years, SG 2000, INIA/Mozambique, the World Bank, and CIMMYT have sponsored the work of Dr. Miloje Denic, a QPM breeder, who helped establish the QPM improvement program at INIA (Instituto Nacional de Investigação Agronomica) and trained staff. Dr. Denic's contributions to QPM promotion have been crucial in Mozambique and other countries in the region. Along with INIA maize breeders, he adapted Obatanpa, a QPM OPV, to regional conditions, which resulted in the release of Sussuma. The team also converted several elite normal materials to QPM, and was responsible for developing high levels of resistance to maize streak virus and downy mildew in various QPM varieties.

STRENGTHENING QPM QUALITY CONTROL

"Ensuring that protein quality of QPM is maintained is the only way to guarantee that farmers and consumers are receiving the full nutritional benefit of QPM," says Haag. The protein quality character (opaque-2 gene) is monitored by observing QPM grains using a "light box" (QPM grains look chalky) and by conducting laboratory tests to quantify tryptophan and lysine levels in the protein.

SG 2000 has provided light boxes and training in how to use them to scientists in several countries. It also has actively supported the establishment of national tryptophan laboratories in Ghana, Mozambique, and Uganda, and has worked closely with CIMMYT and IITA to establish regional labs in Ethiopia, Nigeria, and Zimbabwe. In late 2004, SG 2000, CIMMYT, and IITA sponsored a lab training workshop aimed at teaching the tryptophan analysis method to 14 participants from the region. At course's end, the participants formed a network of labs to facilitate communications and information exchange.



SEED SYSTEM SUPPORT

In 2004, the SG 2000 Regional Program sponsored seed production activities in Malawi by Pedro Chauque, of INIA/Mozambique, and by Dr. Peter Sallah, of Ghana's Crops Research Institute (CRI), in Senegal.

Estimates of commercial QPM seed production in the 14 countries in the region showed no fundamental change from 2003 to 2004 (see table). The vast majority of seed produced is Obatanpa, or a reselection of it. Ghana retains the lead in terms of annual QPM production, but Uganda's production is also expanding rapidly. Burkina Faso, Mali, Mozambique, and South Africa are producing significant amounts of QPM, while production in Ethiopia, Kenya, Malawi, Nigeria, Tanzania, and Zimbabwe is expected to increase rapidly in the next few years. The speed of the expansion will hinge upon the availability of competitive QPM hybrids in the region.

QPM: A BOON TO INFANT NUTRITION

Mrs. Abenaa Akuamo-Boateng, Nutrition Officer with the Ghana Health Service, has published several studies demonstrating the benefits of QPM over normal maize in

infant nutrition. Results show that QPM increases infant growth, reduces stunting, improves general health, and tends to reduce infant mortality. “This validates the objective, now shared by many, of substituting QPM for normal maize,” says Haag.



Mrs. Abenaa Akuamo-Boateng from the Ghana National Health Service with fellow health workers.

Estimates (in mt) of commercial QPM seed production, 2003-04		
Country	2003	2004
Benin	73	100
Burkina Faso	513	311
Ethiopia	180	80
Ghana	1,350	1,500
Guinea	30	125
Malawi	8	37
Mali	160	200
Mozambique	300	150
Nigeria	80	100
Senegal	0	20
South Africa	250	250
Uganda	739	850
Tanzania	50	50
Togo	10	20
Total	3,743	3,793

AGROPROCESSING

Ten years ago, SG 2000 teamed up with the International Institute of Tropical Agriculture (IITA) to run an agroprocessing program aimed at bringing improved postharvest and agroprocessing technologies to small-scale African farmers. Today partnerships are being forged in a number of SG 2000 program countries to stimulate the development of rural-based cottage industries that “focus on processing locally-produced crops for the market,” says Toshiro Mado, SAA agroprocessing program leader.

In 2003 in Benin, the agroprocessing program concentrated on introducing improved shea nut processing equipment, called “*complete karite*,” that includes a nut crusher and a wet-type grinder developed by IITA. The crusher is far more efficient than the manual method used previously, crushing 300 kg of nuts an hour compared to 50 kg a day processed by hand. The wet-type grinder mills the nuts into a paste that is then kneaded to extract the oil or “butter.” One hundred kilograms of shea nut yield 49 kg of shea butter with the new equipment. The technology package not only reduces the processing time, but also increases the quantity and quality of the shea butter produced.

In Guinea, IITA trained manufacturers to produce multi-crop threshers and rice polishers in 2003. Once trained, technicians in Faranah began to produce the threshers. Demand for rice threshers has increased greatly since SG 2000’s promotion of NERICA, the new rice variety developed for Africa by WARDA.

In Ghana the agroprocessing program was re-structured in 2003 and as of 2004 is managed by the GRATIS Foundation. Formerly the Ghana Regional Appropriate Technology Industrial Service Project, funded by the European Union and the Canadian International Development Agency, GRATIS was incorporated into a foundation in 1999 with the mission of “developing and disseminating sustainable and marketable technologies to industry, particularly small-scale and medium-scale enterprises.”



Custom operators of multi-purpose threshing machines are finding a good business helping farmers to harvest teff, maize and wheat.

SAA and GRATIS first joined hands in 1995 to provide improved agroprocessing technology to small-scale farmers and producers. SAA has also been involved in training technicians to manufacture and assemble equipment, working with both GRATIS and IITA. Increasing demand for equipment and after-sales service for customers led to the formation of the Manufacturers' Network in Ghana in 2001.

Established by SAA/IITA with GRATIS, the network offers nine regional workshops and two private workshops. According to Dankyi Dafoor, Executive Director of the GRATIS Foundation, "the network is responsible for the manufacture and sales of agroprocessing equipment. It provides after-sales service, supplies spare parts, undertakes product demonstrations and exhibits at agricultural fairs and trade shows locally and internationally." SAA organized a network meeting in Benin in September 2003 for participants from Benin, Ghana and, for the first time, Ethiopia as well. The attendees discussed issues they have in common, such as production problems, quality control and marketing.

In the last few years GRATIS has expanded its activities beyond Ghana, reaching out into the West African sub-region with the export of agroprocessing equipment to Liberia and Sierra Leone in 2002 and 2003.

In Ethiopia, the Embassy of Japan supported a proposal, submitted by Bishan Babile district staff and a local farmers' cooperative, to build an agroprocessing center, mainly for the processing of drought resistant crops for income generation. Bishan Babile, located in East Haraghe Zone, produces sorghum, groundnut and sweet potato, but remains an area of chronic food insecurity. Within a year the project was completed, and members of the

Sale of agroprocessing equipment, August 2004				
Type of equipment	Benin	Ghana	Ethiopia	Total
Grating machine	235	367	0	602
Double screw press	186	374	0	560
Fermentation rack	44	305	0	349
Bagging stand	24	264	0	288
Sifter	44	266	0	310
Chipper	4	34	0	38
Multicrop thresher	76	24	46	146
Digester	5	77	0	82
Wet-type grinder	60	8	8	76
Rice mill	1	2	0	3
Flour mill	0	0	11	11
Ground nut sheller	0	0	44	44
Total	679	1,721	109	2,509

cooperative now process groundnuts and sweet potatoes into various food products that are sold through a local shop allocated to the center.

In Uganda, initiatives aimed at promoting agroprocessing technology included a JICA-sponsored training program recently held at Nakawa Vocational Training Centre, supported by SG 2000. As a result of the training program, three different types of rice threshers were manufactured and will be used to reduce post-harvest losses.

"Industrialization in African countries is too often seen as an urban activity," comments Toshiro Mado. "We believe that small-scale agroprocessing offers huge opportunities to stimulate activity in rural areas—and that this potential is still virtually untapped."

SAFE

During 2003 and 2004, the Sasakawa Africa Fund for Extension Education (SAFE) continued to expand in response to the increasing demand for courses. In 2003 two new SAFE-style programs were launched, one in Burkina Faso and one in Benin. Diploma-level programs were initiated at the Polytechnic University of Bobo-Dioulasso in Burkina, and at the University of Abomey-Calavi (to be transferred at a later date to the Medji Agricultural College in Sekou) in Benin. Also in 2003, Malawi's Ministry of Agriculture and Bunda College requested assistance in developing a tailor-made staff-training program. In 2004, the curriculum for a SAFE-style program at Bunda College was developed, and the program was deemed ready to begin.



SAFE student Rahmet Yimer graduated as the best overall student at Alemaya University in July 2003.

SAFE statistics, 2003-04						
Mid-career BSc and Diploma Courses	2003			2004		
	Graduated	Current	Total	Graduated	Current	Total
Ghana: University of Cape Coast	204	60	264	204	60	264
Ghana: Kwadaso Agricultural College	99	79	178	99	79	178
Ethiopia: Alemaya University	136	57	193	164	59	223
Uganda: Makerere University	32	88	120	45	85	130
Tanzania: Sokoine University	48	140	188	92	152	244
Mali: IPR/IFRA	–	31	31	–	31	31
Nigeria: Ahmadu Bello	–	30	30	–	30	30
Subtotal	519	485	1,004	604	496	1,100
Scholarships	Graduated	Current	Total	Graduated	Current	Total
BSc	22	6	28	23	3	26
MSc	46	12	58	47	8	55
PhD	3	–	3	3	–	3
Subtotal	71	18	89	73	11	84
Total	590	503	1,093	677	507	1,184

In Ghana, the SAFE program curriculum at the University of Cape Coast (UCC) was revised and shortened in late 2003 in response to the expressed needs of stakeholders. This program is financed by a number of NGOs and bilateral agencies, including the German development agency GTZ and World Vision Ghana, which maintain a strong partnership with the Ministry of Food and Agriculture. The UCC is under pressure to increase the number of students it accepts annually, but limited teaching staff and low financial and other resources will make fulfilling this demand difficult. In 2004, the diploma-level program at Ghana's Kwadaso Agricultural College began attracting the attention of both public and private extension services due to its success.

SAFE supported the establishment of a technology village at Alemaya University in Ethiopia in 2004. The village will support practical training and will be an aid for demonstrating improved technologies to the farming community. A range of labor-saving and value-adding equipment, such as crop-processing technologies, water pumps, tillage equipment, and honey extractors, has been installed. All of the equipment is appropriate for Ethiopian agriculture and affordable for small-scale Ethiopian farmers.

In 2004, SAFE funded and organized a workshop at Mali's Rural Polytechnic Institute for Training and Applied Research (IPR). The IPR and the Ministry of Agriculture, Fisheries, and Livestock are the main partners of the SAFE program in Mali. Attending the workshop were representatives from SAFE institutions in Benin, Burkina Faso, and Mali, in addition to two delegates from a

potential SAFE institution in Guinea. The idea was for participants to become acquainted with the SAFE program and to think of ways of promoting the integration of the program into the educational system of francophone Africa.

Another workshop that SAFE sponsored in 2004 focused on training representatives of four SAFE partner universities in East Africa. It was held at Makerere University in Uganda. "The objective was to make people aware of SAFE program theories and provide the knowledge and skills needed to run a SAFE-style program effectively," says SAFE director Deola Naibakelao. "The outcome will go a long way towards harmonizing and improving the quality of various SAFE programs in this sub-region."

Makerere University held a second stakeholders' workshop aimed at discussing ways of sustaining the SAFE program in view of the lack of funding for students. At the workshop employers renewed their support and promised that staff attending SAFE programs would be fully funded (including their field projects), provided they sought permission for study leave before joining the program.

In April 2004, the SAFE management team held a strategic planning workshop in Mali to reflect on progress made in the past three years, identify challenges and opportunities, and devise strategies for improving and expanding the program. The team agreed to continue focusing on mid-career students and empirical learning, and to remain demand-driven, a strategy that up to now has made the program very innovative. Looking towards the future, Naibakelao commented, "As the SAFE initiative expands, it is vital to ensure program sustainability after SAFE support ends. We should also help SAFE alumni associations in each country to evolve into professional agricultural extension associations."



BSc graduate Kefyalew Worku from Alemaya University showing his improved beehive project. Kefyalew is the chairman of the SAFE Ethiopia Alumni Association.

PUBLIC INFORMATION

Publications released during the 2003 included the *SAA Annual Report 2002-2003*; *From Subsistence to Sustainable Agriculture in Africa, proceedings of a workshop held in South Africa in 2002*; Issues 19 and 20 of the SAA Newsletter, *Feeding the Future*; and the *SG 2000 Calendar 2004*.



2003 FINANCIAL REPORT (thousand US dollars)

Highlights of 2003	
Approved budget	7,670
Actual spending	6,661
Actual receipt	6,931
Cash balance (as of December 31, 2003)	5,573
Details of receipts	6,931
Grant from Nippon Foundation	6,500
Interest	177
Loan recovery	98
Others	156
Details of expenditures	6,661
SG 2000 country operations	4,819
Burkina Faso	292
Ethiopia	426
Ghana	229
Guinea	466
Malawi	384
Mali	353
Mozambique	420
Nigeria	199
Tanzania	97
Uganda	444
Country program administration	1,509
SAA programs	582
Agro-processing	341
Quality protein maize	200
New project development, other	41
HQ administration	1,260



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