

SASAKAWA AFRICA ASSOCIATION



ANNUAL REPORT 2005-2006



ABOUT SASAKAWA-GLOBAL 2000

The agricultural projects of Sasakawa-Global 2000 are operated as joint ventures of two organisations – Sasakawa Africa Association (SAA) and the Global 2000 Program 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 Program, former US President Jimmy Carter and his advisers provide policy advice to national political leaders in support of program objectives. Funding for SG 2000 projects comes from the Nippon Foundation of Japan, whose Chairman is Yohei Sasakawa and whose President is Takeju Ogata.



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FOMENTING AN AFRICAN GREEN REVOLUTION

During 1958-60, China experienced the worst famine in world history. Some 30 to 40 million people starved to death. By the early 1960s, hunger and famine also threatened South Asia, due to the stagnation of region's agricultural productivity. Pioneering international agricultural research and development programs, which began in Mexico in 1943 and later spread to other developing countries, began to yield new crop varieties by the early 1960s that were well adapted to subtropical and tropical production conditions.

The most productive of the new plant types were the radically different semidwarf wheat and rice varieties developed in Mexico and the Philippines by CIMMYT and IRRI, and their predecessor organizations. When grown with adequate moisture and under higher soil fertility, these new varieties yielded up to four times as much as the traditional ones then in use.

In 1965, India was importing 10 million tons of cereal grains, with import demand growing by 2 million tons per year. Greater Pakistan (then including what is now Bangladesh) was importing another 2 million tons per year.

Although blessed with vast irrigated areas across the Indo-Gangetic plains, these potentially high-yield production areas were producing far below their potential. On average, irrigated wheat yields were only around 1 t/ha; rice yields were reaching no more than 1.5 t/ha. These countries were facing desperate and deteriorating food situations and growing prospects of widespread famine.

Despite the misgivings of many national researchers, government leaders in India and Pakistan – and somewhat later in Turkey and China – decided to introduce the new varieties and crop management techniques as quickly as possible. Extensive farm demonstrations were established, and once farmers saw the results themselves, they became the major advocates for the new technologies.

Geopolitics in international grain trade also played a role. India, which relied on cereal donations from the U.S. government to overcome domestic grain production deficits, was under heavy pressure from the Johnson Administration to reduce its criticism of America's Vietnam policy. Increasing self-sufficiency in rice and wheat became a major political goal.

Courageous and decisive leaders in Pakistan and India aggressively supported the rapid introduction and diffusion of the high-yielding wheat and rice technologies. They authorized the purchase of large quantities of the new seed and massive amounts of fertilizer. They also radically changed national investment policies to build domestic seed and fertilizer production facilities, provide economic incentives (fertilizer and irrigation subsidies, as well as stimulatory floor prices on grain), and increased investments in agricultural research and extension services. These policy changes paid off handsomely. Within 20 years, wheat and rice production had doubled, and production continued to grow for more than 30 years.

The rapid adoption of the high-yielding wheat and rice varieties was accompanied by rapid increases in the use of chemical soil nutrients and irrigation. Fertilizer consumption in South Asia increased 15-fold between 1961 and 1980 and the area under irrigation rose by nearly 50%.



Norman E. Borlaug

Mechanization also expanded rapidly, with small tractors being used for both land preparation and to power stationary grain threshers at harvest.

AFRICA'S MISSED GREEN REVOLUTION

While Asia enjoyed the fruits of a dynamic and sustainable green revolution, for a variety of reasons Africa was largely left behind, and even today must still overcome a number of key constraints. Most foods in Africa are produced under rain-fed, often drought-prone conditions. Farmlands are generally isolated from motorized transport systems. Few government price support systems exist for production inputs or farm outputs. National research and extension systems are relatively weak. Food cropping patterns are considerably more diverse. And the political commitment to agriculture and rural development in Africa has been much weaker than in Asia when the Green Revolution was launched in 1965.

Environmental degradation has greatly damaged African agriculture over the past three decades. Increasing population pressure and long-term nutrient depletion have overwhelmed the ability of traditional systems of shifting cultivation to restore or recycle plant nutrients. Today, continuous cropping is increasingly the norm, without viable systems to restore soil fertility. This

Table 1. Changes in the Factors of Production in Asia (1961-2005)

	Adoption of Modern Varieties		Irrigation (M Ha)	Fertilizer Consumption (M Tons)	Tractors (Millions)	Cereal Production (M Tons)
	M of Ha / % of Area Wheat	Rice				
1961	0 / 0%	0 / 0%	87	2	0.2	309
1970	14 / 20%	15 / 20%	106	10	0.5	463
1980	39 / 49%	55 / 43%	129	29	2.0	618
1990	60 / 70%	85 / 65%	158	54	3.4	858
2000	70 / 84%	100 / 74%	175	70	4.8	962
2005	72 / 87%	102 / 76%	178	77	6.4	1,017

Sources: Variety adoption data from CIMMYT and IRRI; Data on factors of production from FAOSTAT

has resulted in a progressive – and now often dramatic – degradation of soil fertility. Fertilizer use in Africa has barely increased and today stands at about 10 kg of nutrients per hectare of arable land. Moreover, erroneous views about what constitutes sustainable agriculture have polarized discussions about the need for organic and chemical fertilizers, and this has hindered African governments in setting proper priorities for soil fertility management.

GETTING AGRICULTURE MOVING IN AFRICA

Africa was by-passed by the Asian Green Revolution primarily because of its agro-ecological conditions, as well as important differences in the social, cultural, political and economic environments when compared to Asia in the early 1960s. Many of those differences persist to this day, and special efforts will be needed to deal with them if Africa's Green Revolution is going to take off.

For various reasons – environmental degradation, food insecurity, supply chain inefficiencies, and inadequate farmer knowledge – we believe that fertilizer subsidies are justified in Africa. In environments that have high production potential and are well-integrated into commercial markets, inorganic fertilizers are the best option for increasing yields. In areas characterized by marginal rainfall conditions, chemical fertilizers are still needed (particularly phosphorus) but at reduced levels, and such practices as “micro-dosing” can significantly boost productivity. Rotating grain crops with nitrogen-fixing leguminous plant and tree species are also effective ways to improve soil fertility.

Fertilizer subsidies should, however, be designed to reach vulnerable groups, especially organized women farmers, so as to not undermine the development of fledgling private fertilizer distribution networks. Such “smart subsidies” can help build commercial demand and, if linked to strong extension education programs that promote efficient input

use, they can do much to accelerate smallholder agricultural growth and development.

A broader and more-integrated development perspective is needed for African agriculture, one that focuses on the entire farming enterprise – food and cash crops, livestock, and value-adding processing activities. Livestock is often the most important income generator for rural African households, and yet this sub-sector has been seriously neglected. Greater attention must also be given to post-production market linkages – especially to grain markets and agro-industrial food processing, which also offer off-farm employment opportunities.

Substantially greater investments in Africa's rural infrastructure – roads, electrical power, water resources, and others – are urgently needed. Such investments will underpin all other efforts in rural and agricultural development on the continent. Unless rural infrastructure is improved, there is little hope for lasting progress in reversing the alarming trend toward food insecurity in Africa or in making agriculture the engine of economic growth that it must become.

To serve both lower- and higher-risk production environments and the different wealth categories of smallholder African farmers, researchers must generate a range of technologies that farmers there can understand and afford and, where possible, that they can disseminate widely via farmer-to-farmer diffusion. For high-potential areas, government investments should promote intensive production systems, similar to many of the interventions made in South Asia nearly 50 years ago. In low-yielding marginal environments, technology generation should focus on protecting and enhancing the natural resource base. Soil conservation, water harvesting and drip irrigation, rotations with legume crops, and mixed crop-livestock systems are particularly useful and appropriate.

While the development of new and improved crop varieties is an essential ingredient for fomenting Africa's Green Revolution, improved varieties by themselves will not suffice. Without adequate plant nutrition, timely planting and correct plant densities, sufficient moisture and sunlight, and protection against diseases, insects and pests, yield impacts will not be great. Multiple cropping systems that integrate cereals and root and tuber crops with grain legumes (such as groundnuts, cowpeas, pigeon peas, soybeans, dry beans and chickpeas) are very important. They add to household food security and contribute to soil fertility and pest management. Increased crop yields also provide the feed and forage needed for expanded livestock operations that yield milk, eggs, and meat – enterprises that can substantially increase smallholder incomes and nutritional well-being.

Still, research and extension efforts that raise Africa's agricultural productivity will comprise hollow achievements if farmers do not have reliable markets that can absorb surplus production at fair prices. Improvements in production and markets must go hand in hand. More productive and stable agricultural production systems are prerequisites for the development of agroprocessing industries, which are in turn crucial for adding value to agricultural outputs and feeding growing urban populations. To help stimulate domestic agricultural production, African governments should also promote import-substitution schemes and – with donor support – progressively encourage the use of domestically or regionally produced foods in food-based safety net programs.

Fomenting a sustainable African Green Revolution will require effective agricultural research and extension, to be sure, but most of all it will require political will – the will to change the status quo. If Africa's smallholder farmers are given the kinds of opportunities that Asian farmers had, we will surely set the grass roots on fire, just as we did in Asia nearly half a century ago.

NEW PRIORITIES AND DIRECTIONS

Over the past two decades, much has been accomplished by our SG 2000 country programs and their many partners, and important lessons have been learned. First and foremost, we have amply demonstrated that there are many modern food crop technologies available in Africa that can at least double, and sometimes triple, yields in farmers' fields. It is also now abundantly clear that farmers are not only willing and able to intensify production – they are, in fact, eager to do so.

Still, there are formidable constraints to broad-based adoption of improved technologies that must be overcome if Africa is to realize its own Green Revolution. Inputs are increasingly expensive and difficult for many farmers to obtain in the quantities they need, when they need them. Prices for farm outputs are often highly variable and unpredictable, which notably increases the risks associated with using expensive inputs. These risks are aggravated by inadequate development of water resources in the region, which has left most farmers at the mercy of highly irregular rainfall. Moreover, market linkages between smallholder producers and consumers are weak, and this also makes the use of input-intensive, high-yield technologies more risky.

In order for a vibrant smallholder commercial agricultural sector to emerge in Africa, food supply chains must become more fully integrated, production and post-production quality standards must be raised to meet consumer expectations, and smallholder producers must become more attuned to changing market demands. These and other factors have figured prominently in SAA's recent decisions about its priorities and future directions.



Marco Quinones (right), SAA Regional Director. SAA activities continue to evolve as the needs of African smallholder farmers change. Staff now partner with a more diverse group of service providers and agencies, and support farmers' efforts to form cooperative associations and deal with a range of post-harvest and marketing issues.

SHARPENING OUR FOCUS; MEETING CHANGING NEEDS

In 2005, the SAA Board finalized and began to implement a strategy for reducing the number of countries hosting SG 2000 projects in order to allow a refocusing and intensification of activities in selected countries. By the end of 2006, only four country projects were in operation (down from nine a decade earlier), and the activities of each had changed so as to better address the real impediments to agricultural development in those countries.

The four SG 2000 "focus countries" – Ethiopia, Mali, Nigeria and Uganda – hold a quarter of the region's 400 million rural poor. At least half of these people are food insecure and must

endure severe hunger periods each year. While the remaining households are financially and nutritionally better off, most have yet to achieve significant improvements in either the productivity of their farming operations or their livelihoods. These realities have kept the agricultural sectors of these countries from realizing their true potential as engines of wider economic growth and development. About 75% of SG 2000 financial resources and staff time are now dedicated to work in the four focus countries and we anticipate that, by concentrating our efforts this way, we will be able to notably increase the impacts of the SAA initiative.

While SG 2000 resources have been refocused in fewer countries, SAA's regional program offerings



**SASAKAWA-GLOBAL 2000
COUNTRY PROJECTS**



The use of multipurpose threshers, which were originally developed in collaboration with IITA engineers, is increasing rapidly in Ethiopia.

have grown. Rice is becoming a very important food security crop in sub-Saharan Africa and, following on from a 2004 Board decision, a new regional rice initiative was begun in April 2005. Headed by Dr. Tareke Berhe, the Rice Program addresses challenges all along the rice value chain – from genetic and agronomic production problems to marketing and end use issues. In the latter case, close links have been established with the SAA Agroprocessing Program in order to strengthen post-harvest handling of rice in our four focus countries, as well as in Guinea where Dr. Berhe worked for over a decade with NERICA rice and still has important research and development relationships that underpin his work in our focus countries.

While our regional QPM and Agroprocessing Programs are now focusing on fewer countries, they also continue to work with colleagues in a number of the former SG 2000 project countries, maintaining networks and connections among scientists and development specialists striving to improve the productivity and livelihoods of smallholder farmers in the region. Moreover, the Sasakawa

Africa Fund for Extension Education (SAFE) is continuing to work with the agricultural universities it has supported in the region, although it too is now shifting its emphasis to SAA's four focus countries.

RESPONDING TO CHANGES IN EXTENSION

Traditional agricultural extension in Africa has focused on increasing production, improving yields, training farmers, and transferring technology. Extension activities have been largely supply driven and usually commodity based. Most government extension efforts have tended to favor smallholder farmers who, under normal weather conditions, are food secure and, as a result, better able to adopt new productivity-enhancing technologies. Historically, governments have provided the bulk of smallholder extension services. Still, the coverage of these public organizations has been limited, reaching no more than 10-15% of the smallholders in most countries.

In the early days of the SAA initiative, efforts focused on supporting the traditional efforts of national extension services in host countries.

Project activities centered on helping extension professionals demonstrate new agricultural technologies to farmers, and on strengthening their abilities to work with farmers. Over time, however, the traditional role of extension slowly changed in response to better understanding of the constraints to improving smallholder productivity in Africa. During the past 10 years in particular, agricultural extension services have evolved. Extension professionals have become much more involved in helping farmers organize themselves into cooperative farmers' groups. They have also responded to the need for farmers to become more engaged in marketing issues, and they now partner with a broader range of service providers and agencies. Today's extension professionals are likely to find themselves involved with:

- Traditional public systems drawing on a large pool of government-employed staff, the effectiveness of which is all too often severely diminished by limited budgets;

- Public/private partnerships that rest on using public funds to hire private service providers to deliver demand-driven advisory services;
- Private extension services operated by commercial firms that address single-commodity cash crops and provide technical and production services to contract farmers; and
- Various NGOs that provide a variety of training opportunities to farmers, but that are very focused on specific locations and groups and, as a result, supply services that are relatively costly on a per-farmer-served basis.

To varying degrees, all of these extension models are present in the four SG 2000 focus countries. In all four countries, government and non-government extension service providers operate independently of one another and suffer from weak inter-organization coordination. Essential linkages between public research entities and the various extension service providers are also weak. Virtually no services are provided to the extremely poor, who face a number of resource constraints – financial, physical, environmental, health and educational. Moreover, government extension organizations in the focus countries are not well-equipped to support market-led smallholder agricultural development, which requires effective farmer associations, market intelligence information systems, and advisory services in post-production technology and quality control.

In order to achieve impact in this more complex operating environment, SG 2000 projects have themselves become inherently more complex than they were two decades ago. The mix of activities undertaken by our project staff has changed, and will continue to evolve in response to changing circumstances and opportunities. We now enter into partnerships with



SAA Board President Norman Borlaug and Member Robert Havener, visit an agro-input dealer in Uganda. Building smallholder input supply delivery systems is a key development imperative and challenge.

a more varied set of organizations all along the agricultural supply and demand chains. We are actively encouraging and providing operational support to organized farmer groups, and through them, focusing on the needs of smallholder farmers who are best equipped to produce marketable surpluses. We help farmer associations understand how to obtain essential production inputs, including fertilizer, seed and crop protection chemicals, at more favorable prices and in a timely fashion. We work with them to facilitate the development of contracts with traders and agro-industries, and to deliver better services to their members, from technical advice to contract irrigation, harvesting and agroprocessing. And we work with farmer associations and other public and private organizations to introduce low-cost, small-scale irrigation systems that will help diversify smallholder farm enterprises

and reduce production risks. This diversification involves integrating higher-value activities within farming systems, such as vegetable production and dairy operations, to augment the vital income derived from staple food production.

Thus, the hallmarks of SAA's new priorities and directions include a sharper geographic focus, support to smallholder farmers (though their associations) who are trying to compete in commercial agricultural markets, added investments in small-scale water development, and a wider array of partnerships with a more diverse mix of development partners. The overall goal of the SAA initiative, however, remains much the same: to help governments and smallholder farmers in sub-Saharan Africa accelerate agricultural growth, and in so doing, contribute to overall economic growth and development in the region.

BURKINA FASO



Officials from Burkina Faso's Ministry of Agriculture, Water and Fisheries visiting a farmer's wheat plot. Food security in the country remains a critical concern.

Abundant rainfall, coupled with the use of improved varieties and soil fertility management practices, led to bumper harvests in Burkina Faso in 2003/04. But the following agricultural season proved to be among the most challenging in recent history. The rains started late and then suddenly stopped altogether before the end of the 2004/05 cropping season. In addition, crops across the Sahel were beset by a major invasion of locusts, reducing yields even further. Cereal production dropped by 14% over the previous year. The 2005/2006 season was spared the locusts, but yields remained depressed due to a continued lack of adequate rainfall in many parts of the country. Even so, total cereal production reached about 3 million metric tons during each of these two cropping seasons – about half a million tons more than was needed to meet domestic demand.

A regional survey commissioned by the government showed that Burkina Faso was the only member country of the CILSS (Comité Permanent Inter Etats de Lutte Contre la Sécheresse au Sahel) to post such surpluses. Still, in 2005 nearly US\$ 2.5 million in food aid (about 9,500 tons of cereals) were required to meet the needs of people living in the northern parts of the country; farmers there had planted their crops late and the region needed the food aid to tide them over until harvest time.

IMPORT SUBSTITUTION FOR FOOD SECURITY

Even though cereal surpluses have been produced in recent years, longer term food security is still a major concern for the government of Burkina Faso. As part of its strategy to reduce the threat of food shortages, the government is encouraging farmers to produce food crops that are otherwise imported at considerable expense. For example, Burkina imports about US\$ 30 million of wheat each year to meet domestic demand. If farmers were to plant just 3,500 hectares of the crop, they could provide 90% of the wheat consumed each year.

With the technical support of Morocco, 350 hectares of rainfed wheat were planted in the Sourou Valley during the 2004/05 cropping season. About 1,000 tons were harvested and delivered to millers, and the wheat flour obtained from the domestic crop produced bread of a high standard. As a result of this initial effort, the government pledged to invest nearly US\$10 million to put 3,500 hectares in the Sourou Valley under irrigation, which could lead to Burkina Faso becoming almost self-sufficient in wheat. In addition to a large annual saving of foreign exchange, this program should help fight poverty. Wheat producers are expected to realize an additional annual income of about US\$1.3 million (at 2006 prices), and some 3,000 new jobs should be created in rural areas as well.

INCREASING RICE PRODUCTION

Another example of the government's import substitution strategy involves increasing the domestic production of rice, a crop for which local demand is steadily rising. Burkina imports an average of nearly 100,000 tons of milled grain each year, at a cost of about US\$ 50 million (at 2006 prices), which supplements the country's domestic production of about 100,000 tons of paddy (roughly 70,000 tons of milled rice).

In an effort to increase domestic production, 33 entries of the WAB series (West African Rice Development Association Bouaké interspecific crosses) were tested on the Tiebele plain (beginning in 2003/04). Two local checks were used – FKR21 (ITA257) and FKR41 (WAB 56-125). Ten producers hosted the tests and more than 40 rice farmers worked with researchers to select the best performing varieties. All the entries showed good vegetative growth, and yields ranged from 1.3 t/ha to 5.3 t/ha. Two of the varieties selected by farmers – WAB 24-36-1-B-B and WAB 880-1-38-8-P3-HB – produced yields above 5 t/ha.

“After three years of testing, we've identified some excellent interspecific rice varieties for both the rainfed and irrigated areas,” says Marcel Galiba, SG 2000's Burkina Faso project leader. “The varieties that have done well in rainfed areas could play a major role in rice production in Burkina. Seventy percent of all rice cultivation is done under these conditions, and rainfed (lowland) rice accounts for almost 50% of the country's total production.”

As part of the refocusing of SAA activities, the Burkina country program was brought to a close at the end of 2006. However, the SAA-sponsored regional QPM and rice programs are continuing to support national efforts to increase the productivity of Burkina Faso's smallholder farmers.

	Maize	Sorghum	Millet	Rice	Cowpea
Area, 000 ha					
2004	380	1,438	1,205	50	588
2005	442	1,422	1,310	53	572
2006	566	1,425	1,313	106	575
Yield, t/ha					
2004	1.3	1.0	0.8	1.5	0.5
2005	1.8	1.1	0.9	1.8	0.8
2006	1.6	1.1	0.9	1.8	0.8
Production, 000 t					
2004	481	1,399	938	75	276
2005	799	1,553	1,196	94	445
2006	906	1,554	1,119	189	450

Source: FAOSTAT

ETHIOPIA

Ethiopia has enjoyed several consecutive years of bountiful harvests, thanks largely to consistent rainfall patterns across the country. Cereal production rose steadily from 2003 through 2005, when it reached an all-time high of 14 million metric tons – and it then shot up to an astonishing 19 million tons in 2006. Despite this dramatic improvement in production, a combination of natural and man-made factors has resulted in serious and growing food insecurity in many parts of the country.

To address this continuing challenge, the government established several food security programs within the framework of its “Plan for Accelerated and Sustained Development to End Poverty (PASDEP).” The overall objective of these programs is to increase the availability of food to vulnerable households by helping them to increase the productivity of their livestock and crop production enterprises, generate more income and improve their livelihoods.

WATER HARVESTING AND DRIP IRRIGATION

During 2005/2006, SG 2000 continued to promote water harvesting techniques in the Rift Valley, in partnership with the government’s regional, zonal and district agricultural offices, the International Livestock Research Institute (ILRI) and the Melkassa Research Centre. One approach being used involves collecting and storing rainwater in large underground cisterns. This water is then applied during the dry season using drip irrigation on 500 m² fruit and vegetable plots. In 2005, 14 storage structures were installed, each with a capacity of 60,000 to 70,000 liters and the capability of serving seven different farms at once. This brought the total number of such drip irrigation systems to 39.

A less expensive harvesting technique involves diverting small amounts of water from shallow perennial streams

into small above-ground metal or plastic storage tanks, from which it is fed through drip tubing onto 500 m² plots. This type of system is now installed on nearly 40 smallholder farms and, with a constant water supply assured these households can now produce and market three crops of vegetables each year. In addition, five of these households have at least one improved dairy cow and are marketing milk and milk by-products in their communities every day.

Regardless of the harvesting and storage techniques being used, the net effect of drip irrigation is to make farming a year-round enterprise (rather than only a 5-6 month operation). Farmers are able to diversify their operations, adding cash crops and livestock products (especially dairy) to their mix of outputs. This in turn leads to dramatic improvements in farmer incomes and livelihoods. “The irrigation facilities and dairy cows have been provided on credit by SG 2000 to the farm households,” says Dr Aberra Debelo, SG 2000 Programme Coordinator. “Repayment will take place over a four-year period, and all farmers involved in the pilot program are gladly paying their debts – including bank interest – as scheduled.”

CONSERVATION TILLAGE

In 2005, the SG 2000 crop demonstration program ran a number of plots designed to verify the apparent productive advantages of conservation tillage that had been noted in previous years. On-farm demonstration plots comparing the performance of QPM and tef (a major cereal crop in Ethiopia) under conservation and non-conservation tillage conditions were established in selected districts during the season. For both crops, conservation tillage plots produced higher yields and were more profitable, supporting the results from previous years. The strengths of conservation tillage also



A water-harvesting and underground water storage cistern under construction. Once linked to a micro-irrigation system, farmers will be able to diversify and intensify their production.

include greatly reducing the erosion of topsoil and eliminating over-plowing, especially with tef, which leads to the loss of organic material. In addition, the use of non-selective herbicides before planting to kill weeds eliminates the need for laborious weed removal efforts – often involving plowing – by farmers.

THE BROAD BED MAKER

Still, not all areas in Ethiopia lend themselves to conservation tillage. The country has about 13 million hectares of heavy, black-clay soils (vertisols). Some 2.5 million hectares are under crop production, with the rest being used for natural grazing. Vertisols are found mostly in the highlands, and are difficult to work with since they get sticky when wet and crack badly when dry. They tend to be waterlogged during the main rainy season (June-

September), greatly limiting crop production. The planting of crops like wheat on such soils is delayed until the rainy season starts tapering off in early September, and this often exposes the crop to moisture stress later in the season, adversely affecting yields. Properly drained, vertisols can be productive, but they are generally regarded as marginal by most Ethiopian farmers.

In an effort to change this perception, SG 2000 established on-farm demonstrations in selected vertisol areas – mainly in the Oromiya region – that showcase a new technology, the Broad Bed Maker (BBM). The BBM is a simple, locally manufactured plow used to make raised seed beds that enable excess water to drain from water logged soils. The design of the BBM, which is based on the traditional Ethiopian plow, has evolved into a relatively light implement with two mould board-shaped wings attached to the traditional wooden frame. As a pair of oxen pulls the BBM through the soil, it makes two parallel furrows. The wings scoop the soil toward the middle, where it is then spread evenly by a chain attached at the back of the wings. This creates a raised seed bed, with furrows on either side that drain excess water (see photo).

Still, the Broad Bed Maker is not a magic bullet that will make vertisols instantly more productive. The BBM is only effective when the soil is friable (easily crumbled), not when it is very wet. The optimum period for operating the implement is therefore short, ranging from 10-15 days after the start of the main rainy season. In order for the drained water to leave the field easily, it is essential for the ground to have a bit of slope to it. But it is also important that the furrows not run in the direction of the slope, which could lead to the formation of gullies and result in significant soil erosion.



The improved broad-bed maker in operation on heavy vertisol soils.

Using the BBM enables farmers to plant (and harvest) earlier than their neighbors – typically at least a month earlier. They are then able to sell their grain before others can get to market, and this usually means a higher price. Moreover, the early harvest may also allow for double cropping on the field, depending on what crops can be grown in the area. BBM demonstrations have also conclusively shown that the yields of improved wheat varieties grown on raised beds (and using other recommended agronomic practices),

are far superior to those obtained from traditional flat beds (Table 1).

Although the advantage of BBM technology over traditional practices is evident, farmers have been slow to adopt it. They give a variety of reasons for this, including the high cost of the implement and lack of credit to buy it. The government decided to carry out a pilot scaling up of the technology during the 2006 crop season, by making thousands of BBM implements available through its Rural Agricultural Technology Centers. These were disseminated on credit, through farmer organizations (unions), to a substantial number of farmers in vertisol areas of Oromiya, Amhara and the Southern Regional States, where demonstrations on the use of the BBM have been carried out by SG 2000. Prior to dispersal of the implements, the farmer organizations were briefed on the management of the credit system. Additional training was also given to field extension staff and farmers on how to get best results out of BBM technology.

Table 1. Average yield of wheat using the BBM compared to traditional flat bed production.

Region	Zone	District	Year *	Average grain yield (tons/ha)	
				Traditional	BBM
Oromiya	Southwest Shewa	Becho	2000 (25)	0.5	2.3
			2003 (10)	0.5	1.9
			2004 (26)	1.8	2.6
		Dandi	2000 (20)	0.5	2.5
			2003 (10)	0.5	2.6
		Alemgena	2000 (20)	0.9	2.4
	2003		-	-	
	Illu	2000 (10)	0.8	2.2	
		2003	-	-	
	Ambo	2000 (10)	0.5	1.4	
		2003	-	-	
	Northwest Shewa	Yayagullelle	2000 (30)	0.5	2.7
2003 (10)			0.5	1.5	
Bereh Aleltu		2000 (10)	0.6	2.9	
		2003	-	-	
East Shewa		Akaki	2000 (10)	0.8	2.7
			2003	-	-
Gimbichu	2000 (10)	0.8	3.4		
	2003	-	-		

* Numbers in brackets indicate number of plots used in calculating average yield of wheat/ha/year in the respective District.

MALAWI

Malawi is one of the largest per capita maize consumers in the world, and SG 2000 maize technologies have had major positive impacts on food security for farmers that have adopted them. Still, Malawi was last self-sufficient in maize in 1999/2000, and since then, adverse weather conditions and misguided agricultural policies have impeded maize production. Rainfall has been limited and erratic, leading to prolonged dry spells. In 2004/05, the country suffered its worst maize season in a decade, with total production falling by nearly 30% compared to the previous year, down from about 1.73 million tons to 1.23 million tons.

Unreliable rains that stopped early and limited availability of the second basal dressing of fertilizer were the two main factors undermining crop production in 2004/2005. The season actually got off to a good start in October, with many parts of the country receiving normal to above average rainfall. But then the rains tailed off just when most crops were at critical stages of development, such as tasselling and cobbing in maize, pegging in groundnuts, and at the point rice needed to be transplanted. The scarcity of fertilizer at the time when the second basal dressing needed to be applied also contributed to the poor yields, though without adequate moisture the second application of fertilizer would not have helped increase yields very much.

Malawi's Vulnerability Assessment Committee concluded that the effects of prolonged poor rainfall and chronic poverty would soon lead to serious food shortages in the country. In addition, while the government has done much to ensure that fertilizers are available to smallholder farmers on time and at reasonable prices, its Targeted Input Programme ran into difficulties that resulted in late distribution in some areas. The government distributed over 56,000 free treadle pumps to

smallholders to encourage winter crop production under irrigation. As a result, the area under irrigation increased from about 45,000 hectares to more than 61,000 hectares.

ADVANTAGES OF ZERO TILLAGE AND QPM

"In 2004/2005, SG 2000 worked in all of Malawi's Agricultural Development Divisions (ADDs), establishing nearly 5,900 small farm field school plots (0.01 hectare in size). More than 800 of these were zero tillage plots and over 2,800 were planted with QPM," says Country Director, José Antonio Valencia. "QPM varieties and zero tillage have much to offer Malawi," he notes, "offering improved nutrition and reducing the labor needed to produce a good harvest of maize." The average yield of the zero tillage plots was 4.2 t/ha, compared with the 2004/2005 national average of 800 kg/ha, and Valencia states that "Labor-saving zero tillage practices and the nutritional advantages of QPM can be especially important where HIV/AIDS is crippling farm households."

Moreover, although the rains stopped early, SG 2000 plots, especially those under zero tillage, were not greatly affected. "The main advocates of zero tillage are no longer scientists or aid workers, but the farmers themselves. They quickly spread word of its benefits to neighboring farms," says Valencia. One farmer, Wilson Kamwamba, said that, "apart from increasing my harvest,

zero tillage saved money. It took me less time to prepare my land and manage my crop. Also, because of the mulching I did there was less erosion, and better fertility and soil moisture."

TRAINING

Because of the success of its demonstration program, SG 2000 received many requests



Labor-saving conservation tillage has much to offer in Malawi.

to provide crop production training to farmers and to staff of organizations involved in agricultural development, including the National Association of Smallholder Farmers (NASFAM), Plan International, Farmers World, and various Lutheran and Baptist groups. In response, SG 2000 began its 2005/2006 program by working with the Ministry of Agriculture and Food Security to train over 750 people. These were primarily farmers, but also selected staff from organizations that had expressed interest in learning about new maize production technologies. The training was done in all ADDs, and it involved well over 12,500 farm field school plots. These included a number of zero tillage plots. A new QPM hybrid from CIMMYT was demonstrated, as were several good open-pollinated QPM varieties. Farmers provided their own inputs and SG 2000 supplied the seed, training and crop production technology backup throughout the growing season.

As a result of SAA's desire to refocus its limited resources, the SG 2000 Malawi country project, which began in 1999, was brought to a close at the end of 2006. Like other SG 2000 countries, however, it was not completely abandoned. The SAA-funded regional programs for QPM and agroprocessing continue to support Malawi's efforts to improve the lives and livelihoods of its smallholder maize farmers.

	Maize	Ground-nuts	Rice
Area, 000 ha			
2004	1,538	218	43
2005	1,514	150	43
2006	1,624	200	43
Yield, t/ha			
2004	1.1	0.7	1.2
2005	0.9	0.6	1.2
2006	1.6	0.7	1.2
Production, 000 t			
2004	1,733	161	50
2005	1,253	92	50
2006	2,611	145	50

Source: USAID/FEWS 2007 for maize; FAOSTAT for groundnuts and rice



Norman Borlaug and Yohei Sasakawa receiving Mali's highest civilian honor – the Medal of the Commander of the National Order of Mali – from President Touré.

According to its Food Security Commission, Mali suffered a food shortage in 2005 of nearly 350,000 metric tons, which resulted from insufficient and erratic rainfall and the 2003/2004 locust invasion. The Commission reported that 101 of 703 municipalities experienced shortages, leading to significant increases in cereal prices. The government responded by importing 110,000 tons of tax-free rice and 100,000 tons of maize, and by distributing cereal free of charge in affected areas.

STRIVING FOR FOOD SECURITY

In May of 2005, Malian President Amadou Toumani Touré launched the “National Programme for Food Security,” an ambitious undertaking being supported by the FAO’s Special Programme for Food Security. The goal of this initiative is to make Mali food secure by 2015, by promoting the transfer and adoption of improved agricultural technologies and sustainable crop intensification. The initiative involves a planned investment of some US\$226 million over 10 years, and is seeking to empower farmers and engender a sense of national ownership in the Programme.

The launch of the Programme fortunately coincided with a much better cropping season. According to SG 2000 Country Director, Marcel Galiba, “Rainfall was good throughout the country in 2005 and harvests were up over the previous year, reaching nearly 3.4 million tons of cereal and some 600,000 tons of cotton.”

The past 20 years of SG 2000 activities in sub-Saharan Africa have demonstrated that, given science-based technologies, smallholder farmers can make very significant contributions to the agricultural economy. “Here in Mali, where SG 2000 started in 1996, production has notably increased over the last ten years,” says Galiba. “We normally even see surpluses being produced in good rainfall years. The weakest links have always been downstream, in the areas of post-harvest processing and marketing.”

This production trend continued in 2006, even in the face of erratic rainfall. Over 3.4 million tons of grain were produced during the 2006-07 season – 16% higher than the five-year average and 1% higher than the previous season. Even with this increase in production, Mali imported nearly 150,000 tons of grain in 2006; some 112,000 tons of rice, 4,600 tons of wheat and 3,600 tons of coarse grains were purchased on the international market. An additional 13,500 tons of rice and 7,700 tons of wheat were brought in as food aid to meet localized shortages in certain areas. All together, the grain balance sheet for 2006-07 shows a net surplus of nearly 265,000 tons, 79% of which is made up of coarse grains (millet, sorghum, maize and fonio). Per capita food availability reached just over 250 kg, up more than 8% compared to the previous year and 18% above the official consumption standard of 214 kg per person per year. “Grain is in good supply in local markets,” notes Galiba. “Prices are lower than last year and below the five-year average for the same time of the year. Rice is still the best crop in terms of profitability in the market-place.”

CREATING OPPORTUNITIES FOR INCOME

A new effort was piloted in 2005 by SG 2000 aimed at promoting agroprocessing and marketing as a way to ensure food security and reduce rural poverty. The activity – known as the Market-Oriented and Commodity-Based Program for Farmer Organizations – began in earnest in 2006 and is set to run for five years. Given the acronym MAP (for Marketing Program), its principal objective is to increase the income-generating opportunities for its stakeholders.

“Marketing lies at the heart of this initiative,” says Galiba. SG 2000 is providing farmers and rural communities with training in selected value-adding agroprocessing activities, and then facilitating access to markets through guarantees and contracts with users. “We often speak about increasing the quantity of food available,” notes Galiba, “but improving food quality is also one of our key objectives. And by doing that, the program is expected to put more than US\$ 250,000 into farmers’ pockets each year.”

STRENGTH THROUGH COLLECTIVE ACTION

For farmers to have access to markets and be competitive, they must be organized. In fact, SG 2000 is convinced that strong, well-organized farmer associations are critical for achieving sustainable agricultural development, in Mali and elsewhere in Africa. An important move in the right direction occurred in July of 2005, when a former SG 2000 farmer named Bakary Togola, from Niamala in the Sikasso region, was elected as the President of the Permanent Assembly of Farmers’ Associations of Mali (APCAM). Mr. Togola has been involved in all facets of rural development in Mali. Like his father before him, he started as a farmer in his village. He went on to conduct research trials with the Institut d’ Economie Rurale (IER) and run demonstration plots for the government extension



A purchase contract is exchanged between Traoré M. Diallo, coordinator of 17 cereal security stocks on Yiromadio (Bamako), and Bakary Togola, President of Niamala Cereal Producers' Cooperative.

services with SG 2000. He then turned to seed production and became involved with the Farmer's Union. Prior to his current position he was the resident of the Syndicat des Producteurs du Coton et du Vivrier (SYCOV) – the Union of Cotton and Food Crops Producers of Bougouni District of Sikasso region.

“Electing an APCAM president with such a wealth of experience is further empowering Mali’s farmers,” says Marcel Galiba. “Mr. Togola shares our vision that organizing the market is essential to building a strong and sustained production system in Mali, and he will be a powerful ally for us in that effort.” In 2005, SG 2000 also established a “Group Empowerment” initiative, which is referred to as the GEM program.

GEM is aimed at helping farmer groups to become more effective in representing the interests of their members. As part of this program, and with the objective of linking producers to markets, a cereal stock exchange (Bourse de Céréales) was established in March 2006 in partnership with the National Department of Agriculture, the Permanent Assembly of Chambers of Agriculture, and Afrique Verte, an international NGO. The Bourse brought together producers and buyers, and

almost 816,000 tons of grain were sold. Farmers were encouraged by the results and agreed to hold a similar auction in Ségou in April of 2007.

As an indication of the amount of money now going into farmer groups through MAP, about 450 producers have decided to dedicate some 530 hectares of their land for to the marketing program. These lands are expected to provide about 1,400 tons of maize, millet and rice seed – with the potential of earning the farmers about US\$370,000.

Two MAP training sessions were held in Bamako, the first in January 2006 and the second in September. Supported by SAA’s Regional Agroprocessing Program, local equipment manufacturers were trained in the use and development of maize shelling and grain winnowing machines. These have now been placed in villages in the region of Sikasso.

THE BAMAKO SYMPOSIUM

SG 2000’s twentieth anniversary was marked by an international symposium entitled “Stimulating African Smallholder Commercial Agriculture,” which was held in Bamako. The occasion provided an excellent opportunity to showcase Mali’s agriculture. When addressing the Symposium, President Amadou Toumani Touré again expressed his commitment to agricultural intensification, and made clear his support for new regulations that will offer “the tools and guarantees

required for the emergence of a modern agricultural economy based on high production targets and optimal productivity.” The President stated that he would encourage “the mobilization of private investment for the development of agriculture in the broadest sense – from production to processing.”

At present, however, Mali’s agricultural sector remains mired in subsistence practices – this despite its importance to the overall economy. It provides employment and income for more than 80% of the population, and accounts for about 40% of Mali’s GDP. The country’s agriculture is constrained by low and erratic rainfall, limited control of freshwater supplies, poor soils, a low level of agricultural inputs, and limited access to agricultural equipment. Poor rural infrastructure and a general lack of organization among farmers and other agricultural stakeholders impede market development.

Still, Galiba emphasizes the positive. “Mali has 2.5 million hectares of irrigable land and a young and vigorous population,” he says. Strong farmer organizations are now emerging, as is an institutional environment favorable to private investment in the agricultural sector. And there are important local research achievements to build on as well.” SG 2000 is convinced that its MAP and GEM initiatives will give participating farmer organizations the commodity chain and market orientation needed to move their smallholder members onto a path to relative prosperity.

Table . Cereal stock exchange (CSE) of march 2006.

Cereal	Quantity 9kg)		Unit cost (CFA)	total cost	
	Presented	Solid		CFA	\$
Maize	530,803	221,200	110	24,332 000	46,435
Sesame	215,000	215,000	250	53,750 000	102,576
Millet	53,165	53,165	135	7,177 275	13,697
Rice seeds	14,316	-	-	-	-
Soybean	2,685	-	-	-	-
Total	815,976	486,365	-	85,259 475	162,708

NIGERIA



Hajiya Mairo Tukintawa, group leader from Kano State, holding improved millet heads.

Rainfall during Nigeria's 2005 wet season was generally above the country's 30-year average, but the rains ended early and this affected the yields of such longer season crops as sorghum and cowpea. Maize was much less affected and, at 4.6 t/ha, average maize MTP yields were just over 2.0% higher than in 2004 – and still considerably higher than the national average. Across the areas in which the program worked in 2005, the highest maize MTP yield recorded for the season was in Kano State (7.4 t/ha). The average cost of production was nearly US\$390 per hectare, but average net income was over US\$725 per hectare – more than 20% higher than the previous season.

During the 2005/2006 dry season, 385 wheat MTPs were established in Jigawa and Kano States. The average yield on these plots was 3.7 t/ha, about 5% lower than the previous season's average of 3.9 t/ha. Temperatures were persistently high during the early growth stages of the crop, which was the main reason for the decline in yields. Still, the national average wheat yield for the season was only 1.2 t/ha – about 70% less than the MTP average. The average cost of production was just over US\$ 1,730 per ha, and at a little more than US\$ 1,090, the average net income was 30% higher than in 2004/05.

TRANSFERRING RESPONSIBILITY FOR THE MTP PROGRAM

The 2006 wet season began more or less as usual in mid-April, but the rains then stopped and a prolonged dry spell ensued, causing considerable anxiety in the farming community. It also made some wonder whether SG 2000's decision to begin transferring responsibility for implementing the MTP program to government extension agents was appropriate. Fortunately, the rains returned and stabilized, were uniformly distributed and lasted a month longer than usual, up to mid-October instead of mid-September.

"This gave us confidence to accelerate the transfer of program ownership and responsibility to states and local governments," says Ahmed Falaki, SG 2000 Country Director. "They are now scaling-up the transfer of crop-based technologies to resident farmers – using their own resources to provide inputs on credit, establish management training plots and build the capacity of their front-line staff."

Bauchi, Kano and Zamfara States have been particularly effective in scaling up maize demonstration plots. A number of additional frontline extension staff recruited, trained, and provided with motorcycles so that they could visit more remote farmers. Government extension agents in the three states trained over 44,000 target farmers, who also received loans for inputs. These efforts are having considerable impact. In Zamfara State, for example, hundreds of thousands of hectares in the south are now under maize cultivation. Under Governor Ahmed Sani's Comprehensive Agricultural Revolutionary Programme (ZACAREP), over 20,000 target maize farmers (along with another 140,000 participating producers) received crop production training, logistical assistance, input loans and market support, which

has transform the southern part of the State into something of a "corn belt." Governor Sani also sponsored the visit of 25 farmers and nine government officials to Ethiopia and Malawi, so that they could observe SG 2000 activities there, and the delegation came back requesting SG 2000 technical support for capacity building in water harvesting, small-scale irrigation and the development of farmer organizations.

A smaller delegation from Kano State, led by the Commissioner of Agriculture Alhaji Ahmed Riruwai, paid a similar visit to Ethiopia and Malawi, with comparable results. The State's Mass Food Production Programme has led to an increase in area and number of farmers growing maize, especially in the north. During 2005/2006, the government supported the participation of over 25,000 farmers in MTP activities.

"Extension outreach activities at the state level are continuing to gain momentum," says Falaki. "Kebbi and Sokoto States have recently joined in the scaling-up of technology dissemination using the SG 2000 approach, and several states are now fully financing MTP demonstrations through input loans to participating farmers."

PROMOTING QPM

In 2005, the development of QPM for Nigeria was given a boost by the formation of a "QPM working group," which includes SG 2000, the International Institute of Tropical Agriculture (IITA), the Nigerian Institute for Agricultural Research (IAR), the National Agricultural Extension and Research Liaison Services (NAERLS), and several seed companies. The purpose of the working group is to promote the research, dissemination and adoption of QPM, and to strengthen the seed delivery system. The first Nigerian QPM variety (Sammaz 14) was officially released by IAR through the

National Varietal Release Committee. In addition, the country's first "QPM village," Layin Taki, was established in Kaduna State, and over 80% of farm households there are now growing the popular Ghanaian QPM variety, Obatanpa.

The SAA-sponsored Regional QPM/Seed Program continues to support the production of breeder and foundation QPM seed and, while the Program has itself provided Nigeria's smallholder QPM producers with about 250 metric tons of certified seed, its aim is to promote certified seed production by private sector companies and local farming communities. A number of extension agents and skilled farmers have been provided with light boxes and trained to use them to check the protein quality of seed at the field level. In addition, Ahmadu Bello University will soon begin laboratory quality analyses of QPM, and a pilot QPM nutrition education program was begun at Muntsira village in Kano State (in collaboration with the State Ministry of Health).

STRENGTHENING NIGERIA'S RICE SECTOR

Through the SAA-sponsored Regional Rice Program, a number of partners joined hands to support SG 2000's work with the New Rice for Africa (NERICA) initially developed by the African Rice Centre (WARDA). Participating organizations included WARDA, USAID, the Presidential Initiative on Rice, the Multinational NERICA Rice Dissemination Project, and PrOpCom. "The development of Nigeria's rice sector is constrained by several factors, including: a shortage of certified NERICA seed, low farmer productivity, the poor quality of locally produced grain (due mainly to post-harvest processing problems), and inadequate private sector participation."



Students from a school in Gombe State with their maize MTP. SG 2000 is working with DFID to expand such school programs, the proceeds of which supplement school feeding programs and enable the purchase of lab equipment, computers and sports equipment.

The Regional Rice Program provided SG 2000 Nigeria with NERICA foundation seed in 2005, and 2.5 metric tons of certified seed were produced during the 2005 wet season. This was doubled to 5 tons during the 2006 wet season, using smallholder contract growers. About 2,000 rice MTPs (using NERICA and other improved rice varieties) were set up under the supervision of government extension staff. More than 8,900 other plots were established by state governments by providing farmers with input loans that were to be paid back after harvest.

AGROPROCESSING

SG 2000 is promoting a village-level rice parboiler fabricated by a graduate of the Sasakawa Africa Fund for Extension Education (SAFE) program at Ahmadu Bello University. As a result, several women's groups are now parboiling and polishing rice

to an acceptable standard for local markets. On a larger scale, SG 2000 – in partnership with a local fabricating company – is supplying processing machines (parboilers, cleaners/de-stoners, dryers and polishers) through a revolving loan package to rice growing communities in Jigawa and Gombe States.

SAA's Regional Agroprocessing Program is also making its mark in Nigeria, mainly in the areas of rice processing, the threshing and winnowing of field crops in general, and in oil extraction. "The technologies being promoted by the Regional Program are efficient and affordable," comments Falaki. "They include an inexpensive grain winnower made of wood, a simple but ingenious multi-crop planting marker, and an oil extractor that is suitable for operation at the village level."

UGANDA

Uganda enjoyed surplus food supplies in 2005 and 2006. Good first and second rains in 2005 were followed by less favorable weather conditions nationwide – particularly drought – in 2006. However, the weather improved in the latter part of the year with heavy rainfall across the country that lasted until December. Agricultural production declined in 2006 compared to 2005, but was still strong enough for the country to remain a net food exporter and a principal source of food security in the Great Lakes and East Africa Region. In fact, the World Food Programme (WFP) purchased about 8% of its total food donations in 2006 from smallholder farmer groups in Uganda – some 170,000 tons of maize and beans valued at US\$ 40 million. WFP intends to increase its purchases to 20% of their planned food donations, largely because of improved quality standards for Ugandan maize, a result of the joint efforts of various organizations operating in the country, including SG 2000.

IMPROVING THE INSTITUTIONAL ENVIRONMENT

In general, Uganda's agricultural investments are guided by its Plan for Modernization of Agriculture (PMA), a sector-wide policy framework that focuses on increasing productivity and integrating agricultural programs to build synergies across various sectors. The PMA has helped to create new institutional arrangements that more effectively support crop production, agroprocessing and marketing. Such organizations as the National Agricultural Advisory Services (NAADS) and the recently reconfigured National Agricultural Research Services (NARS, formerly NARO), as well as various farmer associations, are implementing new programs in the context of this improved institutional environment – and the new emphasis, by NAADS, on establishing more effective farmer organizations is seen by SG 2000 as

a major opportunity for scaling up the impact of modern agricultural technologies.

Sasakawa has been assisting NAADS in this area, using the experience gained from its One-Stop Centre Associations (OSCAs), a 5-year community-based approach initiated in 2003 to provide rural populations with access to agricultural services through farmer-owned and farmer-managed associations. In 2005/2006, rapid progress was achieved in establishing OSCAs. As Country Director Abu Michael Foster reports, "Of the 20 planned One-Stop Centre Associations, over half are now legally established. Formal management structures are in place, institutional capacity building is well underway, and various post-harvest enterprises have been or are being set up." Four OSCAs were established in 2006 that are now enabling 11 farmer associations to provide services to over 8,800 members and their neighbors in 14 districts. Value chains for upland rice and QPM have been established and scaled-up through the use of some 670 demonstration plots at these OSCAs.

FOCUSING ON VALUE CHAINS AND LOCAL COMMUNITIES

The OSCAs will be used as a platform for launching interventions focusing on developing value chains for commodity crops to meet commercial demand for farmers' produce. The plan is for SG 2000 interventions to involve a targeted number of rural communities over a five-year period so that tangible results and impact can be adequately measured. In 2006, SG 2000 therefore began to move away from its traditional focus on strengthening the national extension program in general towards targeting specific rural communities. More resources were allocated to formally establishing farmer organizations made up of specialized producer groups.



Uganda's Minister of Agriculture, Animal Industry and Fisheries, Janet Mukwaya (center), at the 2005 launching of the ZAABTA One-Stop Shop Association in Luwero District.

The SG 2000 Uganda country program, the Japan International Cooperation Agency (JICA) and NAADS have been key partners in this effort – working to scale-up the impact of new technologies and to integrate innovations into the national agricultural service system. In addition to promoting new farmer organizations, other interventions include adding value through post-harvest training at nearly 80 sites on: grain threshing, drying, milling and grinding; improving access to markets through training in collective marketing at 24 sites; and integrating SG 2000 and NAADS methods to assist with institutional development in four new districts (Bugiri, Kamuli, Nakasongola and Kyenjojo). Foster notes that "SG 2000 is striving to integrate its activities into NAADS at both the national and local government levels. Quick roll-out of new technologies and enterprises, as well as the creation of near-term impacts that increase household incomes, is occurring in districts where public/private partnerships are being established."

SG 2000 Project Coordinator Emmanuel Kayaayo points out that "Farmers clearly have increased access to production, post-harvest

and marketing services. By setting up OSCAs in the four additional districts, the project area has been greatly enlarged, from 35 sub-countries in seven districts to 46 sub-countries in 11 districts. Also, membership in farmer associations increased from 24% of the target in 2005 to 86% in 2006.” Moreover, all associations have benefited from improved management and organizational capacity, with 46 executives and some 280 farm community leaders – a high proportion of them women – receiving professional training. Seven of the more mature associations have completed a five-year strategic plan and now produce annual work plans. Financial and administrative controls have also been put in place.

PROMOTING RICE PRODUCTION AND MARKETING

The “rice revolution” that began in Uganda in 2004 continued to gain momentum during 2005/06. A number of districts are now growing NIRICA 4, and upland rice production has hit an all-time high, more than doubling over 2004. SG 2000 has been instrumental in promoting rice production in the country, working closely with the government in its efforts to make Uganda self-sufficient in the crop – a goal set by President Museveni in early 2004. In locations where the demand from the mills for increased rice production is strong, SG 2000 works to facilitate farmer-to-farmer seed multiplication using a seed loan and recovery program that was begun in 2003. In 2005, nearly 5.5 metric tons of NERICA rice seed was loaned to more than 380 farmers and planted on 80 hectares in Ziroobwe, Luwero district. By the end of the season, the loan recovery rate exceeded 60%, a strong response by participating farmers.

In 2006, 305 metric tons of NERICA seed were produced in ten districts on almost 500 one-acre multiplication plots (about 104 hectares). Some



Loyce Ogoola – a groundnut farmer and member of the TMATA OSCA in Tororo District – tending her field.

14 tons of seed were placed in a communal seed bank by participating farmers. Block farms comprising about 13 hectares produced an additional 40 tons of NERICA 4 grain. Yield trials on farmers’ fields confirmed that NERICA 4 continues to outperform other types of available rice varieties.

In addition, ten technicians from local agro-workshops were trained under the SG 2000 Uganda/JICA partnership in 2006, resulting in the increased production of rice threshing machines that have been tested and placed with rice grower groups to improve post-harvest quality. A total of 40 artisans and 78 farmers were trained in the operation and maintenance of various types of post-harvest rice-processing equipment, and rice field days attracted over 540 farmers.

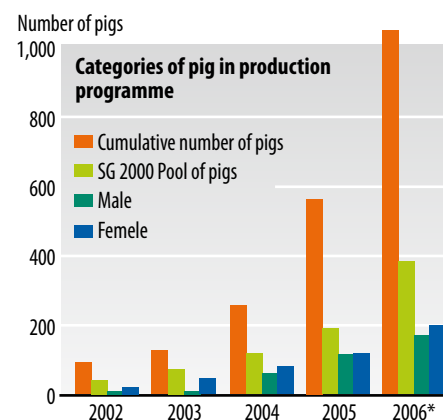
QUALITY PROTEIN MAIZE

Promotional efforts by Uganda’s QPM working group boosted seed sales of the companies involved from some 610 metric tons in 2004 to over 1700 tons in 2005. In 2006, the QPM Longe 5 (called Nalongo) was planted on over 100 hectares on block farms. First season yields averaged 3.5 t/ha and ranged from 2.3 t/ha to 4.1/ha. Nine associations participated in block farming of QPM, and collectively marketed just under 50 metric tons of seed. Seventy percent of the funds allocated to this enterprise were recovered thanks

to more effective One-Stop Centre Association management. SG 2000 plans to slowly change its emphasis from demonstration plots to block farming as the organizational and management capacity of farmer associations increases. The availability of QPM seed has been assured by previous investment in private-public partnerships for seed production and distribution. Nalongo seed is now sold on a commercial basis by six seed companies, and continues to be the most widely available variety of QPM maize seed on the market (nearly 3,900 tons of seed have been sold over the past four years).

PIGS AND POULTRY

SG 2000 has encouraged the intensification of pig farming, an effort aimed at generating additional income for vulnerable households in the OSCA catchment areas. Unfortunately, an outbreak of African swine fever caused severe piggery losses across the country. Many farmers subsequently turned to poultry production – using QPM for feed. In one OSCA, farmers produced tertiary products – eggs and improved cross-bred local birds – and in doing so further strengthened the QPM value chain. Over 300 birds and several thousand eggs were produced at this site alone during 2006, and a further 17 sites were established to promote poultry through the QPM maize value chain.



* Projections for the cumulative number of pigs and the SG 2000 pool of pigs have been made for 2006

REGIONAL PROGRAMS

REGIONAL RICE PROGRAM

The SAA Regional Rice Program, led by Dr. Tareke Berhe, formally started in April 2005. The primary countries included in the program are Ethiopia, Mali and Uganda, but Guinea and Nigeria have also received some support since the Program's inception.

The Program's operational motto is "from plant to plate," which refers to the fact that it addresses challenges all along the rice value chain, from genetic and agronomic production aspects to marketing and end use issues (see box). "One of the main reasons that African countries import rice is because of the generally poor quality of locally produced grain," says Tareke Berhe, Director of SAA's Regional Rice Program. "Local production often falls short of minimum market standards for color, taste, smell and the presence of foreign materials. However, both quantity and quality can be improved if better seed stock is used and improved production and post-harvest practices are used."

In its first year of operation, the Program made a number of advances, chief among being the introduction of almost 300 of the latest elite lines of rice in its initial target countries. These were sourced from the Africa Rice Centre (WARDA – the West African Rice Development Association) and the International Rice Research Institute (IRRI), as well as from two other rice growing nations, Guinea and Madagascar. The introductions included both irrigated and rain-fed varieties and those suitable for upland and lowland growing. In Ethiopia, cold and salt-tolerant varieties were also used.

"Bringing in the New Rice for Africa (NERICA) has proved particularly valuable," says Berhe. NERICA combines the best features of both African and Asian inter-specific rice crosses, maturing 40 to 50 days earlier compared to upland (rainfed) Asian



The use of productivity enhancing technologies like NERICA rice is leading to increased incomes for resource-poor farmers in Africa.

varieties previously grown in West Africa. This allows farmers to add an additional crop, such as a fast-growing pulse, to their annual cropping cycle.

From the first generation of NERICA varieties (numbers 1-7), NERICA 4 had already been released in Mali and Uganda and NERICA 1 had been used in Nigeria. Now a number of new varieties have been added. NERICA 3 and 4 were released in Ethiopia during 2006; NERICA 1 and 2 are under verification for release there. Meanwhile, NERICA 1 has been introduced in Uganda and at least two lowland/irrigated varieties have been introduced in Mali.

The second generation of rainfed upland NERICA varieties (numbers 8-18), together with 60 NERICA lines for lowland and irrigated conditions, are now under testing in the Program's target countries.

MAINTAINING QUALITY

Ensuring that these new seed types are of the highest quality is a vital Regional Program activity. Support starts at the research level, where careful attention

is paid to the provision of good breeder and foundation seed. This support is then extended to the level of farmer groups and trained private seed producers to make sure that high quality, certified seed is produced.

In 2006, the Program supported the production of nearly 1,500 metric tons of improved seed in its target countries, while over 2,000 hectares were planted as a seed source for 2007. The active seed production programs of Mozambique and Guinea are also being supported.

Achieving high quality grain production comes not just from using good seed, but also from the agronomic techniques used. Demonstration and training activities therefore receive considerable attention from Rice Program staff. Over 10,000 farmers in the Program's target countries have been exposed to the full range of improved production technologies being promoted.



Supporting the maintenance, production and availability of high-quality seed from improved varieties is a significant activity of the SAA Regional Rice Program.

Regional Program-backed training introduces farmers to improved agronomic practices, such as timely planting and weeding, the correct application of fertilizer, and best-practice water management. The Program supports national-level research into the development of these technologies, as well as the efforts of national extension programs to promote their uptake by farmers. A large number of on-farm demonstration and seed production plots are established each season to show farmers how the new technologies can be applied under their farming circumstances. Especially important have been the farmer field days that showcase improved technologies, not only to farmers, but also to the wider public and, crucially, to local decision makers. Thirty-seven of these were held in 2006 alone.

POST-HARVEST AND AGROPROCESSING ACTIVITIES

While continuing with its efforts to promote the delivery and adoption of better rice varieties and production technologies among smallholder farmers, the Regional Rice Program is increasing its work on the development and promotion of value-adding post-harvest and agroprocessing operations.

SAA's Regional Agroprocessing Program (see pp XX-XX) works closely with the Rice Program in this endeavor. As a result of this joint effort, in 2006 over 500 post-harvest and agroprocessing machines – including rice threshers, mills, parboilers, sieves and cleaners – to farmer organizations and village communities.

Nigeria leads the way in this area, followed by Mali and Uganda. Mozambique and Guinea were also active in promoting post-harvest and processing technologies. Mali, Uganda and Ethiopia carried out several post-harvest and processing demonstrations and training in the production of different food recipes from rice.

FARMER COOPERATION

Assisting farmers to organize collective grain storage facilities is a feature of SG 2000 activities in Mali and Uganda. In both cases, farmers own a common storage center where cleaned grain of good quality can be stored, processed and then sold at a time when market prices are attractive. The farmers involved are also trained on how to add value to the process by developing collective marketing strategies, as well as pre- and post-harvest handling techniques.

By the end of 2006, eight centers had been established in Mali and six in Uganda, with more due to open in 2007. This approach has proved sufficiently successful for plans to be drawn up to extend the idea to Ethiopia and Nigeria.

BUILDING CAPACITY

Strengthening research and extension capacity within its target countries is seen by Rice Program staff as every bit as important as their technology development as dissemination activities. This training takes many forms, some theoretical and some practical. In some cases, training is done regionally, as was the case when researchers and technicians participated in exchange visits between

Ethiopia, Uganda and Kenya. Experts are also sometimes brought in from outside, which happened when two WARDA scientists and two post-harvest and processing machinists from the Philippines helped train Ethiopian experts in Addis Ababa in February 2006. In another example, Ethiopian machine manufacturers traveled to Uganda and trained machinists there.

BUILDING STRONG LINKAGES

“For the SAA Regional Rice Program to succeed in the longer term, collaboration is essential, both at the national and at international levels. Fortunately, we are able to build on the excellent working relationships already established by SG 2000 country programs,” says Berhe.

THE REGIONAL RICE PROGRAM'S OVERALL GOALS INCLUDE:

- Identifying, introducing and supporting the evaluation of new improved and adapted rice varieties from WARDA, IRRI and other sources;
- Working with national agricultural research and extension organizations to support the maintenance, production and availability of improved rice varieties;
- Promoting productivity enhancing technologies;
- Promoting post-harvest and agroprocessing technologies;
- Supporting the development of enterprises dealing with storage, marketing and increased utilization of rice;
- Facilitating the training of young rice scientists and field technicians;
- Developing strong linkages and working relationships with partners; and
- Lobbying for favorable agricultural policies.



Rice is becoming an ever more important staple food in many sub-Saharan African countries. African rice production has increased steadily at over 3% per year since 1961 and reached more than 14 million tons in 2005 – yet the continent still accounts for more than 30% of global rice imports.

Working closely with partners brings many advantages, such as pooling financial and management resources, better project coordination, and access to a wider pool of expertise. At the country level, SG 2000's partners are national institutions, such as research and extension bodies, colleges and universities, farmer organizations and other agricultural institutions. Internationally, WARDA and IRRI provide the sources for the best rice varieties and elite lines, while the Japan International Cooperation Agency (JICA) and USAID provide finance and training in project countries, especially in the post-harvest arena.

Collaboration also extends into the realm of politics, where effective project implementation and careful

lobbying help generate policies that favor high-quality rice production. In particular, a willingness to tailor the Rice Program's work to reinforce domestic goals can pay big dividends, as can employing qualified national staff to manage projects. Such moves tend to engender good relations with political authorities, making it easier to lobby for supportive agricultural policies. In 2006, such efforts led to useful contacts between the Rice Program and such influential officials as the President of Mali; Uganda's Minister of Agriculture and the country's Vice-President; and Ethiopia's Minister of Agriculture and its Deputy-Prime Minister. These relationships are conducive to official recognition of rice as a crop vital for food security and to investments by national governments in the rice sector.

REGIONAL AGROPROCESSING PROGRAM

In 2005, the G8 Summit highlighted the critical role of the private sector in Africa as a driving force for development. The Summit noted the growth in recent years of a wide variety of micro-, small- and medium-scale businesses across the continent, but it also noted that most of these new enterprises are still operating mainly in urban areas. The development of small, economically viable private businesses in much of rural Africa remains a pressing need, one that SAA's Regional Agroprocessing Program has been addressing in selected countries since the mid-1990s.

The agroprocessing sector is uniquely positioned to contribute to economic development in sub-Saharan Africa. Unfortunately, this fact is still not widely recognized. Policies aimed at encouraging investment in private agri-businesses are weak in many countries and, partly because of

this, there is a wide gap between the contributions of private agri-businesses to African economies compared to private manufacturing. Narrowing this gap by improving the viability of rural agroprocessing enterprises and establishing stronger links between farmers and their markets is a key objective of the Regional Agroprocessing Program.

PROGRAM FOCUS AND ACTIVITIES

The Program's early focus was on Ghana and Benin, where it collaborated with the International Institute of Tropical Agriculture (IITA) on a project bringing improved post-harvest and agroprocessing technologies to smallholder farmers. Today, the Program is focused primarily on Ethiopia, Mali and Uganda, and is engaged in four major activities:

- Research on and development of agroprocessing technologies, in collaboration with local manufacturers;

Agroprocessing equipment sales in Benin, Ghana and Ethiopia

Equipment	Benin 1995-2006	Ghana 1995-2006	Ethiopia 2006	Total
Grater	255	673		928
Double screw press	203	682		885
Fermentation rack	44	308		352
Bagging stand	24	571		595
Sifter	47	614		661
Chipper	4	34		38
Thresher	84	27	69	180
Digester	5	77		82
Wet-type grinder	77	8	13	98
Rice mill	3	13		16
Flour mill	0	0	13	13
Total	746	2,707	95	3,848

Source: SAA



Toshiro Mado, Director of SAA's Regional Agroprocessing Program, with participants at a training program for equipment manufacturers in Uganda.

- Training of manufacturers to produce improved agroprocessing equipment;
- Field demonstrations of improved agroprocessing technologies, in collaboration with the agriculture ministries and local manufacturers; and
- Development of agroprocessing enterprises, in collaboration with farmers' cooperatives and private agroprocessing service providers.

ACHIEVING IMPACT

In 2005, the former Head of IITA's Post-harvest Engineering Unit, Leony Halos-Kim, conducted an impact study of the Regional Agroprocessing Program. "The study shows that the Program's major accomplishments include a much greater awareness of new agroprocessing technologies in targeted rural areas, coupled with mechanisms that help encourage their operation over time," says Toshiro Mado, Director of the Program. "Farmers and private agroprocessors credited the Program for significantly increasing their processing capacity, improving their ability to produce new value-added products, and for

their enhanced access to markets." The study also showed that, by mid-2004, collaborating manufacturers had sold over 500 sets of cassava processing packages; about 150 units of an improved multi-crop thresher; and about 100 units of a wet-type grinder. These machines have been adopted in a number of target rural areas and are providing reliable income for farmers, processors, small-scale entrepreneurs and local manufacturers.

Moreover, the study revealed the growing profitability of several small-scale agroprocessing businesses that were established in rural areas of Ghana, Benin and Ethiopia. Gari (fermented and roasted cassava) has become an important commercial product in West Africa, finding a market not only in the region, but in Europe as well. In Ghana and Benin, many small-scale gari producers use the improved processing package introduced by the Regional Program. As long as the supply of fresh cassava root is not a constraint, these producers are able to more than double their net profit and earn as much as a 70% return on their investment in the improved equipment.

In many cases gari production is a collective activity, and ownership of the processing equipment enables producers to leverage additional support for their activities. For example, in Benin the Takissari Women's Group convinced the French NGO, L'Institut Régional de Coopération Développement (IRCOD), to subsidize the purchase of a second set of processing equipment and build a storage facility for their product. Similarly, the Agodenuo Women's Group was able to get the Centre d'Action Régionale pour le Développement Rural Atlantique (CARDER) to help them buy a grater and a Lister engine, and persuade the government to install a borehole as a potable water source.

An export market has also emerged for Shea butter, which is produced in a number of rural Savannah areas in West Africa, and a wet-type grinder was introduced in Benin and Ghana for processing the butter. The new grinder does enhance the quality of the butter paste, but additional improvements in the components of the Shea butter production system are still needed in order to achieve more stable production capacity and income.

In Ethiopia, the Program is working closely with the Ministry of Agriculture Extension Department to promote adoption of a multi-crop thresher that was originally developed by IITA for processing rice in Guinea. "Threshing is the vital first step towards converting a harvested crop into a marketable product," comments Mado, "so we've been very active in developing and promoting improved equipment used at this stage of production."

Using a threshing machine offers huge savings in time and labor over conventional processing, given that the latter involves perhaps three or four laborers and half a dozen oxen – animals that could be freed up for plowing. The machine is also much more efficient in separating grain from

soil, sand and other contaminants, and this means a higher quality end product that can command premium prices in the marketplace. In the Ethiopian region of Shashemeni, for example, local traders are willing to pay as much as 10% more for mechanically threshed tef.

Mechanical threshing has other benefits as well. In the past, Ethiopian farmers have lost significant amounts of their production to moisture damage, caused by the onset of the rainy season before they have been able to finish threshing their grain using traditional practices. The rapidity with which their crops (especially tef) can be processed using the multi-crop thresher reduces this risk considerably.

To date, about 100 of these improved threshers – each of which can serve the needs of more than 150 farmers – have been purchased by Ethiopian farmers and private service providers. These threshers tend to be purchased

and operated by very entrepreneurial people who travel from farm to farm, threshing the relatively small quantities of grain produced by individual growers. Joint efforts continue with Selam Technical and Vocational Centre to improve the design of the machine, increasing its capacity and cleaning efficiency, and thus reducing costs both to operators and to farmers.

ENCOURAGING VALUE-ADDED AGRICULTURE

“The multi-crop thresher is a good example of how the SAA Agroprocessing Program is facilitating a much needed shift towards value-added agriculture in Africa’s rural areas,” says Mado. Rapid population growth and urbanization in Africa are presenting smallholder farmers with new challenges and opportunities. On the one hand, agricultural products must pass from remote rural locations to major urban areas through long and

usually very complex channels, and delays are commonplace due to poorly developed infrastructure. The control that producers have over the quality of their products generally declines as they move along the marketing chain, making it difficult for farmers to ensure that the quality standards demanded by consumers are met.

On the other hand, the growth of urban markets presents smallholders with the opportunity for tremendous gains, if they can provide the kind of high-quality, value-added products that are increasingly being demanded by urban consumers. “The shift towards value-added agriculture is making headway,” asserts Mado, “but progress remains fragile in many countries. That’s why we are continuing to support innovations that move farmers in this direction. By improving the ability of farmers – usually through their associations – to more efficiently and effectively process and pre-package their products, we are helping to reduce many marketing uncertainties.”

REGIONAL QPM/ SEED PROGRAM

The SAA Regional QPM/Seed Program, which was begun in January 2003, has two primary goals. Its main focus is on replacing conventional maize hybrids and varieties grown by smallholder farmers in SG 2000 countries with significantly more nutritious Quality Protein Maize (QPM) materials. A second and highly complementary goal is to help strengthen public and private seed systems in those same countries.

Intensive maize breeding work is leading to a new generation of QPM hybrids and Open-Pollinated Varieties (OPVs) that have the potential to yield as well as, or better than, conventional maize. The International Maize and Wheat Improvement Center (CIMMYT) in Mexico, the International Institute of Tropical Agriculture (IITA) in Nigeria, and a number of African national



Wayne Haag (left), Director of the SAA Regional QPM/Seed Program.

agricultural research programs are working together to produce the new QPM materials.

“The complexity of achieving our goal of replacing conventional maize with QPM is hard to overstate,” says Dr Wayne Haag, SAA Director for the QPM/Seed Program. “There are a number of very successful conventional varieties and hybrids

currently being grown by African farmers; replacing them will require that the new QPM materials be highly competitive – and not only in terms of yield.”

For any new materials to stand a chance of replacing widely grown conventional hybrids and OPVs, they have to meet or exceed existing post-harvest standards for storage and processing, as well as gain the acceptance of consumers who have well-established preferences for grain color, texture and flavor. These standards and preferences vary widely from country to country, which means that no single QPM variety or hybrid is going to fill the bill in all project countries. Instead, maize breeders – especially those working in national programs – must tailor their efforts to meet local opportunities, needs and preferences.



Kano State Coordinator (left) with farmer demonstrating Sammaz-14 QPM seed production in Nigeria.

In Ethiopia, for example, the major challenge is to identify a superior version of the current QPM hybrid BHQ-542, one that can compete successfully with the country's popular normal hybrid BH-660. In Uganda, the need is to build on the successful OPV, Longe-5 and identify QPM hybrids that private seed companies can take to market. In Mali, the white QPM OPV called Denbenyuma competes well against conventional white maize materials. However, yellow maize is also important in the local market and yellow QPM materials still need to be identified that can compete with the popular conventional maize variety, Sotubaka. In Nigeria, Dr Shehu Garki Ado and his team at the Institute for Agriculture Research, Ahmadu Bello University (IAR-ABU), officially released the QPM variety Obatanpa in 2005. This was followed by the release of the QPM Sammaz-14, which is now being adopted at a rapid rate. Still, there is a need to identify and promote the release of additional QPM varieties that private seed companies in the country can commercialize.

Despite the variability in circumstances from country to country, notable progress is being made towards the SAA/SG 2000 QPM goal. In Ghana, three new OPVs and three new QPM hybrids have been identified as candidates for release, to complement the QPM workhorse, Obatanpa. Ghana's QPM breeder at the Crops Research Institute (CRI), Dr Manfred Ewool, is leading the effort to develop competitive yellow OPVs and hybrids, and it is hoped that this work will lead to releases that can benefit other countries where yellow maize is widely accepted, such as Mali, Nigeria and Ivory Coast.

In Malawi, the new QPM OPV Sussuma is under large-scale seed production and the release process should come to fruition in 2007. In addition, four very promising QPM hybrids from CIMMYT have been identified by the Malawi national program as candidates for release. In 2006, Zimbabwe released its first QPM material, CZHO1021, a hybrid of CIMMYT origin. Kenya's national program recently released

two QPM hybrids, KH-501Q and KH-502Q, and a private Kenyan company – Western Seeds – has released an OPV tagged as WS-104Q. This variety is also being tested regionally by the company.

COLLABORATION IS KEY

Success in achieving the SAA/SG 2000 goal for QPM will ultimately depend on strong collaboration among and between many different national, regional and international public and private partners. In 2005/2006, the Regional QPM/Seed Program continued to work closely with researchers, not only in SG 2000's four focus countries, but also in Ghana, Kenya, Mozambique, Senegal and Tanzania. The Program's efforts were further leveraged by partnering with such sub-regional organizations as ASARECA and CORAF, and by drawing on the expertise of researchers working for CIMMYT, IITA, and the International Centre for Research in the Semi-Arid Tropics (ICRISAT). Dr. Surinder Vasal, a 2000 World Food Prize Laureate for his pioneering work on QPM, continued contributing with voluntary QPM breeding activities at CIMMYT, Mexico.

The Regional Program's efforts to establish and/or support local seed enterprises in Mozambique and other countries have been strengthened in the past by partnering with Rockefeller Foundation, and more recently with the joint Rockefeller/Gates initiative in support of crop improvement and seed systems in Africa. And at the request of the UN Millennium Village Project, the Regional Program and its partners brought QPM and no-till technology to a newly established Millennium Village in Bonsasso, Ashanti.

STRENGTHENING SEED SYSTEMS

The first link in any effective formal seed system involves the production of the high-quality breeder seed that underpins the eventual development, multiplication and delivery to farmers

of commercial certified seed. The objective is to maintain the quality of the seed used by breeders, and while the quantities needed are relatively small, great care must be taken to ensure the integrity of the varieties and lines with which they work.

“The good news,” says Haag “is that breeder seed systems are in pretty good shape in the countries where we’re working. In general, the proper quality controls are in place, assuring the maintenance and availability of high quality seed for public- and private-sector breeders to use. However, problems start cropping up when it comes to the production of foundation and certified seed.”

For the most part, there are adequate stocks of foundation seed being produced, though production systems are in need of additional refinement in several countries. The foremost challenge is one of maintaining quality controls once a number of smaller scale seed growers become involved in the process. This is especially true with respect to the production of the certified seed eventually marketed to farmers. To address this challenge, in 2006 the Regional QPM Program organized a number of joint field visits with certifying authorities, company representatives, seed growers and researchers.

These visits made clear to all that, in addition to making sure the usual guidelines are followed for producing certified seed – such as using only foundation seed and properly isolating production fields to avoid contamination – other steps should also be taken. For example, work is needed to ensure that certified seed fields are planted using good agronomic practices, both as a quality control measure and to help advertise the potential of the seed. In that same vein, fields should be clearly labeled, and producers should clear a 1.5 – 2.0 meter walking path around each field to allow for more effective



Soule Traoré of SG2000 (left) and N'tji Coulibaly, Head of the IER Maize Program (along with field assistants), in a foundation seed field of Denbanyuman in Mali.

presentations during field days, and more importantly, to facilitate the work of certification inspectors. Moreover, as the number of certified seed producers grows, there is a need to strengthen their own field inspection and certification capabilities. In Uganda, for example, each company must now have their own inspectors, duly trained and certified by the national authorities, who also regularly monitor their work with unannounced field visits and assessments of company inspection processes.

QPM NUTRITION RESEARCH CONTINUES

Despite years of research and mounting evidence of the clear nutritional advantages of QPM, some policy makers still need to be convinced. For this reason, research on human and animal nutrition relative to the use of QPM is on-going. In Uganda, plans are in place for a nutrition intervention project using QPM and involving nutritionist Barbara Tembo and Texas A&M graduate student Annete Kuteesa. This work will commence in 2007. The QPM-Malt intervention work in Ghana that was conducted in 2006 by Ghana Health

Services and the Self Help Foundation will continue during 2007. In Ethiopia, the QPM study underway at Sibusire, the results of which will soon be available, will continue in 2007. And as part of the Harvest Plus initiative and in collaboration with CIMMYT and SG 2000, Purdue University graduate student Nilupa Gunaratna continues her thesis work on compiling evidence and strengthening the case for QPM.

QPM LABS AND QUALITY ANALYSES

Significant progress has been made towards establishing functional QPM labs in selected African countries. The problem remains one of sourcing the proper glacial acetic acid needed to conduct reliable quality tests. CIMMYT is currently providing limited back-up testing at its labs in Mexico, but more importantly has developed and is working to verify a new testing protocol that substitutes the more readily available glyoxylic acid for glacial acetic acid. If the effectiveness of this protocol is borne out in 2007, the QPM labs in Africa will be much closer to achieving their goal of providing reliable local quality analyses.

SASAKAWA AFRICA FUND FOR EXTENSION EDUCATION (SAFE)

The Sasakawa Africa Fund for Extension Education (SAFE) began its work in 1993 by sponsoring a small pilot program at the University of Cape Coast in Ghana. Since then, the initiative has grown considerably, and it now supports 12 full-fledged university programs in 9 African countries. Despite this growth and a strong record of achievement, as SAFE enters its 15th year the circumstances that gave rise to it in the first place still persist: more than 80% of Africa's extension workers lack any kind of university degree and, as a result, are rarely considered for leadership or higher level administration positions within their organizations.

“Our goals are to open doors to leadership positions for mid-career extension workers through advanced training, to link courses more closely to the real world of African farmers, and to help universities keep abreast of the rapid changes taking place in rural areas”, says SAFE Director Deola Naibakelao. “With well over 1,100 graduates and about 800 students currently enrolled in SAFE courses, it's clear that the program is very popular with the mid-career professionals we're trying to reach. It's also clear that stakeholder support for the initiative is strong and growing. A number of our graduates have now moved into position of leadership in national public extension systems – one of SAFE's most important stakeholders – and these organizations are working closely with us to create additional opportunities for staff training.”

SAFE PROGRAM COUNTRY HIGHLIGHTS

In Benin, the University of Abomey-Calavi admitted 31 students, including one woman, in 2006. This brought the total number of students currently enrolled in the program to 56. These



Third year students at Bunda College in Malawi discussing a maize project being conducted by one of the students.

students were also relocated to a new permanent facility at Sekou, about 40 km from the main campus in Cotonou.

An external evaluation of the SAFE program at Ethiopia's Alemaya University (AU), done in July 2005, is indicative of positive feedback and support being received for the SAFE initiative generally. The reviewers expressed strong appreciation for the SAFE program's flexibility and the fact that it is a demand-driven activity. They also praised the balance that the program has achieved between extension theory and practical, real-world applications. They noted, too, the strong collaboration among the program's major stakeholders, the fact that program graduates have now assumed leadership positions in Ethiopian agricultural agencies, and that farmers benefit from a wide range of technologies as a result of SAFE students' off-campus Supervised Enterprise Projects (SEPs).

A new SAFE program at Hawassa (formerly Dehub) University in Awasa, to the south of Addis Ababa, admitted its first class of 24 students, including three women, in October 2006. During this first round students were selected from only Oromiya Region and Southern Nations Nationalities Peoples

Region (SNNPR). The university has now established a Department of Agricultural Extension and recruited two new staff, both graduates of the SAFE program at Haramaya University.

The SAFE program at the University of Cape Coast (UCC), in Ghana, has made significant progress since direct funding from SAFE ended in 2002. UCC continues to invest resources in teacher training for agricultural extension at PhD level in Ghanaian universities to overcome the inadequate number of experienced teaching staff. At the UCC-affiliated SAFE program at Kwadaso Agricultural College (KAC) in Kumasi, 35 students were awarded their diplomas in June 2005, and another 50 students graduated in October 2006. This matriculation brought the number of graduates to 232, including 44 women. Ghana's Ministry of Food and Agriculture has renovated several facilities at KAC, such as classrooms, the library, hostels, and the water supply and telephone lines, to ensure smooth implementation of the SAFE program.

In 2005, 34 students graduated from the program at Makerere University in Uganda, bringing the total number



External Evaluation Team Leader, Professor John Mwangi (right), with Dr. Tesfaye Lemma, Head of the Extension Department at Alemaya University, Ethiopia.

to 79. The curriculum was revised to include a full term for SEPs. “There is also a need for a second SAFE-type program in Uganda, given that the government is privatising its public extension system,” notes Naibakelao. “New private extension service providers are not likely to let their staff to pursue full-time degree programs, at least not at first.” Thus, a proposal for a new part-time degree program catering to the needs of private service providers has been presented to the university’s management for approval, and it appears set for launch in the 2007/08 academic year.

The SAFE program at the Polytechnic Institute for Training and Applied Research (IPR/IFRA) in Katibougou, Mali, is also progressing well. “However, we’re still struggling to increase the number of women involved in the program,” says Naibakelao. “We’re headed in the right direction, though.” In 2004, there was only one female extension professional enrolled in the Mali SAFE program. By the end of 2005, there were ten involved in the program, thanks to a special fellowship scheme provided by Winrock International. The first class of 15

students (all of whom first enrolled in 2002) graduated from the Mali SAFE program in December 2006.

The new Technical Diploma level SAFE program at the Samanko Agricultural Training Centre – which is close to Mali’s capital of Bamako and affiliated with IPR/IFRA – took in its first class of 25 students in October 2006. Ten of these new students are women, which is the largest single enrollment of women since the inception of the SAFE initiative. In addition, the Technology Village at IPR/IFRA is now fully operational, and offers practical training and education programs for both students and farmers alike.

Mali’s Ministry of Agriculture, which is the main stakeholder for the SAFE program there, continues to provide financial and logistical support. In addition, support has been received from other local and international partners, including Campagne Malienne de Développement de Textiles, Office de la Haute Vallée du Niger, Office du Niger, CARE International, World Vision and Wageningen University in The Netherlands.

At Malawi’s Bunda College, the SAFE program admitted 18 new students in October 2006, bringing the total number of enrollees to 23, of which six are women. The Malawian SAFE program has significantly strengthened its linkages with the Ministry of Agriculture after a slow start due to frequent changes among senior Ministry staff. This closer relationship is reflected in the fact that the Ministry is financing ten SAFE program students beginning in the 2007 academic year.

In Nigeria, 16 of the 19 SAFE students who first enrolled in the program in 2002 graduated in February 2007. Three of them graduated with First Class Honors and nine with Second Class Honors. There are currently 45 students enrolled in the program. As part of scaling-up activities, a second

SAFE Statistics, February 2007

Mid-Career B.Sc. and Diploma Courses	Graduated	Current	Total
UCC, Ghana (B.Sc.)	246	55	301
KAC, Ghana (Diploma)	231	77	308
Haramaya, Ethiopia (B.Sc.)	215	98	313
Hawassa, Ethiopia (B.Sc.)	--	24	24
Makerere, Uganda (B.Sc.)	130	41	171
Sokoine, Tanzania (B.Sc.)	233	190	423
IPR/IFRA, Mali (Maîtrise)	15	91	106
Samanko, Mali (Diploma)	--	25	25
Ahmadu Bello, Nigeria (B.Sc.)	16	45	61
Abomey-Calavi, Benin (Licence)	--	56	56
Bobo-Dioulasso, Burkina Faso (Licence)	--	24	24
Bunda, Malawi (B.Sc.)	--	23	23
Sub Total	1,086	749	1,835
Scholarships	Graduated	Current	Total
Diploma	--	6	6
B.Sc.	26	5	31
M.Sc.	51	10	61
Ph.D.	3	3	6
Sub Total	80	24	104
Grand Total	1,166	773	1,939

SAFE program in Nigeria is scheduled to commence at Bayero University, Kano, in August 2007. Preparations for that launch are now at an advanced stage.

PH.D. TRAINING FELLOWSHIPS

One of the most critical challenges facing all SAFE programs is the lack of qualified teaching staff at the Ph.D. level to nurture and sustain the SAFE program. To help rectify this, SAFE has provided three Ph.D. fellowships to train lecturers from the University of Bobo-Dioulasso in Burkina Faso, Hawassa and Haramaya Universities in Ethiopia, and two Masters’ degree fellowships for lecturers from IPR/IFRA in Mali. The Department of Agricultural Economics and Extension at UCC has agreed to assist in training these five Fellows in Agricultural Extension, beginning in August 2007. These five fellowships the many that SAFE offers to qualified Masters Degree candidates in SAFE program countries.

PUBLIC INFORMATION

Publications released during 2005-06 include: the *Sasakawa Africa Association 20th Anniversary Report*; *SG 2000 Calendars for 2005 and 2006*; and Issues 21, 22 and 23 of the SAA Newsletter, *Feeding the Future*.



2006 FINANCIAL REPORT (thousand US dollars)

Highlights of 2006

Approved budget	6,660
Actual spending	6,549
Actual receipt	7,244
Cash balance (as of December 31, 2006)	5,856

Details of receipts

Grant from Nippon Foundation	6,500
Interest	226
Loan recovery	96
Others	420

Details of expenditures

SG 2000 country operations	3,381
Burkina Faso	77
Ethiopia	558
Malawi	149
Mali	449
Nigeria	356
Uganda	502
Country program administration	1,290
SAA programs	1,620
Agroprocessing	411
QPM	277
Rice	328
Africa Directorate	251
New project development, others	353
HQ administration	1,548

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*Funded by
The Nippon Foundation*



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