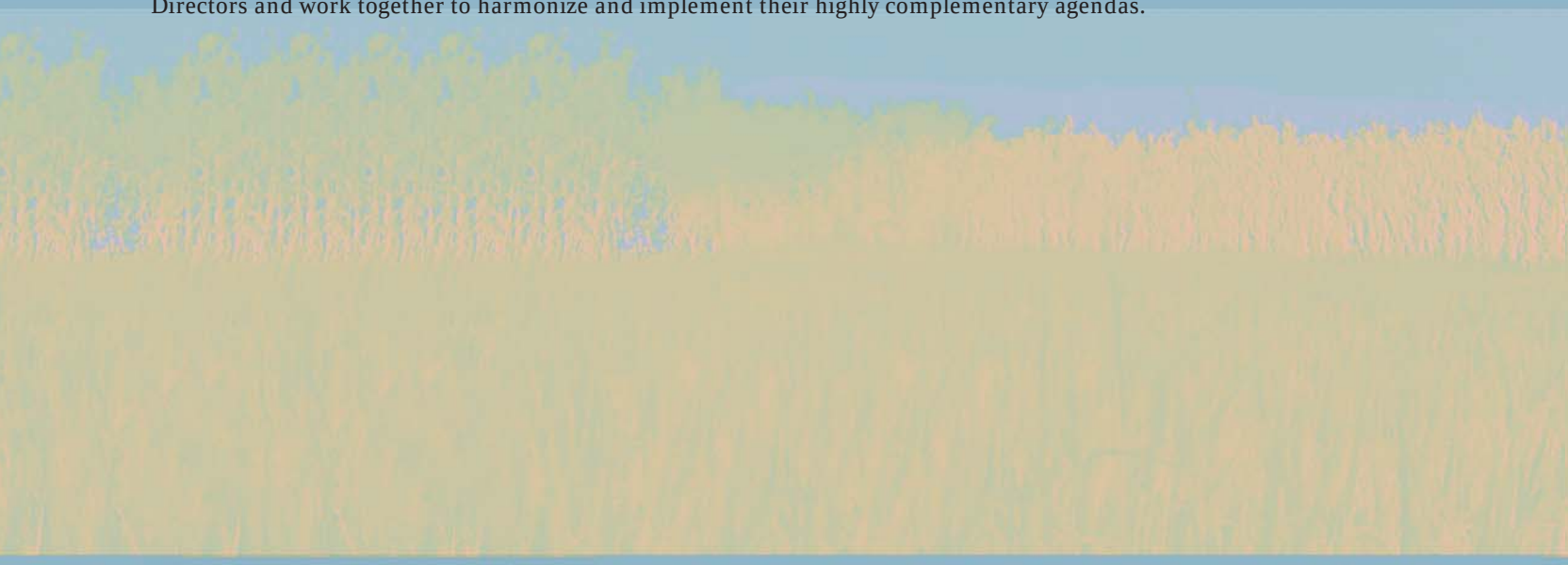
SASAKAWA AFRICA ASSOCIATION

PROGRESS REPORT 2009

About SAA, SG2000 and SAFE

The agricultural projects of the Sasakawa Africa Association (SAA) are operated as joint ventures of two organizations – SAA and the Global 2000 Program of the Carter Center in Atlanta, Georgia (USA). There are currently four SG2000 country projects – in Ethiopia, Mali, Nigeria and Uganda – for which SAA serves as the lead management organization. Former US President Jimmy Carter and his advisors work through the Global 2000 Program to provide policy advice to national political leaders in support of SG2000 project objectives. Funding for SG2000 projects comes principally from the Nippon Foundation of Japan, whose Chairman is Yohei Sasakawa and whose President is Takeju Ogata.

SAA relies on the Sasakawa Africa Fund for Extension Education (SAFE) – a legally separate organization also funded by the Nippon Foundation – to provide leadership for building human resource capacity in agricultural extension. These two organizations share a common Board of Directors and work together to harmonize and implement their highly complementary agendas.



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Management Report 2009

The Loss of Norman Borlaug – SAA's Co-Founder

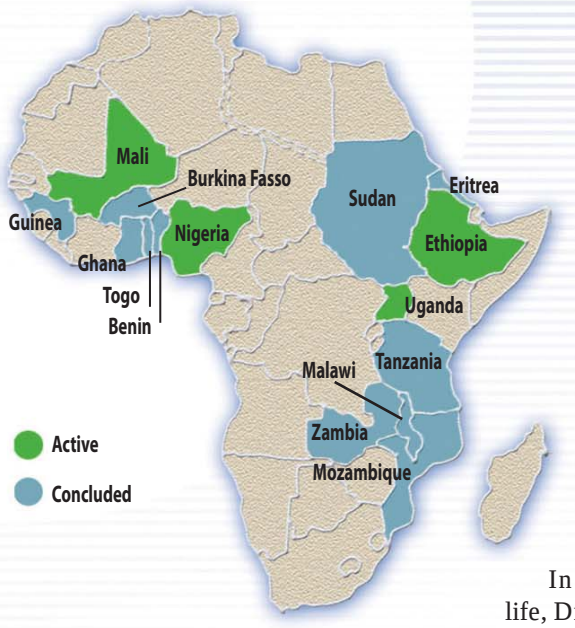
On September 18, 2009, SAA, and the world, lost one of the great agricultural scientists and food security activists of all times. Dr. Norman E. Borlaug was 95 and had spent an incredible 65 years fighting hunger and poverty. As a scientist, he developed a new type of wheat that – together with similar advances by others with rice – led to a Green Revolution in much of the developing world, as well as in industrialized countries. As a hunger fighter, Dr. Borlaug worked tirelessly to convince governments to adopt higher-yielding smallholder agriculture as their development paradigm. In recognition of this work, he was awarded the Nobel Peace Prize in 1970.

Dr. Norman E. Borlaug, 1914-2009.

The benefits of Dr. Borlaug's work to humankind were enormous. Between 1960 and 2000, world cereal production tripled, driven largely by increasing yields, and real prices dropped by 40%. As a result, hundreds of millions of hungry people had enough food to eat, all year long, for the first time in their lives.

As spectacular as the agricultural development-led industrialization in Asia was, similar success in sub-Saharan Africa proved elusive. An African Green Revolution failed to take hold for a number of reasons. As farmers in Asia and elsewhere capitalized on the fruits of agricultural research – higher yielding crop varieties coupled with improved agronomic practices – African farmers faced daunting challenges that limited their ability to make use of the new technologies. Only 4% of Africa's agricultural land was irrigated, compared to 25% in Asia. Drought was a constant threat. Agricultural produce in Africa was largely transported to market along footpaths and on heads of women and girls, while in Asia farmers had access to bullock carts, lorries, and trains. Key agricultural institutions in Africa – research, extension, markets – were weak and under-funded, and African governments spent (in percentage terms) only half what Asian governments invested in agriculture and rural development. By the mid-1980s, most African governments were in dire financial straights and international donors were pressing them to cut back public sector activities on most fronts, including agriculture.

Against this demoralizing set of challenges, Norman Borlaug responded to an invitation in 1985 from Japanese philanthropist, Ryoichi Sasakawa, that they mount a Green Revolution-style agricultural extension program in Africa, in collaboration with like-minded governments. Their goal was to bring improved crop production technology to smallholder farmers in the shortest time possible.



Sasakawa-Global 2000 Country Projects

Within a year, a partnership had been forged with former U.S. president, Jimmy Carter, and the Sasakawa-Global 2000 agricultural initiative was launched. Collaborative projects were established with the governments of Ghana, Sudan and Zambia in 1986; with Benin, Tanzania and Togo in 1989-90; with Nigeria in 1992 and Ethiopia in 1993; with Mozambique and Eritrea in 1995; with Burkina Faso, Guinea, Mali, and Uganda in 1997; and with Malawi in 1999.

Between 1986-2006, SG 2000 country projects helped finance more than 500,000 demonstration plots, involving upwards of 5 million smallholder farmers, directly and indirectly. On 0.25 to 0.5 hectare demonstration plots, participating farmers obtained yields in maize, rice, wheat, millet, sorghum, grain legumes, and roots and tubers that were two to three times their traditional level of production.

Still, despite these impressive field results, adoption of the recommended crop technologies – and especially the more expensive fertilizers and crop protection chemical components – was often less than expected. Only about 25% of participating farmers were able to adopt the full package of practices. Herein was the difference with Asian farmers, who had more ready access to the recommended seed-fertilizer technologies, and where irrigation made adoption a less risky proposition than in Africa.

In the last 10 years of his life, Dr. Borlaug talked more and more of the need for investments in rural infrastructure in Africa, especially roads, but also regional and transcontinental railroads, energy grids, and government action to maintain order in national grain markets. "The road to agricultural development is often a road," he would say.

On September 18, 2009, Norman Borlaug, though very weak, received a report at his home in Dallas, Texas, from a former trainee, now an outstanding professor of soil science. The scientist was talking about the progress of his research team to develop a hand-held scanner to improve the efficiency of nitrogen fertilizer use. At the end of the briefing, Borlaug said, "take it to the farmer." These were his last words. He slipped into a deep sleep and died that evening, his family at his side.

The Evolving SG 2000 Paradigm

Over the past decade, smallholder agriculture has moved to a higher priority on national and international development agendas. Government has an indispensable role to play – in improving infrastructure, strengthening agricultural research and development institutions, and creating incentives for smallholder farmers to adopt new technologies. Millions of Africa's farmers need to move from traditional subsistence agriculture towards becoming commercial agricultural entrepreneurs who are closely linked to market-led agricultural value chains – the customary domain of private sector agribusinesses. The SG 2000 program in 2009 reflects this broader focus in which raising the productivity of resources committed to production and post-production activities is addressed in a more integrated manner.

Figure 1 depicts a simplified view of the rice value chain. Doubling yields on a 0.5 hectare plot can add 750 kg to the farm household production, worth US$ 225 gross and US$ 150 in net revenue. That profit can be more than doubled through various post-harvest handling and agroprocessing operations, greatly increasing benefits to the farmer. The SAA/Global 2000 program now focuses on productivity improvements from the farm to the table.

As it moves forward, another important change in the SG 2000 model is to shift its focus to reaching smallholder farmers who have not previously received much if anything in the way of agricultural extension services. These marginalized farmers, who tend to be very poor and mostly women, have been excluded from mainstream extension programs for several reasons. Limited government resources have usually gone to supporting more prosperous farmers in the misplaced belief that confining investments here would achieve greater benefits. In addition, large groups of poor smallholder producers have been marginalized due to various socio-cultural reasons.

However, research now shows that extension training and crop demonstration programs today can produce greater impacts when focused on smallholder women farmers and resource-poor producers. That is where gaps in information about productivity-enhancing technology are the greatest, and consequently where the largest returns at the margin can be achieved. Indeed, SAA estimates that US$ 1 invested in women-focused productivity training will produce a

Figure 1. A schematic of the rice value chain, indicating the estimated value added at each stage of processing.

30% greater return compared to the same investment in male-focused productivity training.

SAA Restructuring

In 2008, SAA initiated a far-reaching organizational restructuring, in part prompted by negotiations with the Bill & Melinda Gates Foundation for collaboration in agricultural extension. In 2008, BMGF provided SAA with a $400,000 planning grant to assist in its planning and organizational restructuring efforts. In-depth consultations were held with key stakeholders in Ethiopia, Mali, Nigeria and Uganda – SAA's current focus countries. A preliminary project proposal was submitted in late 2008 and revised in early 2009. In mid-2009 BMGF asked SAA to redesign the joint project again and to focus only on Ethiopia. This was done and submitted in late 2009.

In 2009, the SAA Board of Directors approved a new matrix organizational structure involving two executive directors (one for Management and the other for Programs) who serve as co-chief executive officers. They are complemented by a Managing Director, who is the chief operating officer of the organization. Five Thematic Directors lead planning and programming for their respective areas, and four Country Directors drive the implementation of SAA's country programs.

SAA's five thematic program areas are:

- Crop Productivity Enhancement (primarily through closing yield gaps);
- Post-harvest and Agroprocessing (for value-adding enterprise development);
- Public-Private Partnerships (for extension delivery and smallholder development);
- Human Resource Development [led by the Sasakawa Africa Fund for Extension Education (SAFE) for mid-career extension staff]; and
- Monitoring, Evaluation and Learning (for documenting impacts, the effectiveness of investments, and building on lessons learned).

A matrix management approach fits the SAA/SAFE organizations well. The five Thematic Directors and the SG 2000 country teams work together to advance mutually agreed objectives, and the matrix structure provides for better technical quality assurance and the sharing of best practices. At the same time, the Country Directors have the option, in consultation with the SAA Managing Director and the Thematic Directors, of tailoring individualized programs of work that fit country needs and opportunities. The matrix structure also provides SAA with more flexibility in responding to new fund-raising opportunities and challenges, since it allows more flexibility to shift human resources within a thematic area across countries.

Staff Recruitment/ Rationalization

During 2008 and 2009, SAA underwent an extensive review of its personnel policies and staffing patterns. New personnel manuals were approved by the SAA Board, for international staff in 2008 and

SAA's new Managing Director, Dr. Juliana Rwelamira (center, black t-shirt).

for national staff in 2009. In 2008, Mr. Masaaki Miyamoto and Mr. Christopher R. Dowswell, two long-time SAA staff, were promoted to Executive Directors for Management and for Programs, respectively.

Dr. Marco Quiñones, SAA Regional Director, and Dr. Michael Foster, SG 2000 Uganda Country Director, left SAA in 2008. In 2009, other departures occurred, including: Dr. Wayne L. Haag, Regional Quality Protein Maize Coordinator; Mr. Toshiro Mado, Post-harvest/ Agroprocessing Program Director; and Dr. Ahmed Falaki, SG 2000 Nigeria Project Coordinator.

Dr. Juliana Rwelamira, an agricultural economist with Tanzanian citizenship, was brought on board in June 2009 as SAA Managing Director. By the end of 2009, four of the five thematic director positions were in place (ME&L was still vacant and projected to be recruited in early 2010), and new country directors were hired for Ethiopia, Mali, Nigeria and Uganda. (The current staff list is provided on the inside front cover of this report.)

In addition, important administrative positions were filled at the SAA regional office in Addis Ababa and in Tokyo.

The next challenge is to rationalize and recruit in 2010, as needed, national thematic staff in the four SAA focus countries. Since a matrix management approach is being taken, each of the thematic areas will have programmatic staff based in each country. These staff will simultaneously be part of the country teams led by each Country Director and members of their respective thematic teams.

So far, the proportion of our professional program and administrative staff that are female has increased from 5% to about 40%, one of the highest in the NGO community in Africa. This significant change in gender balance is not motivated by political correctness, but rather is the result of our strategic planning process. One of the key outcomes of that process was the conclusion – with data to support it – that the biggest economic impact on smallholders that SAA can make moving forward is to place a major emphasis on reaching women farmers to improve crop productivity and promote post-harvest and agroprocessing enterprise development. SAA is convinced that to do this successfully requires female professional staff in key positions.

New staff members have considerable experience (and successful track records) in mobilizing resources from various donor organizations. They are accustomed to preparing business plans, tracking progress in meeting targets, and measuring impacts. SAA's new strategic plan, which rests on the organization's new structure, provides a general framework for their activities. Still, there will be considerable freedom to develop more country-specific business plans and to establish strategic partnerships.

New Funding Strategies

For virtually all of its 24-year history, SAA – and its partner organizations, the Global 2000 agricultural program of The Carter Center and the Sasakawa Fund for Agricultural Education (SAFE) – has relied on The Nippon Foundation to finance its agricultural programs in Africa. During 2010-12, SAA will strive to diversify its funding sources and increase its annual budgets by at least 50%. Resource mobilization efforts will focus on five categories of potential investors (see Figure 2):

- **Private Foundations** – Strong core support of SAA from the Nippon Foundation is expected to continue for at least the next decade. Several other major private foundations are also expected to become program investors. This category is expected to account for 65% of SAA revenue in the coming decade.
- **National Governments** – SAA is requesting earmarked financial support from its partner governments. In a first attempt, eight northern State Executive Governors in Nigeria have agreed to provide complementary funds to support local SG 2000 programs. SAA seeks to secure up to 20% of its country budget funding from national governments.
- **Official Development Assistance** – SAA expects its support from bilateral and multilateral development organizations – such as Japanese JICA, USAID, IFAD and the World Food Programme – to expand. Good opportunities exist for developing smallholder extension programs that promote market-led, value chain enhancement. This category is projected to account for 10% of SAA funding.
- **Private Sector** – SG 2000 has worked in the past with a range of national and multinational agribusinesses engaged in agricultural input supply and commodity marketing in Africa.

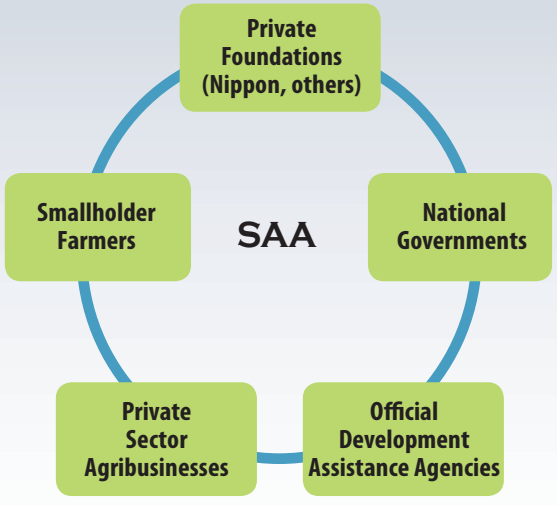


Figure 2. SAA will work to diversify its funding base drawing on a range of potential investors. In addition smallholder farmers will be encouraged to support local extension operating costs, not SAA, which will help sustain SG 2000 interventions.

Moving forward, SAA will seek to develop private-public partnerships in which private companies contribute to the cost of training and demonstration of productivity-enhancing technologies. Funding from private sector organizations will be accepted within a code of ethics framework to ensure extension neutrality and objectivity in farmer recommendations. This source will account for about 5% of SAA's budget.

- **Farmers** – Agricultural extension is a labor-intensive, inherently costly activity. While governments pay for salaries, they rarely allocate adequate operational funds. This is a pervasive problem in African extension that greatly affects effectiveness and impact. It is unlikely that the needed funds will come from government. Hence, village-based extension workers need to develop a revenue model that permits them to generate sufficient income to cover local operating costs. The target extension revenue per farmer-beneficiary is US$ 3/year. While not funding SAA directly, such local revenue generation models will help ensure sustainability of SG 2000 interventions. Developing them will thus be a priority for SAA.

Reaching Policy Makers

The Sasakawa-Global 2000 agricultural alliance was led by an influential group of eminent people – Nobel Peace Laureate agricultural scientist Norman E. Borlaug, Nobel Peace Laureate and former U.S. President Jimmy Carter, and Ryoichi and Yohei Sasakawa, leaders of the largest private foundation in Japan. With leaders of this stature, it is not surprising that SG 2000 had access to the highest levels of government, and it used this access to press for increased investment, especially in high-potential areas, which were still producing far below their promise. A series of international workshops (19 in total) were organized by the Center for Applied Studies in International Negotiations (CASIN), from Geneva, Switzerland, and attended by national and international policy makers. Heads of state and governments were also engaged in these high-level meetings, and outcomes often involved recommendations for significant and much-needed policy changes.

Two of the founders of the Sasakawa-Global 2000 alliance have died. President Carter, still in very good health, will be 86 in 2010, and Yohei Sasakawa, at 71, has pledged his unwavering support. Still, without Dr. Borlaug and with less involvement in the future by President Carter, the nature of SG 2000 influence in policy circles has changed. Before, it was the personalities themselves that carried the weight. Moving forward, SAA's influence will be more directly tied to significant and verifiable project impacts on smallholder livelihoods, and to communicating these impacts to today's leaders and opinion makers in African countries, as well as in the international development community. This is why SAA's new ME&L Theme is so important; it will be responsible for assessing project impacts and transmitting information on best practices through partner organizations. Armed with better information on outputs and outcomes, SAA will work to influence investment decisions within an agricultural investor matrix, involving national governments, private agribusinesses and international donor organizations.

CIMMYT's Sasakawa Impact Project

At the request of the Nippon Foundation – SAA's principal donor – CIMMYT was asked to develop an impact assessment project to monitor and assess the impact of activities and technology packages promoted by the organization and its national partners. With Nippon funding, in 2006 CIMMYT launched an assessment project in Ethiopia and Uganda to gauge the impact on farmers' livelihoods of the main SG2000 extension activities in crop productivity, post-harvest handling and agroprocessing enterprise development. Intended users of project information are SAA, national partners, CIMMYT, other international agricultural research organizations, and the influential public. By the end of 2009, more than a dozen research reports had been generated and can be accessed via the project's interactive webpage (http://sg2000ia.cimmyt.org/).

The pages that follow provide reports from the organizational units that prevailed in mid-2009: SAA's four focus countries (Ethiopia, Mali, Nigeria and Uganda); the SAA Regional Programs for Rice, Post-Harvest and Agroprocessing, and Quality Protein Maize; and from the SAFE program. Future annual reports will reflect SAA's new management and organizational structure.

Ethiopia

As in the previous 4 years, the major crop-producing areas of Ethiopia saw very favorable rainfall during the 2007 crop season. In 2008, however, the rains expected between February and April – called the "belg" – failed, putting at risk up to 20% of the country's total annual grain production and leading to a downturn in the country's food security.

The late onset of the main rainy season – the "meher" – that usually takes place during May to September, further exacerbated the food security situation. Although the rains unexpectedly extended into October, thus benefitting some of the later sown crops, the quality of the early maturing crops was compromised. In addition, the water-logging of soils, the high price of fertilizers, a higher incidence of pests and diseases, and high grain prices all combined to adversely affect food security in 2008.

New Technologies – Scaling Up

The Broad Bed Maker

As part of the government's "Plan for Accelerated and Sustained Development to End Poverty (PASDEP)", such technologies as the Broad Bed Maker (BBM) – which was introduced in order to combat the adverse effects of water-logging of vertisols – the Broad Bed Furrow (BBF), conservation/minimum tillage practices, and post-harvest/agroprocessing equipment such as multicrop threshers and maize shellers have been increasingly adopted by farmers in 2008 in those areas where they are most effective.

Ethiopia has about 13 million hectares of vertisols (heavy, black clay soils), which have traditionally proven difficult to cultivate due to water saturation that leaves them sticky and hard to manage. When the soils dry, they crack badly and are not suitable for planting. As these soils remain water logged during the main rainy season (June-September) and are extremely difficult to drain using traditional methods, farmers are forced to delay the planting of crops such as wheat and chickpeas until the rainy season starts tapering off in early September.

In 2007, a new and improved BBM farm implement was introduced, which is lighter than earlier versions but still retains the two separate mould board-shaped wings that are attached to the traditional wooden frame. As it is pulled through the soil by oxen, the BBM makes two parallel furrows, each about 80 cm apart, 15 cm deep and 40 cm wide. During the field operation, the mould board-shaped wings scoop the soil towards the middle, forming a ridge, and then the chain attached at the back of the wings spreads the soil evenly and covers the seeds. This results in raised seedbeds, where the two furrows located on either side of the beds serve as outlets for draining excess water.

The improved Broad Bed Maker (BBM) in action on Ethiopian vertisol soils. The BBM allows for earlier planting of wheat and, when used in combination with other recommended agronomic practices, leads to significantly higher yields.

BBM demonstrations conducted on farmers' fields in various areas of the country during the last few years have proven conclusively that wheat can be planted at least one month earlier than the traditional planting dates used by the farmers. The yield of improved wheat varieties grown on raised beds, using the BBM along with recommended agronomic practices, was found to be far superior to that grown on traditionally flat beds.

SAA's project coordinator for Ethiopia, Dr Aberra Debelo, explains: "In order to overcome the adverse effects of water logging, Ethiopian farmers have been practicing different methods of draining excess water from their fields. Until recently, the main approach was to use intensive family labor to make raised beds by hand. Another approach was to create narrow beds, sometimes called 'shurrubes' or 'dirdaro', using a local plow that makes more furrows than are necessary and leads to land wastage. However, these methods are not very effective for draining excess water from the field. Thus, a common practice used by the overwhelming majority of the farmers in vertisol areas has been to delay the planting of crops such as wheat until the rainy season starts to end in early September. The problem is that this often exposes the crop to moisture stress later in the season, thereby resulting in low grain yield."

Although the advantages of BBM technology over traditional practices are evident, its adoption rate by farmers was quite slow. Farmers pointed to the relatively high cost of the implement and their lack of access to credit with which to buy it. The government sought to ameliorate this problem and to this end, made available thousands of BBM implements through its Rural Agricultural Technology Centers. The equipment was made available on

credit, through farmers' organizations (unions), to a substantial number of farmers in vertisol areas in the Regional States of Oromiya, Amhara, and the Southern Regional State.

In 2008, following a series of demonstrations of the BBM conducted by SG 2000 in vertisol areas, a number of farmers embraced the new technology and scaled up the equipment for use on wheat plots spread across 132,842 hectares during the 2008 season. Each plot was 0.5 hectares in size, and the project spanned 15 zones and 68 districts of the Regional States of Amhara and Oromiya.

In Oromiya Regional State alone, farmers used the BBM on 37,284 hectares in 7 zones and 57 districts (see Table 1), and in Amhara Regional State, 8 zones and 12 Districts scaled up BBM use on 94,275 plots of wheat. The average yield of wheat obtained on the BBM plots was over 2.8 tons, compared to 0.8 tons produced using the farmers' traditional practices. The legume crop in the two Regional States has not been harvested yet, although the agricultural offices in the Regional States reported its field performance as satisfactory. Overall, it was evident that the farmers who attended field days held at various sites were very receptive to adoption of the BBM technology in their respective districts.

Table 1. Status of scaling up of BBM technology in Oromiya Regional State, 2008 crop season

Zone	Number of:		
	Districts	BBM plots	Participating farmers
Southwest Shewa	8	8,959	17,918
West Shewa	4	13,168	26,336
South Shewa	10	3,991	7,982
East Shewa	4	5,705	11,410
Arsi	18	4,285	8,570
West Arsi	6	289	578
Bale	7	887	1,773
Total	**57**	**37,284**	**74,577**

Conservation/Minimum Tillage

Farmers in Ethiopia tend to practice frequent plowing, and their soils can be turned over between three and eight times before planting in order to kill weeds and prepare smooth seedbeds for good germination and plant growth. This approach, however, also pulverizes the soil and destroys its physical structure: with each plowing, the topsoil and soil organic matter are exposed to erosion by rain and wind. This causes fertility to decline and reduces the water-holding capacity of the soil, rendering it unproductive over time. Furthermore, it allows the soil moisture to evaporate, making the crop more vulnerable to moisture stress later in the season and reducing yields. In order to arrest the loss of the topsoil, build organic matter, improve soil structure, and enhance water and nutrient capacity, the traditional practice of frequent plowing must be exchanged for a conservation/minimum tillage approach.

In conservation tillage the only disturbance to the soil is to dig a small hole or narrow trench to apply fertilizer and plant seeds, which are then covered over. Crop residues should be left in the field after harvest as long as possible, since they protect the soil and the germinating crop against erosion and water runoff, reduce soil moisture evaporation and inhibit weeds. Conventional tillage is replaced by the use of a non-selective Glyphosate herbicide, which is applied to actively growing weeds seven to ten days before planting. This creates good conditions for crop germination, plant growth and effective weed control, as the dried up weeds become part of the crop residue. For long-term sustainability, crop rotations are still needed to minimize the build-up of pests or diseases and to optimize plant nutrient use at different soil depths through synergy between different crop types.

"In Ethiopia, over 89,000 farmers have scaled up the use of conservation tillage with maize in 6 zones and 17 districts, on a total of 44,515 half-hectare plots," reports Debelo. "This was in the Regional States of Oromiya and Amhara, where we intensively demonstrated the technology to farmers. In Oromiya the average yield of maize under conservation tillage was estimated at 5.5 tons/ha, and 5 tons/ha in the Amhara Region."

Similarly, teff CT was scaled up by farmers on a total of 2,458 plots of 0.25-1.00 ha each, in four zones and five districts of the same states. In Ada'a and Lume districts in the East Shewa Zone of Oromiya, an average yield of 1.5 tons/ha was estimated for some 400 ha, while in the Dejen districts of East Gojam zone in Amhar), the yield estimate on 200 ha was found to be 1.7 tons/ha.

Multicrop Threshers and Maize Shellers

Although improved production technologies have led to marked increases in crop yields in recent years, the payoff after harvest has been less significant. Traditional threshing in Ethiopia is a cumbersome process involving beating crops with sticks or trampling the piles under the hooves of animals on bare ground, leaving the grain contaminated with dirt that in turn reduces its market value. Debelo further explains: "This (low payoff) is largely due to post-harvest losses resulting from poor handling systems, both in the field and in storage, higher labor requirements, the use of primitive tools and techniques, and poor quality agricultural products. The price of most raw materials also fluctuates according to supply and demand, which is beyond the control of the farmer. This can mean that marketing middlemen intrude, and the farmer loses out".

Now, however, the introduction of post-harvest and agroprocessing technologies, in collaboration with SAA's Post-Harvest/Agroprocessing Program, means that farmers get a better deal. The new technology increases efficiency, minimizes crop wastage and reduces the drudgery of traditional processing. This enables farmers to realize the gains brought about by improved production techniques, and they can process and market the higher quality produce that consumers demand. "This technology also creates entrepreneurial opportunities," says Debelo. "Agroprocessing adds value to products so they can command higher market prices than the original raw material, thereby increasing farm household income and ensuring food security".

These post-harvest/agroprocessing technologies are being promoted by SG 2000 in collaboration with the Ministry of Agriculture and Rural Development (MoARD), the Ethiopian Institute of Agricultural Research (EIAR), and the Ethiopian NGO, Selam Technical and Vocational Center (STVC). They include two simple post-harvest/agroprocessing machines; an engine-driven multicrop thresher for teff (Ethiopia's major cereal crop), other small grain cereals and grain legumes, and a manually operated and engine-driven maize sheller. "We hope the machinery will transform the processing of cereal grains and legumes, allowing farmers to harvest crops quickly, before the rains, without compromising quality or quantity," says Debelo.

He goes on to provide an example of the impact of the multicrop thresher. "In the Shashamenne District of Ethiopia, farmers harvest teff planted during the belg season at the beginning of the main rainy season. This makes immediate threshing after harvest rather difficult. As a result, the crop is left piled in the field without protection from the rain, where it deteriorates or is lost altogether. Now, with the introduction of the multicrop thresher, threshing has become easier and the quality of teff produced – and its price in the market – has improved. Farmers with multicrop threshers process their crops first, and then provide threshing services to other farmers by going from farm to farm, with their threshers mounted on donkey carts. This has really helped to increase farm income".

Currently both post-harvest machines are manufactured by STVC, which provides regular monitoring services to check the condition of the machines and provide repairs and services where needed. Prompt action is taken to address repair, maintenance and training problems as reported by users to SG 2000's field staff during their visits to the project areas.

Women's Groups

Field demonstration is an important component of the SAA/SG 2000 post-harvest/agroprocessing training program, which is conducted to promote awareness among potential users and policy-makers on the technical options available to improve handling and processing of farm produce.

One such new initiative is a value-adding program for groups of women farmers and housewives. The initiative aims to help rural women's groups develop new income-generating opportunities through small food-processing enterprises, adding value to crops by transforming raw agricultural products into forms more suitable for consumption.

The program collaborates with the government and organized farmers' groups. The approach is to help women's groups that are associated with farmers cooperative unions to develop the techniques and management skills needed to establish small-scale, sustainable processing enterprises that are easily manageable, require little capital investment and use simple equipment. Women farmers improve their knowledge about food processing techniques, as well as their abilities to organize themselves to obtain credit, acquire inputs and market their produce more profitably.

Model processing centers have been established at seven sites near rural towns, where organized women's groups bring their partially processed and raw agricultural produce for processing. These sites were selected based on cropping patterns, volume of production, nature of crop processing and utilization, and accessibility to markets. The potential for future expansion was also examined. A wide variety of products are processed, including wheat, teff, maize, rice, pepper, various grain legumes, spices and milk.

The members of each women's group process more than one agricultural product. The value-added products are then packaged by members and delivered to a shop owned by the women's group, where they are duly registered. Proceeds received from sales are remitted to the group on a weekly basis, after nominal handling charges have been deducted.

At the annual anniversary celebration of the Lume processing Center, it was revealed that gross earnings per individual member over a 10-month period varied from 1,000 Birr to 34,000 Birr, with four out of the 40 members earning over 15,000 to 34,000 Birr for the same period.[1/] Since the women's groups integrate production and processing activities, such rural agroprocessing enterprises can penetrate markets beyond the immediate neighborhood, being close to the source of raw materials.

[1/] 1 US $ = 10 birr at this time

Mali

Despite the fact that Mali suffered another year of erratic rains in 2007, the food security situation remained stable and households still had access to regular grain supplies in markets around the country (FEWSNET, January 2008). The year started slowly, with below average rainfall recorded across the country, and in July, planting was delayed in several regions and emerging crops suffered water stress. As of the end of June only 16% of the targeted millet planting was achieved compared to 39% by the same time in 2006. The cotton planting fared little better, with 33% of the target achieved by end of June against 70% in 2006. The cotton crop, which should be planted before July 20th to maximize yields, was particularly at risk. Heavy downpours came in August of 2007, followed by a dry September, and the good rainfall expected in October never materialized.

While the 2007 rains were irregular, rainfall in 2008 exceeded expectations and was generally well distributed. By mid-July, Mopti had received 110% more rainfall than in 2007 – with Bamako registering a 72% increase and Kayes 55%.

Income Opportunities and Group Empowerment

Launched in 2006 by SG 2000, the five-year Market Oriented and Commodity Based Program for Farmers (MAP) continued in 2007/08, as did the SG 2000 initiative to empower groups (referred to as GEM). Together these programs focus on establishing and empowering strong producers' groups, and in each target village, a development scheme known locally as Niet@Kene – meaning space or environment for all to move forward – is set up. "We see the Niet@Kene as centers of excellence for rural development," says Marcel Galiba, Country Director for Mali, "Members look at all aspects of development and the opportunities that can be exploited. They must keep in mind two points – prosperity and sustainability. They should seek to improve their incomes without mining their soils or otherwise jeopardizing the environment."

At present, all of the established centers have new storage facilities and cereal/seed banks. In addition to these fundamental structures, some co-operatives have built meeting rooms, agroprocessing rooms, drying patios and pens for poultry. All co-operatives can communicate via mobile phones, and are all connected to www.tradenet.biz for cereal marketing information.

Galiba points out that the MAP initiative has had a hugely positive effect on food security in the region. "Under MAP, co-operatives first produce enough food to cover their own needs, and they can then bring any surplus onto the market to earn more income," he explains. "For example, in Segou and Sikasso, SG 2000 producers achieved above-average yields in 2007. In Sikasso, Mali's maize belt region, SG 2000 farmers' yields ranged from 2.95 mt/ha to 4.07 mt/ha, significantly higher than the national average maize yields of less than 1.5 mt/ha. This meant our producers were able to build up cereal banks to provide food security for local villages during the hunger period." Sikasso co-operatives amassed a total of nearly 96 mt of grain in their cereal banks.

"Meanwhile, in Ségou," Galiba continues, "the average yields of SG 2000 millet farmers were between 41 and 118% greater than non-SG 2000 farmers, and nearly 60 mt of crops were put aside. The harvest was so successful that the local administration decided not to provide SG 2000 villages with support from the national security stock, acknowledging in its report that they did not need it. When the 72 villages of Cinzana district were sharing 20 mt of food aid, amounting to around 280 kg per village, SG 2000 villages were enjoying an average of 2000 kg each."

Agriculture as an Engine of Growth

Under the CSLP (Strategic Framework to Fight Poverty), and as part of the National Program for Food Security (PNSA), the government continued to emphasize agricultural intensification and the mobilization of the private sector for agricultural development – from production to processing. In President Amadou Toumani Touré words: "Through pilot villages and the MAP/GEM commodity chain approach oriented towards markets, farmers' organizations and producers can improve their incomes and take

Table 2. Use of SG 2000 cereal banks for food security in Segou

Villages	Stock movement in the cereal banks				
	Members				Non- Members
	Initial stock (kg)	Quantity distributed (kg)	Beneficiaries (Number)	Quantity to reimburse (kg)	Quantity sold (kg)
Tingoni	24,000	--	--	--	24,000
Kondogola	14,000	5,000	24	5,500	9,000
Zambougou	7,200	3,000	28	3,300	4,200
Sorobougou	5,500	3,700	36	4,070	1,800
Niatia	4,300	2,300	23	2,530	2,000
Ndinzana	4,300	2,000	19	2,200	2,300
Total	**59,300**	**16,000**	**130**	**17,600**	**43,300**

the road of relative prosperity. It is important for Mali and its agricultural industry that this happens. Subsistence farming can never be an engine of growth for the economy."

Under the PNSA, the budget of nearly US$ 228 million will cover eight sub-programs dealing with natural resource management, crop intensification and diversification, marketing and agroprocessing, health and nutrition. Dr. Galiba points to Mali's potential – 2.5 million hectares of land suitable for irrigation, a young and vigorous population, the strong emergence of producers' organizations and an evolving institutional environment conducive to private investment – all foretelling of a bright future for the country's agricultural sector.

National Seed Stock Exchange

Under Niet@Kene, producers were able to safely store that part of their harvest destined for the market. In April of 2007, a national Commodity Stock Exchange (CSE) was organized in Segou with several partner organizations, including the Department of Agriculture, APCAM (the Permanent Assembly of Agriculture Chambers), Afrique Verte, Faso Djigui, the Syngenta Foundation and the Millennium Villages. A total of 21,179 mt of goods were supplied, with cereals accounting for 92%. On the demand side, the total was nearly 5,400 mt, 90% of which was cereals. Farmers also offered 672 mt of rice seeds, mainly NERICA 4. In that market, SG 2000 cooperatives were able to sell a total of 1045 tons of commodities for more than $300,000, with maize accounting for the lion's share (40%).

Following the success of the first CSE, a second one was organized for May 26-27, 2008 in Sikasso. Neighboring countries such as Burkina Faso, Nigeria and Senegal attended. The Minister of Agriculture emphasized the importance of improved quality seeds for a sound agricultural base for the country. Owing to the success of this venture, it was decided that in 2009 the Exchange would be held in Segou. Participants were educated regarding the seed production system in Mali and the role of producer organizations and seed companies. Seed growers and dealers presented 1,261 tons of seed for sale against a demand of 955.1 tons. After auction, three major contracts were signed for the supply of roughly 525 tons of seed for a value of 131,250,000 CFA francs (US$ 320,122). All signed contracts have since been honored. The Rice Initiative also benefitted from this auction, with SG 2000 NERICA famers selling more than 216 tons of NERICA 4 for a value of $156,416.

Senegalese buyers seized this opportunity purchase QPM seed to support the government's Maize Initiative underway in their country. SEDAB Ltd (Senegalese Agro business Enterprise) struck a deal with the cooperatives of Bougouni and Sikasso to purchase 700 tons of seed for US$ 426,830. Despite a state decree forbidding seed exports, special authorization was granted for this transaction.

Mali's Rice Initiative

Following sharp price increases for imported rice, the Government of Mali decided to launch an initiative with the objective of making Mali self-sufficient in the crop by 2009. A two-pronged strategy was put forward: to increase the productivity of the different rice systems in the country through intensification; and to add value to the crop by establishing adapted and viable rice processing units. Water, of course, was needed – as well as seed and fertilizer. Mechanization also had to be introduced and equipment provided for small-scale farmers.

Between 2007 and 2008, Mali produced 1,082,384 mt of paddy. The target for the rice initiative was 1,618,232 mt of paddy – nearly a 50% increase. The planned production target is enough to cover the country's needs of 900,000 mt of decorticated rice and allow a surplus of 100,000 mt for export to neighboring countries. A total of 602,923 ha was earmarked for production (see Table 3); with an average yield of 2,684 kg/ha for all five of the rice production systems in Mali – including a targeted 138,000 ha for upland NERICA, making it the second largest rice production system in the country.

Seven donors provided a total of almost 10 billion CFA (about US$ 5 million) in support of the rice initiative. The government subsidized the cost of seed by 60% and fertilizers by 50%. To improve field monitoring, 102 community-based extension agents were recruited, trained and given motorbikes. Paddy production reached 1,624,436 mt. "To the great satisfaction of the entire country," says Galiba, "the target of a 50% increase in production was achieved with flying colors. It was a national success story."

Cereal production as a whole rose by 26.7% – with 33% attributable to rice, 30% to millet, 22% to sorghum and 15% to maize. "As we have said for many years, intensification through good seed and fertilizer is the prime mover for agriculture," comments

Table 3. Rice production systems in Mali, ranked by area, for 2008-2009

Production System	Area (ha)	%
Free Submersion	251,310	42
Upland (NERICA)	138,000	23
Irrigation Complete Control	125,048	21
Controlled submersion	74,365	12
Lowland	14,200	2
Total	**602,923**	**100**

Women farmers using water from a washbore, an affordable technology that could free smallholder farmers in Mali from relying on complex and expensive irrigation systems.

Galiba. "And in this case we had the commitment of a government which was determined to achieve its target."

New Innovations and Projects

In recent years, access to wheat supplies in Mali has been unsatisfactory. The country imports 120,000 mt of wheat each year, but prices in the world market are on the rise. Being a landlocked country, Mali relies on the ports at Conakry and Dakar for its wheat supplies and must then transport them more than 1,500 km to Bamako. After years of enduring increasing fuel prices, frequent delays at both ports and unreliable roads, Mali decided to aim for self-sufficiency by supporting local wheat production. It was determined that there are some 50,000 hectares of land suitable for wheat in Tombouctou, but only 2500 hectares were actually planted. A survey done in late 2006 pointed to two major bottlenecks: a lack of good yielding cultivars, and the high cost of irrigation.

SG 2000 sought to address both of these obstacles. In 2007, two varieties from Nigeria (Attila and Seri M82) were introduced and planted across 11 sites to compare the new cultivars with Tetra, a local variety that is more than 40 years old. Maximum yields of 4400 kg/ha were obtained. Despite late planting due to seed delivery delays, average yields of the new cultivars exceeded 3,200 kg/ha, compared to 2,500 kg/ha for Tetra. Farmers participating in the trials were pleased with the new materials, and in the 2008 season the number of test sites (villages) was increased to 18.

In order to reduce the cost of irrigation, SG 2000 suggested the introduction of the 'washbore' technique, a more affordable method used in the fadamas (riverine valleys) in Nigeria. Three colleagues from SG 2000 Nigeria were brought to Mali to train staff and stakeholders on the approach. Washbores can be used around river borders and on loamy-clay plains where the water table is no deeper than 10 m. This technology makes use of a small, portable pump for irrigation and eliminates the need for larger, fuel-hungry pumps. Five washbores are now under trial, and many farmers have shown an interest in the technique. The technology is affordable, costing less than $300, and could free farmers from complex irrigation systems.

The Ghanaian QPM variety Obatanpa was introduced into Mali in 1991 under the name 'Denbanyuman'. Today it is the most widely used white grain QPM in Mali, covering up to 80% of the maize area planted in some villages, and yields have consistently averaged 3-4 t/ha. Still, SG 2000 sought to improve on this. "We are always looking for higher yields, and we also want to help set up a good seed industry," says Galiba. "This encouraged us to look at hybrids, particularly QPM hybrids". With demand from stakeholders increasing and two commercial hybrids already being sold in Mali (PAN 6568 from Pannar Seed Company and SNK 2778 from Monsanto), SG 2000 Mali decided to run its own hybrid yield trials using materials from CIMMYT Mexico, CIMMYT Zimbabwe, IITA Nigeria, CRI Ghana and IIAM Mozambique.

A total of 29 white and yellow QPM hybrids were tested against Denbanyuman and Sotubaka, a type of yellow maize. After adjusting yields, identifying above average entries and pooling four tests, the ten best entries yielded between 6 and 11 mt/ha. Denbanyuman performed well and was ranked ninth, with a yield of 6 mt/ha. The two commercial hybrids were ranked second and sixth. Plant density was between 62,500 and 80,000 plants/ha, and the fertilizer "hydrocomplex Acthyva" was used only twice, first at planting (200 kg/ha) and then 15 to 20 days after planting (200 kg/ha). All tests were run under zero tillage. Results of the tests indicated there are good QPM hybrids available that are more productive than Denbanyuman, and that could serve as the cornerstone of a nascent seed industry.

Nigeria

Traditional rice threshing in Kano, Nigeria; SG 2000-Nigeria is promoting alternative approaches, such as the use of locally produced, highly mobile multi-grain threshing machines.

The SG 2000 Program in Nigeria began modestly in 1992 in just two states, Kaduna and Kano, and with a focus on two crops, maize and wheat. Since then, well over 100,000 farmers have benefited from the Program and, by 2008, activities had expanded into 6 core and 6 'facility' states. In addition to maize and wheat, the crop portfolio now includes rice, millet, sorghum, cowpea, soybean, sesame, cassava and cotton.

Nigeria began 2007 with higher January temperatures than usual, which affected the yield of dry season crops, especially wheat. Initial rainfall came late in April, but was followed by a long dry spell that lasted until early June. This resulted in significant crop losses, particularly among farmers in the northern part of the country's Sudan Savannah. The crops that suffered most were maize, millet, sorghum, rice and cowpea.

In 2008, average temperatures were lower, ranging from 12-150C at night and 18-250C in the daytime, with the dusty harmattan wind blowing in from the Sahara Desert. Good yields of tomato, onion, pepper and garlic were recorded for vegetables, and following the droughts and poor harvests of the 2007 season, many farmers went into production of maize, rice and wheat under irrigation. The arrival of the rains was followed by the usual dry spell, which raised concerns about a possible recurrence of drought, but the rains gradually established themselves and fell uniformly throughout the season, leading to good harvests.

Government Involvement and Support

The newly elected Nigerian government indicated it will prioritize agriculture as a launch pad for rural development, and has begun to provide additional funding for research and extension.

"During the 2007 rainy season, the main SG 2000 projects were to support the establishment of NERICA (New Rice for Africa) and QPM (Quality Protein Maize) management training plots (MTPs)," says Dr. Ahmed Falaki, Project Coordinator of SG 2000 Nigeria at the time. "It was good to see individual states taking over responsibility for establishing training plots for other crops using their own resources, with SG 2000 providing back-up support in training and supervision."

Bauchi, Kano and Zamfara states have been particularly effective in this area with maize demonstration plots (see Table 4) and the further recruiting and training of additional frontline extension staff who were also provided with motorcycles to enable extension visits to farmers. Over 44,000 farmers were trained and provided with loans for inputs by the governments of the three states.

Table 4. Scaling up maize MTPs in three SG 2000 states, 2004-2006

Year	States and Area Covered by MTPs (ha)		
	Bauchi	Kano	Zamfara
2004	3,260	2,500	6,368
2005	4,800	15,250	20,720
2006	5,245	16,300	22,526

States and local governments, as well as private sector organizations, continue to support training schemes with the aim of transferring program ownership to stakeholders. Nigerian states sponsored the training of 3,145 extension agents and 76,327 farmers in 2007. Other projects conducted jointly with SG 2000, or fully sponsored by the private sector and communities, involved the training of 584 extension agents and 9,900 farmers.

States have also been taking on the responsibility of scaling-up SG 2000 extension technology dissemination methodology to their farmers, using state resources to support capacity-building and to provide inputs on credit to farmers to start up Production Test Plots (PTPs), each of them one hectare or more in size. Bauchi State established 7,500 PTPs, Kano set up 22,868, and Zamfara planted 24,500. Other states, notably Gombe, Jigawa, Kebbi and Katsina, are scaling-up in a modest way, especially in the areas of training and provision of field logistical support to extension staff and farmers.

During the 2008 cropping season, states continued to scale-up their support for farmers involved in PTPs through capacity building and

provision of input loan packages. Capacity building support for community-based extension agents (CBEAs) and farmers by states and the private sector agribusiness companies was strengthened, with more CBEAs acquiring new knowledge and information for dissemination to farmers. Some 2,436 CBEAs and 74,950 farmers benefited from the training during the year (see Table 5).

At a national level, in 2007 the federal government launched a program entitled "Doubling Maize Production" to meet the national demand for maize by industry – flour mills, breweries and feed mills – as well as for human and animal consumption. The program has a three-year target period and is being run along SG 2000 production lines.

Table 5. Number of CBEAs and farmers trained with the support of state government and private sector agribusiness companies in 2008

State	Number of CBEAs	Number of Farmers
Bauchi	250	136
Gombe	150	580
Jigawa	120	1,200
Kano	10,000	6,500
Kaduna	5,300	23,000
Zamfara	4,850	25,200
Total	**2,436**	**74,950**

Improved Rice

SG 2000 provided support to the Nigerian government in its effort to increase local rice production and curtail the need for massive imports.

Despite the drought experienced during the wet season, in 2007 there was a dramatic increase in the area put into rice cultivation, with SG 2000 farmers planting 4,962 hectares, compared to 1,891 in 2006. NERICA production also doubled to 13,244 mt, compared to 6,162 mt the previous year. The dissemination of NERICA 1 was accelerated by the availability of more certified seed produced by farmers under the supervision of the National Seed Service. SG 2000 purchased three tons of NERICA 1 and about 12 tons of lowland NERICA seed under a buy-back arrangement with farmers who planted the lowland varieties they received from the African Rice Center (WARDA).

Under the Rice Seed Multiplication and Dissemination Support scheme, two hectares of lowland NERICA varieties and one hectare of NERICA 1 were planted under irrigation. SG 2000 provided some financial support for the testing and evaluation of 15 and 25 NERICA lowland lines, obtained from WARDA, Benin, Mali and Senegal. Rice seed dissemination was successful, with about seven tons of lowland NERICA buyback seed being supplied to farmers, while Zamfara State purchased 25 tons of SIPI – FARO44 and WITA4 – FARO54 seed from SG 2000 community-based rice seed producers in Kano and Jigawa states, for sale to farmers during the season.

New Approaches

"Post-harvest and agroprocessing remain crucial in moving agriculture from subsistence to a commercial level, especially with the current emphasis on produce quality for market," notes Falaki. "If the main problem of the rice sector is the availability of seed, the second most serious problem is post-harvest and the processing of the rice in order to meet the stipulated quality standards and demand specifications to attain a guaranteed market for the commodity at competitive prices."

In post-harvest and agroprocessing activities, emphasis was placed on those identified by farmers as the most important to them. These included training for manufacturers and technology dissemination, especially in threshing cereals and legumes; processing rice, QPM and groundnuts; storage for cowpea; and recipes for preparing rice and soybean. Eighteen carpenters selected from nine states were trained in the manufacture of standard wooden grain winnowers, while the Dandago Fabrication Enterprise received support to produce a standard multi-crop thresher prototype acquired from the Salem Technical and Vocational Center in Ethiopia. The thresher was successfully field-tested with rice, wheat and maize farmers.

SG 2000 signed an MOU with DFID's PrOpCom program (Promoting Pro-Poor Opportunities through Commodity and Service Markets) to increase productivity in the rice value chain and identify and promote technologies that are technically, financially and socially acceptable to participants in the rice commodity chain (from farmers to parboilers to millers and so on).

"In 2008 we worked with PrOpCom to train 20 CBEAs and 40 farmers on improved rice parboiling, cleaning, drying and de-stoning techniques," says Falaki, "In collaboration with TADCO Rice Processing Company, the project selected and trained 30 traditional women rice parboilers in the technique of processing and packaging quality rice for market. SG 2000 also partnered with IFAD programs in the states to train 15 women's groups in the use of improved groundnut oil extraction, using the extractor developed by SAFE program graduate Nasir Ado from Ahmadu Bello University, Zaria. Preparation and dissemination of recipes for rice, QPM and soybean is being scaled-up with the support of the Women-in-Agriculture departments of the state agricultural development programs. In particular, soybean cheese has been popularized in both urban and rural areas due to its ease of preparation and high nutritional value."

SG 2000 demonstrated the use of wooden winnowers to various women's groups and delivered 'training of trainers' to 19 carpenters on the assembly of the winnowers. Each trainee was required to subsequently train at least 10 other carpenters in his or her own state.

Working closely with the Regional Director of SAA's Post-harvest/ Agroprocessing Program, the project identified manufacturers of agricultural equipment and machines, and selected artisans to be trained on the assembly of various machine prototypes to create awareness and markets. Women's groups were supported to produce food products from QPM, rice and soybean for market. "We brought in a Home Economist/Nutritionist from KNARDA to provide technical support to the program," says Falaki, "and the value-added products are beginning to stimulate production and better prices for soybeans and QPM".

Scaling Up

In anticipation of the scaling up of SG 2000 operations in Nigeria, SG 2000 started a pilot phase by establishing 20 demonstrations in ten crops made up of eight Technology Option Plots (TOPs) and 12 Voucher-Assisted Demonstrations (VADs) in five SG 2000 target states. In each state, farmer leaders were selected using a participatory approach to establish the TOPs, while poor farmers, of whom 67-75% were women, established the VADs.

In 2008, SG 2000 trained 338 Coordinators, CBEAs and farmer leaders who will be involved in overseeing and conducting the TOPs, VADs and PTPs that will be established in 2009 (see Table 6). Each CBEA will conduct three TOPs, three VADs and 20 PTPs in preparation for the scaling up process. SG 2000 is to provide all the required inputs, including seed and fertilizer, for TOPs and VADs, with PTP farmers taking responsibility for their required inputs. The CBEAs will be provided the necessary technical backup, field extension advice and supervision.

Significant Developments

"In 2008, SG 2000 continued to collaborate with other stakeholders involved in agricultural development," says Falaki. "In the area of research we partnered with IITA, WARDA, ICRISAT, the Institute for Agricultural Research (IAR) at Zaria, the National Cereals Research Institute (NCRI) at Baddegi and the Lake Chad Research Institute (LCRI) at Maiduguri, and we worked on extension projects alongside the National Agricultural Extension and Research Liaison Service (NAERLS) and the National Food Reserve Agency (NFRA)." Particularly successful collaborative efforts included:

- The work with PrOpCom (DFID);
- An initiative on value addition and marketing of maize with USAID-MARKETS;
- Work with the International Livestock Research Institute (ILRI) on crop residue fodder production and utilization; and
- A partnership with the West African Seed Alliance (WASA), which aimed to strengthen seed sector development through the demonstration and testing of new hybrids, sourcing foundation seed from research and linking seed companies with smallholder farmers in order to access quality seed of improved varieties.

The major challenges faced by SG 2000 Nigeria include inadequate numbers of post-harvest/ agroprocessing equipment for threshing cereals and legumes, and a lack of improved small- to medium-scale storage technologies to help farmers reduce stored grain losses. But there are also promising opportunities. These include the resuscitation of the National Fertilizer Company (NAFCON), now called Notore, which should ensure availability of adequate quantity and quality fertilizer; the withdrawal of the Government of Nigeria from importing, distributing and selling fertilizer with effect from 2009; and the government directive to all commercial banks and financial institutions to direct 75% of their agricultural lending to smallholder resource-poor farmers at single digit interest rates. "These are significant developments," says Falaki, "and smallholder farmers will feel the benefits."

Table 6. Type and number of TOPs to be established in Nigeria in 2009

Type of TOP	Kano	Jigawa	Bauchi	Gombe	Adamawa	Zamfara	Totals
Maize Hybrid-2 Fert Levels	10		5	5	7	12	39
Maize Hybrid-2 Varieties			6				6
Maize OPV-2 Varieties	1			4	6		11
Rice-2 Varieties	7		5	1	12	3	28
Sorghum-2 Varieties	6		2	1	8	11	28
Millet-2 Varieties	10	7	6	2	1	11	37
Millet-2 Fert Levels		2					2
Cowpea-2 Varieties	6	2	3				11
Cowpea-Spraying Regime		1					1
Groundnut-2 Varieties		3	2	4	6	2	17
Sesame-2 Varieties		5	3	1			9
Soybean-2 Varieties			8	2		1	11
Totals	**40**	**20**	**40**	**20**	**40**	**40**	**200**

Uganda

Uganda's food security situation remained stable in 2007-2008, despite torrential rains in 2007 and the global recession that took hold in 2008. The recession led to price hikes in major farming inputs such as fertilizers and agro-chemicals, leaving them in short supply. Higher input costs for farmers were partially offset by higher commodity prices, but since many farm households are net purchasers of food, the end result was negative for most Ugandan farmers.

The increase in commodity prices brought the underlying inflation rate for 2008 to an average of 8.6% and, while the shilling weakened against the US dollar (which normally allows SG 2000 to do more with its budget), it did not weaken sufficiently to offset the general effects of inflation or the rising prices of agricultural inputs in particular. These realities imposed some scaling back of planned SG 2000 activities in the country.

Moreover, the post-election violence at the beginning of 2008 in Kenya gravely affected Uganda's eastern border, and this caused the prices of fuel and essential commodities to soar. The civil war in eastern Congo in the later part of the year made things worse, and led to an influx of refugees, especially into Kanungu district in the southwestern region.

Government Support for Agriculture

The Ugandan government intensified its efforts to increase farm household food and income security by investing in agriculture through such programs as the National Agricultural Advisory Services (NAADS). It also continued to support the presidential initiative on Prosperity for All (PFA), which was commissioned in 2007 to complement the Poverty Alleviation Action Plan (PEAP). These programs, along with others, help to disseminate productivity-enhancing technologies. SG 2000-Uganda continued its contributions to government efforts to empower farmers through a close partnership with the NAADS program and using its 'One-Stop Center Association' (OSCA) approach.

"Ugandan farmers are trying to reduce their dependence on external funding, and the building of farmers' organizations helps to channel internal resources to investments in agriculture," comments Emmanuel Kayaayo, SG2000's Project Coordinator in Uganda. "Our Farmer Institutional Capacity Building (FICB) program aims to aggregate and strengthen farmers' access to advisory services and markets, and to enable them to select, develop and sustain viable enterprises."

Building on the OSCAs that have been supported in various ways by SG 2000-Uganda, FICB activities in 2008 concentrated on mobilization, organization and capacity building, working with farmers across 15 OSCAs in 13 districts, which now service nearly 55,000 farmers. Total OSCA membership currently stands at 441 member groups and 9,839 individual members, of whom almost 60% are women (see Figure 3). There are currently 11 physical facilities, comprising eight centers and three agroprocessing service sites, that support both institutional and enterprise development. In 2008, the OSCAs sponsored themselves to hold Annual General Meetings and file tax returns, thus moving closer to self-sustainability in terms of management.

The quality protein maize open-pollinated variety, Nalongo, was grown on more than 125,000 hectares in 2009, making it the most popular improved maize variety in use today in Uganda. Nalongo traces its heritage to experimental QPM population 63 SR. The first QPM variety to be released from this population was Obatanpa in 1992. Since then, 8 other countries have released varieties based on Obatanpa and CIMMYT population 63 SR.

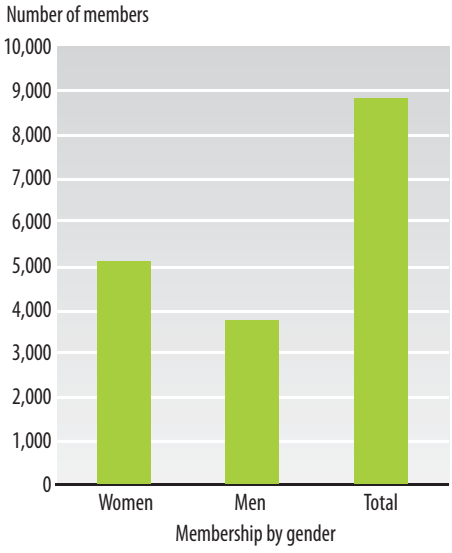


Figure 3. Direct beneficiary groups and farmers involved in OSCAs as of October 2007.

Under the partnership with the NAADS Secretariat, the capacity building project was scaled up in Mukono, Luwero, Iganga, Busia and Tororo districts. The main goal of the partnership was to enhance the formation and development of Higher Level Farmers Organizations (HLFOs), in order to scale out and sustain farmer empowerment skills, as well as farm enterprise productivity and profitability.

Rice and Maize Cultivation

Uganda imports a significant quantity of rice, about 67,000 mt/year according to the Uganda Revenue Authority (URA). Rice imports are third on the food import bill, with an estimated value of US$ 60 million. "Per capita consumption is still low at 6.75 kg/year, compared with the average African consumption of 15 kg/year," notes Kayaayo. "However, consumption of rice is steadily increasing in Uganda, especially in urban areas, due to increasing incomes, urbanization, changing tastes and preferences, and improving local production and processing."

The amount of land under rice cultivation has continued to expand from an estimated 80,000 hectares to 105,000 hectares over the past two years. Since 2001, the production of upland rice (NERICA–4) has increased from 20,000 hectares to over 35,000 hectares. While the average yields being achieved by Ugandan rice farmers are reasonable, there is certainly room for improving them over the longer term. In the near term, however, the best way to increase production is to significantly the amount of land devoted to rice.

Uganda's National Agricultural Research Organization (NARO) is working out a memorandum of understanding with seed companies and farmers' associations to multiply newly released seed (NERICA-1 and -10) in a bid to avoid seed mixing. During the 2007 A and B seasons, SG 2000 facilitated 271.4 hectares of NERICA seed multiplication through 11 OSCAs and trained 25 farmers and 15 extension workers to strengthen their capacity to engage in quality seed production.

SG 2000, in collaboration with the Japan International Cooperation Agency (JICA) and NARO, conducted field-testing of mobile rice mill services in four districts (Iganga/Namutumba, Mukono, Kaliro and Luwero). The mobile rice mill visited 290 homes and milled 27,811 kg of paddy. Japan Overseas Cooperation Volunteers (JOCVs) participated in the assessment.

"Good nutrition is a key part of food security and a major goal," says Kayaayo, "and in 2007 we began promoting more nutritious recipes using grains and legumes. Opportunities for getting more value from crop by-products by using them to produce feed for backyard livestock, such as poultry and pigs, were also promoted. Such activities have largely focused on areas where QPM is grown in large amounts, and we're getting a good reaction from local households."

In 2008, SG 2000-Uganda supported seed production in the country by helping three OSCAs produce 25 hectares of certified seed of the recently released NERICA 1 and 10 varieties, and four other OSCAs to produce 32 hectares of improved legume seed. Most of the seed produced was purchased by private seed companies for re-sale to farmers. Similarly, grain production was boosted by linking OSCA farmers, via block farming schemes, to input and output markets for 15 hectares of NERICA, 16 of groundnuts and 87 hectares of QPM. Thirty-eight farmer leaders were trained in seed quality standards and 21 members of the marketing committees received training in product development, promotion and marketing.

Adding Value

The poultry initiative was expanded to find additional ways of using QPM and adding value to maize. Associations participating in utilization training increased from five to eight. Each unit was provided with animals and materials they would otherwise be unable to afford, including two cocks, 18 pullets, start-up feeds, vaccine kits and materials for building pens. By the end of 2008, about 560 birds were being reared on QPM and other feed mixtures (see Figure 4). The survival rate of the chicks produced was over 75%.

Improved post-harvest handling of maize and rice improves grain quality and adds significant value. In 2007, 204 mt of maize were sold through collective marketing at a premium price (US$ 142/mt), earning an additional US$ 3,468 over the usual price of US$ 125/mt. Association members, combined with other farmers engaged in collective marketing, sold 510 mt of QPM.

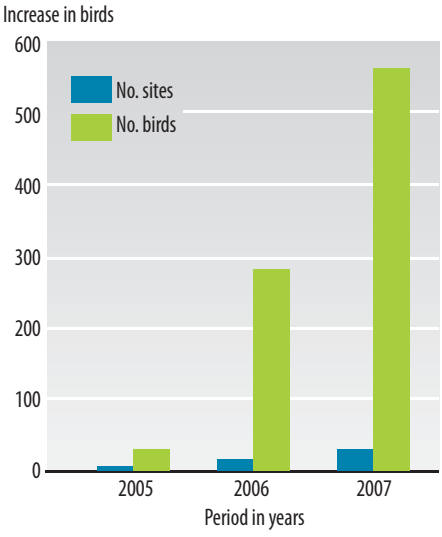


Figure 4. Summary of QPM utilization through poultry 2005-2007.

Ninety women's groups were trained in the utilization of maize, rice and legumes, and produced 20 different products using a range of recipes. In support of the value addition work, SAA's Post-harvest/Agroprocessing Program worked with existing technicians to assemble 48 assorted machines (just under 90% of the target).

Partnerships

"The creative use of our limited project resources to facilitate partnerships with others is one of our central techniques for scaling up impact," says Kayaayo. "Several partners are working with us on projects having to do with the application of technologies and the integration of new innovations. In 2007-08, our partners include NAADS, JICA, JOCV, the Embassy of Japan, the Africa Rice Center (WARDA), CIMMYT, the private sector foundation centers (SEPSPEL and EPSEDEC), and CABI Bioscience UK, which worked on plant health services through mobile plant clinics."

Under the partnership with JOCV, SG 2000-Uganda hosted four Japanese volunteers. Three were placed with OSCAs for nine months and one took on a longer-term placement of two years. The volunteers worked with village communities on NERICA dissemination initiatives across various aspects of agronomy, in collaboration with SG 2000 technical staff. The new mobile rice mill introduced under the JICA partnership also provided an assignment for volunteers, who assessed its performance and provided reports for further research and for the JICA office.

Tareke Berhe, SAA Regional Rice Director, and Junko Nakaji, a JICA volunteer, inspect milled rice at a mobile milling location.

Regional Programs

Regional Rice Program

The SAA Regional Rice Program was established in 2005 to help meet the growing demand for rice in the SG 2000 focus countries. Rice has become increasingly expensive to import and, for many African consumers, to buy. In 2008, rice prices soared to a 20-year high. Domestic protectionism in rice in such major producing countries as Egypt, India and Vietnam is further exacerbating the high cost of the grain in Sub-Saharan Africa rice-importing countries.

"Imported rice tends to be purchased by the elite," says Dr Tareke Berhe, Director of the SAA Regional Rice Program, "and not by the poor and disadvantaged in society. But even locally produced rice is expensive for the general public to buy. In most cases it is double the price of other staple crops".

"We believe that much has been achieved since the Program was started," he says, and we're seeing significant changes occurring on the ground in our focus countries." Because of the rapidly growing importance of the crop in SAA countries and the rising expenditure of scarce foreign exchange reserves on rice imports, governments are increasing their investments in support of domestic production. SAA's efforts to re-invigorate extension systems and increase the number of farmers participating in demonstrations of improved rice varieties and production methods is also adding impetus to the crop.

Ethiopian Expansion

One focus country where rice is receiving considerable attention is Ethiopia. The country does not have a tradition of rice production, but the area of rice under cultivation has increased steadily over the last 4 years from 6,000 hectares in 2005, to 90,000 hectares in 2008, with further increases projected for 2009 (see Figure 5).

Dr. I Akintayo, Director of the Africa Rice Initiative (left), and SAA's Dr. Tareke Berthe in a NERICA 4 rice field in Loutana, Mali.

In addition to the efforts of development agencies and various NGOs – including SAA –involved in promoting rice, the Ethiopian government took a series of steps in 2007 to put the crop at the heart of its agricultural development agenda. These included the formation of a National Rice Promotion Committee, the holding of a National Rice Workshop and the inclusion of rice as a food security crop for the new millennium.

Higher Yielding NERICAs

In Uganda, total rice production increased from 105,000 mt in 2007 to 140,000 mt in 2008. The increase was attributed to the higher yielding NERICA (New Rice for Africa) varieties. In the same period, Mali expected to harvest 1,000 mt of NERICA 4 certified seed to be used for producing an additional 4,000 mt of seed during the off-season, giving a total of 5,000 mt of seed for planting in 2009. While reliable production figures are not readily available for Northern Nigeria, "the situation is equally good, or even better, than in the other three countries," says Berhe.

Berhe is pleased by "the interest, commitment and initiative" taken by the governments of the four focus countries to promote rice production. "Apart from subsidizing inputs, private manufacturers, processors and traders have all been encouraged to play their part."

The US$ 33 million African Rice Initiative, funded by the African Development Bank (AfDB), was created to serve as a single focused channel for NERICA dissemination in Africa. Seven pilot countries were selected for the extensive dissemination of NERICA – Benin, Côte d'Ivoire, Ghana, Guinea, Mali, Nigeria, and Sierra Leone "and progress has been good," says Berhe. "The donor is satisfied with the results and is helping to scale-up NERICA production in each country." Foundation seed has been made available to the pilot countries, and

is being multiplied in Benin, Burkina Faso, Ghana, Guinea, Mali, Nigeria and neighboring countries with funds provided by the Rockefeller Foundation, the Japan International Cooperation Agency (JICA), AfDB and the United Nations Development Program (UNDP).

During 2007/08, the SAA Rice Program was involved in various promotional activities, including: the production of 200 mt of improved seed and its distribution to farmers, and the dissemination in SAA countries of over 200 improved varieties and lines from the Africa Rice Center (WARDA), the International Rice Research Institute (IRRI) and Madagascar. Four improved commercial varieties were released and more than 90 pieces of post-harvest and agroprocessing equipment demonstrated. More than 2,200 farmers and frontline staff were trained on various improved rice production technologies.

Partnerships

In 2007, SAA signed a memorandum of understanding with IRRI for closer collaboration on the promotion of rice in Africa. One positive outcome of this new partnership was the employment of Dr Negussie Zenna, an IRRI Post-Doctoral Fellow, to evaluate cold tolerance of rice germplasm in Ethiopia. IRRI also supplied the SAA Regional Rice Program with 130 entries to be tested for cold tolerance at altitudes of 1,800 to 2,400 meters above sea level. Furthermore, six cold-tolerant varieties were imported from Madagascar to Ethiopia and 30 promising lowland NERICA varieties and lines to Northern Nigeria.

Strengthening partnerships with national and international development agencies and institutions has been one of the pillars of the Program. In 2007, SAA and WARDA joined together to conduct NERICA evaluation missions in Nigeria and Uganda. Along with WARDA and IRRI, other important collaborators in Ethiopia and Uganda are JICA and the Embassy of Japan. They have worked closely with the Rice Program on several joint projects and activities, including rice research and extension, rapid rice seed multiplication, organization and sponsorship of rice workshops, capacity building efforts to train rice scientists and technicians in Ethiopia and the sub-region, and post-harvest and agroprocessing of rice.

WARDA's Rice Post-harvest Unit joined with SAA to increase the dissemination of information on rice, and as a result rice seed health videos were translated and distributed in four local languages in Uganda, in Amharic in Ethiopia, and in Bambara in Mali.

Challenges and Priorities

Major challenges must still be addressed to move Africa towards self-sufficiency in rice production. The first of these is the high cost of inputs, especially chemical fertilizers. "Our first priority must be to come up with alternative productivity-enhancing technologies that are affordable for our farmers," says Berhe. "We need to look closely at such technologies as rotations with legumes – soybeans, cowpeas and mucuna – which can result in 0.5 to 1.0 mt yield increases or can reduce by half the amount of nitrogen fertilizer required to produce current yields. Similarly, rotations can be done with high value, high input crops – such as Irish potatoes, tobacco and vegetables – with much better results."

Eunice, a rice trader, buys her stock from a mill in Palissa, Uganda.

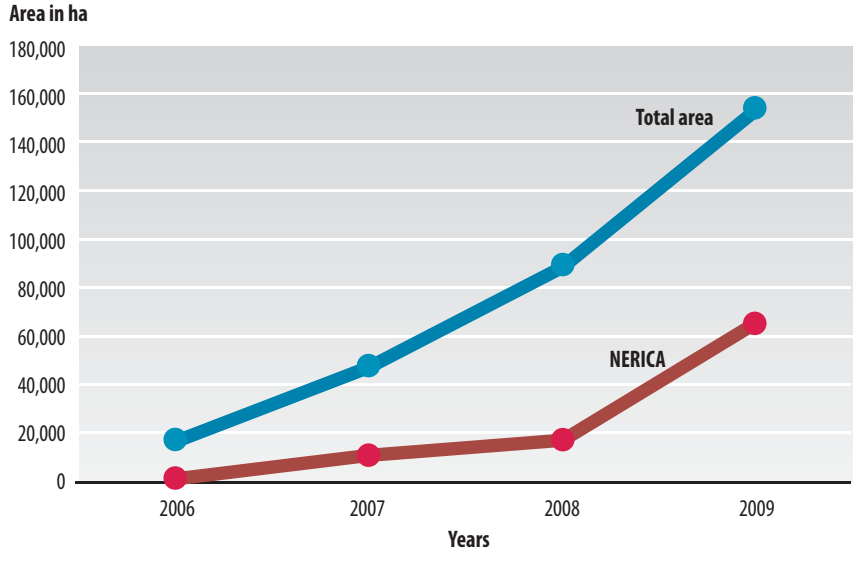


Figure 5. Trends in rice area expansion in Ethiopia.

SG 2000 trainees visiting a private rice mill in Kano, Nigeria.

"Other possibilities are to be found in agroforestry and alley-cropping, and the International Institute for Tropical Agriculture (IITA) and the World Agroforestry Center (ICRAF) are good sources for this technology," he adds. "Nitrogen-efficiency can be increased by micro-dosing and pelleting, and soil and water conservation measures, such as erosion control, conservation tillage and supplementary irrigation, can be effective. And, of course, there is the use of compost."

To Berhe, another top priority is to increase certified seed production and make it available to farmers. There is a serious shortage of rice seed in many countries, particularly in Ethiopia and Mali. "Ways must be found to encourage, support and, where necessary, finance the establishment of rice seed enterprises."

A third challenge is how to increase small-scale mechanization. "Soil preparation with the use of a hoe, harvesting with a sickle, and threshing using sticks and fuel drums will not lead to a green revolution. These centuries-old technologies must go. We must make small-scale mechanization a priority."

And a fourth challenge identified by Berhe is how to effect better gender balance in rice production. "More and more women farmers are getting involved in rice production and benefiting from it. But we must accord priority to accelerating this trend by refocusing extension efforts –in support of both production and post-harvest value-adding activities."

Regional Post-harvest/ Agroprocessing Program

SAA's Post-harvest/Agroprocessing (PHAP) Program was launched in 1994, in consultation with the International Institute of Tropical Agriculture (IITA). The main goal of the Program is to develop and introduce improved tools and basic machinery for agroprocessing and crop harvesting, particularly aimed at women who do most of the harvesting, processing and marketing of food crops in Africa.

Sub-Saharan Africa has seen rapid population growth in recent years, especially in urban areas. The purchasing power of urban consumers is increasing, yet rural agricultural producers in SAA's focus countries have only a limited capacity to supply products to the urban market. A substantial amount of produce is imported to satisfy urban consumers' needs.

"This missing link could be the key to improved and sustainable development," says Toshiro Mado, Director of SAA's PHAP Program. "The major challenge is how to make the market function for resource-poor farmers, allowing them to improve their livelihoods through dynamic growth processes in local, national and even regional economies."

Value Chain Approach

To help achieve this, Mado believes that the Value Chain Approach (VCA), whereby products pass through a chain of activities – from storage to processing to trading to retailing and gaining value at each stage – will help stimulate competition and demand in the marketplace.

The development of rural institutions is crucial to enhancing the innovation capacity of rural communities. Four different types of rural institutions have been implemented in SAA's focus countries (see Table 7).

Table 7. Rural institutionalization effort in SAA focus countries

Country Program	Rural Institutionalization
SG2000-Ethiopia	Farmers' Cooperative Union Agroprocessing Centers
SG2000-Mali	Niet@Kene
SG2000-Nigeria	QPM/NERICA Villages
SG2000-Uganda	One-Stop Center Associations

Although each country program takes a different approach, all of them share similar components. In broad terms, rural institutionalization encourages market-orientation and value-adding activities for farm products, and the role of the PHAP Program is to support these objectives.

Innovation, too, can take different forms at different stages along the value chain. One example is the new mobile rice mill being tested by the Japan International Cooperation Agency (JICA) and SG 2000's Uganda office. In Uganda, the number of rice milling service providers has

The Japan International Cooperation Agency (JICA) has been testing a new mobile rice mill in Uganda. Some of the country's new rice-growing areas lack access to milling services, so a small mill has been mounted on a truck to bring milling services to more remote farmers.

expanded only gradually even though rice production has increased significantly. Some of the new rice growing areas do not have access to rice milling services, which discourages farmers from increasing production.

A rice mill was mounted on truck to provide a mobile service to farmers. This way, the rice milling service was able to reach a much wider area, and information about the milling technology was demonstrated to potential service users. The trial provided insights into the economic viability of a mobile rice milling service, and the role of the private sector in disseminating agricultural information.

A significant outcome of this project was that traders purchased milled rice directly from farmers after processing, thereby demonstrating to farmers the impact of the value-adding activity and the economic potential of rice. It also became clear that there were already some private entrepreneurs willing to enter the mobile rice milling service business.

Mado points out that "a close look at domestic value adding activities reveals the special features of the food industry, and a key factor for growth is market coordination of the food chain." In Ethiopia, for example, the number of bakeries is much larger than other food businesses. The grain milling business of course supports the bakery business by supplying flour as raw material to bakers. These businesses are vertically integrated and the quality of the flour is a major factor in the quality of the bread. Increased bakery sales stimulate the demand for grain milling services and the purchase of wheat from local farmers. "This is how the wheat value chain is developed," says Mado, "and further development will come as the bakery industry grows and the quality of baked goods improves."

In an effort to spur this development, in 2008 SAA asked the Nippon Skilled Volunteer Association (NISVA), a Japanese NGO, to send a bread-baking expert to Ethiopia to improve the bread-making skills of technical staff who would then organize technical training for local bakeries. Kazuo Seki, who had just retired after many years of work in a bread-baking factory in Japan, accepted NISVA's invitation to visit Ethiopia and conduct a three-month technical training course. His key contact was Lidya Worku, home agent of the SAA/Selam VTV collaborative project. Seki taught Worku how to improve bread quality and make several different types of bread.

"The most important factor in bread-baking," says Kazuo Seki, "is the balance of ingredients and complete control of the baking process". He showed how to bake high quality bread from locally available flour and other ingredients and impressed his Ethiopian colleagues with his rich experience and knowledge. He also demonstrated how other available products, such as potatoes and onions, can be used in the bread-baking process.

Lidya Worku is now taking her new skills to the Arsi Negele Farmers' Co-operative Union (ANFCU), which purchases wheat from member farmers. The bread produced is sold in their shop and delivered to restaurants and coffee houses in the town. ANFCU has demonstrated that the wheat value chain can be extended to wheat-based product marketing.

Improved Threshing

Teff threshing is conventionally done by oxen in Ethiopia. However, as the threshing and plowing seasons often coincide, smallholders struggle to find enough oxen to thresh their product on time. There are also problems with sand and dirt mixing with the teff as the animals thresh it with their hooves. In 2007/08, the PHAP Program continued to monitor and adapt the mechanical mobile threshers that were first introduced to farmers during 2000 in Shashemeni, Ethiopia. Some farmers purchased these threshers and, as well as using them for their own crops, they became agroprocessing service providers for neighboring farmers.

Each thresher serves over 100 farmers, and those who purchased them broke even within one cropping season.

"As the result of the new machinery, private threshing service providers have improved the grain quality in the area, and farmers have improved their market access," says Mado. "Teff in Shashemeni used to be considered poor quality, because of sand contamination during threshing," says local farmer Adebabay. "However, with the introduction of mechanical threshers, the quality of our teff has improved and it is now accepted by traders and consumers – and the price we receive has increased".

New Maize Sheller

As part of a regular process to improve the design and capabilities of agroprocessing equipment, a new maize sheller has been developed with Selam Awassa, collaborative manufacturers, in Ethiopia. The new sheller has increased its shelling capacity from 1.2 mt/hour to 2 mt/hour. Major improvements include the feeding hopper, body length and clearance adjustment system. Field-testing of the sheller has demonstrated good shelling performance and negligible grain breakage at 11% moisture content.

Work is also underway on design improvements of a prototype grain cleaner. "With an improved maize sheller and grain cleaner, farmer groups can produce first grade grain, which attracts a better price," says Toshiro Mado. "And they can become regular suppliers to the food industry, which needs good quality raw materials. Many food industry companies import grain from outside because of the quality of grain and its stable supply. Improving agricultural products opens up opportunities for producers."

A new portable maize sheller, developed by Selam Awassa in Addis Ababa, Ethiopia, can shell 60% more grain per hour than previous models.

Agroprocessing Booklet

Toshiro Mado and Kyoko Saio, former Deputy Director of the Agricultural Research Center of the Ministry of Agriculture, Forestry and Fisheries, Japan, have co-authored a booklet titled: Agroprocessing Technology for Innovative Value Chain Development".

Kyoko Saio explains, "The basic idea is that, while most local products are consumed locally the size of local markets can be enlarged through the interaction of producers and consumers, and the establishment of direct sales outlets for agricultural products, such as to schools or local restaurants."

For copies of the booklet contact Patrick Orr at Raitt-Orr and Associates (Patrick@raittorr.co.uk).

Regional QPM/Seed Program

The research and development of Quality Protein Maize (QPM), which was initiated in the 1970s by the International Maize and Wheat Improvement Center (CIMMYT), was the first significant attempt at crop bio-fortification. The role of SAA has been to promote the innovative crop as an important alternative to traditional maize varieties grown in sub-Saharan Africa countries, and to help establish the systems needed to deliver high quality QPM seed to farmers.

The nutritional value of maize was enhanced through conventional plant breeding by raising the levels of lysine and tryptophan in the endosperm protein. This pioneering work has led to the development of numerous agronomically acceptable varieties – both Open-Pollinated Varieties (OPVs) and Hybrids. "The real challenge now," according to Dr Wayne Haag, Director of SAA's Regional QPM/ Seed Program, "is to maintain QPM's higher nutritional value during the seed production process. But there are encouraging signs that, at least in SAA focus countries, the three main components of an effective seed production program – breeders seed, foundation seed and certified, or commercial seed – are getting stronger."

Isaka Mashauri, Director and owner of Tanseed (left), and his assistant deliver QPM flour to a Catholic orphanage during the Nane-Nane Agricultural Fair in Morogoro,Tanzania.

Children display QPM cobs at Layin Taki QPM Village in Nigeria.

Haag also points out that progress has been made to broaden the germplasm base of QPM and to reduce gradually, but consistently, the yield gap with traditional maize. Competitive OPVs and hybrids of QPM are now under production in at least 16 sub-Saharan Africa countries, and more are in the pipeline. This investment in QPM improvement is driven strongly by CIMMYT, with strategic inputs from the International Institute of Tropical Agriculture (IITA) and national agricultural research systems (NARS) in Africa. Haag mentions the Crops Research Institute (CRI) in Ghana and the Ethiopian Institute of Agricultural Research (EIAR) as being "particularly notable among the NARS."

Haag estimates that, by the end of 2008, QPM area in Sub-Saharan Africa reached nearly 1 million hectares (see Table 8). "While this area is significant, it still remains a small proportion of the total area in the region cultivated with maize. In some countries, however, such as Ghana and Uganda, a significant portion of the maize area is now devoted to QPM."

In many countries, QPM promotional efforts involve public sector extension services, as well as ministries of health and private seed enterprises, such as ESE in Ethiopia and Tanseed in Tanzania. Production and promotional efforts are supported in Eastern and Central Africa through the Canadian International Development Agency (CIDA) QPM Development Project; and several organizations financed by the African Development Bank (AfDB), including FARA (Forum for Agricultural Research in Africa), DONATA (Dissemination of New Agricultural Technologies in Africa), and ASARECA (Association for Strengthening Agricultural Research in East and Central Africa).

Seed Improvement and Dissemination

Haag has seen a dramatic change in seed quality and distribution in recent years. "There is now a consensus that the way forward is to provide a sustainable flow of high quality seed to farmers through the development of effective public and private sector institutions."

Table 8. Estimated* change in QPM area for Africa, 2005 – 2008.

Country	Hectares 2008	Hectares 2005	Percent Change
Benin	45,000	45,000	--
Burkina Faso	50,000	50,000	--
Cameroon	20,000	20,000	--
Cote d'Ivoire	20,000	20,000	--
Ethiopia	9,000	3,000	200
Ghana	350,000	300,000	16.7
Guinea	10,000	10,000	--
Kenya	1000	0	--
Malawi	50,000	50,000	--
Mali	60,000	50,000	20
Mozambique	30,000	25,000	20
Nigeria	40,000	30,000	33.3
Uganda	125,000	100,000	25
Senegal	28,000	0	--
South Africa	10,000	10,000	--
Sudan	25,000	25,000	--
Tanzania	15,000	5,000	200
Togo	30,000	30,000	--
Zambia	3,000	0	--
Zimbabwe	6,000	0	--
Total	**927,000**	**773,000**	**19.9**

* Source: Dr Wayne Haag, Director of the SAA QPM/Seed Program

He gives the example of Nigeria where "the QPM Sammaz-14 is fast replacing normal maize in many traditional and non-traditional maize-growing areas. QPM working groups have been formed in nine Nigerian states to promote adoption of the crop, and a national QPM working group was set up in 2008".

In Ghana, two new yellow QPM OPVs (Golden Jubilee and Aziga) were released in 2008 after several years of work to convert Obatanpa – sub-Saharan Africa's first commercial QPM variety – from white maize to yellow. A new hybrid, Etuba, which is related to Mamaba, was also released, as was an extra early white QPM OPV, named Akposoe after a retired Crops Research Institute (CRI) maize breeder and former SG 2000-Nigeria staff member.

In 2007, both Tanzania and Uganda released their first QPM hybrids. In Ethiopia, an early flint QPM called Pool-15 (OPV) was released, as was the QPM hybrid QS-7707 in Mozambique. In Mali and Nigeria, there was intensive testing of several hybrids. Advanced selections will be made soon.

In Uganda, where sales of certified seed reached 1,530 mt in 2007, QPM activities focused on 16 districts. These included QPM Voucher-Assisted Demonstrations (VADs), which help poor farmers and households adopt the technology, improve their food security and nutrition, and increase their incomes.

Dr Godfrey Asea (left), head of the cereals program, which includes maize and rice, at Uganda's National Agriculture Research Organization (NARO), inspecting a seed field with local farmers in Najja sub-country in Mukono District.

Haag believes that there are ever increasing opportunities for the emergence and growth of private sector seed companies. In Mali, for example, a new company called Société Semençière du Mali (SOSEM) began large-scale QPM seed production in 2007. SG 2000-Mali and the SAA QPM Program sourced 5 mt of Obatanpa foundation seed from Ghana, as well as the services of a Ghanaian seed specialist to train SOSEM staff.

SG 2000-Mali also supported the start-up of another new seed company in Mali, called Faso Kaba, which marketed 74 mt of maize seed, including Denbenyuman, as well as seed of several other crops during 2008 season. In 2007, Faso-Kaba also began receiving support from the Alliance for a Green Revolution in Africa (AGRA).

Quality control

Quality control remains a problem. "Many seed companies and their out growers practice extensive seed production, which is meant to reduce production-related costs," says Haag, "but the result is often poor agronomic practice. The answers are usually straightforward – such as clearly labeling the seed fields and building a walking path around each field to clearly mark the boundaries. Such simple steps will facilitate field inspections, reduce inspection costs, and enable the fields to be used for educational and promotional purposes."

Seed associations can also play an important role in quality control. Haag points to the example of the small quality control unit in the Uganda Seed Traders Association (USTA) with its team of independent inspectors who monitor the work of the quality controllers employed by the member seed companies. "This highlights the importance of developing more seed trade associations of this kind in Africa," he says. "The better, most technically orientated farmers, able to invest in intensive production, should be chosen as seed producers. There should be a relatively small number of growers. This will contribute to better seed quality and a reduction in the costs of quality control."

Haag is keen to see more education regarding the importance of good seed at the farm level, where the line between seed and grain is often blurred. Seed enterprises should invite farmers to visit their seed fields, as well as their processing and packaging facilities. Extension services and seed companies should set out field demonstration plots to exhibit their materials. Farmers who wish to produce and keep their own seed should be shown the correct procedures, such as drying, processing and storage.

Finally, Haag emphasizes that poor seed storage practices, all the way through the seed value chain, is a serious problem and a major contributor to seed insecurity in sub-Saharan Africa. "But there are new affordable and effective approaches now available to address the seed storage problem," he says. Ambient temperature storage technology, for example, can compensate for cold rooms that, because of undependable electricity supply, can sometimes turn into saunas. This technology, which normally involves placing silica gel packets into large, heavy duty plastic bags that are filled with maize and then hermetically sealed, dries the seed down to moisture levels that are lower than what can be achieved using the sun or forced-air drying. "Thus the seed can be effectively stored", says Haag, "without the use of cold rooms – providing an answer to many of Africa's seed storage problems."

Sasakawa Africa Fund for Extension Education (SAFE)

The Sasakawa Fund for Extension Education (SAFE) continued to expand its program of academic training and development qualifications for mid-career extension staff in 2008. It now involves total of 2,854 students, representing an increase of nearly 15% on 2007 figures. SAFE now operates at 13 universities and colleges in nine countries, and the number of graduates and the demand for the program is growing every year.

"All ongoing SAFE programs are making steady progress," comments Dr Deola Naibakelao, SAFE Managing Director (see Table 9). "Collaboration with our main stakeholders, particularly ministries of agriculture, has improved significantly. All appreciate the value of a program that provides qualifications and opportunities for leadership in agricultural extension".

Table 9. SAFE Statistics, December 31, 2009

Mid-career BSc and Diploma Courses	Graduated	Current	Total
University of Cape Coast, Ghana (B.Sc.)	371	25	396
Kawadaso Agric. College, Ghana (Diploma)	309	94	403
Haramaya, Ethiopia (B.Sc.)	312	57	369
Hawasa, Ethiopia (B.Sc.)	21	92	113
Makerere, Uganda (B.Sc.)	176	12	188
Sokoine, Tanzania (B.Sc.)	423	183	606
IPR/IFRA, Mali (Maîtrise)	86	90	176
Samanko Centre, Mali (Diploma)	48	77	125
Ahmadu Bello, Nigeria (B.Sc.)	72	65	137
Bayero University-Kano, Nigeria	0	66	66
Abomey-Calavi, Benin (Licence)	51	16	67
Bobo-Dioulasso, Burkina Faso (Licence)	20	36	56
Bunda College, Malawi (B.Sc.)	22	26	48
Sub Total	**1,911**	**839**	**2,750**
Scholarships	**Graduated**	**Current**	**Total**
Diploma	6	0	6
B.Sc.	32	0	32
M.Sc.	59	2	61
PhD	3	2	5
Sub-Total	**100**	**4**	**104**
Grand Total	**2,011**	**843**	**2,854**

Participating Institutions in Focus Countries

In Mali, the number of students at the Polytechnic Institute for Training and Applied Research (IPR/IFRA) in Katibougou continues to increase each year, due primarily to the fact that officials in the various sectors – agriculture, rural development and environment – now have a better understanding and appreciation of the program and will send their staff along without hesitation. The third batch of mid-career students at IPR/IFRA graduated in December 2008 and at the end of 2008 there were 90 students in the program. Meanwhile, Samanko College produced its first group of diploma holders in October 2008. The Mali government continues to give full support to the SAFE programs, both at IPR/IFRA and Samanko College. The Ministry of Agriculture (MoA) and the Ministry of Education (MoE) have created specific budget lines for this purpose. The MoA oversees the students' Supervised Enterprise Projects (SEPs) each year and provides technical training materials for the two programs.

In Nigeria, Ahmadu Bello University (ABU) has seen increasing demand for places on its program, but limited capacity restricted admittance to 22 students in the 2007/2008 academic year. The SAFE program at ABU was fully accredited by the National University Commission (NUC) in May 2008, and so far a total of 72 students have graduated from the course. The students' SEPs, which covered a wide range of technologies, were particularly successful and were widely accepted by farmers. Unfortunately, however, the low level of female participation in the program remains a challenge in Nigeria, as in most of the countries where SAFE operates.

There are currently 66 students at Bayero University-Kano (BUK) in Nigeria. The 61 men and 5 women come from the Agricultural Development Projects (ADPs) in northern Nigeria, where SG 2000 is involved in partnership projects. Here, BUK and SAFE have decided to establish a stakeholders' forum to share ideas for moving the program forward. Major participants include the Ministry of Agriculture, ADPs, NGOs and local government and private sector representatives. The SAFE program at BUK was approved by the National University Commission (NUC) in early May 2008, with full accreditation expected in early 2009. "We have

MSc student Alemayehu Shishigu (left) and Professor Zebedayo Mvena of Sokoine University, Tanzania (right) discuss field research in Ethiopia while a farmer uses traditional methods to thresh teff. Shishigu is working with the Extension Department of the Ministry of Agriculture and Rural Development.

been delighted to work with BUK this year," says Naibakelao. "Their leadership is truly committed to the SAFE program through the personal effort and due attention of the Vice-Chancellor."

In Ethiopia, SAFE funding for Haramaya University has ended, but the University has made tremendous efforts to ensure the sustainability of the program. With the graduation of 34 students in July 2008, the program completed ten full cycles of operation. Six of these graduates achieved 'great distinction', and a further six, including one woman, were given a 'distinction'. Demand for the SAFE program remains high in Ethiopia, as in other countries. Two programs are being offered, but there are around 60,000 diploma holders who hope to get the opportunity to undertake degree programs in extension.

Positive Impact

Tracer studies of SAFE graduates in Ghana and Ethiopia were conducted in 2008. The findings were encouraging. Most of the graduates have been promoted professionally, attained higher supervisory positions and received increments in salaries and other benefits. Naibakelao comments, "One can say without doubt that the graduates constitute a true pool of change agents in the agricultural sector in Ghana and Ethiopia, given their increased responsibilities and the high and sound competencies that they have acquired."

The SAFE programs at the University of Cape Coast (UCC) and Kwadaso Agricultural College (KAC) in Ghana continue to make significant progress in spite of the fact that direct support from SAFE ended in 2002 and 2004 respectively. The UCC SAFE program is being sustained from proceeds generated from the Sasakawa Center, as well as other internally generated funds. UCC continues to be considered a reference institution by all SAFE participating universities and colleges. It has developed and signed MOUs with several other universities in West Africa, and plans are underway to set up similar collaborations with universities in East Africa.

SAFE/UCC graduates continue to come out with high marks, and 26 students were admitted into the program in the 2008/2009 academic year, including two students from Ghana Coco Board and one student from Mozambique. Under UCC's leadership, the diploma program at Kwadaso Agricultural College (KAC) is making significant progress. The course had a huge number of applicants for 2008/09, and the KAC has admitted 60 students, the largest number so far. The success of the KAC program has prompted the Human Resources Directorate of the MoA to start a Diploma in General Agriculture at three institutions in Ghana, all based on the SAFE model.

Following lengthy discussions, Sokoine University of Agriculture (SUA) in Tanzania has finally stopped recruiting high school graduates into its mid-career program. All 106 students recruited into the program last year are diploma mid-career professionals, and fifteen of them are women. Bunda College in Malawi held its first SEPs workshop at which the final year students presented their project proposals. As well as providing combined feedback and advice to the students, the workshop also afforded an opportunity for Bunda College to showcase the strengths of its program, which was very helpful in the face of recent changes to senior management staff in the Ministry of Agriculture and Food Security.

Regional Activities

From September 1-7, 2007, UCC and KAC in Ghana hosted a team from Bayero University-Kano, led by the Vice-Chancellor, Professor A. M. Jega. The team learned about planning, implementation and management at various levels, SEPs and the Technology Village. UCC and BUK developed and signed an MOU during the visit, and under the auspices of this agreement and the existing one between UCC and ABU, two staff from UCC visited BUK and ABU in November 2007. They gave seminars to the staff of the two universities, with an emphasis on SEPs, and held discussions with the leaders of the two universities on ways and means of strengthening collaboration among them.

Ahmadu Bello University in Nigeria hosted a regional technical workshop in April 2008 for all the SAFE-participating institutions in West Africa to share experiences and discuss ways of sustaining the various SAFE programs in the sub-region. The major conclusions for ensuring sustainability included mainstreaming of the SAFE programs into the overall university system, sustained advocacy activities by Vice-Chancellors and Principals, use of mass media to sensitize stakeholders and the general public, publicizing successful SEP projects through mass media, and engaging in projects and activities that can generate income internally.

Gender workshops were organized in the four SAA focus countries to look at ways of reaching more rural women farmers and increasing the number of female faculty and female enrolment in the SAFE programs. The workshop discussions produced several practical recommendations for ways of improving the gender balance across SAA and SAFE staff and students.

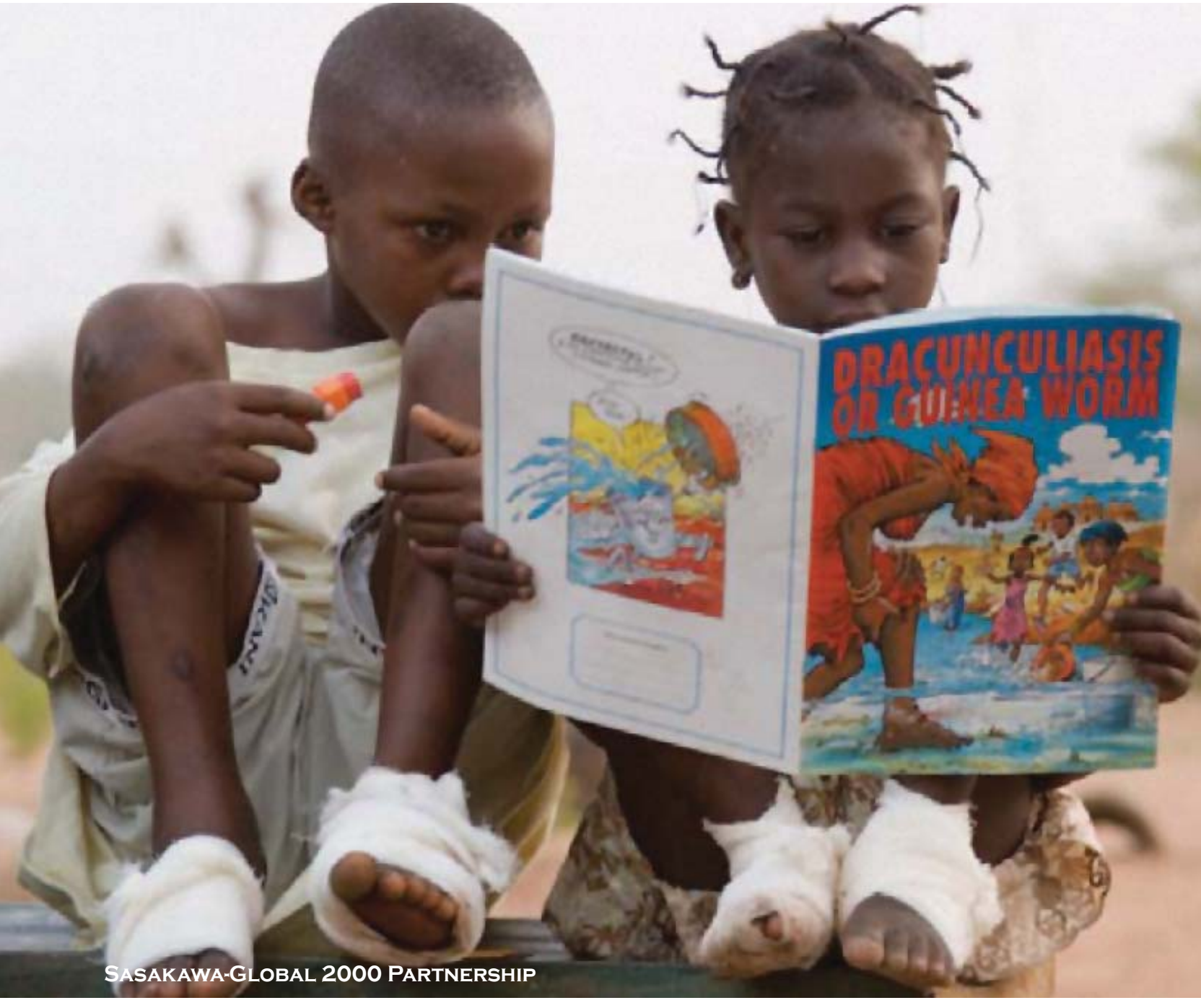
A Malawian farmer, Daniel Kasekani (center, dark shirt), showing his finger millet to mid-career students enrolled in the SAFE program at Bunda College.

Alumni Associations

The Executive Committee of SAFE Alumni Association in Ghana held a series of informal consultations in 2007 with Heads of Departments of Agricultural Extension of the five major public universities, to identify ways of evolving and broadening the alumni association into a Professional Agricultural Extension Association in Ghana. A formal meeting was held in March 2008 to work out strategies for making this a reality.

The SAFE alumni association in Mali has very active members, who often participate in the supervision of students' SEPs all over the country. The association has also produced its first newsletter, and has increased the publicity of the program through its publications and various meetings with the general public. In December 2008 it organized its first conference, which reviewed the agricultural extension system in Mali and suggested ways to coordinate the efforts of various agricultural service providers.

"The participation of graduates in the training of their colleagues, as we have seen in Mali, is laudable," says Naibakelao. "We now need to engage all the existing alumni associations in similar meaningful activities, so they can demonstrate their worth."



Sasakawa-Global 2000 Partnership

SAA has partnered with the Global 2000 program of The Carter Center since its inception. Global 2000, at varying stages of this 23-year relationship, has helped to manage SG 2000 country programs and coordinate an agricultural policy advisory council and an agribusiness forum.

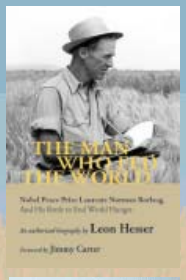
Most of Global 2000´s work, however, is in global health. One of its great contributions has been combating guinea worm (dracunculiasis), often known as the “fiery serpent,” a disease that has existed since ancient times.

In 1986, The Carter Center Global 2000 program spearheaded an international campaign to make guinea worm the next disease after smallpox to be wiped off the face of the world. Since then, the number of reported cases has been reduced from 3 million to only about 3,000 (in 4 African countries). If eradication is successful, guinea worm will be the first parasitic disease eliminated through education and clean water, and without the use of a vaccine or a drug, a historic achievement in global public health.

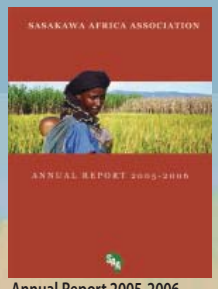
Public information

A number of publications are available from SAA, including the Sasakawa Africa Association 20th Anniversary Report; the SAA newsletter, Feeding the Future, various Theme-related publications, and the SAA Annual Calendar. For a complete list, contact Mr. Tiff Harris (harris.tiff@gmail.com).

In addition, recommended reading includes: the authorized biography of Dr. Norman Borlaug: The Man Who Fed the World. Leon Hesser. Durban House Publishing Company, Inc. 2006.; and Enough: Why the World's Poorest Starve in an Age of Plenty. Roger Thurow and Scott Kilman. Public Affairs Publishing. 2009.



SAA 20th Anniversary Report



Annual Report 2005-2006

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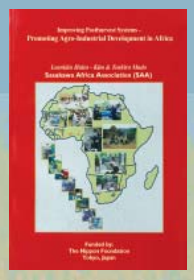
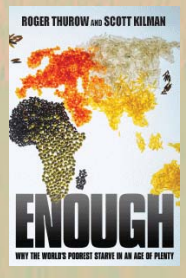
Value Chain Analysis for the Development of Food Systems and Innovative Agro-based Industry in Africa
Toshiro Mado & Kyoko Saio



Improving Postharvest Systems - Promoting Agro-Industrial Development in Africa
Leonides Halos - Kim & Toshiro Mado



2008 Financial Report Highlights (US dollars)

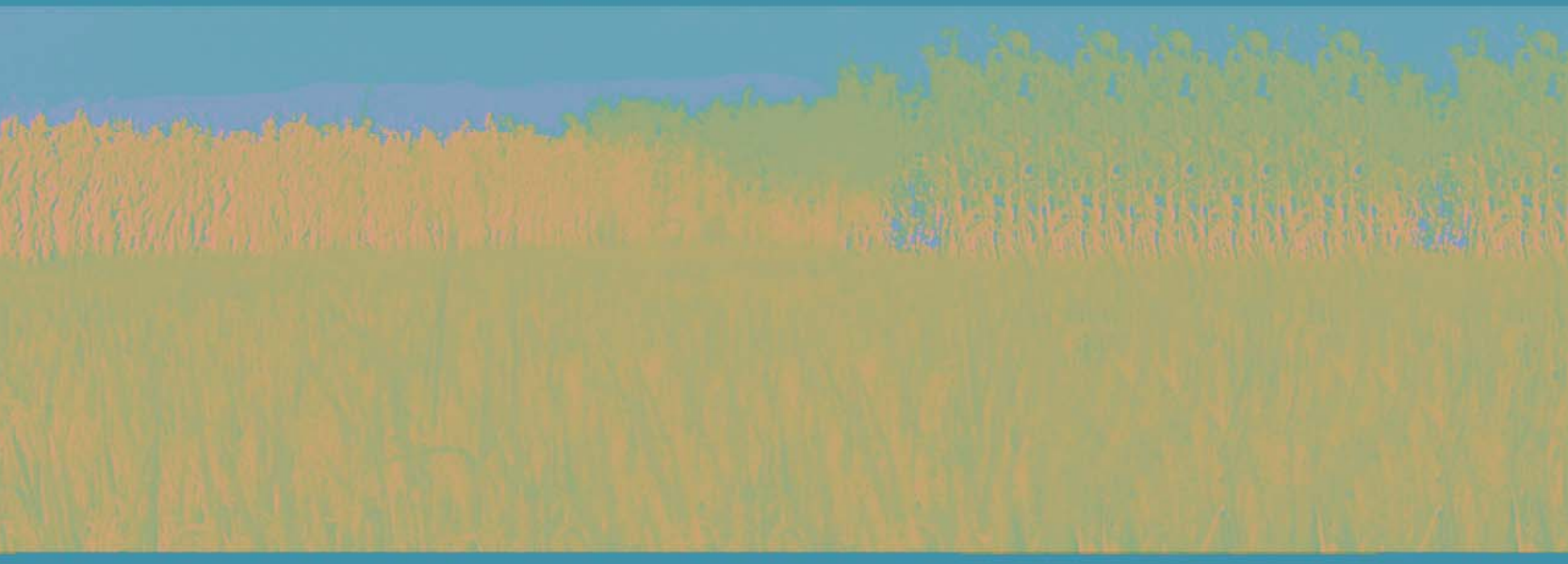
Sasakawa Africa Association (SAA)

Approved Budget	6,899,858
Actual Spending	6,317,425
Actual Receipt	7,191,949
Cash balance as of Dec. 2008	7,534,114
Details of Receipts	
Grant from the Nippon Foundation	6,500,000
Grant from the Carter Center	399,858
Interest	145,470
Loan Recovery	10,886
Others	135,735
Details of Expenditures	
SG 2000 country operation	1,835,968
Ethiopia	492,399
Mali	459,672
Nigeria	393,985
Uganda	489,910
SAA programs	1,448,065
Agroprocessing	302,095
QPM	287,339
Rice	289,694
New projects development/Other	568,937
Program administration	2,130,788
HQ administration	902,604

Sasakawa Africa Fund for Extension Education (SAFE)

Approved Budget	1,822,500
Actual Spending	1,741,362
Actual Receipt	1,800,128
Cash balance as of Dec. 2008	447,172
Details of Receipts	
Grant from the Nippon Foundation	1,800,000
Others	128
Details of Expenditures	
SAFE training programs	621,505
Ghana	11,754
Benin	31,819
Nigeria	124,512
Ethiopia	119,251
Mozambique	10,731
Uganda	77,793
Burkina-Faso	51,154
Mali	154,660
Malawi	39,831
Program administration	939,073
HQ administration	180,784

SASAKAWA AFRICA ASSOCIATION



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