

Feeding *the* Future

Working together for Africa's development



Yohei Sasakawa, President of the Nippon Foundation which funds the Sasakawa-Global 2000 (SG 2000) programme, greets Mallam Lawan Kadabara, a small-scale wheat farmer from Kano State, Nigeria.

Despite losing all his fingers from leprosy, Mallam Lawan Kadabara has successfully embraced the technology

introduced through the SG 2000 project, in association with the Kano State Rural Development Authority (KNARDA)—and reports greatly increased yields as a result.

The Nippon Foundation, through the Sasakawa Memorial Health Foundation, has had a long-term commitment to the World Health Organisation's campaign to

eliminate leprosy by 2005. The disease still exists as a public health problem in 10 countries.

Yohei Sasakawa, with SAA President Norman Borlaug, visited Nigeria in March—meeting with President Obasanjo in Abuja—before travelling to Malawi to see, in farmers' yields, the results of the SG 2000 project in that country.

Quality Protein Maize—Fulfilling the Promise

Quality protein maize (QPM) is, at long last, beginning to fulfill the promise that scientists originally saw in this type of maize, when it was first discovered in 1963. SG 2000 and its donor—the Nippon Foundation of Japan—have played a key role in bringing QPM to farmers' fields.

Agricultural scientists have long had an interest in improving the protein quality of plant. Though not nearly as low in protein content as staple foods such as cassava, maize does have a relatively low protein content (about 9 per cent) and roughly half of that contains no lysine and tryptophan, two amino acids essential for building proteins in humans and other monogastric animals.

In 1963, Lynn Bates, a PhD graduate student working for Professor Edwin Mertz at Purdue University, discovered much higher levels of lysine and tryptophan, in two local maize varieties from the Andean highlands of South America. They were able to determine that these higher levels

were due to the presence of a gene, called opaque-2.

The opaque-2 maize discovery initially stimulated considerable research interest and activity, with high hopes of bringing about substantial improvement in the nutritional welfare of maize consumers, especially in developing countries. But, as is all too often the case in plant breeding, a highly desirable trait turned out to be closely associated with several undesirable ones.

The initial enthusiasm soon gave way to disappointment. The opaque-2 maize kernels were dull and chalky, had 15-20 per cent less grain weight, and were more susceptible to several diseases and insects.

QPM has been developed using conventional maize breeding methods

These formidable obstacles prompted most research programmes to curtail their work. Only a handful of crop research institutes continued their work, most notably the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, with funding from the United Nations Development Programme (UNDP) for 14 years. Using conventional planting breeding methodologies, the CIMMYT interdisciplinary research team—led by Dr Surinder K. Vasal, a breeder, and Dr Evangelina Villegas, a cereal chemist—slowly overcame the original opaque-2 defects while maintaining superior nutritional quality.

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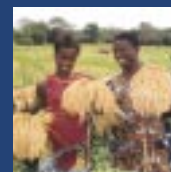
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July 2000



Global 2000 update

The Carter Center's Global 2000 healthcare programme to overcome preventable diseases now includes initiatives to control and eradicate Guinea worm, river blindness, lymphatic filariasis, schistosomiasis, and trachoma. Encouraging progress is being made on all of these terrible scourges.

"We are standing at the threshold of important breakthroughs in our battles against diseases that, until recently, were thought to be unconquerable," reports Dr Donald Hopkins, who heads The Carter Center health programmes.

"Improved health is just the beginning," states President Carter. "When individuals realise that they can protect themselves from these diseases, they begin to ask what else they can do to improve their lives.

"That question is often answered through better sanitation and water supply systems, development of improved food production and storage methods, new schools for children and a renewed commitment to adult literacy programmes, and other forward-looking development initiatives."

Eradication of Guinea worm disease within sight

With Pakistan, India and Yemen having stopped transmission for at least two years, Africa remains the final battleground. Here, too,

encouraging progress is being made. Cameroon, Chad, Kenya, and Senegal have all successfully stopped transmission for at least one year. However, 12 of the 16 originally endemic African countries still report cases (see graph).

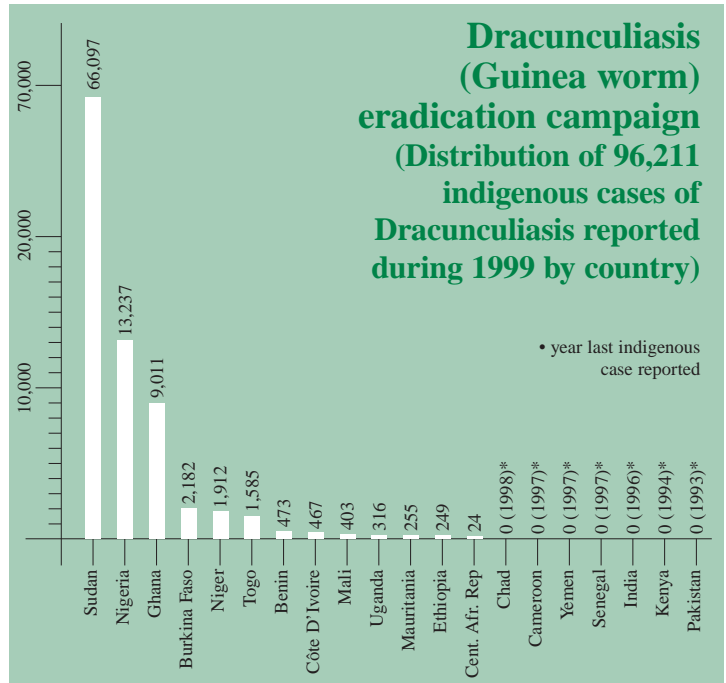
In 1999, some 96,211 cases of Guinea worm were reported. Sudan accounted for 69 per cent of all cases, while Nigeria and Ghana together accounted for 23 per cent. Benin, Côte d'Ivoire, Ethiopia, Mali, Mauritania and Uganda are expected to stop transmission in the next 1-2 years. The Carter Center will host a special awards ceremony 28 July 2000, to honour the seven nations that have attained at least one year with zero indigenous cases of Guinea worm since the global eradication campaign began in 1986.

The Carter Center was awarded a US\$ 15 million grant from the William and Melinda Gates Foundation as one of three organisations engaged in mounting the final push to win the war against Guinea worm disease.



Jimmy and Rosalynn Carter visiting SG 2000 Production Test Plots (PTPs) during a recent trip to Mali.

Dracunculiasis (Guinea worm) eradication campaign (Distribution of 96,211 indigenous cases of Dracunculiasis reported during 1999 by country)



Ernie Sprague to lead Global 2000 agricultural efforts

Ernie Sprague, Senior Consultant for Food Security

Ernie Sprague has accepted a part-time position with The Carter Center as Senior Consultant for Food Security. "I have known and worked with Ernie for more than 40 years," says Norman Borlaug. "His addition to the Global 2000 agricultural team will add depth to our efforts to get more effective agricultural policies into place to reduce poverty and improve food security."

Dr Sprague will be responsible for co-ordinating Global 2000's work within the SG 2000 partnership. A crop scientist with a PhD in plant breeding from Cornell University, Sprague spent a career working for the Rockefeller Foundation in maize research and development. From 1958 to 1969, he served as Joint

Co-ordinator of the All India Maize Improvement Programme. From 1964 to 1969, he was Head of the Inter-Asian Maize Improvement Programme.

In 1970, he was seconded by the Rockefeller Foundation to CIMMYT, serving as Director of Maize Programme until taking early retirement in 1983. In this capacity, he worked extensively in sub-Saharan Africa, backstopping national maize improvement and production programmes in many nations. Since 1984, Dr Sprague has lived in Georgia and continued to consult internationally. In 1997, he began working with Global 2000 as a member of a team working to improve food security in North Korea.



Dr Norman E Borlaug,
SAA President

Listen to technology

There are so many conflicting voices today about ‘appropriate’ technology for smallholder agricultural development in sub-Saharan Africa (SSA) that it must be very difficult for policy makers to know what to do. It seems that too much time is spent on ‘processes’ to assess farmers’ circumstances and set research agendas, rather than on the generation of productivity-enhancing technology, itself.

We need to help farmers prosper and not just survive

Certainly, more-effective institutions and organisational structures are needed in SSA to transform subsistence-based agriculture into market-oriented forms. Institutional capacity building is extremely important.

It is also important for research and extension workers to dialogue frequently with client farmer groups, not only to be able to understand production problems, but also to learn from the farmers themselves. In the end, however, it will be the new technology that matters.

Confusion about fertiliser use continues in development circles. It makes no biological difference to the plant whether the nitrate ion it ‘eats’ comes from a bag of fertiliser or decomposing organic matter. Moreover, given the very low current levels of fertiliser use, and the alarming trends in declining soil fertility, a very strong case can be made that increased fertiliser use in SSA is one of the most ‘environmentally friendly’ things we can do. We need to shift our debate to how we supply adequate plant nutrients to the soil in the most efficient way possible, and bring an end to saddling African farmers with

fertiliser prices two to three times world market prices.

A new array of high-yielding, early-maturity, disease- and insect-resistant varieties and hybrids are becoming available from research institutions, especially for rice, maize, wheat, cassava, and several grain legumes. These materials can make a big difference to smallholder production. They open possibilities for many new cropping patterns, involving food, cash, and green-manure crops.

Minimum tillage systems offer the great hope of checking soil erosion, conserving moisture, and reducing the back-breaking drudgery of hand weeding and land preparation.

Nutritionally superior maize varieties are being enthusiastically adopted by substantial numbers of farmers in a growing number of countries, especially in SSA. In the not too distant future, we may have high-yielding rice types available with higher levels of vitamin A and iron to improve nutrition.

The new tools of genetic engineering—if scientists are permitted to use them—will permit accelerated development of food crop varieties with greater

tolerance to drought, heat, cold, and soil mineral toxicities; greater resistance to menacing insects and diseases; and higher nutritional quality levels. African governments should take care not to let these research products pass them by.

Of course, governments must prepare themselves with the necessary legislation and regulations to ensure proper testing of genetically modified crops. But they also must ensure that farmers have adequate access to the new technologies that come from these scientific developments.

There has been much “minimalist”

thinking about African agricultural development in recent years. We need to shift the focus more towards helping African farmers to prosper and not just survive. Intensification of food production—using modern technologies on the lands best suited to this use—must be at the very heart of this effort.

We have the knowledge to permit African agriculture to prosper. Sadly, still lacking is the political, financial and institutional commitment to ensure that science and technology will be put fully to work in the service of the smallholder farmers and poor consumers of this vast continent.

About Sasakawa-Global 2000

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

SSA per capita food production accelerates

Food production in sub-Saharan Africa during the 1990s has grown slightly faster than population, a marked—and welcome—change over the declining per capita food production statistics of the 1970s and 1980s, reports FAO (see table).

Per capita food production index in sub-Saharan Africa and SG 2000 project countries

(1989-91=100)	1997	1998	1999
SSA, Developing	101	103	103
Ongoing SG 2000 Projects			
Burkina Faso	101	109	106
Eritrea	87	115	110
Ethiopia	104	97	98
Ghana	112	114	128
Guinea	108	113	112
Malawi	93	104	115
Mali	96	96	96
Mozambique	101	106	104
Nigeria	116	122	126
Uganda	87	91	93
Former SG 2000 Project Countries			
Benin	120	119	133
Sudan	136	133	128
Tanzania	79	82	80
Togo	116	105	104
Zambia	82	78	83

Source: FAO AGROSTAT (April/2000)

“Let’s hope the days in sub-Saharan Africa of reporting two per cent annual growth in food production and three per cent in population are behind us,” says Norman Borlaug, SAA President. “But to stay ahead of population growth—and for the poor to increase their caloric intake—African farmers must increasingly use modern technologies.”

“In some SG 2000 countries, per capita food production growth during the 1990s has been very high,” notes Chris Dowsell, SAA

Director for Programme Co-ordination. “In Benin, 33 per cent more food is being produced today per person than a decade ago. In Ghana and Sudan, per capita food production has increased 28 per cent; in Nigeria, 26 per cent; in Malawi, 15 per cent; and in Guinea, 12 percent.”

In Ethiopia, national food production hit rock bottom in 1992. Since then production has risen substantially, thanks to better agricultural policies, good weather, and the adoption of higher-yielding technologies.



Improving rural transport systems in Africa is essential for smallholder commercial agriculture to emerge.

“Still today,” Marco Quiñones, Ethiopian Country Director reports, “we have the cruel paradox of eight million Ethiopians in lowland areas in desperate need of food aid to survive, even though the nation obtained its third largest food harvest in 1999. Highland cereal farmers have grains to sell, but poor consumers in the drought-affected areas have no money to buy them.”

Improving rural transport systems in Africa is essential for smallholder commercial farmers to emerge. “Without adequate rural transport systems, it will be very difficult to develop agricultural markets, decentralise government services, and recruit rural teachers and health-care workers,” says Norman Borlaug. Moreover, notes economist G. Edward Schuh, SAA Board member, improved transport can reduce the cost of food, which

benefits everyone in society, but especially the poor.

Nigerian President Olusegun Obasanjo—a former SAA Board member—has said that, “as long as farming remains, at best, marginally rewarding, young men and women will drift away from the rural areas to increase the battalions of the urban poor. The idea, therefore, that African agriculture should be based only on a half hectare holding is, to say the least, unappetising. I want to see the evolution of young, emergent, commercial farmers who will be holding, not a half hectare of land, but 5 to 10 to 20 hectares of land, and for whom the city will have no big attraction.”

“To realise Africa’s agricultural potential,” says Norman Borlaug, “much greater investments must be forthcoming in agricultural research, extension, infrastructure, transport, general education, and health care.”



Rice is the second largest food import in Africa though the continent could be self-sufficient, and even an exporter.

Quality Protein Maize—Fulfilling the Promise

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They were able to convert the flourey soft endosperm kernels into harder types, increase grain yield potential to the level of the best normal maize types, and ensure similar disease and insect resistance and utilisation and storage qualities of the superior normal maize materials. These new normal-looking, normal-tasting opaque-2 types were renamed 'quality protein maize' or QPM. CIMMYT in 1992, faced with funding problems and a continuing controversy among nutritionists over the importance of protein quality in reducing malnutrition, brought its QPM research activities to a conclusion and put its breeding materials into cold storage.

Fortunately, by that time many QPM breeding materials, experimental varieties and hybrids had already been distributed to national research programmes and a few scientists—most notably in South Africa, Brazil, China, and Ghana—continued their QPM work, although generally at a lower level of intensity.

"This was one of the most unfortunate decisions that I have witnessed in my career," SAA's Norman Borlaug contends. "It came just at the time that QPM was poised to begin making a major production impact."



Dr Twumasi-Afriyie, former head of the maize programme at the Crops Research Institute (CRI) in Ghana where he was assisted by Ben Dzah. Dr Twumasi-Afriyie has played a pioneering role in QPM research and development. Dr Peter Sallah now leads the CRI programme.

SG 2000 was instrumental in reviving QPM research at the Crops Research Institute (CRI) in Ghana, starting in 1990. By 1993, an outstanding QPM variety based on CIMMYT material, had been developed and approved for commercial production. It was named Obatanpa, which means "good nursing mother" in the Ashanti language.

Since its release, Obatanpa has spread to more than 200,000 ha of farmers' land in Ghana. Its high-yield potential, excellent resistance to Maize Streak virus which is a serious disease problem in much of tropical and subtropical Africa, intermediate maturity classification, and white grain type, are all very much appreciated by farmers.

By 1993, an outstanding QPM variety, based on CIMMYT material, had been developed and approved for commercial production. It was named Obatanpa.

Moreover, its broad breadth of adaptation makes it suitable to many maize-growing environments. It has been tested in most other SG 2000 project



The highly adaptable Obatanpa from Ghana is suitable to many maize-growing environments in SSA.

countries, with very good results, and is presently being commercially grown in Benin, Togo, Burkina Faso, Mali, and Guinea, with other countries likely to soon follow.

The success of Obatanpa has encouraged CRI scientists to continue their QPM research. In 1998, three, even higher-yielding, QPM hybrids were approved for commercial production, and are now spreading in farmers' fields. Ghana's success also prompted other African maize research programmes in SG 2000 countries to mount QPM research efforts. Approval for commercial use of new QPM varieties and hybrids is expected in Ethiopia and Mozambique in late 2000 or 2001. "Other SG 2000 project countries will no doubt follow," reports Wayne Haag, a driving force within SG 2000 to expand QPM research and development.

CIMMYT re-engaged

Encouraged by the impact of Obatanpa in Ghana, CIMMYT agreed to reactivate its QPM work. The Nippon Foundation of Japan provided an initial five-year grant in 1997, which permitted it to take its best materials—that had been placed in storage—and send them out for widespread testing and evaluation.

"The Nippon Foundation funding," says Norman Borlaug, "provided the catalyst that CIMMYT needed to re-establish its QPM research collaboration with national programmes in Asia, Latin America, and Africa."

Today our emphasis is more on developing hybrids," says Hugo Cordova, leader of CIMMYT's QPM research team, "although we continue to generate new open-pollinated varieties as well. The yield performance that we are seeing with the new QPM materials in a growing number of countries—including Mexico, China, Guatemala, and El Salvador—is extraordinary."

Getting past old nutritional debates

"The 30-year debate among nutritionists about whether the real malnutrition problem is an energy rather than a protein gap has caused endless, and needless, problems," comments Dr William Foege, Chairman of the Task Force for Child Survival and Senior Health Advisor at the William and Melinda Gates Foundation.

"Today we have a better understanding that we need both protein and calories. An especially vulnerable group is the poor child, 6 to 24 months of age, where protein is a barrier.

"Over half the malnourished children of the world live in countries where maize is a major part of the diet," says William Foege. "Converting a dietary staple to be more nutritious is so much easier than changing the diet or supplementing the diet—and far less expensive than treating the resulting problem. The wonder is that the world isn't demanding quality protein maize with all the righteous anger at its command."

Launched in 1992, the Sasakawa Africa Fund for Extension Education (SAFE) currently supports BSc and Diploma university programmes for career agricultural extension workers in four countries—Ghana, Ethiopia, Tanzania and Uganda—and is continuing to build relationships with universities in other SG 2000 countries.

A national workshop in Nigeria

A national workshop on developing responsive formal university training programmes for mid-career agricultural extension staff in Nigeria has been held in June 2000 at Ahmadu Bello University (ABU) in Zaria. Organised by ABU in collaboration with SAA and Winrock, the workshop looked at the development of an agricultural extension curriculum and other issues related to the implementation of SAFE-type BSc agricultural extension programme at ABU.

Pushing forward in francophone Africa

“Two universities in Mali and Burkina Faso are developing an agricultural extension curriculum,” notes Deola Naibakelao, Director of SAFE, “for the possible launch of a BSc mid-career training programme.” Faculties at the University of Mali and the Polytechnic University of Bobo Dioulasso, Burkina Faso, are currently assessing the training needs of their agricultural extension staff.

SAFE workshop on SEPs at Alemaya University, Ethiopia



Alemaya student, Mr Kefyalew (3rd from right), demonstrating equipment for processing honey to farmers during his SEP.

A three-day workshop examining Supervised Enterprise Projects (SEPs) at Alemaya University of Agriculture (AUA) was attended by faculty members from Sokoine University in Tanzania and Makerere University in Uganda.

Reports on the eight-month field

projects were presented by 18 third-year students in addition to the proposals for future SEPs from the 25 second-year students. “All three universities agreed that the SAFE programme,” says Deola Naibakelao, “had broken new ground in discovering unused potential in mid-career extension professionals.”

First diploma course at Kwadaso, Ghana



First SAFE diploma group enrolls at Kwadaso Agricultural College.

Most frontline extension staff in Africa have Certificate-level training. Thus, there is a need to develop a Diploma course for these agricultural extension workers, to serve as a stepping stone to the BSc course. “We conducted a review in 1998 and concluded that extension career staff should not be away from their work and families for extensive periods,” said SAFE’s Deola Naibakelao.

To support the University of Cape Coast’s continuing post-diploma programme, a new two-year diploma programme in agricultural extension was launched for certificate holders at Kwadaso Agricultural College,

Kumasi, Ghana, in September last year.

The new diploma programme at Kwadaso is affiliated with UCC, which actually grants the Diploma. The course was launched in the autumn of 1999 with 31 students, including 10 women.

The UCC also saw its first batch of post-certificate students graduate from the BSc agricultural extension programme on 8 April. The 24-strong group, including eight women, is the fourth group of students to graduate since the SAFE programme was launched at UCC in November 1993.

International workshop

An international Centre for Applied Studies in International Negotiations (CASIN)/SG 2000 workshop, “Bringing African universities and colleges more into agricultural development”, will be held in Ghana in early September (see also page 9).

Organised by CASIN/SG 2000, the workshop will:

- Analyse major challenges and opportunities in agricultural education and extension in Africa, especially training of experienced mid-career field staff;
- Examine innovative agricultural education and extension training programmes in Africa;
- Propose a strategic framework for funding of agricultural education and extension programmes in African universities and colleges; and
- Develop and facilitate partnerships and networking—both inside and outside Africa—among stakeholders.

Agroprocessing programme

SAA has worked for six years with the International Institute of Tropical Agriculture (IITA) postharvest engineering unit to identify, develop and extend postharvest and agroprocessing technology suitable for small-scale African farmers.

“One of the most satisfying results of the IITA/SAA partnership,” says Toshiro Mado, agroprocessing programme leader, “has been the results on the manufacturing side. Today, 83 fully-trained machinists, welders, mechanics and other technicians from Ghana, Benin, Ethiopia, and Guinea are a direct result of this partnership.”

The agroprocessing programme in Ghana and Benin now boasts 15 local manufacturers who are supplying agroprocessing equipment commercially. Apart from sales within their own countries, manufacturers in these two countries have reported export sales to six other countries including Mali, Niger and Zambia.

“Over 200 cassava grater units have been sold in Ghana and Benin,” reports Toshiro Mado. In

Mozambique and Guinea, local manufacturers have an interest in producing various pieces of equipment. Local production of selected equipment has also started in Ethiopia and Uganda. The SAA/IITA team anticipates wet grinder use to expand in savannah-like areas, such as in northern Ghana, for processing groundnuts, shea nuts and soybeans. Guinea is also interested in the development of a new rice polisher.

Total sales of selected agroprocessing equipment in Ghana and Benin, 1996-2000

Type of equip.	Cassava grater	Double Screw Press	Palm Digester	Multi Thresher	Wet Grinder
No of Units	208	170	43	37	5



Demonstration of a multi-crop thresher produced by trainees at Nazareth Agricultural Research Centre in Ethiopia.

Manufacturing in Ethiopia

Since 1995 Ethiopia has seen a dramatic increase in cereal production. With this increase, use of improved postharvest technology in storage and processing has become increasingly important. The threshing of grains such as teff, wheat, barley and maize is time-consuming and labour-intensive. Traditional postharvest methods result in serious grain losses during threshing, transport, handling—in particular with small grain such as teff.

Until 1998, Ethiopia did not have an engine-driven thresher for teff, the country’s preferred staple, with threshing done primarily by oxen and horses. Through collaboration with the Ethiopian Agricultural Research Organisation (EARO), Ethiopia now has 15 multicrop threshers in use and a further 20 threshers are being produced by private manufacturers. SG 2000 helped to train ten manufacturing technicians, in collaboration with the National Agricultural Research Centre at Nazareth, to boost local manufacturing capacity for the threshing machinery.

“A multi-purpose thresher can be bought for approximately US\$ 800, including the engine, and processes about 1 t/h,” states Toshiro Mado. “One thresher can be used to thresh a range of different crops, without changing any parts.” Some farmers will be able to afford such equipment for themselves. Others will need to hire contract services. SAA believes that local postharvest services companies could be a good business opportunity in future years.

Research and development work is currently being carried out by a



Palm digester in the Technology Village at the University of Cape Coast, Ghana—with Dorothy Ankrah, SAA’s head of agroprocessing in Ghana.

private manufacturer in Awassa, with technical support from SG 2000 and Dr Y. W. Jeon, a former IITA engineer, to improve the mobility of the thresher.

IITA is also developing a prototype roller mill for use in Ethiopia. Good texture flour from maize, wheat and barley, which has been processed by roller mills, mixed with QPM, would make a considerable nutritional impact, particularly in the Ethiopian highlands.

Ethiopia now has 15 multicrop threshers in use and a further 20 threshers are being produced by private manufacturers

Linking farmers to markets



President Carter, Mali's President Konaré and Yohei Sasakawa (left to right) at the CASIN workshop, October 1999.

Workshop 1999, the thirteenth high-level rural governance conference organised on behalf of SG 2000 by the Centre for Applied Studies in International Negotiations (CASIN), was held in Bamako, Mali, last October. Entitled “The Food Chain in sub-Saharan Africa: Linking Farmers to Markets,” the workshop sought solutions to the many bottlenecks impacting on the distribution of food—from farmers’ fields to the market place. Representatives from the World Bank and other multilateral and bilateral development agencies, and the agribusiness corporate sector attended, as well as ministers of agriculture from most SG 2000 project countries.



The urgency of improved rural transport systems will increase as the urbanisation process in Africa continues.

The workshop was formally inaugurated by Mali's President Alpha Oumar Konaré, flanked by former US President Jimmy Carter and Ayako Sono, Chairperson of the Nippon Foundation of Japan, the workshop sponsors.

In plenary session, the World Bank's George Banjo spoke of the isolation experienced by rural dwellers. “Many are unable to go and farm available land simply because of the long travel involved when they have to walk.” There was a market bias against the poor because of “their low purchasing power and the seasonality and irregularity of their ability to enter the market to make purchases.”

Improved rural transport systems can have pervasive effects in

Potential collaboration with ICRAF

SAA president Dr Norman Borlaug and SG 2000 staff joined Dr Pedro Sanchez, Director General of the International Centre for Research in Agroforestry (ICRAF), and colleagues visited eastern Uganda and western Kenya in early June to review the use of nutrient-accumulating tree and shrub species to improve soil fertility. Potential collaboration in this critical area was examined.

ICRAF is currently addressing problems of poverty in rural households in both project areas, brought about by a serious soil fertility crisis. In partnership with organisations such as the Kenya Agricultural Research Institute (KARI) and the Kenya Forestry Research Institute (KEFRI), and the National Agricultural Research Organisation (NARO) of Uganda, and farmers, ICRAF has been developing, testing, and disseminating a combination of technologies consisting of rock phosphate, nitrogen-fixing tree or shrub legumes and a nutrient-rich local hedgerow plant.

“I was very impressed,” said Norman Borlaug, “with the progress made in identifying and developing nutrient-accumulating plant shrub species, such as *Tithonia* and *Sesbania*, among others, to improve plant nutrition for food crops. With the very high cost of delivering inorganic fertilisers to the farm gate in many developing countries, and especially in much of sub-Saharan Africa, ICRAF's work is exceedingly important in helping to mobilise adequate quantities of plant nutrients for high-yielding smallholder food crop production.”

Dr Borlaug later gave a public address on “African Food Production Challenges in the 21st Century,” to a packed audience at ICRAF headquarters in Nairobi.

economic development and poverty alleviation. They will lower transaction costs in commercial agriculture, create job opportunities for off-farm employment, and improve efficiency of decentralised systems of governance, education, and health care. However, as one workshop task force suggested: “substantial additions to the road system are not an effective way of stimulating economic and social development unless existing assets are better protected through effective maintenance.”

As the World Bank's Graeme Donovan remarked: “the urbanisation process will place formidable stresses and strains on agriculture's ability to produce. But it will place even greater stresses and strains on the nascent marketing systems that will bring food to the urban areas.”

In a timely message to the meeting, Dr Norman Borlaug drew attention to “the very real possibility that



Ms Ayako Sono, Chairperson of the Nippon Foundation of Japan—opening the workshop on food distribution in Africa, October 1999.

more Africans will be living in urban areas than in rural areas, 25 to 30 years from now. How these non food-producing consumers will be assured plentiful, safe and affordable food supplies is one of the greatest development challenges we face.”

Promoting the education agenda

The critical role of education in agricultural development is to be addressed at a major workshop in Ghana in early September. Workshop 2000, the 14th policy conference organised by the Geneva-based CASIN, will look at the ways and means of 'bringing African universities and colleges more into agricultural development.' It will explore innovative agricultural education and extension training programmes in more advanced centres of learning—and examine how these can be encouraged and expanded.



Improving the skills and knowledge of midcareer extensionists—there is a major need in sub-Saharan Africa.

Without more opportunities to improve their professional standing, experienced extension field staff in most African countries have little chance of participating in the development of national policy and strategies: nor, indeed, can they effectively implement programmes that match the needs of the farming community. In turn, many African universities need to reform their agricultural education and extension curricula to make them more responsive to the training requirements of key agricultural sector stakeholders—farmers, rural development organisations and agribusinesses.

Workshop 2000 will review the work and progress of the Sasakawa Africa Fund for Extension Education (SAFE), which, through a network of collaborating universities and agricultural colleges, is building pan-African

academic partnerships to develop training programmes for rural extension staff.

"The Nippon Foundation," states Chris Dowswell, SAA's Director for Programme Co-ordination, "is interested in investing more in SAFE in future years. One of the outcomes of Workshop 2000 will be a set of recommendations on how best SAA should proceed in expanding and strengthening its array of institutional capacity-building activities."

Workshop 2000 will be chaired by Dr Norman Borlaug, Yohei Sasakawa and Samuel Kwasi Adjepong, Vice Chancellor of the University of Cape Coast. Participants are expected from ministries of agriculture and education, universities, donor agencies, NGOs, and private sector agribusinesses.

World Bank collaboration

Over the past five years, SG 2000 and the World Bank have steadily increased their collaboration to accelerate the identification and adoption of productivity-enhancing food production and postharvest technology in SSA to reduce poverty, increase food security, and protect the natural resource base.

In November 1999, SG 2000 and World Bank agricultural staff held a two-day meeting in Washington, D.C. to review their framework for collaboration involving three specific themes—linking research with extension, integrating small farmers with input and output markets, and donor/NGO/private sector dialogue and co-operation—and to establish specific activities for collaboration in the year 2000.

Collaborative activities were outlined for most SG 2000 countries in 2000, including Tanzania, Uganda, Ethiopia, Mozambique, and Guinea.

"The agricultural intensification study being carried out in Tanzania is especially encouraging," reports Chris Dowswell, SAA Director for Programme Co-ordination. "Here Marco Quiñones from SG 2000 and Amar Jit Sodhi from the World Bank, are working with national agricultural research leaders to develop an investment programme that could greatly accelerate productivity growth in the food sector."

World Bank support to Tanzania to develop agricultural intensification strategies—in response to a request last year from Prime Minister Frederick Sumaye—has taken a major step forward with the signing of an agreement to set up the Tanzania Soil Fertility Recapitalisation and

Agriculture Intensification Project (SFRAIP). International consultants are now being recruited to assist during the project preparation period.

Sam Muro, the former Commissioner of Agriculture, was appointed project team leader by the Tanzanian government in January. Marco Quiñones, SG 2000 Country Director for Ethiopia and formerly for Tanzania, is also a member of Muro's team. Quiñones is charged with identifying the best strategies and investments to enhance soil fertility and permit sustainable agricultural intensification. "Clearly, Tanzania is committed to agricultural intensification," says Marco Quiñones. "Now, with the partnership with the World Bank, we hope to drive this agenda forward rapidly."



Fertilisers will have a major role in Tanzania's agricultural intensification strategies.

SG 2000 country profiles



Benin

SG 2000 no longer has a formal programme of its own in Benin. However, a close relationship is maintained with the *Fédération nationale des caisses rurales d'épargne et de prêt* (FENACREP), which is an outgrowth of previous work undertaken by SG 2000 and the Ministry of Rural Development (MDR).



A major target—income generating activities for women.

During 2000, FENACREP continued its consolidation phase. SG 2000 remains the largest donor, but the donor base is broadening. Last September, FENACREP was selected as one of five microfinance institutions in Benin selected by the United Nations Development Programme (UNDP) to be part of its Microstart Project, which aims to strengthen the capacity of local microfinance institutions in five sub-Saharan African countries. The project runs for three years, for a total budget of US\$ 150,000. Some first-year Microstart funds have been spent for office equipment and as credit to women members of CREPs for income-generating activities.

Financial Progress

By 31 May 2000, it is estimated that 163 CREPs (*Caisse rurale*

d'épargne et de prêt) in seven administrative departments of the country had about 35,000 members, with US\$ 103,672 in social capital and US \$704,393 in net deposits (see table 1). However, not all of these local CREPs are FENACREP members.

“Our target is to bring all of Benin’s local CREPs into FENACREP,” says Dr Bernadin Glehouenou, FENACREP’s Managing Director and previously SG 2000’s National Joint Co-ordinator in Benin. “We are developing strategies to make them stronger and broaden their financial base through new sources of funding. We have been encouraged by the support of the Ministry of Finance and Economy, which may open new doors at government level, and were offered a substantial loan last year by the Financial Bank of Cotonou at a low interest rate.”

Savings mobilisation fortnights are being organised by FENACREP for 25 CREPs—with each CREP targeting to provide two thirds of its own credit facilities. Around US \$200,000 is expected to be available for credit in 2000,” Glehouenou said, “with about US\$ 150,000 destined for agricultural credits to farmers (1,000 loans) and about US \$70,000 for income-generating activities of about 1,500 women members.”

Agricultural Extension Programme

FENACREP is receiving technical agricultural backstopping from

Table 1: Maize and Mucuna sponsored by FENACREP this year

Departments	Number of maize PTPs	Number of Mucuna PTPs	Number of CREPs
Atacora	175	41	7
Atlantique	125	27	5
Borgou	200	53	8
Mono	125	33	5
Oueme	250	80	10
Zou	500	53	20
Total	1,375	286	55

Table 2: Total CREP social shares, deposits and credits, May 2000

Departments	Number of CREPs	Number of members	Total of social shares (US \$)	Total deposits (US \$)	Total credits (US \$)
Atacora	11	2,116	6,480	73,152	6,273
Atlantique	13	3,051	6,953	23,131	27,369
Borgou	24	4,407	13,560	79,947	1,826
Mono	15	4,789	14,397	97,385	13,663
Oueme	57	10,896	32,055	246,621	40,814
Zou	43	9,824	30,228	184,157	45,405
Total	163	35,083	103,672	704,393	135,350

several MDR production specialists to continue providing extension advice to its members. In early 2000, FENACREP organised a training course for all frontline extension officers involved in these agricultural activities.

Some 1,375 farmers from 55 CREPs were selected to grow maize Production Test Plots (PTPs) in 2000, with PTP farmers receiving seed and fertiliser on credit from the federation (Table 2). “The improved seed provided was of very good quality with over 90 per cent germination rate,” reported Fortune Fagbohoun, Agricultural Training Co-ordinator. Nearly one

third of the maize PTPs (550) were planted with an improved (QPM) variety. “We could have planted more QPM plots,” Fagbohoun noted, “but we didn’t have enough seed.” FENACREP has provided about 200 kg of foundation QPM seed to private seed growers for seed multiplication, which should solve the seed shortage problem next year.

“About 4.3 t of Mucuna seed were also distributed to FENACREP farmers for planting 286 PTPs (15 kg of Mucuna seed is needed to plant half a hectare) as part of our soil fertility restoration efforts,” Fagbohoun said.

From its start up in Burkina in 1996, SG 2000 now operates in seven agricultural regions, involving 23 provinces, 131 technical officers, and more than 4,000 crop and soil conservation-related demonstrations. An eighth region has been added this year—the Poni region in the south. In partnership with another NGO, the Rural Development Project of Poni, some 71 QPM PTPs are being planted in the 2000 season.



Rice PTP in Comoe region—producing 3,700 kg/ha in 1999.

“During 1999, 1,737 Production Test Plots (PTPs) were established in Burkina Faso, each covering 2500 m²,” notes SG 2000 Country Director Marcel Galiba. “Of these, 1,320 PTPs were planted with QPM maize variety, called Masongo in Burkina, with yields ranging from 3,255 to 4,450 kg/ha” (see table 1). In addition, SG 2000 worked with selected farmers to establish 200 one-hectare QPM production plots (PPs) in three regions.

Fewer millet and sorghum PTPs were established than anticipated, as farmers have shown reluctance to use chemical fertiliser on these crops. Thus, the recommended technological package is being reviewed and adjusted.

SG 2000 continued to work to improve and maintain soil nutrient levels in Burkina Faso. Originally, a target of 400 ha of dykes was set for 1999, with significant involvement from farmers.

“However, as most dyke costs are

not reimbursed, SG 2000 support was restricted to those villages with high recovery rates from past PTP loans,” says Marcel Galiba, “resulting in only 132 ha being protected. The use of phosphate rock to improve soil fertility was promoted in legume plots and as an amendment to compost pits.”

A steering committee—established in 1999 to examine the progress of the SG 2000 project in Burkina Faso and comprising representatives from the Ministry of Agriculture—held its first meeting in February 2000. The committee addressed a number of problems such as low PTP loan recovery in some areas, the farmers’ lack of training, and operational difficulties of savings and loans banks.

Three savings and loan associations, (*Caisse rural d’épargne et de prêt*, or CREPs), are already active in savings mobilisation and two CREPs are just starting their activities (see table 2).

MSI Organisation Meeting

A new five-country Millet and Sorghum Initiative (MSI) held its first regional organisation meeting in Ouagadougou on March 7-8, 2000 (see Mali report for additional details). Forty specialists, many of whom will play key roles in MSI over the next 3-4 years, attended the meeting which received financial support from SG 2000 and International Fund for Agricultural Development (IFAD).

Table 2. Savings and loans associations (CREPs), 1999

Location	Membership	Female members	Savings (US \$)
Reo	130	37	943
Boala	65	10	923
Bladi	139	4	1,775
Boudtenga	-	-	-
Togtenga	-	-	-
Total	334	51	3,641

US\$1 = 600 CFA francs

Table 1. Production Test Plot yields, 1999

Agricultural regions	Crop	PTP yields (kg/ha)	No. of PTPs
Centre		4,450	
East-Centre	Maize	3,600	1,320
Comoe	(QPM)	3,850	
South-Centre		3,255	
Comoe	Rice	3,700	123
Mouhoun	Sorghum	1,922	
East-Centre		1,480	294
East-Centre	Millet	750	
South-Centre		749	



Jean Babou Bado (left), SG 2000’s National Co-ordinator in Burkina Faso since 1997, assisted Marcel Galiba in the establishment of the SG 2000 pilot programme in 1996. He previously worked for the Ministry of Rural Development, in charge of training at the national level for agricultural extension workers.

The spectre of famine has fallen on Ethiopia again. Following the total failure of the Belg (short season) rains an estimated eight million Ethiopians in the drought prone areas of the Ogaden, bordering Somalia and northern Kenya, and in the north-east near the border with Eritrea, are at risk of starvation. Ironically this crisis has overshadowed Ethiopia's achievement in producing 10.7 million t of cereals during the 1999 season—the third largest in the nation's history.

The Ethiopian government has completed the first five years of the national extension programme based on the SG 2000 technology transfer methodology. Some 3.5 million farmers participated in the national programme during last season and the numbers are expected to increase this year. A second five-year extension campaign begins with the next cropping season.

“One encouraging sign,” comments Country Director Marco Quiñones, “is that the use of commercial fertilisers, mainly DAP and urea, is increasing in Ethiopia.” The total volume of 1999 fertiliser sales was 290,264t—with projected sales for 2000 of 460,000 t.

Another landmark was the production of 10,000 t of hybrid maize seed by the government-owned National Seed Enterprise.

This is the largest volume ever produced of locally bred hybrid maize seed.

The labour saving benefits of conservation tillage (CT) are being appreciated by an increasing number of farmers

SG 2000 is engaged in a joint research venture with the Ethiopian Agricultural Research Organisation (EARO), the CIMMYT East Africa Cereals Programme, the Bureau of Agriculture of the Arsi Zone in the



Proud farmer with children in front of conservation tillage plot, Jimma zone, Oromiya region.

Oromiya Region, and the Ministry of Agriculture, to develop more-tailored plant nutrient recommendations for optimising economic returns.

SG 2000 has established a pilot grain inventory credit programme with the Development Bank of Ethiopia (DBE), working with three inventory credit groups in southern Ethiopia, with a total membership of 85 farmers. The farmers have deposited 59 t of maize, wheat and teff, with a total value of Birr 73,026 (US\$ 9,000), and borrowed Birr 63,266 (US\$ 7,800) as collateral against their stored grain. With the credit scheme, it is anticipated that farmers can hold their produce for sale later in the year, when market prices are more favourable.

Postharvest activities are also progressing well. In 1988, 10 threshers were originally manufactured by engineering trainees for demonstration purposes at the EARO's Melkassa Agricultural Research Centre. Since then, private companies, such as BBM-Animal Traction, have manufactured 35 multicrop threshing machines, introduced through the SAA/IITA agroprocessing programme, and have sold 15 to date.

The labour saving benefits of conservation tillage (CT) are being appreciated by an increasing number of farmers. The CT programme is being conducted in collaboration with EARO and Monsanto Company. In Oromiya

Region, 266 farmers established CT plots in the 1999 season. Farmers in East Wolega Zone achieved yields of 9.2 t/ha and 7.2 t/ha from CT and conventional tillage plots, respectively. In the Southern Region, 21 farmers in two districts produced roughly equal amounts of maize from both CT and conventional tillage plots. The programme will continue with the same farmers for several years in order to monitor soil conservation and income-growth effects.

After several years of intensive work, EARO's QPM research programme, with assistance from CIMMYT and SG 2000, is moving towards the commercial release of the first QPM hybrid. Farmer-managed verification trials will be carried out during 2000, in the hope that commercial QPM seed production can begin in 2001.

EARO's QPM research programme, with assistance from CIMMYT and SG 2000, is moving towards the commercial release of the first QPM hybrid

Results of maize & wheat conservation tillage (CT) demonstration plots, 1999/2000 crop season

Region	Zone	No. of Plots	Average yield (t/ha)	
			CT plots	Non CT plots
Maize Oromiya	East Wolega	112	5.0	4.6
	West Shewa	400	5.7	4.6
	Jimma	40	5.5	4.7
SNNPR*	Sidama	9	3.2	3.2
	KAT**	6	3.1	3.1
Wheat Oromiya	Arsi	30	2.1	2.4
	East Wolega	15	3.1	2.6
SNNPR*	KAT**		1.6	1.1
	Hadiya		1.8	2.8

* Southern Nations Nationality and Peoples Region

** Kembata Alaba & Timbaro

The SG 2000 programme in Ghana continues to be managed primarily by Ghanaians, working closely with the Ministry of Food and Agriculture (MOFA). The programme is being reoriented to conform with the national decentralisation policy, which places district assemblies in charge of much of rural development planning and decision-making.

“SG 2000 is forging new partnerships, which will encourage community involvement and ownership, and thereby ensuring the sustainability of our programme,” says SG 2000 National Co-ordinator Benedicta Appiah-Asante. “We are currently talking with several district assemblies to discuss their involvement in financing small-scale farmers through the District Assemblies Common Fund.”

Set up by central government, the Fund is disbursed, through district assemblies, to finance rural income-generating activities, including crop production loans. For the Extension Test Plots (ETPs), supported by district assemblies, the local rural banks disburse funds while MOFA/SG 2000 extension co-ordinators

assist in farmer selection, introduction to the financial institutions, and technical crop training.

In 1999, 58 farmers’ groups were supported by district assemblies—35 per cent of the total ETP support—with crop coverage of about 117 ha. Fifty-one farmers’ groups in the Western and Upper West regions received funding from the Agricultural Development Bank (ADB) of Ghana, farming a total of 102 ha. Two rural banks supported 21 farmers’ groups to crop an area of 54 ha. “In addition,” adds Benedicta Appiah-Asante, “Monsanto and two local input dealers jointly supported 28 farmers’ groups, farming an area of 58 ha.” Average ETP yields are shown in table 1.

Table 1. Extension Test Plot (ETP) crop yields, 1999

Crop	Average yield (t/ha)
Maize	3.7
Rice	3.2
Cowpea	1.13



Farmers husking QPM in Ghana.

Table 2. Planned MOFA/SG 2000 demonstration programme this year

Region	QPM hybrid	Rice Cassava	Vegetables	Plantain	Total	Source of credit
Ashanti	200	-	-	-	200	RB
Brong Ahafo	150	-	-	50	200	RB
Central	100	50	100	50	300	RB/DA
Eastern	100	50	50	50	250	RB/ADB
Greater Accra	100	-	100	-	200	RB/DA
Northern	150	-	-	-	150	Monsanto
Upper East	85	-	-	-	85	ADB
Upper West	150	-	50	-	200	ADB/RB
Volta	100	50	50	-	200	DA
Western	160	15	70	160	405	ADB/DA
Total	1,295	165	420	310	2,190	

RB - Rural Bank DA - District Assemblies

SG 2000 is forging new partnerships, which will encourage community involvement and ownership

QPM production in Ghana continued to grow. In the Eastern Region, 14 Verification Demonstration Plots (VDPs) of the QPM hybrid varieties Mamaba and Dadaba were planted. “Farmers were impressed with the QPM performance and, as a result, have requested seed for the 2000 major season,” says Benedicta Appiah-Asante.

In partnership with Monsanto, Dizengoff Gh., and the Crops Research Institute (CRI), the SG 2000/Department of Agricultural Extension Services (DAES) programme continues to transfer conservation-tillage technology to small-scale farmers. Ghana now has about 90 conservation tillage VDPs in the five southern regions during the minor season.

The SG 2000 demonstration plot programme has expanded over the years from maize and sorghum to include rice, cabbages, sweet potato and chilli peppers. This broadening of crop offerings has been largely requested by the farmers to help increase family incomes. In 2000, many of these crops will be featured in the ETP programme (table 2).



TF Asare, a commercial poultry farmer from Kumasi—by buying Obatanpa to feed his chickens, Asare has been able to reduce the imports of high protein meal that he uses for chicken feed.

In 1997, Baba Gallé Camara, Director of *Service National de promotion rural et vulgarisation* (SNPRV) said, “Guinea will arrive at self-sufficiency when all the ships in the port of Conakry that formerly carried imported rice are full of fertiliser.”

This prophecy is beginning to become reality. Guinea’s rice imports have decreased from 232,000 t in 1996 to about 150,000 t in 1999, while fertiliser imports have risen from 5,000 t to 12,000 t in the same time frame. Conakry now boasts three agricultural input importers, storing over 2,000 t of fertilisers.

PTP Programme

The SNPRV/SG 2000 field demonstration programme involved some 2,200 Production Test Plots (PTPs) during 1999. Roughly 50 per cent were in rice and 25 per cent in maize. Almost all the maize PTPs used the QPM variety, Obatanpa, which was imported from Ghana. “Rice and maize PTP yields in 1999 were three times the national average,” says SG 2000 Country Director Tareke Berhe.

Over 600 frontline staff received training in the various PTP

technologies in 1999. Other training activities included a two-day course—attended by 200 women farmers and frontline staff—on food processing and conservation of QPM, soybeans, Mucuna, cereals, fruits and vegetables. Study tours were also organised for Guinea MOA staff to visit other SG 2000 countries.

Rice development

The National Extension Programme, in collaboration with the *Institut de recherche agronomique de Guinée (IRAG)* and SG 2000, is now focusing on accelerated rice production under two regimes: intensive management of irrigated areas, involving high levels of inputs and producing two harvests per year with a combined yield of 8-10 t/ha; and less intensive management of upland areas, with lower levels of inputs, and the use of the new West African Rice Development Association



Young woman farmer with an extension field officer holding heads of new WARDA rice types selected for seed.

(WARDA) rice types. “Seed multiplication is underway on 15 ha,” states Tareke Berhe, “and there are plans to expand rice PTPs and WARDA rice seed multiplication plots of at least 1,000 ha in the 2000 crop season.”

SNPRV plans to provide financial support for 500 PTPs and for farmers to grow a total 500 ha of seed multiplication plots of the new African x Asian inter-specific rice types developed by WARDA, in collaboration with national research partners.

WARDA scientists meet President Conté

On 10 March, WARDA scientists

and SG 2000 Country Director Tareke Berhe met with President Lansana Conté. The meeting, organised by the Minister of Agriculture and Livestock, Jean Paul Sarr, was also attended by the national directors of extension and research.

The WARDA scientists informed President Conté that Guinea’s experience in rainfed rice production could be taken as a model for other African countries. They stressed their belief that, if rice production continued to grow at the same pace as in the last three years, Guinea would not only soon be self-sufficient in rice but also able to supply seed to its neighbours.

PTP results 1999

Crop	Region	No. of PTPs	Yield range (t/ha)	Average yield (t/ha)
Rice	Kindia	114	1.1-5.5	3.1
	Mamou	8	1.6-3.4	2.6
	Labe	68	0.8-4.8	3.1
	Faranah	442	0.9-5.0	3.4
	Kankan	177	1.2-5.4	3.1
	All regions	809	1.1-4.8	3.3
Maize	Kindia	5	1-2.2	1.9
	Mamou	130	0.5-4.8	3
	Labe	112	0.9-5.8	4.1
	Faranah	249	0.1-5.1	2.6
	Kankan	87	1.5-6.0	3.1
	Boké*			
	All regions	583	0.8	3.2

* Boké region statistics not reported



Women farmers involved in planting QPM PTPs using Obatanpa imported from Ghana.

SG 2000 field work in Malawi began in the 1998/99 season (September to March). The programme works through, and in partnership, with the regional Agricultural Development Divisions (ADD) under the Ministry of Agriculture and Irrigation.



Norman Borlaug with farmer Mrs S. H. Phombeya of Blantyre ADD during his March visit to Malawi.

Maize is Malawi's dominant food crop, accounting for more than half the national cropped area. Following in importance are various grain legumes, sorghum, cassava and rice. "Maize is grown on 1.3 million ha, with an average yield of 1.8 t/ha," says José Antonio Valencia, SG 2000 Country Director. "About 28 per cent of farmers use hybrid seed and fertiliser—but rarely to the best advantage. The remainder use little to no inputs and obtain yields of 1 t/ha or lower."

SG 2000 arrived in Malawi just as a huge three-year, food safety net programme—funded largely by the European Union, Britain's Department for International Development (DFID), the World Bank, and the Government of Malawi—was being launched to provide a "starter pack" (mainly 2.5 kg maize seed and 10 kg fertiliser) free of charge to all farmers, enough to plant 0.1 ha. A massive logistical effort, involving government agencies, NGOs, and

the private sector was mounted to assemble the starter packs and distribute to some 1.8 million farmers.

SG 2000 challenged the "starter pack" maize recommendations on plant population density and fertiliser application, saying that yields would still be too low. Since landholdings are generally very small, high yields are needed to secure the family maize supply, and to use some land for other crops and agricultural activities.

Maize is Malawi's dominant food crop, accounting for more than half the national cropped area

Some 249 maize Management Testing Plots (MTPs) were

established in four ADDs—Blantyre, Machinga, Lilongwe, and Mzuzu (see table). Average MTP maize yields ranged from a high of 6.7 t/ha in Blantyre to 4.7 t/ha in Mzuzu.

Farmers growing SG 2000 MTPs (each also 0.1 ha in size) obtained, on average, twice the yield as from the starter pack plots (5.1 versus 2.6 t/ha, respectively), and four times higher than the national average. Moreover, even in the face of the free starter packs, 1998/99 MTP loan recovery was excellent—100 per cent in Blantyre, 82 per cent in Machinga, 80 per cent in Lilongwe, and 77 per cent in Mzuzu. "Despite the higher input costs, the MTP technology appears to be quite profitable to farmers," José Antonio Valencia observes.

The 1999/2000 season in September began with in-service training courses for farmers, regional managers and extension workers. Around 2,250 MTPs were implemented, almost all of them maize, in four ADDs. Rainfall has been very good in most parts of the country and the plots look excellent. The government's Starter Pack programme has adopted the MTP



Mzuzu ADD: farmer and ADD co-ordinator in maize field—Malawi's dominant food crop.

recommendation on plant population density.

"Next season we will begin work on upland rice, QPM maize, and maize/legume crop rotations," says José Antonio Valencia. "We will also strengthen our linkages to research and farmer organisations, and with the private sector." Collaboration talks have started with Monsanto and Novartis in conservation tillage technology, promotion of new maize hybrids, and improved pest control.

Maize MTP yields, 1998-99 season

ADD	Rural Development project (RDP)	No. of farmers	No. of ha	Yield range (t/ha)	Average grain yield (t/ha)
Blantyre	Phalombe	20	2	3.3-9.2	6.7
	Chiradzulu	20	2	3.4-11.2	6.1
Lilongwe	West	50	5	3.0-8.9	4.7
	Lifidzi RDP	49	4.9	2.1-8.7	4.8
Machinga	Namwera	50	5	2.7-9.0	4.6
Mzuzu	Rumph North	20	20	1.0-10.5	5.8
	Central Mzimba	20	2	2.8-8.1	5.3
	South	20	2	1.5-8.5	4.7
Total		249	24.90		5.1

Rainfall in 1999 was good in Mali, stimulating agricultural production throughout the country. Some 4,900 farmers planted 5,048 Production Test Plots (PTPs), covering an area of 2,405 ha during the season (table 1). Around 650 farmers were involved in the control of downy mildew, which still poses a considerable threat—reducing yields by up to 40 per cent in some areas. In soil conservation, 7,950 m of dykes were constructed on 1,826 ha of land with improved fallows.

Table 1. SG 2000 field programme, 1999

	No. of PTPs	Area (ha)
Improved fallow	289	194
Intensification	4,099	1,826
Downy mildew control	660	385
Total	5,048	2,405

Table 2. PTP results, 1999

Crop	No. of PTPs	Area (ha)	Average yield (kg/ha)
Maize	2,159	1,033	3,065
Upland Rice	469	210	2,400
Sorghum	217	106	1,429
Millet	1,254	477	1,309
Total	4,099	1,826	-

Table 3. Mali's savings and loans associations (CREPs)

Region	Koulikoro	Ségou	Mopti	Total
No. of CREPs	5	3	6	14
Total members	533	554	673	1,760
Women members	217	200	193	610
Social capital (US\$)	1,230	1,472	1,287	3,989
Loan portfolio (US\$)	3,493	1,611	4,789	9,893
Savings (US\$)	5,049	3,981	6,129	15,159

“SG 2000 places great importance on soil fertility and organic content of the soil,” remarks Marcel Galiba, SG 2000 Country Director. Some 289 PTPs were grown to demonstrate the benefits of applying finely-ground phosphate rock to the soil as well as adding various grain legumes (groundnuts, cowpea, Dolichos,

hibiscus and sesame) to the cropping system.

SG 2000 PTPs are grown in rainfed and irrigated lands. In 1999, QPM was grown in rotation with rice in some irrigated areas. Yields were outstanding. “The irrigated QPM plots have played a key role in the promotion of the



Through legume rotation, SG 2000 works to improve soil fertility and organic matter content.

QPM, Dembanyuma,” notes Marcel Galiba, “and have become a major source of income.”

Of around 4,000 crop intensification PTPs, approximately half were in maize, followed by millet, rice and sorghum (table 2). PTP farmers obtained yields substantially higher than national averages. For example, over 50 per cent of farmers grew maize PTPs, achieving an average yield of nearly 3.1 t/ha.

The village-based savings and loans associations—the *Caisse rurale d'épargne et de prêt* (CREP)—continue to grow following their launch in Mali in 1997 (table 3). The CREP movement brings together the key members of the local community to create village savings and loans association. With over 1,760 members—26 per cent of whom are women—more than \$15,000 had been placed in savings by the end of 1999.

The Millet and Sorghum Initiative (MSI)

SG 2000 is in the final stages of negotiation, with IFAD and Cooperation Francaise/*Centre de population internationale en recherche agronomique pour le développement* (CIRAD) assuming leadership, for a three-

year regional Millet and Sorghum Initiative, involving governmental and non-governmental organisations, private entrepreneurs, and farmers from Mali, Niger, Nigeria, Senegal, Chad and Burkina Faso. The MSI will seek to promote market development in sorghum and millet, with more industrialised processing for a wider range of food products. “Stimulating market demand for these dominant crops will have widespread benefits throughout the Sahel,” says Marcel Galiba. A MSI co-ordinator will be hired and based at the SG 2000 office in Bamako.



Saving the soil—building dykes to slow rain run off.

International attention focused on Mozambique earlier this year following the severe flooding in the country. Five of Mozambique's ten provinces suffered to varying degrees and some 141,000 ha of crops were destroyed. Nearly one million of Mozambique's population of 18 million were seriously effected.

Since the floods began receding in March, there has been a determined effort to distribute seed and implements and encourage farmers to attempt a second season planting of maize and other crops in low-lying areas. Despite the late onset of the rains in the central and northern regions—the most productive areas of the country—farmers are expected to attain average yields.

The 1999/2000 season saw the SG 2000/DNER (National Directorate for Rural Extension) field demonstration programme expand into three additional provinces—Niassa, Tete and Zambesia, add new NGOs partners, and increase the private sector's involvement in the programme.

Several new input retail outlets have been opened during 1999/2000. The Citizen's Network in Foreign Affairs (CNFA) has begun to work with potential

retailers in Manica province. Also, the IFDC/USAID/MADR (Ministry of Agriculture and Rural Development) fertiliser sector support project has been approved and recently began operations.

The release of QPM materials will be decided on trials harvested in May/June this year

“Most of the inputs supplied on credit for the 1999/2000 crop season were financed by the private sector,” notes Country Director Wayne Haag, “with SEMOC, Agroquimicos, Agrivet and Agrifocus being the main partners.”

SG 2000 and its partner organisations worked with nine crops during the 1999/2000 season—the most popular being maize and rice (see table). “Sunflower, sesame and pigeon pea were also added to the programme, at the request of several NGO partners who have had success in promoting and marketing these crops,” says Wayne Haag.

SG 2000 continues its shift toward working more with farmer associations rather than individual farmers. Of the 2,231 Demonstration Plots (DPs) supported by input credit, 1,500 are with farmers in associations.

Efforts to intensify the use of “no-till” and “minimum till” technologies continue, in maize, rice, and field beans. Despite the setback caused by the flooding in certain regions, good progress was made this season. There was also an expanded no-till effort with sunflower and sesame.

INIA, the national agricultural research organisation, and SG 2000 have been testing available QPM germplasm, Open Pollinated Variety (OPVs) and hybrids over the past three years. The Ghanaian variety, Obatanpa,



Rice research technician evaluating a rice variety trial near Beira.

has performed well, in part due to its Maize Streak virus tolerance. The release of QPM materials will be decided on trials harvested in May/June this year.

Staff from DNER's and SAA/IITA's agroprocessing programmes conducted a manufacturing training course in late 1999 on cassava processing equipment to make the fermented flour, Rali (the equivalent of Gari), and cassava chips for flour production. Technical staff from two fabricators, Kaness and Afro-Alpha, received training.



Sunflower was added to the programme following the request of NGO partners.

Crop demonstration plots and on-farm research trials, 1999/2000

Region Crop	Nampula	Niassa	Cabo Delgado	Manica	Tete	Sofala	Zambesia	Gaza	Total
Maize	720	10	205	529	14	36	5		1,519
Rice						137		225	362
Sunflower	105	2	260	75					442
Cotton	260		33						293
Pigeon Pea	121								121
Tobacco	98								98
Beans		15		45					60
Sesame			132						132
Potato					7				7
On-farm trials	72			45					65
Total Field Plots	1,324	27	630	694	21	173	5	225	3,099



Sabo Garba (centre) shows a bountiful wheat crop to KNARDA's SG 2000 co-ordinator Othman Yahaya Othman.

Nigeria's historic 1999 developments—the democratic election of a new government and the new vigour of President Obasanjo's administration—have had special significance for SG 2000's work in Nigeria. After seven years of field work, SG 2000 programme had intended to bring its direct presence in Nigeria to a conclusion in 1999. However, at the request of many agriculture leaders and farmers—and President Obasanjo himself—SG 2000 has agreed to continue in Nigeria through 2002.

During the summer season, 2,500 farmers grew maize management training plots (MTPs) in Katsina, Kano, Kaduna, Jigawa, Gombe and Bauchi states (see table). "State maize MTP yields averaged between 4.1-5.8 t/ha," noted Dr Ahmed Mustapha Falaki, Head of Extension at ABU and SG 2000 National Co-ordinator. In addition, some 423 MTPs were also grown for a number of crops—including cotton, millet, cowpeas and sorghum. Farmers especially liked the performance of a new ICRISAT millet variety, SOSAT C88.

In August 1999, SG 2000 co-hosted a national maize workshop at Ahmadu Bello University (ABU), Zaria, which was attended by more than 200 agriculturalists, including Ango Abdulaihi, Presidential Food Security Adviser, Lukas Brader,

International Institute of Tropical Agriculture (IITA) Director General, and Norman Borlaug, along with farmers, private entrepreneurs, and government agricultural officials and workers. The proceedings of the papers and discussion are available.

The wheat demonstration programme for the 1999/2000, only involved 362 farmers in Jigawa, Kano, Gombe and Bauchi states. "Unfortunately the number of farmers this season is considerably lower than the 1998/99 season," commented SG 2000 Country Director José Antonio Valencia. "Incorrect information on low wheat prices in the country discouraged farmers from growing wheat."

In March 2000, Kano and Jigawa state Agricultural Development Projects (ADPs), ABU, SG 2000, and Federal Ministry of

Agriculture officials organised a mass wheat field day in honour of a visit by Yohei Sasakawa, President of Nippon Foundation of Japan and Dr Norman Borlaug. More than 1,000 farmers, extension workers, researchers, agricultural officials, and input suppliers and flour millers participated. After the field day, Yohei Sasakawa and Norman Borlaug visited President Obasanjo and his cabinet advisers in the capital, Abuja, to discuss future collaboration.

Programme for summer season, 2000

Currently, 2,500 MTPs are planned, emphasising improved production technologies for rice, sorghum, cowpeas, millet, soybean, cotton, sesame and early-maturing maize.

Partnerships continue

SG 2000 continued to work in partnership with ABU, IITA, International Crop Research Institute for Semi-Arid Tropics (ICRISAT) and the private sector. Five new wheat varieties (with higher yield potential than the dominant variety, Seri) were evaluated by ABU, ADPs, SG 2000, and farmers in 1999/2000.

"SG 2000 collaboration with the Dan-Hydro Fertilizer Company continues," says José Antonio Valencia. "They have donated fertilisers for use in demonstration plots at major field day sites and participated in SG 2000 training sessions." Dan Hydro Fertilizer is a new joint venture of Norsk Hydro of Norway and Dangoti Enterprises of Nigeria.



Chilli pepper harvest—offering a new crop diversification option for farmers.

Maize MTP results, 1999 summer season

State	No. of ha	No. of farmers	Average yield (t/ha)
Jigawa	47	187	4.4
Gombe	49	196	4.1
Katsina	66	263	5.8
Kaduna	262	1,047	5.7
Kano	150	601	4.6
Bauchi	57	226	4.7
Totals	631	2,520	5.2

The fourth year of the SG 2000 Uganda programme has started encouragingly, following high agricultural production in the second 1999 season, after sporadic drought in the first season. Food prices have consequently declined in the central and southeastern parts of the country.



QPM variety trials at Mukuono Agricultural Research Development Centre. Researchers and farmers are being given first-hand opportunities to evaluate QPM at 300 sites around the country.

During 1999, SG 2000's collaborative programme with the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) expanded into four new districts—reaching half of all districts in the country. Over 8,000 farmers attended field days and training events that included demonstrations of improved crop husbandry and postharvest practices, efficient use of animal traction, and productivity-enhancing agroprocessing equipment.

Country Director Abu Michael Foster reports a significant breakthrough in fertiliser supply arrangements in Uganda. "National distributors are now linked directly to an international supplier—Norsk Hydro East Africa Ltd—which is bringing greater efficiency of supply," he says. Fertiliser prices (primarily urea) have fallen by an average of US \$170 per tonne, and fertiliser and seed sales have increased strongly.

Soil fertility improvement is being encouraged by the use of legumes, such as groundnuts, field beans and velvet bean (*Mucuna*). Farmers have produced over 100 t of seeds of these legumes for use in rotation and intercropping systems that build soil fertility.

SG 2000 is actively supporting the government's national Plan for Modernisation of Agriculture (PMA), which offers new opportunities for SG 2000 to collaborate with the World Bank and other donors, in support of local government agricultural development. SG 2000 is participating actively in the creation of a new National Agricultural Advisory Delivery Service (NAADS), which aims to put considerable resources into the hands of local government—and will allow districts to use high-impact technology transfer approaches.

In 2000, the MAAIF/SG 2000 technology demonstration programme plans to reach 80 per cent of all sub-counties in the 18

Demonstration plot yields, 1995 to 1999

Crop yields (t/ha)	1995	1996	1997	1998	1999
Maize	1.5	1.7	2.5	2.3	2.5
Beans	1	1.2	1.5	1.4	1.5

districts where SG 2000 currently operates. Over 300 extension staff have been mobilised to work with farmers in 272 sub-counties. Sixty motorcycles have been provided to extension staff in order to improve their operational efficiency.

After initial success in Tororo and Busia, cassava mosaic-resistant cultivars will be made available in two more districts in western Uganda—Masaka and Ssembabule. The focus on the multiplication of bean seeds, in central and western parts of the

country, will change to climbing beans and root rot-resistant cultivars. Improved seed (varieties K132 and K131) is now widely available to farmers. New varieties of groundnuts (Igola 2 and Serere nut) will be multiplied in Soroti and Masindi following the successful multiplication of the existing variety, Iglola 1, in 1998/99.

Four hundred animal traction kits (plough, cultivator) were made available to farmers at the start of the year. One hundred new kits have been placed with farmers and training programmes are underway with several groups of farmers graduating before the start of the season.

This year, over 300 farmers will test the QPM variety Obatanpa alongside normal maize on verification plots in seven districts. Masindi seed farm has produced two tonnes of Obatanpa seed in collaboration with the National Agricultural Research Organisation (NARO) and SG 2000.

Soil fertility improvement is being encouraged by the use of legumes, such as groundnuts, field beans and velvet bean (*Mucuna*)



Bean seeds being cleaned and sorted at a stockist's shop in Masaka District before resale to farmers.

SG 2000 publications and videos

For copies please contact Raitt Orr & Associates Ltd in London

Publications



1. Proceedings of Workshop 1999: Innovative Extension Education in Africa.
2. Proceedings of Workshop 1998: Partnerships for Rural Development in Sub-Saharan Africa.
3. Proceedings of Workshop 1998: Microfinance in Africa.
4. Proceedings of Workshop 1998: Enhancing Postharvest Technology Generation and Dissemination in Africa.
5. Proceedings of Workshop 1997: Agricultural Intensification in Sub-Saharan Africa.
6. SG 2000 in Nigeria—The First Seven Years (1999).
7. The Earth and the Sky—the change and challenges in Africa agriculture, (1998).
8. This is SAA: An introduction to the work of the Sasakawa Africa Association.

Other proceedings available:

- Proceedings of Workshop 1996 on Women, Agricultural Intensification, and Household Food Security.
- Proceedings of Workshop 1996: Overcoming Rural Poverty in Africa.
- Proceedings of Workshop 1995: Achieving Greater Impact from Research Investments in Africa.
- Proceedings of Workshop 1994: Strengthening National Extension Services in Sub-Saharan Africa.

Videos



1. Setting the Grassroots on Fire—Norman Borlaug and Africa's Green Revolution. 1999.*
2. Ethiopia, My Hope . . . My Future . . . The 'Green Revolution' in Ethiopia. 1998.*
3. Breaking the Mould. Bringing African Universities into Development. 1997.*
4. Fulfilling the Promise. How nutritionally-improved maize can alleviate malnutrition in maize-dependent countries. 1997.*
5. Facing the Future. The SG 2000 Programme for Agricultural Development in Africa. 1996.*
6. You Can't Eat Potential. Breaking Africa's Cycle of Poverty. 1996.*

All videos are available in English and French. Video formats are PAL, Secam and NTSC.

* Also available in Japanese.

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