Feeding *the* Future

Conservation tillage

Gaining ground in Africa

Conservation tillage (CT) has been spreading rapidly throughout the agricultural world over the past 20 years. Today, some 100 million ha are planted using CT technology, and the area is expanding at 5-6 million ha per year.

Photograph courtesy of the Nippon Foundation

Conservation tillage has particular relevance for women farmers. It reduces the need to cultivate the soil and saves many additional days of weeding. It also improves household food security.

The term "conservation tillage" refers to planting crops in soils which have received little or no mechanical tillage (either by ploughing or turning over with a hoe), and in which only a small hole or narrow trench is opened to plant and cover the seed. Plant residues are left on the surface as long as possible and the residues remain undisturbed after planting.

Not all soils are suitable for cropping, either conventionally or with CT. Waterlogged fields have to be drained and compacted soils have to be deep tilled before they are suitable for transition to CT. In many low-rainfall, dry land situations without irrigation, the amount of residues available at harvest may not be enough to provide adequate cover. Depending upon the extent to which the soil is disturbed, more specific terms, such as minimum tillage, no-till or zero-tillage, are used in place of "conservation tillage."

CT involves the use of herbicides for effective weed control before crop planting. The herbicide is sprayed on the field, killing weeds, which then dry up and become part of the mulch. As with conventional tillage, for long-term sustainability, crop rotations are needed that can break potentially damaging disease and pest cycles and still be profitable to the farmer. Mulch management is perhaps the most difficult aspect of CT. Bush fires and use of crop residue for animal feed all reduce the amount of mulch.

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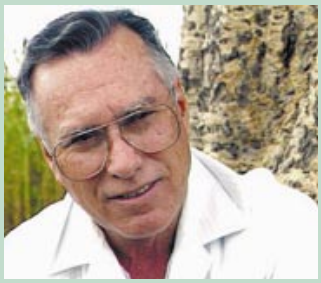
SG 2000 leadership strengthened

In July 2001, Dr Marco Quiñones, Sasakawa Global 2000's most senior field staff member, was appointed Regional Director for Africa by the Sasakawa Africa Association's Board of Directors.



Quiñones has worked in Africa since 1986 when he joined the Global 2000 project in Sudan as a senior agronomist, and was responsible for initiating wheat demonstration work in the irrigated Gezira region, which led to a quadrupling in production by 1992.

In late 1988, Quiñones established the SG 2000 project in Tanzania, which eventually spread to seven regions of the country and, in 1993, set up the SG 2000 project in Ethiopia.

"Marco's appointment as regional director is a source of great satisfaction and pride for me," says SAA President Norman Borlaug. "I have known him for nearly 40 years, from when he was fresh out of school, and I have seen him develop as a talented scientist with a broad grasp of the many factors involved in agricultural development. He has made an enormous contribution to our programmes in Africa these past 15 years."

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April 2002

The Nippon Foundation

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Gaining ground in Africa

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CT offers a number of agricultural benefits compared to normal tillage, including (1) better timing in the sowing of the crop, thus, using the full extent of the rainy season, (2) improved erosion control when combined with good mulch cover, (3) improved water penetration and conservation in semi-arid environments, (4) reduced turnaround between crops in multiple cropping systems, (5) lower costs due to reduced labour requirements, since little or no tillage or weeding is needed, and (6) especially for the small-scale farmer, it offers an opportunity to increase the area cultivated with very little capital investment.

Over time, continuous use of CT can bring about long-term benefits, such as improvements in soil organic matter content and structure, improved weed and pest control, if adequate crop rotations are used, and improved nutrient mobilisation.

SG 2000 began its work with CT in Ghana in 1993, teaming up with the Ministry of Food and Agriculture (MOFA) extension service, the Smallholder Business Development Programme of the Monsanto Company, and the Crops Research Institute (CRI), to launch a major on-farm research and promotion programme. CRI had initiated CT research (no-till with mulch) in the 1980s under the Ghana Grains Development Project (GGDP) funded by the Canadian International Development Agency (CIDA), and involving close collaboration with a series of CIMMYT scientists assigned to Ghana.

Good mulch cover reduces erosion, conserves moisture and improves soil organic content.

Between 1996 and 2001, the Ghana no-till promotion programme established nearly 2,000 extension test plots (ETPs) to train participating farmers in the practical aspects of this technology. Most of the ETPs were established in the "maize belt" in Ghana, which covers Ashanti, Brong-Ahafo, and parts of the Northern Region. By 2000, herbicide dealers were estimating that CT was being practiced on 45,000 ha by upwards of 100,000 farmers.

"Many people have played a role in the development and spread of conservation tillage technology in Ghana," notes Benedicta Appiah-Asante, SG 2000 project co-ordinator. "From the SG 2000 side, Wayne Haag and Ben Dzah have been the driving forces; from CRI, Kofi Boa has provided the primary leadership and Roberto Soza, a former CIMMYT scientist assigned to CRI during the 90s, made a notable contribution. From the Monsanto side, consultant Jim Findlay has been instrumental."

In 2001, SG 2000 and Monsanto financed an impact study on the no-till technologies in Ghana, which was conducted by researchers from CIMMYT headquarters and CRI. Researchers interviewed 146 farmers in the maize belt, including those who were currently using CT, those who had used it and at some point abandoned it, and those who had never used it. The average farm size was 2.1 ha for those involved in the study.

Sixty-two percent of the farmers interviewed had continued using CT for two years or more. They were very satisfied with the technology. When asked to list the three most important impacts on their families, they responded as follows:

Impact on family

% of farmers reporting*	
Increased income	87
More time for other activities	48
Increased food availability	51
Reduced labour and effort	43
Reduced child labour	5
Financial self-dependency	8
Farm expansion	7
Built house/acquired building plot	6
Prompt payment of school fees	19
Purchased home appliances	10
Purchased milling machine	3
Improved health	3

* The percentages do not add up to 100% because of multiple answers.
Source: CIMMYT, 2002

The Ghana study showed that the substantial economic advantage of CT over the traditional system of shifting cultivation grew with each year that no-till was performed.

Conservation tillage technology has now spread from Ghana to most other SG 2000 project countries and is taking root in Mozambique, Ethiopia, Malawi, Nigeria, Mali, Burkina Faso and Guinea.

"CT will form a key part of the soil fertility restoration and maintenance strategies being developed by the Government of Tanzania, as part of the new SOFRAIP loan being negotiated by the government with the World Bank," says Marco Quiñones, SG 2000 Regional Director for Africa. "Moreover, over the next five years, I envisage that CT will be a central technology in all SG 2000 programmes where sufficient moisture exists for adequate mulch establishment and management."

SAA President, Dr. Norman Borlaug, is enthusiastic over the results obtained so far with CT technology and smallholder agriculture. "CT will allow farmers to expand the area under production, increase incomes, and reduce the labour requirements and drudgery associated with slash and burn shifting cultivation and hand weeding," he says. "In areas heavily affected by HIV/AIDS, CT technology can help to mitigate growing labour shortages."

SG 2000 leadership strengthened

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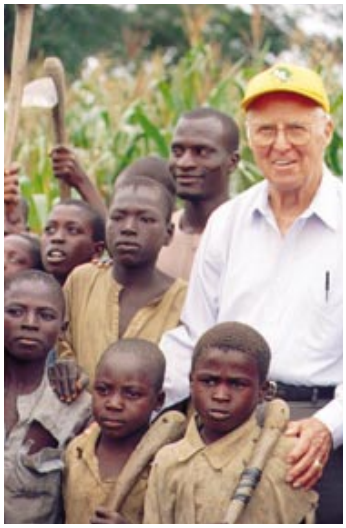
Dr. Quiñones considers that one of his main responsibilities is to strengthen the networking amongst the various SG 2000 country projects, governments and key development assistance organisations. "Greater sharing of experiences and information will increase efficiency and our effectiveness," he says.

Quiñones graduated from the National University in Mexico City in 1963 in marine biology, and later obtained an MSc in cytogenetics and a PhD in plant pathology from the University of Manitoba in Canada. He joined the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico in 1963, rising to head the durum wheat breeding programme. In 1976, he was appointed national wheat research team leader at Mexico's National Institute of Agricultural Research (INIA).

From 1979-85 he worked in private farming in his home state of Sonora. He has also spent time teaching at the National University and the Ciudad Obregon campus of the Technological Institute of Monterrey School of Agriculture. "Strengthening the human capital of young scientists and extensionists has always been a particular interest of mine," he says.

Marco Quiñones has authored and co-authored over 50 scientific publications and has received several awards for his achievements in agriculture.

Technology is available—incentives are lacking



Dr Norman E Borlaug, SAA President

Over the past 15 years, SG 2000, in partnership with national extension services in 14 sub-Saharan African countries, has assisted several million farmers to grow on-farm demonstration plots in most of the important food crops. This has conclusively shown that:

- Technology is available to double and triple food crop yields.
- Good yield response to fertilisers has been obtained across a broad spectrum of soil conditions.
- Farmers have shown great eagerness to adopt the high-yield crop technologies demonstrated through the Ministry of Agriculture/SG 2000 programmes.
- Government extension officers, when given training, mobility, and logistical support, are effective change agents.

Despite the impressive yield results obtained in the demonstration programmes, participating farmers have remained caught in cost/price production squeezes at the farm gate (high input costs; low output prices) which have kept them from fuller adoption of the recommended technologies.

Although current market conditions and transport infrastructure in Africa will not permit as favourable input:output price ratios as in the industrialised countries, certainly they can be much improved over what smallholder farmers face today. If farm gate fertiliser prices were only twice international prices rather than three-to-four times, as they are now, this would make a huge difference in the economics of using high-yield technological packages built around fertiliser and improved seed.

Although research organisations have developed many improved varieties in most of the major food crops, seed supply in Africa remains a very weak link in many SG 2000 countries. Only in southern Africa and parts of East Africa is there any real semblance of an industry. Surprisingly, there are almost no viable seed companies in west and central Africa. Establishing the conditions for the growth of effective seed industries could result in tremendous productivity gains, especially if this development goes hand-in-hand with an expansion in fertiliser use.

A continuing stream of new research information and technology is also essential in Africa, not only for the basic food, feed and fibre crops, but also for cash crops to expand traditional and non-traditional export markets. To do this, African researchers and extension workers need adequate incentives to do their work properly. Such institutional capacity cannot be built on pitiful salaries and operating budgets.

One of the failures of leadership in Africa has been an inability to see the powerful linkages that are created between a rapidly growing agriculture and other economic sectors. As a result, few African governments have adopted pro-growth agricultural and rural development policies.

International donor agencies also must share in the blame, since they have continued making grants and loans to governments which fail to serve their rural populations—in education, health, or development.

Also, the hypocrisy of the rich nations, which extol the benefits of globalisation yet continue to find ways to restrict market entry for Africa's agricultural and fibre crops while subsidising their own farmers to the tune $350 billion per year—roughly equal to the GDP of sub-Saharan Africa—must end. It is high time developing nations be allowed to compete on a level playing field in selling their agricultural and textile products in the industrialised nations.

Agricultural growth can create large economic multiplier effects throughout Africa. But to achieve such growth, agricultural producers, processors, suppliers and traders must have adequate incentives. The private sector needs more incentives to invest in developing input delivery systems, markets, and agro-industrial enterprises. Governments need to put policies in place that will encourage these sorts of activities and enterprises.

Although research organisations have developed many improved varieties in most of the major food crops, seed supply in Africa remains a very weak link in many SG 2000 countries.

Until African governments and donors put "pro growth" policies and programmes into place, sub-Saharan African agriculture will continue to perform far below its potential, poverty reduction will remain an elusive goal, and human suffering and misery will continue.

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.

Building smallholder input delivery systems

For their businesses to be viable, input dealers need to stock multiple product lines.

Throughout Africa, small shops and traders bring soft drinks to even the most remote villages, yet fertiliser, seed, and other critical farm inputs are often scarce or unavailable. Indeed, smallholder farmers often have to travel a day or more to buy production inputs.

Over its 15-year history, SG 2000 has promoted the development of village-level input supply systems—both through private entrepreneurs and farmers' organisations and through local savings and loan associations. Dynamic, input-assisted crop demonstration programmes help to build demand for inputs among smallholder farmers. Demonstration plots provide farmers with first-hand experience of the potential of high-yielding technologies and serve as a training ground for teaching optimal input use efficiency.

SG 2000 has further sought to build smallholder input delivery systems by using local dealers to supply the inputs utilised by participating farmers in the crop demonstration programmes. In many project countries, SG 2000 has provided participating farmers with input loans for one or two years. As the number of demonstration plots has grown into the thousands (and in the case of Ethiopia several million), input demand has grown, thus providing added incentives for larger input supply companies, private entrepreneurs and farmers' associations to enter the smallholder input supply business.

Smallholder credit

SG 2000 has been active in attempting to link farmers and input dealers to more formal credit sources. In Ghana, such a programme was established in the mid-1990s between Ghana's Agricultural Development Bank (ADB), private input suppliers, the Department of Agricultural Extension Services, and organised groups of farmers who had signed up to participate in the Ministry/SG 2000 crop demonstration programmes. The farmer groups approved for input credit by ADB were supplied with the necessary inputs by private dealers who, in turn, were paid by ADB. After harvest, participating farmers were expected to repay their production loans to ADB.

"This programme ran fairly successfully for five or six years when SG 2000 was active in providing monitoring and follow-up," notes Chris Dowswell, SAA Director of Communications. "Over time, however, the system broke down because of the relatively high transaction of ordering and distributing the inputs and processing loan requests, and because of growing loan defaults. On a more positive side, the increased use of these production inputs has helped to develop more input outlets at the village level, even though these enterprises operate primarily on a cash and carry basis."

"More recently," comments Benedicta Appiah-Asante, SG 2000 project co-ordinator in Ghana, "farmers participating in the extension demonstration programme have been able to access production credit from local rural banks and district assemblies and are sourcing their required inputs independently from local stockists." The rural banks, in particular, have been impressed by the profitability of the conservation tillage technology, which has gained rapidly in popularity in Ghana's maize belt.

In Benin, Mali and Burkina Faso, farmer members of the village savings and loans associations, called CREPs *(Caisse Rurales de Epargne et de Prêt)*—which SG 2000 helped to establish—have been able to draw on their savings and credit lines to purchase inputs.

In Benin, where the CREP movement had grown to 20,000 members in some 100 CREPs, a national federation of CREPs, called FENACREP, was able to negotiate large credit lines for fertiliser for its members, first from the parastatal cotton company and later from a private fertiliser company, HydroChem-Benin. Some 2,000 tonnes of fertiliser were supplied in 1999 and 1,200 tonnes in 2000.

Unfortunately, the individual CREPs did not channel these fertiliser sales through CREP loans to individual members, but rather passed the fertiliser directly on to farmers with full credit. "Adverse weather during 1999 and 2000, and poor management of the fertiliser credit lines led to serious defaults and left FENACREP in a crisis from which it has not been able to recover," reports Marcel Galiba, who was instrumental in the creation of the CREP system when he was SG 2000 country director in Benin.

Input dealer business development

SG 2000 has also experimented with various schemes to assist village input dealers to obtain credit lines from private wholesalers and bankers. In Tanzania in the mid 1990s, SG 2000 helped to select and screen village stockists (either individual entrepreneurs or farmers' associations) and introduce them to larger input suppliers, such as the Tanganyika Farmers Association (TFA) or the Tanzanian Fertiliser Company (TFC). In a programme called the Joint Input Guarantee Scheme (JIGS), participating village stockists paid 50 percent on receipt of a shipment of inputs, and received a short-term credit line for the remaining 50 percent, which was guaranteed by SG 2000. This debt was liquidated when the village stockists made the next order for inputs.

"JIGS worked quite well from the standpoint of input distribution and loan repayment," says SG 2000's Michael Foster, one of the creators of the scheme. "However, the programme did not continue, largely because TFC and TFA were under financed themselves, and were unwilling to establish ongoing credit lines to the village dealers without the SG 2000 guarantee."

Technical training has been offered to stockists so that they can advise farmers on product use and safety.

Building smallholder input delivery systems

In Uganda, Foster, the SG 2000 country director, spearheaded the formation of a rural stockists' network. Initially, the identification of rural stockists in strategic locations was carried out in collaboration with extension workers and community leaders. Training was then undertaken to equip rural stockists with a basic knowledge of business management with an emphasis on marketing, procurement and record keeping.

Prices and profit margins were negotiated between the potential stockists and distributors and importers of agricultural inputs – with the dealership agreement being witnessed by SG 2000 staff. To facilitate the process, SG 2000 stood as guarantor for the stockists for an initial period of two years, to be reviewed after each season's performance.

"This credit guarantee component was specifically tailored to support retailers and distributors serving farmers in the less desirable rural agricultural input distribution network as opposed to the large-scale farming commercial sector," says Foster.

With increased demand for agricultural inputs through the SG 2000/Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) agricultural intensification programme, the stockists' network expanded rapidly and now serves farmers in more than 30 districts in Uganda.

"We originally hoped that rural finance institutions would adapt the guarantee scheme and work out a tailored lending facility that would be attractive to rural entrepreneurs," adds Foster.

We regard the development of the stockists' network as one of our most significant contributions to the welfare of rural farmers in Uganda.

He was proved right. Stockists who have consistently performed well with the guarantee system have taken regular commercial loans from banking institutions. Financial support for stockists has also been forthcoming from micro-finance organisations.

"We regard the development of the stockists' network as one of our most significant contributions to the welfare of rural farmers in Uganda," comments Foster. "Moreover, it has laid the foundation for potential grain merchants and suppliers for other rural services."

In collaboration with national research and extension organisations, technical training has been offered to input dealers so that they can advise farmers in the best use of inputs. In some project countries, such as Mozambique, SG 2000 has also collaborated with other NGOs in business management training for local dealers.

An analysis of village stockists also shows that product mix is an important factor in establishing viable business concerns. Clearly, some inputs have higher margins and faster turnover, and can help to "pull" along the sales of other product lines. In Ghana (see Page 12), CRI researchers interviewed 28 input dealers who supplied inputs to farmers who had adopted CT technology. Sixty-four percent of the dealers reported that their herbicide sales had 'doubled or tripled' over the past three years (see table).

Multiple product lines are important to make input stockists into viable small businesses. Ideally, items for sale would include improved seeds, fertilisers, crop protection chemicals, tools and implements, and veterinary supplies. In addition, stockists should be able to provide some technical advice on product use and safety. Often, contract services, such as spraying of crop protection chemicals and rental of certain equipment, can also be profitable business lines.

Packaging size is also important for smallholder farmers. SG 2000 has championed the packaging of improved seed in 1, 2, and 5 kg bags and fertiliser into 5 and 10 kg sacks—lots that are more easily transportable and affordable for many farmers—rather than more traditional sizes of 10, 25 and 50 kg bags. "Our experience has shown that appropriate packaging encourages the adoption of external inputs," reports Wayne Haag, SG 2000 country director in Mozambique, "especially during the early stages, when small-scale farmers are first testing the technology or just beginning to build their capital base."

SG 2000 has championed the packaging of improved seed in smaller lots, which are more affordable and easier to transport for smallholder farmers.

"More development attention needs to be paid to the profitability of input supply systems and their financial requirements," observes Marco Quiñones, SAA Regional Director for Africa. "Market development of the commercial grain sector, including input supply to small-scale farmers, involves considerable risk. Without public-private partnerships that include some cost- and risk-sharing, sufficient incentive may not exist for private investors to become more active in smallholder input delivery."

Importance of product line sales in Ghana, 2000

Product	% of dealers selling					
	1st line	2nd line	3rd line	4th line	5th line	6th line
Herbicides	46	50	0	0	0	0
Seeds	43	21	11	7	4	0
Pesticides	4	11	43	29	7	0
Fertilisers	7	14	18	39	14	11
Knapsacks	0	4	21	4	7	0
Veterinary products	0	0	0	0	7	0
Tools	0	0	0	0	7	7
Other products	0	0	0	0	4	0
N/A	0	0	7	14	54	79

Source: CIMMYT/CRI Study on Impact of No-Till Technologies in Ghana

Workshop 2001 – debating the changing environment

Ayako Sono welcomes President Yoweri Museveni to the opening of the Workshop.

Workshop 2001, held in Kampala in June last year, addressed the impact of the changing environment on food security in Africa.

This was the fifteenth policy conference to be organised by the Geneva-based Centre for Applied Studies in International Negotiations (CASIN) and was attended by ministers of agriculture and policy makers from SG 2000 countries, representatives from the World Bank, bilateral development agencies and agribusiness companies.

Speaking at the official opening, President Yoweri Museveni said that while Uganda was virtually self-sufficient in food production, there was still malnourishment at household level. "Modernising agriculture," he said, "is a holistic approach. If there is not a good road network, food cannot be distributed. If there is no money in the rural economy, our people will move to the towns."

In her opening statement, Ayako Sono, the Chairperson of the Nippon Foundation, which funded the workshop, spoke about food security as a priority for Africa. The President of the Nippon Foundation, Yohei Sasakawa, said that for Africa "there can be no development without improved agriculture." In his address, former US President, Jimmy Carter, paid tribute to the success of women in agriculture, the cornerstone of the farm family.

Jimmy Carter (second left) and Yohei Sasakawa (centre) enjoy a dance with farmers led by Uganda's Vice-President, Specioza Kazibwe (second right), in Iganga district.

In the first session, which he chaired, the former President of Benin, Nicéphone Soglo, spoke of the need for governments to "create an environment for rural people to take control of their own governance. Decentralisation helps to create a spirit of ownership —providing it goes hand in hand with financial power."

Ghana's Deputy Minister of Food and Agriculture, Dr Abdel-Majeed Haroun, shared this view. "Decentralisation," he said, "affords us the opportunity to build local capacity, check corruption at the micro-level, and focus our productive energies on the efficient exploitation of our comparative and competitive advantages."

In a session chaired by Ethiopia's Minister of Agriculture, Mengistu Hulluka, the World Bank's David Nielson returned to the role of women in agriculture—pointing out the "vulnerability of women to poverty ahead of male youth and households with large families. The superimposition of the devastating consequences of HIV/AIDS on women is compounding their vulnerability."

"Fortunately," he continued, "there is a strong national policy framework and high level political commitment to the mainstreaming of gender issues and consensus into the national socio-economic development agenda in Uganda."

In his concluding comments, G Edward Schuh, Regents Professor of International Economic Policy at the University of Minnesota, said that, "as we think about the modernisation of agriculture we tend to focus our attention on promoting technological change. But we need to give a great deal more attention to institutional and policy innovations. In the absence of such innovations, agricultural modernisation will be restrained and the rate of return to our investments in agricultural research and extension will be limited."

"If there is not a good road network, food cannot be distributed. If there is no money in the rural economy, our people will move to the towns."

President Yoweri Museveni

"Africa's farmers still have to cope with the shortage of inputs."—Dr Wilberforce Kisamba-Mugerwa, Uganda's Minister of Agriculture.

Mengistu Hulluka, Ethiopia's Minister of Agriculture, who chaired the session on the challenges for extension service delivery, with Yohei Sasakawa.

SG 2000 and IITA travelling seminar in Nigeria

At the of end August 2001, SG 2000 and IITA (International Institute of Tropical Agriculture) staff participated in a travelling seminar in Nigeria, visiting IITA headquarters in Ibadan and the IITA Regional Station in Kano. Some 15 SG 2000 staff, including Norman Borlaug, SAA President, Ernie Sprague, Global 2000 Senior Advisor for Food Security and Marco Quiñones, SAA's Regional Director for Africa, participated in the seminar. In addition, Professor Tetsuo Matsumoto of Nagoya University in Japan—and Team Leader of the upcoming SG 2000 External Review—participated in the travelling seminar and subsequent SG 2000 staff retreat.

The SG 2000 group interacted with scientists from IITA, ICRISAT, WARDA, and ICRAF on recent research developments in maize, cowpeas, soybeans, rice, sorghum and millet, cassava and yams, and agroforestry. In addition, the group visited the IITA postharvest engineering unit and food technology programme.

Excellent progress is being made in the development of striga-resistant maize varieties, extra early maize varieties and dual-purpose grain legumes and sorghums, which produce good grain yield as well as increased foliage.

Mrs Halos Kim (right), Head of IITA's Postharvest Engineering Unit, joins her team in a demonstration of IITA agroprocessing equipment (see page 9).

After two days at the IITA campus in Ibadan, the group headed north to the Kaduna-Kano area, where SG 2000 and the international institute researchers visited extension field demonstration plots in maize, cowpeas, and soybeans, interacting with participating farmers. The group also visited researchers at the IITA Kano station, where the discussions focused primarily on advances in cowpea research.

Following the travelling seminar, SG 2000 staff held a two-day retreat in Kano, presenting their logical framework project documents and interacting with Professor Matsumoto about the upcoming SG 2000 external review.

"Almost every year the SG 2000 staff is combining its staff retreat with a travelling seminar, generally involving IARC research staff and national research and extension officers," reports Dr Borlaug. These events," he adds, "have been excellent, and have provided a venue for research and extension staff to exchange ideas and experiences, and review new research developments."

Dr BB Singh, IITA, and Dr Borlaug tour the Kano research station.

Ghana evaluation

(From left to right) Kofi Boa-Ampongsem, Council for Scientific and Industrial Research; Toshiro Mado, SG 2000 Agroprocessing programme leader; Seth Ashiamah, Ministry of Food and Agriculture; and Ernie Sprague, The Carter Center.

Last year the Sasakawa Africa Association (SAA) commissioned an independent evaluation of the SG 2000 programme in Ghana from 1988-2001—the first of several reviews of country programmes to be undertaken over the coming year. The review team was headed by Professor Tetsuo Matsumoto of the International Co-operation Centre for Agricultural Education at Nagoya University, Japan; his colleague Professor Hiroyuki Takeya, also from Nagoya University, and Dr Donald Plucknett, the Principal Scientist of Agricultural Research and Development International of Annandale, Virginia, USA. They were joined by two senior Ghanaian scientists, two members of the SG 2000 staff in Africa, and a staff member from Global 2000 of The Carter Center.

The evaluation report, which was submitted to the SAA Board meeting in London in January, noted that SG 2000 Ghana activities had reached a mature stage in some areas – such as the transfer of modern technology to farmers through extension workers. It emphasised "the need to accelerate the transfer of ownership to Ghanaian counterparts in several areas, notably QPM promotion and utilisation, seed production, marketing, farmer group formation and agroprocessing."

It recommended that "SG 2000's partnership with Ghana should end when basic ownership is transferred to Ghanaian counterparts; however, phasing out should be judged from the standpoint of achievements, not from a time-frame alone."

SAFE

Courage E Quarshigah, Ghana's Minister of Food and Agriculture (centre), inspects the library at Kwadaso Agricultural College, which was renovated and stocked by the SAFE programme.

The Sasakawa Africa Fund for Extension Education (SAFE) continues to create career education opportunities for frontline extension staff by expanding its activities at universities in Ethiopia, Ghana, Tanzania and Uganda.

Following the graduation with BSc degrees in agricultural extension of the first two groups of extensionists in October 2000 and October 2001, the mid-career programme at Makerere University in Uganda has begun to make a significant impact. Forty-two students have enrolled for this academic year—more than double the intake of previous years—prompting the government to fund 20 places for the first time. SAFE's partner, Winrock International, is funding five of the 17 female students admitted this year.

In July 2001, SAFE funded and facilitated a successful workshop at Tanzania's Sokoine University of Agriculture, where the first 12 students graduated from the SAFE-assisted BSc programme in 2001. The workshop brought together key shareholders—government ministries, the district councils and the university—with the aim of encouraging them to incorporate the mid-career programme into their staff development plans. Impressed by the programme design, representatives of the district councils expressed a desire to begin this incorporation and suggested strategies for formalising the partnership with Sokoine. The Ministry of Agriculture and Food Security and the university were asked to play a lead role in following up on the resolutions made.

The mid-career BSc programme at Alemaya University, Ethiopia, completed its third cycle with the graduation of all of the 25 students who originally started the course. "As with the first two groups, the results of the third group were very encouraging indeed," comments SAFE Director, Deola Naibakelao. Four students, including one woman, graduated with distinction, bringing the number of students who have successfully completed the programme in Ethiopia to 72.

At the University of Cape Coast (UCC) in Ghana, 52 students, including ten women, successfully completed their BSc in Agricultural Extension in June 2001, bringing the total number of graduates to 153. There are 55 students currently enrolled in the SAFE-supported programme, including foreign students from Burkina Faso, Malawi, Mozambique and Nigeria.

In June 2001, the first batch of 29 frontline extensionists successfully completed their Diploma course in Agricultural Extension at Kwadaso Agricultural College (KAC), Ghana. The current student enrolment is 67, including one student from Malawi. The KAC Diploma course is affiliated to UCC and continues to receive back-up support from experienced UCC academic staff. After another tour of duty in the field, these students will be eligible to apply for the BSc course at UCC. SAFE has assisted the diploma programme by renovating a dormitory for the students and other basic facilities, which were officially inaugurated on 5 October 2001 in the presence of the Minister of Food and Agriculture, Courage E Quarshigah.

A Strategic Planning National Workshop was held at UCC from 23 to 27 July 2001. Participants included representatives from 25 SAFE/Ghana shareholder organisations, the Ministry of Food and Agriculture (MOFA), graduates, current and former students, farmers, World Vision, UCC, SAA, SG 2000, and Winrock. The objectives of the workshop were to clarify and develop a common understanding of the SAFE/Ghana programmes, and to assess the progress that has been made and to develop future strategies.

The workshop stressed the need for improved working relationships among shareholders, increased domestic funding and regular participatory curricula reviews, in order to ensure the SAFE programmes remain relevant to Ghana's rapidly changing agricultural sector.

New programmes

"Plans are underway to launch three new SAFE programmes in West Africa in 2002," says Deola Naibakelao. Ahmadu Bello University in Zaria, Nigeria, is actively working towards launching a BSc course in Agricultural Extension Education. The National University of Benin and the University of Mali are also working closely with SAFE to launch programmes in the near future.

SAFE statistics 1993-2001

Mid-career BSc and Diploma Courses	Graduated	Current	Total
University of Cape Coast, Ghana	153	55	208
Alemaya University, Ethiopia	72	103	175
Makerere University, Uganda	17	80	97
Sokoine University, Tanzania	12	128	140
Kwadaso Agricultural College, Ghana	29	67	96
Sub total	**283**	**433**	**716**
Scholarships	**Graduated**	**Current**	**Total**
BSc	15	7	22
MSc	37	16	53
PhD	3	-	3
Sub total	**55**	**23**	**78**
TOTAL	**338**	**456**	**794**

Agroprocessing programme

SAA and the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria, have been collaborating for eight years on a project to introduce improved agroprocessing tools and machinery to small-scale farmers.

Linking industry and agriculture

One important aim of the agroprocessing programme is to strengthen the link between agriculture and light industry. Although industrial development in Africa has been a key development objective for some time, the link between industry and agriculture is weak in many African countries. "Industrial development tends to be regarded as an area for heavy and capital-intensive industry or large-scale private factories," says Toshiro Mado, the agroprocessing programme leader. However, agricultural commodities are the main source of raw materials for major industries such as food oil, starch and processed food. "Opportunities exist in these areas for small- and medium-scale agroprocessing entrepreneurs," he says, "but they first need to increase their productivity, through more efficient crop production, crop processing with improved equipment, and better marketing."

Continuous evaluation

Mrs L Halos-Kim, Head of the Postharvest Engineering Unit at IITA, has been engaged in the research and development of agroprocessing technology since the project started in 1994. The equipment she designs is now widely used in Benin and Ghana. There is an on-going process to improve the design and performance of this equipment. Agricultural extension workers collect feedback from the farmers and processers, which Mrs Halos-Kim analyses and uses to modify her designs.

In 2001, a survey was carried out to assess the programme and to better understand the needs of the users. The evaluation focused on Benin and Ghana, where about 380 entrepreneurs use the improved agroprocessing equipment (see table). Some 100 of these entrepreneurs were selected in each country to participate in the survey.

The survey found that all the IITA designed equipment in the field was still functioning, even after several years of use, proving its durability and easy-maintenance. It also found that the cassava grater and the multi-crop thresher were generally owned by groups of farmers. Mrs. Halos-Kim discovered that cassava processing equipment reduced processing losses by 54 percent, and saved as much as 75 percent of the labour required. On the other hand, more individual entrepreneurs owned the wet-type grinder and the palm oil digester, which can process oil products. As oil products generally yield better prices, more individual entrepreneurs invested in the oil processing business. An in-depth survey will be conducted in 2002 to evaluate the socio-economic impact at the user level.

Cassava progressing in Benin—ITA equipment substantially reduces processing losses and labour requirements.

Gaining momentum

The agroprocessing programme continued to expand in 2001, particularly in Guinea (see page 13) and in Mozambique.

In Mozambique, both Agro-Alpha and Kanes produced additional cassava chipping and grating units. Efforts to promote the manufacturing and sales of the cassava processing equipment will continue and new prototypes will be produced by Agro-Alpha and Kanes, including multi-purpose threshers, rice de-huskers and polishers and a hand operated rice thresher.

The agroprocessing project is a collaborative effort by several partners each taking an active role in the dissemination of agroprocessing technology (see below). The project co-ordinator plays a crucial role in linking and integrating each partner effectively.

Stakeholders	Training extensionists	Training manufacturers	Training users	Field demonstration/ product promotion
Ministry of Agriculture	Support of agroprocessing extension		Co-ordination of field activities	Executing field demonstration with manufacturers
Ministry of Industry		Support of agro-industry promotion		Fixing a quality control guideline with manufacturers
Agro-metal Workshop		Training of own staff Sharing training costs	Basic training to users on delivery of equipment	Promotion of own products
Farmers/ agroprocessors			Active participation Cost sharing	Purchasing equipment Providing feedback
IITA and other research institutes	Advice on the best use of technology and equipment	Technical support to national training programme	Advice on the best use of technology and equipment	Collecting feedback from users
SAA/SG 2000	Co-ordination Sharing extension costs	Co-ordination Sharing training costs	Co-ordination Sharing training costs	Co-ordination Sharing costs

SG 2000 country profiles

Burkina Faso

Country director Marcel Galiba reports that the 2001 rainy season was a considerable improvement over 2000. Although slow to start in May and June, fairly normal rainfall fell in July and August, ending finally in October. Food, however, was in short supply, grain prices rose sharply and food aid, supplied mainly by the European Union, was required for over 525,000 vulnerable people in 25 provinces.

The SG 2000/Ministry of Agriculture programme began operations in 1996, concentrating initially on soil fertility improvement. From 1999, there was a rapid expansion of villages involved in the programme—290 villages were included in 2000, of which 48 had graduated from direct input loan support from the programme. A total of 2,133 Production Test Plots (PTPs) of 2,500m^2 were established in 2000 to demonstrate recommended technological packages with major cereal crops and pulses. These PTPs were supported by demonstrations of dykes, improved fallow and composting. Loan recovery rates from the 2000 season were around 60 percent at the end of October, 2001.

"In 2001, we decided to create more income-generating activities for farmers in the programme," comments Galiba. "Sweet potato, yams, and cassava were introduced for the first time." Conservation tillage (CT) is also being evaluated in the cotton zone. "CT technology may offer many benefits," notes Galiba, "including improved soil fertility and water and topsoil conservation through mulch management and dramatically reduced labour requirements."

The QPM Obatanpa from Ghana was introduced in the first year of the programme. Renamed Ma Songo (good nursing mother), this nutritionally superior maize variety was tested in different feeding formulations for weaned children in six towns last year—Dedouugou, Toma, Dâh, Tougan, Ouahigouya and Gourcy. Six *Centres de Récupération et d'Education Nutritionnelle* (CRENs) participated in this project. Preliminary results have confirmed the superiority of Ma Songo over normal maize. QPM production plots (PPs) were grown on nearly 1,000 ha in Burkina in 2001.

There has, conversely, been disappointment with the QPM hybrid variety, Mamaba, introduced from Ghana in 2000 as a follow-up to Ma Songo. "For two years we had poor germination and lack of plant homogeneity," says Galiba. "We will be testing other QPM hybrids during the off-season this year, and also during the major season."

Since 1999, there has been a huge increase in the number of villages participating in the programme.

SG 2000 has joined forces with a newly created parastatal company SOPROFA *(Société de Promotion des Filières Agricoles)*, set up by the government to collect and market agricultural produce. The government owns 25 percent of the capital of the company, with 75 percent being held by Aiglon, an international organisation based in Geneva. In the first phase of its operations, SOPROFA will purchase 125,000 tonnes of rice, 35,000 t of maize and 20,000 t of sesame from producers, injecting as much as US $200 million into the national economy.

Farmers hope to supply 20,000 t of QPM to SOPROFA in 2002. Five agricultural regions will be involved—Centre Sud, Comoé, Hauts Bassins, Mouhoun and Sud Ouest. SG 2000 will supply 200 t of QPM seed to producers and SOPROFA will contribute 3,000 t of fertiliser.

SG 2000 took part, last April, in a meeting with the Ministry of Agriculture, and other contributing organisations, to discuss agricultural extension. Subjects reviewed included the participation of farmers in the management of extension services, the more efficient coverage of farming areas by extension, and the integration of the private sector into the process. It was agreed that the SG 2000 approach—involving the PTP and PP systems—provided a sound method for technology transfer.

In September, the Millet and Sorghum Initiative (MSI) held a three day workshop on the status of millet and sorghum in Burkina. The workshop, which involved most of the organisations involved in agriculture in Burkina, ended with a food show at which more than 50 ways of presenting millet and sorghum were demonstrated.

SG 2000 Field Programme in 2001

QPM PPs (ha)		Number of PTPs		Verification and Diversification plots
978	Maize	1185	Hybrid maize	10
	Sorghum	143	CT	79
	Rice	138	Sweet potato	8
	Millet	80	Yam	2
	Pulses	587	Cassava	10

Ethiopia

Ethiopia has now embarked on its second five-year Agricultural Development Programme (2001–2005) with the main goals of attaining food self-sufficiency, improving food security and increasing the living standards of small-scale farmers, while laying the foundations for economic development.

The programme, at the start, envisaged a growth of 40 percent in food crop production over the period of the plan, which would have increased production from around 9 million tonnes of cereals and pulses to 12.6 million tonnes by 2005. However, due to good rains and increased use of improved seed and fertilisers, this target has already been attained in the 2001/02 crop harvest. Nearly four million farmers have participated in the National Extension Intervention Programme (NEIP)—as part of the first five-year plan—which was largely modelled on the SG 2000 extension intervention methodology. The yield impact has been impressive (see table). "The challenge ahead," says Regional Director for Africa, Marco Quiñones, "is to address constraints in grain marketing and agroprocessing to add value to agriculture outputs."

The surplus of grain and the low selling price of agricultural products has indeed had an impact on the income of the rural economy which the Government needs to face.

SG 2000 in Ethiopia is now concentrating its resources on providing technical and financial backstopping to a range of new agricultural extension and research. "It is a source of great satisfaction to us at SG 2000 that the Government has given such a high priority to agricultural intensification," says project co-ordinator, Takele Gebre. "We stand ready to make any targeted interventions that are within our means to provide."

For example, SG 2000 is working to develop more area-specific fertiliser recommendations for wheat in the Arsi Zone, where chemical fertiliser is utilised more extensively than in other parts of the country. SG 2000 has already published some information from this work, which is continuing. Results indicate that farmers in the study area should use more nitrogen fertiliser per hectare in some areas, instead of the blanket recommendation of 100 kg/ha. It is expected that the study will be expanded into other major fertiliser-consuming parts of Ethiopia. The study is being sponsored by SG 2000 in collaboration with the Ethiopian Agricultural Research Organisation (EARO), the Maize and Wheat Improvement Center (CIMMYT), the Ministry of Agriculture, and the Bureau of Agriculture in Arsi Zone.

A conservation tillage plot in Zimma Zone, Oromia region. Over 700 on-farm demonstrations have been conducted to show farmers that they can attain higher yields with less tillage.

SG 2000 has also been collaborating with EARO, regional departments of agriculture, Monsanto and Makobu International, the Monsanto distributor in Ethiopia, to introduce conservation tillage (CT) to small-scale farmers. Over 700 on-farm demonstrations have been conducted to show farmers that they can attain higher crop production with less tillage. "The CT demonstrations have been well received," notes Quiñones, "especially by the 50 percent of small-scale farmers who cannot afford the ox-drawn plough, known as the *maresha*." Farmers have noted that the average yield per hectare on the 700 maize conservation tillage plots, over the three years since the programme started, was 4.2 t/ha compared with 3.8 t/ha using recommended cultivation practices.

SG 2000 will be launching an extensive programme during the current cropping season to promote a new quality protein maize (QPM) hybrid, shortly to be released by EARO among small-scale farmers. The programme will concentrate on western and south-western Ethiopia, the major maize-producing areas of the country.

SG 2000 has been instrumental in introducing and verifying promising QPM varieties. While on-farm testing of QPM was in progress, SG 2000 worked with the livestock research branch of EARO, and with the Ethiopian Nutritional Institute to affirm the superior nutritional value of QPM. Feeding trials with pigs and albino rats indicated that the protein efficiency ratio was double that of normal maize.

It is a source of great satisfaction to us at SG 2000 that the Government has given such a high priority to agricultural intensification.

SG 2000 is assisting the Ministry of Agriculture in a project to explore the potential of storing run-off water during the rainy season for use as supplementary irrigation water in drought affected areas of the country. SG 2000 has sponsored the training of a number of experts from the Ministry by a Chinese engineer — and has collaborated over the construction of three underground water tank structures that will serve as sites for future training programmes.

Productivity of major food crops: NEIP v traditional technologies, 1996 - 2000

Crop	Average yield (t/ha) NEIP* demonstation plots	Traditional
Maize	5.8	1.8
Sorghum	1.9	1.1
Tef	1.4	0.8
Wheat	3.0	1.2
Barley	2.5	1.5

*National Extension Intervention Programme

Ghana

Partnerships between farmers, extension workers and rural banks have paid off.

SG 2000's project in Ghana dates back to 1986, and has been a source of many innovations which have spread to other countries. Thus, Ghana, through SG 2000's close collaboration with the Crops Research Institute (CRI) and the Ministry of Food and Agriculture (MOFA), has become a centre for developing and diffusing Quality Protein Maize (QPM). SG 2000's work on conservation tillage technology also began in Ghana.

SG 2000's core activity in Ghana continues to be technology dissemination and adoption, but with the key objective of transferring ownership to Ghana and its institutions.

"This is being achieved," says SG 2000 project co-ordinator, Benedicta Appiah-Asante, "by strengthening partnerships with local government and rural institutions which help to bring sustainable agricultural production support and financial services to farmers."

Last year, for example, Farmers Production Plots (FPPs) were introduced with rural bank sponsorship. Four rural banks provided credit, through the FPP system, to 470 farmers growing maize, cowpeas and groundnuts on two-acre plots. The banks were pleased with the farmers'yields and the consequent loan recovery percentages.

Similarly, a total of 4,710 Extension Test Plots (ETPs) were established—4,200 in the major season and an additional 510 in the minor season. "There was strong support from the Adventist Development and Relief Agency," says Appiah-Asante, "and the involvement of nine rural banks, nine district assemblies and other NGOs, which provided the necessary credit. The crops planted included QPM, rice, groundnuts and cowpeas. The final total well exceeded the original target."

One innovation has been the introduction of 'agricultural science tutors' to participate in training programmes, before the start of the planting season, to set up no-till Verification Demonstration Plots (VDPs). This proved to be a considerable success in 2001 with 534 participants being trained in no-till technology and producing 534 no-till 1000 m^2 VDPs. The 'agricultural science tutors' consisted of 78 from senior secondary schools, 64 Agricultural Extension Agents (AEAs) and 392 farmers.

"No-till technology is becoming increasingly popular with Ghanaian farmers," comments Appiah-Asante.

SG 2000 also collaborated with MOFA's Conservation Agriculture Pilot Project, with funding support from the World Bank. SG 2000 regional co-ordinators from Ashanti, Brong-Ahafo and Northern regions organised additional farmers' groups to set up demonstration plots in three districts in each region. This provided a further 75 VDPs of 0.5 acres each—with inputs being supplied by the project.

Last year the Sasakawa Africa Association (SAA) commissioned an independent evaluation of the SG 2000 programme in Ghana from 1988-2001 (see page 7).

Table 2. QPM demonstrations, 2001

Region	No. of sites	Variety	Average yield (t/ha)
GT. Accra	7	Mamaba	2.96
Ashanti	7	Obatanpa	3.78
Brong Ahafo	17	Obatanpa	5.05
Eastern	10	Mamaba	5.25
Western	14	Mamaba	6.96

Mamaba - QPM hybrid. Obatanpa - QPM Open-pollinated

An extension worker helps a farmer from Mataheko village dry her chilli harvest.

Table 1. Pre-season training participation and number of No-Till Verification Demonstration Plots, 2001

Region	No. of Districts	No. of Farmers	No. of AEAs	No. of SSS	Total no. of demonstrations
Ashanti	3	48	12	30	90
Brong Ahafo	3	48	12	12	72
Central	3	48	12	12	72
Eastern	3	48	12	12	72
Greater Accra	3	48	12	12	72
Northern	4	136	-	-	136
Western	1	16	4	-	20
TOTAL	**20**	**392**	**64**	**78**	**534**

AEA - Agricultural Extension Agent. SSS - Senior Secondary Schools

Guinea

The Republic of Guinea continues to enjoy the benefits of positive agricultural development policies and programmes – an average of five percent annual growth, higher crop yields and total production, and declining food imports. Rice imports have declined from 300,000 t in 1996 to 154,000 t in 2000. Fertiliser consumption has increased from less than 5,000 t in 1996 to 15,000 t in 2000.

NERICAs are the first rice varieties to thrive in the acid soils of the Fouta Djallon. Local farmers describe these higher yields as a "miracle".

The SG 2000 Guinea project is now concentrating on consolidating the positive results of the past five years and further integrating programme activities within national organisations and other NGOs, to help ensure that key activities are continued once the SG 2000 project comes to an end.

From 180 kg of QPM seed variety Obatanpa, imported from Ghana in 1997, over 500 ha are now in cultivation in Guinea, with an average yield of 3 t/ha. Guinean women have started feeding their infants with gruel made from QPM. A preliminary study of 60 mothers with infants, carried out with national extension and Ministry of Health officials, has shown promising health benefits for infants. QPM is also being promoted as feed for poultry and pigs. A yellow-seeded QPM (CMS-475) selected from lines introduced from Brazil in 1998 is under fast multiplication in Kindia and Labé Regions.

SG 2000 Guinea has continued to support the promotion of the new rices for Africa (NERICAs), developed by the West Africa Rice Development Association (WARDA) from inter-specific crosses between African and Asian species. Over 17 t of improved seed were distributed to farmers in 2001. Of particular interest is that these varieties were for the first time tested in the acid soils of the Fouta Djallon, a zone considered unsuitable for rice and which can only produce 200-300 kg of the local cereal, Fonio. When farmers saw rice yields of 2-3 t/ha from those soils, they often commented that it was a "miracle." The miracle makers are the improved NERICAs and the use of appropriate fertilisers. Guinea has so far served as a source of NERICA seed to SG 2000 projects in Uganda, Malawi, Nigeria and Mali.

The early-maturing characteristics of the NERICAs allow farmers to grow a second crop of rice or legumes, such as cowpeas or soybeans, especially when conservation tillage is introduced, which eliminates the need for normal land preparation. Farmers are accepting the idea fast. IITA is providing elite lines of cowpea and soybean varieties for farmers to select the best ones for their systems.

Over 100,000 ha in the Fouta Djallon area of the Middle Guinea are out of crop production due to high levels of acidity, aluminum toxicity, and phosphorus deficiencies. SG 2000 is supporting research to look at the impact of corrective measures, such as liming, application of rock phosphates from Senegal and Mali and the use of various leguminous crops. Initial results are very encouraging. The first trials raised pH by 0.5-0.8 units and increased nitrogen levels from 0.1 to 0.14 percent in the upper 10 cm of soil, while an equivalent of 11 t/ha of dry matter was recorded from Mucuna with phosphate rock application. After the corrective measures, Irish potato yields of up to 14 t/ha were obtained. Good crops of soybeans, fonio, maize and rice have been harvested.

Postharvest and agroprocessing activities aim at reducing product losses, improving quality and adding value. Six women's groups were financed to promote their products in a national agricultural fair. More than 100 women, including three from SG 2000 projects in Mali and Burkina Faso, were trained in QPM, soybean, cassava and mucuna food processing. Three model narrow cribs were constructed in strategic locations.

Over 17 tonnes of improved seed were distributed to farmers in 2001.

A two-day Partnership Strengthening Workshop was organised from 13-14 October 2001 in Labé. National and international organisations participated. The workshop was preceded by a field day featuring demonstrations related to soil fertility restoration and management, the WARDA rice varieties, and postharvest and agroprocessing structures and machines. In addition, participants were able to taste various locally prepared foods made from QPM, soybeans, cassava and Mucuna. This was done in the presence of the Minister of Agriculture and Livestock, Jean Paul Sarr, and other government officials.

Yellow QPM has now reached farmers' granaries in Guinea.

Malawi

Malawi has moved from being a maize exporter to an importer in a single year. The disappointing 2000/01 Season was characterised by flooding and disease problems (primarily Grey leaf spot). As a result, Malawi is faced with a deficit of around 400,000 tonnes and serious malnutrition problems in parts of the country. Last August, Malawi imported 150,000 tonnes of maize and further imports will probably be necessary.

Malawi's Minister of Agriculture,Aleke K. Banda(left), on a visit to one of SG 2000's minimum tillage plots.

The SG 2000 programme in Malawi is run in partnership with the regional Agricultural Development Divisions (ADDs) of the Ministry of Agriculture and Irrigation and the National Research Institute for Agriculture (NRIA). Its main thrust has been to disseminate improved maize production technology.

Three seasons have now been completed since the programme was established in 1998/99. In the 2000/01 Season, participating farmers grew 3,174 maize management training plots (MTPs). The recommended package included the use of locally available hybrids and 120 kg/ha of N and 60 kg/ha of P. The overall yield was 4.8 t/ha (Table 1). In addition, conservation tillage (CT) technology was demonstrated on 47 MTPs, in collaboration with Monsanto (Table 2). The average yield was 4.7 t/ha, with farmers reporting significant savings in labour.

"Conservation tillage technology has been well accepted by small-scale farmers," says country director, José Antonio Valencia. "CT reduces soil erosion and conserves moisture. Time normally devoted to tillage and weeding operations is saved and available for other agricultural activities."

Low grain yields, still obtained by most of Malawi's small-scale farmers, remain a serious cause for concern. Again, Valencia is specific about the reasons, citing low and improper use of fertiliser and improved seed, the failure of extension to deliver technological messages effectively to farmers, the lack of rural infrastructure to market inputs and outputs at affordable prices, and poor market information systems. As a consequence, Valencia reports that "the SG 2000 programme has not yet achieved the impact on adoption that it could and should."

During the 2001/02 Season, SG 2000 intends to become more active in postharvest technology issues. SG 2000 farmers are losing up to 30 percent of the grain harvested, with much of this loss due to the larger grain borer. In collaboration with NRIA, national extension, other NGOs and GTZ of Germany, SG 2000 will be promoting crop protection measures to control this devastating insect pest.

Crop diversification beyond maize is needed in Malawi, and SG 2000 is helping to offer new production alternatives to farmers. Farmer participation in the selection of improved upland rice varieties, in partnership with the national rice-breeding programme, has proved successful. In 2001, SG 2000 and NRIA multiplied 350 kg of seed of six new upland rice varieties at the Salima research station, which will be used in MTPs and farmer seed plots in various parts of the country. SG 2000 has also initiated seed multiplications of improved varieties of soybean (1.5 t), cowpea (600 kg) and pigeon pea (200 kg) at the Bwanji Irrigation Scheme in Salima ADD, in conjunction with the national legume research programme. Finally, SG 2000 is working with IITA to introduce new high-yielding cassava cultivars to farmers and with SAA, IITA, and GTZ to introduce improved cassava processing equipment at the household level.

SG 2000 and the Ministry of Agriculture and Irrigation organised, last September, two technical review seminars involving CIMMYT and Chitedze researchers, which included Dr Thomas Payne, CIMMYT's assistant wheat programme director, and Dr Kevin Pixley, CIMMYT's maize project leader in Harare. As a result, wheat varieties from Zimbabwe will be tested next winter season under irrigation, while CIMMYT will be sending QPM materials for testing on farmers' fields.

Dissemination of improved maize technology has been the main goal of the ADD/SG 2000 partnership.

Table 1. 2000/2001 maize MTPs

Agricultural Development Division	Number of MTPs	Yield range t/ha	Average yield kg/ha	MTP loan recovery %
Blantyre	890	8.5 – 1.1	4,868	84
Machinga	920	9.7 – 1.8	4,910	77
Lilongwe	917	9.7 – 1.5	4,658	73
Salima	50	6.2 – 3.6	4,702	100
Mzuzu	397	7.0 – 2.5	4,769	81
Overall	**3,174**	**9.7 – 1.1**	**4,804**	**79**

Recovery up to August 2001.
The project expects more than 90% recovery by December.

Table 2. 2000/2001 conservation tillage MTPs

Agricultural Development Division	Number of MTPs	Yield range t/ha	Average yield kg/ha
Blantyre	10	7.5 – 3.5	4,982
Machinga	18	6.5 – 1.3	4,291
Lilongwe	9	9.0 – 2.3	5,384
Salima	5	7.1 – 3.7	5,425
Mzuzu	5	4.3 – 2.5	3,340
Overall	**47**	**9.0 – 1.3**	**4,667**

Mali

After a period of drought, leading to a serious cereal deficit in 2000, the 2001 season yielded adequate and fairly well distributed rain. In SG 2000's four operating regions—Mopti, Ségou, Koulikoro and Sikasso—rainfall averaged 824 mm over the previous season. "This enabled production on SG 2000 PTPs (production test plots) to return to 1999 levels," says country director, Marcel Galiba.

Zero tillage is being introduced to reduce the drudgery of weed control.

The SG 2000/Ministry of Rural Development field programme continued to focus on soil fertility, crop intensification, collective action and partnership, "while cassava and sesame were introduced for the first time to stimulate income generation." Zero tillage was another innovation, mainly to reduce the drudgery of weed control, with farmers and extension officers being trained in its use.

Galiba stresses the importance of collective action to combat soil erosion as a central goal of the programme. Whole villages are involved in the building of dykes or rock bunds, planted with live hedges, to break water momentum and allow better retention. "Soil erosion is a huge problem for Sahelian countries," he says.

A powerful partnership for SG 2000 has been created with the *Compagnie Malienne des Textiles* (CMDT), which operates in southern Mali where it produces 600,000 mt of cotton in an area of over 100,000 km^2. Maize is the main cereal with production tripling between 1990 and 2000. Last season, SG 2000 carried out a joint operation with CMDT to demonstrate the importance of the QPM variety Denbanyuman with SG 2000 providing 22,735 kg of seed and CMDT the fertiliser. Some 1,216 farmers were involved with 907 ha planted solely with Denbanyuman across three regions, Bougouni, Sikasso and Koutiala, eight districts and 75 rural zones – involving at least two villages in each rural zone.

"We were greatly encouraged by the demand from the farmers," says Galiba, "which then led to a shortage of seed. We therefore plan to capitalise on the irrigated off season to produce enough seed for 10,000 farmers. The area targeted covers 300,000 ha of maize each year.

"Farmers in the south are used to herbicides and make a strong case for the introduction of zero tillage which could lead to better soil management and higher productivity."

Meanwhile, the growing popularity of Denbanyuman has led to the production of biscuits with a high QPM content. Produced by the *Générale Alimentaire Malienne* (GAM), a factory making milk products and baked items, the latest biscuit to enter the market, known as 'DIA', was presented to President Konaré by Norman Borlaug during his visit to Mali last August.

SG 2000 has collaborated with GAM, the National Research Institute (IER), and the sorghum network, Rocars, to produce biscuits using wheat and sorghum (Ntenimissa cultivar). Farmers from the SG 2000/Ministry of Rural Development programme are expected to enter into a contractual programme to supply GAM with QPM (Denbanyuman) and sorghum.

Farmers in the south are used to herbicides and make a strong case for the introduction of zero tillage which could lead to better soil management and higher productivity.

In partnership with ICRISAT, FAO, and the National Research Institute, SG 2000 has become involved in an inventory credit scheme named 'warrantage' in three villages of the four initially selected. Each village in the scheme must have a cereal bank to store grain with part of it being used as a guarantee for input credit. The scheme is closely linked to the *Caisses Rurales d'Epargne et de Prêt* (CREP) system and to accumulated savings and loans associations.

Recovering input loans from farmers is a problem, and using farm produce as a down payment for inputs is becoming more widespread—as in the region of Ségou where 17 villages have an agreement with the input dealer to provide fertiliser for 884.5 ha of millet and sorghum.

SG 2000 Mali hosted a national forum last October to review the status of millet and sorghum in the country. The market driven Millet and Sorghum Initiative in West Africa is financed by FIDA and French Co-operation.

The high QPM 'DIA' biscuit in production at *Générale Alimentaire Malienne*.

The 2001 field programme focused on soil fertility, crop intensification, collective action and partnership. The following table illustrates the level of realisation of all activities:

	No of PTPs	% Realisation	Kg/ha
Maize	499	98	3,255
Millet	151	67	1,235
Sorghum	103	90	1,055
Zero Tillage	35	205	
Rice	34	100	
Millet	8	29	
Cowpea	8	29	980
Cassava	9	112	
Sesame	7	58	
Total	**854**	**-**	
Average	**-**	**95**	

Mozambique

Market instability remains a major barrier to the widespread adoption of the technologies being promoted by the Ministry of Agriculture and Rural Development (MADER), the National Directorate for Rural Extension (DNER), the National Institute for Agricultural Research (INIA) and SG 2000. Recently, grain prices have recovered—benefiting the 2000/01 crop—due mainly to export opportunities existing in the grain-deficit neighbouring countries of Zimbabwe and Malawi.

A farmer in Gondo, Sofala Province, applies glyphosate to prepare a rice field for planting. The use of new technologies empowers women farmers.

"One significant improvement," says country director, Wayne Haag, "is the progress made in the data gathering and reporting system in DNER, though much still needs to be done to improve the timing of the process. The staff of INIA, the national agricultural research organisation, are becoming increasingly involved in taking yield data and training extension staff."

Haag points to the success of the well-monitored conservation tillage (CT) plots in Manica province, where 11 plots of 0.5 ha were maintained under CT for two consecutive seasons. The mean yield from these plots was 4,243 kg/ha in 2000/01, with a range of 2,681 to 6,162 kg/ha, compared to a mean yield of 3,887 kg/ha in 1999/2000. Overall, provincial mean yields for the maize demonstrations in 2001 ranged from 2, 947 kg/ha for 259 plots in Nampula, to 3,401 kg/ha for 200 plots in Manica to 3,657 kg/ha for 49 plots in Sofala (see table).

Haag notes that CT rice yields were lower than expected, particularly in Gaza province, due to late planting caused by the delayed supply of inputs. "Most plots did not receive the initial fertiliser application, but only the Urea top-dressing," he comments. "No-till continues to gain in popularity and will continue to be included in all crop demonstrations except cotton, potato, paprika, onions and garlic."

INIA's maize research programme, led by Eng David Mariote, with technical input from Dr Miloje Denic, is being directed increasingly towards the development and promotion of QPM. Indeed, the launch of QPM in Mozambique is well underway with plans advanced to distribute 350 tonnes of Sussuma seed (developed from Obatanpa). This seed was produced in Zimbabwe during the 2000/01 season and supplied and marketed by SEMOC/SeedCo and PANNAR. Some of this seed will be distributed through the seed relief programme in districts damaged by flooding during the 2000/01 season. An estimated three tonnes of Sussuma foundation seed, produced by INIA, will be used by SEMOC/SeedCo to plant 100 to 150 ha of certified seed during the 2001/02 season. An early flint (Matuba type) QPM open-pollinated variety, resistant to MSV and Downey Mildew, is being developed.

In the current season, a total of 8,536 demonstration plots are being planted, involving all ten provinces and 14 different crops. Maize still dominates with approximately 39 percent of the total planned number of plots. Almost all the maize demonstration plots are being planted with Sussuma, with inputs purchased with the PROAGRI (the public sector agricultural investment programme) and MADER funds facilitated by the World Bank. SG 2000 is assisting with some transport costs and is participating in the technical training effort for extension staff.

In the area of soil fertility, SG 2000 will continue to support the work of INIA. Simple fertiliser response trials will be conducted with maize, cowpea, beans, sunflower, soybean, sesame and paprika. The 'green manure' Mucuna will continue to be introduced, particularly in the northern sector.

"The major agricultural intensification challenge remains the strengthening of the entire input supply system and the provision of reasonable output prices," says Haag. "One component will involve the reform of the Japan KR-2 programme or the development of other mechanisms to support the development of the private input sector." The Japan International Cooperation Agency (JICA) has placed a full-time staff member with the National Directorate of Agriculture (DINA) to study the effectiveness of the KR-2 system and to explore alternatives.

Field demonstration programme 2000/2001

Province	Crop	No. of Demo Plots	Average Yield kg/ha	Traditional Yield kg/ha
Nampula	Maize	259	2,947	600
Manica	Maize	200	3,401	1,193
Sofala	Maize	49	3,657	1,030
Gaza	Rice	154	1,771	850
Sofala	Rice	127	2,986	860
Nampula	Cowpea	61	923	350
Maputo	Cowpea	33	1,328	463
Nampula	Paprika	48	793	344
Nampula	Sun Flower	14	996	301
Nampula	Sesame	28	648	209

Nigeria

The SG 2000 programme has continued to make headway in Nigeria. SG 2000 has received many requests to extend its crop-based technology transfer approach to all the 36 states of the Federation. Last season, in addition to its nine operational states, SG 2000 conducted training in Borno, Cross-River, Nassarawa and Ogun States.

SG 2000 technologies have doubled or tripled yields for many Nigerian farmers.

During this time, the country experienced an initial spell of drought and early cessation of rainfall. Most of the rain fell between late June and mid-September, resulting in floods—especially in Jigawa, Kano and Sokoto States. Despite these setbacks, farmers still recorded good yields of maize, millet, sorghum, soybean and rice. A total of 3,751 Management Training Plots (MTPs) was established of which 2,113 were devoted to hybrid maize. MTPs were also established for sorghum, millet, cowpea, soybean, rice, sesame, cassava and cotton. Farmers reported good yields of wheat (see table).

On 4 and 5 September 2001, SG 2000, in collaboration with Ahmadu Bello University, organised a National Maize Workshop at Zaria with the theme "Maize for Better Nutrition". Prominent maize scientists from the International Maize and Wheat Improvement Center (CIMMYT) and SeedCo (Zimbabwe), IITA Ibadan, NRI (UK), Monsanto (South Africa), and IAR/ABU (Nigeria) presented papers with an emphasis on Quality Protein Maize (QPM). Dr Ernie Sprague, a maize breeder and Senior Advisor for Food Security at The Carter Center, gave the closing address at the workshop.

Nigeria's Minister of Agriculture, Adamu Bello, was the Guest of Honour. He announced that his Ministry had inaugurated an Inter-Ministerial Committee to co-ordinate a national programme for the implementation of QPM in Nigeria. He emphasised his Ministry's commitment to provide full logistic and financial support to the committee. The Minister also observed that farmers have rapidly embraced SG 2000 technologies. Crop yields in farmers' fields have doubled or tripled over the national averages resulting in a marked improvement in income and living standards. Already, the Federal Ministry of Agriculture is implementing a Japanese sponsored Special Rice Programme (SRP) using SG 2000's technology transfer approach.

SG 2000 has continued to extend its partnerships with Dangote and LCRI in promoting Durum wheat; IITA in promoting technologies for groundnut oil extraction; CIMMYT and SeedCo in promoting QPM; Candel/ Monsanto in conservation tillage and Women-in-Export by linking them to good sources of sesame, soybean and groundnut for export to the West African sub-region.

Results of dry season programme - 2000/2001

STATE	WHEAT MTPs			
	No. of farmers	No. of ha	Yield Range (kg/ha)	Average Yield (t/ha)
Bauchi	21	6	4,739-4,193	4.5
Jigawa	187	46	6,348-2,942	4.5
Kano	147	37	5,162-2,653	4.4
Total	**355**	**89**		**4.5**

A team of three experts from the SAFE programme, Dr Deola Naibakelao, Dr Moses Zinnah and Professor Roger Steele, visited Nigeria in November to discuss issues concerning the forthcoming SAFE programme at Ahmadu Bello University (ABU). The programme is due to commence during the 2002/2003 academic year. The management of ABU gave its full commitment to the programme and promised to rally all other stakeholders towards its successful commencement. It is expected that a Memorandum of Understanding (MOU) will be signed between ABU and SAA early in 2002 for the initiation of the ABU/SAFE programme.

SG 2000 has been involved in training young small-scale farmers undergoing a one-year sponsored course at the Leventis Foundation Agricultural Schools in Kano and Kaduna States. Using SG 2000's technology transfer approach, the trainees are already making a positive impact on the practices of farmers in their villages and also encouraging boys and girls to take to farming.

A national programme is underway for the implementation of QPM.

Youth in Agriculture

Photograph courtesy of Emeka Ukwuaba

The Enugu State Agricultural Development Programme has been using SG 2000 publications and videos as part of its Youth in Agriculture Programme. The programme assists pupils in 100 secondary schools to establish 0.5–1 ha maize farms. These are then used as demonstration plots for school children and local farmers. The videos are screened in a media van, so that people all over the state can have access to them.

Tanzania

While rain patterns have stabilised following the severe drought of 2000, the general state of Tanzania's agricultural industry remains depressed—a fact well recognised by the Government. In 2000, SG 2000 returned to Tanzania after an absence of two years. Dr. Marco Quiñones actively participated with the Government and the World Bank in developing a major new project to assist smallholder farmers to restore degraded soil resources and achieve greater agricultural growth through increased intensification of production. Quiñones was SG 2000's first country director in Tanzania, during 1988-93.

SOFRAIP reflects the Government's determination to overcome food insecurity.

The project—the Soil Fertility Recapitalisation and Agricultural Intensification Project (SOFRAIP)—aims to promote improved land husbandry and agricultural intensification practices. This will include, through strengthened producer organisations, the development of private markets for inputs and outputs, as well as policy and regulatory changes.

Last October, the project document had its first appraisal by the World Bank and is expected to be submitted for approval to the Board of Directors during March this year. "Assuming it is approved, we expect the project to be on-stream by July," says Quiñones.

In the interim, the World Bank and the Government have agreed to use leftover funds from the previous national agricultural extension project as well as from the project planning facility for SOFRAIP to begin a series of pilot activities during 2001/02. Roughly US$ 1.8 million has been earmarked for these activities, in anticipation of the main injection of World Bank finance in 2003.

A workshop was held last September, in which district extension and planning officers participated, to develop a work plan and establish the methods for implementing the pilot activities in agricultural intensification, soil fertility recapitalisation and smallholder credit. Sixteen districts in the country were identified to begin the pilot activities.

SOFRAIP, with support from SG 2000, has produced a memorandum of co-operation with Monsanto for the promotion of conservation tillage under the SOFRAIP programme. New maize hybrids developed by Monsanto Seed (formerly Cargill), as well as other private seed companies, will also be demonstrated. Integrated soil fertility recapitalisation strategies will involve the use of inorganic and organic fertilisers. In the acid soils of the southern highlands, the direct application of rock phosphate from indigenous sources, such as Migingu rock phosphate, will be employed.

SG 2000 is also collaborating with the Government in the promotion of quality protein maize (QPM) varieties and hybrids, developed by CIMMYT in collaboration with Tanzania's Directorate of Research and Development (DRD). Three QPM open-pollinated varieties were released in 2001 by DRD. SG 2000 will support further QPM research leading to the release of suitable hybrids.

"The SOFRAIP pilot activities being carried out during the 2001/02 planting season that started in December last year are designed to set the stage and provide lessons for the main project which will become operational later this year," says Quiñones.

SG 2000's return to Tanzania comes in a follow-up to ten years of field collaboration with the extension services of the Ministry of Agriculture (1988-98). During that time, participating small-scale farmers grew around 40,000 half-hectare maize management training plots (MTPs), primarily in the southern and northern highlands. Annual average yields of these maize MTPs ranged from 4.5 to 5.5 t/ha—three times higher than the national average.

Improved sorghum varieties and production packages were also promoted in the drier areas, such as Dodoma and the lowland Tarime district in Mara region. Various legumes were also grown, including a very productive intercrop involving pigeon peas and maize. Finally, considerable effort was undertaken to introduce improved grain storage systems at the farm household.

Unfortunately, SG 2000's previous efforts to help establish a more permanent system of input delivery and commercial output marketing for basic foods were not successful. SOFRAIP, with a total budget exceeding $90 million over four years, reflects a new determination of the Government of Tanzania to overcome food insecurity and reduce poverty.

"We are confident, based on our experience of the country," says Quiñones, "that SOFRAIP will help Tanzania's agricultural sector turn the corner."

Dr Quiñones, SAA Regional Director for Africa, will continue to provide consultancy advice to the SOFRAIP project.

Dr Aikawa joins SOFRAIP

Dr Jiro Aikawa, a newly recruited Japanese SG 2000 agronomist, has been seconded to the Soil Fertility Recapitilisation and Agricultural Intensification Project (SOFRAIP) and is based at the SG 2000 office in Dar es Salaam.

Dr Jiro Aikawa

Tanzania is not a new country to Dr. Aikawa, who served as a Japanese Overseas Cooperation Volunteer (JOCV) in Mbeya region (1992-94) and speaks Swahili.

Following his volunteer work in Tanzania, Dr Aikawa returned to Japan to complete a PhD in Agriculture at The United Graduate School of Agriculture, Ehime University. His major was in Pomology and Soil Micro Organisms. He then worked as a trainee at the Association for International Cooperation of Agriculture and Forestry before joining SG 2000. Dr Aikawa recently spent four months familiarising himself with the SG 2000 field programme in Ethiopia.

Uganda

Uganda has achieved bumper harvests of maize and other food staples during the last two crop seasons. As a result, maize grain prices have collapsed to an all time low of UG Shs 30,000 per tonne. While efforts to encourage more on-farm storage are in progress, they have been overshadowed by the prospect of another good maize crop in the minor season from eastern Uganda.

Mrs Osere (2nd from right) of Ajuket Village in Busia was able to buy a new home with the proceeds of three years' participation in SG 2000 programmes. Here she welcomes SG 2000 staff to her farm.

"Farmers have been desperate to sell maize at any price," says country director, Abu Michael Foster, "but there have been signs that the situation is beginning to stabilise. High food deficits in neighbouring countries may push up demand for maize and strengthen grain prices here."

Over 14,000 small-scale farmers continue to participate in the SG 2000/Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) agricultural intensification programme in 23 districts. In 2001, 159 extension workers supervised over 2,000 crop demonstrations on farmers' fields in 135 sub-counties. Productivity levels for maize, sorghum, groundnuts, beans and pigeon pea demonstration plots were far higher than those obtained by farmers who still follow traditional methods (Table 1).

There has been an enthusiastic response by farmers to the high-tryptophan and high-lysine Nalongo—the local name given to the QPM variety, Obatanpa, originally developed in Ghana (Table 2). Released officially in November 2000, "the planted acreage of Nalongo is growing as rapidly as availability of certified seed will allow," comments Foster.

Already the Naseco Seed Company and the East African Seed Company have taken up QPM seed production vigorously, and have collectively targeted production of 100 tonnes of Nalongo seed for 2002. The Naseco Seed Company is in a second production cycle for certified QPM seed, and has over 120 ha of QPM maize seed planted with a potential production of 500 t of certified seed for 2003. The East African Seed Company has substantial orders to supply QPM seed to farmers in northern Uganda.

Elsewhere, targets for seed increases were met with groundnuts and pigeon pea. The increased availability of legume seeds ensured that farmers were able to plant more legumes in association with maize. SG 2000 is promoting a higher productivity strategy in which risk is shared by intercropping with legumes. Farmers are also rotating cereals with legumes to help build soil organic matter.

The private network of agricultural input dealers and stockists "is now more mature," reports Foster. "This ensured a steady supply of seed and fertiliser to rural areas last year. Many organisations are well-stocked for 2002."

Growing competition in the local market place has continued to maintain a downward pressure on fertiliser prices as volumes increase. The new formulation of tree crop fertiliser for cash crops such as banana and coffee was, however, in short supply in Uganda due to strong demand in Kenya.

Small-scale farmers are co-operating actively with SG 2000 to build mechanisms and educational systems that will sustain the application of productivity enhancing technologies. SG 2000 has supported two rural communities to build "One-stop" service centres in Bwagaju and Nakalama sub-counties. These centres provide a range of services for farmers on a cost basis. Agricultural advisory and marketing services will initially form the core of operations, while other services will be added on as the community increases its asset base and develops a broader coalition of partners.

"We hope," says Foster, "that the one-stop centres will help to spawn strong farmers' associations, and have the capacity to sustain programme activities previously supported exclusively by SG 2000."

In June last year, Uganda's Plan to Modernise Agriculture received high exposure at the CASIN/SAA/Global 2000 Workshop 2001, held in Kampala and opened by President Yoweri Museveni (see page 6).

Table 1. 2001 demonstration programme

District	Crop	Demo. Plot t/ha	Traditional Plot, t/ha
Buigiri	Maize	3.90	1.89
Kabale	Sorghum (BM29)	3.51	1.24
Iganga	Rice WABC 165	4.3	1.89
Eastern Districts	Groundnuts	1.14	0.65

Table 2. Protein quality analysis on grain samples of QPM and normal Ugandan maize varieties, 2001

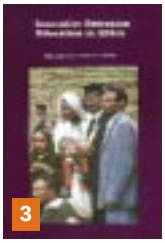
LAB No. (2001)*	Entry	Nitrogen %	Tryp % total protein	Lysine % total protein	Protein %	Quality index
10800	Nalongo (Longe 5 QPM)	1.48	0.80	4.18	9.22	0.87
10801	Hybrid A (normal)	1.33	0.52	2.84	8.31	0.63
10802	Longe 1 (normal)	1.33	0.41	2.91	8.31	0.55

* In collaboration with CIMMYT.

SG 2000 publications and videos

For copies please contact Raitt Orr & Associates Ltd in London

Publications



1. Proceedings of Workshop 2000: Extension Education - Reshaping African Universities and Colleges for the 21st Century.
2. Proceedings of Workshop 1999: The Food Chain in Sub-Saharan Africa.
3. Proceedings of Workshop 1999: Innovative Extension Education in Africa.
4. Proceedings of Workshop 1998: Partnerships for Rural Development in Sub-Saharan Africa.
5. Proceedings of Workshop 1998: Microfinance in Africa.
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7. Proceedings of Workshop 1997: Agricultural Intensification in Sub-Saharan Africa.
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Other publications available:

- SG 2000 in Nigeria—The First Seven Years (1999).
- Proceedings of Workshop 1996 on Women, Agricultural Intensification, and Household Food Security.
- Proceedings of Workshop 1996: Overcoming Rural Poverty in Africa.
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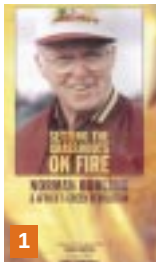
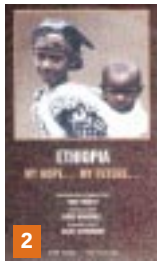
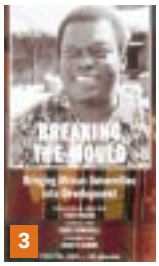
Videos







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6. You Can't Eat Potential. Breaking Africa's Cycle of Poverty, (1996).

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

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