

SEEDS OF HOPE

**AN EMERGENCY PROGRAM TO ASSIST RESTORATION OF CROP
PRODUCTION AND REHABILITATION OF FOOD SECURITY IN
RWANDA AFTER THE CIVIL WAR**

VOLUME I - PROJECT COMPLETION REPORT

**ON BEHALF OF THE IMPLEMENTING AGENCY
CIAT, CALI, COLOMBIA**

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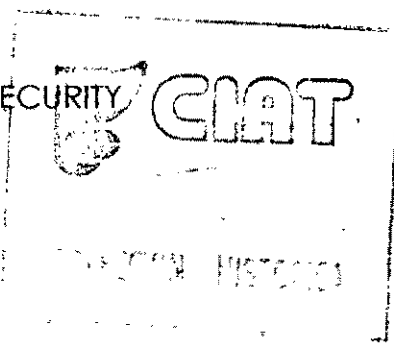
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VOLUME I PROJECT COMPLETION REPORT

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EXECUTIVE SUMMARY

1 BACKGROUND

The 1994 civil war in Rwanda devastated agriculture and domestic food production. By August 1994 war and genocide caused the death of an estimated 800,000 people. More than 2 million had become refugees and some 700,000 people were internally displaced. Only 4.25 million or 53% of the pre-war population were able to farm and produce food as best they could.

In August 1994 the grain and pulse harvests were down 60% and production of root crops and plantains down by 30%. These crops provide 73% of food consumed in Rwanda and represent 79% of both calorie intake and dietary protein. The spectre of widespread famine in Rwanda loomed large.

To complement food aid, emergency measures also were necessary to restore domestic food security. The Seeds of Hope (SOH) initiative brought together agricultural research programs of neighbouring countries and international centers of the CGIAR, NGOs, inter-governmental organisations and donors to assist restoration of agriculture and food security in Rwanda.

2 KEY OBJECTIVES OF SOH

- Re-introduce varieties and land races adapted to the agro-climatic regions of Rwanda;
- Provide technical support, advice and seeds of adapted crop varieties to emergency relief organisations;
- Rehabilitate agricultural R&D in Rwanda by retraining, restoring crop research and repairing basic facilities;
- Assess the impact of SOH on restoration of crop diversity and seed security to Rwandan farmers.

3 IMPLEMENTATION

The donors who pledged \$US1.071 million were USAID (USA), AusAID and World Vision (Australia), ODA (UK), SDC (Switzerland) and IDRC (Canada).

The national agricultural research programs of Uganda, Kenya, Tanzania, Zaïre, Burundi, Malawi and Ethiopia provided seed samples, facilities and expertise for initial seed multiplication and assisted in the retraining of Rwandan scientists.

The participating CGIAR Centers included CIAT, CIMMYT, CIP, ICRISAT, IITA, and IPGRI. The CGIAR centers contributed in-kind resources totalling \$US800,000. ILRI also offered facilities for seed increase. CIAT was the

implementing agency on behalf of the donors and partners.

A related but separately managed project to rehabilitate the Rwandan Tree Seed Centre involved collaboration between ICRAF and the CSIRO Australian Tree Seed Centre.

Excellent collaboration was established early with NGOs and UN agencies, particularly World Vision, CARE, ICRC, Swiss Disaster Relief, Catholic Relief Service, Austrian Relief, FAO, UNHCR, UNICEF, and the World Bank.

The re-establishment of ISAR (Institut des Sciences Agronomique du Rwanda) in December 1994 facilitated early implementation of SOH activities in Rwanda.

4 ACHIEVEMENTS AND IMPACT

a Overall Impact

The project established a new paradigm to rehabilitate agriculture and to restore food security following disaster. Regional NARS, IARCs, NGOs and inter-governmental agencies collaborated to deliver seed technology to farming communities and to help restore domestic food security at an unprecedented scale and with an effectiveness not previously achieved.

The most important achievement was to ensure that crop variety diversity was restored and sustained in Rwanda following the war.

SOH partners assisted the rehabilitation of ISAR by providing technical and research support, training and funds to help restore facilities and acquire some basic equipment. A coordinator for SOH was stationed in Kigali from May 1995.

b Reintroduction of Crop Diversity

Many varieties and land races of the important food crops adapted to Rwandan conditions were assembled, multiplied in neighbouring countries and reintroduced into Rwanda for further multiplication as soon as conditions allowed. The material introduced included:

Beans - 15 tonnes of 275 adapted varieties, local races and advanced lines.

Maize - 148 tonnes of the three major varieties grown in Rwanda.

Sorghum - 7 tonnes of varieties adapted to low, medium and high elevations.

Potato - 20 tonnes of seed potato, mini-tubers and true seed of 3 major and 5 minor varieties.

Cassava - several million cuttings of 18 varieties and clones for introduction to Rwanda when importation is permitted in the near future.

As early as February 1995 SOH provided support for seed multiplication at ISAR stations in Rubona, Ruhengeri and Karama. In addition, SOH supplied seed to NGOs for multiplication in Rwanda partly through farmer contracts.

c Rehabilitation of Crop Variety and Agronomy Trials

SOH provided technical and financial support to ISAR to begin experimental trials to evaluate yield, agronomic performance and disease resistance in beans, sorghum and maize. Evaluation and selection of improved lines has begun and includes farmer-based trials with climbing beans.

Fertilizer and inter-cropping trials are underway for beans, sorghum and maize.

d Technical Support to NGOs

The SOH partners provided technical expertise to many emergency relief NGOs and UN agencies about adaptation characteristics of crop varieties, where to obtain appropriate varieties both inside and outside Rwanda, evaluation of seed quality, protocols for seed multiplication under phytosanitary conditions, seed storage and packaging, crop production and disease evaluation.

e Rebuilding Scientific and Technical Capacity in Rwanda

(i) Training. Human resources were decimated by the war. Fewer than five scientists were left at ISAR after the war from the 55-60 who previously staffed ISAR. Training and familiarization with Rwandan agriculture was a priority for newly recruited scientists and technicians.

The SOH partners provided technical and training expertise as well as funds to conduct group training courses on research and management of beans, maize, potato, sorghum and cassava in Rwanda or neighbouring countries.

A number of new program leaders and senior technicians from ISAR attended or are attending comprehensive training courses on beans, sorghum or maize research and management at the respective IARCs.

Technicians are receiving hands-on training during seed multiplication of the various crops and during the impact assessment survey.

(ii) Regional Networks. RESAPAC, the regional bean network, has restored research sub-projects in Rwanda. PRAPACE, the regional potato network, has reinstated small research projects in Rwanda. ICRISAT and CIMMYT have included Rwanda in regional plans for sorghum and maize research.

(iii) Re-establishing Facilities and Infrastructure. Looting, wanton destruction and disregard for productive assets resulted from the civil war. The IARC partners provided limited SOH funds to assist ISAR rehabilitate the tissue culture facility at Ruhengeri, repair some laboratories, offices and houses at stations in Rubona, Karama and Ruhengeri and to acquire a few vehicles, computers and some furniture.

f Assessing the Impact of the War on Crop Diversity.

The socio-economic impact assessment had two phases. Phase I dealt with the immediate post-war seasons (October 1994-July 1995) and the Phase II involved a nation-wide survey of approximately 1200 households on beans, maize, sorghum, potato and cassava.

Phase I revealed that:

- farmers managed to keep significant amounts of their own seed stocks;
- distribution of mixtures allowed farmers to select favoured types;
- distributing varieties based on source and adaptation gave higher yields;
- the impact of the war across the country differed depending on intensity and length of fighting, displacement of people and weather conditions;
- farmers recovered "lost" varieties because local seed distribution channels began to function quickly;
- improved varieties that were "lost" were difficult to recover.

Phase II is still underway. A supplementary report on the impact assessment will be issued later in 1996. To date the analysis reveals that:

- the average time away from the farm during the war was about four months;
- the percentage of female-headed households had increased by 3-4%;
- for beans and sorghum, diversity seemed relatively stable generally but some farming communities are still vulnerable to variety erosion;
- lack of resources for farmers to acquire seed seems a greater constraint than lack of seed *per se*;
- the incidence of root diseases in beans is increasing;
- potato and cassava production is significantly reduced since the war;
- planting material of potatoes and cassava is in short supply;
- use of fertilisers and fungicides has been significantly reduced;
- less than 25% of farmers have ever used new varieties of sorghum or cassava;
- the concept of "varietal erosion" must take account of the lack of farmer resources to access variety diversity as well as reduced diversity *per se*.

g Assisting Rehabilitation of the Rwandan Tree Seed Centre (RTSC)

Rehabilitation of the RTSC was managed by the CSIRO Australian Tree Seed Centre (ATSC) and ICRAF with funds earmarked by AusAID and World Vision Australia from their SOH contribution. The achievements include:

- restoring buildings and facilities to a functional level;
- restoring the RTSC seed collection by salvaging from the looted seed store, collecting new seed and obtaining seed from Zimbabwe and Honduras;
- restoring capacity of RTSC to sell seed primarily to NGOs for re-forestation;
- ICRAF and the ATSC assisting in training newly recruited scientists to RTSC, training local seed collectors and providing advice to NGOs.

5 PROBLEMS ENCOUNTERED, SOLUTIONS FOUND AND LESSONS LEARNT

The intensity of the war and the associated genocide made the sequence of events unpredictable. SOH had to be flexible but focussed on its objectives.

Future stability in Rwanda is uncertain. However, SOH achievements mean that restoring seed and food security will be easier in the event of future disruptions.

The knowledge and experience about Rwandan crop agriculture gained by the CGIAR centers and neighbouring NARS during the previous decade of R&D underpinned the success of SOH. Without this experience, knowledge and the will to apply it to restore crop production and food security, Rwanda would have suffered further serious food deprivation.

Locating the SOH Coordinator in Rwanda enabled better coordination of SOH activities, improved liaison with the Rwandan authorities, NGOs and other agencies, enabled better identification of training needs, assisted the complex impact survey analysis and helped restore R&D activities in ISAR. The coordinator should have been recruited sooner for location in Rwanda earlier.

The extent of disruption to agriculture and food production resulting from war damage initially was not fully appreciated by SOH. A larger budget was needed for basic rehabilitation of facilities and to replace basic equipment for seed multiplication, related activities and to restart R&D.

The impact of the war and genocide on human resources was more traumatic than anticipated. The vast majority of scientists and technicians were killed, are in hiding, in exile or became refugees. Many of the new scientists and technicians are expatriate Rwandans. "Institutional memory" about agriculture in Rwanda is at a low level. More extensive and intensive training is required.

For crops like cassava restrictions on import of cuttings into Rwanda precluded reintroduction of adapted varieties. Regional agreements are necessary to enable freer movement of seeds and cuttings following disaster.

SOH was a transitional project in response to the Rwandan disaster. SOH became a "lifeline" to re-establish agricultural research and food security in Rwanda, particularly when some NGOs and UN agencies ceased operations. SOH needed more resources to assist ISAR restore pre-existing development programs and to secure new long term funding. SOH continued operations in Rwanda after December 1995 but effectively ceased activities by mid-1996.

The SOH response to the Rwanda emergency was successful. It also focussed attention on the need for a pre-emptive strategy for rapid regional response to disaster wherever and whenever it should occur. Disaster is an ever present reality in the Greater Horn of Africa. Following the Rwanda SOH initiative, USAID is funding a feasibility analysis and action plan to develop a strategy that will ensure a preparedness to respond to disaster in the Greater Horn of Africa.

SEEDS OF HOPE

PROJECT COMPLETION REPORT

I. IMPACT OF CIVIL WAR ON FOOD SECURITY

When the plane which carried the Presidents of both Rwanda and Burundi was shot down on 6 April 1994, the chronic civil hostilities in Rwanda escalated to an acute state of civil war. The initial rampage of social killings degenerated into racial recrimination and genocide.

Following the military success of the Rwandese Patriotic Front against the government forces, a new government was sworn in on 19 July 1994.

The previous three months of civil war and genocide resulted in the deaths of 10% of the population (800,000), 30% of the population (2.07 million) becoming refugees in Tanzania and Zaïre and upward of 700,000 people became internally displaced. In mid-August the population "at home" was estimated to be 4.25 million or only 53% of the population of January 1994.

Prior to the beginning of the civil war, Rwanda had experienced a drought in 1993. As reported by FAO in March 1994, there was a 30% shortfall of grain to feed Rwanda. This is arguably one of the major causes of the internal pressures that erupted in civil war. The war left Rwanda in complete disarray politically, socially and psychologically.

In particular, agriculture and food production were devastated because of the large scale displacement of farmers and farming families which comprised 92% of the pre-war population in Rwanda. The civil war occurred in the middle of the 1994B (February-July 1994) growing season. Following the 1994B harvest, food security in Rwanda was estimated to be the following:-

CROP	LOSS OF PRODUCTION RELATIVE TO 1993B HARVEST	ESTIMATED FOOD DEFICIT (tons)
CEREALS	- 60%	80,000
BEANS	- 60%	31,500
PLANTAIN	- 27%	325,000
ROOTS AND TUBERS	- 30%	267,000

The major sources of food in Rwanda are beans, sweet potato, potato, sorghum, maize, cassava and plantain. These crops represent 73% of all food consumed and 79% of both calorie intake and dietary protein.

II. ORIGIN OF SEEDS OF HOPE

On 26 May 1994 the CIAT Bean Research Group met in Kampala, Uganda as part of the normal review process for the CIAT Regional Program on Beans in Eastern Africa. This program was integrated with the regional bean network, RESAPAC (Reseau pour l'Amelioration du Haricot (Phaseolae) dans la region de l'Afrique Centrale), which included Rwanda.

This meeting discussed the likely impact of the civil war on supply of planting seed, crop production and food security in Rwanda. It was apparent that a possible major consequence of the war would be the loss of varietal diversity in farmers' seed stocks.

A second possible impact was the indiscriminate introduction of poorly or non-adapted varieties of beans into Rwanda by relief agencies and NGOs.

The third major impact was the likely loss of human resources and knowledge about beans resulting from death, internal displacement, hiding and refugee status of experienced and knowledgeable people.

The fourth impact would be the loss of variety trials which contain the breeding materials which have the potential to improve yield, generate resistance to pests and pathogens and tolerance to environmental constraints.

It became apparent that other Rwandan crops also would be affected further threatening crop production and food security. Other IARC centers (CIP, CIMMYT, ICRISAT, IITA) were also responding to the expected devastating impact of the war on food production in Rwanda.

The IARC Centers met to consolidate their efforts on 23 June 1994 in Nairobi. These centers included CIAT, CIMMYT, CIP, ICRISAT, IITA and IPGRI. Encouragement for an emergency response proposal came from several organisations, notably the US Agency for International Development (USAID) and the International Development Research Centre of Canada (IDRC).

The then Director General of CIAT, the late Dr Gustavo Nores, sought and gained the endorsement of the Directors General from all of the CGIAR centers identified as having the potential to contribute to the Rwandan initiative. The Chairman of the Center Directors Sub-Saharan Committee also endorsed the initiative.

In early July 1994, the SEEDS OF HOPE (SOH) initiative was presented to potential donors and made available to international agencies, NGO relief agencies and national agricultural research systems (NARS) in countries bordering Rwanda.

By mid-August 1994 commitments to fund the SOH initiative were :

	Originating Currency	\$US
USAID/OFDA	\$US 400,000	400,000
ODA (UK)	£stg 50,000	76,000
SDC (Switzerland)	\$US 200,000	200,000
IDRC (Canada)	\$Cdn 150,000	110,000
AIDAB (Australia)	\$Aud 260,440	185,000
World Vision Australia	\$Aud 140,845	100,000
	TOTAL	1,071,000

The participating CGIAR Centers would contribute in-kind resources of \$US800,000 during the tenure of the project to 31 December 1995. CIAT was endorsed as the implementing agency.

From the AIDAB (now AusAID) and World Vision Australia (WVA) contribution, \$US49,000 was earmarked for the rehabilitation of the Rwandan Tree Seed Centre in Butare for implementation by the CSIRO Australian Tree Seed Centre and ICRAF, Nairobi. WVA was allocated \$US5,353 for administration.

It is important to recognise that the Seeds of Hope initiative was only possible because the international centers of the CGIAR, supported by a number of donor countries and organizations, had worked continuously on developmental aid projects in the region for several years. Many of the projects in east and central Africa directly involved Rwanda. In this way an unparalleled body of knowledge and expertise was acquired about crop production and crop variety adaptation in Rwanda and the region.

III. KEY OBJECTIVES

The key objectives of the Seeds of Hope initiative are:-

- A. Reintroduction of seed and planting material of crop varieties and land races adapted to Rwanda's unique environment where crop yield, performance and disease and pest resistance are highly dependent on genetic diversity among crop varieties and land races. This diversity is particularly relevant to beans, sorghum, maize and cassava.
- B. Provision of technical advice and support to NGOs and inter-governmental relief agencies concerned with restoration of food security as well as providing food aid.
- C. Rebuilding of human resource capacity through training programs with the major focus on ISAR, the Rwandan agricultural research organization. Training programs are an important first step to the re-establishment of longer term research and development programs.

- D. To analyse the impact of the civil war on crop diversity and attempt to deduce the impact of re-introducing variety diversity back into Rwanda. This analysis is essential to help define better strategies for future disasters elsewhere.

IV. PROGRESS AGAINST OBJECTIVES

A. RE-INTRODUCTION OF CROP VARIETY DIVERSITY

This was the most important objective. The first priority was to assemble from wherever possible varieties and land races known to be adapted to the various growing conditions throughout Rwanda, to multiply the seeds and planting material of these varieties and land races and to ensure that further multiplication would be carried out in Rwanda by a restored ISAR and NGOs working in Rwanda. For added security a limited amount of seed multiplication was carried out in neighbouring countries.

As part of the objective to restore crop diversity, a second priority was to attempt to assist Rwanda, through ISAR, rehabilitate variety evaluation and agronomic trials at ISAR research stations and if possible under on-farm conditions.

1. Reintroduction and Multiplication of Crop Varieties Adapted to Rwanda

(a) Beans

(i) More than 260 different lines of beans have been multiplied during the course of the project in Tanzania, Malawi, Uganda and Kenya and then released in Rwanda through Service Semences Selectionnees (SSS) for further multiplication by NGOs, FAO, ISAR and SSS as follows:

TYPE OF LINES	NO. OF LINES	AMOUNT (metric tons)
Rwandan local landraces	165	1.7
Released varieties and improved varieties in diffusion		
- Bush beans	11	0.8
- Climbing beans	8	4.6
Burundi varieties and mixtures	2	4.9
Released Ugandan varieties	2	0.7
Advanced breeding lines	95	1.2

(ii) Since February 1995 (start of the 1995B season) more than 100 lines were multiplied in Rwanda by various NGOs and ISAR. The resulting 2.3 tonnes of seed has been replanted in Rwanda for further increase.

(iii) A technical pamphlet describing bean varieties for Rwanda, bean seed assessment and bean production was produced for general distribution.

(iv) Reserve supplies of seed were multiplied in Malawi, Zaïre, Tanzania, Uganda, Kenya and Colombia to be supplied to Rwanda on advice from ISAR and SSS to replenish diversity in vulnerable growing areas and to vulnerable groups of people.

(b) Sorghum

(i) Twenty tonnes of sorghum procured by ICRISAT and NARO, Uganda from the highlands of southwest Uganda (>160 masl) were transported and distributed by CARE to farmers in the Gikongoro prefecture in January 1995.

(ii) Seed of three Rwandan sorghum varieties were multiplied in Kenya:
5DX160 - adapted to low elevations <1500 masl
Ikinyaruka - adapted to mid-elevation 1500 - 1800 masl
Cyatanobe - adapted to high elevation >1800 masl

A total of seven tonnes of seed was distributed to farmers in Rwanda for the 1996A and B planting seasons.

(iii) A pamphlet describing sorghum varieties adapted to Rwanda and sorghum production methods was produced.

(c) Maize

(i) Multiplication of seed of three different varieties of maize adapted to the 3 major agro-ecologies of Rwanda was completed in September 1995 yielding 148 tons thus:

Zm607	24 tons
Tamira (Pool 9a)	117 tons
Mamesa	7 tons

All seed was harvested, processed and sent to Rwanda by 1 October 1995.

(ii) The 148 tons of seed for Rwanda was distributed for the 1996A season by:
- World Vision
- Catholic Relief Services
- Red Cross

A pamphlet entitled "Maize in Rwanda" was prepared and provided to all NGOs distributing maize seed to assist them in targeting the three varieties to the appropriate regions of adaptation.

(d) Potato

(i) A wide range of planting material was produced in Uganda and Kenya for shipment and distribution in Rwanda as follows:

Variety	Seed Type	Kgs	Month Shipped (1995)	Where Produced
Cruza	Field multiplied basic	6,800	June	NARO, Uganda
Sangema	Field multiplied basic	1,800	June	NARO, Uganda
Sangema	Elite tuberlets from stem cuttings	360	August	CIP/KARI, Kenya
Cruza	Elite tuberlets from stem cuttings	55	August	CIP/KARI, Kenya
Mabondo	Elite tuberlets from stem cuttings	145	August	CIP/KARI, Kenya
Sangema	Pre-basic tubers from stem cuttings	1,075	September	NARO, Uganda
Cruza	Pre-basic tubers from stem cuttings	4,200	September	NARO, Uganda
Victoria	Pre-basic tubers from stem cuttings	3,000	September	NARO, Uganda
88001	Seedling tubers from TPS	690	September	NARO, Uganda
88006	Seedling tubers from TPS	735	September	NARO, Uganda
IP88001	TPS	100g	October	CIP HQ, Lima
IP88004	TPS	100g	October	CIP HQ, Lima
IP88006	TPS	100g	October	CIP HQ, Lima

TPS = True Potato Seed

Basic seed from Uganda was distributed by World Vision to farmer-multipliers in the Gikongoro region who sell 80% of the seed harvest back to World Vision for distribution as commercial seed.

Elite and pre-basic seed from Kenya and Uganda was given to ISAR for further multiplication at the Kinigi research station. The TPS from CIP was multiplied in seedling nurseries by ISAR.

(e) Cassava

Cassava varieties previously released by the Rwandan national program and local cultivars of Rwandan origin were identified in areas of Uganda (five varieties) and Tanzania (eight varieties) which bordered Rwanda. Five additional clones were obtained from Burundi. Multiplication of these clones was begun in Uganda and Tanzania with a target of producing 4 million mini-cuttings for transfer to Rwanda.

From the outset the transfer of cassava cuttings into Rwanda has been frustrated due to the reluctance of the Rwandan authorities to provide phytosanitary certificates and import permits. It was also erroneously thought that there was no erosion of genetic variability in cassava during the war. As a consequence expansion of cassava plantings was curtailed. Nevertheless, 10 hectares of cassava is under multiplication in each of Uganda and Tanzania.

It is anticipated that authorisation will be forthcoming to enable transfer of cassava cuttings into Rwanda in time for planting in the latter part of 1996. As a stop-gap measure some cuttings have been distributed to Rwandan refugees camped close to the multiplication sites in Tanzania.

2. Rehabilitation of Crop Variety and Agronomy Trials

This aspect could not be attempted until ISAR was re-established and was able to recruit and retrain scientists and technicians. It was also necessary that there was reasonable security of tenure over research station trial sites and that stations had minimally functioning facilities and equipment.

ISAR was re-established in December 1994 and by May 1995 approximately 26 scientists and technicians had been recruited to ISAR. The chance to begin experimental trials was only possible beginning with the 1996A growing season (September/October 1995). A seed increase of a bean variety trial, serendipitously harvested in Rwanda by a technician in July 1994, was carried out during the 1995B season.

The following variety and agronomic trials have been carried out in Rwanda since October 1995:

(a) Sorghum

* ISAR and ICRISAT are conducting sorghum variety trials at Karama, Rubona and Rwerere to evaluate:

- tolerance to low temperature with 159 varieties ;
- a disease resistance trial with 110 varieties;
- a yield trial of 65 varieties;
- an international anthracnose tolerance nursery.

* A multi-location trial using 105 sorghum varieties recovered in Rwanda after the war.

* A trial for response to nitrogen, phosphorus and potassium is underway at Karama with variety 5DX160 and at Rubona with cultivar Ikinyaruka.

* A soil improvement trial with rock phosphate and the multi-purpose tree, *Calliandra calothyrsus*, is underway to improve the yield of sorghum.

(b) Beans

- * Trials have been established on ISAR stations at Rubona, Rwerere and Karama to evaluate:
 - a breeding, a regional and an international nursery;
 - early stage screening trials for both climbing and bush beans;
 - comparative variety and multi-location trials for both bush and climbing beans.
- * Trials of bean varieties and segregating material for disease and pest resistance or tolerance to:
 - Pythium species;
 - bean stem maggot;
 - root rots;
 - bean common mosaic virus;
 - angular leaf spot.
- * An on-farm trial for farmer evaluation and selection among ten populations of climbing beans.
- * Trials to select lines tolerant to low levels of nitrogen and phosphorus.

(c) Maize

- * A trial to compare performance of new varieties with older land races.
- * A trial to evaluate response to nitrogen, phosphorous and potassium and a separate trial to evaluate fertilizer response under acid soil conditions.
- * Inter-cropping trials of maize varieties ZM 607 and Pool 9A with beans.

(d) Potatoes

- * Field increases of potato varieties are underway to assist ISAR restore its germplasm collection and varietal selection program.

(e) Pastures

- * ILRI has provided ISAR with six grass and five legume species for evaluation in the ISAR small ruminant animal program.

B. PROVIDE TECHNICAL SUPPORT TO NGOS

Throughout the SOH project this was a continuing activity. At the outset it was clear that emergency relief organizations had superior capacity and expertise to acquire, package, transport and deliver planting seed. Organizations with which the CGIAR centers interacted most closely included World Vision, CARE, CIRC, CRS/Caritas, Belgium Development Assistance, FAO, UNICEF, UNHCR, SSS and Concern.

Beginning with weekly meetings in 1994, interaction led to the development of pamphlets for beans, sorghum and maize which would assist emergency relief agencies to source appropriate crop varieties from outside Rwanda and to more effectively target the distribution of varieties within Rwanda.

More recently the interaction and provision of technical support to NGOs is taking the form of collaboration in seed multiplication within Rwanda. World Vision, CARE and the World Food Program are particularly concerned with this aspect. Several NGOs have made a commitment to development research to sustain food security and they will develop longer term alliances with both national and international agricultural research organisations.

C. ASSIST IN REBUILDING SCIENTIFIC AND TECHNICAL CAPACITY IN RWANDA

The three main activities which were undertaken to fulfill this objective were training and retraining of human resources, assisting Rwanda to resume participation in the existing research networks of the region and to assist ISAR restore and refurbish research facilities.

1. Training

(i) At the outbreak of civil war in April 1994, some Rwandese scientists and technicians were undertaking training courses at CGIAR research facilities outside Rwanda. For a limited time these scientists were allowed to continue research in the respective IARC institute. It is uncertain how many of these scientists or technicians have returned to Rwanda.

(ii) While ISAR was formally re-established in December 1994, some time elapsed before staff were recruited, some of whom were expatriate Rwandese scientists. Therefore training activities could not be initiated until mid-1995.

(iii) Training programs that have been completed or are underway include:

* A Crop Research, Management and Training course on "Basic Principles of Agricultural Experimentation" was conducted by CIMMYT for ISAR researchers during the week of 4-8 September 1995.

- * In October 1995, twenty-eight scientists and technicians from ISAR, Ministry of Agriculture and some NGOs attended a 10-day training course in Rubona on "Production of Potato Seed in Rwanda". Senior scientists from CIP, national programs in Ethiopia, Uganda and Zaire and from PRAPACE assisted in teaching and training activities.
- * A 7 week (May-July 1995) training program was provided by ICRISAT in Kenya for the new sorghum breeder in ISAR.
- * ICRISAT provided five weeks of training (November/December 1995) in Kenya for two Rwandese scientists and technicians on sorghum research in low, mid and high altitude zones.
- * An ISAR scientist from the Sorghum Program will train for 6 months on sorghum breeding and data analysis at the ICRISAT Asia Centre, India from May to November 1996.
- * The ISAR Beans Program Leader received training experience in Uganda and Kenya.
- * The acting head of the ISAR Bean Program received training on Crop Management Research run by CIAT and CIMMYT at Egerton University, Nairobi.
- * An ISAR scientist attended a CIP regional training course on "Potato Seed Technology and Virology" in Nairobi, 24 November - 8 December 1995.
- * The head of ISAR's Maize Research Program attended a 4 month training course on maize genetics and improvement at CIMMYT, Mexico.
- * IITA carried out the training of two ISAR scientists on "Post-harvest Technology and Rapid Multiplication of Cassava".
- * The head of the Rwandan cassava program and two technicians will participate in a course on root crops research management and development in August/September 1996.
- * ILRI, Addis Abeba, offered training on small ruminants for ISAR scientists.
- * Significant training of technicians has occurred *in situ* during seed multiplication on ISAR stations at Rubona, Karama and Ruhengeri.
- * The socio-economic impact assessment involved training of Rwandans as survey enumerators.
- * ISAR continues to request additional training opportunities for their newly recruited scientists. In Rwanda the great majority of scientists in ISAR prior to the war in 1994 are no longer part of ISAR because they were killed, have disappeared, are in exile, are hiding or are refugees. New scientists and

technicians have been recruited, many of whom are less than familiar with varieties and crop growing conditions in Rwanda. In hindsight SOH should have had greater resources for training and to help restore "institutional memory" about crop agriculture in Rwanda.

2. Restoring Rwandan Participation in Regional Networks

Prior to the escalation of the civil war in 1994, Rwanda's ISAR was an active member of several regional networks involving NARS and IARCs in the region. SOH has assisted ISAR restore its research capacity to again become an active participant in the following networks and regional initiatives:

- * RESAPAC, the network on bean improvement for the Great Lakes region, has restored its research sub-projects in Rwanda. RESAPAC has also expanded its mandate to encompass the eastern and central part of Africa, formerly under the ECABRN.
- * PRAPACE, the regional potato network, has reinstated the funding for small research projects in Rwanda.
- * ICRISAT, as part of its medium term plan to the year 2000, has established a priority ranking for sorghum research in Rwanda as part of its regional activities.
- * CIMMYT has conducted a prioritization exercise for maize and wheat research in Rwanda.
- * The AFRENA research network has been funded to continue agroforestry research in Rwanda.

3. Assist in Re-establishing Facilities and Infrastructure

- * The civil war created an environment where looting, wanton destruction and disregard for productive assets was commonplace. Although major damage to research facilities was limited, buildings and equipment were damaged and looted to the point where the facilities or equipment were rendered unusable. Significant injection of money is required to refurbish the research facilities and resupply or restore basic research equipment.
- * A number of the CGIAR partners have carried out some basic rehabilitation of ISAR offices, laboratories and staff housing and the procurement of basic furniture and basic supplies to conduct field research.
- * The SOH partners allocated limited funds (\$US45,500) to rehabilitate the tissue culture laboratory at the ISAR Ruhengeri station, to provide mesh for a glasshouse (\$US3,000), to provide two computers and photocopiers for

research use and to carry out minimal laboratory and building repairs at the ISAR stations in Karama and Rubona. These priorities were determined in consultation with ISAR. It is regrettable that additional funds were not available for facility and equipment refurbishment.

D. ASSESSING THE IMPACT OF THE WAR ON CROP VARIETY DIVERSITY

* An analysis of the impact of disaster on the diversity among the crops that are important to ensure food security has never been conducted before.

* The impact assessment is in progress and an interim report referred to in Section X - F. Situation in June 1996 is in Appendix 1. A final report will be published as a supplementary document in the latter half of 1996.

* The socio-economic impact assessment has two distinct phases. The first phase concerns the immediate post-war seasons (1995A and B) when SOH worked with a range of NGOs to help monitor the impact of their emergency aid and simultaneously to assemble baseline information on farmer seed and varietal needs. During this first phase when there was considerable fear and insecurity throughout the country, working with the NGOs was the only way to reach farmers and their communities. The complementarity of the CGIAR and NGO partners worked extremely well - the NGOs were experienced in emergency response and the CGIAR centers experienced in technical and research aspects of crop production and food security.

* In the second phase of the analysis beginning September 1995, SOH worked closely with ISAR and the Ministry of Agriculture to help re-establish the national program and to identify short and longer term R & D needs. The phase two analysis concerned an intensive nation-wide, post-war survey for beans, potato, sorghum and cassava, and an overall analysis of the impact of war on agricultural production.

1. Phase I Major Findings

The major findings and lessons from the Phase I assessments are:

* Farmers were able to keep significant portions of their own stocks because food and seed aid was distributed quickly. For example, during the 1995A season 45% of bean and 25% of maize seed came from farmers' own stocks. However there was great heterogeneity depending on army activity, civil disturbance and refugee movements.

* Distributing varietal mixtures had the added advantage that production was stabilized and farmers were able to recover or select out their "best varietal bets".

* Targeting the distribution of varieties based on source and adaptation to local conditions gave much higher yields than if distribution was not based on varietal characterisation and adaptation.

* The war had significantly different effects on agricultural production even within short distances.

* Farmers were able to recover "lost" local varieties because the local seed channels began functioning quickly. For example, 30% of farmers said that they had lost varieties but could recover them from neighbors and families; only 4% said that they had irreversibly lost varieties.

* Improved varieties that were lost seemed more difficult to recover than local varieties.

2. Phase II Findings

(I) Preliminary Overall Impacts

The Phase II analysis which involved approximately 1200 households and farming units is in progress. Preliminary results indicate the following:

- * The "time away" from the homestead during and after the war was variable. On average farmers were dislocated from their farms for about four months.
- * Overall, harvest rates of the key food crops addressed by SOH during the turbulent 1994B season were higher than official estimates suggested, but there was considerable variability in the harvest depending on the crop and the region.
- * The percentage of female-headed households is presently higher than pre-war levels i.e. 26.2% versus 22-23% pre-war.

(II) Impact on Specific Crops

For the individual crops surveyed the following concerns are emerging:

*** Potatoes**

- production is drastically reduced relative to the pre-war period;
- one third of growers have difficulty obtaining seed lost during the war;
- fungicide and fertilizer use has been seriously curtailed;
- two varieties dominate production.

* **Beans**

- comparing pre- and post-war, bean diversity seems relatively stable;
- specific vulnerable communes complain of lack of local varieties;
- lack of farmer resources to acquire seed appears a greater constraint than lack of seed *per se*;
- root diseases seem to be increasing in severity.

* **Sorghum**

- variety diversity seems not to have been affected by the war except in some specific communes;
- inability to purchase seed rather than lack of seed *per se* is a widespread problem;
- only 25% of farmers have ever tried using improved sorghum varieties.

* **Cassava**

- there appears to have been minimal erosion of cassava variability;
- specific regions have a low availability of cuttings for planting;
- half the farmers report reduced cassava planting because of lack of cuttings, more attention to other shorter cycle crops and reduced availability of labour;
- only 20% of cassava farmers have tried improved varieties.

(iii) Varietal Erosion

- * For beans, the survey suggests that the war did not cause extensive erosion of variety diversity.
- * The bean survey indicates some erosion of variety diversity over the longer term due to the adoption of climbing bean varieties and the increase in root rot diseases. The recent expansion in climbing beans results from higher productivity and a more versatile food source.
- * For sorghum, the survey indicates that there was no serious erosion of varietal diversity resulting from the war.
- * The survey in Rwanda suggests that a major reassessment of the concept of "varietal erosion" is required. The main problem appears to be a lack of resources among farmers and communities to access variety diversity rather than a reduction in the level of diversity *per se*.
- * The Rwandan analysis suggests that future initiatives similar to SOH should also emphasise strategies to re-establish seed distribution channels to re-supply the adapted varieties as well as restoring variety diversity *per se*.

V. OVERALL IMPACT OF THE PROJECT

The Rwandan Seeds of Hope project was highly successful. It is the first time that such an initiative has been undertaken anywhere in the world. The project has established a new paradigm to assist in rehabilitating agriculture and the restoration of food security following disaster. In the case of Rwanda the disaster was the result of civil war, but the paradigm applies equally to disasters resulting from natural causes.

The most notable achievement of the project was to assist in re-establishing and maintaining variety diversity in the important food crops grown in Rwanda and to help ensure that the best adapted varieties of beans, sorghum, maize, potato and cassava were preferentially reintroduced into appropriate agro-climatic regions.

Much of the credit for this success also goes to the many NGOs who delivered seed to farmers and also carried out further seed increase. Credit also goes to national agricultural research programs in Uganda, Kenya, Zaïre, Tanzania, Burundi and Malawi who provided seed supplies from their collections and made available facilities and resources to multiply material.

The positive response of farmers in Rwanda demonstrated resiliency and resourcefulness. Seed channels were re-established and farmers were rebuilding particular seed stocks with which they were familiar. NGOs reported good cooperation with farmers to increase seed but with the reservation that farmers also put a priority on rebuilding their own seed stocks.

The project depended absolutely on the generous support of the donors:

- * USAID - United States
- * AusAID - Australia
- * World Vision Australia
- * SDC - Switzerland
- * IDRC - Canada
- * ODA - Great Britain

An early benefit of the SOH project was the early establishment of effective links between ISAR and International Agricultural Research Centers, particularly to restore agricultural R&D and food security. As SOH reduces its presence in Rwanda, it is uncertain who will fill this role until longer term development aid is reinstated to Rwanda. Hopefully the CGIAR centers will retain a limited presence in Rwanda.

SOH led to outstanding collaboration between the CGIAR centers and NGOs particularly in technology transfer and delivery relative to food security. Further consolidation is essential to ensure that the IARC and NGO communities cooperate to alleviate hunger and poverty in the developing world.

The impact assessment and genetic analysis currently underway will provide additional evidence of the overall impact of the Seeds of Hope project.

The precedent established by Seeds of Hope is widely appreciated. For example, the administrator of USAID, Mr Brian Atwood, highlighted the Seeds of Hope project as an outstanding example of how to successfully integrate research and development with emergency relief. This conclusion was made during USAID Day at the CGIAR Inter-Centers Week in October 1995. Activities such as Seeds of Hope are central to USAID's policy to address the continuum from development aid to emergency relief.

Flowing from the Seeds of Hope experience, two new initiatives are underway:

*** Seeds of Hope II: Crop Seed Banks to Assist Restoration of Food Security in the Greater Horn of Africa** (Appendix 2) involves a feasibility analysis and design of an action plan to provide a pre-emptive capacity to respond to future disaster in the region. The primary theme of SOH II is the restoration of food security through rehabilitation of seed security in the region. This project is funded by USAID through its Greater Horn of Africa Initiative Task Force and is being implemented by CIAT, Cali, Colombia through a consultant, WR Scowcroft. The initiative is strongly endorsed by the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) who convened the first consultative workshop on SOH II in Entebbe in March 1996.

*** The Angola Seeds of Freedom Project** is designed to assist Angola to restore seeds of crop varieties to Angolan farmers as part of the effort to restore food security after the protracted civil war. This project derives the majority of its funding from USAID and is being implemented as a partnership between the Angolan Instituto Investigacao Agronomia (IIA), World Vision and ICRISAT as coordinator of technological contributions from relevant CGIAR centers. Several major NGOs also are involved. This project is similar to the Rwandan SOH I initiative but implemented under very different conditions that include widespread presence of mines in agricultural land, insufficient quantities of seed of adapted varieties and lack of trained people in IIA.

VI. PROBLEMS ENCOUNTERED AND SOLUTIONS FOUND

In a project such as Seeds of Hope, the major problem is the unpredictability of events. The new government moved as quickly as possible to stabilise the country and this has helped the continuing implementation of SOH. As part of this the re-establishment of ISAR has provided a focal point to ensure that SOH activities serve the needs of Rwandan agriculture. Without this, progress would have been difficult.

Long term stability in Rwanda is uncertain. Nevertheless, the relative success of Seeds of Hope means that even if future social disruptions occur in Rwanda, restoration of food security will be easier.

The major problems and SOH responses are as follows:-

* Coordination of SOH activities in Rwanda immediately following the war was difficult because of the lack of an effective Rwandan authority dealing with agricultural research, particularly in relation to restoring food security, at least until December 1994. The solution was to draw on previous knowledge about Rwandan agriculture held by the participating IARCs. SOH also established strong working relationships with NGOs, particularly World Vision and CARE, whose knowledge was invaluable during the early phases of SOH activities in Rwanda.

* Locating a SOH coordinator in Rwanda as early as possible would have been an advantage. The earliest that this could have been done would have been October 1994. As it was SOH did not have a Kigali based coordinator until May 1995. Subsequently, Dr Kande Matungulu has played a very significant role in:-

- coordinating activities among the CGIAR centers;
- assisting ISAR, World Vision and others in seed multiplication and distribution;
- facilitating interaction and collaboration among the IARCs, NGOs, IGOs, ISAR, SSS and MINAGRI;
- assisting in the organisation and coordination of training courses;
- assessing priorities for facility and equipment refurbishment;
- assisting in the organizationally complex impact survey analysis;
- providing a link between the IARC centers and ISAR and MINAGRI to begin the process of rebuilding longer term development programs.

* Perhaps somewhat naively, the SOH partnership did not appreciate the extent of infrastructure damage that the war would leave and the subsequent disruption of agricultural research. A larger budget was needed specifically to carry out minimal repairs to laboratories and buildings such as replacement of doors, windows, electrical outlets, sinks and benches. Likewise, moveable equipment was looted or wantonly destroyed. A larger budget was required to provide basic equipment to enable scientists and technicians to carry out minimal research directly related to restoring food security. Loss of vehicles, computers and telecommunications equipment made it very difficult for ISAR and its research stations to function properly. Nevertheless SOH was able to provide a few second-hand vehicles, computers, some basic furniture, field supplies and help make minimal repairs to laboratories, offices and houses. In reality a substantial injection of several millions of dollars is required to restore agricultural research facilities to a minimally functional level.

* The impact of the war on human resources was more traumatic than had been anticipated. Only a few of the scientists and technicians who worked in ISAR or MINAGRI before the war appear to be still working in these organisations. They were killed during the genocide, are refugees, are still "in hiding" or have become voluntary exiles. Many of the newly recruited scientists

and technicians are expatriate Rwandese who have returned to Rwanda after many years absence. The net effect was a precipitous decline in institutional memory about agricultural research in Rwanda. The response by the SOH partners and ISAR was to implement training courses in Rwanda using expertise from the neighbouring countries. Meaningful courses could only be implemented from the middle of 1995 because prior to that ISAR had not recruited new researchers. SOH will continue limited training into 1996 but Rwanda and ISAR must look to other sources of development aid to maintain training courses for new recruits to ISAR as well as refresh the knowledge base of pre-war technicians.

* Restrictions on the movement of varieties and germplasm into Rwanda partly constrained reintroduction of planting material of crop varieties, particularly cassava, adapted to the agro-climatic regions of Rwanda. Phytosanitary controls are of course essential to prevent the introduction and/or spread of diseases and pests. However, this constraint frustrated the reintroduction of adapted cassava varieties into Rwanda for almost two years, despite the fact that the material was grown under phytosanitary conditions. Hopefully, the Rwandan authorities will provide the necessary authorisation to enable reintroduction of adapted cassava material in the latter part of 1996.

* For the future it is most important that national authorities of countries in the region will agree to facilitate the rapid transfer and reintroduction of clean planting material into areas recovering from disaster.

* SOH had limited funds to carry out an extensive but nevertheless clearly defined program. There were other related initiatives such as the FAO/World Bank initiative (\$US4 million) directed specifically at introducing seeds, fertilizer and hoes into Rwanda. Similarly a World Bank initiative (\$US1 million) was designed to import an estimated two million mini-tubers and cuttings of potato into Rwanda. The SOH experience argues that at least some of these funds, for example 15-20%, should have been allocated to assist Rwanda re-establish an in-country capacity for seed multiplication and distribution as quickly as possible. As well as helping to develop self-sufficiency and food security, such a measure also provides meaningful work for people, thereby helping to stabilise the socio-economic and political base of the country.

* The SOH initiative was a transitional project in response to an emergency. In a way it became a lifeline for agricultural research in Rwanda. Immediate follow-up is required to ensure that agricultural research in Rwanda resumes its previous purpose of sustaining and improving agricultural production for the long term. As SOH activity in Rwanda rapidly draws to a close, it is uncertain whether there will be donor support for research in ISAR at least in the near term. Continuing support for ISAR from the IARCs and some of the NGOs will depend on the goodwill of those organisations. There is no immediate solution to this problem. In hindsight, perhaps SOH should have budgeted some funds to facilitate follow-up international support to consolidate restored agricultural R&D in Rwanda in order to sustain food security.

VII. PUBLIC AWARENESS AND PUBLICITY

From the outset this initiative received considerable attention from the press and electronic media. Public awareness of the SOH project has been high and includes:

- * An invited presentation on SOH to the plenary session of the CGIAR International Centers Week in Washington in October 1994.
- * A press conference in Washington arranged by the Chairman of the CGIAR in December 1994 from which numerous press reports emanated.
- * A presentation of SOH as part of the technical sessions at the First Conference of the Parties to the Convention on Biological Diversity, Bahamas, November/December 1994.
- * Production of a 16-minute video about SOH organized by ICRISAT through Acacia Productions, UK in 1995.
- * An invited presentation about SOH at a two day World Bank sponsored press seminar, Wye Woods, Queenstown, Maryland 28-30 January 1996 with a seminar theme of 'The World Bank's Role in Integrating Countries into the World Economy - From Crisis to Reform'.
- * Inclusion of SOH in the IPGRI led presentation of the CGIAR's role in biodiversity and food security at the FAO's Fourth Technical Conference on Plant Genetic Resources, Leipzig, June 1996.
- * Numerous interviews with the press, radio and television in the USA and Australia.

VIII. FINANCIAL REPORT

The financial report for the period 1 July 1994 to 30 June 1996 comprises Table 1 - Revenue, Table 2 - Expenditure and Table 3 - Allocation and Expenditure on SOH Activities. For comparison, the original July 1994 budget is in Table 4.

Funds were expended directly by CIAT or by the CGIAR partners who were active in the project according to the allocations in Table 3. Memorandums of Understanding between CIAT and each of ICRISAT, CIMMYT, CIP and IITA provided quarterly payments to each center (see Appendix 4: Report of the Seeds of Hope Business meeting, ILRI, Nairobi 23/24 January 1995, Annex III). Expenditure was basically in concordance with the original budget thus:-

ITEM	EXPENDITURE TO 31 DEC 1995		SOH PROPOSAL BUDGET	
	\$US	%	\$US	%
1. Seed Relief	351,674	35.4	345,000	34.1
2. NARS/Capacity Building/Rehabilitation	152,499	15.4	145,000	14.4
3. Strategic Research Support	260,798	26.3	338,000	33.4
4. Operations + Admin Support	227,626	22.9	183,000	18.1
TOTAL	992,597	100	1,011,000	100

Expenditure for seed relief was slightly higher than originally proposed because there was no effective infrastructure to conduct seed increase in Rwanda until the 1996A season.

The need for training new ISAR staff and the rehabilitation of the Ruhengeri tissue culture facility caused higher expenditure on capacity building and rehabilitation.

The lack of infrastructure to support crop research in Rwanda resulted in reduced expenditure for support of strategic research. Operations and administrative costs were higher because of the additional cost of maintaining the coordinator in Rwanda.

Donors had fulfilled their funding obligations by 31 December 1995. IDRC has yet to remit the second tranche of approximately \$US55,000 which is earmarked for 1996 expenditure on impact assessment.

**TABLE 1 SEEDS OF HOPE: FINANCIAL STATEMENT FROM 1 JULY 1994 TO 30 JUNE 1996
REVENUE - IN \$US**

DONORS	AIDAB/WVA	IDRC	ODA	SDC	USAID	TOTAL
AIDAB/WVA - 16/12/94	55,736					55,736
- 27/07/95	55,736					55,736
- 31/08/95	55,750					55,750
- 03/12/95	55,750					55,750
IDRC - 02/03/95		52,667				52,667
ODA - 18/08/94			76,000			76,000
SDC - 11/11/94				200,000		200,000
USAID - 10/01/95					125,000	125,000
03/03/95					137,500	137,500
28/07/95					137,500	137,500
TOTAL INCOME	222,972	52,667 (1)	76,000	200,000	400,000	951,639

(1) Balance of IDRC pledged funds to be received is approximately \$US 55,000.

**TABLE 2 SEEDS OF HOPE: FINANCIAL STATEMENT FROM 1 JULY 1994 TO 30 JUNE 1996
EXPENDITURE - IN \$US**

DONORS	AIDAB/WVA	IDRC	ODA	SDC	USAID	TOTAL
1. SEED RELIEF						
Product'n/multiplicaf'n/packdng	67,642		19,433	51,141	102,281	240,497
Storage	2,745		779	2,049	4,097	9,670
Distribution/Transport	10,265		2,904	7,642	15,285	36,096
Travel + Vehicle Lease	15,794		4,229	11,129	22,259	53,411
Staff - assistants	3,228		986	2,595	5,191	12,000
2. NARS, CAPACITY BUILDING, REHABILITATION						
NARS Support/Training	28,044	7,000	11,442	30,110	60,219	136,815
Special training	2,877		756	1,989	3,978	9,600
Special support to Burundi	1,823		479	1,261	2,521	6,084
3. STRATEGIC RESEARCH SUPPORT						
Staff	8,867		9,496	24,988	49,977	93,328
Operating	12,028	19,442	1,218	3,205	6,410	42,323
Research facilities	8,056		2,116	5,569	11,139	26,880
Consultancies	21,044	41,300	885	2,329	4,658	70,216
Coordination/Meetings	1,824		479	1,261	2,521	6,085
Travel	6,276	12,904	313	824	1,647	21,966
4. OPERATIONS + ADMIN						
Operations/Administration	28,391	3,683	17,910	47,133	94,265	191,382
Travel	4,224		3,600	9,473	18,947	36,244
TOTAL EXPENDITURE	223,130	84,349	77,025	202,698	405,395	992,597

**TABLE 3 SEEDS OF HOPE: FINANCIAL STATEMENT FROM 1 JULY 1994 TO 30 JUNE 1996
ALLOCATION AND EXPENDITURE ON SOH ACTIVITIES - IN \$US**

	GRAIN CROPS			VEGETATIVE CROPS		IMPACT ASSESSMENT		PROGRAM COORDINATN CIAT	TOTAL
	BEANS	SORGHUM	MAIZE	POTATO	CASSAVA	SOCIO- ECONOMIC	GENETIC DIVERSITY		
	CIAT	ICRISAT	CIMMYT	CIP	ITA	CIAT	CIAT		
REVENUE RECEIVED									
USAID	91,059	58,529	54,040	44,040	33,615	9,362	45,529	63,826	400,000
ODA	17,301	11,120	10,268	8,368	6,387	1,778	8,651	12,127	76,000
SDC	45,529	29,264	27,020	22,020	16,808	4,681	22,765	31,913	200,000
AIDAB/WVA	50,759	32,626	30,123	24,549	18,738	5,218	25,380	35,579	222,972
IDRC						52,667			52,667
TOTAL REVENUE	204,648	131,539	121,451	98,977	75,548	73,706	102,325	143,445	951,639

EXPENDITURE									
1. SEED RELIEF	138,611	67,763	109,000	31,500	4,800				351,674
2. NARS/CAPACITY BLDG/REHABILITATION	12,800	26,115	15,000	61,500	24,000	7,000		6,084	152,499
3. STRATEGIC RESEARCH SUPPORT		14,010			31,680	73,666	87,539	53,903	260,798
4. OPERATIONS AND ADMIN SUPPORT	51,738	22,417	13,000	12,000	11,520	3,683	40,718	72,549	227,626
TOTAL EXPENDITURE	203,149	130,305	137,000	105,000	72,000	84,349	128,257	132,537	992,597
BALANCE	1,499	1,234	(15,549)	(6,023)	3,548	(10,643)	(25,932)	10,908	(40,958)

TABLE 4 - BUDGET - SEED MULTIPLICATION FOR RWANDA, JULY 1994-DECEMBER 1995

CROP (CENTRE)	SEED CROPS			VEGETATIVE CROPS		IMPACT ANALYSIS (8)		PROGRAM COORDINATION (9)	TOTAL
	BEANS	SORGHUM	MAIZE	SW/POTATO	CASSAVA	SOCIO-ECO	GENETIC DIVERSITY		US\$
	(CIAT) US\$	(ICRISAT) US\$	(CIMMYT) US\$	(CIP) US\$	(ITA) US\$	(IPGR/CIAT) US\$			(CIAT) US\$
SEED RELIEF									
Product., multiplic., pack. (1)	105,000	51,000	80,000	-	-	-	-	-	236,000
Storage (2)	5,400	5,800	5,000	-	-	-	-	-	16,200
Distribution/Transport (3)	21,600	6,200	10,000	-	-	-	-	-	37,800
Travel & Vehicle lease	20,000	5,000	2,000	5,000	5,000	-	-	-	37,000
Staff - assistants	18,000	-	-	-	-	-	-	-	18,000
NARS/CAPACITY									
BUILDING/REHABILITATION									
Nars support/training (4)	15,000	15,000	10,000	25,000	15,000	15,000	10,000	-	105,000
Special training (5)	-	-	-	10,000	10,000	-	-	-	20,000
Special support to Burundi (6)	-	-	-	-	-	-	-	20,000	20,000
STRATEGIC RESEARCH									
SUPPORT									
Staff	-	-	-	-	-	45,000	50,000	50,000	145,000
Operating	-	-	-	-	-	20,000	20,000	-	40,000
Research facilities	-	-	-	30,000	28,000	-	-	-	58,000
Consultancies	-	5,000	-	5,000	5,000	15,000	-	25,000	55,000
Coordination/meetings	-	-	-	-	-	-	-	20,000	20,000
Travel	-	-	-	-	-	12,000	8,000	-	20,000
OPERATIONS AND ADMIN.									
SUPPORT (7)									
Operations/Administration	20,000	19,000	15,000	12,000	12,000	18,000	14,000	15,000	125,000
Travel	-	-	-	-	-	-	-	15,000	15,000
Contingencies	<u>9,000</u>	<u>5,000</u>	<u>5,000</u>	<u>4,000</u>	<u>4,000</u>	<u>6,000</u>	<u>5,000</u>	<u>5,000</u>	<u>43,000</u>
TOTAL	214,000	112,000	127,000	91,000	79,000	131,000	107,000	150,000	1,011,000

TABLE 4 [CONTINUED] - BUDGET - SEED MULTIPLICATION FOR RWANDA, JULY 1994-DECEMBER 1995

16. Int 8/11/94/8 July 94

	<u>SEED CROPS</u>			<u>VEGETATIVE CROPS</u>		<u>IMPACT ANALYSIS (8)</u>		<u>PROGRAM COORDINATION (9)</u>	<u>TOTAL</u>
	<u>BEANS</u>	<u>SORGHUM</u>	<u>MAIZE</u>	<u>SW/POTATO</u>	<u>CASSAVA</u>	<u>SOCIO-ECO</u>	<u>GENETIC DIVERSITY</u>		
	(CIAT)	(ICRISAT)	(CIMMYT)	(CIP)	(IITA)	(IPGRI/CIAT)		(CIAT)	
CG CENTER CONTRIBUTION (10)									
SS/MANAGEMENT YEARS	0.40	0.20	0.20	0.20	0.20	0.30	0.20	0.30	2.00
	\$	\$	\$	\$	\$	\$	\$	\$	\$
SS/MGMT	40,000	20,000	20,000	20,000	20,000	30,000	20,000	30,000	200,000
OPERATING	72,000	36,000	36,000	36,000	36,000	54,000	36,000	54,000	360,000
ADMIN. SUPPORT	<u>48,000</u>	<u>24,000</u>	<u>24,000</u>	<u>24,000</u>	<u>24,000</u>	<u>36,000</u>	<u>24,000</u>	<u>36,000</u>	<u>240,000</u>
	160,000	80,000	80,000	80,000	80,000	120,000	80,000	120,000	800,000

IX FUTURE PLANS

The immediate short term objective is to assist ISAR and some NGOs complete the current (1996B) growing season, to complete training programs and to finish the impact assessment and genetic diversity analysis.

There are no long term future plans for continuing an SOH styled project for Rwanda. It is now essential that Rwanda (through ISAR and MINAGRI), neighbouring NARS, the CGIAR centers and NGOs collaborate to re-establish longer term development projects in agriculture.

This will require extra effort to negotiate with potential donors on the need to restore developmental style R & D programs to Rwanda. It will also require unusual empathy and concern by the donor community to recognise that restoring food security in Rwanda is an essential part of stabilising the country. Despite the fractious discord that continues in Rwanda, any further threat to food security will immediately exacerbate racial, social and political tensions. For humanitarian reasons alone the developed world must help secure domestic food security in Rwanda.

The Seeds of Hope II project (Appendix 2) is a follow on from the Rwanda initiative. The SOH feasibility analysis is expected to be completed by September 1996. Thereafter the intention is to attempt to secure multilateral funding to implement a pre-emptive strategy to assist in the rehabilitation of agriculture following either civil or natural disaster thereby assisting the restoration of food security.

X SITUATION AND PROGRESS REPORTS

A. Situation in September 1994

Details for this period are provided in Appendix 3.

First visits were made to Rwanda in September 1994 just prior to the 1995A planting season (October 1994 - January 1995). Highlights were:-

- * Rains had begun in the north of Rwanda and there was evidence that some land preparation had begun. The south was still dry.
- * An FAO mission in August reported that the 1994B season (Jan - July 1994) was severely affected by the war despite favourable weather conditions during the season. War, refugees, people displacement, scavenging and animal damage greatly hindered crop maintenance, pest and disease control and harvest and consequently yield and quality deteriorated. The result was a 60% reduction in cereal production and 30% reduction in output from tuber and root crops and plantains.

- * Widespread shortages of beans and maize seed were experienced.
- * Clean, healthy cuttings of sweet potato and cassava were limited.
- * NGOs and relief agencies had been very active in acquiring supplies of planting seed. The main organisations were World Vision, ICRC, CARE, UNICEF, CRS/Caritas, Concern, UNHCR, Action North South, Belgium Development Corporation, FAO, Swiss Disaster Relief. Weekly "seed meetings" were held in Kigali to coordinate efforts. SOH participated and provided essential advice about obtaining the best adapted materials from outside Rwanda for distribution within Rwanda. Seed acquisition and distribution was late relative to the onset of the planting season beginning in October.

8. Situation in January 1995

Details are presented in Appendix 4.

As reported the general situation in Rwanda was improving. Services such as electricity, telephones and postal services had begun working at least in Kigali and primary and secondary schools had resumed teaching. The University at Butare was scheduled to re-open on 29 January 1995. The currency had been changed to invalidate the old currency much of which had left the country during and immediately after the civil war.

- * Bus loads of refugees were returning each day and the agricultural population "at home" was estimated to be 4.8 million which is 2 million less than before the civil war. At this time 87% of Rwandans were involved in agriculture, down from 92% prior to the war.

- * In Kigali markets, food was in good supply and prices were not out of line, eg beans were selling at 80-100 Rw.fr./kg compared to 60 Rw.fr previously.

- * During the 1995A season many NGOs (some assisted by SOH) distributed considerable volumes of planting seed including approximately 7,000 tonnes of beans, 1,700 tonnes of maize and 7,200 kg of vegetable seed along with hoes and fertilizer. FAO provided major support to this effort.

- * Much of the bean seed was obtained and targeted for distribution in the correct regions largely as a result of SOH advice. The outstanding effort of NGOs, FAO and other donors during the 1995A season meant that bean seed supplies would generally be adequate for the 1995B season. It was estimated that 83% of seed needs would be met from locally produced seed but it was not certain if this was adapted material nor was there information about seed quality. The Butare prefecture only had 50% of its bean seed requirements.

- * The Institut des Sciences Agronomiques du Rwanda (ISAR) was re-established in December 1994 with Dr Bikoro Munyanganizi as the new Director.

* The Rwanda Ministry of Agriculture had wished to host the Nairobi meeting, but at the last minute postponed the meeting until 1-3 February 1995. The Nairobi meeting proceeded because attendees had already arrived at the time MINAGRI postponed the Kigali venue. The Kigali SOH meeting was held on February 1 and 2 and covered a similar agenda to the Nairobi meeting the previous week. A report of the Kigali meeting was not received.

* During the Kigali meeting Dr Martin Bicamumpaka, PRAPACE Coordinator, was arrested on 2 February 1995 and imprisoned in Kigali Central Prison. Dr Bicamumpaka had become a refugee with his family in Nairobi following the outbreak of war in Rwanda in 1994. Tragically Dr Bicamumpaka died on 16 May 1995 while still in prison. Further tragedy struck the family when his wife, Colette, died of meningitis on 11 January 1996 in Nairobi. Martin and Colette left a family of three young children, Oscar 10 years, Oliver 8 years and Odile 4 years. Plans are in progress for the children to be adopted into a Canadian family.

C. Situation in May 1995

Details are provided in Appendix 5.

* Detailed commentary about the general situation in Rwanda and about the rehabilitation process for ISAR in particular was provided by the Director of ISAR. The security situation in Rwanda was considered good and it was relatively safe and easy to move through the country.

* NGOs had done an excellent job in emergency seed distribution. However there appeared to have been some inefficiencies which SOH should now help to correct. For the future the emphasis should be on quality of seed and not quantity. In particular seed of adapted varieties that is as free as possible from disease and impurities is the main requirement.

* The program should be expanded to include livestock and forestry. The civil war devastated livestock populations and restoring herds is a major priority. It was pointed out that ICRAF and CSIRO, Australia have begun rehabilitation of The Tree Seed Centre at Rubona and that ILRI has submitted a proposal to USAID to restore the genetic base of livestock in Rwanda.

* There were now 27 young researchers assigned to ISAR, with at least one at each of the stations. Most of these were new recruits. Approximately 10 trained technicians also had been re-hired. Thus staff in ISAR is approximately 60% of the pre-war level. Funds are needed to restore the offices and houses, and short-term training is necessary to give the new researchers enough information to get started. The short term priorities are:

- Re-collect and assess germplasm
- Multiply seed
- Train personnel

* Rwanda and ISAR require short term (1-2 months) training programs preferably in Rwanda to restore basic technological capability to the country. In particular the Director asked that SOH target training to assist rehabilitation of structures that give rise to high quality seed. ICRISAT had five trainees on short-term attachment in Nairobi and one Rwandese scientist will participate in a six-month course at ICRISAT Asia Center from May-November 1996.

* A SOH coordinator, Dr Kande Matungulu was appointed in May and is to be located in Kigali .

D. Situation in October 1995

Details are provided in Appendix 6.

* The Director General of MINAGRI, Dr Alfred Mutebwa, advised the SOH group that Rwanda was on the road to recovery despite numerous problems which followed in the wake of the civil war of 1994. The international community had greatly assisted in the recovery and rehabilitating of Rwanda's agricultural resource sector and in restoring food security. However, more time and a longer commitment was required to consolidate the rehabilitation.

* ISAR began seed multiplication based on planting material including beans, cassava, seed potato, provided by SOH, MINAGRI, SSS, World Vision, FAO and others. SOH specifically provided beans, maize, sorghum and potato. A lower than expected yield was obtained because of the late arrival, and therefore late planting of the seed, the lack of a specialist in ISAR at that time and lack of technical expertise in several NGOs which were involved in seed multiplication in Rwanda.

* Overall the 1995B season yielded a quantity of planting seed estimated at 50% of that normally produced before the war. There appeared to be no major concern about large scale future shortages of crop seed with the exception of potato, due to the low rate of natural increase for this crop.

* To help overcome the shortage of potato planting material, the World Bank provided US\$1 million to produce an estimated two million mini-tubers and cuttings outside Rwanda for importation into the country. MINAGRI and ISAR were strongly urged to request the World Bank to allocate some of the US\$1 million to rehabilitate potato seed multiplication infrastructure and training in Rwanda. The SOH partners, including the NGOs and ISAR, Rwanda, urged that at least part of the \$1 million (e.g. \$70,000 - \$80,000) should be used to refurbish micropropagation facilities in Rwanda. Prior to the war Rwanda had a very successful potato micropropagation facility at Ruhengeri. This facility can be restored quickly and will add to Rwanda's capacity to multiply potatoes in-country rather than depend on supplies from Belgium.

* Comprehensive countrywide surveys of beans, sorghum, maize and cassava and a detailed survey of potatoes in key production areas were underway and would continue into 1996. An extensive geographic coverage including 800-900 households for grains and pulses and separately 300 households for potatoes sampled across 100 communes (2/3 of the communes in the country) in all ten prefectures will be undertaken.

* Combined training and research for Rwandan technicians was underway with all centers involved.

* The 1996A season began favorably and there appeared to be a return to normalcy as far as the farming sector was concerned. Land area was opening up. Previous farmer inhabitants had returned and new "immigrant" farmers (returning refugees who emigrated in the late 1950s and early 1960s) had come into some areas. In general there appeared to be a higher number of dependents per household. There was some anxiety about the impact of the impending return of the many hundreds of thousands of refugees presently in Zaïre during the next months.

* Seed distribution and exchange systems began to function as previously. For local varieties market prices were noticeably higher in areas which were more stressed by the war, eg the south west, than in less stressed areas where prices appeared normal. "Varietally-stressed" areas resulted from compounding of one or more of the following factors:

- harsh environments where production is normally low and where there is a narrow range of cultivars;
- areas where disturbances were significant as a result of populations fleeing *en masse* and where war and insurgency were prolonged;
- areas where crop production was compromised because of fear and insecurity which led to poor and restricted management of crops;
- areas where seed channels functioned imperfectly.

E. Situation in February 1996

Details are provided in Appendix 7.

* Seeds of Hope was designed to operate until 31 December 1995. Essentially all seed increase by SOH CGIAR Center partners has ceased except for small amounts of bean seed increase to provide adapted material for a few continuing vulnerable areas. The CGIAR partners of SOH worked closely with ISAR, MINAGRI, FAO/World Bank, SSS and World Vision all of whom were carrying out seed increase in Rwanda. The SOH partners provided seed and advice during the 1996A growing season.

* Training courses were held for ISAR scientists on potato and sorghum seed production. Teaching support was provided by NARS from surrounding countries.

* As part of the SOH budget, funds were allocated for rudimentary refurbishment of research facilities and supply of basic equipment and second hand vehicles to ISAR stations at Rubona, Karama and Ruhengeri.

* The impact assessment and genetic analysis of crop variety diversity will continue until mid-1996 as agreed at the outset of the project with funds earmarked by IDRC for this purpose.

* The SOH partners agreed that the SOH coordinator should continue in Rwanda until July 1996 to assist with the impact assessment and to facilitate the transition from the SOH emergency relief measure to longer term sustainable development aid programs.

F. Situation in June 1996

A meeting for this period was not considered necessary. The SOH coordinator, Dr Kande Matungulu, had a continuing presence in Rwanda to assist ISAR scientists and technicians, the majority of whom are newly recruited and tend to lack technical field knowledge. A consolidated report of activities for the period is in Appendix 8.

(a) Seed Multiplication ISAR is now responsible for most of the seed increase in Rwanda. The CGIAR centers provided operating funds for the seed increase as well as technical support.

* **Potatoes.** Three varieties and four clones have been multiplied on 20 ha in Kinigi (Ruhengeri) and Rwerere.

* **Sorghum.** Nine hectares of sorghum varieties adapted to low, mid or higher altitudes are being multiplied at Karama, Rubona and Rwerere.

* **Maize.** Through CIMMYT, two varieties (Pool 9A, ZM 607) were multiplied in Rubona on four ha in the 1996A season.

* **Beans.** Bean varieties were multiplied on ISAR stations at Rubona, Karama and Rwerere for ISAR on about 15 hectares.

* **Cassava.** This summary of cassava multiplication covers the period since May 1995.

Varieties which had been released by the Rwanda cassava program or were local Rwanda cultivars were collected in areas of Tanzania (8 varieties) and Uganda (5 varieties) bordering Rwanda. Four other varieties came from

Burundi. These varieties were multiplied in collaboration with national cassava programs in Uganda, Tanzania and Burundi.

It was planned to produce four million mini-cuttings on 10 hectares in each of Uganda and Tanzania for transfer and further multiplication in Rwanda primarily at the Karama station, to establish demonstration plots and for limited distribution to Rwandan farmers. The extent of the first stage multiplication was curtailed because of the difficulty of transferring cuttings into Rwanda.

Transfer of the planting materials has been frustrated for almost two years due to non-issuance of import permits and phytosanitary certificates from Rwanda. The transport of cuttings from Tanzania to Rwanda was rejected at the border. The different names used in Rwanda and Tanzania for the varieties being transported emerged as the main cause for rejection.

The difficulty in transfer of material was repeatedly brought to the attention of the Director General of ISAR and the SOH Coordinator. Following current negotiations with the Ministry of Agriculture hopefully the planting materials can be moved into Rwanda in time for the next growing season (1997A).

* **Other SOH related seed multiplication.** The SOH I CGIAR centers supplied seed (beans, maize, sorghum, potato, cassava) to a number of NGOs who are multiplying the seed through contracts with farmers. The NGOs include World Vision Rwanda (WVR), CARE, Agro-Action Allemande (AAA), GTZ, Salvation Army, Oxfam and SSS.

NGOs such as WVR are also multiplying wheat, soybeans, groundnuts and pigeon peas. Currently World Vision has 47.4 hectares of land under seed multiplication in Rwanda of which 65% is used to increase beans, maize and potato varieties originally supplied by SOH I.

The sorghum variety 5DX160, supplied by ICRISAT, is being multiplied by the brewing company, Bralirwa, in Kibungo, Bugesera, Gitarama and Butare under contract to more than 100 farmers. This contract seed production which was in operation before the escalation of the civil war in 1994 will generate needed income for ISAR operations.

(b) Crop Variety and Experimental Trials

The variety evaluation and agronomy trials are being carried out on ISAR stations as collaborative efforts between ISAR, the respective SOH partners and some NGOs. The presence of SOH and the provision of funding, technical support and encouragement to ISAR scientists had a major impact on re-establishing research and development earlier than would otherwise have been possible.

* **Beans.** Twenty-six nursery and bean variety trials are underway on ISAR stations in Rwanda with the help of CIAT. The majority of the trials are in

Rubona with some trials in Butare and Gikongoro. The trials include evaluation of advanced populations of beans resistant to the main diseases in Rwanda, i.e. angular leaf spot, bean common mosaic virus, anthracnose, root rot; selected lines from the International Bean Nursery; populations with tolerance to low phosphorus or nitrogen; and several early generation populations. Ten populations of climbing beans with BCMV resistance also have been distributed to 10 farmers for on-farm evaluation and possible selection.

* **Sorghum.** Sorghum trials and nurseries are being carried out by ISAR at Karama, Rubona and Rwerere with support and guidance from ICRISAT. The trials will provide information on adaptation to various environments, yield potential, disease resistance, response to mineral fertilizer and tolerance to low temperature and to provide necessary field experience for the new ISAR staff.

* **Maize.** Field trials are in progress in Rubona to evaluate the response of two main varieties to mineral fertilizer and to compare old Rwandan land race varieties with reintroduced newer varieties

(c) Training Activities. The following training was sponsored by the SOH partners in 1996:

* The Head of ISAR Maize Research attended a course on maize improvement at CIMMYT, Mexico (February-June 1996).

* The Acting Head of ISAR's Bean Research attended a CIAT/CIMMYT crop management course at Egerton University, Nairobi (February-June 1996).

* The Head of ISAR's Sweetpotato Research visited sweetpotato programs in Uganda, Kenya and Tanzania.

* A scientist from the ISAR Sorghum Program is at the ICRISAT Asia Centre on an in-service training course (May-November 1996).

* Students of the Rwandese National University are completing Ingenieur Agronome thesis projects on beans, maize and agroforestry as part of SOH.

* A training course on cassava multiplication and production was cancelled because of import restrictions on cassava cuttings entering Rwanda. The Head of the cassava program and two technicians plan to attend a course on root crops research and management in Kampala, 12 August-6 September 1996.

(d) Rehabilitation of Facilities

* The tissue culture facility at Ruhengeri is being refurbished with SOH funding of \$US45,000 to purchase laboratory equipment, computers, a photocopier and to carry out minimal repairs to the laboratory and associated

facilities damaged during the war. CIP implemented the acquisition of equipment which arrived in July 1996 in consultation with ISAR and the SOH Coordinator.

* Limited repairs were made to facilities at ISAR stations at Karama and Rubona with SOH funds provided through ICRISAT and CIAT respectively.

* A great deal of work is required to restore ISAR facilities. Commitments by donors to help restore facilities is urgently needed otherwise research to restore and sustain food security will languish.

(e) Impact Assessment Surveys

The impact assessment analysis being conducted by Dr Louise Sperling continued through the first half of 1996. In **Section IV D - Assessing the Impact of War on Crop Variety Diversity**, an Interim Technical Report (Appendix 1) which covers the results of this assessment to date is summarised.

G. Assist Rehabilitation of the Rwandan Tree Seed Centre

The rehabilitation of the Rwandan Tree Seed Centre (RTSC) in Butare resulted from collaboration between the Australian Tree Seed Centre (ATSC), CSIRO Division of Forestry and Forest Products, and ICRAF, Nairobi working with ISAR.

This initiative was closely related to the SOH project but separately managed with funding of \$US49,000 allocated from the AusAID/World Vision Australia contribution to the SOH initiative. ICRAF and/or ISAR attended and reported to the SOH meetings.

a. Objectives of the RTSC Project

The main objectives of the RTSC project were to:

- * Build up tree seed supplies and distribute them to farmers;
- * Train local people in seed collecting and retraining of RTSC leaders;
- * Provide technical advice and support to relief agencies;
- * Assess the condition of the RTSC, assist in rebuilding RTSC and restocking RTSC with appropriate seed;
- * Assess the impact of the project and define strategies for future disasters.

b. Achievements and Highlights of the RTSC Project

A project completion report for the RTSC Project donors, World Vision Australia and AusAID is in Appendix 9. The highlights and the impact of this project are:

- * The RTSC building and facilities have been restored to a functional level but more resources are needed.
- * Approximately 2 tonnes of tree seed was salvaged from the 3.3 tonnes of seed which was scattered by looters in the seed store during and after the 1994 civil war. The salvaged material represented 84 separate species and provenances. Remarkably all of the seed documentation was left intact.
- * A tree seed catalogue listing seed of species available has been produced and distributed.
- * More than 1,000 kg of seed has been collected by the RTSC from 21 species in Rwanda. RTSC also bought seed from local seed collectors. Through CSIRO, seed also was obtained from National Seed Stores in Zimbabwe and Honduras.
- * During 1995 RTSC sold almost 500 kg of seed of forestry and agroforestry species, mostly to NGOs dealing with re-forestation programs.
- * Training of local seed collectors was reestablished during 1995.
- * ICRAF and CSIRO gave advice to NGOs on species to plant and where to obtain appropriate seed.
- * A vehicle which is essential for seed collection was supplied by the Swiss Government, but was "requisitioned" by the military. This seriously curtailed seed collection until a replacement second-hand vehicle was supplied by the Swiss at the end of 1995.
- * Overall the main impact was to assist ISAR rehabilitate the RTSC facilities and to restore RTSC capacity to collect, acquire, store and sell seed. The sale of seed is particularly important in order to generate much needed revenue for further rehabilitation of RTSC.

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