

# Fact Sheet • RWANDA FOOD SECURITY RESEARCH PROJECT (FSRP)

►FOOD SECURITY II COOPERATIVE AGREEMENT◄  
between  
►U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT and MICHIGAN STATE UNIVERSITY◄  
► IN-COUNTRY TIME PERIOD: MARCH 1999 - MARCH 2003<sup>1</sup>◄

## 1. Cooperating Institutions and Collaborators

Ministry of Agriculture, Animal Resources and Forestry (MINAGRI)  
Ministry of Finance and Economic Planning (MINECOFIN)  
National University of Rwanda (UNR)  
Agency for International Development, Rwanda Mission (USAID/Rwanda)  
Agency for International Development, Bureau for Economic Growth, Agriculture, and Trade, Office of  
Agriculture and Food Security (EGAT/AFS)  
Department of Agricultural Economics, Michigan State University (MSU)

## 2. Researchers Involved

### **MINAGRI/MSU Food Security Research Project (FSRP) In-country Researchers:**

Alfred Mutebwa (Director, MINAGRI Department of Planning and Agricultural Statistics, DPSA), Edson Mpyisi (In-country Coordinator), Alphonse Nkeshimana, Safari Karitanyi, Jean Marie Nyabyenda, Jean-Baptiste Nyarwaya, Emmanuel Shingiro, Laurent Munyankusi, Providence Nyirabagenzi, Aleston Kyanga, and Thassien Munyemana (researchers and technical specialists)

MSU Campus Backstop: Daniel Clay, Michael Weber, Margaret Beaver, James Bingen, Valerie Kelly, Cynthia Donovan, Scott Loveridge, and David Neven

## 3. Objectives of the Research and Policy Outreach Activities

The overall goal of FSRP is to increase food security in Rwanda as part of a broad-based, market-oriented sustainable economic growth strategy. The operational objective of the project is to improve the capacity of Rwanda's Ministry of Agriculture to analyze food security issues, to formulate policies, institutional reforms, investment plans, and management processes that promote food security. These activities aim to strengthen the empirical foundation for food policy decisions in Rwanda by:

- Conducting seasonal agricultural surveys similar to the ones conducted by the pre-war MSU project *Enquête Agricole*; these surveys provided regular data on land use (total farm area, cultivated area by crop, pasture and woodlot), use of inputs (particularly fertilizers), and crop production results.

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<sup>1</sup> Note: These Fact Sheets were used to record project activities from 2002-2004. Starting in 2004, on-line reporting of activities was initiated using the FS-III Web site. Obtaining a complete picture of project activities therefore requires taking into consideration both the Fact Sheets and the on-line reporting system. See <http://www.aec.msu.edu/fs2/rwanda/index.htm>

- Undertaking new studies on national food security issues in Rwanda. Key research issues addressed under FSRP are:
  1. increasing on-farm productivity through better access to improved inputs (particularly fertilizers);
  2. improve MINAGRI's knowledge of farmer and rural associations and the NGOs serving them so that MINAGRI can better identify policies to improve marketing, inputs access, and off-farm employment opportunities, and thereby promote more broad-based agricultural and rural development;
  3. a socioeconomic study of the coffee sector focusing on the supply side at the household level (farmers' decision-making perspective);
  4. effects of adult deaths in the prior three years and how rural households in Rwanda respond to illness and death, particularly the effects on household labor allocation, cropping, and income behavior; and
  5. household labor availability and its effects on agricultural production and sustainability, farm and off-farm income and assets, dis-aggregating where relevant to male, female and child-headed households.
- Diffusing more widely to Rwandan researchers and policy makers the results of food security research and their implications for guiding food security policy in Rwanda.

#### 4. Approach to Project Implementation

FSRP approaches its research and outreach mandate through a program of activities designed to: (a) strengthen the capacity of MINAGRI and other government agencies responsible for food security in Rwanda to carry out applied research on food security; and (b) reinforce capabilities within MINAGRI to help coordinate research on national food security issues. The Project Technical Committee, representing the Rwandan government, with MSU, has identified a research agenda and approved a Memorandum of Understanding to guide research and implementation activities over the life of the Project.

#### 5. Outputs

##### 5.1. Written Materials

###### Policy Syntheses

- Loveridge, Scott with Jean Baptiste Nyarwaya and Emmanuel Shingiro. 2003. *Decaffeinated? Situation, Trends, and Prospects for Coffee Production in Rwanda*. Policy Synthesis Number 5E. Kigali, Rwanda: FSRP.
- Loveridge, Scott with Nyarwaya and Shingiro. 2003. *Décaféiné? Situation, Tendances et Perspectives pour la Production du Café au Rwanda*. Policy Synthesis Number 5F. Kigali, Rwanda: FSRP.
- Donovan, Cynthia, Edson Mpyisi, et Scott Loveridge. 2002. *Commentaires sur les forces motrices des changements dans l'agriculture paysanne rwandaise 1990-2001: Agriculture et Elevage*. Policy Synthesis Number 4D. Kigali, Rwanda: FSRP.

- Donovan, Cynthia, Edson Mpyisi, and Scott Loveridge. 2002. *Summary Comments on Forces Driving Change in Rwandan Smallholder Agriculture 1990-2001: Crops and Livestock*. Policy Synthesis Number 4E. Kigali, Rwanda: FSRP.
- Bingen, James and Laurent Munyankusi. 2002. *Farmer Associations, Decentralization and Development in Rwanda: Challenges Ahead*. Policy Synthesis Number 3E. Kigali, Rwanda: FSRP.
- Loveridge, Scott, Edson Mpyisi, and Michael T. Weber. 2002. *Perspectives dans le défi de la coordination de la filière caféicole au niveau des exploitations au Rwanda*. Policy Synthesis Number 2F. Kigali, Rwanda: FSRP.
- Loveridge, Scott, Edson Mpyisi, and Michael Weber. March 2002. *Farm-level Perspectives in Rwanda's Coffee Supply Chain Coordination Challenge*. Policy Synthesis Number 2E. Kigali, Rwanda: MINAGRI/FSRP.
- Kelly, Valerie, Edson Mpyisi, Emmanuel Shingiro, and Jean Baptiste Nyarwaya. 2001. *Agricultural Intensification in Rwanda: An Elusive Goal*. Kigali, Rwanda: MINAGRI/DSA.

### Working Papers and Research Reports

- Donovan, Cynthia, Linda Bailey, Edson Mpyisi, and Michael Weber. 2003. *Prime-Age Adult Morbidity and Mortality in Rural Rwanda: Effects on Household Income, Agricultural Production, and Food Security Strategies*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Loveridge, Scott, with Jean Baptiste Nyarwaya and Emmanuel Shingiro. 2003. *Decaffeinated? Situation, Trends and Prospects for Smallholder Coffee Production in Rwanda . Analysis of a Rural Household Survey, 2002*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Loveridge, Scott, with Edson Mpyisi, and Emmanuel Shingiro. 2003. *Rwandan Smallholder Coffee Tree Maintenance and Cherry Processing Techniques Results of a National Farm-level Survey, 2002*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, and Joseph Nyirimana. 2002. *Learning from Doing: Using Analysis of Fertilizer Demonstration Plots to Improve Programs for Stimulating Fertilizer Demand in Rwanda*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, et Joseph Nyirimana. 2002. *Apprentissage par l'Expérience: L'Utilisation des Résultats des Démonstrations du MINAGRI et du PDMAR pour Améliorer les Programmes de Stimulation de la Demande d'Engrais au Rwanda*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, E. Mpyisi, D. Byandagara, and A. Kyanga, with E. Shingiro and B. Mgeni. 2002. *Minagri 2001B Demonstration Plot Program: Results and Recommendations*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Jayne, T.S., Takashi Yamano, Michael Weber, David Tschirley, Rui Benfica, David Neven, Anthony Chapoto, and Ballard Zulu. 2001. *Smallholder Income and Land Distribution in Africa: Implications for Poverty Reduction Strategies*. MSU International Development Paper Number 24. East Lansing: Michigan State University.
- Loveridge, Scott, Edson Mpyisi, and Michael Weber. 2001. *Some Observations on Farm-level Perspectives in Rwanda's Coffee Supply Chain Coordination Challenge*. Kigali, Rwanda: MINAGRI/FSRP.

- Bingen, James, and E. Mpyisi. 2001. *Non-Governmental Organisations in Agricultural Development: Survey Results*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Clay, Daniel C., T. Reardon, V. Kelly, and E. Mpyisi. 2001. *Promoting Input Use and Conservation Investments among Farm Households in Rwanda*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, E. Mpyisi, A. Murekezi, and D. Neven, with assistance from E. Shingiro and J.B. Nyarwaya. 2001. *Fertilizer Consumption in Rwanda: Past Trends, Future Potential, and Determinants*. Kigali, Rwanda: MINAGRI/DSA.
- Kelly, Valerie, E. Mpyisi, A. Murekezi, et D. Neven. Avec le concours de E. Shingiro et J.B. Nyarwaya. 2001. *Consommation des Engrais au Rwanda: Tendances Passées, Potentiel Futur, et Facteurs Déterminants*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, and Anastase Murekezi. 2000. *Fertilizer Response and Profitability in Rwanda: A Synthesis of Findings from MINAGRI Studies Conducted by the Food Security Research Project and the FAO Soil Fertility Initiative*. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Kelly, Valerie, and Anastase Murekezi. 2000. *Réponse et rentabilité des engrais au Rwanda: Synthèse des Résultats des Etudes du MINAGRI menées par le Food Security Research Project (FSRP) et l'Initiative sur les Fertilité des Sols de la FAO*. Kigali, Rwanda: FSRP, MINAGRI/DSA.

### **Agricultural Statistical Reports**

- Nyarwaya, J.B., E. Shingiro, and E. Mpyisi. 2003. *Statistique agricoles: Production Agricole, Elevage, Superficie, et Utilisation des Terres, Année Agricole 2002*. Publication FSRP/DSA #5F. Kigali, Rwanda: MINAGRI/DSA.
- Mpyisi, Edson. 2002. *Estimation and Production of Root and Tuber Crops in Rwanda*. Paper presented in the FAO Expert Consultation on Root Crop Statistics meeting, 2-6 December, Harare, Zimbabwe.
- Nyarwaya, J.B., E. Shingiro, and E. Mpyisi. 2002. *Statistique agricoles: Production Agricole, Elevage, Superficie, et Utilisation des Terres, Année Agricole 2001*. Publication FSRP/DSA #5F. Kigali, Rwanda: MINAGRI/DSA.
- Mpyisi, Edson, E. Shingiro, and J.B. Nyarwaya. 2001. *Statistiques Agricoles: Production Agricole, Elevage, Superficies et Utilisation des Terres, Année Agricole 2000*. Kigali, Rwanda: MINAGRI/DSA.
- Mpyisi, Edson, E. Shingiro, and J.B. Nyarwaya. 2000. *Enquete Sur la Sécurité Alimentaire: Phase I. Production Agricole et Utilisation des Terres, Saison 2000A*. Kigali, Rwanda: MINAGRI/DSA.

### **Technical Documents**

- Fiche: *Enquête sur la main d'œuvre et l'historique des décès en milieu rural*. 2002. Rwanda Rural Labor and Deaths Survey (RLDS), Survey Instrument, English version). FSRP and MINAGRI/DSA.
- Edson Mpyisi. 2002. *Estimation of Area, Yield and Production of Root and Tuber Crops in Rwanda*. Document prepared for the Expert Consultation on Root Crop Statistics, 3-6 December Harare, Zimbabwe.

- Fiche: Enquête Agricole: Utilisation des Terres (2002, 2001, 2000). Land and Input Use Questionnaire. Kigali, Rwanda: FSRP/DSA, MINAGRI.
- Fiche: Production Post-Récoltes (2002, 2001, 2000). FSRP Post-harvest Crop Production Instrument. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Manuel des Enquêteurs pour la Fiche: Production Post-Récoltes. 2000. Interviewer's Manual for the FSRP Post-harvest Crop Production Survey. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Fiche: Prévision des Récoltes. 1999. FSRP Crop Forecasting Instrument. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Manuel des Enquêteurs pour la Fiche: Prévision des Récoltes. 1999. Interviewer's manual for the FSRP Crop Forecasting Survey. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Enquête Phase 1 sur la Sécurité Alimentaire: 1999-2000. 1999. FSRP Phase 1 Survey Instrument. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Manuel des Enquêteurs pour l'Enquête Phase 1 sur la Sécurité Alimentaire: 1999-2000. 1999. Interviewer's manual for the FSRP Phase 1 Survey. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Fiche: Enregistrement des Ménages. 1999. FSRP Household Listing Instrument for Phase I and Follow-on Surveys. Kigali, Rwanda: FSRP, MINAGRI/DSA.
- Megill, David. 1999. Recommendations on Sampling and Estimation Methodology for Rwanda Agricultural Surveys. Kigali, Rwanda: FSRP, MINAGRI/DSA.

### **Theses and Other Published Documents**

- Donovan, Cynthia, Edson Mpyisi, and Scott Loveridge. Forthcoming. *Smallholder Response to Population Pressure and Adversity in Rwanda*. Chapter in the Handbook of Development Policy Studies. New York: Marcel Dekker.
- Munyankusi, Laurent. 2002. Participation des Organisations Paysannes aux Innovations Agricoles et au Développement Rural au Rwanda: Cas de L'impuyaki. Master's Thesis, Université Nationale du Rwanda.
- Clay, D., V. Kelly, E. Mpyisi, and T. Reardon. 2002. Input Use and Conservation Investments among Farm Households in Rwanda: Patterns and Determinants. In *Natural Resources Management in African Agriculture: Understanding and Improving Current Practices*, ed. C.B. Barrett, F. Place, and A.A. Aboud. Wallingford: CABI Publishing.
- Reardon, T., C. Barrett, V. Kelly, and O. Savadogo. 1999. Policy Reform and Sustainable Agricultural Intensification in Africa. *Development Policy Review* 17.4: 375-95.
- Kangasniemi, Jaakko. 1998. People and Bananas on Steep Slopes: Agricultural Intensification and Food Security under Demographic Pressure and Environmental Degradation in Rwanda. Ph.D. dissertation, Michigan State University.

### **Market Analysis Notes**

- Tardif-Douglin, David. 1998. Food Market Integration: A Preliminary Analysis of MIS Bean and Sweet Potato Prices. Research note. Kigali, Rwanda: FSRP, MINAGRI.

#### **FSRP/DSA-Sponsored Seminars and Workshops**

- January 2003. Seminar on Using Analysis of Fertilizer Demonstration Plots to Inform Policy Decisions. The seminar participants (UNR professors and students, and ISAR researchers in Butare and NGOs, and donors in Kigali) discussed which institutions (government or private) are best placed to carry out policy analysis, basic agronomic research, demonstration programs, monitoring and evaluation, and coordination of fertilizer sector. Butare and Kigali, Rwanda.
- January 2003. Seminar on the Challenges of Organizing and Assigning Responsibility for Fertilizer Promotion and Input Sector Support Programs. Kigali, Rwanda.
- December 2002. Seminar on Rural Labor and Death Survey in Rwanda and Preliminary Implications for Agriculture, with a Focus on the Effects and Strategies Indicated by the Farm Households. In Butare, students and professors from various departments of UNR participated in the discussion following presentation of preliminary results. In Kigali, a range of NGOs and donors participated in discussion of those the results. Kigali and Butare, Rwanda.
- September 2002. Workshop on Agricultural Statistics and Agricultural Development in Rwanda. This workshop brought together various research efforts and dialogue with stakeholders on the future of agricultural statistics, while profiting from analyses based on previous data collection. Presentations included: 1) Opening discussion on the importance of agricultural statistics in Rwanda; 2) Farm-level analysis of coffee; 3) Developments in Fertilizer subsector and lessons from demonstration plots; 4) Rural illness and death in Rwanda and preliminary implications for agriculture; and 5) Future policy work and agricultural statistics. Participants included representatives from the Rwandan public sector (MINAGRI, MINECOFIN, Office of the President, ISAR, OCIR Café, TRAC), international agencies (FAO, USAID, FEWSNet, CIAT), and various projects within Rwanda (ADAR, PEARL, ACIDI/VOCA, CARE, Abt). Kigali, Rwanda.

This full day workshop touched on various themes, demonstrating the value of empirical analysis in the formulation of policy, and the needs for agricultural data collection and analysis.

- June 2001. Seminar on Building an Effective MINAGRI-NGO Partnership. The purpose of this workshop was to offer an opportunity for MINAGRI national and provincial officers to exchange information and views concerning their relationships with NGOs and their perception of the contributions of NGOs to agricultural development. Attendees were divided into three small groups in order to facilitate an open discussion. Each group was asked to address and then report on seven questions/issues related to NGOs: the actual relationship with NGOs; the contribution of NGOs to their work, and ideas for improving this contribution; constraints in working with NGOs and ideas for resolving these constraints; support provided by the MINAGRI to NGOs; and the type of training that would be useful for MINAGRI staff in order to improve their capability to work with NGOs. Kigali, Rwanda.

Following a presentation of each group's discussion of these items, the workshop participants developed the following four recommendations:

1. Organize a follow-up workshop with NGOs, MINAGRI (ministerial department directors and provincial officers) and selected representatives from MINALOC in order to discuss the issues and concerns raised in the MINAGRI workshop;

2. Improve relationships between the provincial administrative authorities and the MINAGRI officers in order to assure a more effective overview of NGO activities within each prefecture;
  3. Create an NGO coordination unit in each prefecture similar to that in Gitarama; and
  4. Improve the oversight capacity of MINAGRI for the NGOs active in agricultural and livestock activities.
- February 2001. Abt/MSU Fertilizer Workshop. The workshop was organized in the context of growing population pressure on land, and the agricultural strategy of intensification and commercialization adopted by the Government of Rwanda. The participants included MINAGRI staff, extension personnel, input traders, and representatives of NGOs and farmer organizations. The most formidable constraints to continuous growth in per hectare yields are depleted soil fertility, declining organic manure use, and persistent low use of chemical fertilizers. Hence, removing the soil-fertility constraint is the single most important task in the intensification of Rwanda's agriculture. Therefore, the pertinent question before the workshop was not *whether* to increase fertilizer use, but *how* to generate rapid and sustainable growth of fertilizer use with an ultimate objective to make prudent policy recommendations. Kigali, Rwanda.

The papers discussed in the workshop assessed the scope of growth of fertilizer use, identified difficulties in raising the present level of use, examined alternative ways to overcome critical bottlenecks, and reviewed experiences of other developing countries to draw policy lessons useful to Rwanda.

- December 1999. Fertilizer Profitability Workshop was conducted for MINAGRI by FSRP in collaboration with FAO/Kigali on The purpose of the workshop was to present and validate the preliminary findings on fertilizer profitability from FSRP and FAO analyses, obtain feedback on the results from a broad range of persons knowledgeable about fertilizer response and input/output markets and prices, and discuss the policy implications of the findings. Participants were asked to critically review the findings and recommendations which evolved from FSRP/FAO review of existing fertilizer response data, updating of profitability analyses, and mapping of fertilizer recommendations by crop and zone. Approximately 30 individuals representing various departments of MINAGRI, ISAR, some NGOs, and the donor community participated actively in the discussions. The workshop ended with participants accepting the FSRP/FAO fertilizer recommendations including a recommendation to use urea and DAP in lieu of NPK complexes. Participants also acknowledged that the research results provided the type of policy guidance that was necessary to get the newly established inputs market program (funded by the World Bank) off the ground. Kigali, Rwanda.

#### **Presentations and Briefings by FSRP/DSA Staff and Affiliated Researchers**

- March 2003. Mpyisi met with MINECOFIN Department of Statistics staff to discuss the proposed Central Statistical Bureau and the needs for agricultural statistics.
- January 2003. Donovan, Weber, and Jayne presented results from the Adult Mortality and Morbidity work in Rwanda and Kenya to a group of approximately 25 USAID staff members in Washington, D.C.
- December 2002. Mpyisi participated in and presented paper Estimation and Production of Root and Tuber Crops in Rwanda at FAO Expert Consultation on Root Crop Statistics meeting. Harare, Zimbabwe.
- December 2002. Donovan and Nyarwaya met with MINECOFIN staff members to discuss the progress with the joint FSRP/EICV analyses related to adult death and mortality, anthropometric analyses, and agricultural statistics in Rwanda.

- November 2002. Dr. Andrew McKay, University of Nottingham and DFID consultant, met with on-campus researchers at MSU to discuss collaboration on income and expenditure analysis based on the EICV database, combined for FSRP database.
- September 2002. Weber discussion with USAID director and Ambassador concerning the importance of research and evaluation of land use and policy as it relates to poverty alleviation.
- September 2002. Weber met with USAID Director Patrick and A. Karas to discuss the close-out of FSRP.
- September 2002. Kelly and Donovan met with the FAO Representative to discuss the future of agricultural statistics in Rwanda and provide input into FAO proposals for funding and activities.
- May 2002. Mpyisi met with staff of TEGEMEO Institute in Nairobi, Kenya, and briefed them on research activities in Rwanda and particularly on coffee sector development and possible research exchanges between Kenya and Rwanda.
- April 2002. Mpyisi presented Recent Changes in Agricultural Production in Rwanda and Agriculture Section of the PRSP to USAID SO3 (Andy Karas) and AID team from Washington on evaluation mission.
- March 2002. Mpyisi, Donovan, and Loveridge presented Changes in Agricultural Production in Rwanda to FAO Training Workshop on Monitoring and Evaluation and then led discussion on possible causes of these changes.
- March 2002. Mpyisi, Donovan, and Loveridge presented various FSRP research themes to an Ad Hoc Advisory Board meeting, and then facilitated discussions on the research priorities for FSRP.
- September 2001. Mpyisi, Nyarwaya, and Shingiro presentation to MINAGRI field staff concerning FSRP/DSA data collection and analysis.
- September 2001. Mpyisi and Donovan met with staff members of TRAC and UNAIDS to discuss adult mortality and morbidity research, and current health research in Rwanda on HIV/AIDS.
- August 2001. Weber, Loveridge, and Mpyisi brief Karas on FSRP planning and research activities, to develop no-cost extension document.
- August 2001. Presentation by Mpyisi and Weber to University of Rwanda faculty, staff, and students on FSRP research activities and changes in cropping patterns between 1990 and 2000.
- June 2001. Weber, Kelly, and Mpyisi brief Andy Karas in Washington on FSRP activities.
- May 2001. Bingen briefing of MINAGRI staff on work with NGOs and farmer associations.
- February 2001. Presentations by Kelly and Mpyisi at the Policy Workshop on Fertilizer Use and Marketing, organized by Abt Associates with FSRP assistance, held February 22-23.
- February 2001. Kelly briefed USAID staff on FSRP activities, with a focus on inputs work.
- February 2001. Kelly and Mpyisi organized field trip to Ruhengeri with Murinda (MINAGRI), Mellor (Abt), and Desai (Abt) to discuss demonstration plot program with the DRSA, farmers, and traders.



- January 2001. Karas briefed by Food Security staff in Michigan, focusing on FSRP activities in Rwanda.
- November 2000. Bingen briefing of USAID staff on work with NGOs and farmer associations.
- November 2000. Bingen briefing of MINAGRI staff on work with NGOs and farmer associations.
- September 2000. Bingen briefing of USAID staff on work with NGOs and farmer associations.
- September 2000. Bingen briefing of MINAGRI staff on work with NGOs and farmer associations.
- July 2000. Kelly and Mpyisi briefed the Minister of Agriculture on fertilizer work, and obtained approval to work with MINAGRI personnel to develop a program of demonstration plots using DAP and urea.
- July 2000. Kelly briefed John Mellor of Abt Associates on the fertilizer work.
- July 2000. Kelly briefed the World Bank consultant on links between poverty alleviation and input use.
- July 2000. Kelly, Mpyisi, and Neven briefed USAID staff on MSU food aid work.
- January 2000. Presentation on Pre-harvest Crop Production Estimates by Nkeshimana on the results of the 1999 Prévision de Récoltes activities to members of the agencies charged with addressing problems of food insecurity (MINAGRI, FEWS, WFP, FAO, and UE).
- December 1999. Mpyisi, Bingen, and Kelly briefing of USAID staff on FSRP project activities.
- December 1999. Bingen briefing of MINAGRI staff on work with NGOs and farmer associations.
- April 1999. Presentation by Mpyisi to NGOs/projects on project goals and potential collaborative ties to NGOs and projects sponsored by USAID/Rwanda.
- 1999. Three debriefings by Mpyisi to USAID/Rwanda Mission Director and staff on FSRP progress and research activities/findings.
- 1999. Four official debriefings of the Minister and Secretary General of MINAGRI by Mpyisi. Focus on FSRP progress and research activities/findings.

## **5.2. Data Base**

Restored and documented the 1983-1994 (pre-war) data base including: Crop production, Crop area/land use, Income and expenditure, Livestock, Assets/equipment, Demographic characteristics of the household, Nutritional status, Inputs use, Conservation investments, Agroforestry practices, Nonfarm strategies, and Coffee subsector.

FSRP Land Use Survey (seasons 2000B, 2001A, 2001 B, 2002A, 2002B) data (sample size = 1,584 households) for all crops in all prefectures.

FSRP Farm-level Coffee Survey- conducted January-February 2002 on 2001 year (sample size = 1584 households).

FSRP Rural Labor and Deaths Survey- conducted during season 2002A (sample size = 1,520 households).

FSRP Post Harvest Survey (seasons 2000A, 2000B, 2001A, 2001 B, 2002A, 2002B) data (sample size = 1,584 households) for all crops in all prefectures.

FSRP Demographic Survey - conducted during season 2001A (sample size = 1,584 households).

FSRP Phase I Survey for Season 2000 A (sample size = 1,584 households) including: Land use, Land tenure, Farm size, Physical characteristics of parcels, Inputs use, Farmer associations, and Food aid receipts and perceptions.

FSRP Crop Forecasting Survey Season 2000 test data (sample size = 264 households) for all crops in all prefectures.

FSRP Livestock Survey - conducted during season 2000B (sample size = 1,584 households).

NGO Survey - Survey of 51 NGOs (18 international and 31 national) conducted in late 1999 and early 2000.

### **5.3. Short-Term Training**

- December 2001. Donovan conducted an on-campus short course on the use of SPSS for cross-sectional data. The training was implemented for six Rwandan graduate students at MSU through the PEARL project.
- December 2001. Kelly trained three MINAGRI staff on use of spreadsheets for analyzing demonstration plot data.
- September 2001. Mpyisi and Nyarwaya in collaboration with DSA/MINAGRI conducted a one day workshop on decentralizing data collection to the province and district levels, an experimental model for MINAGRI.
- May 2000. Beaver and Clay provided Karitanyi, Nyabyenda, and Nyarwaya training in SPSS and the fundamentals of survey analysis (creating and reading tables, comparison of means, data aggregation, etc.). Collaborators used data recently collected and entered from the FSRP Phase I survey of 1,584 rural households. The goal of the training will be for each collaborator to work through assigned sections of the data and develop a report of the major findings from those sections.
- March 2000. Bingen and Beaver provided Nkeshimana a focused, hands-on training program at MSU in Microsoft Access, a relational data base program. The purpose of this training activity was to help develop the national, analytic capacity within the Ministry of Agriculture to develop the data base tables and data entry forms that can be used in collecting and assessing a range of information related to the roles and contributions of non-governmental organizations in agricultural development.
- December 1999. Short-term training sessions by FSRP statistical and field staff to the field enumerators, focus on the Phase I Food Security Survey. This training program included survey methodologies, area measurement techniques ( $p^2/a$ ), stride calibrations, questionnaire terminology, etc.
- October 1999. Short-term training sessions by FSRP statistical and field staff to the field enumerators, focus on agricultural/rural statistics and household listing concepts and practice.
- September 1999. Kelly trained FSRP collaborator Karitanyi in the use of spreadsheet software to conduct profitability analysis for the application of improved inputs to selected crops.

- August 1999. Shingiro spent two weeks at Michigan State University working with Beaver to develop a procedure to document data files produced from the surveys collected in Rwanda before 1993. This documentation is necessary to permit easy user access to the data base for the purposes of applied research and policy analysis. The documentation includes a brief summary of the purpose for the survey, sampling design, the survey instrument, file directory structures, descriptions of the process for cleaning (if known), and documentation of the fields within each of the files.
- January 1999. Clay provided training to FSRP/MINAGRI staff (Karitanyi, Nkeshimana, Nyabyenda, and Nyirabagenzi) in the use of SPSS for survey analysis. The training sessions were based on the MSU Sample Session materials for SPSS. Clay used existing Rwanda farm and parcel level data for follow-on exercises and to help staff become familiar with using multi-level farm data.

#### **5.4. MSU Backstop Trips to In-Country Team and Other Project Travel**

- March 2003. Weber and Donovan plan traveled to Rwanda for closing out activities and additional outreach efforts in Kigali and Butare.
- January 2003. Kelly traveled to Rwanda for presentation of results and work with MINAGRI counterparts on the use of demonstration plots.
- January 2003. Longabaugh travel to Rwanda for updating financial records in preparation for close out.
- December 2002. Donovan in Kigali and Butare to work with local researchers on Rural Labor and Deaths analysis, as well as documentation issues for the databases.
- November 2002. Andrew McKay, School of Economics, University of Nottingham, UK at MSU to work with on-campus team concerning EICV income and expenditure data.
- October 2002. Beaver travel to Rwanda to assist FSRP team in database documentation.
- September 2002. Weber, Kelly, Loveridge, and Donovan presented preliminary research results to a wide group of participants in an FSRP workshop.
- September 2002. Longabaugh follow-up trip to Rwanda for administrative issues.
- June 2002. Donovan worked with Mpyisi and FSRP team in Rwanda to initiate analysis of Rural Labor and Death Survey data.
- May 2002. Mpyisi to Nairobi to meet with TEGEMEO staff to discuss coffee sector developments.
- May 2002. Longabaugh to Rwanda to assist in administrative matters and new financial record keeping systems.
- May 2002. Beaver to Rwanda to assist in cleaning Rural Labor and Deaths Survey and Coffee Survey.
- February and March 2002. Donovan and Loveridge, with Mpyisi, drafted new work on trends in agriculture, as well as meeting with an Ad Hoc Advisory Board to develop research priorities.

- October 2001. Beaver provided continued support work in Rwanda to MINECOFIN on the Agricultural Section of the EICV database and overall documentation of the EICV dataset and provided SPSS training to DSA staff.
- September/October 2001. Donovan worked in Rwanda on database documentation and integration with EICV database, development of in-service training aspects with DSA staff, discussion and modification of the No-Cost Extension document with FSRP and USAID staff members, as well as various research-related discussions with researchers in Rwanda.
- August 2001. Weber and Loveridge traveled to Rwanda to work with FSRP staff and coordinate activities with partners, developing a research agenda.
- June 2001. Mpyisi participated in FS II Rwanda project research and implementation planning process at MSU. Conferred with the MSU/FSII accounting office to streamline project management procedures. Also participated in the Partnership to Cut Hunger in Africa conference.
- May 2001. In Rwanda, Bingen reviewed NGO document and organized workshop for June 2001. Monitored farmer association interviews and discussed next phase with MINAGRI.
- February 2001. Kelly traveled to Rwanda for fertilizer work, including participation in Abt/FSRP/MINAGRI workshop.
- November 2000. Bingen followed up in Rwanda on NGO and farmer association surveys due to change in MINAGRI staff.
- November 2000. Kelly traveled to Rwanda for inputs work.
- October 2000. Clay worked in Rwanda with USAID/Rwanda and the Rwanda Ministry of Agriculture on project implementation activities including contributing to the series of Phase I Survey data analysis and reporting.
- August/September 2000. With FSRP staff in Rwanda, Bingen designed and tested surveys for NGO and farmer associations.
- July 2000. Kelly followed up with MINAGRI in Rwanda on fertilizer profitability work and began fertilizer demonstration work. Also discussed with USAID potential food aid monetization work to be carried out by Neven.
- June/July 2000. In Rwanda, Neven provided training to FSRP staff in statistical analysis and launched food aid monetization work.
- April 2000. Clay worked with USAID/Rwanda and the Rwanda Ministry of Agriculture on project implementation activities including: 1) cleaning and structuring data from the FSRP Phase I survey, the Crop forecasting survey and the Post-Harvest Production Survey; 2) reviewing plans for analysis of these data sets; and 3) an evaluation of the crop forecasting data based on interviewer observations and a comparison with post-harvest survey data.
- January 2000. Clay worked with FSRP staff in Rwanda on planning and scheduling of analyses from the Phase I survey.

- December 1999. Clay worked in Rwanda with FSRP staff in finalizing the Phase 1 survey instrument and field operations, developing “light” survey modules for post-harvest and production forecasting, pre-testing the production forecasting instrument, and completing analysis on a paper focusing on intensification investments.
- December 1999. Bingen completed work in Rwanda on a preliminary diagnostic study of selected NGOs that support various types of farmer associations. Also entered the data collected from the diagnostic study into a relational data base that would help generate information to be used in developing a collaborative research program with selected NGOs on an in-depth study of selected farmer associations.
- December 1999. Kelly worked in Rwanda with FSRP consultant Anastase Murekezi to prepare a synthesis of FSRP and FAO fertilizer response and profitability analyses, conduct a workshop to discuss the synthesis with representatives of MINAGRI, ISAR, and others (World Bank, NGOs, etc.) working on fertilizer issues in Rwanda, and prepare a draft paper based on workshop proceedings and recommendations.
- September 1999. Clay traveled to Rwanda to work with FSRP staff in: 1) the development of FSRP Phase I survey instrument and field operations; 2) examining options for linkages with Nutrition Survey proposed by USAID Health Officer; 3) pretesting a “light” methodology for area measurement; and 4) follow-up on activities planned on fertilizer subsector and farmer associations work.
- September 1999. Kelly presented to the GOR in Rwanda the results of preliminary fertilizer profitability analyses; trained collaborators in how to use the software to revise and/or update the underlying response and price data; and assisted the FSRP team in developing a survey module to evaluate input use and production in the 2000-A season.
- June 1999. Sampling specialist David Megill was in Rwanda to assist FSRP staff in: 1) developing the sampling frame and sample design for FSRP household-level data collection; and 2) selecting the sample of primary sampling units to be listed.
- June 1999. Clay worked in Rwanda with FSRP staff and Megill in developing the Phase I survey sample design and in setting the parameters for project collaboration with MINECOFIN on the agricultural component of the Living Conditions Survey and on the household listing implementation for both surveys.
- May 1999. Bingen worked with MINAGRI staff assigned to FSRP in launching a program of activities that would create MINAGRI capacity for institutional and policy analysis of farmer associations and professional agricultural groups. Also he helped to identify a possible short- and medium-term program of applied policy research on farmer associations and professional groups that would be coordinated with the Fertilizer Sub-Sector Studies and other data analysis activities planned for FSRP.
- April 1999. Clay provided orientation and guidance to Mpyisi in Rwanda; established FSRP project accounts and reporting procedures; reviewed FSRP researcher training needs and plans; recruited additional project personnel (analyst, computer specialist, and accountant); and provided guidance to FSRP researchers engaged in fertilizer subsector study.
- April 1999. Kelly worked with FSRP staff in Rwanda to finish collection of secondary data on fertilizer response, update fertilizer profitability analyses, and met with farmers and farmer associations to conduct informal interviews on use of fertilizer and input distribution systems as input into developing surveys for 2000-A season.
- January 1999. Clay worked with USAID/Rwanda and the Rwanda Ministry of Agriculture to implement FSRP financial procedures; finalize Year-1 project work plan; review FSRP researcher training needs and plans; liaison

with other ministries, organizations and projects; continue project personnel recruitment; and provide initial SPSS training for project staff in the Ministry of Agriculture.

- January 1999. Kelly traveled to Rwanda to develop a research program on inputs themes.
- November 1998. Clay and Tardif-Douglin worked in Rwanda with USAID/Rwanda and the Rwanda Ministry of Agriculture on project start-up activities including working out administrative procedures; drafting a Memorandum of Understanding between MINAGRI, USAID, and MSU; liaison with other ministries, organizations and projects; project personnel recruitment; and locating/renting office space.

## **6. Research Activities**

### **6.1. Survey Design and Implementation**

#### **Phase I Food Security Survey**

The Phase I Food Security Survey was developed in September-November 1999 and fielded during December 1999 through February 2000. It focused on household-level land use and agricultural intensification (including improved inputs such as fertilizer, pesticides, improved seed, and other investments made by farmers to enhance yields, such as the construction of anti-erosion hedgerows and terraces). The survey also included information on household participation in farmer associations and the ways in which farmer groups enhance access to land, labor, inputs, credit, markets, and other resources and institutions essential to successful rural livelihoods. The survey concludes with a module on food aid receipts and perceptions.

This survey was implemented on a nationally representative sample of 1,584 households, a subsample of households selected for study in the MINECOFIN Living Conditions Survey (EICV). It is anticipated that relevant data from the EICV (income and expenditure, consumption, nutrition, etc.) will be merged with the Phase I Survey data once available.

#### **Crop Forecasting Survey Test**

A “light” methodology for obtaining household and crop level pre-harvest estimates of production for early warning purposes was developed and tested in December 1999. The test was conducted on a 264 household subsample of FSRP Phase I sample. The pre-harvest estimates will be compared to the post-harvest estimates to evaluate the usefulness of household pre-harvest estimates in assessing rural household vulnerability.

#### **Post-harvest Crop Production Survey**

A post-harvest crop production methodology was developed and fielded on the Phase I sample of 1,584 households following the 2000 Season A harvest. These data were used to estimate crop production for MINAGRI on a seasonal basis. When linked to field area data from the Phase I Survey these data will serve as the basis of estimating crop yields.

#### **Regular Land Use and Crop Production Surveys**

Regular land use and crop production surveys are conducted each season (two times per year) on the sample of 1,584 households. Occasional surveys of livestock and demographics are added to these regular surveys.

### Farm-level Coffee Survey

In early 2002, FSRP designed and implemented a survey at farm level concerning coffee production and harvesting in Rwanda. This survey is a replication of an earlier study conducted in 1991. The full FSRP sample of 1584 households was interviewed and asked questions concerning their coffee trees, cultivation methods, post-harvest processing, and their opinions on the future of coffee, coffee prices, and their own actions.

### Rural Labor and Death Survey

In response to requests from USAID staffers, this survey was fielded in Feb-April 2002 to understand how many rural households in the previous 4 years had suffered a death, particularly prime age death, or currently had someone who is chronically ill living in the household. This survey is similar (although not identical) to research being conducted in Kenya, Zambia, and Mozambique. A sample of 1520 households from the FSRP sample was interviewed.

## 6.2. Fertilizer Subsector

Although there is a very broad range of factors that influence fertilizer demand and supply, there are four basic sets of questions that must be addressed by the GOR as it designs and implements a new fertilizer policy:

- Where are the best opportunities for profitable use of fertilizer and what is the **effective** and **potential** demand?
- What type of fertilizer import system would be most cost-effective in the short, medium, and long-term?
- What type of fertilizer distribution system would be most cost-effective in the short, medium, and long-term?
- What can be done – in addition to improving import and distribution systems – to stimulate farm-level demand?

The FSRP research program was designed to be complementary to fertilizer subsector activities already being designed – in particular the FAO soil fertility initiative, the WB-funded input marketing project, and MINAGRI extension programs.

**Research Question 1:** What crops and zones/communes can profitably use fertilizer under (i) current prices, and (ii) under a variety of alternative price scenarios?

*Principal research activities:* Development of a spreadsheet analysis of fertilizer profitability indicators for each commune by crop. This would entail the following:

- Review available response data from FAO/ISAR and make (well-documented) decisions about the most appropriate response data to use for each crop/commune. In cases where response is obtained using 17-17-17, convert to DAP+urea equivalent (ignoring potassium because it showed no significant response) to compare NPK vs DAP+urea costs.
- Using base output price data from EU, develop a method of estimating minimum, maximum, and typical output prices per cropping season.

- Using fertilizer import and distribution cost data from EU plus supplementary information on alternative methods for importing, develop a schedule of fertilizer costs for NPK (17-17-17), urea, and DAP delivered to each commune.

Maintain and improve the spreadsheet by:

- monitoring the impact of price changes; and
- collecting response data from demonstrations and trials recently (or currently) being conducted by extension and/or NGOs on farmers fields.

**Research Question 2:** What is the effective and potential demand for fertilizer by crop and commune and what is needed to turn potential demand to effective demand in areas that appear to have high fertilizer profitability?

This is a very difficult question to answer. There are some very optimistic estimates circulating at present (up to 70,000 MT/year when the maximum imported to date has been less than 8,000 and the average annual use about 4,000 MT). To develop a reasonable policy concerning fertilizer imports and distribution systems, the MINAGRI and the private sector need a better understanding of what effective demand is and why effective demand has never come close to potential demand. During the EU fertilizer import program, there was strong evidence that ‘demand’ is not backed by financial capacity to pay (i.e., high level of unpaid fertilizer credits by farmers’ associations; inability – or unwillingness – of distributors winning EU bids to pay for their fertilizer and remove it from EU warehouses until they had firm tenders from downstream purchasers).

Although it is impossible to accurately estimate demand at different prices with currently available data (e.g., no information on price or income elasticities of fertilizer demand), FSRP can make a significant contribution toward a better understanding of the factors influencing fertilizer purchase decisions.

Principal research activities:

- Describe past fertilizer use at a disaggregated level (a rapid review of the DSA data to 1994) to determine where fertilizer was being used, how much, and on what crops.
- Combine information on past behavior with information on current use coming from the WB farm surveys to assess changes in use patterns (note that the WB survey is not a representative national survey as was the DSA but we should be able to develop some hypotheses about changes that are occurring and where fertilizer is being used).
- Based on results of these analyses and the profitability analyses (described above), identify a number of key crop/commune combinations where fertilizer use should be high but is not.
- Develop a research program for these areas to obtain a better understanding of why fertilizer has not been rapidly adopted. The research could involve close monitoring of NGO or government demonstration programs to encourage use and/or some type of farm/farmer association/distributor surveys.
- In this phase of the program we would try to broaden the focus from fertilizer only to fertilizer in combination with other inputs and management practices so as to get a better understanding of overall farm income and the relative profitability of different combinations of improved technologies.



## Key Findings to Date

There is strong evidence that fertilizer use is profitable for a number of crop/zone combinations (potatoes and climbing beans are particularly strong candidates for fertilizer use). However, for many of the crops that figure in GOR plans for transforming the agricultural sector from a semi-subsistence to a commercial base, our understanding of fertilizer response is limited (this is true for maize and rice in many zones). Although more research is needed to determine the nature of fertilizer response for these crops with commercial potential, results of the profitability analyses for crops already well understood suggest that fertilizer consumption can increase during the next decade from current levels of about 5,000 tons/year to 13,000 or even 16,000 tons if appropriate extension and input marketing policies are promoted.

### 6.3. Farmer Associations

The Government of Rwanda has a tremendously rich history of working with and through farmer groups to promote agricultural and rural development. These experiences, however, are both discontinuous and highly divergent.

In 1998, the Ministry of Agriculture, Livestock and Forestry (MINAGRI) began moving toward a new system of “vulgarisation agricole” that would be participatory, adaptive to the country’s highly variable agroecological conditions, economically effective and programmatically flexible over time. Specifically, the government would like these groups to become full partners in development, and eventually take responsibility for assuring their own “agricultural extension needs,” especially with respect to seed multiplication, agricultural input distribution, agricultural marketing and processing.

In order to implement such a policy successfully, the government and donor agencies need to consider and account for the different capacities, experiences and expertise of the NGOs and the farmer groups. Not all NGOs or farmer groups can be expected to assume the same level of responsibility for program implementation. The wide variability among NGOs and farmers groups requires an adaptive and multi-pronged policy.

The farmer association component of the project seeks to respond to these policy needs by:

- Creating a **decision-making database of NGOs** that will help the Ministry: a) assess the viability of both national and international NGOs to implement different types of agricultural and rural development programs; b) provide a nationwide commune level map of agricultural and rural development activities; and c) provide a basis for collaborative accountability in development planning and programming.
- Undertaking an in-depth study of farmer associations and NGOs that will provide the government with a more operational set of criteria of the different experiences, skill levels and organizational relationships of NGOs and farmer associations around the country.

### Preliminary Findings

- Field visits to the farmer association sites of three NGOs and interviews with NGOs in Kigali during May 1999 confirm the need for MINAGRI to develop a capacity for identifying strengths and weaknesses, as well as commonalities and differences among these various groups throughout the country. The mission and operational objectives of the main NGOs that support the largest number of farmer associations in various prefectures differ significantly. Some NGOs continue to promote their “own programs,” while others encourage farmer-driven

initiatives. Differences in the mission and objectives among NGOs have also led to significantly different approaches to capacity building among farmer associations.

- It has been widely recognized for some time that some farmer associations are more “real” than others. In order to understand and deal with the diversity among NGOs, several types of inventories of NGO activities and farmer groups have been prepared. These data bases, however, are used more as catalogs than as resources for decision-making.

## 6.4. Coffee Research

The world market for coffee is changing rapidly. Among the changes is an emphasis on improved quality and greater consideration of how coffee is grown and marketed. Important new producers of bulk quality coffee (especially in Vietnam) have driven down world market prices. Rwanda's production and marketing system for coffee has not kept pace with changes in the global high quality market, so prices are down. Farmers have responded to the price declines, so recent Rwandan coffee exports are less than half what they had been in the 1980s. Despite the challenges in coffee marketing and production, coffee remains one of Rwanda's most important sources of foreign exchange.

Rwanda has natural agro-climatic conditions that are favorable to the production of high quality coffee which attract premium prices for world markets. Due to this fact, there is considerable interest in Rwandan coffee among private investors and donor agencies. Prospects for capturing a share for Rwanda of the growing high value coffee market depend on understanding the final market, and making wise business connections and investments. Prospects for improving Rwanda's coffee harvest to facilitate such a market success story depend on supply chain considerations that begin on the farm and with inputs into coffee farming. To be able to understand how farmers will react to new opportunities, farm level information must be developed to accompany and complement varietal, crop input, processing, and marketing initiatives to form a comprehensive supply chain approach. Understanding how farmers will respond to market signals, and how to enhance farmer responses, is necessary to facilitate the transition to higher value coffee supply chain products.

### Survey Method

The data for this research came from a national survey of rural Rwandan households in MINAGRI's Food Security Research Project sample. The survey was fielded in January and February 2002. The total number of useable survey responses was 1576. The interview questions replicate a 1991 study addressing the same topics, enabling ten-year comparisons of changes in farmer practices. The analysis also compares growers according to the number of trees the household manages. The focus of the study is an assessment of the current status of farmer practices in coffee tree maintenance, farm-level post-harvest coffee processing and farmer attitudes towards the coffee sector and pricing.

### Key Findings to Date

Very few Rwandan growers are planting new trees. The proportion of growers pruning their coffee has also declined. Prices for coffee appear to be at a tipping point with many growers considering removing their trees, while others have already pulled them. Use of both inorganic and organic soil fertility-enhancing measures increased since 1991, but large numbers of farmers still do not use organic fertilizers, and less than 10% of growers use chemical fertilizers. The proportion of growers who use pesticides has declined from 96% to 57% since 1991. The proportion of growers who de-pulp the same day as the harvest has increased since 1991, but is still only 44%. The percent of growers who use locally made de-pulping machines has increased since 1991, but some growers are

still using rocks to de-pulp their coffee. Only 22% of growers ferment their de-pulped coffee in rust-free containers. Coffee drying techniques remain extremely crude, with by far the most common method being a mat spread on the ground. Large quantities of high quality coffee are "lost" to Rwanda because growers fail to employ "best" practices at nearly every stage of production and post-harvest processing.

The Government of Rwanda must take these potential changes into consideration not only as it considers how to improve the coffee sector, but also in terms of its macro-economic and balance of trade planning. Coffee yields, while better than in 1991, are still well below the standards established in nearby countries. Quality is also below that achieved by nearby countries. So it is logical to focus on ways to improve the yields and quality of the area currently under coffee. The survey results suggest two areas of recommended future agronomic research that could contribute to increases in coffee production. First, many farmers are clearly interested in intercropping coffee and other crops. Principal among these crops is beans. Agronomic research into how best to harmonize intercropped beans and coffee could help reduce coffee grower costs by effectively reducing the land area required by coffee and perhaps economizing on fertilizers. It is important to establish research to determine where food and coffee can be intercropped in sustainable ways that make economic sense at prevailing prices.

The second area of agronomic research priority is the further investigation of farmer experiences with pesticides. The comparison with the 1991 survey results on pesticide effectiveness shows a worrying trend that resistance to pesticides is growing. If resistance to existing treatments is truly growing, the threat to Rwanda's coffee output is real. On the other hand, growers may be applying the pesticides inappropriately. In that case, increased efforts to help them learn appropriate application rates and techniques are needed.

The results of the research highlight Cyangugu as a province deserving of special attention in future coffee production and marketing enhancement efforts. The reasons for a focus on Cyangugu are the following:

- A high concentration of larger growers; these smallholders are in general more apt to use inputs. Larger growers may also be easier to work with to establish processing facilities to improve coffee quality.
- High yield per tree relative to other areas of the country.
- Many Cyangugu growers are considering altering the use of fields now dedicated to coffee.
- For non-growers, the modal year of leaving coffee production (2001) was more recent than other provinces, so it may be easier to bring some of these growers back to coffee.
- Given that high quality coffee must be washed within eight hours of picking, washing stations may be more profitably located close to areas with highly concentrated production.

Efforts to improve processing and marketing of coffee must be complemented with research and extension work geared towards improving the quality of the average bean harvested from Rwandan trees. It is also important to explore costs and benefits of various scales of washing stations.

## 6.5. Rural Labor and Deaths

Understanding the impact on households of prime age illness and deaths is critical for the development of interventions to assist the increasing number of rural households and communities that are affected by HIV/AIDS.

Key research questions are: 1) Which households and members of households tend to be hot with prime age adult morbidity and mortality; 2) Are these households different from other rural Rwandan households; 3) How are these households affected by morbidity and mortality; 4) What are their strategies for dealing with the stress, as they relate to their agricultural production; and 5) What is the evidence of these strategies in their agricultural production and land use?

In March and April 2002, a survey was conducted of the 1584 households in the FSRP sample. Preliminary work was completed and the dataset was combined with the Living Standards Measurement Survey (known as EICV in Rwanda) for analysis. A seminar was presented in September 2002 to a group of about 30 people in Kigali, including USAID staff, staff from various NGOs, Ministry of Agriculture and Finance staff, as well as health sector personnel. The seminar highlighted the prevalence of illness and death in rural areas of Rwanda, as well as presenting the initial analysis of the relationships between households with death or illness and their characteristics. In November 2002, two additional seminars were presented with a draft report on the effects on agricultural production and the strategies that are used to deal with those effects. At the University of Rwanda in Butare and in Kigali, participants from agricultural and health sectors provided input on current and proposed research.

### **Key Findings to Date**

Rwandan households cite the loss of agricultural labor as the most important effect and they use various means to deal with the stress. As in Kenya, it makes a difference who in the household is ill or dies. When women are ill or die, the household attempts more often to bring in new members or hire in labor than when a man dies. Reliance on social networks, particularly sharing labor with neighbors, is very often the most important strategy. Initial analysis shows that these households are more likely to be in the lower expenditure quintiles than the overall rural population.

## **6.6. Forces Driving Trends in Agricultural Production and Land Use**

Household surveys over the past decade reveal tremendous changes in Rwandan agricultural outputs. The traditional Rwandan farmer has apparently responded to changing circumstances by making radical shifts among crops. For some crops, the change in output may be the result of secular shifts in productivity driven by lack of resistance to disease. In other cases, land availability, prevailing prices, lack of labor, lack of land, or food security may be the primary drivers behind substantial crop shifts by smallholders. The purpose of this research is to document major shifts in output and provide hypotheses about the forces driving these changes.

### **Key Findings to Date**

Farmers have shifted production out of bananas and coffee into cassava and other crops. These changes in production signify potential declines in soil fertility, due to erosion. With declining livestock herds, reduced quantities of manure are available to nourish the soil. Bananas and coffee used to be main sources of cash revenue for Rwandan farmers, so declines in these crops may signify a lowered access to the cash economy. On the consumption side, reductions in beans and soy along with the reduced livestock result in lowered farm level production of proteins, and so lower quality diet and poor nutrition.

## **6.7. Data Base Development**

Documentation of data files and surveys are required for data that was collected in Rwanda from 1986 through 1993 for the data to have any value for researchers. Beaver at MSU and Shingiro from Rwanda worked together to develop and implement a procedure to document the surveys and the data collected.

The documentation of each survey includes: a brief summary of the purpose for the survey; sampling design; field procedures; the survey instrument; file directory structures; descriptions of the process for cleaning data and syntax used to clean data; and documentation of the fields within each of the files.

The data are stored in SPSS (Statistical Package for the Social Scientist) format files.

Coordination of data distribution to interested users is the responsibility of USAID and MINAGRI in Rwanda. Further information can be obtained from C. Donovan or M. Weber at Michigan State University.

### **Enquêtes Integrale sur les Conditions de Vie des Menages au Rwanda (EICV) 2000**

The EICV is also known in English as the Living Conditions Survey and was conducted by the Ministry of Finance and Economic Planning (MINECOFIN) with funding from DFID. It is a comprehensive survey of more than 6000 rural and urban households, conducted in 2000-2001, concerning demographics, income sources, assets, consumption, and labor. The 1,584 households in the FSRP/DSA sample (including the Phase I surveys) represent a subset of this EICV sample, so that information on these households can be paired and evaluated. This serves two basic purposes: 1) enables FSRP/DSA to look at other aspects within the household which are not covered in the FSRP/DSA data collection; and 2) help demonstrate the advantages and disadvantages of a smaller subset of households for rural data collection.

FSRP is currently assisting MINECOFIN in cleaning one section of the EICV data and later will collaborate with MINECOFIN staff to evaluate the relationship between EICV full sample and the FSRP/DSA sub-sample. In addition, the sub-sample EICV data will be used by researchers to evaluate the relationship between farm and non-farm activities and other aspects. For more information and database access, contact the Department of Statistics, MINECOFIN, Kigali, Rwanda.