


TaCRI
TANZANIA COFFEE RESEARCH INSTITUTE

Tanzania Coffee Research Institute

Annual Report 2007

Contents

TAP Members from left Dr. Francis Shao, Dr Roshan Abdallah, Prof. Martin Kyomo (deceased), Prof. Bruno Ndunguru and Prof. James Teri

Chairman's Statement

Mr. Edwin Mtei, Chairman, TaCRI Board of Directors

Once again, I am very pleased to write a foreword to TaCRI's Annual Report for the year 2007. This is an important milestone, since it respresents five years since TaCRI became legally constituted and operational as a stakeholder-owned and managed institute. It will be recalled that in our first Annual Report in 2003, I noted that stakeholders had very high expectations from TaCRI. I had confidence in the team to address the major coffee research and development constraints and priority activities as identified by coffee stakeholders. I am proud of TaCRI's performance and achievements since its inception.

The Board can confidently claim that TaCRI is a well managed institution, and has built a good reputation gaining national, regional and international respect. The Institute has enjoyed some high profile visits in recognition of its work. For example, President Jakaya Kikwete honoured us with a visit at Ugano in October 2006; Vice President, Dr. Mohammed Shein visited Mbimba in November 2006; Prime Minister Edward Lowassa visited Lyamungu in February 2007 and Maruku in March 2007; and, the EU Heads of Missions in Tanzania visited Lyamungu in March 2007. All were positively impressed and expressed satisfaction with TaCRI's achievements.

The newly released coffee varieties that combine exceptionally good beverage quality with high productivity and resistance to CBD and leaf rust are a big milestone for the industry. Demand for planting materials for these new varieties far exceeds TaCRI's capacity, hence our strategy of empowering stakeholders to produce their own planting materials from hybrid seedlings supplied by us. We are all very proud of progress to date in this direction. We are also exploring the use of tissue culture techniques to accelerate the multiplication and distribution of these varieties.

During the period, we started work to modernise TaCRI's research facilities and infrastructure at Lyamungu Head Office and at Maruku, Mbimba and Ugano sub-stations. This was clearly identified as essential for good quality research to support the rejuvenation of the coffee industry in Tanzania.

A major and historic decision of the Board of Directors during the period was to establish two additional sub-stations at Mwayaya, Kasulu and Sirari, Tarime in order to better serve coffee growers in Kigoma and Mara regions, two areas that produce exceptionally good quality Arabica coffee and have great potential for expansion. Mwayaya and Sirari will be the first ever agricultural research stations in these regions. This brings the total number of TaCRI sub-stations to six (Lyamungu, Maruku, Mbimba, Mwayaya, Sirari & Ugano), covering all major coffee growing zones in the country.

These and other achievements have been adequately covered in these pages, and on behalf of the Board, I commend TaCRI's management and staff for all their work in meeting our objectives.

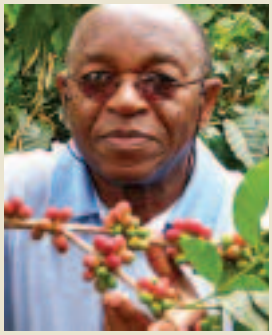
These efforts by our young Institute were made possible by contributions from Tanzania coffee growers, the Tanzania government, and the European Union. We also benefited from a collaborative programme with CABI, funded by the Common Fund for Commodities (CFC) and IPM/CRSP in collaboration with Ohio State University and Sokoine University of Agriculture. I would like to once again record our appreciation for this support which has been so pivotal in making our work possible.

Sadly, we lost Professor Martin Kyomo, 70, who succumbed to prostate cancer on 20 May 2007. Professor Kyomo was the first Chairman of the Technical Advisory Panel (TAP). He was serving his second term as Chairman.

Edwin I. M. Mtei
Chairman, TaCRI Board of Directors

TaCRI Board of Directors inspecting rehabilitation works at TaCRI, Lyamungu

Chief Executive Director's Statement



Professor James Teri, Chief Executive Director

This year marks the fourth year of implementing TaCRI's 5-year Strategic Action Plan (SAP), 2003 – 2008, and in this report we summarise the key achievements during the year, in our vigorous efforts to implement the SAP, to achieve the following key results:

- Result 1: that a well-managed, financially viable, customer focused, forward thinking, nationally and internationally respected, sustainable research institute is established.
- Result 2: that appropriate crop improvement research programmes are implemented.
- Result 3: that appropriate crop productivity and quality improvement research programmes are implemented
- Result 4 : that livelihoods and income security research is undertaken.
- Result 5: that appropriate technologies are multiplied on farm, promoted by extension and training and made available to Coffee Farmers.
- Result 6: that TaCRI facilities, equipment and management systems are suitably modernised.

During the year we launched the following tenders for the rehabilitation and modernisation of TaCRI's research facilities and infrastructure using STABEX funds:

- Package 1 (Building Works Lyamungu)
- Package 2 (Civil Works Lyamungu)
- Package 3 (Building and Civil Works Mbimba)
- Package 4 (Building Works Maruku)
- Package 5 (Building and Civil Works Ugano)
- Supply of Laboratory Equipment and Materials

In the coming year, these contracts will become operational, with the Institute becoming a hive of activity as the projects are implemented.

We also launched a tender to write a coffee table book, which will be used to help promote Tanzanian coffees both locally and internationally. The book will demonstrate the historical and current importance of coffee for the people of Tanzania, and the exceptional quality of Tanzania's coffees. In the same vein we launched a tender for a documentary film, recording TaCRI's achievements and milestones. With the 5-year SAP drawing to a close in 2008 we also launched a tender for a consultancy to review the SAP and develop a revised 5-year SAP and TaCRI business plan for 2008 – 2013. The objectives of the consultancy will be:

(i) To update the Strategic Action Plan of 2003 and focus on research and technology transfer priorities and on financial forecasts and plans in respect of (a) the costs generated by TaCRI's activities for meeting its business objectives, and (b) revenues through stakeholders' contribution, government budgetary allocations, service delivery and sales of materials (with an option to include mass multiplication of the new varieties), commercial coffee production as well as revenues from the endowment fund.
(ii) To identify possible adjustments on either the cost or the revenue side that are necessary to guarantee TaCRI's financial sustainability in the medium and long term. In this context the consultant will determine the risks associated with different scenarios (risk analysis) and recommend financial options.
(iii) To develop a strategic business plan and a new medium term (5 years) R & D strategy to reinforce work started during SAP I to rejuvenate the Tanzania coffee industry. The study will develop a comprehensive, results- oriented, demand-led SAP II with Annual Workplans & Budgets.

During the period, we concluded an internal management systems review of TaCRI, which included a review of the financial, administrative and human resource management systems currently in place. This was implemented by Moore Rowland Forensic Services Ltd of South Africa, with recommendations for improvement.

The short, medium and long term breeding programmes are on course to develop Arabica coffee varieties for the future, that combine productivity and beverage quality with durable resistance to CBD & CLR, as well as Robusta varieties that are resistant to CWD – the three major diseases that pose a threat to the Tanzania coffee industry.

We also made progress in our quest for novel pest management strategies that are effective and more friendly to the environment.

I take satisfaction from the ever growing demand for technologies being generated by TaCRI and especially planting materials of the new varieties. It is a big challenge! We are experimenting with new approaches: grafting, producing hybrid seeds, and somatic embryogenesis to accelerate the multiplication and distribution of planting materials of the improved varieties. I can say with confidence that there is light at the end of the tunnel in meeting our commitments to our stakeholders.

Professor James Teri,
Chief Executive Director

Crop Improvement

Dr. Linus Masumbuko, Head of Department

This year has been one of increased activities in the Crop Improvement Department. More field trials were established, there were increased demands for more crosses, departmental scientists working on their MSc courses got closer to graduating, and we commenced coffee micro-propagation work. All the additional activities were executed with the existing departmental staff, for which the increased workload was quite a challenge. Going forward, there is a need for the department to train existing field officers and recruit at least three new field officers in order to fulfill our objectives and manage the increased volume and complexity of work.

Major Achievements 2006 – 2007

Short-term programme

Multiplication of second generation tall crosses

One of the priorities over the period was the release of additional new varieties. Nine varieties have been released to date and one potential variety (SC 13) was in the pre-release stage. This will be included with other entries in the national performance trials to be planted this year. As mentioned in the previous report, the first second generation variety trial (SGVT 1) was planted at Lyamungu station in June 2006 and another was planted at Ugano in November of the same year. These have resulted in 5,049 clonally multiplied seedlings from F 23, which is enough to establish at least three trials this year.

Multiplication of second-generation tall selections from Field 27 resulted in 341 seedlings from 13 selections, which have now been planted in the clonal mother garden in order to generate more materials. This exercise will be on-going until enough materials have been harvested to establish at least 6 multilocational trials and 10 on-farm trials. Thirty-five (35) seedlings from Field 27 have also been planted as male parents in the seed garden. Projections are that seedlings will be ready for multilocational (national performance trial) planting next year. The major limitation in the multiplication exercise is the poor response to clonal multiplication by some of the selections resulting in few seedlings. Nine officially released varieties continue to show stability across coffee regions; vegetative variations have not been observed.

Preparation of cuttings from harvested shoots of second generation hybrid varieties

Medium-term programme

Development of compact type hybrid varieties

Our medium-term activities involve seeking an alternative strategy to get improved coffee varieties to farmers in the most efficient way. In this endeavor, development of compact hybrid varieties has been the method of choice. The CBD pre-selection of 2005-2006 compact crosses selected 4,857 seedlings, which will be used to set up on-station and on-farm trials in sub-stations and farmers fields. At present the seedlings are in the nursery awaiting arrangements with sub-stations and farmers to have them planted from early next year.

To date, seed-gardens have been established at Lyamungu and Ugano research stations. At the Lyamungu seed-garden, female (and some male) parents have started flowering. In order to meet the demand for improved seeds, another garden is to be set up at Mbimba. Processing of seeds from compact female parents PNI 086, PNI 088 & PRO 127 for shipment to Mbimba is underway.

In June 2007, we took delivery of pollen-processing equipment, an important landmark event in TaCRI's coffee breeding activities. The equipment will enable us to harvest, process and store pollen in large quantities, giving us more control in the crossing programme. A case in point is this reporting year, when the prolonged rains

Nursing of clonal cuttings prepared from second generation tall selections from field 27 in the vegetative propagation boxes

exacerbated alternate flowering in males and females and interfered with the crossing programme. Compact types started flowering in October-November; there were no flowers in compact female parents; and flowering was seen in the selected tall types.

The pollen storage facility will reduce interference from weather conditions and speed up work in producing new crosses. The compact variety trials 1 and 2 (CVT 1 & CVT 2) planted at Lyamungu in March and September 2006 respectively will be replicated in other sub-stations. Plans are underway, either to start multiplying the entries clonally or to repeat the crosses.

In order to stimulate flowering and maximise pollen production, a few adjustments in the irrigation system will be made this year with the installation of overhead irrigation which will increase capacity in controlled crossings.

Meticulous breeding programme in progress: two year old second generation tall selections from field 23

Long-term breeding programme

Part of long-term breeding efforts is the transfer of useful traits from accessions in the germplasm collection to our breeding materials. Based on data from Dr. van der

Preparation and standardisation of CBD inoculum concentration for screening for resistance

Vossen, new Ethiopian accessions were selected for crossing with some of our breeding materials. During the 2006-2007 period, forty-six controlled crosses were done resulting in 2,037 berries.

Development of compact coffee seed varieties is another of the long-term breeding goals. Once a suitable (good cup quality, high yielding, disease resistant, etc.) test cross is selected a number of selfings, 4-6, to fix the genes and make the variety homozygous will result in a good seed variety. If this is successful, varieties resulted from this programme will be multiplied using seeds.

Compact hybrid seedlings in the nursery

The on-going scientific collaboration with CIFC in developing coffee varieties with CLR and CBD durable resistance provided an opportunity for a three-month attachment of scientists from the department. At CIFC they learned techniques on characterising CBD pathogens using isozymes and rust, and studying resistance mechanisms of coffee varieties to *Colletotrichum kahawae,*

Meticulous breeding programme in progress: two year old compact variety trial

the causaltive agent of CBD. An additional 12 rust differentials were availed to TaCRI Lyamungu, which will be used to characterize coffee rust races locally.

Germplasm collection

There have been two accessions of Sarchimor from CIFC added to the germplasm collection this year. The accessions will be used to improve the breeding programme.

Part of TaCRI's germplasm collection at Lyamungu

Tissue culture

Eight varieties were cultured and produced callus. The progress of producing plantlets has been slow, but there is hope for more progress.

Culturing of explants in tissue culture laboratory

Major Priorities 2007-2008

1. To make the tissue culture laboratory fully operational for subsequent testing of somatic embryo genesis, and multiplication of plantlets for experiments and secondary clonal mother gardens in farmer groups.
2. Two trial SGVT sites were established at Lyamungu and Ugano during 2006/07; in 2007/08 estabish trials at Mbimba and Mwayaya Kasulu. At least 14 on-farm trials are planned for the Southern highlands, Northern zone and Western coffee growing areas.
3. To have the pre-released clone SC-13 qualified for release by including it in the multi-location variety trials. This potential variety is to be planted in multilocational trials (NPTs) with second-generation hybrid materials. Three or four on-station trials will be complemented by a

Coffea conephora contributes to future development of Arabusta coffee

number of on-farm trials of this variety in the Northern coffee growing areas.
4. Effect first batch of crosses in the seed garden at Lyamungu to produce at least 50,000 hybrid seeds for on-farm trials establishment.
5. Multiplication of 273 CWD resistant varieties to generate a minimum of at least 1000 clonal seedlings for multilocational and on-farm trials.
6. To train departmental staff on large-scale pollen harvesting, processing and storage.

Differential plants obtained from CIFC Portugal for the identification of coffee rust races in Tanzania

A side view of the seed garden. Compact varieties (front) and tall varieties (back)

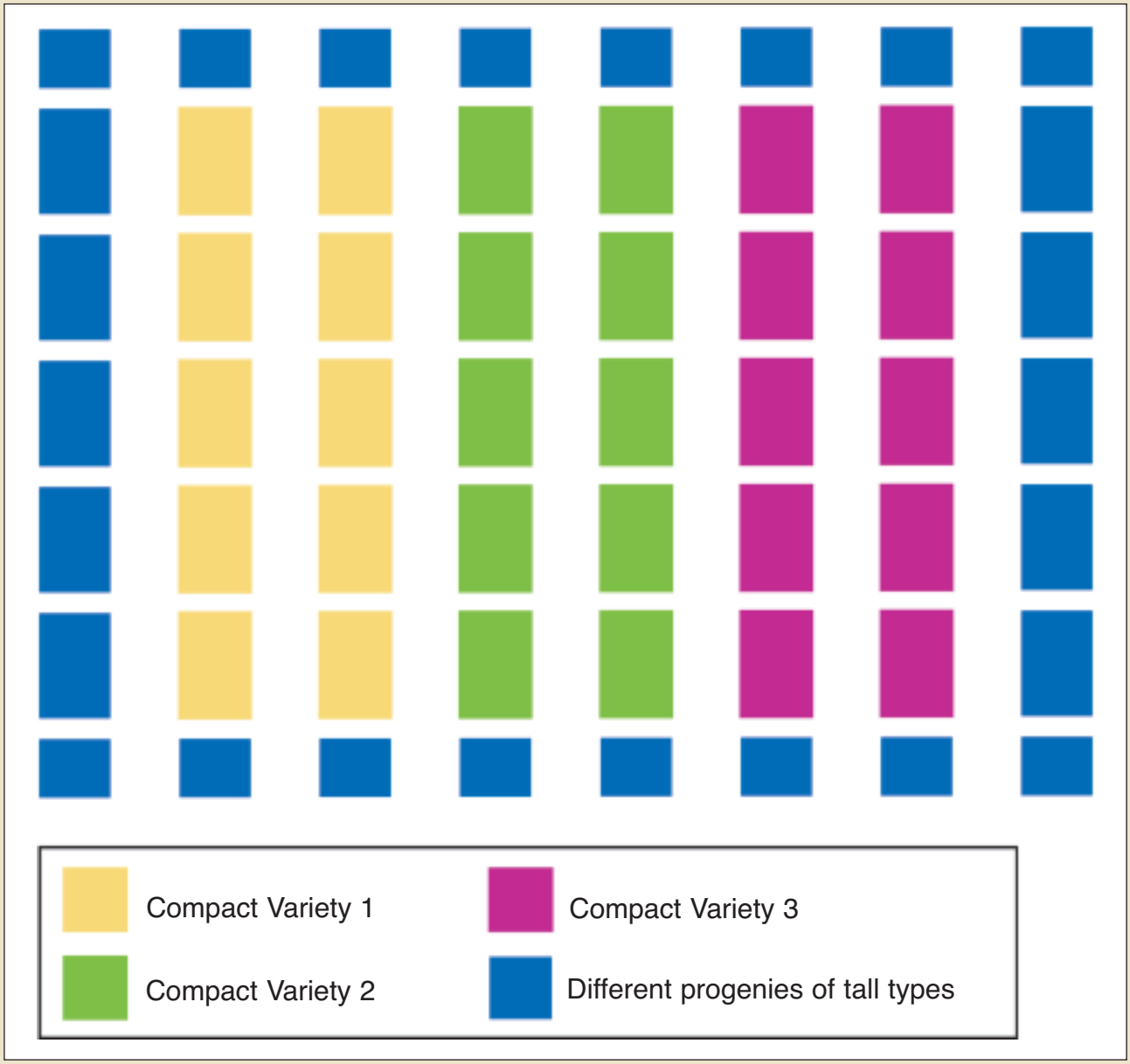
Case Study 1:

The Establishment of seed gardens in substations

The establishment of seed gardens meant for producing compact hybrid varieties is one of the strategies planned to address the challenges in getting improved coffee varieties to farmers. One main strategy is to provide compact varieties in the form of seeds. The method will have a major advantage over the clonal multiplication approach, because once the crossing parents are identified, it can be followed by controlled pollination, harvesting, packing and distribution of the resulting seeds, which is much less expensive and laborious than clonal multiplication.

Seed gardens will be developed at Lyamungu, Ugano and Mbimba sub-stations. To ensure seed quality for the decentralized seed gardens, the Lyamungu research station will be the only source of bulk pollen, until male parent blocks are established and sub-station staff have been trained.

Figure 1: Seed Garden Layout Schematic



Case Study 2:

Newly released coffee varieties in Tanzania are not genetically modified (GMO)

At TaCRI we sometimes get questions about genetic modification and are asked if our new varieties are genetically modified. TaCRI varieties are not genetically modified!

The coffee breeding programme at TaCRI utilises controlled hybridization to transfer resistance genes from Arabica varieties with resistance to CBD and CLR to the traditional Arabica coffee varieties (N 39 & KP 423) which have very good agronomic qualities but were susceptible to CBD and CLR. This process was done manually.

Pollen transferred to female parent

The hybrid varieties obtained from these initial crosses were advanced in the same way through back-crossing to either parent to improve intended attributes. The final varieties released were evaluated on their performance through the normal planting in the field under high disease pressure to ensure their resistance level. Together with resistance evaluation, yield levels and cup quality were seriously monitored and ascertained.

Emasculation to release pollen from female parents

Simple schematic diagram to produce hybrid variety:

N 39 or KP 423 x CBD & CLR resistant variety

Hybrid variety with qualities from both parents

Since these varieties are hybrids they must be multiplied vegetatively to maintain their parents characteristics.

Pollen transfer to female parents during controlled hybridization

Crop Productivity & Quality Improvement

Mr. Godsteven Maro, Head of Department

During the year under review, the department continued to address itself to its key result areas, many of which made increasing impact on stakeholders. These included training in coffee quality management, perfecting and training on grafting techniques, the expansion of the botanical garden, and evaluation of the potential of the botanical species as bio-pesticides. In relation to the attributes of new varieties, trials on the effects of shade and on tonic effects of copper were set at Lyamungu, Ugano and Mbimba. The matured technology of coffee-banana intercropping was appropriately packaged for dissemination to coffee farmers.

The big story has been the rehabilitation, or rather rebuilding, of the soil fertility laboratory at Lyamungu, which after a long wait, was finally accomplished this year. There is still some way to go until the laboratory is fully operational with more high tech equipment required and a GIS facility. Communication with PUM scientists in the Netherlands continued, in a bid to develop a quantitative approach in plant nutrient management, and results are promising.

Major Achievements 2006-2007

Quality improvement activities

The preliminary report on the performance of the new ecological wet pulpers was released. The findings show that the new pulpers do not save water as was initially expected, especially when it comes to sanitation after a day's work. Also, in the process of removing mucilage by mechanical abrasion (thus doing away with the fermentation operation), the new pulpers tend to damage parchment by nipping or squeezing-in. Other observations need further verification, as one season is not enough for a concrete inference. The trials are going on for another season.

Integrated Pest Management activities

The botanical garden was expanded further to include more plant species, including *Aloe vera*, *Mammea americana* and *Opuntia humifusa*. As for the two oldest species in the botanical garden (*Tephrosia vogellii* and *Azadirachta indica*), a field trial was initiated to check the efficacy of their leaf extracts against a common insecticide Selecron, for the control of mealybugs and scales. Preliminary results indicate that the three are fairly comparable.

The evaluation of alcohols as trapping media for adult coffee berry borer continued during the year, with special emphasis on the use of locally available and cheaply affordable alcohol. The trial entries included "Mbege", a popular drink among the Chaggas, banana juice and coffee cherry juice, tested against the 1:1 mixture of Methylated spirit and water which had excelled in the earlier trial. The results indicate that Mbege, and especially its 1:1 mixture with methylated spirit, is top of the list, as shown in Figure 4.

Making a botanical leaf extract for coffee pest control

Figure 2: After first treatment - first application of two botanicals

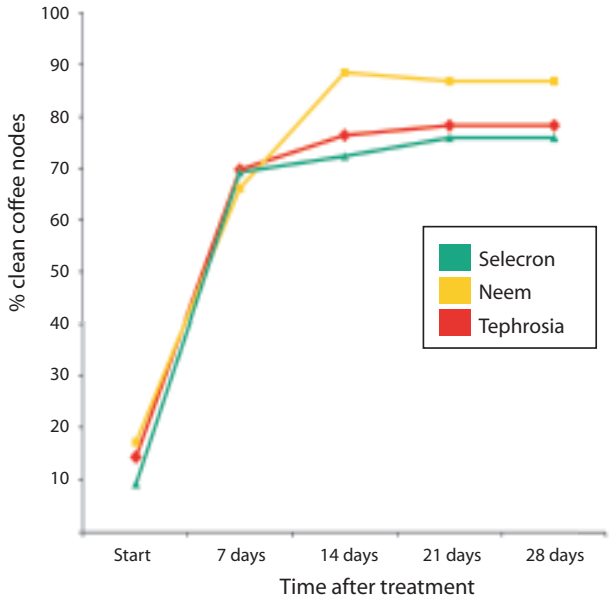
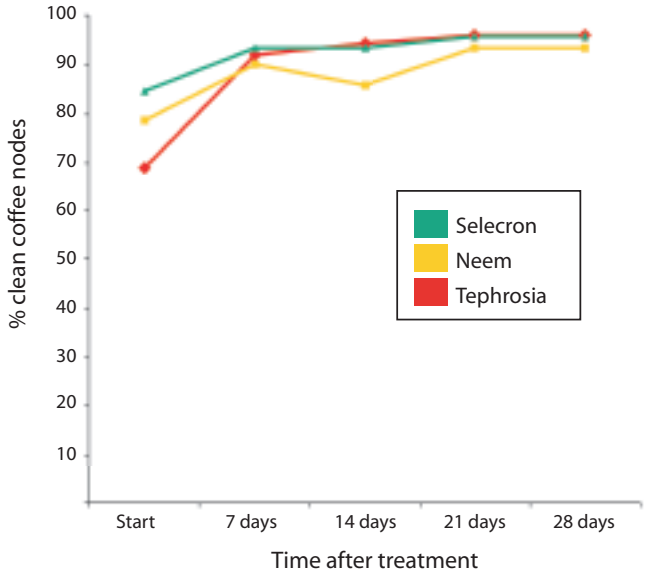


Figure 3: Repetition 2 months later - results of second application of two botanicals



The comprehensive report on the IPM baseline survey for Hai and Moshi Rural districts was completed and submitted to our collaborative research partners, Sokoine University of Agriculture. The report indicated that special attention is needed on training for pest identification and severity assessment, safe handling and use of pesticides, and upscaling the use of IPM (including the establishment of farmer group botanical gardens). At the research level, rigorous exploration on the active ingredients, best formulations, target pests and correct dosages is recommended.

Integrated soil fertility management

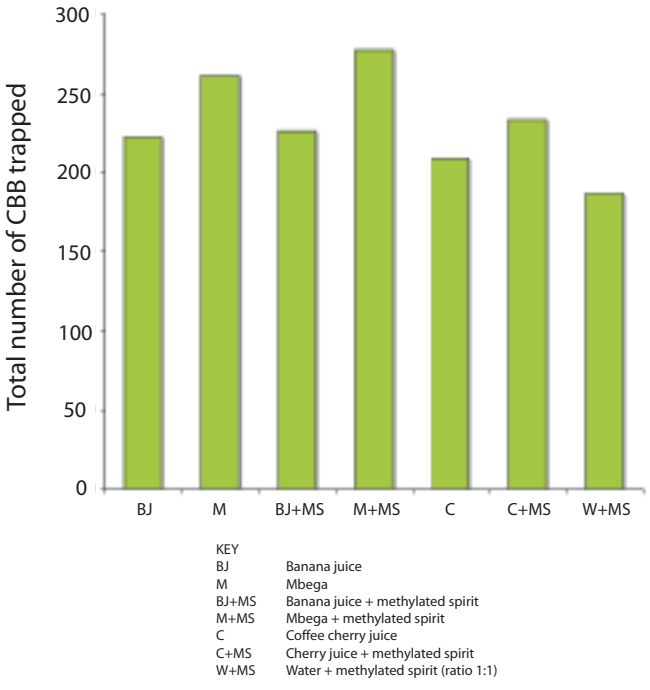
The campaign "Know your farm" was continued, which included more farmers from Arumeru, Rombo, Mwanga, Same, Lushoto and Kibondo. The last one was heavily represented this year, not only by executives from district councils but also from extension officers at different levels. As usual, this training seems to have had a great impact on the farmers, who wished to have their soils analysed immediately.

The rehabilitation of the soil laboratory, which involved the demolition of the existing wooden structure and the construction of a new concrete building over the same platform, started in November, 2006. Although the speed of construction has been slower than expected, and the building is two months overdue, it is now almost completed (see Case Study 3), except for the fixation of a few necessary gadgets. As such, we will soon be able to meet the stakeholders' demand for soil analysis and fertiliser advice.

The crop nutrition consultant from PUM, the Netherlands, Dr. Bert Janssen, paid his second consultative visit to TaCRI from 27th May to 9th June, 2007. Amongst other things, he collaborated well with our local soil scientist in refining the draft model, SAFERNAC, and the results are impressive, as can be seen in Case Study 3. He also laid down a good foundation for the proper running of the new soil laboratory, including an equipment service scheme (where he collaborated with an instrument service consultant from Mlingano, Tanga), the synchronisation of procedures, and quality control. Regrettably, we shall still need to purchase a new atomic absorption spectrometer, since the second-hand piece sent is not compatible with Windows programmes.

Discussing a point: Dr. B. Janssen (right) and Mrs. F. Faraji (second right) at Finca Estate

Figure 4: Comparing the efficacies of alcohol mixtures for trapping CBB



Crop Productivity & Quality Improvement

This year, the Crop Nutrition section was heavily represented at the Nane Nane agricultural show held at Themi grounds, Arusha. There was a mini soil laboratory on display, where a few farmers benefited from some simple analyses such as pH, and were advised on the appropriate type of fertiliser to use in their farms. This is a historical event, which we hope will be upheld.

Green manure crops: *Mucuna purpureum* (left) and *Lupine spp* (right)

Three field trials have been established, to look into the nutritive values of the different plant species used in making litter composts, temporal variation in nutrient release where different green manure species are ploughed under, and the most economically optimum combination of manures and inorganic fertilizers for coffee. The first one is at the preliminary stage with a total of six grass species collected and kept for bulking up.

Crop Husbandry

The emphasis for crop husbandry this year, has been to develop relevant technologies to complement the new varieties. The study on the effect of shaded and non-shaded coffee production on bearing, quality and pest incidence was continued during the year, with new trials set at Lyamungu, Ugano and Mbimba. The trial on spacing, pruning and fertiliser requirements of the compact varieties continued to be monitored.

Farmer training on strategies for farm rehabilitation, with particular emphasis on grafting, was continued successfully with a total of 516 people trained. The success rate was 85-95%. Further perfection of the technology is going on, by assessing the best season for effective grafting and comparing the growth, yield and quality of improved varieties grafted on different rootstocks.

Successfully grafted seedlings looking healthy and strong

This year also witnessed a historical event when the department handed over mature and tested technology to TTD, to be forwarded to coffee farmers. The technology developed and perfected since 2003, shows the new pattern of coffee-banana intercropping (3 coffee rows between 2 banana rows), together with an impressive garden of improved banana suckers. As banana is becoming a trade commodity in the Northern zone, it was high time this technology was given a push. The Field Officer, Agronomy, was also transferred to TTD to facilitate this.

Perfection and release of various technological packages

A number of write-ups were prepared and submitted to TTD for editing and final publication. These included a field note on the management of white coffee stem borer (questions normally asked by farmers), a poster and a leaflet on the importance of soil analysis at farm level, as well as other leaflets on pruning, coffee-banana intercropping, and replacement of coffee trees. At the same time, a training module and manual for soil fertility and coffee nutrition was also completed and submitted.

A total of 5 new stand banners were prepared and used during this year's Nane Nane show. These presented a soil analysis flow chart, the identification of symptoms of nutritional disorders, the proper handling of farmyard manure and compost making, coffee pest identification, and IPM practices.

Two leaflets are at the draft stage. These include the establishment, preparation and application of small-scale botanical gardens, and the proper handling and usage of farmyard manure and other litter composts. Another write-up, for which TaCRI collaborated with TCA, will be designed into a brochure on tips for management of central pulperies.

Major Priorities 2007-2008

Recruitment of staff

The need for additional staff, as was stated in last year's report, is still pressing although the process was delayed by the imminent completion of the first SAP. There is still a need to recruit personnel. An agronomist is needed to head up coffee husbandry research, farm rehabilitation techniques and agro-meteorology. We also need a quality improvement specialist, or processing engineer, to deal with factory and CPU maintenance, improvisation of home-made and industrial pulpers, emphasis on the 10 golden rules of processing, OTA awareness, and the

residual effects of agrochemicals in coffee beans. And finally there is urgent requirement for a senior technician and 3 analysts for the soil laboratory, since the laboratory is completed, but badly understaffed.

Evaluation of different pulping technologies

The department plans to collaborate with TCA and other stakeholders in evaluating the performance of different pulping technologies. An agreement has already been reached, and the TCA is communicating with potential suppliers of different brands of pulpers for evaluation. Subject to availability, local innovative pulpers will also be evaluated.

Research on grafting

The plan here is to continue with the assessment of different aspects of grafting for better perfection and adoption (including the seasonal suitability of grafting old rootstocks and the adaptability of scions to different rootstock seedlings). Other plans are to continue with backstopping visits to the farmers who adopted the technique earlier, and to train new farmers.

Integrated pest management

We plan to do further research and to collect more information on the improved management of White Coffee Stem Borer, with an emphasis on IPM. Along the same lines, we also plan to do further research and collect information on the cultural control of Coffee Berry Borer by trapping, using local and cheaply available alcohols, and promoting the same to smallholder farmers. Longer term strategies may include the use of colour traps against berry moths and leaf miners, as well as the screening and establishing the chemistry of bio-pesticides.

Coffee husbandry

The department will continue to conduct research on the agronomic behaviour and requirements of the new varieties, both tall and compact (including spacing, shade, pruning, organic versus conventional farming, integrated soil fertility management).

Analytical services

Subject to timely completion of the rehabilitation of the soil laboratory and acquisition of the important equipment, plans are underway to tune up the analytical services to international standards, by establishing quality control mechanisms and ensuring scheduled equipment maintenance, prompt data interpretation, and reporting. It is also our hope that the data created will be enough to validate and perfect the SAFERNAC model.

Soil and water conservation

In collaboration with TTD, there are plans to put efforts into sensitising farmers on the importance of soil and water conservation measures, including shade management, mulching, and planting of fibre-rooted plant species (like Setaria splendida) along contours. We also plan to continue planting trees in the catchment area at Ziwani, Lyamungu.

Technology dissemination

In collaboration with TTD, we plan to continue with the unlocking, perfecting, packaging, and dissemination of existing technologies.

Case Study 3:

A modern soil laboratory now available to the Tanzanian coffee industry

The Lyamungu Coffee Research Station has been in existence since 1936. It was reformed from ARI to TaCRI in 2001 with the quest for stakeholder-led and demand-driven research. Crop nutrition has been a major agronomic concern since its inception. The Crop Nutrition Section operates a soil and leaf testing laboratory which is very important for fertiliser advice.

Before 1984, there was a small soil laboratory for general use and particularly for coffee. Limited by size, analysis was possible but at small scale and inefficiently. At the same time, the Canadian Wheat Project which was operating in Tanzania by then operated a much larger wooden laboratory. When the project shifted to Selian in 1984, the wooden laboratory building was left with the maize/bean project, but was under-utilised. The management of the ARI lab requested and was authorized to use the building as the soil lab in 1989, and as a consequence efficiency improved substantially.

When TaCRI came in, its major strategy was to modernize the infrastructure, and a major rehabilitation programme was planned under the EU/STABEX funding. A study on the status of the buildings condemned the wooden lab to demolition and after much negotiation, it was finally agreed to replace it with a modern concrete structure. The work officially started in November, 2006 and is now more than 95% completed.

As one of the major milestone's in TaCRI's rehabilitation programme, the laboratory has attracted many visitors. These included the Honourable Prime Minister, Mr. Edward Lowassa, who visited the station on the 3rd February, 2007, and laid down the foundation stone for the rehabilitation project in this building. Others were the EU heads of mission in Tanzania, a total of 20 dignitaries, who visited the lab on the 29th March, 2007. A presentation on the status and prospects of the lab was made during the soil analysis stakeholders' workshop held at Mkonge Hotel, Tanga, between the 16th and 8th April 2007, and won much credit as an outstanding presentation.

The old wooden laoboratory before rehabilitation: outside (left), inside (right)

The new laboratory: outside (left), inside (right)

Despite its completion, there is still much to do to make the lab functional and efficient. One important challenge is inadequate staffing. The laboratory only has 2 lab crews compared to a required minimum of 6 in a standard soil lab. Plans are afoot to recruit one senior lab technician and three analysts to start with, and implementation is on track.

Certain things need to be in place for a reputable soil laboratory, including a sustainable equipment service scheme, quality control, repeatability standards and later on, laboratory accreditation. Achieving this will win us confidence from large stakeholders (estates), which is likely to relieve them of the inconvenience of sending their soil samples overseas (Kenya or South Africa).

The last expectation is to develop a spatial data management system (GIS). This is important to enable the coffee industry in Tanzania to build its own soil fertility database and manipulate it for precision agriculture. While we are planning to order a modern version of GIS (preferably ArcGIS), a collaboration has been initiated with NSS, Mlingano, on the facilitation and training required.

The laying of foundation stone by Premier Edward Lowassa

Case Study 4:

A quantitative approach to fertiliser recommendation for coffee in Tanzania

TaCRI has identified poor soil fertility management as one important reason for low coffee productivity in Tanzania. Following the successful "Know your farm" campaign launched last year, farmers are now rushing soil samples to Lyamungu for analysis, and as we are embarking on a grand soil database project, we need a simplified tool for interpretation. The SAFERNAC model is aimed at developing such a tool.

Dr. Janssen explaining SAFERNAC model to TaCRI scientist (left) and inspecting the new Laboratory (right)

SAFERNAC is the acronym for the "Soil Analysis for Fertility Evaluation and Recommendation for Nutrient Application in Coffee". It is a complicated mathematical model capable of calculating the expected yield of parchment coffee on the basis of organic Carbon, P-Bray-I, exchangeable K, and pH(H2O); response to fertilisers, animal manure and green manure; economics of nutrient application and scenario analysis for the design of fertiliser and manure trials.

The basic equation of SAFERNAC is given as:

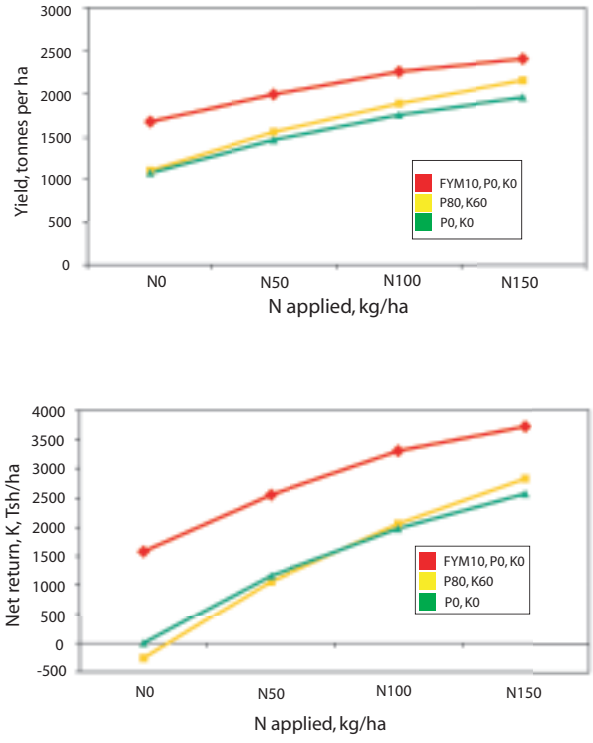
$$Y_{1,2} = Y_1 A + \left(\frac{2(Y_1 D - Y_1 A)^2 \left(U_1 - \frac{Y_1 A}{a_1} \right)}{\frac{Y_1 D}{a_1} - \frac{Y_1 A}{a_1}} \right) - \left(\frac{(Y_1 D - Y_1 A)^2 \left(U_1 - \frac{Y_1 A}{a_1} \right)^2}{\frac{Y_1 D}{a_1} - \frac{Y_1 A}{a_1}} \right)$$

Where $Y_{1,2}$ represents the yield response to nutrients 1 and 2 within limits of the availability of nutrient 3. Such nutrients, according to the model, are N, P and K. Y represents yield, D the limit of dilution and A the limit of accumulation. U stands for the maximum possible uptake of a given nutrient. The expressions 'a' and 'd' stand for the physiological efficiencies in kg of parchment coffee per kg nutrient taken up at accumulation and dilution levels respectively. Six such equations are needed for YNP, YPN, YNK, YKN, YPK and YKP, the average of which gives the overall estimated yield. More details of the model, including the logical assumptions involved, will be given in a separate paper, to be out soon.

The model was built by the PUM consultant in coffee nutrition, Dr. Bert Janssen, during his first advisory mission to TaCRI in December, 2004. It was largely based it on the framework of an earlier developed model QUEFTS (Quantitative Evaluation of the Fertility of Tropical Soils), adjusted to fit the specific environment of a coffee crop. Many of the coffee-specific assumptions were based on two field experiments on NPK reference (Kifufu, Kibo and Lyamungu C) and fertilizer x tree density trial, Lyamungu.

During his second visit in May/June, 2007, the model was improved further in collaboration with the local soil scientist, by developing the best fit equations of yield per tree based on tree density, integrating a module for organic manures and the economics of fertilizer application. He experimented on the scenario analysis for fertilizer trials under SAFERNAC, with a soil of 26g/kg organic carbon, 2.6g/kg N, 52mg/kg P, 20mmolc/kg K and ÚH-water of 5.2; a 4x3x2 factorial design with 0, 50, 100 and 150kgN/ha, 0, 40 and 80kgP/ha and 0 and 60kgK/ha, combined randomly with 0, 2.5, 5, 7.5 and 10 tons of farmyard manure per ha.

Figure 5: Illustration of SAFERNAC Model Application



Yield response (top graph) and Net returns (bottom graph) at different levels of N application given prices for coffee and fertiliser

It was observed that the application of 10 ton/ha FYM with 80kgP and 60kgK can increase yield by up to 60% if no fertiliser N is added, the difference getting smaller and smaller as more N is added. It was also noted that when prices are high, say Tsh 2,500/kg of parchment, applying 80kgP and 60kgK with no N, results in a loss of up to Tsh 200,000. Conversely, there is a positive net return of up to Tsh 1.6 million with 10 tonnes FYM added. This is an indication that organic matter has a significant role in nutrient supply, especially nitrogen.

Model perfection is in progress, with the aim of developing one module for shaded coffee and another for intercropped coffee, which is more smallholder-like. The model is still operating in an Excel spreadsheet, so the long-term plan is to programme it into a user-friendly software package.

Case Study 5:

Beware: Chemical residues can spoil the market

The world coffee market is increasingly concerned about chemical residues found in coffee beans, which have had an impact on human health with continuous usage. The Codex Alimentarius commission is an international organisation that prescribes limits for various residues and contaminants in food for human consumption, and has set limits for residual agrochemicals in coffee beans. Countries that import food commodities develop their own standards in line with the international standards (e.g. Active Substances in Indonesia, and USEPA in the US). This means that an export consignment will not be accepted unless it is proven to conform to the importing country's set standards.

One of Tanzania's most important coffee export markets is Japan. The country has been concerned about residual chemicals for some time, and last year it released a policy governing the "positive list" system – the Japanese regulations on agricultural chemicals used for green coffee beans. It recognises 2 categories, positive agrochemicals, and exempt ones. The positive list was subdivided into 3 groups – chemicals of "no residue detection" status (a total number 15), chemicals with prescribed individual maximum residual limits (MRLs), (a total of 140), and those with a prescribed uniform level of 0.01 ppm – those which do not feature in the two lists above.

TaCRI is working with TPRI and TCA on the registry and usage of pesticides for coffee in Tanzania. Information collected from the IPM baseline survey done in 2006 in Hai and Moshi districts was used as the framework. Commonly used pesticides were established as shown in Table 1 below. It was observed that if the MRLs are too low, it will be very difficult to abide by them, so the limit was set to 0.05 ppm. For those with MRLs below 0.05 ppm, it is safer to look for effective alternatives and discourage their use with coffee. All copper derivatives, according to the Japanese list, are treated as exempt chemicals (as copper itself is deemed so); and in their MRL column they are marked NA (not applicable). On the other hand, the chemicals marked with three asterisks in the table are among those that did not feature in the Japanese positive list, and were given an arbitrary MRL of 0.01 ppm and as such, their usage should be very cautious.

Based on the outcomes of this study, TaCRI is convinced that coffee exported from Tanzania is safe (well below the standard MRLs), backed by the fact that smallholders (the bulk producers) have too low an income to afford pesticides. However, the issue of chemical residues must not be taken for granted, especially with estates that can afford these chemicals. It is not only expensive but also embarrassing to have an export consignment returned just because a sample exceeds the MRLs for food commodities.

This study provides a summary of the registry and field usage of synthetic pesticides whose residues may be found in dry coffee beans, and the way such chemicals feature in the Japanese maximum residual limits. This is one example of effective collaboration stakeholders, down to consumer level. In other words, getting to know what customers want and adjusting our strategies accordingly.

TaCRI's work on integrated pest management (IPM) aims to reduce use of pesticides in the production of coffee in Tanzania in order to meet the requirement of MRLs.

Table 1: Allowable maximum residual levels of different chemicals in Japanese markets

Category	Trade name	Chemical name	Target pest/disease	Japanese MRLs (ppm)
Insecticides	Decis	Deltamethrin	All pests	2
	Dursban	Chlorpyrifos	Antestia bug	0.05
	Selecron	Profenofos	All pests	0.01***
	Sumithion	Fenitrothion + Fenvalerate	All pests	0.01***
	Thiodan	Endosulfan	All pests	0.1
	Thionex	Endosulfan	ntestia bug	0.1
Fungicides	Anvil	Hexaconazole	Leaf rust	0.05
	Banco	Chlorothalonil	CBD, Leaf rust	0.2
	Bayleton	Triadimefon	Leaf rust	0.05
	Blue copper	Copper oxychloride	CBD, Leaf rust	NA
	Cobox	Copper oxychloride	Leaf rust	NA
	Delan	Dithianon	CBD, Leaf rust	0.01***
	Dithane	Mancozeb	CBD	0.01***
	Funguran	Copper hydroxide	Leaf rust	NA
	Nordox	Cuprous oxide	CBD, Leaf rust	NA
	Red copper	Copper hydroxide	Leaf rust, scale	NA
	Sandoz	Cuprous oxide	CBD, Leaf rust	NA

Source: Tanzania Coffee Association (TCA)

Livelihoods & Income Security

Activities in the Livelihoods and Income Security Department are focused on providing an understanding of the diverse coffee farming and livelihoods systems that exist around the country and identifying and prioritising constraints to coffee productivity, quality and profitability so as to ensure sustainability of the coffee sector.

It is estimated that about 420,000 smallholder coffee farmers and their families depend on coffee in Tanzania and that in some coffee growing areas coffee is the only crop that provides income for these families. Coffee productivity and profitability have been in decline over the last two decades resulting in a fall in confidence in coffee as a crop by coffee farmers, and an increase in poverty among coffee growers.


Mr. Cyril Ignas Chimilila, Agricultural Economist

The department has the following responsibilities: to provide an understanding of coffee farming and livelihood systems in coffee growing areas; to identify and prioritise constraints to coffee productivity, quality and profitability; to study and analyse interactions along the coffee production chain (from farm to primary processing to export); to identify and prioritise policy issues for a sustainable and profitable coffee industry in Tanzania; to assess the impact of TaCRI's research and technology transfer activities; to cooperate closely with TaCRI research staff and provide an economic perspective on research trials and outreach programmes; and to provide a holistic complete value-chain-focused economic assessment of the viability of organic coffee farming, specialty coffee and other niche market potential.

Major Achievements 2006 - 2007

Recruitment of an agricultural economist

The Department recruited an agricultural economist with experience in the coffee sector.

Assessment of the economic benefits of the new coffee varieties

A study analysing the economic benefits of improved new varieties was carried out. Results indicate that farmers who adopted new varieties receive an average gross margin three times that obtained by farmers who grow traditional varieties. This profitability differential is attributed to the higher production and lower costs of growing improved varieties over traditional commercial varieties. Case Study 6 below presents the economic benefits of new varieties in detail.

Finalised preparations and logistics for socio-economic studies

Preparations for a number of socio-economic studies have been finalised. These include providing an understanding of the diverse farming and livelihood systems in coffee farming areas, and prioritisation of farm level constraints of productivity, quality and profitability. The socio-economic studies will be carried out in the coming year in four principal Arabica farming districts, and then replicated in Robusta farming areas.

Major Priorities 2007 – 2008

1. To conduct socio-economic studies that will provide an understanding of diverse coffee farming and livelihood systems in coffee growing areas.

2. To conduct socio-economic studies that will identify and prioritise constraints to coffee productivity, quality and profitability at farm level.

3. To conduct an impact assessment of TaCRI's research and technology transfer activities. The impact assessment will identify constraints of adoption, contribution of TaCRI's technologies on farmers' income and livelihoods, provide feedback on the performance of those technologies to other research departments, and prioritise farmers' needs for improvement or new technologies.

4. To participate in the preparation of the second strategic actions plan (SAP II).

Case Study 6:

Improving smallholder coffee farmers' income through innovation: the economic benefits of new coffee varieties and integrated pest management techniques

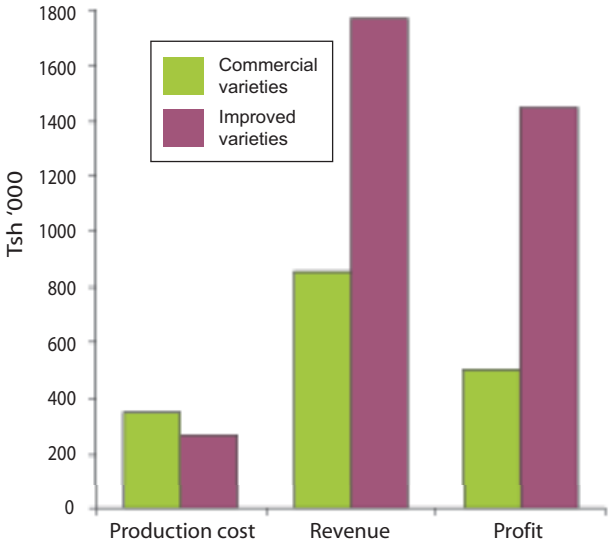
For many years both income and welfare of coffee farmers have been affected by a number of exogenous factors and has resulted in increased poverty. These factors include low yields of traditional coffee varieties, poor resistance of commercial varieties to diseases such as coffee leaf rust and coffee berry disease, high input costs, and the falling price of coffee on the world market. The coffee crisis of 1997 to 2002 further elevated the problem and caused loss of confidence in the crop amongst small scale farmers.

Through technological innovation in the development of improved coffee varieties which are resistant to diseases, are high yielding and have good beverage quality, TaCRI has contributed towards improving the situation. A survey of smallholder coffee farmers conducted in Mbinga district has revealed that farmers who adopted these new improved coffee varieties earn more than 100% more profit than farmers who grow traditional commercial varieties. These innovative farmers produce an average of 1 Kg of parchment coffee per tree compared to 300-400gm per tree harvested by growers of traditional varieties. Since these new varieties are resistant to coffee diseases, the production costs are significantly lower, by an average of 30 to 40% per kilo of coffee (Tsh 610 per kg) compared to those of growing traditional commercial varieties (Tsh 900 per kg). In addition, the average profit per hectare for farmers who planted new varieties is three times that obtained by farmers with traditional commercial varieties.

Farmers who practice integrated pest management (IPM) techniques such as the use of coffee juice or local brew to trap coffee berry borer, further reduced their production costs and earned more profit.

These cost-reducing production technologies are very useful in ensuring farmers income, (especially during times of deflated prices), as well as competitiveness and sustainability of the industry. For instance during the coffee crisis there was a point where coffee production costs outweighed returns and caused some farmers to abandon coffee production completely.

Figure 6: Economic returns between traditional and improved coffee varieties (per hectare)



The economics of coffee depend as much on marketing as they do on production. The new coffee varieties have exceptionally good beverage quality and thus fetch good price at market. The cupping results of some of the coffees produced by smallholder farmer groups with improved varieties (such as Longa farmers' group) indicated quality scores of up to class 4, and an average net price of Tsh 2,300 per kg.

Demand for quality coffee is growing steadily and specialty coffees fetch premium prices of up to 70% in some markets. Thus, by adopting these new varieties and improving crop husbandry, farmers can earn a decent income, have more income security and consistency, and help themselves to improve their livelihoods.

Technology Transfer & Training


Mr. Twahir Nzallawahe, Head of Department

The Technology Transfer and Training Department (TTD) continued with its important mission to support the rejuvenation of the coffee industry in Tanzania. This included the promotion and dissemination of appropriate and financially viable technologies to farmers and associated agencies, and the facilitation of two-way linkages between researchers, district extension staff and farmers, by encouraging participatory techniques.

In accordance with the SAP, the Department geared up, not only to support the development of new nurseries to produce planting materials of new varieties but also to develop and deliver training courses to coffee farmers, farmer promoters(FPS), extension staffs, and other partners within the coffee industry.

Major Achievements 2006 - 2007

Promotion of research outputs through the media

The Department intensified the implementation of its communication strategy during 2007. This included amongst others, the promotion and dissemination of appropriate technologies to stakeholders through the media, including newspapers, radio and television. More than 350 articles were published in different national newspapers and a number of programmes were aired on national and community radio stations, as well as Star Television, TVT, and ITV.

An important breakthrough was the establishment of TaCRI's website which is now at its initial operational stage. Our address is www.tacri.org

Preparation of technologies in appropriate formats and their dissemination to stakeholders

During the year under review, in collaboration with TaCRI's research departments, TTD successfully consolidated the production of the revised version of 16 leaflets. This included two new publications and a brochure on farmer groups, as well as two posters on the eight commandments of increasing productivity and the ten commandments of processing and quality improvement. Leaflets were also published covering various topics such as; the Identification of CWD; Know CWD, Coffee Berry Borer, Antestia, Mealburg, Leaf miner, White stem Borer; Processing; Minjingu Phosphate; Coffee Leaf Rust; Organic Fertilizer, and Coffee Berry Disease; Clonal Multiplication; Mother garden; Grafting; Trapping of CBB; and Know Your Farm.

All publications are divided into eight key sections, including plant protection, disease control, plant nutrition, clonal multiplication, rehabilitation of old coffee farms, processing, farmer groups, productivity and quality improvement.

Multiplication and distribution of clonal seedlings

The department continued with the important task of multiplication and delivery of clonal materials to farmers in coffee growing areas. During the period, a total of 800,000 mother trees were distributed to farmers for further multiplication of seedlings. Farmer groups and estates have produced and planted about 500,000 clonal seedlings in their fields. The Department also provided backstopping services to 400 secondary and tertiary clonal nurseries managed by farmer groups, NGOs, and estates.

The provision of clonal seedlings to stakeholders is now the top priority. The establishment of district nurseries during 2007 in Rombo, Moshi, Arumeru, Njombe, Ludewa, Rukwa and Mbozi was one major effort towards this objective.

TaCRI Open Days and Farmers Fairs

TaCRI continued to attract many visitors to Lyamungu and its various sub-stations. In the year 2007, the Institute received and hosted 5,000 visitors, which brings the cumulative visitors figure to 17,900 since the Institute opened its doors in 2001. Prominent amongst them were the visits of our national leaders: The President of Tanzania H.E. Jakaya Mrisho Kikwete who visited Ugano sub station; The Vice President H.E Dr. Mohamed Shein who visited Mbimba sub-station, and the Prime

Minister H.E. Edward Lowassa who visited Lyamungu headquarters. All of them appreciated the efforts being done by TaCRI and were encouraging. Other visitors included journalists from EU countries.

The Institute continued to participate at zonal and national agricultural shows and 1,600 visitors visited our booths in Mbeya at zonal level and in Arusha where this year's Nane Nane show was held at national level.

Structured Visits

Several structured visits were made to Karatu Coffee Estates, Ngorongoro Coffee Estates, Blackburn Estate, Manyata, and Finca, Levy Farm, Finagro Plantations, Eldeweisse Estates, Burka Estates, Tanzania Episcopal of Conference (TEC), Vasso, Tudley, and APK.

Research Extension Linkages

Training on research extension linkages continued to 235 village extension workers, including 45 district extension officers from all 12 major coffee growing areas. The Department also continued to expand linkages, and added Lushoto, Kasulu, Kigoma, Tarime, Rukwa, Mpanda, Ileje, Ludewa, Njombe, Kilolo and lastly Mahenge, to the initial 12 major districts that have been covered. In total, the Institute is now engaged in more than 25 districts.

Major Priorities 2007 - 2008

Unlock on-shelf technologies

Continue to work with research departments to unlock on-shelf technologies on pest and diseases, fertility management, coffee processing, and general coffee husbandry practices.

Packaging of technologies

Continue the packaging of research recommendations such as IPM, Pest and Diseases, Primary Processing, Pruning, Intercropping and Fertility Management.

Open Days

Prepare and run field days hosted by stakeholders in all 12 major coffee districts.

Demonstration Plots

Set up farmer demonstration plots to demonstrate issues of banana-coffee intercropping, fertiliser application and pruning patterns (at least 50 demonstration plots to be set up with farmer groups).

Research-Extension-Linkage

Strengthen research-extension-farmer linkages with the 25 District Coffee Subject Matter Specialists in all major coffee producing districts.

Training of Trainers (ToT)

Undertake training of the 250 district coffee extension staff working with TaCRI.

Training of Farmer Promotors (FPs)

Conduct training of at least 1,500 farmers at all TaCRI Training Centres.

Village Based Training (VBT)

Initiate and support Village Based Training with 200 of the 400 groups working with TaCRI.

Clonal seedlings multiplication

To scale up seedlings multiplication by establishing district clonal mother gardens in 10 districts.

Nursery attendants / supervisors

Train at least 250 nurseries and clonal garden supervisors from farmer groups and District nurseries working with TaCRI.

Provide technical back-stopping

Continue the backstopping of clonal nurseries managed by farmer groups, districts, estates, and NGOs.

Support farmers to improve quality

Conduct "Coffee Processing for Quality" campaigns in all 12 major districts and the newly introduced districts of Lushoto, Same, Kasulu, Kibondo, Njombe, Iringa, Rukwa, Mpanda, Tarime and Kigoma.

Promote central pulping technology

Organise and facilitate farmers in Mbinga, Mbozi, Arumeru, Moshi, Rombo and Hai to process quality coffee in central pulperies.

Domestic coffee consumption

Participate and contribute in efforts towards promoting local consumption of coffee so as to enhance competitive coffee prices

Case Study 7:

TaCRI proudly to host high profile visits of top government officials and EU Heads of Missions

During the year TaCRI was proud to host visits by top government officials as well as EU Heads of Missions to Tanzania, all of whom were eager to see how the Institute is achieving its goals.

The President H.E. Jakaya Kikwete visited Ugano sub-station Mbinga District on 9th October 2006 and showed enthusiasm for TaCRIs activities in Mbinga and the Institute's commitment to rejuvenating the sector and improving the welfare of coffee farmers. He was impressed by the vegetative propagation methods currently used by TaCRI to multiply coffee seedlings. "I didn't know that coffee seedlings can be produced from the cuttings" he said, while admiring the coffee seedlings.

H.E. President Jakaya Kikwete (front left) when he visited Ugano substation - Mbinga

The visit by the President was followed by visits from other top government officials: The Vice President, Hon. Dr. Ally Mohamed Shein visited Mbimba substation in Mbozi district on 24th November 2006; Prime minister, Hon. Edward Lowassa visited TaCRI headquarters at Lyamungu in Hai district on 3rd February 2007 and later went to Maruku substation in Bukoba region on 12th March 2007; other members of the cabinet, Hon. Dr. Juma Ngasongwa and Hon. Joseph Mungai, visited the Institute on 28th August 2006, and the Hon. Steven Wasira visited on 3rd February 2007.

The visits by these many top government officials in a period of less than six months reflects the Institute's growing profile and reputation, and also the commitment of Government towards the coffee sector.

In March 2007, TaCRI was also proud to host a visit by the EU Heads of Missions in Tanzania. The EU support TaCRI through Stabex funds, and the delegates visited the Institute to see the research activites first hand. The visit was the largest EU delegation to be hosted at TaCRI, and the delegates were impressed by TaCRI's implementation of its activities.

European Union Heads of Missions visit to TaCRI headquarters in Lyamungu

All visitors noted the challenge that TaCRI faces in meeting the massive demand for new coffee seedlings in the country. Responding to this, the TaCRI Chief Executive Director Prof. James Teri explained that the Institute is working hard to ensure that demand is met, by strengthening the capacity of all substations to produce more seedlings, and by opening new sub-stations in Kigoma and Tarime. Other endeavours include working with existing farmers groups, individual farmers, and districts to establish their own nurseries for seedling multiplication and distribution.

Professor Teri added that it is vital to have a supportive policy environment especially in the context of the national coffee strategy, and that there was also a need for an increase in the contributions made by coffee stakeholders, as well as improved marketing, better availability of agro-inputs, and improvement in rural infrastructure such as roads and water in coffee growing areas, in order to enhance growth and sustainability in the coffee sector.

Case Study 8:

TaCRI extends its wings to Kigoma and Mara Regions

During the year, the Board of Directors made a decision to establish a TaCRI sub-station in Kigoma region, following demand from stakeholders to offer more proactive support for the development of the industry in this region. Kigoma has 265,000 ha under coffee in Kigoma North, Kasulu and Kibondo districts, with other areas south of Kigoma District having great potential for coffee production.

The challenges facing coffee growers in the region include lack of proper extension services for coffee husbandry practices, particularly application of fertilisers, manures, control of insect pests and disease, pruning, and processing techniques, but also a lack of proper marketing information to help them market their agricultural produce efficiently.

Furthermore, the main coffee varieties grown in the region to date are KP423 and N39, both of which are highly susceptible to CBD and CLR.

The hybrid varieties released by TaCRI are resistant to CBD and CLR with a potential mean yield of 2,300 kg per ha. By June 2007, a total of 10,100 of these clonal seedlings had been delivered to eight villages in the region: five villages in Kigoma district received seedlings (Mkigo, 1300, Nyarubanda, 1448, Kalinzi, 1465, Matyazo, 1200, and Mukabugo, 1205). In Kasulu District three villages received seedlings (Kitambuka, 1148, Mkatanga, 1130, and Rusaba, 1130). Seedling mortality was high because of lack of frequent backstopping, a situation which underscored the importance of having a greater TaCRI presence in Kigoma.

The Kigoma regional and Kasulu district authorities have allocated 78.5 ha to TaCR in Mwayaya, land that is being developed into a TaCRI sub-station using EU support from STABEX funds.

The Head of Delegation of the European Union, Ambassador Frans Baan visited Kigoma in September 2006 and was impressed by the quality of the coffee from Kigoma, as well as the enthusiasm and commitment of smallholder coffee growers to increase coffee productivity and quality in the region.

Tarime in Mara region produces some of the world's finest hard Arabicas. However, like Kigoma, the district is remote and far from current TaCRI substations, which has resulted in it receiving inadequate backstopping services to date. In order to address these issues, the Board of Directors authorised the posting of a new Extension Agronomist in Tarime to support the development of the coffee industry in this district. A district clonal nursery of improved hybrid varieties will be established at Sirari to accelerate the availability of seedlings of the improved varieties to Tarime coffee growers.

Lyamungu Sub-Station, Hai

Major Achievements 2006 - 2007


Mr. Msanjo Temu, Extension Agronomist, Lyamungu

Since the initiation of SAP 1, two major strategies have been implemented over the period: communication, and the supply of clonal coffee materials.

Training at Lyamungu

A total of 340 people were trained during the reporting year, of which 320 were farmer group representatives and 20 VEWs. Vegetative propagation methods, participatory extension, rehabilitation methods, and general coffee husbandry practices and quality coffee processing were covered during the training sessions.

Production of own vegetative propagated seedlings

As a major priority during this financial year, the Lyamungu sub-station continued an aggressive programme to empower farmer groups to produce their own seedlings. Using a strengthened participatory approach, the sub-station successfully strengthened and empowered 51 voluntary farmer groups, which have now produced over 400,000 seedlings. Of these, 380,000 seedlings were planted (close to 200 ha) and a further 45,000 were sold at Tsh 300 per seedling, with a total collection of Tsh 13.5 million We now have more than 150 farmer groups producing seedlings.

Table 2: Seedlings Production by Farmer Groups

Year	No of groups formed	Number of seedlings Produced	Planted	Sold
2003	5	---	---	---
2004	15	5,000	2,600	950
2005	30	27,400	15,900	2,700
2006	41	43,500	35,115	3,300
2007	58	424,000	386,385	45,500
Total	150	500,000	440,000	52,500

Village Based Training (VBT)

A total of 1,200 farmers (320 women & 1,170 men) have benefited from Village Based Training in Hai district, as well as 60 (10 women & 50 men) in Moshi, 34 (10 women & 24 men) in Mwanga, and 55 (15 women & 40 men) in Rombo.

Research extension linkages strengthened

The Lyamungu sub-station conducted three workshops to strengthen research extension linkages to 140 farmer promoters (FPs) from 70 farmer groups in Rombo (20) and Moshi (50) districts. The central focus of the training was the role of FPs and participatory extension. Other disciplines included husbandry practices, processing, farmer group formation, and management. These are now our facilitators in the two districts working hand in glove with TaCRI.


Mr. Nkya training farmers on grafting of coffee trees

Farmer Group-Hosted Open Days

The second batch of open days organised and hosted jointly by farmer groups and TaCRI were successfully conducted The following groups hosted the events:
Ledea in Lekura and Undugu in Mkomongo, both in Moshi district; Lambo in Mwanga district, Mti Mama Mshewa in Same district and Nronga A Machame in Hai district. Three groups namely Rafiki, Ngaronyi and Wandri in Siha district where Mr. Mohamed Babu, the Regional Commissioner for Kilimanjaro was the guest of honour jointly hosted the flagship event. An estimated record number of 4,200 people attended these open days.


Farmer Group-hosted open day at Wandri

Open day at Lekura hosted by LEDEA Group

Establishment of district nurseries to accelerate seedling multiplication

In gearing up for a massive replanting campaign in 2007, the establishment of district nurseries was launched in Rombo, Moshi and Arumeru districts where clonal gardens with 2,000 mother trees were established. Fitted with modern drip irrigation systems, the production of seedlings is expected to increase from 10 seedlings to 50 seedlings per tree per year. The expansion of Arumeru nursery with 3,000 seedlings is expected soon.

Major Priorities 2007 - 2008

Unlock on-shelf technologies

Work with research departments to continuing to package technologies in informative, digestive formats for use by farmers.

Open Days

Prepare field days – 1 Singisi –Arumeru, 1 Mamsera Rombo, 1 Msindo Same, 1 Lushoto and 1 in Narumu.

Demonstration plots

Establish demonstration plots in a number of areas - 3 Machame Hai, 2 Uru, 2 Old Moshi, 1 Kilema, 2 Marangu Moshi, 1 Monduli, 1 Mwanga, 2 Lushoto and 2 Same.

Promotion of technologies

Continue to make use of electronic media to disseminate our technologies to stakeholders. The target is for at least one 30 minute TV agronomic & processing practice show per fortnight and one radio narration of coffee technology activity per week.

Farmer Fairs

The northern zone will continue to participate in all major Farmer fairs, including Nanenane in Arusha at national level.

Research-Extension-Linkage

Continue to strengthen links with 10 DCSMS.

Farmer Promotors

The empowerment of farmers in technological advances is crucial. To enhance this process at least 300 Farmer Promoters will be trained.

Village Based Training

Continue to support VBT in 100 farmer groups.

Link farmers to markets

In order for farmers to benefit from premiums for coffee quality, link 4 farmers groups with the markets.

Scaling up seedlings multiplication

Increase seedling multiplication capacity by expanding the central clonal garden with 3,000 more trees and 48 VP boxes. In total 25,000 mother trees are expected to produce 1.5 million seedlings/year (60 seedlings/tree).

Nursery supervision

Improve and increase vegetative propagation efficiency in both farmer groups and district nurseries by training 300 clonal propagators to work as nursery attendants.

Tertiary nurseries

Continue the establishment of district/ward nurseries: 1 Same, 1 Lushoto, 1 Mwanga, and expand Rombo (500), Meru (3,000), Monduli (300).

Estates to multiply clonal seedlings

Support 3 Estates to establish clonal gardens & VPUs: USA Ltd, Nkwansira & Kararagua.

Diversify livelihoods income

Support & strengthen 100 farmer groups to establish nurseries for shade trees and other useful trees, especially for bee keeping and other domestic use.

Collaboration with other departments

Maintain on-farm & on-station trials.

Support modern irrigation technology

Drip irrigation is now in place in the central nursery at Lyamungu, 4 districts nurseries Rombo, Marangu, Arumeru, Same and Lushoto, 2 ward nurseries (Mwanga and Monduli), and 10 farmer groups nurseries. Our role looking forward is to support these modern initiatives.

Case Study 9:

The role of the church in coffee rejuvenation; The case of the Evangelical Lutheran Church of Tanzania (ELCT) Northern diocese and the Roman Catholic Church (RC) – Rombo

There is a general widespread belief that the role of the church in almost all communities is only religious. However, ELCT's Northern diocese and the RC Rombo Parishes have demonstrated that worshippers will deepen their religious beliefs and worship commitments if they are economically and spiritually well off. Indeed, an economically disadvantaged person is likely to find it difficuld to concentrate on religious activities or contribute financially to the development of the church.

It is on this basis that ELCT – Northern diocese and RC Parishes in Rombo embarked on a campaign to sensitise their Christian congregation to join the coffee rejuvenation programme.

The case of ELCT started in 2005 when TaCRI was invited to participate in a seminar held at LEDEA Lekura to discuss amongst others, ways to empower Christians to involve themselves in economic activities ranging from improved coffee-banana intercropping, profitable poultry and dairy keeping, and the establishment of SACCOS as a means of economic emancipation. Following this seminar three participatory farmer groups (Masia A & B, and Kiwako Kotela) were formed. Since then, these have become our partners in vegetative coffee seedlings multiplication with a combined production of 43,000 new coffee seedlings per year. Again, through village-based training, the farmer promoters from these groups are empowering other farmers with appropriate coffee technologies, and in particular the Eight and Ten Commandments.

In 2005 and 2006, TaCRI was invited to participate in the Diocese Annual General Meeting which was held at Masoka College of Management. Pastors from all over the diocese, numbering more than 250 including other parish workers, attended. TaCRI's presentations bore fruit, with the formation of five farmer groups and subsequent coffee clonal gardens as follows: Nronga B, Wakabosu- Sonu; Kiukabosa – Sawe; Ukaki – Uswaa and Wakabongi – Ngira. These have become very important seedling producers with a capacity of 160,000 new seedlings per year. In addition, farmer promoters from these groups are helping to facilitate rapid technology dissemination to other farmers.

One major milestone during the campaign, was a bold move by the Diocese Bishop Dr. Martin F. Shao to be a pioneer in Mwika Lole, by transforming his old farm into an exemplary improved modern farm.

For its part, the RC Church in Rombo participated in the coffee programme by supporting over 15 farmer groups to establish a mother garden in every parish across the district. This is pioneering and innovative support which will help speed up seedling multiplication and facilitiate replanting with new improved varieties.

These forward thinking and positive undertakings by the Church will play an important role in helping to change the lives of many impoverished worshippers who in turn can be used by the church to build social economic projects such as schools, health centres and so on. It is a win win situation, and noble work.

Bishop Dr. Martin Shao's farm as it was before rehabilitation

After rehabilitation

Maruku Sub-Station, Bukoba

Mr. Nyabisi Nghoma, Extension Agronomist, Maruku

Maruku sub-station continued in its support for the development of the Robusta coffee industry in Kagera Region, with particular emphasis on Bukoba, Karagwe, Missenyi and Muleba Districts where rural coffee and banana/ coffee (mainly Robusta) based farming systems are prevalent. The Sub-station was busy disseminating proven technologies to farmers, District extension staff as well as providing training courses on manure application, CAN and NPK application, stumping, mulching, timely weeding, pruning, harvesting ripe cherries, drying cherries on racks /mats, hulling coffee at farm level and marketing channels in all four districts. The station has also been active in its work with the regional government and other stakeholders to increase the region's coffee productivity from the current 21,000 tons (or 320 gm per tree of clean coffee) to 68,000 tons (or 1kg per tree), with the goal of improving the livelihoods of the 250,000 families in the area whose livelihoods depend on coffee.

During the period, Maruku made an impact at policy level by raising awareness of CWD which threatens the survival of Robusta coffee in the region. For example, during the Regional Agricultural Strategic Planning Workshop organised by the Kagera Regional Commissioner's Office, staff from Maruku presented a paper focusing on its efforts to rejuvenate the coffee industry in the region with particular emphasis on various campaigns employed to eradicate CWD. The forum attracted participants from processing factories, financial institutions, policy makers, NGOs, Cooperative Unions and political parties. As a resolution, all District councils were instructed to include a component of eradicating CWD in their agricultural plans.

Major Achievements 2006 - 2007

Production of Robusta clonal seedlings

Maruku continued with the multiplication of Robusta clonal seedlings to meet the increasing demand by coffee farmers in the region. During 2006/2007, 110,076 Robusta clones were produced, of which 52,000 clones were distributed to farmers. A further 42,000 seedlings from seeds requested by Kagera Cooperative Union (KCU) were produced at Ibwera vegetative propagation unit (VPU).

Establishment of Arabica mother garden

Maruku sub-station successfully established three Arabica mother gardens to start the process for the multiplication of resistant Arabica varieties, as follows. Maruku (194 plants), Ibwera (200 plants) and Biirabo (200 plants). The Sub-station also successfully distributed 400 potted Arabica seedlings to two farmers in Muleba District, and has a further 2,000 seedlings ready for distribution to Mr. Ludovick Mutalemwa, and 1600 more seedlings for Biirabo and Ibwera VPUs

Field based training

Thirty-one farmer groups benefited from field-based training during the year, through the Participatory Learning Approach, with a total of 930 farmers trained in different best crop husbandry practices. The training emphasis was on manure, CAN or NPK application, stumping, pruning, timely weeding, harvesting, proper drying, storage and marketing.

One of the newly established groups clonal mother gardens for seedlings multiplication and distribution to coffee farmers

Participatory Farmer Groups (modified Farmer Field Schools (FFS))

Farmer field schools are vital tools in imparting appropriate technologies to farmers on the improvement of coffee productivity and quality. During the reporting period, a total of 630 farmers and 15 extension workers were fully involved, and following the success of this year, it has been agreed that more FFS will be initiated in other areas going forward.

Monitoring of Coffee Wilt Disease (CWD)

Coffee Wilt Disease continues to threaten Robusta coffee production in Kagera region, with a recent report concluding that Bukoba and Missenyi Districts are more affected by the Coffee Wilt Disease than other Districts in the region.

Maruku Sub-Station, Bukoba

A comprehensive research study was undertaken by Manyafubu farmer group and other groups in Bugabo, Kyamutwara, Katerero and Kiziba divisions in Bukoba and Misenyi districts respectively.

Table 3: Coffee Wilt Disease Monitoring in Bukoba and Misenyi districts

District	Ward	No. of infected coffee trees	No of uprooted coffee trees	Percent of uprooted coffee trees
Bukoba	Rubafu	1,318	727	55.1
	Kishanje	3,878	2,958	76.3
	Kaagya	6,350	4,184	65.9
	Buhendangabo	3,332	2,577	77.4
	Nyakato	2,714	1,565	57.7
	Buhembe (Bukoba mjini)	101	0	0
	Maruku	235	235	100
	Kanyangereko	45	45	100
	Ibwera	60	60	100
Misenyi	Kanyigo	11,411	2,809	24.6

Training on Coffee Wilt disease management

The institute successfully conducted training to the extension workers on identifying and management of Coffee Wilt Disease. During the reporting period, 95 extension workers were trained (32 in Bukoba, 26 in Muleba, and 37 in Karagwe). Farmers in the region are becoming increasingly sensitised to the potentially catastrophic effects of CWD on their livelihoods. As a consequence farmers are eager for information and techniques on how to identify and manage the disease. With their new-found knowledge, extension workers now have the tools to pass information on to farmers around the region.

Farmer-to-farmer training

Maruku Sub-station worked with Manyafubu Farmer Group which conducted farmer training sessions in the Rubafu, Kishanje, Kaagya, Buhendangabo, Nyakato and Buhembe Wards in Bukoba District on the identification and management of Coffee Wilt Disease. A total of 2,000 farmers were trained. One of TaCRI's main goals is the speedy dissemination of technologies around the country, and having farmer groups then going on to train other farmers was one of the strategies identified to achieve this. Thus, the work by Manyafubu Group was a significant achievement in meeting this goal.

Open days

Maruku hosted an open day at Bugombe village in Kanyigo Ward to sensitize farmers, politicians, and other ward leaders, on the importance of efficient and effective management of Coffee Wilt Disease. A total of 213 participants took part in this important event.

Exchange visits

During the year, Maruku facilitated exchange visits between farmer groups in Bukoba, Karagwe, Missenyi and Muleba Districts. The purpose of the exchange visits was to enable farmers to see how, by adopting better and more appropriate coffee husbandry techniques, coffee productivity can be improved. The visits were used as forums for sensitising farmers and other stakeholders on CWD which threatens Robusta coffee in the region. Bwizandulu, Bulinda, Bushumba, Rubya, Kamachumu, Muhurile, Rukuraijo, Kayungu, and Chabuhora villages all hosted Exchange visits. A total of 577 participants, both men and women took part in the event.

Promotion of research output through the media

The Sub-station continued to promote and disseminate technologies to stakeholders through the media including coverage on radio, television, and through the press. More than four articles were published in different national newspapers, and programmes on appropriate Robusta coffee husbandry practices and management of CWD were aired on Radio Free Africa (RFA), Radio Tanzania, TVT, ITV, and Star Television.

Establishment of demonstration plots with farmers

In collaboration with farmer groups, the Sub-station used 43 demo plots for Robusta coffee rehabilitation, showing farmers how best to use manure, CAN and NPK and how to effectively manage CWD. The results from these demonstration plots were impressive and the model will now be scaled up across the whole region.

Expansion of Maruku Robusta germplasm

The Sub-station continued to maintain 216 Robusta germplasm collections by weeding, applying fertilizers, pruning and gap filling. Efforts have been made to expand the germplasm by collecting 396 accessions from

Farmers admiring seedling production during exchange visits

farmer fields in Bukoba, Karagwe, Missenyi and Muleba districts. To date Maruku has collected and raised 300 accessions, which will be planted in the main field in April 2008.

Screening for resistance to coffee wilt disease

In collaboration with CID, the sub- station continued to maintain a clonal mother garden of CWD resistant Robusta varieties at Maruku. The garden contains 201 robusta materials of different varieties. Clonal seedlings were strengthened by applying manure, inorganic fertilisers, ensuring timely weeding and applying insecticides to control pests. It is expected that during 2008 the garden will produce a minimum of 2,000 seedlings per year. The seedlings will be used for on farm and multilocational trials establishment.

Major Priorities for 2007 – 2008

Training Programme

The sub-station plans to continue with both residential and village based training programmes focusing on the rehabilitation of Robusta coffee, the proper use of inputs and coffee quality improvement. The plan is to train 4,680 farmers, and to conduct training to 120 farmer groups and to 186 rural primary societies by 2010.

Conduct field days and exchange visits

The sub-station plans to conduct field days for 1,000 farmers. In addition the station plans facilitate exchange visits to 300 farmers and 20 extension workers.

Multiplication of new varieties

The sub-station will continue with the multiplication of both Arabica and Robusta coffee planting materials at Ibwera, Biirabo and Maruku VPUs based on client requirements. Plans are underway to expand the Arabica mother gardens from 594 to a total of 2194 plants at Maruku, Biirabo and Ibwera VPUs to meet the stakeholders demand in Kagera region, and to produce 640,000 Robusta coffee planting materials by June 2008.

Maintenance and establishment of new Robusta germplasm

Maruku sub-station will continue with the maintenance of on-station trials and will establish a new Robusta germplasm at Maruku by applying manure, inorganic fertilisers, weeding, pruning harvesting and recording yield data, processing coffee cherries and evaluating the performance of Robusta materials in terms of quantity and quality in respect to yielding ability, weight of beans, sizes, out turn ratios, and cup quality. These trials will include:

- Evaluating the performance of 5 Robusta clones selected from Maruku materials,
- Evaluating the performance of 24 best Robusta materials from 136 Robusta accessions selected from farmers' fields in Kagera Region
- Evaluating the performance of 136 Robusta accessions selected from farmer fields in Kagera region

In addition the institute will continue with its plan to establish the new Robusta germplasm by collecting accessions from farmers' fields in Bukoba, Karagwe, Misenyi and Muleba districts, and raising seedlings in the nursery at Maruku.

Further more, a study will be started to evaluate the effect of environmental and genetic interaction on the quality of Robusta coffee. This will involve collecting more than 100 coffee samples of improved robusta materials and local landraces from different farms in Bukoba, Karagwe, Misenyi, and Muleba districts.

Screening Programme

In collaboration with the crop improvement programme, the sub-station will continue with its CWD screening for resistance programme, and the multiplication of 201 CWD-resistant Robusta coffee varities. These will be established in the clonal garden and are needed for the creation of on-farm and multilocational trials in Bukoba, Karagwe, Misenyi and Muleba districts. Campaigns to minimise the spread of CWD, such as eradication of diseased trees, will continue.

Agro-forestry, intercropping and bee keeping trials

During the coming year, the sub-station will establish an agro-forestry and bee-keeping programme to complement the traditional coffee farming system at Byamutemba village in Missenyi District. In addition, the evaluation of coffee and banana intercropping trials at Maruku will be finalised.

Case Study 10:

Farmer Group to Farmer Group Agricultural Extension Participatory Training Approach: The Case of Juhudi Farmer Group in Karagwe District

TaCRI is empowering farmer groups through its participatory training approach (PTA) which uses farmers themselves to help disseminate appropriate coffee husbandry practices to other coffee growers. This farmer empowerment has been a great success in helping to get information out fast to people who need it.

Juhudi is a farmer group based in Chabuhora village in Karagwe district and has more than 30 members. The group was formed mainly so that a number of farmers whose coffee had been abandoned through depressed prices, could work together to start a rejuvenation programme.

Working with Karagwe district council, TaCRI's Maruku Sub-station has worked closely with this farmer group to provide reassurance, training, planting materials, and marketing information to give the farmers both confidence and the tools they need to start the improvement programme. Over the past few years the group has participated in training sessions organised by Maruku with the collaboration of the DALDO's office in Karagwe. The group set up demonstration plots to show how stumping, pruning, waterways, manure application, and compost making, should be done properly. The outcome of this work so impressed TaCRI, that Maruku asked the Group to host an open day in mid-2006, which was attended by more than 2,500 people.

In November 2006, the TaCRI Board of Directors visited this farmer group and were impressed by progress. Farms were well maintained and each farmer was committed to ensuring that each member of the group had a well-established coffee farm.

The Juhudi-TaCRI farmer group has since encouraged many villagers to join the scheme and as a result, many farmers from neighbouring villages have subsequently formed their own groups. This is what TaCRI calls the "snowball" effect; successful groups attract other farmers who then set up their own groups, improve their own farms and livelihoods, and then attract yet more farmers.

Case Study 11:

The Study of Manyafubu Group - Using successful farmer groups for technology transfer

Manyafubu is a farmer group based in Bushasha village, Bugabo division in Bukoba District. The group has 25 members (13 men and 12 women) and was formed in March 2004 to bring farmers together to collaborate in the fight against CWD in the District

Since it started, this group had trained more than 1,800 farmers in 18 villages in Bugabo division. During the 2006/2007 financial year, 1,513 farms were visited of which 508 were found to be affected with CWD. A total of 17,693 coffee trees were infected of which 12,658 were uprooted.

To date, the Manyafubu Farmer Group has also started 7 farmer field schools, 10 farmer groups, and 20 training centres. In order to implement these activities smoothly, the group has been given financial and technical support by TaCRI. Since the Group was set up it has received just over Tsh 1 million from TaCRI, an amount which was spent on transport costs for trainers who travelled around the division. Group members contributed over Tsh 700,000 to the programme, a commitment which reflects the Group's determination to make a difference.

Group organisation

For effective dissemination of technologies, the Manyafubu Farmers Group has organised itself into various specific committees which serve different functions, in order to optimise skills and activities. The committees and their functions are described below:

1. Functional / Central Committee
This committee has four members, a group chairperson, secretary (facilitator), treasurer and disciplinary group chairwoman. The job of this committee is to ensure that group meetings are conducted as planned, to help run FFS training sessions on the last Saturday of every month, to follow up and provide assistance on social issues such as illness, funerals and weddings, to facilitate meetings and discussions during FFS sessions, to help solve group disputes, and to coordinate the production of reports regarding the status of Coffee Wilt Disease and the progress of training sessions and eradication programmes from all 18 villages in Bugabo division.

2. Planning / training committee
The members of this committee include the chairman (Facilitator), Secretary (Group Disciplinary Chairperson), and guardian, whose collective responsibility it is to prepare training programmes, organise group choirs and songs, prepare training strategies, and supervise group SACCOS.

3. Disciplinary Committee
This committee is composed of the group discipliner chairperson and group guardian. The functions are to maintain discipline during meetings, ensure that group members adhere to good social practice in the village enforce and manage the uprooting and burning of infected coffee trees in their farms, maintain group confidences, and to ensure that working tools are kept in group office.

4. Inspection committee
The committee members include a facilitator (chairperson), group chairperson and group discipliner. This committee interrogates the validity of reports on Coffee Wilt Disease from different villages in Bugabo division, and supervises the group's training programme.

5. Finance and Planning Committee
This committee is composed of four members: the Chairman, Secretary, Group Guardian Advisor and Group member representative. The functions of this committee are to ensure that all income is entered into the SACCOS account, that allocated money is utilised for the intended purposes, to ensure that all expenditure is receipted and accounted for properly, and to provide a swift and efficient service to members.

6. The Group Guardian
The function of the guardian is ensure that group members' fees are collected, to help solve members' problems, and to safekeep group working equipment.

7. Board of Trustee
The Board of Trustees is composed of a Chairman (Ward councillor) and a Village Chairman and Facilitator (the secretary). The Board's function is to oversee all group activities from a strategic and broad perspective.

Mbimba Sub-Station, Mbozi

Mr. Isaac Mushi, Extension Agronomist, Mbimba

TaCRI's Mbimba sub-station continued to strengthen emphasis on its major role which is to improve the livelihood of coffee growers in Mbeya and Rukwa regions.

To achieve these objectives, TaCRI Mbimba has increased its efforts to organise smallholders into farmer groups of between 25-30 members. In total 80 farmer groups have been created, benefiting from collective knowledge on production and quality improvement in order to increase productivity. During the period, training courses were conducted for coffee stakeholders, the facilitation of two way linkages between researchers, extension workers and growers continued, and the multiplication of clonal hybrid seedlings which are resistance to coffee berry disease, (*Colletotrichum kahawae*) and coffee leaf rust, (*Hemileia vastatrix*) for re-planting and farms expansion was on-going.

Major Achievements 2006 - 2007

On 24th November 2006, The Vice President of the United Republic of Tanzania Hon. Dr. Mohamed Ali Shein visited Mbimba with an entourage that included the Mbeya Regional Commissioner, Mbozi District Commissioner and other government dignitaries. The Vice President was impressed with the sub- station's activities and the techniques used to disseminate relevant technologies to stakeholders. The Vice President inspected the mother garden, where clonally seedlings are being produced by vegetative propagation methods.

In its efforts to meet the increased demand for proven technologies by stakeholders in region, Mbimba Sub-Station performed the following activities for the year under reporting:-

Improved communication between stakeholders

The sub-station continued with the dissemination of relevant extension massages through leaflets, posters, calendars and the media. More than 2,000 sets of leaflets with different messages were distributed to extension workers, farmer groups, estates and other stakeholders. The extension messages focused on vegetative propagation methods, grafting techniques, crop protection, and processing.

Use of media to promote and disseminate research output

Mbimba continued to enjoy excellent coverage of its activities. The station was covered on TVT, ITV, Star TV, Radio Free Africa, and RTD, as well as various news papers including, Majira, Mwananchi and Daily News.

Exchange Visits

TaCRI supported a three-day study trip of 20 farmers from Rungwe and Mbozi districts, as well as four extension officers and four district leaders including the TaCRI Board Member Mr. Godfrey Makonganya who visited coffee growers in Mbinga. The purpose of the visit was to bring farmers and government officials together to learn from one another and share their experiences on coffee production, quality improvement, farmer groups' formation, and the management of hybrid seedlings production by vegetative propagation methods. The tour's success is reflected in the fact that the participated farmers have now established their own farmer groups and village nurseries. Similar tours have been conducted within the district with one farmer group visiting another.

Training

Both on-station and field based training continued. At Mbimba sub-station 80 farmers, 40 extension officers from Mbozi and Rungwe Districts, 53 Secondary School pupils and 10 Students from Sokoine University of Agriculture were trained on coffee production, quality improvement, farmer group formation and management, hybrid seedlings production by vegetative propagation methods, and grafting techniques.

Village Based Training (VBT) was conducted to 527 farmers as detailed in brackets: Mbozi (369), Rungwe (120) and Mbeya (38). This training of farmers and other stakeholders has had a significant impact, with the quality of their coffee improving from class 9 to classes 6 and 5. This is major visible achievement at farmer level.

Trainings for Nursery Attendants

Intensive trainings on the establishment and management of clonal garden was conducted to 24 nursery attendants in Mbozi district.

Multiplication and distribution of clonal hybrids

In order to meet the high demand for hybrid seedlings for stakeholders, TaCRI worked with the respective district councils to encourage and empower farmer groups to establish and manage their own hybrid seedlings nurseries. The following nurseries were established; Mbozi 12 sites (4,200 seedlings), Ileje 2 sites (1,040 seedlings), Mbeya 1 site (650 seedlings), and Rungwe district 4 sites (1,600 seedlings).

Establishment of Secondary Vegetative Propagation Unit (VPU)

Secondary vegetative propagation units, managed by the farmer groups, were established in areas where establishment of mother garden is limited by the availability of water. Shoots for cuttings were supplied from the station mother garden. A total of 2 VPUs were established at Masangula and Hiyari ya Moyo Coffee farmer groups, and planted with 1,500 and 3,000 cuttings respectively.

Establishment of new clonal mother gardens by farmer groups to enhance multiplication of new varieties. Planting (left) and a well maintained new clonal mother garden (right)

Grafting

Grafting of improved hybrid variety scions onto old stumps was used to change old farms to new. During the period a plot of 670 old stumps were grafted.

A total of 2,000 old variety seedling were raised at the station VPU which will be grafted with new varieties. The same exercise will be conducted to farmers who have nurseries of old varieties estimated about 40,000 seedlings.

Buildings rehabilitation and civil works

The rehabilitation works commenced in October 2006 and progressed fast during the period. Rehabilitation works include:

a) the renovation of four residential houses, a rest house, training centre, office block, car park shade, and water pump house.

b) the construction of a weir wall on the Mbimba dam to restrict water spillage, the installation of a water tank, a sprinkler irrigation system in coffee fields and nurseries, the renovation of the existing Vegetative Propagation Unit (VPU), and the construction of a new VPU.

Farmers listening attentively to Mr. Charles Mwingira during one of the village based training sessions

Major Priorities 2007 - 2008

1. Continue with the dissemination of extension messages to stakeholders with a target to reach at least 40,000 growers by the end of June 2008.
2. Conduct structured visits to five districts; Mbozi, Rungwe, Mbeya, Ileje and Mpanda at least once per quarter.
3. Conduct exchange visits to farmers within and outside the region.
4. Facilitate farmer groups to conduct open days in their respective villages.
5. Participate in Agricultural shows which will be held at zonal level in Mbeya.
6. Develop demonstration plots for proven technologies for stakeholders in 5 districts.
7. Conduct workshops to strengthen linkages with extension staff in five districts, with a target for at least 75 extension staff.
8. Conduct training on proven technologies in on-going efforts to increase productivity and quality to at least 80 farmer groups from 5 districts, as well as 40,000 coffee growers and 75 extension staff.
9. Mobilise more farmers to process their coffee at central pulping units to improve the quality to gain higher prices.
10. Expand the on-station clonal garden from 10,000 to 12,000 mother plants.
11. Facilitate the establishment of two district nurseries with 2,000 mother plants each in Rungwe and Ileje districts.
12. Facilitate the establishment of two clonal gardens with 1,000 mother trees to Itende N.S and Shiwanda farm.

Case Study 12:

Green scales: A threat to coffee production in southern highlands

Coffee green scales, (*coccus viridis*) is a serious pest to coffee in many countries, and has been devastating in some places like Mbozi which is a major coffee growing area in Tanzania. In places where the pest is uncontrolled an estimate 60% of the crop has been lost. The control of the scales has been difficult, since most farmers are not educated on the cause of pest, nor its relationship with ants . Incorrectly, there are some farmers who believe that ants cause scales.

Description

The adult Coffee green scales insect is flat, oval and green with an irregular, but very distinct loop of blackish spots on the middle of its dorsum. Its oval rounded behind is sometimes asymmetrical. This is a very small pest with a length of between 2.5 to 3.25mm, and a breadth of between 1.5 to 2.00mm. The adult is immobile and lives its whole life in one place provided the leaf remains alive. The young hatchling nymphs are activeand can move at a rate of around one meter per hour. The insect usually settles downon the underside of the leaf close to the central vein, or near the tip of green shoots.

Green scale and Ants

Green scales produce large amount of excreta in the form of a sweet exudation known as honeydew which is very attractive to ants. As with so many other species, the real pest is often the combination of ants and scales.

It has been thought that there was some kind of symbiotic relationship between the Green scales and ants; that the ants benefited from consuming the honeydew and in return they transported the adult green scale around the coffee bush, thus spreading its destructive powers yet further.

However, various studies have concluded that there is no symbiotic relationship. Van der Goot, for example, found that the ants were attracted to the scales, but that they did not transport the pests,. Similarly, Keuchenius found that there was no connection between the spread of scales and ants. Scales were never found in ants nest and it was not uncommon to find trees heavily infested with scales yet entirely free from ants. From the forgoing and other evidence of close association of ants with *coccus viridis*, an association which often markedly increases the rate of reproduction rate of the scale insects, its clear that there is great advantage in any means of preventing access of ants to the scales.

Life history

The insect lays eggs which hatch very soon after, so that young active insects are often seen under a reproducing insect, together with some eggs not yet hatched.

There are three nymph instars all broadly oval and flat, increasing in size in each instar. The insect remains mobile until the adult stage is reached. Reproduction may begin when the insect is 6 weeks old, with a period of active reproductive maturity of 21 and 111 days and a total lifespan of between 89 and 214 days. Feeding is undersurface of the leaves, seldom the upper, on green shoots and occasionally on green berries.

Damage to plant

The pest sucks from the plant, which can eventually kill the plant, particularly vulnerable nursery plants. The sugar and other food constituents taken up from the sap, are then partially excreted in the form of honeydew which form a sticky covering to the leaves on which black sooty mould *(Capriodium ssp)* develops, particularly when it is not heavily attended by ants; but when it is, the reproduction rate is usually higher and so more damage may be done.

Managing green scales

Knowing the association of green scales and ants, the most effective way to control the infestation is to limit or stop the ants climbing onto the tree to attend the scale by using the following techniques; pruning all primary branches touching the ground to break the way for the tree; target spray to the main stem and to the ground where the nest of ants are likely located; wrap the main stem and just below the first primary branches with a piece of cloth soaked with a concentrated solution of recommended insecticides to deter the ants from climbing the stem (selection 750 EC (profenophos) sprayed at the rate of 1 liter per hectare, repeated fortnightly for three times has is known to be an effective control for both scales and ants).

Ugano Sub-Station, Mbinga

Mr. Felician Swai, Extension Agronomist, Ugano

This year Ugano sub-station continued in its mission to support the rejuvenation of the coffee industry in Ruvuma (Mbinga & Songea R) with a significant expansion into Iringa as an additional region growing coffee. The emphasis has been to promote and disseminate appropriate/proven technologies to stakeholders, and to encourage farmers to form more farmer groups through a participatory approach.

The station continued to support the development of new nurseries to produce new cultivars for the re-planting programme, and also developed and delivered training courses to coffee farmers and extension staff. There were also specific programmes designed to encourage farmers to rehabilitate their old farms through stumping and grafting with new cultivars. A campaign to encourage domestic coffee drinking within the region was undertaken to assist efforts to expand the market and increase demand.

Major Achievements 2006 - 2007

At Ugano, commitments to work with farmer groups continued in the sprit of delivering proven technologies. The formation of farmer groups continued and as a result, 92 new groups were created during the period. The station continued to promote TaCRI's research activities through various meetings in Ludewa, Njombe and Kilolo Districts in Iringa region, and Songea Rural, and Mbinga Districts in Ruvuma region.

Training of farmers

Farmers were trained on best field practices, the multiplication of new varieties such as preparation of mother gardens, and other related practices. Eighty-four farmer groups benefited from this training, with training campaigns carried out in the following wards as indicated in brackets; Mbinga (9), Njombe (8), Ludewa (4), Songea rural (2), and Kilolo district (4).

Use of media to disseminate research output

Ugano continued to enjoy excellent coverage of its activities. The station was covered on ITV, TVT, Star TV, Channel 10, Radio Tanzania Dar es Salaam, Radio Free Africa and Radio Maria. The programmes aired focused on multiplication and dissemination of new varieties, farmer-to-farmer campaigns and quality improvement. Eight news articles appeared in different national newspapers.

Exchange visits

Within Mbinga district, 147 farmers from 18 farmer groups visited the station and 135 farmers came from Njombe, Ludewa and Kilolo districts in Iringa region and Lilondo (Songea), with their extension staff.

Mr. Felician Swai (standing left) addressing one of the village meetings on coffee rejuvenation in Kilolo District

Training of trainers

The sub-station conducted its training of trainers programme for 175 farmers and extension staff from different groups in Ruvuma and Iringa regions. The training emphasis was on supervising nurseries, multiplication of new varieties, and effective management of mother gardens.

Grafting

Grafting of new varieites onto old stumps, is one technique used in the rehabilitation of old farms. During the period, 45 farms were stumped and grafted as indicated in brackets: Mbinga (18), Njombe (18), Kilolo (5), and (Songea (4). A total of 210 coffee trees were grafted.

Research extension farmer linkages

Ugano sub-station continued with research extension linkages and conducted four workshops. Two took place in Mbinga, where 45 extension staff from coffee growing areas participated. Another workshop was carried out in Ludewa, Iringa which attracted 6 extension staff, and the fourth took place in Njombe District at which eight extension staff participated.

Organisation of farmers to utilise central pulping technologies

Strong mobilization of farmers to utilize best-practice pulping technologies continued with 127 farmer groups in Mbinga, Njombe, Kilolo, Ludewa and Songea Rural benefiting from the training. After training, coffee quality continued to improve from class 7-9 to class 5-7. This is a remarkable achievement for smallholder farmers and is a very visible sign that their efforts are worthwhile, since increased quality pushes prices up and has a knock on impact on farmers' income.

Dissemination of clonal materials to farmers

More than 22,700 seedlings were distributed to farmers. A total of 1,800 mother trees were distributed to farmer groups in Mbinga each received 100 plant and more than 3,950 plants were given to individuals and farmer groups in Ludewa, Njombe, Kilolo and Songea rural.

During the period, all District Executive Directors gave their full support in facilitating the establishment of district and village based nurseries. As ever, TaCRI and Ugano are greatly appreciative of such teamwork and enthusiasm in trying to improve the lot of smallscale coffee farmers in the region. Farmer groups and individual farmers with vegetative propagation units were provided with 11,000 bare rooted materials for hardening, which were later planted in their fields. In addition, 3,000 shoots were distributed to farmer groups with VPU's.

Establishment of district nurseries

TaCRI is increasing pressure to establish more nurseries in all coffee growing districts in the region. In 2007, two nurseries, each with 2,000 seedlings, were established in Ludewa and Madaba Songea.

Multiplication of new clonal materials by farmers

Farmers and farmer groups with mother gardens successfully multiplied 31,000 seedlings, and planted them out on their farms. In Mbinga, farmers continued with the construction of vegetative propagation boxes with a total of 82 new VPU's built for further multiplication of varieties. This is a notable achievement in the year of reporting.

Collaboration with TaCRI research departments

During the reporting period, the Sub-station successfully worked with TaCRI's central Crop Improvement Department to establish a hybrid seed garden of female lines with 4,700 plants, as well as a multilocation trial of compact hybrid testcrosses at Ugano. In collaboration with the Crop Productivity and Quality Improvement Department, the station evaluated new primary processing techniques for a second season running and initiated trials both on the effect of shade trees on coffee, and on the tonic effect of copper fungicide on grafted clonal coffee.

Ugano sub-station clonal mother garden

International workshops, conferences and exhibitions

Ugano sub-station continued to participate in various local and international forums. The Extension Agronomist Mr Felician Swai, participated in the East Africa Farmers Dialogue and presented a paper titled "improving livelihoods of coffee farmers in South Tanzania" in November 2006, which was held at Buhuri, Tanga. The Extension Agronomist also attended an international conference and exhibition on the Specialty Coffee Association of America in May 2007 which was held at Long Beach California in U.S.A.

Promoting internal coffee consumption

During this period, Ugano made its first inroads in promoting local coffee consumption. The Sub-station set up a promotional unit at the bus stand in Mbinga, which was attented by more than 500 people, including the Mbinga District Commissioner Mrs. Amina Juma Masenza.

Bee-keeping - an alternative source of income

As an alternative source of income to coffee farmers, TaCRI Ugano started encouraging coffee farmers to keep bees. The station provided 8 beehives to farmers in Madaba Songea and kept a further 6 hives for training purposes at the station.

Major Priorities 2007 - 2008

1. Produce 2.7 million seedlings for a re-planting campaign in Ruvuma and Iringa
2. Continue with village based training in Mbinga (at least 25), Songea (10), Njombe (10), Ludewa (10), Kilolo (5), Mufindi (5)and Makete (5) Districts
3. Conduct field days in Iringa (Ludewa 2,Njombe 2), and Ruvuma (Mbinga 5) coffee growing districts
4. Continue with training of extension staff on best field practices at Iringa (20 VEOs) and Ruvuma (38 VEOs)
5. Establish district nurseries one each at Njombe, Ludewa and Kilolo in Iringa and Mbinga district
6. Continue with exchange visits to both farmers and extension staff in Iringa (20 groups) and Ruvuma (40 groups)
7. Provide training on best field practices to farmers in Iringa (20 groups)and Ruvuma (30 groups)
8. Continue with the mobilisation of farmers to form more farmer groups to help link them to auctions
9. Mobilise more farmers (at least 50 groups) to use central pulping technology for to improve their coffee quality.
10. Encourage stumping and grafting technology to more coffee farmers (100 farmers) in Ruvuma and Iringa.
11. Continue with the promotion of internal coffee consumption campaigns in Ruvuma
12. Provide more mother trees to farmers in Iringa (Kilolo 4,000, Makete 4,000, Njombe 5,000, Ludewa 4,000, Mufindi 2,000 and Ruvuma (Mbinga 8,000 & Songea 5,000)
13. A total of 150 trainers, 8 DCSMS & 60 VEOs will be trained on quality processing, marketing, grafting multiplication, and budgeting
14. Demonstration plots at Njombe (3), Ludewa (3), Mbinga (3), Songea (1)

Bee-keeping as an additional source of income to coffee farmers

Sirari Sub-Station, Tarime


Ms. Sheila Mdemu, Extension Agronomist, Sirari

This sub-station is new and was established during the reporting year to help develop the potential for the coffee industry in Mara region and adjacent districts. Currently there are just 2,900 hectares under coffee production in the region producing around 2,300 tonnes per year, but the estimated potential is closer to 35,000 hectares, suggesting an under-capacity of more than 90%.

There is potential for both Arabica and Robusta production in the region, with the highland areas suitable for Arabica and the lower areas more appropriate for Robusta. Currently just over 8,000 farmers in the region earn a living from coffee production. In the immediate term, the goal is to help the existing farmers. As such, during the period 6 farmer groups were trained in clonal multiplication with a total of 1,490 clonal seedlings. In order to cover all 2,850 ha currently under Arabica cultivation, the demand for seedlings is approximately 4,000,000.

Major Achievements 2006-2007

The first task of the new Extension Agronomist was to acquire office premises and equipment, and to build relationships with the Tarime district offices and personnel. Once established, the Sub-station undertook the following activities:

Village Based Training

The first major task was to implement village-based training, covering clonal multiplication and rehabilitation of old coffee trees.

Intercropping patterns

Most farmers in the area undertake an intercropping farming system, cultivating coffee with other crops such as maize, sweet potatoes, cassava, sorghum, yams, bananas, avocados, and shade trees of different types. Five farmer groups with a total of 222 members took part in a training programme to advise them on the most effective intercropping crops, spacing and techniques.

Establishment of clonal nurseries

A total of eight farmer groups were formed during the period and their clonal mother gardens are faring well. At the same time, the farmer groups received training on how to manage and plant out clonal seedlings, thereby empowering them with the necessary skills needed to manage their gardens effectively.


Training on stumping of old trees

Major Priorities 2007 - 2008

Establishment of the district nursery

A district nursery will be established at Sirari on 14.5 acres of land provided by the district. The plan is to start the clonal mother garden with 3,000 plants which will then be upgraded to a total of 10,000 plants. The garden will expand capacity for mass distribution of new variety seedlings to farmers.

Formation of more farmer groups

During the period a further 8 farmer groups will be created, bringing the total for the area to 16 groups by the end of 2008.

Training of farmers

During the period it is planned that all groups will be trained on coffee husbandry and clonal multiplication of coffee. Formal training will be delivered to groups and farmer promoters with a three day training programme conducted for each group.


Seedlings production by vegetative propagation by one farmer group

Training of trainers will continue to receive priority with Village Based Training of farmers and support to farmer groups on establishment of clonal gardens training (VBT) used to reinforce trainings.

Collaboration with district councils

Collaboration with district councils will be strengthened in the areas of extension to help support and encourage farmers to establish clonal gardens.

Extend services to other coffee farming districts

It is planned that services will be extended to other coffee farming districts in the zone, with zones currently earmarked for development being Serengeti and Ukerewe where farmer groups and clonal gardens will be established, and training provided.

Open Days

An open day will be conducted in one of the farmer groups, during which coffee husbandry and clonal multiplication techniques will be demonstrated. It is estimated that 3,000 or more farmers will attend.

Establishment of demonstration plots

During the period the Sub-station plans to set up demonstration plots for each farmer group, to demonstrate good practice in agronomy and show off the performance of the new varieties.


Tarime landscape

Case study 13:

Farmer to Farmer Agricultural Extension the case of Taswira Group– Gwitiryo

TaCRI has always had a participatory approach (PA) in working with farmers, a strategy which helps farmers learn from each other, share knowledge, meet regularly to discuss specific problems, and gain collective experience in order to improve their coffee farms and other crops.

The Taswira group is a model group in Tarime district. The group started in 2004 with the main objective of starting multiplication of clonal coffee hybrids. Group representatives were trained in clonal coffee multiplication, and then provided with mother trees to start multiplication. The group started with 250 mother trees, and with some losses, they now have a total of 236 mature and healthy mother trees.

At the start the group fared badly, and performed worst amongst all the 6 groups who had set up mother gardens. But as the Swahili proverb says "Penye nia pana njia", which means where there is a will there is always a way, the group has turned itself round and has become the hero! The group has now produced more than 1,000 seedlings for members, but what distinguished it most from its sister groups is that the members are being active farmer promoters, eager and committed to training and sharing knowledge with other farmer groups and individual farmers. As a consequence, a further four new farmer groups have been created during the reporting period.

These new groups have themselves now started to multiply clonal coffee, with the Taswira group providing them with shoots and all necessary technical expertise. This is what we call the multiplier effect, and a model example of how farmers can help themselves by helping one another.

Farmers participating in plant cuttings in a propagation box during one of the exchange visits

Mwayaya Sub-Station, Kasulu


Mr. Sixbert Mourise, Extension Agronomist, Mwayaya

Mwayaya sub-station in Kasulu district, Kigoma region is the second new sub-station to be set up by TaCRI during this past year.

Mwayaya is the only agricultural research sub-station in Kigoma region and the sole research sub-station dedicated to coffee in the whole western zone. The sub-station is set to serve close to 4,000 coffee growing families in Kigoma region and the neighbouring district of Ngara in Kagera region.

Kigoma is well-known for producing good coffee. In a medium roast, the beans have a sweet smell, with hints of honey and citrus. Mwayaya substation is promoting sustainable good quality coffee production by disseminating proven technologies to farmers.

The Extension Agronomist for Mwayaya substation reported in May 2007 to begin preliminary preparations of serving stakeholders in Kigoma.

Major Achievements 2006 - 2007

Dissemination and communication

Attended the RUMAKO Cooperative annual general meeting, where over 300 members attended. They were encouraged that TaCRI had come to serve them. They had three major requests of TaCRI: for TaCRI to be at the forefront in efforts to enlighten farmers on good agronomic practices for coffee; the Institute to collaborate with the union to promote Kigoma coffee; and for TaCRI to keep farmers informed of world coffee markets.

Quality coffee processing campaigns

Farmers were trained on processing techniques that would improve their coffee quality. A total of 97 people were trained from 2 farmer groups in Matiazo and Mukigo. At Mukigo, the farmer group was provided with essential tools to help dry coffee properly, and these items included coffee mesh (2 rolls) nails (10 Kg), and timber (16 pieces).

Training

A training session officiated by the Kigoma District Commissioner, Mr John Mongella was held with thirty farmers from five farmer groups from Kalinzi, Mukigo, Matiazo, Mukabogo and Nyarubanda villages. The farmers were trained on clonal seedling production techniques.

At Muhange village, a training session was undertaken on various subjects including rehabilitation, pest control and general crop husbandry. A total of 30 participants were involved, 7 of whom were women.

Field visits

During the period under review, farmers were visited at random all across the region, amongst other things, to understand some of the issues farmers in the region face. Although the majority of farmers take good care of their coffee, some had abandoned their trees, citing a lack of technical know how, limited inputs, low prices and an ageing farmer population.

Priorities for 2007/2008

Multiplication of clonal varieties

To produce coffee seedlings both from seeds and clones and grafting of root stocks with scions from new varieties so as to be able produce over 200,000 planting materials by the next year.

Communication and Dissemination

To continue working with farmer groups, with the target being to add a further 9 farmer groups to the existing 11 that are serviced by the Sub-station.
These new farmer groups will be set up in the following districts: Kigoma (Mkongoro 1, Rusaba 1 and Mukigo 1), Kasulu (Mubanga 1, Muhinda 1 and Kibwigwa 1), Kibondo (Muhange Juu 1, Gwarama 1 and Kabale 1), and finally Ngara (Rulenge 1). The sub-station will also participate in farmer's fairs such as Nane Nane, farmer's days, and open days.

Mwayaya Sub-Station, Kasulu

Demonstration plots
A total of 7 demonstration plots will be set up for each district, each planted with 200 new coffee hybrid varieties. The plots will be established as follows: Kigoma (Mikabogo 1, Nyarubanda 1), Kasulu (Mwayaya 1, Rusaba 1), Kibondo (Mabamba 1, Muhange 1), and Ngara (Rulenge 1).

Training
Training of trainers will be conducted to 300 farmers/farmer representatives with an emphasis on clonal coffee multiplication and rehabilitation of old coffee fields.

Village Based Training
A total of 600 farmers will be targeted in all four districts, with 150 farmers reached in each quarter.

Research-Extension linkage
The link between local government agricultural extension machinery will be strengthened further, using field extension staff to deliver extension messages to coffee growers.

Use of Media
Continue dissemination of extension messages through all aspects of the media.

Open days
A total of 8 open days to promote good coffee husbandry and processing are planned across the four districts, with a target to reach 5,000 farmers.

Publications
A Crop Calendar for Kigoma region will be published.

Groups strengthening
A clonal mother garden with 10,000 mother plants will be established at Mwayaya, to help strengthen the existing 9 farmer groups' clonal gardens. The target is for each farmer group to have a minimum of 1, 000 mother trees. At the same time, 40 propagation boxes will be constructed at Mwayaya VPU and a further 36 propagation boxes will be made for the farmers' VPUs.

Other activities
The Sub-station has plans to construct 50 beehives, as an income generating project at Mwayaya, which will then be promoted to coffee growers as a means for them to improve their livelihoods.

Kigoma coffee cropping systems

Case Study 14:

Local Coffee Consumption

There is a coffee drinking culture in Kigoma region, particularly amongst the large Muslim population, and for roasters, it can be a highly lucrative business, netting up to Tsh 18,000 per day.

Idrisa alias Ras, is a good example. A 36 years old Kalinzi resident, he began roasting his own coffee way back in 1991. In his words, he cannot afford to leave this business, no matter what! And to this end he markets his coffee energetically and yields a good income. To the coffee drinkers at Kalinzi centre, he has built a strong reputation for providing a great cup of consistently good coffee.

Sun dried coffee cherries. the raw materials for a sip!

So how does he do it?

Mr. Idrisa mostly buys sun dried coffee cherries, or low grade parchment coffee (mostly rejected parchment) wherever he can find it, supplemented with dried cherries that customers bring to him, paying around Tsh 3,500 per 1.5kg bowl of cherries or parchment.

Using a pestle and mortar, the coffee cherries and parchment are hulled repeatedly to remove husks, and the husks are later blown off by winnowing, leaving the green beans. The beans are then dry roasted for about 45 minutes on firewood stove, (stirring continuously) until they change from green to a shiny, black colour.

After roasting, the black beans are ground in a mortar with pestle and, in a series of grindings and sieving; the end product is fine brownish coffee powder.

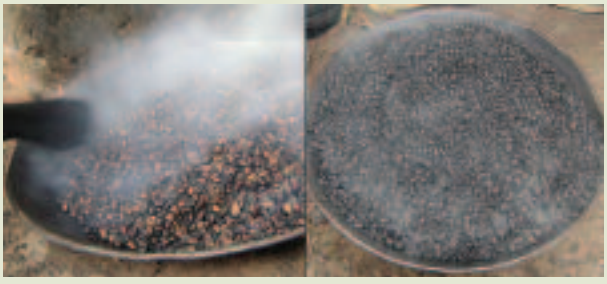
Coffee beans after hulling and winnowing

To make his brew, Mr. Idrisa, boils up the coffee powder for 10 minutes, creating strong, black liquor with a slightly bitter taste but very pleasant aroma. He then pours the hot liquor into a serving kettle and presents it to his customers in small cups, who consume it with sweetened peanuts called kashata.

The business

In terms of revenues, a serving kettle gives 64 cups of coffee liquor, sold at Tsh 50 each. On a good day (market days at Kalinzi) he sells as many as 12 kettles of coffee, the equivalent of 760 cups, which earns him an impressive Tsh 38,400. On quieter days in the village, he sells an average of 9 kettles, equivalent to 570 cups which generates Tsh 28,800.

Regarding the costs, Mr. Idrisa spends Tsh 14,000 daily on his green beans, a further Tsh 4,000 on firewood and water, and another Tsh 1,500 for an assistant to help him.



Roasting of coffee beans

Black beans poured into mortar ready for grounding

So what is his profit?

Well, on a good day Mr. Idrisa nets up to Tsh 18,000 (or US$15) and on a quieter (non-market day) he is pocketing Tsh 8,000, a significant income and one which is well above the national per capita daily income. It's a great business!

The customers

Mr. Idrisa has many enthusiastic customers who never miss a chance to visit his stall. One, Mzee Ashel Katamba for example, drinks eight cups of coffee liquor on average a day, and this makes him feel good.

Conclusion

The case study of Mr Idrisa is clear evidence that coffee vending can be good business, and there is certainly great potential to enhance consumption within. Mwayaya Sub-station intends to help to promote local coffee consumption through a number of strategies.


Sieving (left) and preparation (right)

- Promoting coffee liquoring/tasting and competitions
- Training coffee vendors on how they can best serve their customers, by helping them improve quality and helping them become more business oriented.
- Sponsoring coffee clubs/events where as many people as possible get to drink locally produced and processed coffee.

Currently many vendors are using poor quality coffee beans which are not cheap anyway. At the current price of raw coffee, they can even go for cured fine coffee at the factory. Idrisa alone grinds close to 1.5 metric tonnes per year. He is not alone in the region, there are many! If they can access the cured coffee from the curing plant at Matiazo, it means that will create a local market, adding value to local coffee in return.


The sip! Customers taking their coffee at Mr. Idrisa's coffee parlour

Finance & Accounts


Mr. Hubert Lema, Accountant

During the year under review TaCRI continued to receive financial support from the EU through EDF/Stabex programme, industry stakeholders with the voluntary coffee cess, the Government of Tanzania through budgetary allocation to support research and seedlings multiplication support activities, and from the CFC through CABI, under the Coffee Wilt Disease Eradication programme.

The Endowment Fund which was established to create sustainable financial support for the future, continued to show a positive trend in earned returns. TaCRI is expected to utilize the Endowment Fund earnings at a future date when the need for such support to finance its operations become necessary, and especially after all other financial support programmes end. TaCRI had various other sources of income, including the sale of coffee seedlings and farm produce (mainly bananas and coffee), from the research farms, and from fixed deposit accounts. A summary of income from these transactions, detailed below, has been authenticated as correct records by the auditors.

Income and Expenditure

TaCRIs income and expenditure statement for the year 2006 / 2007 shows a surplus of Tsh 703.46 million as compared to Tsh 853.09 million the previous year; this lower figure is attributable to increases in staff, administration and technology transfer costs due to new recruitment, salary reviews and the general price index increases for the operational costs.

The cost trends indicate that staff costs have fallen from a high of 44% of total operational costs in the year 2005 / 2006 to 31% in 2006/2007, with the proportion of administration costs falling from 43% in 2005 / 2006 to 30% for the year under review. However upward trends in costs were recorded in both research and technology transfer expenditures to 22% and 17% respectively from a low of 15% and 2% compared to the previous year. This reflects an expansion of operations in both cost centres. Overall, in the ratios of administration and staff costs are within acceptable limits, though prudence and frugality in expenditure are an on-going exercise.

FINANCIAL STATEMENT (unaudited) Tsh 000

	2007	2006	2005	2004
Balance B/F	983,877	589,424	183,711	140,311
INCOME				
Stakeholders contributions	169,748	501,019	536,801	408,763
EDF Funds	800,184	733,857	497,681	1,159,555
Government Funds	257,062	-	77,744	-
Other income	7,503	85,123	55,376	11,344
	1,234,497	**1,320,000**	**1,167,603**	**1,579,663**
Total	**2,218,374**	**1,909,424**	**1,351,314**	**1,719,974**
EXPENDITURE				
Staff costs	449,301	385,149	271,895	441,877
Administration costs	428,975	407,201	227,106	382,447
Research support costs	311,384	148,372	96,644	221,653
Technology transfer costs	270,162	19,783	3,494	1,080
Repairs & maintenance	2,186	124	4,251	167
Capital expenditure & contracts	52,907	95,709	-	232,208
Total Expenditure	**1,514,915**	**1,056,338**	**603,391**	**1,279,432**
Surplus	**703,460**	**853,086**	**747,924**	**440,542**
REPRESENTED BY				
Bank Balances Current Accounts	340,177	853,086	747,924	440,542
Bank Fixed Deposits	363,283	-	-	-
Total	**703,460**	**853,086**	**747,924**	**440,542**

Human Resources


Dr. Omar Kizango, Personnel & Administration Manager

TaCRI's human resources policy is to recruit high calibre staff who offer excellence and high standards of performance, and who are professional and team-spirited. It is heartening to note that during the year, TaCRI retained its core staff.

Recruitment

In the year under review, the TaCRI team was strengthened with the addition of the following staff members: Mr. Cyril Ignas Chimilila (Agricultural Economist), Mr. Epafra Mosi (Laboratory Technician), and Mr. Godlisten Mphuru and David Mjaila (drivers). Linkages in the extension activities were also reinforced with TaCRI bringing together collaborative partners in dissemination work with the stakeholders.

Governance & Policy matters

The TaCRI Board of Directors which met according to its schedule during the year, approved the TaCRI Staff Handbook, a guiding policy document for all issues in respect to staff regulations including recruitment, work discipline, welfare issues, and codes of ethics and conduct in line with standing statutes.

Team Building & Capacity Development

During the year, team building and capacity development activities continued to be undertaken as summarised below.

The overall working atmosphere continued to be good, with TaCRI's remunerative package continuing to be attractive, and on-going modernisation of the Institute facilities, helping to ensure a pleasant working environment.

Table 4: Courses Undertaken 2006 - 2007

Particulars of Seminar, Course, Workshop & Capacity Development Activity	Participants	Department	Dates
Annual operational review and team building	All staff	All departments	January 2007
Study visit to CIFC Portugal as part of their MSc. Degree studies due for completion in September 2007	Mr. D.L. Kilambo Mr. D.J. Mtenga Dr. L.I. Masumbuko	CID CID CID	March- May 2007
Participation in the 21st International Conference on Coffee Science, ASIC by 9 TaCRI staff members at Montpellier France in September 2006.	Dr. J.M. Haki Prof J.M. Teri Mr. G.P.Maro Mr. D.L. Kilambo Mr. D.J. Mtenga Mr.N.M. Ngh'oma Mr. F.L. Magina Mr. T.S. Nzallawahe Mr. M.H. Temu Dr. L.I. Masumbuko	Board CED CPQI CID CID CID CPQI TTTD TTTD CPQI	September 2006
Attendance at 2 workshops: the first on New Company Laws & Performance Evaluation of Entities and the secondon the International Financial Reporting Standards) organised by the National Board of Accountants & Auditors as part of the continued programme on education.	Dr. O.S. Kizango Mr. H.N. Lema	Administration	December 2006 & February 2007
Seminar on sustainable digital library development in Tanzania, challenges, prospects and strategies	Mrs. A. P. Kimaro,	Administration	February 2007

Table 4: Courses Undertaken 2006 - 2007 (continued)

Particulars of Seminar, Course, Workshop & Capacity Development Activity	Participants	Department	Dates
Seminar on Plant disease diagnostic capacity and needs in Nairobi Kenya	Mrs J. Meli Urassa,	CID	March 2007
East Africa Farmers Dialogue forum at Buhuri-Tanga	Mr. F.B. Swai Mr. Isaac K. Mushi	TTTD	November 2006
Attendance to a regional workshop on the Kagera regional strategies on coffee development & the 4th African Fine Coffee Conference & Exhibition in Addis Ababa-Ethiopia.	Mr. N.M. Ng'homa	TTTD	February 2007
Seminar on Best Field practices held at Ngurdoto Hotel, Arusha	Mr. F.L. Magina Ms. S Malinga Mr. T.S. Nzallawahe	CPQI CPQI TTTD	February 2007
MSc. Training on crop protection-SUA	Mr. F.L. Magina	CPQI	September 2006
Workshop on Agricultural R & D project cycle management-Mombasa Kenya	Mr. G. P. Maro Dr. O.S. Kizango	CPQI Administration	December 2006
Soil Science stakeholders' workshop-ARI Tanga	Mr. G. P. Maro	CPQI	April 2007

Retirement with Dignity

Mr. Abbas (right) and Prof. Teri (left)

During the year under review, one of the Institutes' longest serving staff member, Mr. Abbas Adam Mushi, retired having worked in a number of government over a period of 36 years.

Asked about the secret behind his successful career, Mr. Mushi explained "It is a combination of commitment, discipline, and maintaining respect for others, as well as working hard".

True to his word, over his career, Mr Mushi has been awarded "The best worker" award several times during the annual May Day celebrations.

Mr. Mushi was delighted with a surprise farewell function held to bid him farewell saying he was glad to have left service amongst memorable friends, management and staff alike.

We all wish him all the best in his retirement.

The late Prof. Martin L. Kyomo

Obituary

The Chairman, Board of Directors regrets to announce the death of Professor Martin Luther Kyomo (70) who died on May 20, 2007 in Morogoro from prostate cancer. Professor Kyomo played a key role in helping TaCRI develop its strategies to best meet the needs of coffee stakeholders. In 2001, the TaCRI Board of Directors appointed Professor Kyomo as a member of the Technical Advisory Panel for fours year during which time he was appointed as Chairman to the panel. In 2007 he was re-appointed to chair the panel for another two years in recognition of his invaluable contribution to the Institute, a role that he was sadly unable to complete. Our condolences and thoughts continue to be with his family and friends.

TaCRI Officers and Staff

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Prof. James M. Teri	Secretary

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Prof. Martin Kyomo	Chairman (deceased)
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Prof. Emmanuel Mbiha	Member
Dr. Francis Shao	Member
Prof. James M. Teri	Secretary

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Mr. Hubert N. Lema, Cert. Acc. (Tanzania Inst. of Acc.), Dip. Bus. Adm. (CBE), Dip. Fin. Mgt. (Inst. Comm. Mgt.)	Accountant
Mr. Geoffrey N. Mtei Dip. Agric. Eng. (Egerton), Adv. Dip. Ind. Mgt. (Krans College)	Estates & Works Manager
Mrs. Salama A. Kozi Secretarial Cert. (Modern College) Comp. Appl. Certificate (KIT) Off. Mgt. Certificate (NIP)	Secretary to the CED
Mrs. Amelda P. Kimaro National Librarian Certificate (TLS) Higher Librarian Certificate (Mantep)	Librarian Assistant
Ms. Restituta A. Mallya National Bus. Exam. Cert. (NABE) Secretarial Certificate (MCC) Comp. Appl. Certificate (MCC)	Accounts Office Assistant
Mr. Haruna S.Msangi Certificate (NABE)	Store Keeper

Mr. Hassan O. Kimathi Elect. Tech. Cert. (NVTC)	Electrical Technician
Mr. Ismail S. Msuya	Plumbing Technician
Mr. Abbas A. Mushi*	Office Attendant
Mr. Joseph D. Kweka	Head Security Guard
Mr. Bertini C. Kweka	Security Guard
Ms. Isdora C. Mankya	Security Guard
Mr. Ludovick B.Kweka	Security Guard
Mr. Nuru J. Ilala	Driver
Mr. Aloyce Koinange	Driver
Mr. Ally R. Chakasambi	Driver
Mr. Geoffrey E. Nkilosibi	Driver
Mr. Godsteven Mphuru	Driver
Mr. David Mjaila	Driver
Mr. Fidelis E. Soka	Driver
Mr. Robson I. Mushi	Driver

CROP IMPROVEMENT DEPARTMENT

Dr. Linus I. Masumbuko B.Sc. Agric. (SUA) M.Phil. (Birmigham) PhD (Swed. Univ. of Agric. Sciences)	Head of Department
Mr. Deusdedit L. Kilambo Dip. Crop Prod. (Ukiriguru), B.Sc. Agric. (SUA), M.Sc. Crop Science (SUA)**	Senior Research Officer
Mr. Damian J. Mtenga Dip. Irrig. (Nyegezi), B.Sc. Agric. (SUA), M.Sc. Crop Science (SUA)**	Research Officer
Mr. Faustin L. Mtuy Cert. Agric. (Nyegezi), Dip. Hort. (Tengeru)	Field Officer
Mr. Josephine M. Urassa Dip. Crop Prod. (Uyole)	Field Officer
Mrs. Eliansoe E. Mosha Cert. Agric. (Ukiriguru)	Field Officer
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** Towards completion of M.Sc. Studies in September 2007.
*** Research on progress for M.Sc.

Appendix I: Technical Reports, Courses & Conferences

Technical Reports 2006-2007

1. Maro, G.P (2007). The TaCRI Lyamungu Soil Fertility Laboratory: Status & Prospects. Proceedings of the PADEP Stakeholders Workshop, Mkonge Hotel, Tanga, 16-18 April 2007

2. Mtenga, D.J; Kilambo, D.L; Teri, J.M; Masumbuko, L.I. (2006) Progress in developing coffee berry disease (Colletotrichum kahawae) resistant compact hybrid varieties (Coffea Arabica) in Tanzania.

3. Swai, F & Mushi, I (2006) Development of Smallholder Coffee Growers in Southern Highlands of Tanzania. Paper presented at the Farmers Dialogue Conference, Buhuri, Tanga, 5-10 November 2006

Short Courses and International Conferences Attended

1. Kizango, O.S.K & Maro, G.P, Project Initiation, and Project Cycle Management workshop (Organized by ASARECA/CORNET) held at Sarova Whitesands Hotel, Mombasa, Kenya, 3-7 December 2006.

2. Aminiel, A; Mdemu, Y.S; Teri, J.M, 4th African Fine Coffee Conference & Exhibition, Organized by East African Fine Coffee Association (EAFCA) held at the United Nations Conference Centre Addis Ababa, Ethiopia, 15 -17 February 2007.

3. Urassa J, attended a pathology-related course in Kenya, titled "Stakeholder Meeting: Assessing plant disease diagnostic capacity and needs in East Africa" from 5-9 March 2007.

4. Aminiel A, and S. Mdemu, Coffee Stakeholders Workshop for Promoting Domestic Coffee Consumption and Market Development (Organized by East African Fine Coffee Association, in conjunction with the Swedish Chambers), held at Kilimanjaro Crane Hotel, Moshi, Tanzania, 4th April 2007.

5. Swai, F and Teri, J.M, International Conference and Exhibition on Specialty Coffee Association of America held at Long Beach, California, USA, 4-9 May 2007.

Appendix II: Abbreviations & Acronyms

ASIC	International Coffee Science Association
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
CABI	Centre for Agriculture and Bio-Sciences International
CBB	Coffee Berry Disease
CED	Chief Executive Director
CFC	Common Fund for Commodities
CID	Crop Improvement Department
CIFC	Centre for Investigation of Coffee Diseases
CLR	Coffee Leaf Rust
CORNET	Coffee Research Network
CPQI	Crop Productivity & Quality Improvement
CPU	Central Processing Unit
CRSP	Collaborative Research Support Project
CVT	Compact Variety Trial
CWD	Coffee Wilt Disease
DCSMS	District Coffee Subject Matter Specialist
EAFCA	Eastern Africa Fine Coffee Association
EDF	European Development Fund
EU	European Union
FFS	Farmer Field School
FPs	Farmer Promoters
FYM	Farm Yard Manure
GIS	Geographical Information System
GMO	Genetically Modified Organisms
IPM	Integrated Pest Management
NABE	National Business Examination
NGO	Non Government Organization
NVTC	National Vocational Training College
PUM	Netherlands Senior Experts Programme
SACCOS	Savings and Credit Cooperative Society
SAFERNAC	Soil Analysis for Fertility Evaluation and Recommendation for Nutrient Application in Coffee
SAP	Strategic Action Plan
SGVT	Second Generation Variety Trial
SUA	Sokoine University of Agriculture
TaCRI	Tanzania Coffee Research Institute
TAP	Technical Advisory Pannel
TCA	Tanzania Coffee Association
ToT	Training of Trainers
TPRI	Tropical Pesticide Research Institute
TTTD	Technology Transfer and Training Department
TZS	Tanzania Shilling
UDSM	University of Dar es Salaam
USEPA	United States Environmental Protection Agency
VBT	Village Based Training
VPU	Vegetative Propagation Unit

Major Coffee Growing Areas of Tanzania, and TaCRI Sub-stations

Tanzania Coffee Research Institute

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