

Improved plant management practices in different farming systems



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Agrometeorology and climate change

On-shelf coffee husbandry technologies were unlocked and packaged. “Amri Nane” for proper coffee husbandry and 8 other technical packages were released in posters and leaflets. The information was later refined and consolidated into the TaCRI coffee management handbook (1st Edition), published in 2011.

Research was conducted to evaluate different coffee-banana intercropping patterns suitable for tall varieties. It was concluded that planting three coffee rows between two banana rows is technically sound and economically profitable for both crops (Figure 1). This new technology has been promoted and adopted by many smallholder farmers across coffee zones.

The science and art of coffee grafting, said to be impossible for many years, was evaluated and perfected to a success rate of 85-95% in old stumps and seedlings (Figure 2). Other factors like the best season for grafting and establishment of compatibility matrix between different varieties used as scions and as rootstocks were also evaluated. Grafting has been adopted as one of the TaCRI official methods of seedling multiplication and farm rehabilitation. In collaboration with the technology transfer programme, many individual smallholders and estate staff have been trained and are carrying out the activity themselves.

Priority research area for SAP IV, most of which are brought forward from SAP III, include the following:

- Economic comparison of organic and conventional coffee farming systems
- A follow-up study on the photosynthetic performance and crop yield of the promising drought-tolerant varieties
- Continue research on intercropping with bananas and other fruit crops
- Effects of multiple stem coffee systems on yield consistence and fertilizer requirement
- Effects of shade on yield and quality of coffee

- Effects of using different seedling multiplication techniques on plant establishment and coffee yields.



Figure 1: A new coffee-banana intercropping pattern perfected by TaCRI (left), demonstrating the art of coffee pruning (right)



Figure 2: Successful grafting of seedlings (left) and old stumps (right)

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Since SAP I, it was the responsibility of this programme to collate, check for accuracy, interpret and report monthly weather data for each of the principal coffee growing areas in the country and to manage the TaCRI-affiliated weather stations. To achieve this, a memorandum of understanding was signed with Tanzania Meteorological Agency in 2009, for collaboration in running the two existing weather stations (Lyamungu – Hai and Mbimba – Mbozi) and establish new ones in other TaCRI substations. So far, two automatic weather stations have been installed at Ugano – Mbinga and Lyamungu, the latter to be run parallel with the old manual station. Historical data since 1935 have been collected and digitally stored, and have been the basis for studies on climate change.

TaCRI has integrated climate change in its research priorities along the lines of:

- a) Intensifying genetic resistance to coffee berry disease (CBD) and leaf rust (CLR): This is important because, with the changing climate, we need varieties with higher and higher levels of resistance in case new disease strains evolve with ability to break the current level of resistance.
- b) Monitoring the evolution of CBD and CLR and possible emergence of others following climate change: An up-to-date knowledge of disease strains and their evolution is important in order to take proper and timely measures.
- c) Screening the germplasm for the possibility of having genes for insect pest resistance, for further manipulation and usage.
- d) Breeding for tolerance to abiotic stresses such as heat and drought: We have at least 3 promising lines in this, and multilocational trials are ongoing.
- e) Evaluating and promoting appropriate climate-smart GAPs in different agro-ecosystems including, but not limited to:
 - Soil water management (rain water harvesting, mulching and use of storm water trenches)
 - Control of soil erosion (contour ploughing, terracing)
 - Coffee agroforestry (use of shade trees, banana intercropping)

TaCRI has also collaborated in the following international initiatives:

- a) Coffee and Climate (C&C) Initiative: This was initiated by a group of coffee companies in collaboration with GIZ in 2012. The objective was to strengthen smallholders' capacity in the coffee sector to adapt to changing climate conditions and to improve their access to financial and technical support mechanisms. Risk and opportunity analysis (ROA) was performed in the pilot areas of Mbeya and Kilimanjaro, which resulted into a specific strategy for coffee in Tanzania, better known as the Climate-smart Tool kit (C&C, 2015).
- b) The CHIESA Project: The climate change impacts on ecosystem services and food security in Eastern Africa (CHIESA) project was initiated in 2011. Its objective was to fill critical gaps in knowledge related to climate and land change impacts on ecosystem services and develop adaptation strategies towards it by building the capacity of local research and administrative organizations by research, training and dissemination. TaCRI benefited from training on GIS and watershed modeling. We also participated, under the follow-up AFERIA mini-project, in evaluating the suggested climate-smart GAPs, particularly improved IPM practices for coffee along the selected transect along the slopes of Mt. Kilimanjaro.

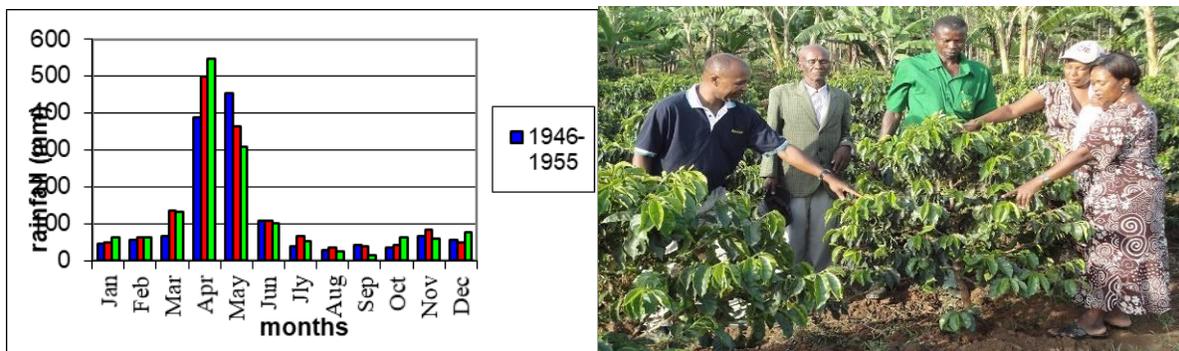


Figure 1: Monthly rainfall trend for 3 decades Lyamungu (left), admiring the drought tolerant varieties onfarm (right)



Figure 2: Participation in the CHIESA meeting, Lutheran Uhuru Hotel, Moshi, 2nd-3rd June, 2015