**TANZANIA AGRICULTURAL RESEARCH INSTITUTE**

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**Quarterly Report on Research, Management and Coordination Progress**

**For the period of 1st July-September 31st 2021**

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**31th September 2021**

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# **Abbreviations and Acronyms**

AVRDC African vegetable research and development centre

BMGF Bill & Melinda Gates Foundation

BBSRC Biotechnology and biological sciences research council

CIMMTY International Maize and Wheat Improvement Centre

COSTECH Commission for science and technology

EAT East African Tall

EAV-IPMIL East African vegetable integrated pest management initiative laboratory

FAO Food Agriculture organization

NAB National Australia Bank

ICIPE International centre for insect physiology and ecology

IPM Integrated pest management

NaCRRI National crop research resources Institute

NCDP National coconut development program

NRI Natural Resource Institute

NCSU North Carolina state University

SPLCV Sweet Potato Leaf Curly Virus

TARI-MKN Tanzania agricultural Research Institute Mikocheni

TOSCI Tanzania official seed certification agency

USAID United State of Agency for International Development

# **1. Introduction**

Tanzania Agricultural Research Institute-Mikocheni (TARI-MKN) is one of the 17 research centres under TARI. It was established in March 1996 as a measure to sustain and institutionalize coconut research and development activities conducted by the then National Coconut Development Programme (NCDP). The NCDP was established by the Government of the United Republic of Tanzania in the fiscal year 1979/80 with the aim to promote coconut production and utilization in the country. The program covered the whole coastal belt of Tanzania and the Island of Zanzibar.

TARI-Mikocheni mandate is in two-folds, namely conduct and promote research for the development of the coconut sub-sector and promote research and utilization of agricultural biotechnology for socio-economic development in the country.

The centre’s head office is in Dar es, salaam at Mikocheni B, Plot 22 along the Coca cola Road. It has two sub-stations, namely Chambezi and Mkuranga, where most of the research activities are conducted. The former is located about 55 km north of Dar es salaam near Bagamoyo town at latitude S6.520 and longitude E 38.910, while Mkuranga sub-station is located at S 7.120 and longitude E 39.200, about 50 km south of Dar es salaam.

There are two departments: 1) Research and Innovation and, 2) Technology Transfer and Partnership. Under these departments there are six subprograms: crop research, natural resources, post-harvest management, socioeconomics and marketing, technology dissemination, commercialization and partnership, and knowledge management and communication programs. The institute is within the eastern zone together with TARI Kibaha and TARI Mlingano.

The Mikocheni centre basically has two research programs, which are its mandates: coconut and biotechnology. The coconut program is the main with 4 research units which include: agronomy, disease control, pest control, social economy, post-harvest and technology transfer, the biotechnology program accommodate 3 units: tissue culture, molecular diagnostics and genetic engineering laboratories. All the research activities in each unit in the coconut program are designed to address all agricultural challenges facing the coconut agroecological systems. whereas in biotechnology as a tool cuts across all crops and supports other research mandates.

Research at TARI-Mikocheni has mainly depended on government competitive grants through Commission for science and technology (Costech) and external support from different international funding organisations mainly the “Bill & Melinda Gates Foundation” (BMGF), Bio innovate Africa II, Biotechnology and Biological sciences research council (BBSRC), Food and agriculture organization (FAO) and International Centre for Insect Physiology and Entomology (*Icipe*). In this reporting quarter (July to September 2021) the institute operated a total of 7 research projects with financial support of **Tshs. 260,643,245.00** of which 5.7% is from Tanzania government and 94.7% from the international donor support.

Thus, in this quarter, using the available support, the institute recorded significant achievements in research activities by: optimizing regeneration protocol for mass propagation of sisal planting materials, evaluating a seed treatment for cassava cuttings technology using pesticides, new improved varieties Amaranthus, and a control measure for tomato leaf miner (*Tuta absoluta*) and continue provision of laboratory services to Seed sector through GMO testing of all imported seeds.

In line with technology development, the institute also continued with the production of quality seeds for coconut and certified virus free planting materials for sweet potato, banana and sisal, as well as dissemination of IPM technologies for vegetables and cassava growers on safe handling and use of agrochemicals for pest control and whitefly infestations

# **2. Research Programs /Activities conducted in this quarter**

## 2.1 Coconut research program

The centre continued to maintain its coconut germplasm, seed nursery and weeding in coconut orchards. Currently, the coconut nurseries are continuing planting seedling for selling. A total of 1300 nut sown in Mkuranga and 3000 in Chambezi substations, respectively. The sowing is continuing to achieve a target of 6000

### **Disease control unit**

The unit is currently executing 1 project on sweetpotato since 2018 until to date. This project is now winding up on No cost extension mode

#### **Sweet potato project**-(Bio innovate II)

This project is officially closed since June 2021. Though the project has closed but it still maintain a total of 15,000 vines of Mataya and Jewel are currently being bulked in the screening house. The vines were targeted for short rains of September-October 2021, but due to unreliable short rains, no vines were sold.

**2.1.2.2. *Sweet potato leaf curl virus* (SPLCV) next generation sequencing project**

This project addressing sweet potato disease funded through COSTECH entitled “Next-generation sequencing based investigation of genetic diversity and distribution of sweet potato leaf curl viruses and their effect on sweet potato in Tanzania” is currently winding up on No cost extension mode until December 2021.

The goal of this work was to increase knowledge of sweet potato leaf curl virus diseases in Tanzania and thus enable development of management strategies for the same, with specific objectives to: 1) Determining the occurrence and spread of sweet potato leaf curl viruses (SPLCVs) in sweet potato plants in Tanzania, 2) Determining the genetic diversity of isolates of SPLCVs in Tanzania, and 3) determining the yield losses caused by the SPLCVs.. In this quarter the project accomplished the followings:

* Collection of agronomic and pathological data from its field experiment in Chambezi to determine the yield loss inflicted by the SPLCV disease. The data are currently being analysed and will be reported in the 2nd manuscript of an MSc student in this project
* Molecular analysis of sequence data of 30 Coat protein gene (CP) and 17 cylindrical inclusion protein (CI) from SPLCV are being analysed for their diversity and recombination. The information will result into a 3rd manuscript and forms part of the MSc thesis.
* Completed intern training to Ms Bertha Kanda on various techniques on molecular detection and diagnosis of plant viruses. Ms. Bertha, is one of the 3 interns planned to be trained by this project under the capacity building
  + 1. MSc student Ms. Hilda Bachwenkizi partially supported by the project is writing her thesis, the student has already submitted her thesis to the university waiting for the defence
    2. **Pest control unit**

The unit continued to implement a project on ‘Combating Arthropod Pests for Better Health, Food and Climate Resilience (CAP) in Tanzania’. The objective is to generate knowledge on common arthropod pests affecting avocado, tomato and cucurbit to enable growers plan crop calendar and their measures.

The project conducted a field surveys in 4 districts: Arumeru in Arusha, Bagomoyo in Coast, Lushoto in Tanga and Morogoro district. The surveys focused to i) determine the diversity of pollinators visiting cucurbits, tomato and avocado plants, ii) identify potential pollinators, and iii) assess leaf infestation from tomato and cucurbit from leaf miners (*Tuta absoluta)*.

* The major findings show: Tomato leaf miner (*Tuta absoluta*) from Arumeru district differ significantly to cucurbit leaf mines from Bagamoyo district (P< 0.0152)
* A comprehensive data base, and risk analysis of common pests in avocado, cucurbit and tomato was created
* A list of threatening arthropod pests and risk analysis for invasive species in Avocado tomato and cucurbits crops compiled (*Ref. Detailed project report 2021*)

### **Agronomy Unit**

### The unit has been running 2 projects on horticultural crop since 2018 in collaboration with AVRDC

#### **Amazing Amaranths and Eggplant projects**

In this reporting period the achievements included:

1. Conducted Amaranthus training on production and cooking recipes of Amaranthus to stakeholders
2. Transplanting and collecting Amaranthus seedlings data in the screenhouse Mikocheni
3. Collected agronomical data from African egg plants for SSASA project at Chambezi station
4. Continuation of field experiment at Chambezi to evaluate field performance of mycorrhiza treated eggplant seedlings
5. Dissemination of planting procedures and varieties of Amaranthus at agricultural technology hub at nane nane ground, Morogoro
6. Conduct screen house expt. on Koch postulate and pathogenicity test for Fusarium on vegetables using different isolates from Tanzania to see if the causative agent of the experienced disease symptoms in the field
7. Preparation of the training manuals for the identification and management of ‘Wilt disease’ in African eggplant for trainers and extension agents
8. Conducted farmers field day on 28th and 29th September 2021 in Dar es salaam

### **Post-harvest technologies unit (PHT)**

The emphasis of the PHT Unit had been on developing, testing and promoting small-scale coconut oil processing technologies and the utilization of coconut products and by-products. The unit has not produced oil this quarter due to shortage of coconuts. The harvest has adversely affected by prolonged dry spell.

## 2.1.6 Socio-Economic and Marketing Research Unit

The unit focus has been on developing improved and appropriate technologies that are affordable under farmer’s conditions. Its main activities are: i) Identification of production constraints and opportunities through participatory approaches and, ii) conducting adaptive on-farm experiments, socio-economic surveys and impact studies

### **Research activities in this quarter**

1. **Marketing and value chain studies**

In this reporting period the unit carried out the following activities:

1. Harvesting data collection from MandisPlus field trial from contact farmers in Miono village Bagamoyo for computation of Cost benefit analysis of the promoted technology of cassava cutting dressing with limited chemical and frequencies for the control of whitefly infestation was completed and the analysis report is being compiled.
2. Three students, two from UDSM and one from SUA were trained on Data analysis using SPSS, and various social economic aspects of agricultural research during their field practice July and August 2021 at our institute TARI Mikocheni.

## 2.1. 7 Biotechnology program

The program has been running 2 biotech related projects and provision of biotech laboratory services to stakeholders’ peer institutions. In this quarter the implemented activities include:

### **Molecular entomology**

This is the regional project titled “African Cassava Whitefly: Outbreak Causes and Sustainable Solutions with funding from BMGF through Natural Resource Institute of (NRI)-United Kingdom from 2018 to 2022.

In this project TARI has implementing 4 of the 5 aims:

1. The team has completed collection of harvest data on Whitefly resistant cassava variety technology evaluated in 16 demo field trials established in 7 districts
2. Collect seeds from the cassava crossing block between African and Latin America cassava genotypes at Ilonga, Morogoro
3. Harvesting and yield data collection from 16 on farm trials established in 7 districts completed
4. Agronomic data on the 2nd season cassava variety evaluation on 16 on-farm trials in Sengerema, Bunda, Muheza, Mtwara rural and Nyasa is continuing.

**2.1.7.2 East Africa IPM Innovation Lab: Research and Technology Transfer for Vegetable Crops Project**

TARI-MKN has also been implementing a USAID-funded project titled “East Africa IPM Innovation Lab: Research and Technology Transfer for Vegetable Crops since 2018 to date. The project is implemented in collaboration with regional and in country partners for 4 years from 2018 until 2020. In this project TARI has been implementing objective 2 and 3 which include:

1. Conduct long and short-term training and capacity-building in i) IPM systems and ii) pest diagnostics, with an emphasis on adoption of modern communication tools when and where appropriate
2. Training on agrodealers in Iringa and Kilolo distrcts was completed in this quarter, whereas a total of 100 farmers were trained (70 Male and 30 Female) in the two districts on IPM strategies for managing vegetable disease, and safe use and handling of agro-inputs.

**Other activities of the program include:**

1. Application of tissue culture techniques for mass propagation of different crop such as banana, sweet potato, pineapple, and cassava

**2.1.5.1 Optimizing regeneration protocol for mass propagation of sisal planting materials**

The unit has continued to provide technical backstopping to TARI Mlingano TC laboratory on micropropagation of sisal plant. TARI Mikocheni TC lab. is still maintain a total of 160 clean cultures of sisal initiated on August. The cultures will be sub cultured twice and sent to TARI Mlingano for further multiplications cycles.

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**2.1.5.2 Provision of diagnostic services**

The biotech lab is currently implementing government directives to screen all the imported seeds for the presence of GMO elements prior to their distribution in the country. In this quarter a total of 52 samples of seeds received from 10 seed companies through various TOSCI branches were received and screened for presence of GMO elements. By the end of this quarter September 31st a total of 581 seeds have been processed

**Capacity building activity**

In this reporting period the lab received a total of xx BSc students (Biotechnology and laboratory services) from the University of Dar es Salaam and Dodoma were engaged for field practical in biotech labs. Also the institute is hosting one PhD student from UDSM for his research at TARI Mikocheni since 28th Sept 2021.

# **Technology Dissemination and Partnership unit**

This unit serves as a link between on-station research, extension services and the farmer. It functions as subject matter specialist in disseminating research results and technical packages to the farmers through: Farmer’s Field Days Demonstration and research verification plots on farmers’ fields.

### In this quarter the unit participated in the inauguration of agricultural extension hub at Nzuguni ground in Dodoma where it showcased its technologies: Coconut virgin oil, ii) coconut cultivation technologies.

### **Organizing Training and Workshops to farmers**

Through projects a farmer training was conducted which enabled dissemination of new technologies as in (**Table 3A)**.

**Table 1: Technology Dissemination in between July-September 2021**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Centre** | **No. Farmers expected to be trained** | **No.**  **farmers trained** | | **Location** | **Stakeholder origin** | **Topic/**  **technology** |
| **Male** | **Female** |
| Mikocheni | 100 | 70 | 30 | Kilolo and Municipal in Iringa | Agro-dealers Extension officer Researchers Experts (TOSCI, TPRI,) Farmers Journalists Private Seed Company | IPM strategies for managing vegetable diseases, safe use and handling of Agroinputs |
| **Total** | | **219** | |  |  |  |

### **Identifying gaps between Research, Extension and other agricultural stakeholders**

### **Collecting news (Radio / TV programmes aired)**

In Mass media, TV programs were planned but only program TV4 aired no program aired this period

### **Participating in Agricultural related shows**

### On 30/09/2021 the institute participated in the inauguration of Agricultural extension hub at Nzuguni grounds Dodoma During the show a Hon. Minister of Agriculture and total of 50 farmer visited at the hub and the institute technologies

### **Partnership established**

No new partnership was established this period

### **Visitors**

### In this quarter, the institute received a total of 12 (7male and 5 female) visitors who visited to biotechnology laboratories.

### **Number of projects documented**

In this reporting period a total of 7 projects have been going on. Six are donor-funded and 1 are government funded projects (**Table 5**)

### **Table 5: Total number of projects executed during April to June. 2021**

|  |  |  |  |
| --- | --- | --- | --- |
| **SN** | **Project title** | **Year started** | **Source of funds** |
| 1 | Integrating ICT in commercial production of tissue culture-based quality sweet potato planting materials in East Africa | 2018 | Sida/ICIPE |
| 2 | Marker assisted selection of useful cassava germplasm adapted to biotic and abiotic stresses caused by global climate change (FAO) | 2016 | FAO |
| 3 | African Cassava Whitefly: Outbreak Causes and Sustainable Solution | 2018 | BMGF/NRI |
| 4 | Amazing Amaranth: Hardy and nutritious amaranth lines and food practices to improve nutrition in EA | 2018 | GIZ/World Vegetable Centre |
| 5 | Improving production efficiency of African Eggplant for smallholder farmers in SSA | 2018 | BBSRC/NIAB |
| 6 | Integrated pest management of Avocado and cucumber pest in East Africa | 2018 | ICIPE |
| 7 | Next-generation sequencing based investigation of genetic diversity and distribution of sweet potato leaf curl viruses and their effect on sweet potato in Tanzania | 2019 | COSTECH |
| 8 | Vegetable Crops IPM for East Africa | 2016 | USAID |
|  |  |  |  |

### **Table 2: Undocumented Knowledge, communication and Documentation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Media** | **Status** | **Users** | **Remarks** |
| Library | Working | Scientist | Small outdated, need librarian |
| TEEAL | Working | Offline access | Internet service is not available |
| AGORA | Journals Available | Scientists | Easily available |
| Video conferencing facilities | Working | Scientist | Internet service is not available |

# **Newsletters and Publication**

In this reporting period, 2 of new paper articles on cassava were published each on Daily news and Habari Leo news papers

# **Research technical Resources**

### **Table 3. Total number and category of research technical resource**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Profession** | **PhD** | | **MSc** | | **BSc** | |
|  | **Male** | **Female** | **Male** | **Female** | **Male** | **Female** |
| Agronomy | - | 1 | - | 1 | - | - |
| Plant breeding | - | - | 1 | - | - |  |
| Entomology | 0 | - | 1 | - | - | - |
| Biotechnology | - | - | 1 | - | - | 2 |
| Plant Pathology/Virology | 1 | 1 | 1 | 5 | 1 | - |
| Agricultural Engineering | - | - | 1 | - | 1 | - |
| Food Science and Nutrition | 1 | - | - | - | - | - |
| Socio/Agricultural Economics | - | - | 2 | 1 | - | - |
| Agricultural Extension and Education | - | - | - | 3 | - | - |
| **Total** | **2** | **2** | **7** | **10** | **2** | **2** |

## Human resource capacity building

### **Long Term-Training**

Three (3) students supported by different projects are continuing with their studies in various universities (**Table 4**). Three of them 1 of them is expected to defend her PhD on 2021.

### **Table 4: Total number of Researchers in long term training and their status by 31th September 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Name** | **Sex** | **Program** | **University** | **Start Date** | **End Date** | **Sponsor** | **Remarks** |
| 1 | Vailet Mwaijande | Fe | PhD | Wagenigen, Holland | 2015 | 2019 | CIMMTY-TAMASA/BMGF | Graduating April 2021 |
| 2 | Evangelista Chiunga | Fe | PhD | NCSU-USA | 2017 | 2020 | BMGF/NCSU | Writing thesis in TZ |
| 3 | Emmanuel Mrema | Fe | PhD | Accra-Ghana | 2019 | 2022 | BMGF/NextGen. | Doing research work in TZ |
|  | **Total** | **4** |  |  |  |  |  |  |

## Research Infrastructure

In this reporting period, the laboratory furniture worth USD 51,000 are still held by the custom dept. awaiting tax and duties clearance. Efforts have been stepped up by the TARI administration to seek exemption from the responsible Ministry to enable clearance. Similarly, the vital machine Realtime PCR for analysis is down thus, requires repair and software update

* 1. **Funding**

In this reporting period TARI-MKN received funds from two main sources: government as operation charges (OC) amounting to **Tshs. 15,600,000** being for the month of August and September only**,** and from donors amounting **Tshs 245,743,245** (**Table 9**). In addition, in this reporting period the institute received a total of 14,900,00 from the government through TARI to support research in two specific areas; GMO screening (Tsh. 4,900,000 and coconut research Tsh. 10,000,000). All the available funds were utilized primarily on research activities and normal operations.

### **Table 5. Total funds received (Tshs.), their sources and expenditure for the period ending 1st June to 31th September 2021**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type** | **OC** | **\*Donor** | **Govt./Res.** | **Sales** | **Com.**  **Levies** | **Expdt.** |
| **Jun-Sept.** | 15,600,000 | 245,743,245 | 14,900,000 |  |  | - |
| **Total** | **15,600,000** | **245,743,245** | **14,900,000** |  |  | **30,500,000.00** |

# **Seed Produced (in kgs) including cuttings**

Of the Tshs.8,000,000.00reportedin this reporting period are from the previous quarter which were still at the headquarter. Not from the sale in this quarter. However, due to excess drought no sales of seedlings were done on this quartet.

# **Monitoring and Evaluation**

In this reporting period, no monitoring and evaluation exercise was conducted due to COVID 19 pandemic, there was restricted movement.

# **Annexes (2021)**

**Annex 1a: TARI-Mikocheni Researchers Status by Highest Qualifications**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Zones** | **Station** | **Highest qualification** | | | **Total** |
| **BSc** | **MSc** | **PhD** |  |
| Eastern | TARI-Mikocheni | 5 | 17 | 4 | **27** |

**Annex 1b: TARI Field Officers and Support Staff**

|  |  |  |
| --- | --- | --- |
| **Zones** | **Field officers** | **Support staffs** |
| **TARI-Mikocheni** | 9 | 12 |

**Annex 2: Recruited Researchers**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | **SN** |  |  |  | | **Name** | |  | | --- | | **Gender** | | **Designation** | **Station** |
|  | Nil |  |  |  |

**Annex 3a: Researchers Employed on Contracts and those retired**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | **SN** |  |  |  | | **Name** | |  | | --- | | **Gender** | | |  |  |  | | --- | --- | --- | | **Highest Degree** |  |  | | **Discipline** | **Status** | **Station/Project** |
|  | NIL |  |  |  |  |  |

## Annex 3b: List of Researchers on Leave without Pay by Station

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **S/N** |  | | |  | | --- | | **Name** | | **Gender** | |  |  | | --- | --- | | **Higher Degree** |  | | |  |  | | --- | --- | | **Discipline** |  | | **Station** | **Current Affiliation** |
|  | Nil | **-** | **-** | **-** | **-** | **-** |

## Annex 4a: Researchers on Long-Term Training for the period by Sept. 2021

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Name** | **Sex** | **Univ.** | **Station** | **Degree/ Discipline** | **Year of Study** | **Sponsor** | **Amount of money** |
| 1 | Ms. Vailet Mwaijande | Fe | Wagengen-Holland | TARI-MKN | PhD | 2015 | CIMMTY/BMGF |  |
| 2 | Mr. Emmanuel Mrema | Ma | Accra-Ghana | TARI-MKN | PhD | 2018 | NextGen |  |
| 5 | Ms. Evangelista Chiunga | Fe | JKUAT-Kenya | TARI-MKN | PhD | 2018 | BMGF/NCSU |  |
| 6 | Nsajigwa Mwakyusa | Ma | MAK-Uganda | TARI-KBH | MSc | 2015 | ACWP/BMGF | completed |
| 7 | Navin Tarimo | Fe | MAK-Uganda | Private | MSc | 2015 | ACWP/BMGF |  |

## Annex 4b: Support Staff on Long-term Training for the period by March . 2021

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **S/N** |  |  | | |  | | --- | | **Name** | | |  |  | | --- | --- | | **Sex** |  | | **Research Station** | **Degree and Discipline** | **Sponsor** | **Amount of money** | **Year of Study** |
| 1. | NIL | - | - | - | - | - | - |

## Annex 5: Short-term Training for Staff

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **S/N** |  |  | | **Course Title** | **Staff Category** | |  |  | | --- | --- | | **Number of Participants** |  | | **Duration** | **Year of Study** | **Sponsor** |
|  | NIL | - | - | - | - | - |