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SUCCESS STORIES ON AGROECOLOGY IN EASTERN AFRICA

EOA
ECOLOGICAL ORGANIC AGRICULTURE

PELUM ASSOCIATION
Networking for a greener Africa.

SUCCESS STORIES ON AGROECOLOGY IN EASTERN AFRICA

KILIMOHAI ORGANIC

kwa taarifa zaidi tembelea www.kilimohai.org

TOAM

Ecological Organic Agriculture Initiative (EOAI) in Africa

www.eoai-africa.org

SUCCESS STORIES ON AGROECOLOGY IN EASTERN AFRICA

Ecological Orgarnic Agriculture (EOAI) is a pillar based initiative responding to the African Union (AU) decision, with an overall goal of mainstreaming Ecological Organic Agriculture into national systems by 2025 in order to improve agriculture productivity, food security, market access and sustainable development in Africa.

The African Union Heads of State decision EX.CL/Dec.621 (XVII) in support of Ecological Organic Agriculture (EOA) was passedi in the 18th Ordinary Session in January 2011. The Lead Coordinating Organisations for the initiative are Participatory Ecological Land Use Management (PELUM) Kenya and Biovision Africa Trust (BvAT).

PELUM Kenya hosts the Eastern Africa Regional Secretariat. PELUM Kenya is a network which works with its member organisations to promote ecologocal land use management pratices and principles for improved livelihoods among small holder farmers.

This publication of success stories has been prepared by PELUM Kenya on behalf of EOAI Eastern Africa Regional Secretariat.

This publication has been prepared with the support of:

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INTRODUCTION

EOAI Vision

Vibrant Ecological Organic Systems for Enhanced Food Security and Sustainable Development in Africa

EOAI Mission:

To scale up ecologically sound strategies and practices among diversified stakeholders through institutional capacity development, scientific innovations, market participation, public policies and programs, outreach and communication, efficient, coordination, networking and partnerships.

The Overall Goal of the EOA Initiative

To mainstream Ecological Organic Agriculture into national agricultural systems by 2025 in order to improve the quality of life for all African citizens.

EOAI Objectives

1. To increase documentation of information and knowledge on organic agricultural products along the complete value chain and support relevant actors to translate it into practices and wide application.
2. To systematically inform producers about the EOA approaches and good practices and motivate their uptake through strengthening access to advisory and support services
3. To substantially increase the share of quality organic products at the local, national and regional markets.
4. Strengthen inclusive stakeholder engagement in organic commodities value chain development by establishing national, regional and continental multistakeholder platforms to advocate for changes in public policy, plans, programs, and practices.

EOAI Implementing/ Pillars

1. Research, Training and Extension Pillar: Understanding research and training gaps within EOA value chains and undertaking activities to fill them.
2. Information and Communication Pillar: Creating awareness and strengthening EOA extension support systems through diverse information and communication strategies, products and technologies.
3. Value Chain and Market Development Pillar: Stimulating development of sustainable markets and increase trade in traditional and high value agricultural produce both at domestic and export levels within EOA.
4. Networking and Partnerships Pillar: Promoting engagement by relevant stakeholders including governments, farmers, civil society, private sector and the international community.
5. Policy and Programme Development Pillar: Supporting the development and implementation of enabling policies and programmes.
6. Institutional Capacity Development Pillar: Supporting and equipping professionals with skills and competencies to promote EOA in Africa.

LIST OF ABBREVIATIONS

1. ASDP II .....Agricultural Sector Development Programme
2. ASAL.....Arid and Semi-arid Land
3. ATA .....Agriculture Transformation Agency
4. BWW.....Banks Without Walls
5. DAs..... .....Development Agents
6. EMO.....Effective Microorganisms
7. EOA.....Ecological Organic Agriculture
8. EU.....European Union
9. ECOSAF.....Empower Civil Society and Strengthen Food Security For Farmer
10. FFLG.....,..Farmer Family Learning Group
11. FFS.....Farmer Field Schools
12. FGD.....Focus group discussion
13. FTCs.....Farmers Training Centers
14. GAW.....Green Action Week
15. GG.....Good Governance
16. ICIPE.....International Centre on Insect Physiology and Ecology
17. ICT.....Information Communication Technology
18. ISD.....Institute of Sustainable Development
19. KALRO.....Kenya Agriculture and Livestock Research Organization
20. KOAN.....Kenya Organic Agriculture Network
21. NGO.....Non-Governmental Organization
22. NOGAMU.....National Organic Agricultural Movement of Uganda
23. OD.....Organic Denmark
24. PGS.....Participatory Guarantee System
25. PPT.....Push-Pull Technology
26. PSP's.....Practicing Skills Providers
27. SACDEP.....Sustainable Agriculture Community Development Programme
28. SAT.....Sustainable Agriculture Tanzania
29. SATNET.....Sustainable Agriculture Trainers Network
30. SCAN.....Sustainable Communities Network
31. SSNC .....Swedish Society for Nature Conservation
32. TOAM.....Tanzania Organic Agriculture Movement
33. TVET.....Technical, Vocational Education Training

Collaborating Partners:
PELUM Kenya
Biovision Africa Trust Kenya (BvAT)
Kenya Organic Agriculture Network (KOAN)
National Organic Agriculture Movement for Uganda (NOGAMU)
Participatory Ecological Land Use Management (PELUM) Uganda
Tanzania Organic Agriculture Movement (TOAM)
Institute for Sustainable Development (ISD) Ethiopia
Rwanda Organic Agriculture Movement (ROAM)
Burundi Organic Agriculture Movement (BOAM)

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Manei Naanyu, Coordinator, EOA-I Regional Secretariat (Eastern Africa)

FOREWORD

For the last 4 years or so, Ecological Organic Agriculture Initiative (EOAI) has been implemented in 8 countries in Eastern and Western Africa. The initiative is being supported by Swiss Development Corporation (SDC) in 8 countries (Kenya, Uganda, Tanzania, Ethiopia, Senegal, Benin, Cameroon and Nigeria) and by Swedish Society for Nature Conservation (SNNC) in 3 countries (Kenya, Uganda and Ethiopia). The EOA Initiative is implemented by development partners in each of these countries and coordinated by two lead organizations; Biovision Africa Trust (For SDC support) and PELUM Kenya (for the SSNC support).

Success is not a word often used when dealing with issues of agriculture in Africa because more often than not, people dwell mostly on its failures rather than its successes. It is also very easy to sink into pessimism about African agriculture and ignore the optimism that there are many successful narratives coming from the efforts being made.

It is therefore with delight that PELUM Kenya and Biovision Africa Trust (BvAT) presents these success stories which have been collected and captured by the partners who are implementing the initiative in the Eastern Africa.

These stories and case studies have unique grassroots experiences which have impacted positively to the lives of many farmers. The details on the cases may not be complete and many readers may want to get more information. For every case, possible contacts have been given. It is our hope that this publication will be shared broadly with the wider public and will motivate policy makers and donors to support the work of EOA Initiative in the region.

I wish to appreciate the funds provided by SDC and SSSNC. Indeed their support has increased the momentum in the implementation of EOAI. I also wish to appreciate the efforts made by the EOAI implementing partners in the region. PELUM Kenya and BvAT Programme teams have made gallant efforts to coordinate and monitor the implementation and also in the identification of these cases.

I also thank Ms. Manei Naanyu, Coordinator EA Regional Secretariat, who has worked very hard to ensure that these cases are put together and are published.

As you all read these success stories, the tale of success will justify all the great efforts put in the collection and compilation of the cases.

Mr. Zachary Makanya,
Country Coordinator
PELUM Kenya

PREFACE

There are many development programmes implemented all over the world. Most of these programmes are designed along project frameworks like overall goal, purpose or the main goal, objectives and activities. People have gone deeper to develop results-based frameworks and most significant changes after programmes are implemented. The main purpose of these is to ensure that the programme is implemented and achieves the intended results and impact. These are all important tools for reporting and satisfying the project implementers and the funding partners.

However, one of the most powerful methods of showing the real impact of a project is to capture the success stories directly from the end-of-project beneficiaries. These could be farmers, women, the youth and even children. In this publication, PELUM Kenya and BvAT, working directly with the EOAI implementing partners, have identified some of the success stories from the on-going EOAI Programme. All these have been obtained directly from the beneficiaries.

The stories range from use of information and communication technologies; emerging enterprises promoted by the youth; increasing organic market outlets for farmers; green action week; use of research data by farmers and the youth to improve organic production; show-casing that group development approach can work; biological weed control; production of organic fertilizer on large scale; growing of arrow roots in drylands; the effectiveness of push – pull technology; and increasing market access to farmers.

All these cases show there is a good justification of Agro-ecology as a viable option to the production of abundant and healthy food to feed population at the urban and rural areas. We believe that these successes will encourage the implementing partners to increase their efforts to churning out more results in order to improve livelihoods of communities they serve.

It is therefore with great pleasure that I invite you to enjoy reading these success cases. Feel free to send any feedback to pelumkenya@pelum.net.

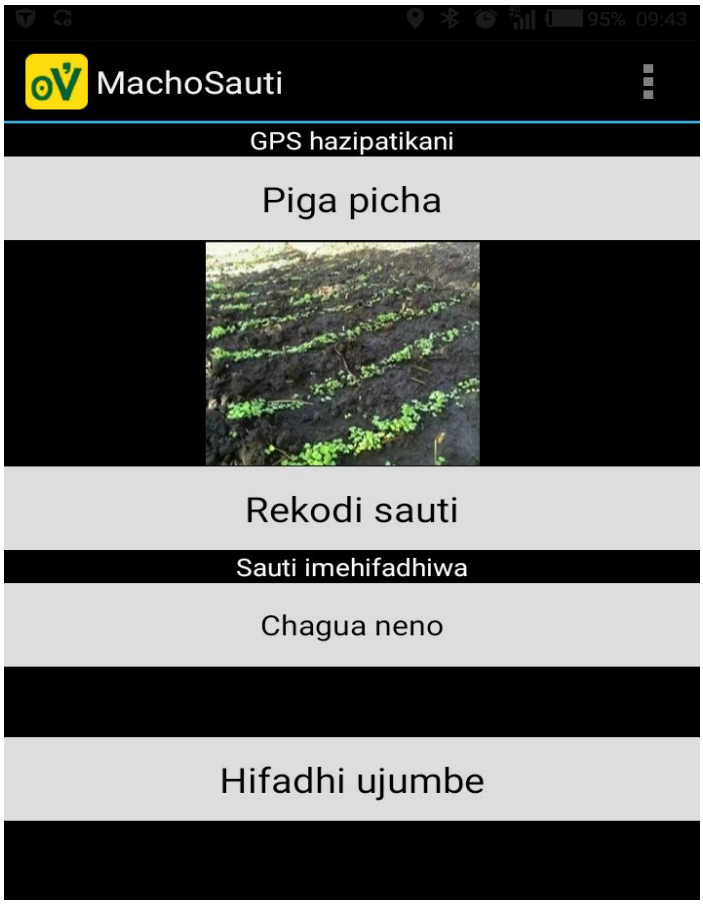
Manei Naanyu
Coordinator, EOAI Eastern Africa Regional Secretariat
PELUM Kenya

1. HOW ICT IS BEING USED IN BAGAMOYO, TANZANIA TO PROMOTE AGROECOLOGY- *A Success Story By TOAM, Tanzania*

In the recent past, mobile communication technologies have become the main Information Communication Technology (ICT) tools for Agriculture Initiatives. Small-scale farmers have benefited from use of mobile phones, through; accessing timely information and expertise advice, receiving advance warning about weather and other risks and accessing complementary services such as mobile banking and insurance.

Despite some potential risks, the interactive and connective power of ICT is believed to effectively empower smallholder farmers, by embedding these technologies into the practices and methodologies of Agroecology.

Macho Sauti *(Eyes and Voice)* project is an innovative collaboration between institutions of scientific research and civil society in content development. *Macho Sauti* aims at disseminating the best agroecological practices among small-scale farmers engaged in agroecological practices and scientific researchers.



Picture 1.1: Macho Sauti App

Macho Sauti originated from the pilot project *Sauti ya Wakulima* (The Farmers' Voice) which was started in 2011 by researchers from ETH Zurich, Switzerland.

Using the concepts from this project, the Tanzania Organic Agriculture Movement (TOAM) mobilised and organized groups of small-scale farmers in Bagamoyo, Tanzania to share and use smart phones to document and post their agricultural practices using pictures and voice recordings, thus creating a shared online repository.

The ICT platform used in *Macho Sauti* consists of open source mobile and web applications. The implementation methodology includes human moderation of contents posted by farmers, as well as face-to-face interactions through regular trainings and workshops.

Macho Sauti is becoming an established channel of communication between farmers, experts and scientists at local and international institutions. To date, the project has reached a total of 1,113 small scale farmers in Mtwara region sharing 73 smart phones in groups of 15-20 farmers.

Macho Sauti has been used as a tool of bringing farmers closer to the world of agroecology through sharing experiences, challenges and solutions.

The key challenges of *Macho Sauti* include lack of expertise, unstable internet connection and the long-run costs like recharging internet bundles.

More tools and methodologies in ICT for Agroecology should be designed and improved in close collaboration with farmers. In addition, online platforms should be integrated and complemented with face to face interaction among stakeholders.

Besides, farmers should be empowered to own an ICT platform. This platform will also improve interaction between farmers, researchers and experts. This is anticipated to lead to effective up taking of proven agroecological practices that can increase income for farmers' households.

Picture 1.2: Sauti ya Wakulima farmers

With this kind of success and impact, TOAM and Swiss Aid are ready to scale-up the lessons from this inspiring project for replication.

2. NEW THRIVING EOA ENTERPRISES EXCITES AND EMPOWERS YOUTH IN KIANJUGU VILLAGE, KENYA- *A Success Story By SACDEP, Kenya*

Agriculture productivity in Muranga County in Kenya is low since farmers depend on rain fed agriculture. The little that is produced is bought at poor prices by the middlemen. This trend has resulted to high poverty index which is witnessed from the low lifestyles. The increase in population has led to competition for few available work opportunities. As a result, many young people have been left without source of income as the parents tend to hold majority of the land for their income generation.

Picture 2.1: Members of Gakima Youth at a sharing meeting

Like any other parts of the country, idleness has given birth to insecurity and rural- urban migration amongst the youth. The youth who go to towns looking for greener pastures return to the villages desperate and majority get indulged into drug and substance abuse.

The project is being implemented in Kilimambogo, Mithini, Makuyu and Gikindu. This is done through training, extension and showcasing alternative dry land crops, improved indigenous chicken, dairy goats and savings and credit schemes referred to as 'Banks Without Walls (BWW)'. Through this initiative, 7 women groups and 4 youth groups, each with a membership of 15 youths, both men and women, were mobilised, organized registered and trained on several EOA practices through institutional training, on-farm training, and field and exposure visits. An intensive training programme was developed and carried out covering institutional training, exposure visits, on-farm visits and workshops.

Currently, the youths grow tomatoes, kales, local vegetables, fruits trees like avocadoes for export market, bananas and citrus fruits for local market.

Initially, it was difficult to bear with the impatience exhibited by the youths. However, after six months of continuous training and follow-ups, the groups picked up and started implementing the agreed action points. Most of them prepared their land, prepared some compost and vermin-culture to use in their farms. Some revived their fruit orchards which they had earlier neglected. BWW is a concept that trains farmers on formalized savings and credit in the rural regions. In Kianjugu village, SACDEP has empowered farmers for the last over 15 years on Sustainable Agriculture principles and practices. Community members who are beneficiaries of the BWWs are able cope with financial challenges better than non-members. This is because they are able to save little by little and acquire loans at affordable and farmer friendly terms. Some youth members have been recruited in the BWWs, making their farming activities easier as they can afford to replicate the technologies they learn.

As a result of technologies learnt and skills gained through this project, majority of the youths have made good progress in adopting new technologies such vermin-culture, dairy goats rearing and production of high value horticultural crops which mature within a shorter period.

Youth groups have formed organized marketing structures whereby, they have established produce aggregation points and sell their products in bulk. This has given the groups bargaining powers and attracted many the buyers. Different groups grow different crops such as maize, tomatoes, sweet potatoes, mangoes and avocados.

Testimonies as told by the beneficiaries and stakeholders

The Assistant Chief

Mr. Peter Ngatia is the assistant chief in Kirimiri sub location. He narrates: *"For many years there has been a lot of insecurity in my location. Cases of petty crimes were reported to my office on daily basis. Majority of the suspects were youths who hopelessly loitered in market places. We held many barazas to identify the root cause of the vice. Many residents said that the youth involved in petty crimes were doing so to eke a living. Some parents mourned their sons who were killed by mobs while others complained that their children were suffering in the hands of the government like in prisons. The situation did not improve, causing majority of local businesses to close down. One day, Mr. Sabastian, an elder in the village came to my office and informed me that he had worked with SACDEP in various projects, including rural savings & credit and mango value addition. He further told me that there were plans to recruit youths in the groups for capacity development. After discussions, we agreed to mobilize and organize the youth in the area for training with hope to transform them.*

Picture 2.2: Gakima youth with GOK and SACDEP officers

A series of field training sessions were carried out especially on agriculture ventures. Four groups were formed and registered with authorities.

Parents were asked to allocate to their youths portions of land for farming. In a period of 6 to 8 months we started to notice a lot of changes. Many young persons who were involved in sand harvesting returned to farming.

The cases of petty crimes reduced drastically. Businesses started popping up; this time being run not only by the elderly but also by the youth. We now have hope for a good future".

Youth Leader

Mr. Patrick Maive is a youth leader and among those who excelled as a result of intervention. *"All along, I thought that farming was tedious, unrewarding, time wasting and for the aged. My turning point was after SACDEP organized an exposure visit to Ganga for a few youth leaders. I met an educated youth who had excelled in farming. My main challenger was Mr. Peter, a Moi University graduate who told us that he cannot pursue a white collar job since agriculture was paying him well and had freedom to explore life without seeking for*

permission like many employed youths. Peter told us that he decided to be a farmer after being offered a job with a salary of Kshs.15, 000 in Nairobi.

He took the offer but resigned after a week and returned home. He borrowed Kshs. 10,000 from his father. That was his capital. In five months, Peter had grown high value crops including tomatoes, butternuts and corianders, making over Kshs. 150,000. At the time of our visit, he had leased 2 acres and was paying wages to at least 5 casual labourers daily, who helped him attend his farm enterprises which included 2 dairy cows.

Picture 2.3: One of the maize & beans crop land of the youth groups

On returning home, we mobilized more youths to venture into organic farming. I lead a group called Gakima Achievers Youth Group. This group is comprised of 23 members, although 15 of them are the most active. I manage my mother's two acres of land. I grow tomatoes, coriander green, and I have planted avocado trees as I foresee a promising future in this farming. On my farm, I practice Ecological Agriculture in which I am a champion.

In the past one year, I have made a profit of approximately Ksh. 115,000 from selling farm produce.

In past, my mother had established a poultry project. She bought 200 indigenous chicken after borrowing a loan. After rearing them for two months, just when they had gained good weight for the market, they were stolen in two nights. The situation was so bad that any resident who looked promising was targeted by young thugs. Insecurity was the order of the day. Many young persons died from mob justice and others from witchcraft. Youths migrated to Thika and Nairobi in search of greener pastures. Majority of them lived desperate lives, ending up into drugs and substances abuse. On returning to the villages, they would become agents of crime. We had to combine effort to end the vice through meetings and offering life options. Today, I am very thankful because hope has been restored in my village. Young persons are busy, engaged in agribusiness. A good number of them have bought motorbikes and employed riders. Today, our mothers don't fear walking home after dusk, the shopkeepers don't inconvenience us by closing shops early."

It would be ideal to insert the pictures of those quoted in the testimonials.

Picture 2.4: Youth reaping from EOA- SACDEP interventions

Strategies For Scaling Up the Innovations

SACDEP has already started making plans to scale-up the innovations. Two incubators with a capacity of 528 eggs each will

be issued as a training tool to two Practicing Skill Practitioners (PSPs). The incubators will be used for hatching eggs for sale to meet the high anticipated demand from the youths in the locality and beyond. Since more youths will be recruited into the BWWs, it is expected that capital will be outsourced from the farm proceeds and some loans. They will plough back their income and extend to other groups.
Youths will attract buying companies that target crops that previously were never considered important in the region. Contracts will be signed for production and supply of macadamia nuts and avocado. The emerging BWWs will be clustered together with the old ones to form a regional village bank where community members/youth will access even huge loans for development.

In future, EOA initiative will change the socio-economic dynamics for the farming communities and enhance the social fabric of both the rural, peri-urban and urban communities. Communities will have food for consumption and surplus for sale to supplement their income.

Within the short time the project has been running, SACDEP-Kenya has already noted a big long jump among some farmers. This project is an indicator that EOA is playing its part as an answer to empowering the youth and stabilization their future.

3. GREEN ACTION WEEK OPENS A ROAD FOR INCREASED MARKET OUTLETS OF ORGANIC PRODUCTS IN ETHIOPIA- *A Success Story*

By ISD, Ethiopia

In 2017, Institute of Sustainable Development (ISD) implemented the Green Action Week (GAW) in Ethiopia, as part of the global-initiative initiated by Swedish Society for Nature Conservation (SSNC) and extended for implementation in other countries like Ethiopia among others. .

The 2017 5th GAW campaign was celebrated between November 2nd - 10th 2017, under the theme: "*Organic Food and Farming For All*". The campaign, which was specially designed for consumers and producers, targeted promotion of the production and consumption of organic foods for a healthy life.

Picture 3.1: Organic Vegetable and Fruit Exhibition during the Green Action Week, Ethiopia

It aimed at creating awareness about the benefits of organic foods and farming to consumers, producers (farmers) and agriculture extension workers at zone, district and sub-district levels. The participants of the GAW 2017 were Farmers, Government officials, Media & Media Practitioners, Researchers, University and High School Students.

In 2017, the GAW campaign was designed to disseminate messages about organic farming to producers and consumers using local and national broadcasting services, social media and promotion materials.

An estimated 9,551,476 people including consumers, producers (farmers) and other stakeholders are believed to have heard about "Organic Farming and Food For All" through seven mainstream media, two television stations, two radio broadcasts and 3 newspapers which covered the Green Action Week celebration. Further, 500,000 were sensitized directly. About 47,700 people drawn from civil service, two universities and nine schools were sensitized about organic foods and farming through a one-week campaign. The campaign was done through three

Picture 3.2: Organic Vegetable and Fruit Exhibition during the Green Action Week

workshops, two organic produce sale and exhibitions, school campaigns and information and promotion materials and activities.

At least 227 farmers, development agents, agriculture bureau heads representatives and researchers in agronomy who attended the workshops in Addis Ababa. Woldia and Dessie areas received a refresher awareness course about the status of organic agriculture and food. They were also sensitized on the importance of scaling it up to the national agriculture extension system and its benefit to human life, biodiversity and the ecosystem.

Picture 3.3: School Campaign – Information sharing through quiz for students during the Green Action Week

Most of the participating farmers, who were already engaged in various levels of eco-friendly organic agriculture activities, were recognized and appreciated. They also shared their optimism about EOA and the challenges of promoting organic agriculture.

University researchers both in Wollo and Woldia shared research practices that will help implement EOA at a large scale. They presented research findings that prove the importance of organic farming and food in keeping the soil and the ecosystem healthy and securing healthy nutrition.

There were two organic produce exhibitions in Addis Ababa and Dessie to motivate organic farmers and enhance market access for them. Moreover, 10 farmers and young organic vegetable and fruit producers from Holeta and Haike sold out 15 plus types of fruits and vegetables for around 15,000 Ethiopian Birr (EtB). The interest from the consumers, coupled with higher profits are believed to be an encouragement to the farmers and a motivation for them to embrace organic agriculture.

The organic produce exhibition and promotion in both Addis Ababa and Dessie contributed to enhancing consumer awareness about organic food consumption and has helped in promoting organic market and market linkages for the organic farmers.

ISD is planning to strengthen this good communication and marketing campaign for EOA food and farming in coming years. It is hoped that one of the ultimate impact of the Green Action Week is increased market outlets for organic products thus increasing income for local farmers. The case from Ethiopia shows that this is possible.

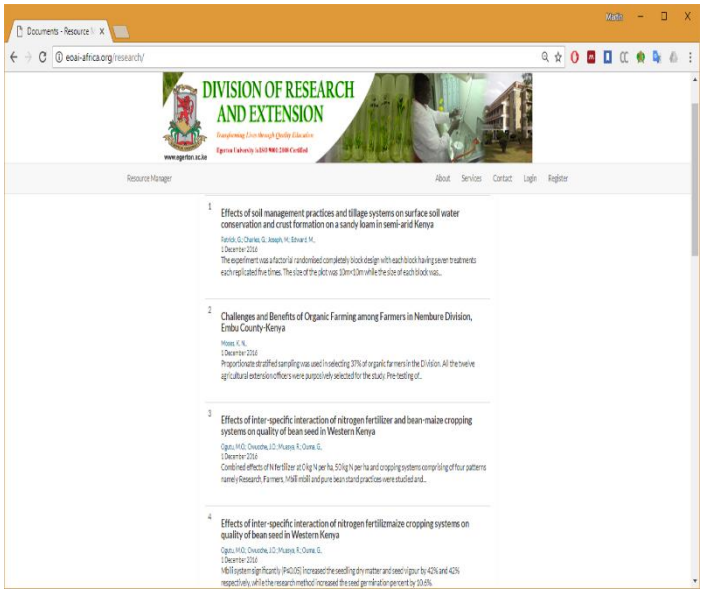
4. INCREASING USE OF RESEARCH DATA FOR DIRECT AND PRACTICAL APPLICATION BY FARMERS AND PRACTIONERS- *A Success Story By*

Egerton University, Kenya

The EOAI database (http://eoai-africa.org/research/) was originally created as a task to accomplish Pillar 1 activity; "To Create and regularly update a data base of EOA research into use at national level".

It was envisioned as a compliment to the previously existing OISAT database (http://www.oisat.org/) and Biovision Africa Trust's Infonet Database (http://www.infonet-biovision.org/).

Its main purpose is to catalogue all EOAI related data captured from various academic, other relevant research and field documentation. The project is supported by SDC through Biovision Africa Trust (BvAT).



Picture 4.1: The EOAI database

However, it has now evolved to become a bigger and a much more important part of African Organic Research community.

Those conversant with the research process are aware that literature review forms the basis of any research activity; it underpins the justification and purpose for a research study. Literature review is demanding and tests the researcher's ability to select and critically assess the written works in the light of his/her area of research.

A detailed consultative process went into the conceptualization and design of the research database. The process was spearheaded by renown Professors John Gowland Mwangi (Agricultural extension expert) and the DVC Research and Extension of Egerton University, Prof. Rhoda Birech (Organic Crop protection expert), among others.

Overall target for the project was to get many people interested in organic agriculture to use the system, the main actors for the system being; academic research users: graduate students; lecturers and knowledge users; general users and organic agriculture enthusiasts.

The key targeted demographic was academic research users, because most of the information that was to be captured would suit their needs and have them direct others to the database. This would help drive the traffic to the site much faster.

The new database now has over 1000 research documents from crop, livestock and other related research, a culmination of over 3 years of consistent data collection and analysis.

Since the online version was initialized in 2016, the database has been visited over 20,000 times (source google web analytics) from different sources, mainly been from IPs registered within Africa.

Egerton University ran an online survey on the site in early 2017 for site visitors, and discovered that most of the users were graduates and post graduate researchers in the fields of Agronomy and livestock production. This could be attributed to the fact that the database was initially hosted at Egerton University and directly linked to Division of Research and Extension (www.research.egerton.ac.ke).

The database has also provided a point of interaction between student researchers at Egerton and the EOAI project.

Most of the people who carry out data collection are Masters and Doctorate students in fields such as Livestock production, dry land agriculture, crop protection etc. The students undergo training by the project's information scientist on how to source for information and format it to fit the database metadata structure (this ensures the data is well labelled for easier caching by search engines).

So far over 20 students have been trained and are currently assisting in data collection on rotational basis.

Using the information contained in the database, Egerton University in partnership with BvAT's Farmer Communication Programme sourced writers familiar with the database to develop articles for The Organic Farmer Magazine on different topics. Over 10 articles were developed in 2017 from different fields, including; Crop production, animal nutrition, post-harvest processing and aquaculture.

The main challenges experienced throughout the process have been software related. Hosting has been precarious, the system to date has been moved over 3 times owing to unreliable hosting. Recently, it was moved to EOAI-Africa.org servers (under BvAT) but recent changes to the servers have disabled the system rendering it offline. The movement also affects traffic since the users' bookmarks become obsolete. With no way of finding the database, traffic has to be cultivated anew.

Due to its intuitive design, the system is easy to use. With greater attention from cross border partners especially in publicity and data collection, the system will have a bigger impact on not only the EOAI community, but also other researchers and users. Creating in-links and out-links with all the project partners in Africa will ensure better visibility, traffic and utilization.

Egerton University is carrying out capacity building exercises with organic extension service providers to help them develop farmer manual and factsheets using information sourced from the database. This is after successful use in developing articles for The Organic Farmer Magazine.

The rationale behind the training is that, since farmers have closer interaction with extension service providers than researchers, helping the former access the information and convert it into a farmer friendly format will ensure greater knowledge transfer on EOA. This scenario can be replicated by project partners in East Africa as well as other regions.

The Ecological Organic Agriculture Research Database has been a labour of love by the team at Egerton University.

"Although the journey has faced many challenges, which continue plaguing us, the future is bright and very much within our grasp." In order to realize these benefits, conscious and directed efforts have to be channelled towards supporting the system, and not just the software. The system is driven by the people and the processes. By agreeing to work in concert and not cocooning our works, the research database will grow to become a robust resource for the movement and beyond.

5. EOA INITIATIVES PRODUCE AN ACADEMIC JOURNAL AND LAUNCH OF AGROECOLOGY SOCIETY- *A Success Story By Uganda Martyrs University (UMU), Uganda*

As early as 2012, initiatives to streamline Ecological Organic Agriculture (EOA) in sub-Saharan Africa had been in place. There were also efforts to develop and disseminate curricula for training organic farmers.

In the same year, a skeleton draft curriculum were outlined for Certificate, Diploma and Undergraduate Course in Organic Agriculture for rolling out in East Africa. There was no progress however, for further development, refinement and finalization of the curriculum.

Picture 5.1: H.E Excellency the Ambassador of France in his capacity as an Ambassador, and in his individual capacity, was glad to be nominated as the first patron of the society

The EOA Initiative also called for research to provide solutions to some of the existing agroecological issues and answer pertinent questions about organic farming. There was little evidence to support these initiatives due to inadequacy of published works in the area of ecological organic agriculture. The works were elusive, not necessarily because the researches done were poor, but also because the concepts were not clear.

Uganda Martyrs University is one of the partners which has been overseeing and implementing the research training and extension pillar since 2014. Among its important assignments was review and/or development of curricular at/and for all levels, and carry out research in EOA. Three bachelor's degree courses were reviewed and two new bachelor's degree courses developed for UMU universities. As an initiative, it has supported students' research at M.Sc. level.

Agroecology was developed as a program for ecological organic agriculture. Further, a PhD program in Agroecology and livelihood systems is finally fully operational.

As the EOAI Pillar I coordinators in Uganda, Uganda Martyrs University together with the wider agroecological society held a successful international conference from 13 to 16 December 2017 at Ssese Islands in Kalangala district, Uganda.

The theme of the Conference was; '*Re-focusing on the Agroecosystem is key to mitigating Climate Change, ensuring health, food and nutrition security as well as achieving Sustainable Development,".*

This theme was chosen to help the Agroecologists reflect on the ongoing research and establish whether it is meeting the current needs in mitigating effects of climate change, ensuring health, food and nutrition security as well as achieving sustainable development.

For an institution running research activities in ecological organic agriculture, inaugurating the academic journal and a supportive society, are a landmark in the achievements of an intervention.

Various comments and responses by two beneficiaries and one stakeholder

Mr. Ntende Zepher, "*I completed my M.Sc. under an Agroecology program. My thesis was on 'misuse of pesticides in Uganda; a case of application of Dithane M-45 as a post-harvest preservative on tomatoes'. My findings from Masaka district need to be published in a journal that disseminates agroecology information. I would prefer waiting, or even repeating the study to get such an opportunity*."

Picture 5.2: First Agroecological conference banner in Kalangala District, Uganda

Mr. Ogogol Rajab*"Upon completion of my M.Sc. in Agroecology, I searched in vain, for an agroecology journal to publish my findings. Eventually, my paper "Evaluating the potential of luring PheidoleMegacephala using food baits to manage Xylosandruscompactus in Uganda" was later published in a journal that made adjustments to suit conventional orientations. Our own breed of the journal would be a better choice*".

Ms. Stella Among "*I wish this idea came during my time! One and a half years ago I completed my M.Sc. in Agroecology. Just before the commencement of this conference, one of my papers "Efficacy of Neem tree extract on white cabbage aphid control" had just been published by a journal of agricultural sciences that would probably not be my choice if the African journal of Agroecology was up and running".*

EOAI has been in operation for five years during which, intensive research has been carried out. It was timely for agroecologists to sit together and showcase what has been taking place in the region. The project gauges itself in form of self M&E to take stock of the achievements.

It is hoped that in future, many such conferences will be organized to complement the on-going efforts of EOAI.

6. AN ALL-INCLUSIVE DEVELOPMENT APPROACH THAT MAKES FARMERS FACILITATORS- *A Success Story By NOGAMU, Uganda*

Majority of farmers in Uganda practice the kind of agriculture that is close to Ecological Organic Agriculture (EOA). The practice of EOA based on organic principles however is still new to many farmers. This raises need for farmers to be trained regularly, as well as be offered extension services on EOA.

Picture 6.1: FFLG members helping the host farmer construct a goats' shade

The implementation of government-supported extension service does not include EOA. This situation is aggravated by the fact that there are very few professional experienced personnel who can train on EOA compared to the demand by the farmers. The National Organic Agricultural Movement of Uganda (NOGAMU) in collaboration with Organic Denmark (OD) came up with an innovative way to bridge this gap.

This was geared towards enabling farmers to learn from each other, advice each other, and develop their communities through the Farmer Family Learning Group (FFLG) approach.

The FFLG is a participatory extension approach which entails farmers working together, with the help of a facilitator, to develop their farms, improve livelihood and food security in their families, develop and learn together and build up social capital in their local communities. FFLGs are built on principles of adult education and experiential learning processes.

Unlike the conventional Farmer Field Schools (FFS) where farmers learn from one demonstration field, the organic FFLG concept is based on the belief that each farmer's field is unique. Individual farmers face different challenges that cannot be easily integrated and be addressed at a bigger administrative level. Instead of focusing on a single enterprise, FFLGs emphasizes a holistic (whole) farm approach.

Before FFLG was initiated, a baseline study conducted by SATNET on farming communities in western Uganda in Kamwenge, Kasese, Kabarole and Kyenjojo districts in 2009, revealed that a large proportion of the rural population were food insecure for the bigger part of the year. Food insecurity was caused by low productivity exacerbated by dwindling soil fertility and low income levels. Farmers could not afford external inputs to improve their production and this resulted to more losses. To a large extent, government agricultural extension services, did not reach most farmers and did not include alternatives to conventional inputs. This challenge was worsened by the fact that many farmers had lost or never had knowledge about sustainable agricultural practices. Organizations working with farmers

also needed knowledge about sustainable agriculture practices.

Majority of the farmers who were interviewed during the study claimed to have some knowledge on organic agriculture and to practice the same. However, when probed further, it was discovered that these farmers practiced organic farming by default, and that they integrated it with traditional farming practices.

There was need therefore, for a new extension approach that could improve food security by combining sustainable efforts for increased and diversified food production at home, together with increased focus on income generation. Income generation could be the result of either producing specific crops for sale, or selling surplus food crops locally.

The desired approach would serve in addressing constraints such as; food insecurity, lack of market access leading to limited income generation, labour mostly restricted within the family i.e. farmers were poor and could not afford to hire labourers even when they owned big chunks of land etc.

Farmer families (father, mother and older children) join a group within walking distance of their homes with the purpose of learning, sharing and participatory monitoring of EOA practices.

Picture 6.2: Members of a FFLG working on a host farm

Each FFLG is attached to an external facilitator who mobilizes and organizes farmers, introduces them to the FFLG approach and trains them on how it works. There is also an internal facilitator who is a member of that group.

Members learn through practice (learning by doing). They implement rotational visits to each member's farm to learn and support implementation of EOA activities. Each farmer's farm becomes a unique learning site. Each individual farmer is a 'facilitator' on his farm. The entire group members have equal chances of being host farmers.

Within the FFLGs, farmers implemented various activities for both crop and animal husbandry. They also supported each other by practicing EOA practices at community level, to increase production, enhance productivity and improve environmental management.

Farmers engaged in crop enterprises including coffee, banana, maize, beans, rice, cassava, pineapple, irish potatoes, tomatoes, cabbages. They also participated in promotion of kitchen gardening.

The FFLG approach was piloted through 'Development of Farmer Field School Concept for Family Food Security in Western Uganda (February 2009 to February 2011)' project. 25 FFLGs were involved in the pilot project which was implemented in five districts; Kyenjojo, Kabarole, Kasese, Bundibugyo, Kamwenge, followed by a scale up project involving 50 FFLGs in the same area. Empower civil society and strengthen food security for farmer families ((ECOSAF1,) primary target groups were family members of the 111 farmer groups, among them; Caritas Kampala 24 groups, URDT 36 groups, A2N 36 groups, Sulma Foods 15 groups, which participated in the project.

Following the success of ECOSAF 1, a second phase ECOSAF 2 was started in March 2016 with the same four organizations involving 200 FFLGs in about 6,000 households.

Picture 6.3: Fire place before FFLG intervention

The FFLG members showed steady progress in adoption of recommended EOA practices as well as active participation in all FFLG activities. There has been integration of both family food security and income generation in all FFLGs. Farmers focus on increasing productivity using EOA practices as opposed to farming in a very big area that a farmer may fail to weed due to high cost of labour. *This was complemented by better farm planning and management with training and advice amongst members.*

Using the FFLG approach and working with four partner organizations, NOGAMU trained external facilitators, 243 internal facilitators, over 240 FFLGs and reached an estimated number of 6,000 households.

Practices such as compost making, crop rotation, intercropping, cover cropping and use of fuel saving stoves were integrated within farming systems in various areas. This knowledge and practice is consistently diffusing through the different levels of the local communities surrounding FFLGs.

It is evident that there is need for a sustainable extension approach that is integrated into what the farmers are practicing and that can continue after basic intervention. The FFLG presents a suitable solution to the existing extension challenges.

Successful implementation of the FFLG approach requires structured, participatory monitoring and close follow-up.

It is therefore recommendable to conduct regular project update meetings to discuss and share on experiences and lessons learnt among the board and staff members of each organization. Facilitators should take part in a continuous learning process with colleagues.

Picture 6.4: Fire place after FFLG intervention

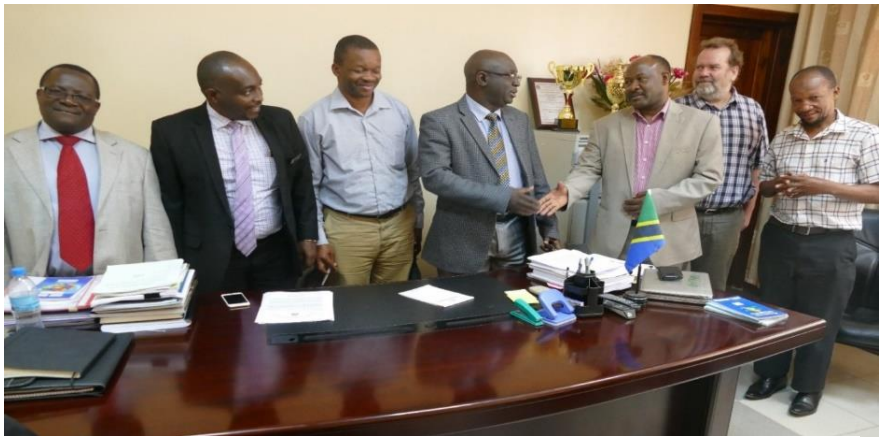
The possibility for up-scaling the FFLG approach is very high, because it is easy to develop, flexible and easily adaptable to different areas, scenarios and sectors.

Currently in Uganda, Caritas Kampala has adapted the FFLG approach and is using it in the health sector to address health issues in various communities.

FFLG is referred to by the pioneers as 'the approach which is owned by everybody who uses it and that cannot be patented since it is unique in each case."

7. FRUITS OF SUCCESSFUL ADVOCACY REALIZED IN MAINSTREAMING POLICY ON ORGANIC AGRICULTURE- *A Success Story By TOAM, Tanzania*

The Tanzania Organic Agriculture Movement (TOAM) was formed in 2005 as an umbrella body for development of organic agriculture sector in the country. It brings together various organic stakeholders including producers, processors, traders, exporters, operators, researchers, certifiers, educators, consumers, NGOs, and other stakeholders.



Picture 7.1: TOAM CEO Mr. Jordan Gama shakes hands with Permanent Secretary of the Ministry of Agriculture, Eng. Matthew Mtigumwe for inclusion of the Organic Sector Development Project implementation of the current Agriculture Sector Development Plan (ASDP II)

As an umbrella organization responsible of overseeing organic agriculture in Tanzania, immediately after its inception, a policy review was initiated. The findings were that the country's agriculture policy was silent about Ecological Organic Agriculture (EOA).

Several policies, procedures, standards and guidelines that had been published and disseminated for public use were reviewed. However, none of them had even a single sentence on Agroecology.

TOAM, in collaboration with stakeholders, developed a draft policy paper to push for organic agriculture in Tanzania. In addition to this policy paper, there were several other strategic steps and strategies that were geared towards addressing the policy gap; like defining the purpose of a policy dialogue and engagement of community and actors in the process of policy formulation.

In 2013, after years of dialogue, the National Agricultural Policy included Agroecology. For the first time, Tanzania got a policy statement which reads "*The national food security and nutrition enhanced through production, accessibility and utilization of sufficient quantity and quality food…. Production of food crops according to Agroecological zones shall be promoted".*

It further reads, "*Agricultural development is strongly dependent on environmental resources such as land, forest, air, water and other resources and sustainable utilization of these resources is vital for the growth and sustainability of the sector. Although the intensification of agriculture exerts pressure on natural resources it also contributes to natural carbon pool".*

Currently, at least there is an organic desk at the Ministry of Agriculture. While this is too small to offer effective coordination of a vast and fast growing organic sub-sector, it offers a sound foundation on which to build on it in future.

Additionally, an EOA National Strategic Plan is in place. It is being backed-up by Organic Sector Development Programme which was developed by organic agriculture stakeholders in collaboration with Agricultural Sector Development Programme (ASDP) II.

Among the challenges facing the agricultural sector in Tanzania is inadequate allocation of government funding for agriculture contrary to 2003 Maputo Agreement of African nations to allocate 10 per cent of their financial resources to the Agriculture sector.

Having a policy statement on agroecology in Tanzania has attracted new funding for agroecology. A new project 'Research and Advocacy for Agroecology' by Swiss Aid is currently being implemented. Many others are set to be implemented. They will altogether help to improve the livelihoods for the Tanzanian people.

Among the biggest lesson learnt during is that policy dialogue should always be a *continuous process at* various levels. It is also important to share the knowledge and experience in policy making to other NOAMs in East Africa because some countries within the region still don't have policies that recognize organic agriculture in their respective countries.

8. ENHANCING BETTER MARKETS AND INCREASED EARNINGS OF ORGANIC FARMERS AS A RESULT OF STEADY INCREASE OF ORGANIC OUTLETS IN NAIROBI- *A Success Story KOAN, Kenya*

Unavailability of fresh organic produce in many retail outlets within Nairobi and major towns has been a great setback in campaigning for mainstreaming organic agriculture in Kenya and towards changing the perception of organic and indigenous food as a poor man's diet.

For long, Kenya Organic Agriculture Network (KOAN) tried to link traders to supermarkets. However, successes had been short lived and very frustrating especially when the traders failed to supply consistently or the supermarkets closed down or terminated supply contracts.

Picture 8.1: Fresh Vegetable Promotion at Carrefour Supermarket, Two Rivers Branch

The entrant of Carrefour Supermarkets in the Kenyan retail sector one year ago however marked a major shift in this. The supermarket was ready and willing to stock organic fresh produce. KOAN, through the support of Ecological Organic Agriculture Initiative, approached Fine Aromas, a local company that does aggregation, bulking and supply of organic fresh products to retailers, schools and restaurants.

Initially, it was quiet difficult to convince Fine Aromas that this would be a profitable business that would link hundreds of small holder farmers to market. To begin with, KOAN had to turn to Sustainable Communities Network (SCAN), a self –help group of farmers in Kiambu, Muranga and Kirinyaga counties in Kenya. Members of SCAN had previously been supported to aggregate their fresh produce through Swedish Society for Nature Conservation (SSNC) but were unable to access markets due to logistical and organizational challenges.

SCAN agreed to mobilize farmers again and also act as a local aggregator whereby, Fine Aromas would collect the fresh produce, sort , grade , package and deliver to the supermarket. Fine Aromas were also to take the responsibility of organic certification and quality management.

KOAN also worked with Fine Aromas in developing a business plan with clear objectives and targets. The business plan helped Fine Aromas to mobilize resources and also plan according to their capacity both, in terms of capital and human resources. The company was also linked to Acert Services Ltd, a local certification body which had previously worked with KOAN in third party certification of small holder farmers.

The negotiations with Carrefour Supermarkets were not easy especially because organic products attracts a premium price and would require a different pricing mechanism from the conventional products. Besides, the supermarket wanted assurance that this was going to be a long term trading contract. The company had put in place the right mechanisms for this; a business plan and KOAN assurances came in handy for this.

Picture 8.2: KOAN staff and Fresh Produce Manager during an organic products' promotion at The Hub Branch in Karen

On the other hand, the Supermarket agreed and supported pricing the mechanism for organic products and also display of the Organic Certificate on their outlets. This is geared towards boosting the consumers' confidence and trust.

Currently, there are about 100 farmers who supply organic products at Carrefour supermarkets. Most of the suppliers are women and youths.

Meeting quantity and quality of organic products remain a major challenge. Therefore, more effort is required to build farmers' capacity on quality production, food handling and safety requirements to meet the market expectations of premium buyers.

The logistical challenge remains a big headache for the Fine Aromas and KOAN as fresh produce require refrigerated vehicles and warehousing which are currently not available.

Besides, there is increased change in perception and attitude among consumers and other retail outlets which have expressed since interest in stocking organic products.

KOAN has designed an organic marketing programme project that is aimed at scaling up market outlets in outlaying counties around Nairobi like Machakos. With these development, the future of increasing organic market in Kenya and beyond is bright and promising. Carrefour is also set to open more branches in Nairobi, other towns and Kampala.

9. RUN-OFF WATER HARVESTING IMPROVES LIVELIHOODS OF SMALL HOLDER FARMERS- *A Success Story By BvAT, Kenya*

Meet Zipporah Wambua, a farmer from Kiima- Kimwe location, Machakos County. She is a member of a sixteen-member group known as Kiima Kimwe Self-help group which is trained on sustainable farming technologies by Margaret Kioko, an extension officer at Biovision Africa Trust.

Picture 9.1: Zipporah at her maize farm in Machakos County

Besides rearing two dairy cows, Zipporah grows vegetables and maize. However, for long, her farming was faced by challenges due to water shortage. This was until when she received training about water harvesting.

Sometime before the short rains in 2017, Zipporah attended a training session on how to harvest rain water through the various methods.

The extension officer explained different ways of harvesting rain water; an experience that Zipporah proudly describes as "such an eye opener". From what she learnt at the training, Zipporah surveyed her farm and identified a section on which she would collect rain water for domestic and farming purposes. Zipporah then purchased a polythene dam liner to help in water harvesting and storage.

Water harvesting is a good practice for ecological sustainable agriculture farming systems. It reduces erosion and flooding. Besides, water harvesting contributes to environmental conservation. It is also good for food and nutrition security as it leads to increased production. It builds resilience for farmers to cope with effects of climate change.

Picture 9.2: A view of Zipporah's water harvesting pond

According to Zipporah, the harvested run-off water is useful in watering her vegetables and for her dairy animals.

Her joy is realized in the fact that she earns better income from selling vegetables and milk. Using this income, Zipporah is able to cater for her basic needs.

From the ½ acre she grows maize on, her harvest tripled from two to six 90-kilogram bags.

She started off with one dairy cow. But her herd has now grown to five, all which she can now comfortably feed.

"Now that we have knowledge on run-off water harvesting and proper land utilization, we can produce more because our soils are fertile enough for vegetables and maize farming. This will eradicate poverty and improve food security."

10. REAL BENEFITS OF WORKING AS A GROUP AS SHOWN BY MASASI FARMERS IN TANZANIA- *A Success Story By TOAM, Tanzania*

For many decades, smallholder farmers have been facing market-related challenges, occasioned by mistrust among themselves and brokers who take advantage of the farmers. Besides, the challenges are also caused by farmers' diverse needs and strict government restrictions, among other market-access related issues.

Since 2012, the Tanzania Organic Agriculture Movement (TOAM) has been working with Masasi groups during EOA pilot phase. Under this project, different groups have been taken through training on Participatory Guarantee System (PGS), marketing skills, linkages and seed banking. Besides, they have been and introduced to some news crops like sunflower.

Picture 10.1: A thriving sunflower crop in Masasi land

The main crop cultivated in Masasi land is cashew nuts. However, there are other primary crops like green grams, Bambara nuts, groundnuts, cassava, cowpeas and vegetables (like tomatoes, amaranths, spinach, cabbage, okra).

Among the facilitated groups was the Nachili Farmers Group, which a membership of 243 farmers has drawn from five villages.

In 2010, the Nachili Farmers Group was facilitated by Swiss-aid project. Later, TOAM came in with organic agriculture training during EOA piloting phase. The group members received orientations and training on issues such as marketing skills. Earlier, the group had very little knowledge on market access.

Following the intervention, the group had its first big sale in 2015, when members made a total of TSh. 6,460,000 with the price per kilo of produce being TSh. 1,700 up from TSh. 1,500. This motivated group members, who decided to be aggregating and jointly marketing other produce including cashew nuts.

Although they do not jointly own land, each of them farms on his/her piece of land individually but marketing is done collectively.

Collective marketing is a solution for smallholder's farmers. Additionally, crop diversification comes with a basket of advantages such as spreading risk in case one crop face uncontrollable situation such as pricing or diseases.
Currently, members of Nachili group sell all the products from their farms locally and in raw form.

However, plans are underway for value addition and market expansion both locally and internationally in the near future.
Said Nachili Group Chairperson, Mr. Mbarouk Abdallah; *"Success of a group brings victory to every individual member; Collective marketing is crucial to any group which wishes to be progressive and successful in its undertakings."*

Picture 10.2: Mr. Salum packages produce before delivering it to a collection point

This group is geared towards becoming the best agricultural co-operative society in Tanzania. Currently, the group is in consultation with TOAM's marketing department on development of a viable business plan. This business plan will enable the group to explore more business opportunities, linkages and loans to purchase machineries for peanut butter processing machines, un-husking cashew nuts and vacuum packing.

11. HOW ACCESS TO INFORMATION IS TRANSFORMING LIVELIHOODS IN TANZANIA- *A Success Story By PELUM Tanzania*

Until 1990 Tanzania had been under single political party system. Freedom of expression was limited as media was highly controlled by the state and the supreme political party. This trend hindered some segments of the population from accessing information especially on matters pertaining development and social wellbeing.

Picture 11.1: Beneficiaries of one of the information centres with their distributed materials

However, influence of free media and opposition parties is limited to urban areas, where people can easily access newspapers, independent FM radio stations and TV. All these are to a large extent not accessible to many parts of the rural areas. As such, a bulk of the community in the rural areas remained unaware of various matters related to development and their wellbeing. This resulted to continuing state of abject poverty, low productivity and hunger.

However, between 2010 and 2012, a project on promoting Good Governance (GG) practices, for effective delivery of basic social services, in Chamwino District, Dodoma, Tanzania, was conceived.

INADES Formation Tanzania and the Chamwino District Council implemented the three-year GG project from 1stDecember 2009 to 31st January 2012 with support and funding from Spain's Intermón Oxfam. The project's specific aim was to promote inclusive participation, transparency and accountability, focusing on village and ward units at local governance levels.

Implementation activities of GG project focused on training and sensitization campaigns to raise awareness among women and men about their roles and rights to participate, and hold duty bearers accountable.

The project's specific activities were:

1. Construction of information offices to serve as office for the groups and for keeping and displaying information and education materials.
2. Training of two person's one man and one woman from each managing group on how to organize, keep and manage documents and information materials at the centre.
3. Linking the information centres with diverse sources of information materials, for everlasting sustainability.
4. Publicizing information centres.

By the end of the project, a total of 22 Information Centres had been established in all the 9 wards within Chamwino District, serving a population of 83,000 farmers, their leaders and executives.

The Ecological Organic Agriculture – Initiative (EOA-I) for Africa, supported five villages of Wilunze, Machali, Chinangali, Makoja and Chamwino. This was done through provision of training of the ten information centre managers on record keeping, centre management, supply of relevant information and education resources and installations of one solar powered TV set at the Makoja centre. By December 2017, Participatory Ecological Land Use Management (PELUM) Tanzania, had distributed a total of 1,607 booklets, leaflets and magazines with 15 different titles to the five information centers. Additionally, PELUM Tanzania distributed one solar powered TV with the following accessories; a solar Panel, one TV set, a TV dish & decoder, and one DVD Player. These were installed at Makoja Information Centre. This support facilitated access to TV news and programs, some of which air content on Ecological Organic Agriculture and agricultural programs in general. The villagers are also now able to watch related documentaries on DVDs.

Feedback from some beneficiaries

Waziri Iddi, 35, is a horticultural farmer at Wilunze village, in Chamwino district, Dodoma. He actively uses the Wilunze Information Centre to get informed on various issues including farming. The centre stocks books, periodicals, leaflets and journals on issues such as human rights, agriculture, law, cooperatives among others. It provides services such as on spot reading and borrowing. Waziri attributes the knowledge he has on tomato production to the center. He testifies that the information he has been reading has transformed his entire family's livelihood.

Ms. Fatuma Sengoli, 40, of Wilunze village, "*The information we get here is very helpful. We read on land laws and inheritance, cooperatives and farming. I personally, started horticultural production following the article I read here about tomato production. To be honest, we have been able to support our children with school fees, cater for family needs, and construct houses, from sale of tomatoes."*

Eliabi Chomola Togoya, 45, "*I support my family of eight children through farming. Initially, I produced cereals – maize and sunflower. However, after reading several articles on horticultural production at the centre, especially information on proper seasons and market demand my production has gone up."*

In conclusion this case provides a lesson that knowledge is key to any production. Further, access to information is a great step towards transformation of livelihoods among communities.

12. EFFICACY OF BIO-PESTICIDES IN SUCCESSFULLY CONTROLLING POWDERY MILDEW DISEASE- *A Success Story By Mekelle University, Ethiopia*

Holeta town in Oromiya region is 35km from Addis. It is one of the EOA's project sites with estimated 400 Households in the area who practice vegetable farming. The area is in mid- altitude with ample rainfall. However, plant diseases are a major challenge causing farmers to often use pesticides.

EOA was introduced to small holder farmers at Holeta in the year 2013. Value Chain and Market Development pillar is so far working with 70 farming households.

Picture 12.1: A healthy Zucchini plant after powdery mildew was controlled. A bee enjoys pollen from a Zucchini plant

The project started with undertaking a value chain and market development study and analysis. The study's findings showed there is a growing market for organic produce Addis Ababa.
Target beneficiaries of pillar three got knowledge and skills on EOA, basic marketing skills, concept of value chain development, farm planning, budgeting, record keeping and experiences on best practices of value chain development. The knowledge sharing and building targeted stake holders who are closely supporting EOA farmers.

Initially, farmers started with a small size of field for EOA. Since then, fields' sizes for EOA have been increasing. Soil fertility improvement was the first agricultural practice for the EOA farmers. Agricultural organic inputs are a limiting factor, particularly in pest management practices.

Habetamu Audgana is a young farmer who joined the project at the end of 2014. He has two plots of land in different areas on which he grows mostly vegetables and cereals. He cultivates organic vegetables on 2200m^{2}of land. He practices mixed farming and also runs a dairy farm.

Habetamu had for long struggled with powdery mildew disease on his Zucchini vegetable plant field. It is a very common problem in the area. Habetamu came up with his own innovation of a bio pesticide prepared from a mixture of milk and water in a ratio of 1:10. He was able to control the plant disease with this mixture.

Production of Zucchini in the area has since increased. At some point, frost with a very low temperature of- 4.5 to -5.00 degree centigrade hit the Zucchini leaves badly. However the stems of the plants survived afterwards and production continued because of the plenty organic matter in the soil. He kept harvesting for a total of four months compared to only two months harvesting under favourable weather conditions when he practiced

conventional farming. He earned a net income of USD 863 from Zucchini production on 1500m^2 field.

He shared his experience with EOA farmers during one of the farmers' learning meetings and visit to his farm.

One of the EOA female farmers by the name Wro Werquie was struggling with powdery mildew plant disease on her grape vine plants. She used the same mixture and it worked. This will be shared with more new EOA farmers and stakeholders.

Picture 12.2: Habetamu happy with his Zucchini harvest in 2016

In conclusion, this is a pointer that farmers are generally innovative and if given support, they can do on farmer research and this can be scaled to other farmers.

THE WONDERS OF PUSH AND PULL TECHNOLOGY- *A Success Story*

By ISD, Ethiopia

Over the past 20 years, drought has become more rampant in Ethiopia. However, ISD has observed that farmers, who use compost and other agroecological practices often, overcame these challenges.

Maize and sorghum are among the major five crops in terms of production and coverage area. However, the yield of these crops is severely affected by larvae of stem borer, moths and the parasitic weed Striga. Striga also paralyzes finger millet and teff in some areas. Many methods, including pesticides, have been tried to control these biotic problems. While their cost has been high, there has been little success.

Synthetic Pesticides Destroy the Ecosystem

The use of synthetic pesticides to control weeds and pests leads to destruction of the ecosystem. Synthetic pesticides are deliberately made poisonous to destroy agricultural pests. Sprayed hazardous insecticides and herbicides can reach another destination other than their targeted species. For example, in the four PPT project districts of Amhara region (Tehuledere, Ambasel, Werebabu and Kombolcha) 19,985 hectares of land was allocated for production of maize and sorghum: 10,165 ha were infested by stem borer. Diazinon 5% was sprayed on 7,285 ha of land to control the outbreak of the pest costing the government EtB.497,400 (USD 27,630) in 2013. Two oxen and a cow died as a result of grazing on sorghum where the chemical had been applied.

Continued use also promotes resistance to pesticides, destroys natural enemies, creates new pests, harms other non-target species and contaminates both human and animal food.

The Push-Pull Technology

In 2011, ISD introduced Push-Pull Technology (PPT) to main production areas of maize and sorghum in Ethiopia. The initiative was geared towards improving food & nutrition security and productivity, by combining with farmers' traditional knowledge and practices. The technology is 100% biological, as it uses companion plants both to decrease pest infestation and increase productivity of crops and livestock.

PPT is a biological pest control system based on planting drought resistant Bracharia (a forage grass) and Desmodium (a forage legume) as companion crops to maize or sorghum. It is a technology used mainly in areas where rainfall is scarce, in order to control the damage by stem borer pests and the parasitic Striga weed. ISD started implementing PPT project in two districts; Central Tigray and in South Wollo of Amhara where six demonstration plots were established and the results were encouraging.

Between 2011-2014, the number of farmers in South Wollo increased from 1 to 273; 28 of whom are female. The number of FTCs had shot from 2 to 13 during the same period and in the same district.

In Tigray, there was also a rapid increase in the number of farmers implementing PPT from 2 farmers (no female) and 2 FTCs in 2 weredas in 2011, to 374 farmers (41 female) and 43 extension personnel (2 female) in 11 weredas in 2014.

Data Collected
In 2014, at the end of the cropping season, yield data was collected from 28 farmers' PPT fields and from 5 FTCs. These results showed that a farmer with a minimum yield from PPT maize field got more yield by 0.75 t/ha than a farmer who got a maximum yield from a non PPT maize field. For the improved variety of sorghum, a farmer getting a minimum yield of 3.25 t/ha on a PPT sorghum field got 1.45 t/ha more than a farmer with a maximum yield from a non PPT sorghum field.
Activities included in dissemination of the technology are; training on the implementation of PPT - both theoretical and practical, seed distribution, farmers field days, ex-ante and socio-economic survey, crop data sampling, evaluation workshops ,among others.

There has never been sufficient Desmodium seeds to supply to all the farmers who have participated in PPT training. ISD has been encouraging farmers to produce these seeds for sale as they can fetch up to 500 EtB (USD 26) per kg.

Government Takes up Push-Pull Technology
The Ministry of Agriculture and Natural Resource is currently integrating PPT with its own extension system. The government of Ethiopia, under its extension system which has a very strong structure, has a plan to reach out to more than 20,000 farmers this year.

Stakeholders Involved
This initiative brought together various stakeholders including;
Famers located in north-eastern part of the country, which is known as sorghum-belt of the country and International Centre on Insect Physiology and Ecology (ICIPE): In 2011, ISD became a partner in an EU-supported project coordinated by ICIPE to introduce PPT in Ethiopia.

Other partners include, Agriculture Transformation Agency (ATA): ISD joined hands to train farmers on PPT and also in distributing seeds. The McKnight Foundation: Through its program, Collaborative Crop Research Program (CCRP); ISD secured a development research project with two public universities in Ethiopia on PPT since 2015. This project is based on ISD's previous efforts to disseminate PPT. It aims at bringing farmers, extension personnel and researchers into partnership to combine traditional and modern scientific knowledge of agricultural practices for increased and sustained production in harmony with ecological dynamics. This is especially to build the resilience of farming communities to the impacts of climate change. Wollo and Woldia Universities which are the two partnering public universities in Ethiopia worked closely with smallholder farmers and extension personnel under the project entitled 'Push Pull Plus'. The main focus of the Push-Pull Plus Project was supported by the McKnight foundation. DebreMarkos University also partnered with ISD to carry out more researches on PPT supported by French Embassy.

The technology itself doesn't need any external chemical inputs. It promotes intercropping of Desmodium legume with the main cereal and Bracharia grass at the plot's borders. ISD promotes PPT as an EOA practice and technology.

14. SCALING UP SUCCESSFUL INNOVATIONS IN DRYLANDS- *A Success Story By SACDEP, Kenya*

Arid and Semi-arid Land (ASAL) in Kenya receives very minimal and unreliable rainfall ranging from 250mm to 750mm. About 80% of the country is classified as ASAL and home to 20% of Kenya's population. Most of the ASAL areas are within agroecological zone IV, V and VI, characterized by high temperatures and fragile soils.

Picture 14.1: Farmers Demonstration plot on Cassava

Crop productivity is low. This leaves small holder farmers with no option but to seek other means of survival. Many young and energetic men and women are forced to migrate to the cities in search of employment. Many older men leave behind their wives to solely look after their malnourished children in the villages. There are other members of the same family who opt to remain behind but in most cases, engage in unhealthy habits such as alcoholism and engage in drugs due to frustrations.

Since 2013 to date, SACDEP-Kenya has introduced EOA initiative in Kilimambogo-Mithini area, Makuyu and Gikindu through training, extension and showcasing alternative dry land crops and improved indigenous chicken. This has since brought about a paradigm shift in these fragile areas where the word 'Ugali' (maize meal), still remains synonymous to food. Maize was the only crop farmers could think of despite the continuous failure year in year out. Their families would often depend on food aids (locally known as "Mwolyo" from the government and other emergency relief agencies.

SACDEP-Kenya through the EOAI's project, collected seeds of 10 different crops: cassava, sorghum, finger millet, ground nuts, green grams, pigeon peas, and dry-land maize. This was a follow-up plan after training was held at SACDEP Kenya Training facility in Thika by Egerton Universityon soil fertility management, pests and disease control. The participants came from KOAN and SACDEP-Kenya.

Picture 14.2: Mithini Farmers PSPs Level 1 being taken through the agronomic practices on Sorghum crop

The 10 crops were planted in the same region using poultry manure. Farmer groups in the region were taken through all the agronomic practices,

step by step, from land preparation, planting to harvesting. In the same field, they were able to compare performance of all the crops including maize.

The farmers were also trained on keeping improved indigenous chicken which they had out-sourced from Kenya agriculture and livestock research organization (KALRO). The cassava and sorghum, provide feeds for both the farmers' families and their chicken.

Picture 14.3: Green gram demonstration plot- Pests and disease scouting day with farmers

Mr Francis Mutunga, one of the farmers in Mithini SHG tells his story: "*For many years, I struggled with maize farming. However, I have harvested two bags of sorghum and sold 15 of my cocks and 10 hens at Kshs950 for the cocks and Kshs650 for the hens, earning a total of Kshs20, 750. I will spend the money on clearing my children's fees arrears. I am currently waiting for some showers so that I can plant and also have more chicken to sell. This time round, I will expand my cassava and sorghum plantations because I have two children who are in class 8 and I need a lot of money for next year's school fees, when they will be joining form one".*

Picture 14.4: Mr. Francis Mutunga PSP-L1 Harvest his cassava crop after training by SACDEP-Field officer Mr. Munguti

Since the establishment of the EOA initiative project in Kilimambogo-Mithini, Makuyu and Gikindu, many youths have ventured into fabrication of poultry feeders, brooding, heaters and drinkers. This has created indirect employment to over 300 youths who make an average of between Kshs800- Ksh1, 000 on a good day. As a result, there has been drastic drop in cases of insecurity in the regions extending to Thika town especially Makongeni village. The opportunities which have been created include: - blacksmithing and distributing/supplying.

Caroline Waweru one of youths in the region, saw the opportunity and started selling affordable chicken rearing - related equipment to farmers. She established a kiosk at Makongeni, where she sells the chicken related equipment/tools.

Picture 14.5: Ms. Caroline Waweru showcasing her poultry water drinkers

Says Caroline, "*I used to partner with my fellow farmers before SACDEP came up with EOA project. The project focuses mainly on emerging crops and KARI Kienyeji chicken. More farmers were captured and with my past experience I saw an opportunity in supplying the chicken rearing equipment. I acted quickly by looking for a kiosk at Thika near where the blacksmiths operate from. My initial capital was Kshs. 5,000 which I had gotten from a merry- go- round. Using the contacts of my fellow farmers I supply the items door to door.*

Picture 14.6: Pigeon peas at flowering stage in Kilimambogo demonstration garden

On the first month, I earned Kshs. 30,000 .This has improved my income and has enabled to move my two children from a public to a private school where they are accessing better quality education. I have also managed to buy a piece of land on which I am planning to build soon.

I thank SACDEP for introducing EOA project in our area since it created an indirect opportunity for me".

Strategies for scaling up the Innovation

SACDEP is putting in place several strategies for scaling-up the innovations. . Research has been carried out on emerging crops and small livestock. This has been done by organizing at least 4 farm field days, carrying out on-farm demonstration gardens on various crops ranging from cereals, root crops, legumes, tubers fruit trees and small livestock. Besides, there have been institutional training workshops and publications.

Picture 14.7: Practical demonstration carried on making plant tea during the EOA training with Prof. Rhoda Birech and Mr. Joseph Macharia

Picture 14.8: Mama Mutungi Showing her flock of indiginous chicken in Mithini project area

Picture 14.9: Mama Mutungi's poultry house

15. YOUTH INVOLVEMENT IN AGROECOLOGY EMPOWERS THEM ECONOMICALLY- *A Success Story By BvAT, Kenya*

Busia County in Western Kenya is well endowed with favorable weather and fertile soils. Despite this, food and nutrition security remains a key challenge to the farming community in the area.

According to the Kenya Health and Demographic Survey (KHDS) 2014, 1 in every 4 children in the area is stunted while 10 % are malnourished. In addition, it was noted that in the region, the average age of a smallholder farmer is between 50 – 65 years. Youth involvement in agriculture is minimal.

It is for this reason that Biovision Africa Trust, through the Ecological Organic Agriculture Initiative project, decided to raise awareness on the value of biodiversity for food and nutrition security. This is through establishing school gardens.

Picture 15.1: Multistorey garden with vegetables in Mundika Girls Primary School

School gardens are important practices as they provide nutritious meals to growing children and adolescents. They have also been identified as best practices for mobilizing biodiversity for improved dietary diversity as well as introducing the youth to agriculture. Children are involved in the entire process of establishing school gardens.

School gardens can help in promoting good diet, developing livelihood skills, and environmental awareness. School gardens can also become a seed ground for a nation's health and security.

Purposes of School Gardens

The school gardens serve various purposes, ranging from social, economic to ecological as listed below;

Social

a. They can be used to introduce life skills to the youth.
b. Health improvement through better nutrition
c. Creating a better image of agriculture among the youth.

Economic

a. It is an income generating activity for the children
b. Trains on marketing skills
c. Includes additional training on value addition and food preparation.

Ecological -Environment Conservation

a. Helps improve schools' environment through improved biodiversity.
b. Creates awareness about nature and how to work with nature, not against it.
c. Creates awareness on climate change
d. Trains the children on using organic methods of farming.

Guiding Principles of Establishing a School Garden

- Everything is in relationship
- Diversity rules
- Work with nature, not against it
- Design for the children

Establishing School Gardens

Two schools were selected to implement the project; Mundika Girls Primary School, a public school and Resonate Academy, a private school. The main crops selected for planting were indigenous vegetables including; amaranth, black nightshade, jute mallow and spider plant. Other crops included
spinach, sweet potatoes and sorghum.

Picture 15.2: Pupils from Mundika Girls at their school garden plots

The initial step was capacity building for the teachers, parents and pupils. They were trained on gardening including compost making, post-harvest management and cooking.
The next step was actual setting up of the demonstration gardens. After land preparation, the children were involved in planting and other agronomic practices during the growing season. At the end of the season, pupils harvested vegetables, sold to teachers and took some home to their parents.

Key Achievements

The following are the achievements that have been realized from the project:

- Improved nutrition for the pupils
- Environmental conservation
- Creation of market opportunities
- Creating a positive image on farming

Key Outcomes

- Good Gardening
- Improved Income
- Good Environment
- Healthy Eating

Project Implementers

The project was initiated by the Information and Communication Pillar Implementing Partner, Biovision Farmer Communication Program (FCP). In the field, implementation was done by staff at SINGI farmer resource Centre in collaboration with Diversity International and the school communities. Funding for establishing and running the school gardens was provided by the Swiss Agency for Development and Cooperation (SDC) funded component of EOA.

Picture 15.3: Pupils from Resonate Academy at their school garden plot

The ripple effect after the introduction of the Innovation

The pupils were very enthusiastic about the project and proudly shared their success with their teachers and parents.

Scaling up

The aim of the school gardens is to teach children and adolescents on sustainable agricultural practices, climate-sensitive technologies and methods and the nutritional value of locally available foods. The initiative can be up scaled to more schools. In addition, we hope that the production in each school can be increased to contribute to the school feeding program.

Quotes from beneficiaries

"I sold vegetables to my teacher and got money to buy biros and pencils for myself"

"I took vegetables from my school garden to my mother and she also planted at home. Now we eat nutritious food

"I took some vegetables from my garden to my mother and she was very happy."

16. HOW INCREASED MARKET ACCESS HAS IMPROVED LIVELIHOODS OF SMALL HOLDER ORGANIC FARMERS- *A Success Story By TOAM, Tanzania*

Arusha is one of Tanzania's touristic cities. This city has high demand for organic produce. The demand is mostly from Hotels, Lodges and diplomatic offices based here. Initially, farmers in Arusha's Meru and Arumeru districts grew vegetables conventionally. This resulted to adverse health and environmental effects. Their produce did not meet market demand in terms of quality and quantity. In addition, farmers lacked mobilization and coordination to tap the organic market opportunities.

Picture 16.1: Training on compost making

Established in the year 2013, Meru Sustainable Land Ltd (MESULA) is a company limited by guarantee. The company is located in Arusha and operates within Arusha and Meru Districts (Arumeru District Council). It is a service provider and supplier of organic horticultural crops.

Initially, MESULA was a project under a NGO dubbed Oikos East Africa, before it turned into a company, as a way of addressing the gaps in production and selling of organic produce. MESULA's mission is to develop a valuable market for organic products, increase production and raise awareness in Arusha Region. With technical support from TOAM, MESULA organized trainings on organic production and Participatory Guarantee System (PGS) for organic certification in 2014. The trainings resulted into formation of KANA and JOINT-KB PGS groups with 33 members. TOAM monitored both groups. In 2016, the groups were certified and licensed to use East African Organic Mark. To date, the groups have active license.

Picture 16.2: Jigsaw puzzle on quality management (PGS training)

Mesula Company owns an organic shop located in Arusha town, supplied with organic certified farm produce from KANA and JOINT-KB PGS farmers. From records the shop is visited by about 230 people, monthly. Every month, Mesula Company organizes a farmers market at the Oikos East Africa compound in Arusha.

The event brings together about 40 vendors and 150-350 consumers monthly, with diversified produce (vegetables, fruits, cheese, jams, coffee etc). The company's average monthly sales vary due to seasons; ranging from Tsh. 5,000,000 to Tsh. 17, 00,000.

TOAM has been supporting organized farmers market by designing, printing and supplying promotional materials like gazebo, aprons, banners and brochures, to promote Kilimo-Hai mark and share messages about organic products, as a part of consumer awareness campaigns. MESULA has been using its own resources to build capacities of the farmers on organic production; certification; consumer awareness and market linkages.

TOAM has ongoing projects with similar activities on consumer awareness. As a member of TOAM, Mesula benefited from the following projects: One Stop Organic Shop East Africa (OSOSEA), Organic Trade East Africa (OTEA) and Ecological Organic Agriculture Initiatives (EOAI).

Picture 16.3: Interview with farmers during farmers market organized by Mesula

Staff and farmers participated in events such as Meru farmers fair and farmers market organized by Mesula. There were also consumer awareness campaign days. The company plans to expand its operations within the current areas of operation and to the remaining districts of Arusha region. Currently, the company operates in 2 out of 7 districts.

Mesula Company played a big role in building farmers' capacity on organic production and certification; market linkage and consumer awareness in Arusha region. It is important for stakeholders, including public and private sector, to join forces on enabling farmers to tap into opportunities in the organic market.

Picture 16.4: TOAM&MESULA shared pavilion during Meru farmers Fair in Arusha

USING BEANS AS A COVER CROP SUCCEEDS IN SUPPRESSING WEEDS IN MAIZE PLANTATIONS- *A Case Study By SAT, Tanzania*

In the year 2010, a research was conducted to assess the viability of beans as a cover crop in maize fields to suppress weeds. Results showed that maize, intercropped with beans at a spacing of 50cm x 20cm gave significantly higher grain yield of 5.1 t/ha while maize grown as a sole crop gave low grain yield of 3.3 t/ha during the year's short rains season.

Generally, bean intercropped at 50cm x 20cm was the best population for suppressing weeds without affecting maize yield.

Botanicals and Natural Enemies as a Solution to Destructive Pests
In most cases, pre and post-harvest losses occur as a result of destructive insect pests. Most farmers fail to control these pests because the pesticides known are chemical based and expensive.
This research was conducted to assess to what extent botanicals and natural enemies can be a solution to destructive pests of crops.

These plants were proved to be a solution to most organic farmers. Researchers also urged governments to direct their attention to this and to possibly license use of botanicals and natural enemies as they are better for our health and soil in general.

Use of Rows
In Majulai and Migambo villages research was done to assess the efficiency of normal rows and rows with mixture of different mulches in erosion control, fertility management and yield increase. Results showed that crops planted in rows with Vernonia and Tithonia mulches produced better harvest as compared to crops planted in normal rows.
However, the research revealed that Vernonia does better compared to Tithonia.

Fertility management

Results on Weeding and Use of Natural Fertilizers on Yield
Research was conducted to assess the health of maize in fields that were weeded once compared to maize fields that were weeded 2 - 3 times. The result showed that it is important to weed 2 - 3 times in maize fields for better yield.

Efficiency of Nitrogen from Natural and Synthetic Sources in Growth, Yield and Quantity of Oil in Sunflower Crop
Sun flower oil contributes 40% of oil needed in Tanzania. However, sunflower yield is estimated to be 800 kg – 1100 kg per Hectare. The less yield is to some extent attributed to soil infertility.
This research assessed three different farms; one without use of any fertilizer, with Farm Yard Manure and another with use of synthetic fertilizers.

Results showed that both sunflower planted with farm Yard manure and that planted with Synthetic fertilizers were tall and produced well. However, sunflower applied with Farm Yard Manure had high oil content. To get better yields therefore, farmers were advised to use farm Yard manure at a rate of 10 tonnes per hectare.

Sustainable Agriculture; Impacts on Small Holder farmers.
Another research assessed the possibility of organic farming to improvement of farmers' lives. Researchers assessed more on how farmers run their farming activities from production to marketing. They also aimed at assessing and comparing the incomes of conventional and organic farmers.
Results showed that organic farmers have more than one crop in the farm and the quantity of production did not differ with that of conventional farmers.

Impacts of Organic Farming
Food and nutrition security to organic farmer was found to be higher as compared to normal farmers. This is attributed to mixed cropping, use of natural pesticides and timely planting. Organic farms also remain fertile for a long time and without developing a hardpan in the land.

Challenges Faced by Organic Farmers
The main aim of this research was to reveal the challenges associated with organic farming. The research checked on the following issues: innovativeness of farming techniques, mixed cropping, availability of irrigation water and marketing terms.
The research revealed that the challenges faced by most farmers were; lack of sufficient markets for their crops, poor land preparation, low price and change in weather conditions.

Organic Farming Technologies Available in Tanzania
Deep research was conducted to know the technologies used by farmers in production. This reviewed various researches through primary data, trainings conducted and extension services.
The results indicated that 54% of 26 technologies identified were applied in Soil Fertility Management. The widely used techniques being Mixed Cropping, Ridging, Terracing, Mulching and Rotational Cropping.

The benefits realized by use of these technologies are; improvement in soil fertility, (structure, nutrients, moisture retention) pests and diseases management and erosion control.

In general, this research helped to show positive impacts of organic farming technologies that were not widely disseminated for the purpose of scaling up.

EXCITING BREAKTHROUGH IN WEED CONTROL IN REMOTE VILLAGES OF MOROGORO, TANZANIA- *A Success Story By SAT, Tanzania*

Until the time Sustainable Agriculture Tanzania (SAT) intervened, farmers in Diovuva and Kiziwa villages in Morogoro used to practice unsustainable farming. This involved practices such as slash and burning, use of chemical fertilizers and pesticides like Kungfu and Karate which were common practices during farming seasons.

In 2015, SAT intervened by introducing agroecological farming methods. Groups were created in these villages. A Farmer Field Schools (FFS) approach was used to disseminate knowledge of organic agriculture.

Farming methods have since changed. Unlike previously, farmers have adopted sustainable farming methods. There is a change in land preparation, planting, weed management, irrigation, fertilizer use, insects, pests and crop diseases control by farmers in these villages.

Validating Organic Farming Practices

The study's general objective was to validate organic farming practices for soil fertility improvement, weed control and insect pest management. The study adopted case study approach whereby data was collected through various ways, including household survey and questionnaires which were designed and administered to 25 farmers from Diovuva and 22 farmers from Kiziwa. There were two Focus group discussion (FGDs); one from each village involving 15 participants.

Mulching For Crops Nutrition

Incorporation of grasses or crop residues during land preparation has made farmers see vegetation as potential source of mulch and crop nutrients. Comparing the current land preparation practice to the conventional one, one respondent from Diovuva village said: *"In the past we would simply slash the grass, burn, plough the land and plant. But having attended SAT trainings, we make terraces while following some technical measurements and burning is strictly discouraged".*

The Key Findings

Application of farmyard manure - According to the FGDs in both villages, the main difference between conventional and the current practice is on fertilizer use. Farmers currently use farmyard manure.

Control of pests and crop diseases using botanical extracts - Farmers from Diovuva were more positive that organic pests control is effective compared to farmers in Kiziwa.

Intercropping - According to FGDS most of the main crops are intercropped with at least one crop. Cow peas are the common crop used for intercropping.

Mulching - Mulching was reported as effective in suppressing weeds. Furthermore, mulching significantly increased soil fertility.

Construction of terraces - Farmers used to practice farming without any erosion control measures in the sloping land. It was observed that since being trained by SAT, farmers use terrace technique.

Farmers' Opinion towards Organic Farming

Farmers' opinions towards organic farming were measured against four outcomes namely; soil fertility improvement, weed control, crop yield improvement and pest management.

Effectiveness of organic farming in soil fertility improvement - 98% of farmers indicated that organic farming is effective in improving soil fertility. The main reason provided to support the argument is that farmyard manure and mulch/grass that is incorporated/applied in the soil offer long-term improvement of soil fertility.

Effectiveness of organic farming in weed control - 96% of farmers claimed that organic farming is effective on weed control. Wandering Jew has particularly been believed to be difficult to control. However, farmers reported that they were able to effectively control this type of weed through organic farming.

Effectiveness of organic farming in insects, pests and crop disease management - 66% of farmers reported that it is possible to control insects and pests in crops through organic farming. However, 30% of the farmers believed that organic farming is not effective in controlling insects' pests.

Effectiveness of organic farming in crop yield improvement - Farmers from both villages reported increase in yield from organic farming. Providing crop yield data and overall assessment of the group, Diovuva FGD participants indicated that they earned TShs210, 000 (US$ 91) from a 0.12-acre plot; which is very high revenue considering the plot's size.

19. ARROWROOTS THRIVING IN DRYLANDS- *A Case Study By Egerton University, Kenya*

Objective of the research

The research aimed at determining the growth and yield performance of upland-grown cocoyam in an effort to develop a package of agronomic practices to improve production in Kenya.

Picture 19.1: H.E Kinuthia Mbugua, Former Governor, Nakuru County (Center) and Prof. Rose Mwonya Vice Chancellor- Egerton University, admiring cocoyam at The Nakuru ASK Show

About arrowroots

In Kenya, arrowroots or cocoyam, (commonly known as "*nduma*") is normally grown in marsh lands and along riverbeds. Most farmers believe it can only be grown under such conditions. However, due to climate change, there has been increased scarcity of fresh water. This limits the availability of cocoyam especially in urban areas. To meet the ever growing demand some unscrupulous people have resulted to growing the crop in untreated sewage/ waste water. This exposes the growers and consumers to adverse health risks such as heavy metal poisoning (phytoremediation) and other infections due to exposure to dangerous pathogens, including parasites and bacteria (Thebo et al., 2017). Most consumers in urban setups opt not to buy due to these same reasons

Benefits of arrowroot

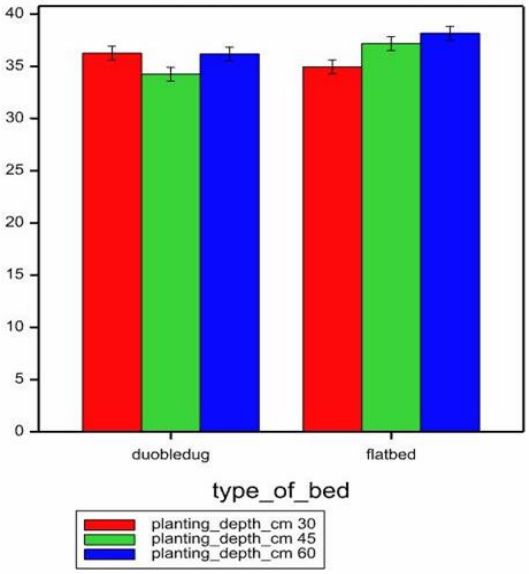
Arrowroots have high-quality phyto-nutrition profile comprising of dietary fibre, and antioxidants in addition to moderate proportions of minerals, and vitamins. Its corms provide important nutritional components such as carbohydrates, protein, thiamine, riboflavin, niacin, oxalic acid, calcium oxalate, minerals, lipids, unsaturated fatty acids and anthocyanins (Ramos Filho, Ramos, & Hiane, 1997; Subhash, Sarla, & Jaybardhan, 2012).

Picture 19.2: Picture showing cocoyam grown in sewage/ waste water

It is one of the finest source dietary fibres; 100 g flesh provides 4.1 g or 11% of daily-requirement of dietary fibre. Together with slow digesting complex carbohydrates, moderate amounts of fibre in the food help gradual rise in blood sugar levels.

Significance of the Research

This research sought to improve food security and income among smallholder farmers through cocoyam production under upland agroecology. The field study was conducted at Egerton University Research station (00o22'S, 35o35'E); Altitude 2267 m above sea level and receives a mean annual rainfall of 1000 mm with a mean temperature of 14-16 degrees centigrade. The experiments were carried out in the main growing season of 2016 and 2017. Cultivars were sourced from Nakuru, the study county, while experimental plots were used.



Graph 19.1: Effect of seedbed and planting depth on girth of tuber (cm)

Two Types of Seedbeds, Three Planting Depths

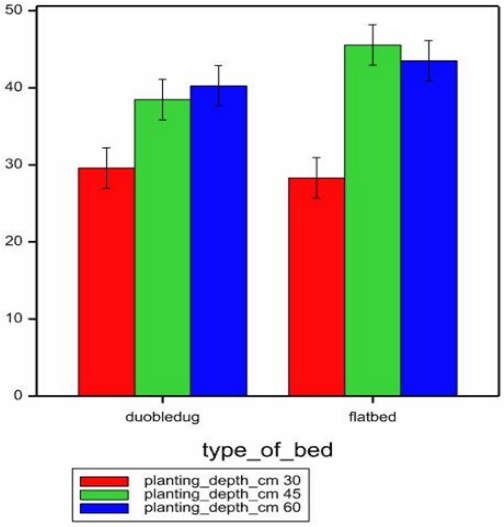
Treatments consisted of two types of seedbed and three planting depths of 30cm, 45cm & 60cm.

Increase in planting depth from 30 cm to 60 cm caused a **significant increase** in tuber yield at harvest. The trend was the same for both types of seedbeds.

Similarly, yield components such as tuber girth and length also increased significantly with increase in planting depth.

Type of Seedbed Influences Tuber Yield

The study showed that the type of seedbed influences tuber yield and other yield components at harvest in cocoyam. Total tuber yield at harvest increased with increased planting depth and peaked at 60cm irrespective of the type of seedbed, reaching a maximum of over 28 t/ha for double dug bed compared to the current farmers' practice which yields 15 t/ha (Acland, 1980).



Graph. 19.2. Effect of seedbed and planting depth on tuber length (cm)

It was also observed that the mean cocoyam girth and length was influenced by type of seedbed and depth of planting.

The impact of use of organic practices such double digging and manipulation of planting depth, coupled with application of organic crop residue in the production of rain-fed organic cocoyam was well illustrated. The organic practices had the ability to promote water harvesting and conservation, while at the same time providing nutrients which promoted crop canopy that is vital for dry matter accumulation and yield. Consequently, both type of seedbed and depth of planting were recommended for high tuber yield of rain-fed cocoyam.

Egerton University showcased the results on several platforms including; Egerton University Open Day, World Environment Day and Nakuru ASK show.

This yielded a lot of positive interest from farmers and the general public. A number of farmers have already been trained on the farming practices.

A documentary for farmers on the practice will be developed in partnership with BvAT.

Picture 19.3: Pictures of harvested Cocoyam at Egerton University

Picture 19.4: An early adopter in Sirwa Sub-county

Picture 19.5: Cocoyam on display at the ASK Show, Nakuru

	TYPE OF SEEDBED					
Depth (cm)	**Double dug bed**			**Flat bed**		
	Girth (cm)	**Length (cm)**	**Yield (Kg)**	**Girth (cm)**	**Length (cm)**	**Yield (Kg)**
30	34.25	28.39	8.42	34.94	29.61	8.50
45	36.18	43.57	11.48	37.18	38.53	14.19
60	36.26	45.64	17.34	38.17	40.32	13.96
Mean	35.56	39.20	12.41	37.17	36.15	12.22

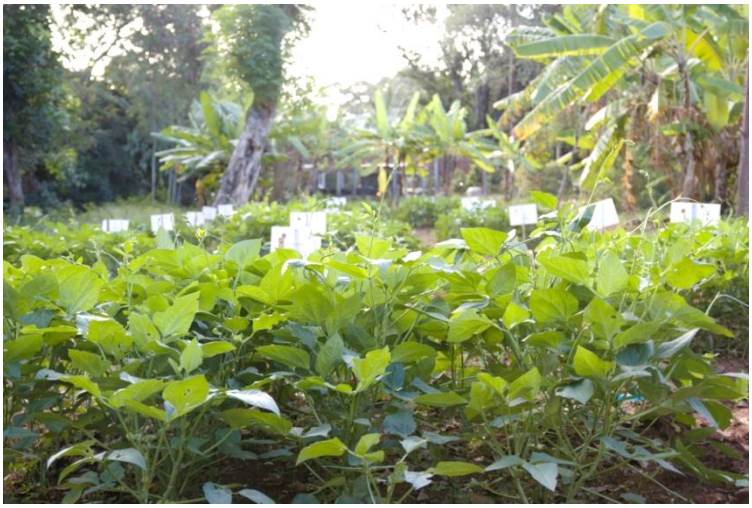
Table. 19.1. Mean of cocoyam tuber girth, length as influenced by type of seedbed and depth of planting in 2016

20. HAKIKA ORGANIC FERTILIZER; A NEW SOIL IMPROVEMENT TECHNOLOGY FOR LARGE SCALE ORGANIC FARMING- *A Case Study*

By TOAM, Tanzania

Hakika is a brand for a locally produced commercial-grade organic fertilizer in Tanzania. It is one of the Ecological Organic Agriculture (EOA) technologies available in Tanzania that was tested during EOA pillar one on research, training and extension. The eco-friendly and nutrient rich product is manufactured by Dar es Salaam-based Guavay Company Limited.

Field trials for the new product begun in 2016 with the aim of testing performance on different horticultural crops.



Picture 20.1: A view of cowpea grown by using HAKIKA Organic fertilizer

The research findings showed that Hakika improved soil organic matter, water retention capacity of the soil and the soil structure. Crop yield compared to other fertilizer treatments was more or less similar.

It was observed that Hakika has a residue effect to the soil, meaning that over time soil would improve and yield would substantially increase in the coming seasons.

Through the EOA pillar 1, three partners collaborated to embark on a field trial program. These included; Guavay Company Limited the private sector partner, ARI-Dakawa, a government agriculture research institute and University of Dar es Salaam.

Picture 20.2: Field testing at University of Dar es Salaam for three horticulture crops

Hakika organic fertilizer is produced from sorted bio-waste from food markets and other selected bio products. The technology behind its production involves engineered steel bio-reactors that decompose the feedstock to up to 75° C. At this temperature most pathogens cannot survive. The product is packed in granular form in 25kg and 50kg polythene bags and marketed at a price of TSh. 15,000 and TSh. 30,000 respectively.

Guavay is conducting product development to produce Hakika in cylindrical pellets which are more efficient in fertilizer application. Besides, this reduced the product's bulkiness. More than 100 farmers were introduced to the new technology.

Lessons Learnt

There is need for partnership with private sector and research institutions in testing new technologies in order to maximize output. It was also learnt that results dissemination was a lacking component, despite the technology performing well during the field trials.

Picture 20.3: Healthy cowpeas harvested in plot treated with Hakika Fertilizer

The possibility of Scaling-up this technology

Guavay Company Limited operates a 20 tones/month organic fertilizer small-scale factory in Dar es Salaam. The company looks ahead to scale up its production in the next 2 years to a medium-scale operation as the demand for organic fertilizer is set to increase. A key strategy to reach out to more smallholder farmers to adopt the new technology is through conducting more field-demonstrations to showcase the product's performance.

After the successful implementation of field trials and farmers trainings of the new organic fertilizer, the product is now known by a few farmers. Guavay is in the process of establishing distribution channels and work with existing agro-dealers to supply the fertilizer. There is a market opportunity for quality-certified organic fertilizer. However rigorous efforts are necessary for market penetration.

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