Interim Technical Report – July 2012

Evidence-based Scaling-up of Evergreen Agriculture for Increasing Crop Productivity, Fodder Supply and Resilience of the maize-mixed and agropastoral farming systems in Tanzania and Malawi

1. Purpose, objectives, planned outputs

Research Objectives

The objectives of this project are to: 1) carry out socio-economic and biophysical baselines of Evergreen Agriculture (EGA) practices, 2) establish the infrastructure for supplying tree seed and seedlings to be integrated into maize-legume-livestock systems based on farmers' needs, and 3) strengthen the capacity of farmers to use EGA technologies for sustaining maize and livestock production, and to collect, interpret and use weather information to make climate smart farming decisions.

Planned Outputs

- Socio-economic, cultural, and policy factors influencing the success of EGA documented.
- Biophysical factors underpinning the success of EGA documented
- Models to sustainable tree seed and seedling supply systems analysed
- The capacity of farmers to practice EGA and use weather information analysed

2. Project Partners

- **ICRAF**: Overall coordination of the projects, collect baseline information to identify constraints and opportunities for agricultural intensifications, conduct tree inventory and document ecological and socio-economic values of trees in the agricultural landscape.
- **IRA** (Institute of Resource Assessment, University) of Dar-es-Salaam: training farmers on the use weather information
- **SUA** (Sokoine University of Agriculture): Analysis of Land cover and land use change to identify degradation hotspot and possible interventions for addressing the problem.
- **ARI (Agriculture Research Institute)-Hombolo**: Literature survey and Baseline survey in collaboration with ICRAF-Tanzania.
- **Others**: The field visit to select site for this jumpstart identified the following partners who will be actively involved during data collection: District Agricultural and Livestock officers (DALDOs) and extension officers. Activity 1.2 under the output 1 (Appendix 1) will also generate information of other partners who will be useful for the AfricaRISING project work in subsequent years.

3. Achievements and deliverables against plan

The research team conducted pre-site visit in Kondoa and Mbulu districts and later held the inception workshop on June 4th and 5th in Bagamoyo, Tanzania. These sites however have been changed to Kongwa and Kiteto districts following the recommendation by Jerry Glover their visit to USAID mission in Tanzania. The inception workshop reviewed research focus, objectives, outputs and methodologies through a series of presentations given by researchers as detailed in the workshop proceedings (Appendix 2). The main deliverables and how they will contribute to the AfricaRISING Project are summarized in Appendix 1.

4. Key Deliverable Deviation

- Given the short-duration nature of this project, the output 4 was revised at the inception workshop to focus on assessing training needs of farmers in respects to collection, interpretation and use of climate change information as well as practising EGA and then use this information to prepare the training materials.
- Study site which were pre-selected prior to the inception workshop and now been changed to Kiteto and Kongwa districts to co-locate AfricaRISING activities with the Feed-the-Future action sites as recommended by Jerry Glover.

5. List of geo-tagged locations/sites where activities took place

Not applicable at this stage as the tree inventory work will start on July 30th, 2012. Household to be interviewed will not be geo-referenced since names of interviewee will be obtained from the village Government or Ward office and selected at random.

6. Support of AFRICA RISING

The link between this jumpstart and the AfricaRISINg project is summarized in Appendix 1.

7. Scalability

Not applicable at this stage

8. Lessons learnt

The field visit was conducted prior to the inception workshop revealed that exotic trees, mainly *Grevillea robusta* and *Eucalyptus* spp are dominating farmlands in Kondoa and Mbulu districts where they supply various wood products and also re-enforce soil and water conservation structures. During the visit it was revealed that farmers use little or no fertilizer. Soil erosion and nutrient mining, recurrent drought, continued use of farmers recycled seeds of crops and lack of tree germplasm and limited grazing area seems to be one of the major constraints for increased agricultural productivity. Therefore, we anticipate that the following issues may be one of the key areas that need further studies and scaling out activities under the AfricaRISING Project: 1) increasing tree diversity on-farm for improved nutrition, soil fertility replenishment, and soil erosion control, 2) agronomic trials on integrated soil water and nutrient management to optimize yields of maize and legumes, and 3) tree-crop- livestock interactions to optimize crop yields and utilization of land and forest resources.

9. Publicity

The project anticipate to publish a working paper on factor influencing the success of evergreen agriculture in central Tanzania and two journal articles: 1) the dynamics of tree cover changes, stocking levels and values of trees on-farm in Semi-arid Tanzania, and 2) Sustainable tree seed and seedling supplying systems in Malawi. Other forms of information outlets such as conference presentations, extension materials and fliers will be explored during the implementations.

Appendix 1: Research Activities for the Evergreen Agriculture Project in Tanzania and Malawi

Activity/Output	Main Deliverables	Link to Africa RISING
Output 1: Socio-economic, cultural, and policy factors influencing the success of EGA documented		
1.1. Review literature on socio-economic, cultural and policy factors determining the success of EGA in Tanzania	Report (based on the LR and baseline study) on the socio-economic aspects of EGA and existing EGA technologies in the study sites	Set a platform of technologies and partners for scaling out EGA
1.2. Collect and analyse information from other stakeholders such as where they work, focus of their work and complementarity and synergies.		
1.3. Baseline survey through the use of PRA and interviews with head of households and key informants		
Output 2: Biophysical factors underpinning the success of EGA documented		
2.1. Conduct on-farm tree inventory and vegetation mapping	Report on tree stocking and vegetation mapping	Map high potential and marginal areas for agricultural intensification.
2.2. Conduct land health and soil survey across the study sites	Report and mapping of hotspots of degradation and agricultural potential areas in the study sites	
2.3. Literature search and review on vegetation, soils, farming systems in the study sites	Literature review report on the biophysical aspect of EGA	
Output 3: Models to sustainable tree seed and seedling supply systems analysed		
3.1. Improve seedling production capacity of 4 selected central nurseries.	5000 tree seedlings produced for the 2013 growing season	Establish the demand and assess local capacity to supply of tree germplasm Ensure availability of planting materials for the next growing season.
3.2. Conduct an inventory of the existing tree nursery, their production capacity and the appropriate germplasm supply systems	Survey reports on existing tree nurseries and their production capacity	
3.3. Desktop study on comparative analysis of germplam supply systems based on existing information in Malawi with inputs of baseline data from Tanzania	Research report on the appropriate germplasm supply systems	
Output 4: Training materials on EGA practices and the use weather information by farmers developed		
4.1. Training needs assessment based on PRA, household interviews and key informants and literature review on climate change and agriculture	Literature reports on climate change issues	Prepare training manuals for scaling out and further research Prepare ToT and master farmers for scaling out and further research.
4.2. Preparation of training manuals on climate issues and agroforestry practices	100 training manuals produced and distributed to stakeholder e.g., extension staff, farmers etc., for pre-testing.	
4.3. Testing of training manuals on climate issues (weather) for feedback from stakeholders	• Reports on training manual pre-testing • Revised version of the training manual produced. • 500 farmers trained/reached during preparation and pre-testing training manuals	

Appendix 2: Proceedings of the Evergreen Agriculture inception workshop

Held at Livingstone Hotel Resort,

Bagamoyo, Tanzania

4th – 5th June 2012

Narrated by
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Table of contents

1. INTRODUCTION

1.1 Background

Inception workshop for the new project under the African Rising under the jumpstart activities was held in Bagamoyo on 4th – 5th June in Bagamoyo, 60 km north of Dar es Salaam. Participants from partner institutions involved in the project gathered to refresh the work plan and critical review of the methodology.

The World Agroforestry Centre, is implementing a project titled '*Evidence-based Scaling-up of Evergreen Agriculture for Increasing Crop Productivity, Fodder Supply and Resilience of the maize-mixed and agropastoral farming systems in Tanzania and Malawi*', in collaboration with Institute of Resource Assessment, University of Dar Es Salaam and Hombolo Agricultural Research Institute. This is a six months project feeding into the AFRICAN RISING project under the leadership of IITA and funded by USAID Feed the Future program. The project will be implemented in Kondoa (in Dodoma region) and Mbulu (in Manyara region) in Tanzania and Ncheu and Kasungu districts in Malawi. These sites have now been changed to Kiteto and Kongwa districts as described earlier.

The main objective of this project is to build an evidence base for scaling up Evergreen agriculture (EGA) to increase crop productivity, fodder supply and resilience of the maize-mixed and agro-pastoral farming systems in Tanzania and Malawi. Specific objectives are to: 1) provide a synthesis of state-of-the-art knowledge on EGA, (2) establish socio-economic and biophysical baselines of EGA practices, 3) establish the infrastructure for supplying tree seed and seedlings to be integrated into maize-legume-livestock systems based on farmers' needs, and 4) strengthen the capacity of farmers to use EGA technologies for sustaining maize and livestock production, and to collect, interpret and use weather information to make climate smart farming decisions.

1.2 Project outputs

The project has four outputs which include:

Output 1: Socio-economic, cultural, and policy factors influencing the success of EGA documented.

Output 2: Biophysical factors underpinning the success of EGA documented.

Output 3: Models to sustainable tree seed and seedling supply systems analysed.

Output 4: Training materials on EGA practices and the use weather information by farmers developed.

1.3 Objectives of the inception workshop

The objectives of the inception workshop were to:

i. Bring together team of researchers that developed the project for joint revisit of the project methodology, outputs and deliverables

ii. Updates on the new development since the submission of the project.
iii. Agree on modalities for project implementation.
iv. Formulate work plan for implementation.
v. Sorting out budgeting and sub-contracting issues.

2. PRESENTATION ON THE SUBJECT MATTERS

2.1 Opening remarks

By Bekunda Mateete, IITA System Agronomist

Prof. Bekunda Mateete is the IITA System Agronomist based in Arusha Tanzania, overseeing the jump start projects under African Rising in Eastern and Southern Africa. In total ten jump start projects are being implemented focusing in Manyara, Dodoma and Morogoro regions in Tanzania. Overall, the African Rising project is expected to last for the next five year.

He highlighted that this early win project is part of the Feed the Future program, which is trying to get people out of hunger and also out of poverty. Under this big umbrella science and research was considered to be part of the activities for the Feed the Future. The essence was to get the research institutions work together to ensure the sustainable intensification which is not new to farmers become easier to adopt.

He further pointed out that there is need to intensify African farming system e.g. a call under CRP 1.1 and 1.2 of the CGIAR centres, which tally with the umbrella project name RISING (**R**esearch **I**n **S**ustainable Intensification for the Next Generation). While implementing the early win or jump start proposal it is also important to address the priorities of the USAID missions in the countries as expressed in their strategies. Furthermore, in Malawi Prof. Snapp of Michigan State University is working in Ntcheu district which is also selected for this project as well.

2.2 Overview of the project

By Anthony Kimaro, ICRAF Country Representative, Tanzania

He reiterated the fact that several challenges still face the agricultural sector in sub-Saharan Africa, which this jump start project will contribute in finding proper solutions. Reminded that this jump start proposal is led by ICRAF and two major national partners including Institute of Resource Assessment, Hombolo Agricultural Research Institutes and Sokoine University of Agriculture. Furthermore, other partners will be co-opted as the implementation starts including district authorities, central government, local NGOs and public institutions.

It was highlighted that the time left for implementing the project is very limited. Several factors have contributed to the delay, but much focus should now be on the implementation. This inception was thus to serve as the screening meeting to identify outputs and deliverables which are realistic given the time frame that has remained and resources available.

2.3 Farming systems in Mbulu and Kondoa districts, Tanzania

By Mathew Mpanda, ICRAF Tanzania

Presentation was focused on the field visits to respective districts of Mbulu and Kondoa (Fig. 1) combined with discussion with key informants, who were DALDOs, agricultural officers and HADO manager in Kondoa.

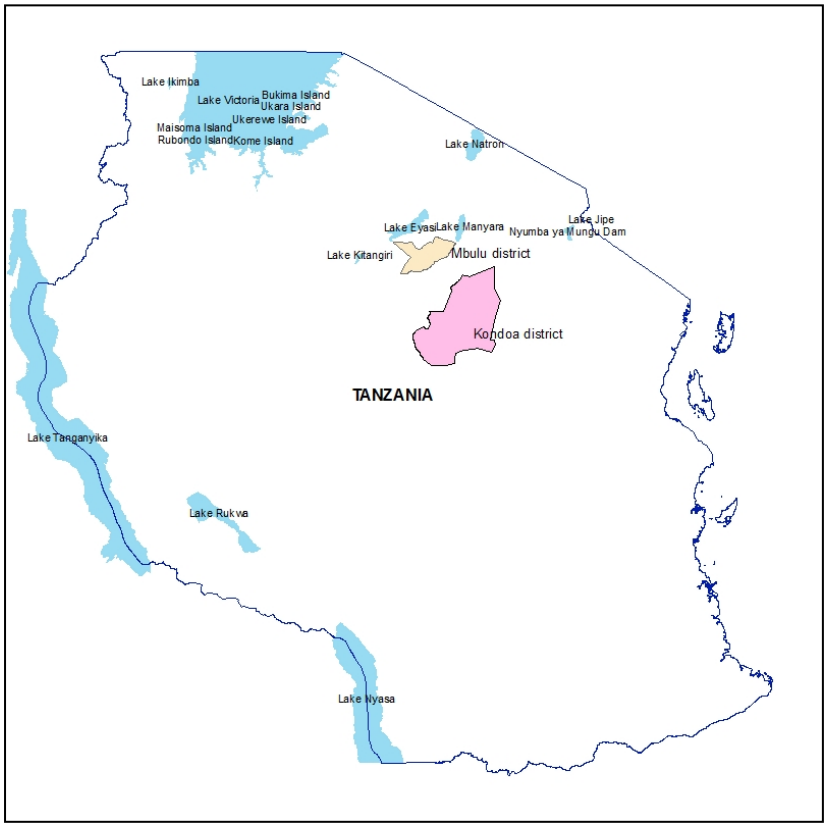

Figure 1: Sketch map of Tanzania showing the project site of Mbulu and Kondoa districts

Mbulu district in Manyara region was explained to have Rainfall ranging from 300 – 1200 mm and temperature of 12.6 – 30.2^{o}C. Agriculture is the mainstay of the majority of people involving crop farming and livestock keeping. Zero grazing was informed to be practices in the central zone, while the rest of the district uses free grazing. Maize, sorghum, millet, wheat, sweet potato, beans, pigeon pea, sunflower, etc are the main crops produced. Coffee was reported to be cultivated in the eastern zone which was much cold and humid. Agroforestry practices i.e. trees on farm (mainly Grevillea, Eucalyptus, very few indigenous especially in the highlands, shrubs incorporated such as Calliandra).

Plate 1: Agricultural landscape in the southern part of Mbulu district. *Photo credit: Mathew Mpanda*

Kondoa district in Dodoma region and is one of the most productive districts. It has 34 wards covering an area of 13,210 km^2. It is one of the productive districts in Dodoma region, with rain season starting in Nov and ending in April or May. Livestock keeping is done across the district. The main food crops include maize, millet, sorghum, cassava and sweet potato, Cash crop includes sesame and sunflower. The northern zone of the district is made up of highland predominantly maize growing with pigeon pea, semi mechanized farming, but with shallow and sandy soils, high rainfall, some areas practising zero grazing. Southern zone part is lowland, predominantly cultivating sorghum, millet, very deep red and black soils, relatively dry, livestock keeping mainly free grazing,

2.4 Farming systems in Kasungu and Ntcheu districts, Malawi

By Isaac Nyoka, Consultant ICRAF Malawi

Presentation for the farming systems in Kasungu and Ntcheu districts (Fig. 2) which are representatives of other areas of Malawi. The sites are found in the central and southern parts of the country.

Kasungu district is predominantly large and small scale tobacco farming area. Tobacco is the single most important cash-crop providing most of the income for majority households. Maize is the staple crop, and other crops are groundnuts, sweet potatoes and soya beans. Livestock keeping is practised in the northern part of the district. Kasungu District falls under the Kasungu-Lilongwe Plain Livelihood zone. Population of the zone is 3.2million.

Ntcheu district is predominantly maize based system with legume crops, and livestock keeping. Other crops include cassava, vegetables, Irish potato and some temperate fruits in the higher altitude. Ntcheu district falls in the Rift Valley Escarpment Livelihood zone. Population of Zone is 1,167,578 (9.78%).

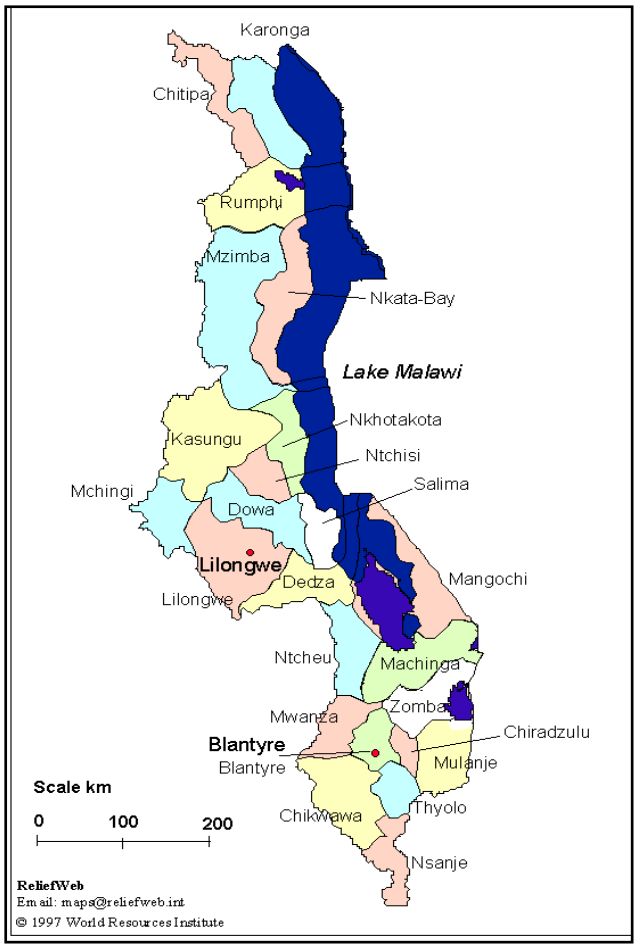

Figure 2: Sketch map of Malawi showing project sites of Kasungu and Ntcheu districts

Plate 2: Tree incorporation with crops in Malawi

3.0 REVIEW OF THE METHODS FOR PROJECT IMPLEMENTATION

3.1 Synthesis of existing knowledge on socio-economic, cultural, and policy factors influencing the success of EGA

Presented by Anthony Kimaro

Methods for the information gathering involved various techniques such as literature search (mainly from research institutions reports/scientific paper on; agriculture, forestry, climate change land restoration), household questionnaire survey, and focused group discussion (replicated at village-level, with contrasting area from one village to another).

At the meantime draft tools were reported to be in place including checklist for interview with key informants, draft questionnaire for household survey. Furthermore, district will be stratified according to agro-ecological zones and production potentials, and thus specific villages chosen.

It was emphasized that major indicators and minor ones should be formulated as per shared USAID format. The terminology 'evidence based scaling up' was found to be too load, and most likely would require clear focus on the outputs.

Furthermore, it was advised that the short name of the project need to be formulated to enable easier communication among partners and other stakeholders.

3.2 Documentation of biophysical factors underpinning the success of EGA

Presented by Mathew Mpanda

The presentation focused on the tools for characterization of the project site condition to enable rolling out of best alternatives in regard to the current practices. Key issues to be scrutinized include land health, vegetation cover and farming system. Key methods to be used include literature survey, focused group discussion and transect walk for soil and tree inventory.

Information to be collected will be from various documents, report and records pertaining to land health e.g. soil nutrients, pH, species, density, spatial arrangement, impacts on crops and soil productivity, crops, livestock etc. Primary data will be collected in the field through involvement of district officers and communities through focused group discussions to unveil pattern of land uses, and transect walk to collect information on soil through spot assessment and profiling. Tree inventory will be done along the transect walk utilizing both visual and actual measurements.

Information gathered will later to be used to analyse stocking parameters, diversity, use, and preference by local people. Furthermore, information on soil such as soil organic carbon, nutrients, pH, and bulk density will be used to dictate type of interventions need in a particular area. Combination of the vegetation and soil data

will enable development of various spatial layers of the soil, vegetation, population and weather and later production of various maps such as soil maps, vegetation maps, hotspots of land degradation, and potential areas for scaling up EGA etc.

3.3 Analysis of capacity and models to sustainable tree seed and seedling supply systems

Presented by Isaac Nyoka

This presentation introduced some key elements to consider in sustainable tree seed and seedling supply systems. First importantly to understand are the elements of sustainable agroforestry germplasm systems which includes;

- Must be high quality germplasm
- Must be cost effective
- Must supply the right species, seed sources
- Must be demand driven

The actors of the agroforestry germplasm supply should be known, who may include farmers, NGOs, govt and individual entrepreneurs. Furthermore, understanding of who does the seed multiplication is very important, as this also can determine sources of germplasms such as;

- Designated seed orchards
- Planted farmland trees e.g. woodlots, boundary plantings, intercropped trees etc
- Remnant farmland trees
- Seed orchards

He further highlighted that tree germplasm quality (e.g. genetic quality, purity, viability, health) are important to be known, and this can contribute to knowledge on tree germplasm. However, he emphasized that in Malawi synthesis of published work can be use especially from seed systems for crops and seed systems for trees.

Experience from Malawi was requested as to how the seed agency is performing bearing in mind that the similar agency in Tanzania i.e. Tanzania Tree Seed Agency is totally relying on government subsidies. He explained that the same experience is there in Malawi, there are two institutions; a government tree seed centre, and a quasi-government tree seed centre (Land Resources Centre - LRC), both of which and this is due to the tendency of centralization, making it difficult to reach farmers who are the majority and main buyers of tree seeds. Furthermore, in Malawi Prof. Snapp of Michigan State University is working in Ntcheu district which is also selected for this project as well. Germplasm distribution in Malawi is largely aided by NGOs with very limited farmer-to-farmer exchange.

3.3 Analysis of the capacity of farmers to practice EGA and use of weather information

Presented by Amos Majule

The essence of this output dwells on linking indigenous knowledge of farmers forecast to scientific weather forecast and thus enables farmers to timely align to seasonal activities. Available tools will be updated to suit the two project sites of Kondoa and Mbulu districts. Farmers from one area which have been trained will be used to train others and hence making the transfer of technology much easier and quicker. The meeting was informed that this method has proved to be useful to farmers in some parts of Tanzania, hence will be adopted in the project sites.

Knowledge of local people on climate change will be assessed mainly using pairwise ranking to various causes of climate change as per farmers understanding. Data on temperature and precipitation will be used during the training to enable farmers conceptualize various tools that will be used.

Plate 3: Farmers receiving training and practise use of weather information to facilitate their farming activities.

4.0 PROJECT IMPLEMENTATION STRATEGY

Generally plenary was conducted to review the project indicators, planning for the field work, reporting time and format, resources allocation per outputs and activities, sub-contracts and engagements of interns and field assistants. Key operational statements agreed include;

i. A total of 4 villages were agreed to be included in each district for this phase of the project i.e. each district has to engage two wards with contrasting features and have two villages from these respective

wards. The aim is to maximize the sampling size and have enough number of grassroots involved in the project.

ii. Stakeholders and other interested parts in the project sites will be involved in implementation depending on their current roles and capacity e.g. HADO in Kondoa. Furthermore, local government authorities in Kondoa and Mbulu will be part of the implementation team to enable easy retrieval and spread of knowledge to farmers even beyond the selected villages.

iii. ICRAF being the overall lead of the project will be responsible to ensure adherence to timeline and financial accounting of the project resources. However, key partners in the project will be sub-contracted to implement some specific tasks depending on their areas of specialization.

iv. Coordination of the project activities will need to be shared among team members to enable sharing of resources like vehicles and hence reduce implementation costs and maximize the field work output.

v. Criteria for final selection of the project sites at village level should be clear and objective across all districts in Tanzania and Malawi

vi. Good communication strategy should be in place to enable project members update on the status of the project and other important information. This can be effected through emails, phone calls, skype etc.

vii. Regular writeshops should be organised to synthesize information collected from various

Furthermore, the following actions points was agreed to fast track the project implementation;

i. Revision of the Workplan in a good format with output, activities and timeframe. 15th June Friday next week. *Anthony to send the draft to members*

ii. Submit indicators in-line with the Workplan. 15th June Friday next week.

iii. Revision of data collection tools to incorporate comments. 15th June Friday next week

iv. Drafting of sub-contracts by ICRAF Tanzania. 15th June Friday next week

v. Proceedings of the workshop will be out in 15th June Friday next week

vi. Communication strategy: Synchronizing information among members of the group through emails, phones, etc

Closing remarks for the workshop was given by Mr. Elirehema Swai, who thanked participants for the commitment shown during this inception workshop for effective planning of the implementation. He further thanked IITA for support especially during this meeting for explaining some useful concepts. He also thanked Isaac Nyoka for sharing his experience on the work in Malawi and reiterating that the combination of the Tanzania and Malawi work in this project will provide good basis for farmers to share knowledge and practices in future.