



TERMS OF REFERENCE FOR

**TRAINER (S) TO PROVIDE TRAINING ON BASIC
MATHEMATICS IN AGRICULTURE FOR AGRICULTURAL
TUTORS FROM 29 AGRICULTURAL TRAINING INSTITUTES**

**LED LIECHTENSTEIN
DEVELOPMENT
SERVICE**



AUGUST, 2021
SUSTAINABLE AGRICULTURE TANZANIA
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1.0. About Sustainable Agriculture Tanzania (SAT)

Sustainable Agriculture Tanzania (SAT) is an organization which was registered in June 2011 with registration number SA-17581 and complying to the NGOs Act 2002 as amended in 2019 with registration number 00NGO/R/833 issued in December 2019. SAT's vision is that "the majority of farmers are using acknowledged agroecological methods to improve their livelihoods, conserve the environment, and reduce pressure on natural resources". To visualize this, SAT has several missions which are to transform farming practices in Tanzania through proper knowledge dissemination; to build the capacity of farmers so that they can effectively participate in the value chain; to collaborate with relevant partners in the public and private sector in order to strengthen their capacity in agroecology; and to work as a credible organization, which has a transparent, accountable and cost-efficient approach to the holistic transformation of agriculture into an environmentally friendly and economically viable sector. SAT collaborates with other stakeholders like the Ministry of Agriculture, universities, organizations, companies and governmental extension officers to be involved in activities that are carried out by SAT. This holistic approach establishes an Innovation Platform, where dissemination, research, application and marketing and networking build the main pillars. SAT headquarters are located in Morogoro Town, operates in more than 4 regions in Tanzania and manages a Farmer Training Centre, which is located on a 600-acre organic farm at Vianzi village. SAT runs its operations through a number of donor-funded projects and the Curriculum Implementation Support for Training Institutes (CISTI) project is one of them.

2.0. About CISTI project

Sustainable Agriculture Tanzania (SAT) in collaboration with Division of Training, Extension Services and Research of Ministry of Agriculture started to implement the Curriculum Implementation Support for Agriculture Training Institutes (CISTI) project in 2019 which is supported by Liechtenstein Development Service (LED). The CISTI project has the major aim of supporting the production of competent technical personnel who work effectively to meet the demand of Tanzania's agriculture sector, increasing climate resilience and strengthening livelihoods of small holder farmers, thus alleviating poverty and food insecurity for sustainable development. In the bid to reach this aim, 4 major objectives have been set up namely: (i) CISTI is fully introduced to stakeholders, compendiums on Organic Agriculture (OA), Gender in Agriculture, Environmental Management, Principles of Cooperatives in Agriculture and Basic Communication Skills are developed, continuously updated and used in all training institutes. (ii) Students benefit from knowledgeable and skilled tutors who can cope with the new curriculum using state-of-the-art educational methods. (iii) Well-equipped institutions and SAT FTC provide conducive learning environment for students and tutors. (iv) An efficient Division of Training Extension Services and Research (DTER) ensures harmonization, adoption, delivery and implementation of the new curriculum.

3.0. How basic mathematics in agriculture module came about

In August 2018 the Ministry of Agriculture reviewed curriculum for Certificate and Ordinary

Diploma in Agriculture. As the results of the review, the name of the curriculum was changed from General Agriculture to Agriculture Production. This change has an effect to all Agricultural Training Institutes (14 public and 15 private Agriculture Training Institutes). The need for changes in the curriculum was justified with the recently conducted Situational Analysis. In 2020, Sustainable Agriculture Tanzania in collaboration with the Ministry of Agriculture conducted situational analysis to identify knowledge, skills and technologies needed in the labour market to inform the review of six curricula of the ministry of agriculture (Agromechanization, Horticulture, Crop Production, Food Technologies and Nutrition, Agricultural Land Use Planning and Management and Irrigation Engineering). Basic Mathematics in Agriculture is among the skills and knowledge that a graduate from ATIs should demonstrate in the labour market as indicated in the situational analysis results. To meet the labour market demand, the Basic Mathematics in Agriculture module was incorporated in all 7 curricula of the Ministry of Agriculture.

4.0. Objective of the assignment

The main objective of Basic Mathematics in Agriculture training is to equip 29 agricultural tutors with knowledge and skills on Basic Mathematics in Agriculture. Training of tutors responsible to train students on Basic Mathematics in Agriculture is an important step towards enabling effective delivery of the curriculum. After the training, the tutors are expected to work together to prepare a draft compendium/training manual on Basic Mathematics in Agriculture. The developed compendium will be used as a teaching and learning resource to both tutors and students.

5.0. Scope of Basic Mathematics in Agriculture Training

The facilitator may navigate in length, width and depth regarding the field of Mathematics in Agriculture, but they should focus on the following aspects below, as they are reflected in the curriculum to be implemented. Basic Mathematics in Agriculture will be offered to students under National Technical Award (NTA) level 5. The aim of offering this training to students is to enable them to apply basic mathematical computation techniques to manipulate basic mathematical information in agriculture.

5.1 Summary of learning outcomes

5.1.1 Principal Learning Outcomes

Students who will be trained on Basic Mathematics in Agriculture are expected to be able to Apply basic mathematical computation techniques to manipulate basic mathematical information in agriculture.

5.1.2 Enabling Learning Outcomes

Under this module, there are six enabling outcomes as stipulated in the agriculture production curriculum, at the end of training on Basic Mathematics in Agriculture module, students should be able to:

1. Apply basic mathematics techniques to describe number systems

2. Use basic mathematics skills to operate with numbers
3. Apply mathematical computation techniques to measure agricultural quantities
4. Apply mathematical computation to convert and estimate agricultural data
5. Apply measures of variations and ratios to establish relationship between two agricultural variables
6. Apply basic trigonometric ratios to compute different dimensions in agriculture

5.1.3. Sub-Enabling Outcomes

Under this module, there are twenty (20) major sub-enabling outcomes. These are the major areas that students will be required to gain knowledge and skills from through theoretical and practical learning. These sub-enabling outcomes are expounded further through their related tasks as will be indicated in the table that follows this section.

3.1.1 Describe number systems

3.1.2 Describe a number line and a plane

3.1.3 Describe types of numbers (whole, natural, integers & rational)

3.1.4 Describe fractions

3.1.5 Compare types of fractions (proper, improper, mixed)

3.2.1 Operate with fractions (adding, subtracting, adding, dividing)

3.2.2 Describe units of measurement (Length, Weight, Time)

3.2.3 Describe and use systems of measurement (Metric and non-metric)

3.2.1 Operate with fractions (adding, subtracting, adding, dividing)

3.2.2 Describe units of measurement (Length, Weight, Time)

3.2.3 Describe and use systems of measurement (Metric and non-metric)

3.4.1 Describe devices for measuring agricultural quantities for length, weight and time

3.4.2 Describe linear functions and slopes of a line

3.4.3 Present graphs of linear functions

3.5.1 Describe relationship between agricultural variables

3.5.2 Solve problems related to variations and ratios

3.5.3 Describe basic trigonometric ratios

3.6.1 Describe relationship between basic trigonometric ratios

3.6.2 Use basic trigonometric ratios in setting agricultural related tasks

3.6.3 Describe number systems

The table below gives more details of these sub-enabling outcomes by breaking them down into related tasks. Related tasks are the more refined content areas that are derived from each sub-enabling outcome.

Table 1: Sub-enabling Learning Outcomes and their related tasks

Sub-enabling Outcomes	Related Tasks
3.1.1 Describe number systems	(a) Define a number system (b) Use a number line to describe types of numbers in the number system (c) Locate points and sketch a number line and a number plane
3.1.2 Describe a number line and a plane	(a) Explain a number line with integers (b) Explain a number plane with integers (c) Show the points on the plane
3.1.3 Describe types of numbers (whole, natural, integers & rational)	a) Explain and list an example of Natural and whole numbers (b) List the natural numbers in groups of odd, even, and prime (c) Explain and list an example of integers and whole numbers
3.1.4 Describe fractions	(a) Define fractions (b) List fraction (c) Represent fractions in a number line
3.1.5 Compare types of fractions (proper, improper, mixed)	(a) Describe different types of fractions (b) Identify techniques to compare fractions (c) Use techniques to compare fractions
3.2.3 Solve problems with fractions (adding, subtracting, dividing and multiplying)	(a) Operate with improper fractions (b) Operate with mixed fractions (c) Use fractions in agriculture
3.3.1 Describe units of measurement (Length, Weight, Time)	(a) Define units of length, weight and time (b) State the important standard units of the three measurements (c) Use calibrated instruments to measure weather, chemicals and other quantities used in agriculture
3.3.2 Describe systems of measurement (Metric and imperial) applied in agriculture quantities	(a) Define system of measurements (b) Identify systems of measurements (c) Use systems of measurements to measure agricultural Quantities

3.3.3 Convert and compare different units of measuring Agriculture quantities from one unit to another	<ul style="list-style-type: none"> (a) Outline different units of measurement (b) Convert and compare units (c) Use appropriate units to measure agricultural quantities
3.4.1 Describe devices for measuring agricultural quantities for length, weight and time	<ul style="list-style-type: none"> (a) Identify measuring devices in agriculture (b) State the right activity each device is used (c) Use the devices to measure lengths of agricultural fields
3.4.2 Measure length, perimeter, circumference of different shapes, areas, volumes and weight of agricultural quantities and products	<ul style="list-style-type: none"> (a) Identify features required to be measured in the field of agriculture (b) State different measurements used to measure length, area, volume, weight (c) Use metric and nonmetric instruments to measure regular and irregular field areas, distances, volumes and weights in agriculture
3.4.3 Describe ways of converting and estimating agricultural inputs (weight of fertilizers, pesticides...)	<ul style="list-style-type: none"> (a) Estimate different agricultural inputs in different sizes of weights and volumes (b) Convert units of each input appropriately measuring a quantity (c) Use converted right instruments to measure the quantities
3.5.1 Describe linear functions	<ul style="list-style-type: none"> (a) Define a line and a slope of a line (b) Connect the relationship between a line and a slope (c) Use a line and a slope of a line to estimate gradients and slopes of lands
3.5.2 Present graphs of linear functions	<ul style="list-style-type: none"> a) Define a linear function (b) Sketch graphs of linear functions (c) Use graphs to predict output in agriculture
3.5.3 Describe relationship between agricultural variables	<ul style="list-style-type: none"> (a) Explain the relationship between two variables (b) Determine agricultural input and output variables (c) Use trends to predict agriculture yields
3.5.4 Solve problems related to variations and ratios	<ul style="list-style-type: none"> (a) Define variation and ratios (b) Calculate ratios and variations in the field of agriculture (c) Use variations and ratios to estimate agricultural quantities
3.6.1 Describe Basic trigonometric ratios	<ul style="list-style-type: none"> (a) Define basic trigonometric ratios (b) Calculate triangular and rectangular fields, length, areas and perimeter (c) Use basic trigonometric ratios to determine length of edges of agricultural plots

3.6.2 Describe relationship Between trigonometric ratios	(a) Define relationship between sine, cosine, and tangent of an angle (b) Calculate sine, cosine and tangent of an angle (c) Determine edges of agricultural plots by calculated values
3.6.3 Use basic trigonometric ratios in setting agricultural related tasks	(a) Identify basic trigonometric ratios applicable to specific agricultural tasks (b) Describe the use of basic trigonometric ratios applicable to specific agricultural tasks (c) Describe appropriateness of specific basic trigonometric ratio to particular agricultural related tasks

6.0. Methodology

The facilitator is at liberty to use any workable methodologies based on his/her experiences in facilitating and teaching mathematics in Agriculture to mid-cadre professionals. The bottom line is that, whatever techniques that will be used, the trainees should get the most out of the contents to be delivered by the facilitator/trainer.

7.0. Expected deliverables

The following deliverables are expected from the facilitator/trainer.

- i. Inception report indicating the detailed training methodologies, training contents, sources, five-day training program and training materials will be discussed and approved by SAT team before training starts.
- ii. Carry out face-to-face training to trainees for 5 days
- iii. Comprehensive training report of the training assignment
- iv. Deliver notes which may be shared in soft or hard copy materials
- v. An electronic copy of all training materials and contents including presentations, videos and other resource relevant materials basic mathematics in agriculture.
- vi. Technical advice on Basic Mathematics in Agriculture compendium development to SAT management and the task team.
- vii. Proof-reading of the draft compendium on Basic Mathematics in Agriculture once developed by the Task Team **Note:**

The training report will be produced after one week from the date of the training closure. Training notes and other resource materials should be provided during or at the end of the training.

8.0. Time span of the training

This training is expected to be carried out for a period of 5 days (from 30th to 3rd August 2021).

9.0. Expertise

a) Academic qualifications

*At least a master's degree in the relevant field in the areas of Mathematics based on areas shown in **Sub-enabling Learning Outcomes and their related tasks b)***

Experience

- *At least three years professional hands-on experience in training of trainers on similar areas of knowledge and skills regarding Basics Mathematics in Agriculture*
- *Demonstrated experience and proven records in undertaking similar assignment.*

c) Skills and Competences

- *Have experience in the field of facilitation of training and especially Basic mathematics in agriculture*
- *Good administration and interpersonal skills*
- *Evidence of having undertaken similar assignments, at least 3 references of clients*
- *Experience in developing learning and training manuals (compendium)*
- *Proficiency in adult-learning principles*

10.0 Proposed modality of payment

Upon signing of the contract before the start of the assignment, a first instalment of 50% of the agreed sum amount will be paid. and then 50% after finishing the entire assignment and handing over the reports for the assignment.

11.0. Points for consideration in evaluating expression of interests

- Demonstration of clear understanding of the scope of the assignment
- Demonstration of the trainer's expertise, capacity and capability to undertake the assignment
- Clear budget cost for the entire assignment
- Evidence of past similar works done through references
- Demonstration of innovative approaches/methodologies of undertaking the assignment
- Early submission of the Expression of Interest (EOI)
- Clear proposed plan/timetable of the assignment

13.0. Application and Documentation

An interested qualified trainers are invited to lodge their application. Trainers who meet the requirements should submit the following; application letter (EOI), Curriculum Vitae, conceptual inception report showing how you intend to achieve the stated objectives, previous experience (signed stamped copies of contracts), proposed five days training program and budget for undertaking the assignment. Please send your application electronically via consultancy@kilimo.org by **18th August 2021** with the subject line of email **Basic Mathematics in Agriculture Training**. Review of proposals will be done on the **19th August 2021**. Award giving of the assignment to a suitable trainer will be on the **20th August 2021**. **NB:** Deadline for submission of EOI will be on **18th August 2021 at 1700hrs of the East African Time**. Late EOIs and portions of EOI, shall not be accepted for evaluation irrespective of the circumstances.