Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

SOIL EROSION CONTROL

AGRSE302

Control soil erosion

Competence

RQF Level: 3

Learning Hours 70

Credits: 7

Sector: Agriculture and food processing

Trade: Agriculture

Module Type: Specific

Curriculum: AFPAGR3001 - TVET Certificate 3 in Agriculture

Issue Date: May 2022

<table>
<tr><td>Purpose statement</td><td colspan="5">This module describes the skills, knowledge and attitude required to control soil erosion. It is designed for learners who have successfully completed nine years' basic education or its equivalent and pursuing TVET Certificate III in Agriculture. At the end of this module, learners will be able to prepare for soil erosion control operations, identify the soil erosion types, causes, and effects, apply cultural soil erosion control measures and apply mechanical soil erosion control measures. Qualified learners deemed competent may work with others soil erosion control sites including terraces construction sites and farming sites under supervision</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="5">N.A</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group project and presentation</td><td>20%</td></tr>
<tr><td>• Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
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Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Prepare for soil erosion control operations	1.1. Occupational Health and Safety (OHS) hazards and risks are properly assessed for reporting to the supervisor
	1.2. PPE are selected according to the desired operation
	1.3. Environmental implications of soil erosion are properly identified for discussion with supervisor
2. Identify the soil erosion types, causes and effects	2.1. Soil erosion types are Adequately identified according to site characteristics
	2.2. Soil erosion causes are properly assessed referring to soil erosion effects
	2.3. Soil erosion effect and severity are effectively assessed according to soil erosion types
	2.4. Records are properly kept as required by supervisor
3. Apply cultural soil erosion control measures	3.1. Data are properly collected according to site location and conditions
	3.2. Cultural soil erosion control measures are effectively identified based on collected data
	3.3. Cultural soil erosion control measures are properly implemented

		according to collected data and following procedures
	3.4.	The developed soil erosion control measures are adequately maintained according to their requirement
	3.5.	Records are properly kept as required by supervisor
4. Apply mechanical soil erosion control measures	4.1.	Data are properly collected according to site location and conditions
	4.2.	Mechanical soil erosion control measures are effectively identified based on collected data
	4.3.	Mechanical soil erosion control measures are properly implemented according to collected data and following procedures
	4.4.	The developed soil erosion control measures are adequately maintained according to their requirement
	4.5.	Records are properly kept as required by supervisor

Course content

Learning outcomes	At the end of the module the learner will be able to: • Prepare for soil erosion control operations • Identify the soil erosion types, causes and effects • Apply cultural soil erosion control measures • Apply mechanical soil erosion control measures

Learning outcome 1: Prepare for soil erosion control operations	**Learning hours: 5**

Indicative content

- **Assessment of occupational Health and Safety (OHS) hazards and risks.**
  - ✓ Definition of Hazard
  - ✓ Types of hazards associated with erosion control
  - ✓ Hazard risks
  - ✓ Assessment of hazard risks
- **Selection of PPE according to the desired operation.**
  - ✓ Importance of PPE
  - ✓ Categories of PPE used in agriculture
  - ✓ PPE Selection criteria
- **Identification of environmental implication of soil erosion control measures.**
  - ✓ Definition of environment and environmental impact assessment
  - ✓ Impact of soil erosion control on environment
    - Improve land aesthetic, Improve soil stability, Ecosystem preservation, Forestation, Carbon

sequestration, Water preservation and Soil conservation

Resources required for the learning outcome	
Equipment	Computer, First aid kit and projector
Materials	Interconnection, books, newspapers, reports, scientific paper, water, antiseptic gel, chalks, field, and PPE
Tools	Hand hoe, Forked hoe, Rake maker, Ropes, Pegs, Buckets, Baskets, Sacs, Measuring tape, Spade, Shovel, Manure fork, Sickles, DVD player, panga, spring balance, pots.
Facilitation techniques	Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise Individualized, Field visit and Group discussion
Formative assessment methods	Written assessment, Oral presentation, and Performance assessment

Learning outcome 2: Identify the soil erosion types, causes and effects	**Learning hours: 15**

Indicative content

- **Identification of soil erosion**

✓ Definition of soil erosion
✓ Indicators of soil erosion
  - Bare soil, Plants or rocks on pedestals exposed roots, small benches of soil behind obstacles, Surface soil crusts, Increased tendency of runoff water to flow together into a network of connected channels, Deposits of soil where the field's slope changes, decreased thickness of topsoil, Exposed subsoil at the soil surface, Visible rills or gullies, Silt-clouded water or sediment deposits in surface water bodies and irrigation canals and Poor plant growth

✓ Types of soil erosion
✓ Forms of soil erosion

- **Assessment of soil erosion causes**

✓ The process of soil erosion
✓ Causes of soil erosion

- **Assessment of soil erosion effect and severity**

✓ Effect of soil erosion
- Agricultural effects and Socio-economic effects
- Keeping of records as required by supervisor

✓ Content of record form

✓ Method of recording

Resources required for the indicative content	
Equipment	Computer, projector, and blackboard
Materials	Interconnection, books, newspapers, reports, scientific paper, chalks, field notebook, record forms, flip chart, markers, field, photos, and PPE
Tools	Ropes, Pegs, Measuring tape, Spade, Shovel, DVD player, panga, farm tools
Facilitation techniques	Brainstorming, Individual and group work, Practical exercise, Field visit, Group discussion and Observation
Formative assessment methods	Written assessment Oral presentation and Performance assessment

Learning outcome 3: Apply cultural soil erosion control measures	Learning hours: 30

Indicative content

- Collection of data according to site location and conditions
  - ✓ Data on site location and conditions
  - ✓ Climatic condition
- **Identification of cultural soil erosion control measures**

✓ Cultural soil erosion control Methods

✓ Selection criteria of cultural erosion control methods

- **Implementation of suitable cultural soil erosion control measures**

✓ Perform selected cultural soil erosion control measures

- **Maintenances of developed soil erosion control measures**

✓ Maintenance practices

- **Keeping records**
  - ✓ Importance of record keeping on soil erosion control
  - ✓ Record keeping form content
  - ✓ Types of working evidence collected

Resources required for the indicative content	
Equipment	Wheelbarrow, PPE, computer, First aid kit, projector and blackboard, GPS, Dump level, Theodolite
Materials	Interconnection, books, newspapers, reports, scientific paper, chalks, organic fertilizers, lime, dolomite, gypsum, field notebook, record forms, flip chart, markers, field,
Tools	Hand hoe, Forked hoe, Rake maker, Ropes, Pegs, pruning shears, knives Measuring

	tape, Spade, Shovel, Manure fork, Sickles, DVD player, panga, spring balance, pickaxes, N-Frame and A-Frame, carpenter level (water level), ranging pole
Facilitation techniques	Lectures/ brainstorming, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided and Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment and Product assessment

Learning outcome 4: Apply mechanical soil erosion control measures	**Learning hours: 20**
Indicative content	
• **Collection of data** ✓ Data on site location and conditions ✓ Climatic condition • **Identification of mechanical soil erosion control measures** ✓ Mechanical soil erosion control methods ✓ Selection criteria for mechanical erosion control measures • **Implementation of mechanical soil erosion control measures** ✓ Perform selected mechanical soil erosion control measures • **Maintenances of developed soil erosion control measures** ✓ Amendment ✓ Fixing plants ✓ Water retention ponds di-Silting ✓ Repair the eroded area. • **Keeping records** ✓ Importance of record keeping on soil erosion control ✓ Record keeping form content ✓ Types of working evidence collected	
Resources required for the indicative content	
Equipment	Wheelbarrow, computer, First aid kit, projector and blackboard, GPS, Dump level, Theodolite
Materials	Interconnection, books, newspapers, reports, scientific paper, chalks, organic fertilizers, lime, dolomite, gypsum, field notebook, record forms, flip chart, markers, field, fixing plants, stones, and PPE
Tools	Hand hoe, Forked hoe, Rake maker, Ropes, Pegs, pruning shears, knives Measuring tape, Spade, Shovel, Manure fork, Sickles, DVD player, panga, spring balance, pickaxes, N-Frame and A-Frame, carpenter level (water level), ranging pole
Facilitation techniques	Lectures/ brainstorming, Demonstration and simulation, Individual and group work, Practical exercise, Field visit, Field practical work and Group discussion
Formative assessment	Written assessment, Oral presentation, and Performance assessment

methods	

Integrated/Summative assessment (For specific module)

Integrated situation

Farmers of Gakenke District grow maize, Irish potatoes, orange sweet potatoes and cassava. In March 2017, a heavy rainfall in the above district caused parts of field to be transported in valley in Gakenke sector. In some fields of Karambo sector, rills erosion has been observed/reported all around fields, while in Rushashi sector, field sheets erosion was observed. Farmers in those sectors have reported a decrease of yield, loss of lives, water logging, and destruction of infrastructure, caused by the above events. As a skilled agricultural worker, you are requested to demonstrate to those farmers of Gakenke sector, Gakenke cell, how to create two trenches of 4m long, 40cm width, 50cm depth for each, and 50cm spacing between trenches. These activities have to be conducted within 4 hours for this task.

Resources

Tools	Shovel, A-frame, N frame , Carpenter level (water level), Hammer, Hoes, Level, Machete, Panga, Pegs , Picks, Ranging pole, Ropes, Shovel, Sticks, Tape measure and Fork hoe
Equipment	Dump level, Theodolite, GPS and PPE
Materials/ Consumables	Grasses planting materials

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Prepare for soil erosion control operations (10%)	1.1 Occupational Health and Safety (OHS) hazards and risks are properly assessed for reporting to the supervisor	Types of hazards are described			2
		Types of risks are described			2
	1.2 PPE are selected according to the desired operation	Types of PPE are selected			2
		PPE selection criteria are respected			1
	1.3 Environmental implications of soil erosion are properly identified for discussion with supervisor	Impact of soil erosion control on environment are identified			3
Learning outcome 2: Identify the soil erosion types, causes and	2.1.Soil erosion types are Adequately identified according to site characteristics	Indicators of soil erosion are described			1
		Types of soil erosion are differentiated			2
		Forms of soil erosion			2

effects (20%)		are described			
	2.2.Soil erosion causes are properly assessed referring to soil erosion effects	The process of soil erosion are described			2
		Causes agents of soil erosion are differentiated			3
	2.3. Soil erosion effect and severity are effectively assessed according to soil erosion types	agricultural effects are identified			3
		socio-economic effects are identified			2
	2.4. Record is properly kept as required by supervisor	Content of record form are detailed			2
		Driving sources are described			1
		Impact of soil erosion are explained			1
		State of soil erosion are described			1
Learning outcome 3: Apply cultural soil erosion control measures (30%)	3.1. Data are properly collected according to site location and conditions	Data on site location are collected			2
		Data on site conditions are collected			2
		Data on climatic conditions are collected			2
	3.2.Cultural soil erosion control measures are effectively identified based on collected data	Cultural soil erosion control measure are described			3
		Selection criteria of cultural soil erosion control methods are respected			3
	3.3.Cultural soil erosion control measures are properly implemented according to collected data and following procedures	Selected cultural soil erosion control measures are applied			7
	3.4. The developed soil erosion control measures are adequately maintained according to their requirement	Maintenance practices of selected cultural soil erosion control measures are applied			6
	3.5. Record are properly kept as required by supervisor	Record keeping content are detailed			3
		Types of working			2

		evidence are collected			
Learning outcome 4: Apply mechanical soil erosion control measures (40%)	4.1.Data are properly collected according to site location and conditions	Data on site location are collected			
		Data on site conditions are collected			
		Data on climatic conditions are collected			
	4.2.Mechanical soil erosion control measures are effectively identified based on collected data	Mechanical soil erosion control methods are described			
		Selection criteria for mechanical erosion control measures are respected			
	4.3.Mechanical soil erosion control measures are properly implemented according to collected data and following procedures	Selected mechanical erosion control measures are applied			
	4.4. The developed soil erosion control measures are adequately maintained according to their requirement	Amendment are applied			
		Fixing plants are applied			
		Water retention ponds de-silting are done			
		Eroded area are repaired			
	4.5. Record are properly kept as required by supervisor	Record keeping form content are detailed			
		Types of working evidence are collected			
Total marks		100			
Percentage Weightage		100%			
Minimum Passing line % (Aggregate): 70%					

Reference books:

1. Agriculture, government of india.
2. Ericher Brand stter (2013), Construction Storm Water Erosion and Sediment Control Manual, DEQ's Office of Communications& Outreach, Portland
3. Footsteps,Tearfund.TearfundInternationalLearningZone. Issue15http://tilz.tearfund.org/Publications/.LastAccessed2/22/07
4. Http://tilz.tearfund.org/Publications/Footsteps+6170/Footsteps+70/Contour+barriers.htm
5. Http://www.cst.cmich.edu/users/Franc1M/esc334/lectures/physical.htm
6. Http://www.ehow.com/how_5964925_calculate-1_2_percent-slope.html
7. Manage–national instituteofagricultural extensionmanagement,ministry
8. Source: http://www.ndsu.edu/soilhealth/wp-content/uploads/2013/03/Screen-Shot-2013-03-23-at-1.13.49-PM.png
9. www.manage.gov.in,Last accessed 2/20/2007.