



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

BASIC PRINCIPLES OF AGROFORESTRY

FORPA402

Apply basic principles of agroforestry

Competence

RQF Level: 4

Learning Hours



Credits: 10

Sector: Agriculture and Food processing

Trade: Forestry

Module Type: Specific

Curriculum: AFPFOR4002 - TVET Certificate 4 in Forestry

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Purpose statement	This module describes the skills, knowledge and attitude required to apply basic principles of agroforestry. It is designed for learner who have successfully completed level III in Forestry and pursuing level IV in Forestry. At the end of this module, learner will be able to establish agroforestry systems, apply agroforestry practices and manage agroforestry practices. Qualified learner deemed competent may work in various places including open field, and a range of tasks related to agroforestry principles. She/he can work alone or with others under minimum supervision.					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
			Summative Assessment			50%

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria	
1. Establish agroforestry systems	1.1.	Agrisilvicultural system is properly designed with respect to ecological interaction
	1.2.	Silvopastoral system is properly designed with respect to ecological interaction
	1.3.	Agrosilvopastoral system is properly designed with respect to ecological interaction
	1.4.	Aquaforestry system is properly designed with respect to ecological interaction
	1.5.	Apiforestry system is properly designed with respect to ecological interaction
	1.6.	Entomoforestry system is properly designed with respect to ecological interaction
2. Apply agroforestry practices	2.1.	Alley cropping is properly implemented with respect to ecological interaction
	2.2.	Home garden is properly implemented with respect to ecological interaction
	2.3.	Taungya is properly implemented with respect to ecological interaction
	2.4.	Windbreak is properly implemented according to climatic factors
	2.5.	Fodder bank is properly implemented according to type of livestock
	2.6.	Improved tree fallow is properly implemented according to soil fertility status

3. Manage agroforestry practices	3.1.	Pruning is properly performed according to the tree usage
	3.2.	Pollarding is properly performed according to the tree usage
	3.3.	Coppicing is properly performed according to the tree usage
	3.4.	Fertilization is properly performed according to soil fertility status
	3.5.	Lopping is properly performed according to the tree usage
	3.6.	Pest and diseases are efficiently controlled according to economic threshold level
	3.7.	Thinning is properly performed according to the tree usage
	3.8.	Tree crown is properly managed according to the associated crops
	3.9.	Weeding is properly performed according to weed species
	3.10.	Mulching is properly applied according to soil condition
	3.11.	Bending is properly performed according to the tree usage
	3.12.	Training is properly performed according to the growth habit

Knowledge, Skills and Attitudes

Knowledge	Skills	Attitude
✓ Describe agroforestry ✓ Describe agroforestry components ✓ Describe agroforestry systems ✓ Description of agroforestry practices ✓ Classify agroforestry system ✓ Describe ecological interactions in agroforestry systems ✓ Identify agroforestry practices ✓ Describe management practices	✓ Design of agroforestry practices ✓ Manage strategy of agroforestry practices ✓ Evaluate community perception about agroforestry practices	✓ Be cautious about using tools and equipment in Agroforestry. ✓ Respect hygiene and safety in working environment. ✓ Manage the time ✓ Work with others and by your own ✓ Work under minimum supervision. ✓ Be flexible

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Establish agroforestry systems. 2. Apply agroforestry practices. 3. Manage agroforestry practices.
Learning outcome 1: Establish agroforestry systems.	Learning hours: 35
Indicative content	
• Description of agroforestry • Description of agroforestry components ✓ Land ✓ Tree ✓ Non-tree crops ✓ Livestock • Description of agroforestry systems ✓ Agrisilvicultural system ✓ Silvopastoral system ✓ Agrosilvopastoral system ✓ Aquaforestry system ✓ Apiforestry system ✓ Entomoforestry system • Classification of agroforestry system ✓ Structural classification  Based on nature components  Based on arrangement of components ✓ Functional classification  Productive agroforestry system  Protective agroforestry system ✓ Socioeconomic classification  Subsistence agroforestry system  Commercial agroforestry system  Intermediate agroforestry system ✓ Ecological classification • Description of ecological interactions in agroforestry systems	

- ✓ Positive interaction
- ✓ Negative interaction

Resources required for the learning outcome

Equipment	PPE, Dumpy level, Theodolite, GPS
Materials	Tree seedlings, ropes, pegs, seeds, notebooks, pencils, papers, pH meter,
Tools	Ranging rods/poles, Plumb bob, hoes, machetes, soil auger, measuring tape, spirit level, A-frame level, N-frame level, shovel, pickaxe
Facilitation techniques	Demonstration by viewing videos and films, simulation, Individual and group work, Practical exercise, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment, Product assessment and Performance assessment

Learning outcome 2: Apply agroforestry practices.

Learning hours: 35

Indicative content

- Identification of agroforestry practices
 - ✓ Alley cropping
 - ✓ Home garden
 - ✓ Taungya
 - ✓ Windbreak
 - ✓ Fodder bank
 - ✓ Improved tree fallow
- Description of agroforestry practices
- Design of agroforestry practices

Resources required for the indicative content

Equipment	PPE, Dumpy level, Theodolite, GPS, wheelbarrow, spray pump
Materials	Tree seedlings, ropes, pegs, seeds, notebooks, pencils, papers, pH meter, sacs, pesticides, nails,
Tools	Ranging rods/poles, Plumb bob, hoes, machetes, soil auger, measuring tape, spirit level, A-frame level, N-frame level, shovel, pickaxe, baskets, watering cane, hose pipe, hammer,
Facilitation techniques	Demonstration by viewing videos and films, simulation, Individual and group work, Practical exercise, Individualized, trainer guided and Group discussion, Oral presentation, interactive presentation,
Formative assessment methods	Written assessment, Oral assessment, Product assessment and Performance assessment

Learning outcome 3: Manage agroforestry practices**Learning hours: 30****Indicative content**

- Management strategy of agroforestry practices
 - ✓ Management in horizontal dimension
 - ✚ Water
 - ✚ nutrient
 - ✓ Management in vertical dimension
 - ✚ Light
 - ✚ Moisture
 - ✓ Management in time dimension
- Description of management practices
 - ✓ Initial tree spacing
 - ✓ Tending operations
- Community perception about agroforestry practices

Resources required for the indicative content

Equipment	Wheelbarrow, power tiller, sprayers, electronic balance
Materials	Water, chemical, fertilizers,
Tools	Machete, Knife, Hoe, Ropes, shears, Watering can, Spades, Baskets, secateurs, telescope shears, pruning saw
Facilitation techniques	Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided and Group discussion
Formative assessment methods	Written assessment, Oral assessment, Performance assessment, Product based assessment and Project based assessment

Integrated/Summative assessment**Integrated situation**

Green Solutions Ltd is a private company located in City of Kigali delivering services related to landscape restoration in Rwanda. Recently, Nyanza district faced a serious disaster of soil erosion of 20 hectares in Nyagisozi sector due to heavy rain. The district initiated the tendering process to restore the site and the tender was won by Green Solutions Ltd. The main duty of the contract is to establish agroforestry system, agroforestry practices, manage agroforestry practices to reduce soil erosion and improve the livelihood needs.

As a forest technician, you are hired by Green Solutions Ltd to establish a demonstration plot of 0.5ha on agroforestry practices through the following tasks:

1. Identify agroforestry system with respect to ecological interaction in one (1) hours.
2. Design and implement agroforestry practices in accordance with their standards in four (4) hours.
3. Perform silviculture treatments with respect to tree usage and site conditions in two (2) hours.

Instructions:

1. Tools, materials and equipment are available in the store.
2. Time allowed to accomplish these tasks is seven (7) hours.

Resources

Equipment	PPE, GPS, Power tiller, wheelbarrow, trucks, dumpy level, total station,
Materials	Measuring tape Manure, Ropes, seedlings, pegs, sacs, papers, soil fixing plant, tree cuttings, pencils, field book
Tools	Machete, Hoe, Ruler, shears, pruning saw, Hammer, Watering can, Spades, Baskets, sacs, A-frame, N-frame, ranging rods, pick axe, shovel

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Establish agroforestry systems. (40%)	1.1. Agrisilvicultural system is properly designed with respect to ecological interaction	Trees and crops are integrated			4
		Trees are selected			4
	1.2. Silvopastoral system is properly designed with respect to ecological interaction	Trees and livestock are integrated			4
		Trees are selected			4
	1.3. Agrosilvopastoral system is properly designed with respect to ecological interaction	Trees, crops and livestock are integrated.			4
		Multipurpose tree are selected			4
	1.4. Aquaforestry system is properly designed with respect to ecological interaction	Trees and fishpond are integrated.			4
		Trees/shrubs are selected			3
		Fishpond bunds are stabilized			3
	1.5. Apiforestry system is properly designed with respect to ecological interaction	Bees and trees are integrated			3
		Woody species are selected			3

	1.6. Entomoforestry system is properly designed with respect to ecological interaction	Trees and beneficial insects are integrated			3
2. Apply agroforestry practices. (30%)	2.1. Alley cropping is properly implemented with respect to ecological interaction	Alley is designed			3
		Alley cropping is installed			3
	2.2. Home garden is properly implemented with respect to ecological interaction	Home garden components are identified			3
		Homegardern is described			3
	2.3. Taungya is properly implemented with respect to ecological interaction	Taungya system is described			3
		Taungya system is installed			3
	2.4. Windbreak is properly implemented according to climatic factors	Wind direction is checked			2
		Woody species are selected			2
		Windbreak is installed			2
	2.5. Fodder bank is properly implemented according to type of livestock	Fodder species are selected			2
		Fodder bank is installed			2
	2.6. Improved tree fallow is properly implemented according to soil fertility status	Trees/shrubs are selected			2
3. Manage agroforestry practices. (30%)	3.1. Pruning is properly performed according to the tree usage	Pruning is done			2
	3.2. Pollarding is properly performed according to the tree usage	Pollarding is performed			2
	3.3. Coppicing is properly performed according to the tree usage	Coppices are managed			2
	3.4. Fertilization is properly performed according to soil fertility status	Fertilizers are selected			2
		Dosage is respected			2
		Fertilizers are applied			1
	3.5. Lopping is properly performed according to the tree usage	Lopping is done			1
	3.6. Pest and diseases are efficiently controlled according to economic threshold level	Pests are identified			1
		Diseases are diagnosed			1

		Severity level is judged			1	
		Phytosanitary products are selected			1	
		Phytosanitary products are handled			1	
		Dosage is respected			1	
		Phytosanitary products are applied			1	
	3.7.	Thinning is properly performed according to the tree usage	Thinning is performed			1
	3.8.	Tree crown is properly managed according to the associated crops	Tree/shrub crown is managed			1
	3.9.	Weeding is properly performed according to weed species	Weeding is performed			1
	3.10.	Mulching is properly applied according to soil condition	Mulching is applied			1
	3.11.	Bending is properly performed according to the tree usage	Bending technique is carried out			1
	3.12.	Training is properly performed according to the growth habit	Training of trees is done			1
	Total marks		100			
Percentage Weightage		100%				
Minimum Passing line % (Aggregate): 70%						

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Improve Resilience to Climate Change and Sequester Carbon. ICRAF, PROFOR, Washington D.C. Pp 13-3

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