



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

OPERATING SMALL FARM MACHINERY

AGRFM301

Operate Small Farm Machinery

Competence

RQF Level: 3

Learning Hours



80

Credits: 8

Sector: Agriculture and Food Processing

Trade: Agriculture

Module Type: Specific

Curriculum: AFPAGR3001- TVET Certificate 3 In Agriculture

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Purpose statement	This module describes the skills, knowledge and attitude required to operate small farm machinery. It is designed for learners who have successfully completed nine years' basic education or its equivalent and pursuing TVET level III in Agriculture. At the end of this module, learners will be able to prepare, manipulate and maintain small farm machinery. Qualified learners deemed competent may work in various places including open field, Nursery and greenhouses performing a range of tasks related to crop growing. She/he can work alone or with others under supervision.				
Delivery modality	Training delivery	100%	Assessment	Total 100%	
	Theoretical content	30%	Formative assessment	50%	
	Practical work:	70%			70%
	<ul style="list-style-type: none"> Group project and presentation 20% Individual project /Work 50% 				
	Summative Assessment			50%	

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Describe the small farm machinery	1.1. Types of small farm machinery and implements are well identified in accordance with farm operations
	1.2. Main parts of the small farm machinery are described referring to the manufacturer instructions
	1.3. Safety instructions are applied in reference to the manual
2. Operate small farm machinery in land preparation	2.1. Implement is well chosen according to land condition and activity to be performed
	2.2. Small farm machinery are well chosen according to land condition
	2.3. Small farm machinery is cross checked referring to the operation manual
	2.4. Implements are mounted and dismounted according to the activity to be performed
	2.5. Implements are well adjusted according to the activity to be performed
	2.6. Land preparation is well performed depending on the type of crop and land condition
3. Operate small farm machinery in planting	3.1. Implement is well chosen according to the crop and activity to be performed
	3.2. Small farm machinery is cross checked referring to the operation manual
	3.3. Implements are mounted and dismounted according to the activity to be performed
	3.4. Implements are well adjusted according to the activity to be performed
	3.5. Planting is well performed depending on the type of crop and activity performed

4. Operate small farm machinery in crop maintenance	4.1. Implement is well chosen according to the crop and activity to be performed
	4.2. Small farm machinery is cross checked referring to the operation manual
	4.3. Implements are mounted and dismounted according to the activity to be performed
	4.4. Implements are well adjusted according to the activity to be performed
	4.5. Weeding is well performed depending on the type of crop
	4.6. Fertilizer application is well performed depending on the crop and type of fertilizer
	4.7. Spraying is well performed depending on the type of crop
5. Operate small farm machinery in harvesting and handling crops	5.1. Maturity index in the field are well identified referring to the crop and market requirement
	5.2. Small farm machinery is cross checked referring to the operation manual
	5.3. Implements are mounted and dismounted according to the activity to be performed
	5.4. Harvesting machines and attachments are well operated according to the crop and operation manual
	5.5. Postharvest machines are well operated in accordance with the crop and operation manual
6. Apply Basic maintenance of small farm machinery	6.1. Systems of small farm machinery are well checked according to the manufacturer manual
	6.2. Daily maintenance is well performed referring to the manufacturer manual
	6.3. Periodic maintenance is well performed referring to the manufacturer manual

Course content

Learning outcomes	<p>At the end of the module the learner will be able to:</p> <ol style="list-style-type: none"> 1. Describe the small farm machinery. 2. Operate small farm machinery in Land preparation 3. Operate small farm machinery in planting 4. Operate small farm machinery in crop maintenance 5. Operate small farm machinery in harvesting and handling crops 6. Apply Basic maintenance of farm machinery
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Indicative content

- **Identification of small farm machinery and implements**

- ✓ Types of small farm machinery:

- ✚ Power tiller (2wheel tractor), Tractor (4-wheel tractor), Crawled tractor, Rice trans planter, Rice harvester, Combine harvester

- ✓ Classification of the small farm machinery

- ✚ Type, capacity, purpose

- **Description of main parts of the farm machinery**

- ✓ Small farm machinery

- ✚ Cabin, size, crawler and wheels, walking and driven machines

- ✓ Small Farm machinery attachments

- ✚ Self-propelled implement, propelled implement, Number of bottoms/disk, hoppers, soil opener, PTO (Power Take Off)

- ✓ Systems of small farm machinery

- ✚ Engine, Transmission system, hydraulic system, electrical system, steering system, cooling system, fuel system

- **Application of safety instructions**

- ✓ Cross check surroundings of the small farm machinery and attachment

- ✚ Surround obstacles, machine defects, attachments defects

- ✓ Identify universal symbols

- ✓ Position of all levers

Resources required for the indicative content

Equipment	Tractor (4-wheel tractor), Combine harvester, Power tiller (2-wheel tractor), Motorized sprayer pump, Rice trans-planter, reaper and reaper binder, Baler machine, blower, projector
Materials	Chemicals, grease, spare parts, seeds, fertilizers, machine oil, internet connection, land, PPE
Tools	Disk Plough, Rotary plough, Back hoe, Disk harrow, Sub-soiler, Ridgers, Planter/seeder, Grass chopper, Cultivator, Potato planter, Potato harvester, tools box
Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion
Formative assessment methods	Written assessment, oral presentation, performance assessment, product based assessment, project based assessment

Indicative content

- **Identification of land conditions**
 - ✓ Measure the land slope
 - + Materials to measure the land slope, slope measurement techniques
 - ✓ Identify the type of soil
 - ✓ Identify mechanization land obstacles
- **Clearance of land**
 - ✓ Identify the obstacles to land preparation
 - ✓ Remove the land obstacles
 - ✓ Dispose removed obstacles
- **Choosing of farm machinery**
 - ✓ Identify the capacity of machine according to land type
 - + Virgin land, Normal land, Land size
- **Checking farm machinery**
 - ✓ Check the tyre inflation
 - ✓ Methods used to measure pressure inflation
 - ✓ Optimum tightness to avoid risks
 - ✓ Loss of parts or recommended viscosity
 - ✓ Sensitive attention
 - + Abnormal noise, engine smoking
 - ✓ Checking the brake system
- **Choosing of proper implements**
 - ✓ Select the implements according to the activity to be performed
 - + Primary tillage, secondary tillage, leveling, ridging
- **Mounting and dismounting of implements**
 - ✓ Implement check
 - ✓ Linkage system check
 - + Lower links, check chain, top link, lifting arms
 - ✓ Mount and lock the implements
 - ✓ Unlocking and dismounting the implement
- **Adjusting of implements**
 - ✓ Unlock the implement
 - ✓ Shift all levers

- ✓ Test the operation and adjust implement if necessary
- **Preparation of land**
 - ✓ Operation standards
 - ✚ Depth, pulverization of soil, furrow opening
 - ✓ Ploughing methods in primary and second tillage
 - ✚ Casting ploughing method, gathering ploughing method, round and round ploughing method, continuous ploughing method
 - ✓ Leveling
 - ✓ Ridging

Resources required for the indicative content

Equipment	Power tiller (2-wheel tractor)
Materials	Chemicals, grease, spare parts, machine oil, land, PPE
Tools	Disk Plough, Rotary plough, Back hoe, Disk harrow, Sub-soiler, Ridgers, tools box
Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 3: Operate small farm machinery in planting

Learning hours: 17 hours

Indicative content

- **Choice of proper implement**
 - ✓ Select the attachment according to the crop and activity to be performed
 - ✓ Select the attachment according to the small farm machinery capacity
 - ✚ Implement size, Implement weight, Number of bottoms/disks, Working depth
 - ✓ Check the conditions of the attachment
 - ✚ Good working condition, Break down condition
- **Checking farm machinery**
 - ✓ Check the tyre inflation
 - ✓ Methods used to measure pressure inflation
 - ✓ Optimum tightness to avoid risks
 - ✓ Loss of parts or recommended viscosity
 - ✓ Sensitive attention
 - ✚ Abnormal noise, engine smoking
 - ✓ Checking the brake system
- **Mounting and dismounting implements**

- ✓ Implement check
- ✓ Linkage system check
 - ✚ Lower links, check chain, top link, lifting arms
- ✓ Mount and lock the implements
- ✓ Unlocking and dismounting the implement
- **Adjustment of implements**
 - ✓ Unlock the implement
 - ✓ Shift all levers
 - ✓ Test the operation and adjust implement if necessary
- **Performance of planting**
 - ✓ Sowing
 - ✓ Planting
 - ✓ Transplanting

Resources required for the indicative content

Equipment	Power tiller (2-wheel tractor)
Materials	Chemicals, grease, spare parts, seeds, fertilizers, machine oil, internet connection, land, PPE
Tools	Trans planter, Planter and seeder, tools box
Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 4: Operate small farm machinery in crop maintenance	Learning hours: 14 hours
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Indicative content
<ul style="list-style-type: none"> • Choice of proper implement <ul style="list-style-type: none"> ✓ Select the attachment according to the crop and activity to be performed ✓ Select the attachment according to the small farm machinery capacity <ul style="list-style-type: none"> ✚ Implement size, Implement weight, Number of bottoms/disks, Working depth ✓ Check the conditions of the attachment <ul style="list-style-type: none"> ✚ Good working condition, Break down condition • Checking small farm machinery <ul style="list-style-type: none"> ✓ Check the tyre inflation ✓ Methods used to measure pressure inflation ✓ Optimum tightness to avoid risks

- ✓ Loss of parts or recommended viscosity
- ✓ Sensitive attention
 - ✚ Abnormal noise, engine smoking
- ✓ Checking the brake system
- **Mounting and dismounting implements**
 - ✓ Implement check
 - ✓ Linkage system check
 - ✚ Lower links, check chain, top link, lifting arms
 - ✓ Mount and lock the implements
 - ✓ Unlocking and dismounting the implement
- **Adjustment of implements**
 - ✓ Unlock the implement
 - ✓ Shift all levers
 - ✓ Test the operation and adjust implement if necessary
- **Performance of weeding**
 - ✓ Mechanical method
 - ✓ Chemical method
- **Performance of fertilizers application**
 - ✓ Method of fertilizer application
 - ✓ Dosage
 - ✓ Time of application
- **Performance of spraying**
 - ✓ Types of pesticides
 - ✓ Application methods

Resources required for the indicative content

Equipment	Power tiller (2-wheel tractor), Motorized sprayer pump
Materials	grease, spare parts, pesticides, machine oil, land, fertilizers, gun, shears, ropes, pipes, PPE
Tools	Tools box
Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 5: Operate small farm machinery in harvesting and

Learning hours: 14

handling crops

Indicative content

- **Identification of maturity index**
 - ✓ Check the crops maturity to be harvested
 - ✓ Assess the land and field conditions
 - ✚ Waterlessness of the land, weeds, land slope
 - ✓ Assess the weather
 - ✚ Dry, wet/ rainy
- **Checking small farm machinery**
 - ✓ Check the tyre inflation
 - ✓ Methods used to measure pressure inflation
 - ✓ Optimum tightness to avoid risks
 - ✓ Loss of parts or recommended viscosity
 - ✓ Sensitive attention
 - ✚ Abnormal noise, engine smoking
 - ✓ Checking the brake system
- **Mounting and dismounting implements**
 - ✓ Implement check
 - ✓ Linkage system check
 - ✚ Lower links, check chain, top link, lifting arms
 - ✓ Mount and lock the implements
 - ✓ Unlocking and dismounting the implement
- **Performance of harvesting using small harvester machines**
 - ✓ Select the harvesting machines and attachment
 - ✓ Adjust the harvesting machines and attachments
 - ✚ Crop height, position of harvested plant parts
 - ✓ Manipulate the harvesting machines and attachments
 - ✓ Re-adjust the harvesting machines and attachments If necessary
- **Performance of postharvest handling**
 - ✓ Type of small postharvest handling machines
 - ✚ Combine harvester, thresher, huller, winnower, dryer, grading machine
 - ✓ Adjust the working speed of post harvesting machines and attachments
 - ✓ Manipulate the post harvesting machines and attachments
 - ✓ Re-adjust the working speed of harvesting machines and attachments

Resources required for the indicative content

Equipment	Power tiller (2-wheel tractor)
Materials	grease, spare parts, machine oil,
Tools	Grass chopper, Baler machine, blower, tools box

Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise ,Individualized, Trainer guided ,Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 6: Apply basic maintenance of small farm machinery	Learning hours: 8 hours
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Indicative content

- **Checking Farm machinery systems**
 - ✓ Check engine
 - ✚ Oil, sound, exhaust gases, leakage
 - ✓ Check transmission and steering system
 - ✚ Oil, brake, clutch, grease, bolt and nuts
 - ✓ Check Hydraulic system
 - ✓ Checking of electrical system
 - ✚ Battery, fuse, bulb, visual inspection of light
 - ✓ Checking of cooling system
 - ✚ Air, radiator, water, fan belts
- **Daily maintenance of farm machinery**
 - ✓ Top up of fluids
 - ✚ Oils, water
 - ✓ Greasing
 - ✓ Tightening bolts and nuts
 - ✓ Perform cleaning
- **Periodic maintenance farm machinery**
 - ✓ Change engine oil
 - ✓ Change filters
 - ✓ Adjust the fan belt

Resources required for the indicative content
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Equipment	Power tiller (2-wheel tractor), Motorized sprayer pump, Rice trans-planter, reaper and reaper binder, Baler machine, blower
Materials	Grease, spare parts, machine oil, water, soap, lubricants,
Tools	Disk Plough, Rotary plough, Back hoe, Disk harrow, Sub-soiler, Ridgers, Planter/seeder, Grass chopper, Cultivator, Potato planter, Potato harvester
Facilitation techniques	Lectures, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Integrated/Summative assessment (For specific module)

Integrated situation

Kamali, a farmer of Gatsibo District is willing to cultivate Irish potato, French beans and tomatoes by using Small farm tools and machinery. He has got the upland of two hectares and twenty are of wetland (2.2Ha) dispatched as below:

- One hectare (1Ha) will be for Irish potato
- One hectare (1Ha) will be for French beans, and
- Twenty Ares (0.2Ha) will be for tomatoes. Note that the farm machineries to be used are located at his land.

As a field grower, you are requested to serve him in the following tasks:

- Land preparation one hectare (1Ha) of Irish potato to be performed in 16 hours.
- Spraying Irish potatoes (1Ha) of Irish potato to be performed in 8 hours.
- Sowing French beans in one hectare(1Ha) in 4 hours.
- Transplanting tomatoes in twenty Ares (0.2Ha) in 5 hours.

Resources

Tools	Disk Plough, Rotary plough, Back hoe, Disk harrow, Sub-soiler, Ridgers, Planter/seedler, Grass chopper, Cultivator, Potato planter, Potato harvester
Equipment	Tractor (4-wheel tractor), Combine harvester, Power tiller (2-wheel tractor), Motorized sprayer pump, Rice trans-planter, reaper and reaper binder, Baler machine, blower, projector
Materials/ Consumables	Chemicals, grease, spare parts, seeds, fertilizers, machine oil, internet connection, land

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Describe the small farm machinery (10%)	Types of small farm machinery and implements are well identified in accordance with farm operations	Small farm machinery described			1
		Small farm machinery attachments described			1
		Systems of small farm machinery described			1
	Main parts of the small farm machinery are described referring to the manufacturer instructions	Main parts of small farm machine checked			2
		Small Farm machinery attachments checked			1
		Systems of small farm machinery checked			1
	Safety instructions are applied in reference to the manual	Surround obstacles checked			1
		Universal symbols/ Signals identified			1
		Position of all levers/ control panel checked			1
	Learning outcome 2: Operate small farm machinery in land preparation (20%)	Identification of land conditions	Land slope measured		
Type of soil Identified					1
Obstacles to land preparation identified					1
Land obstacles removed					1
Small farm machinery are well chosen according to land condition		The capacity of machine Identified			1
		Conditions of the machine Checked			1
		Land size measured			1
Small farm machinery is cross checked referring to the operation manual		Check the tyre inflation adjusted			1
		Loss of parts or recommended viscosity checked			1
		Brake system Checked			1
Implements are mounted and dismantled according to the activity to be performed		Linkage system checked			1
		Implements mounting and locking			1
		Implements unlocking and dismantling			1

	Implements are well adjusted according to the activity to be performed	All levers shifted			1
		Implement adjusted			1
		Status of land after first tillage			2
	Land preparation is well performed depending on the type of crop and land condition	Status of land after second tillage			2
		Status of land after levelling			1
Learning outcome 3: Operate small farm machinery in planting (20%)	Implement is well chosen according to the crop and activity to be performed	Purpose of attachment selected			2
		Capacity of attachment selected			1
		Attachments conditions checked			1
	Implements are well adjusted according to the activity to be performed	All levers shifted			1
		Implement adjusted			1
	Small farm machinery is cross checked referring to the operation manual	Tyre inflation checked			1
		Optimum tightness checked			1
		Recommended viscosity checked			1
		Brake system Checked			1
	Implements are mounted and dismounted according to the activity to be performed	Linkage system checked			1
		Implements mounting and locking			2
		Implements unlocking and dismounting			1
	Planting is well performed depending on the type of crop and activity performed	Sowing performed			2
		Planting performed			2
		Transplanting performed			2
Learning outcome 4: Operate small farm machinery in crop maintenance (20%)	Implement is well chosen according to the crop and activity to be performed	Purpose of attachment selected			1
		Capacity of attachment selected			1
		Attachments conditions checked			1
	Small farm machinery is cross checked referring to the operation manual	Tyre inflation checked			1
		Optimum tightness checked			1
		Recommended viscosity checked			1
		Brake system Checked			1
	Implements are mounted and	Linkage system checked			1

	dismounted according to the activity to be performed	Implements mounting and locking		1	
		Implements unlocking and dismounting		1	
	Implements are well adjusted according to the activity to be performed	All levers shifted		1	
		Implement adjusted		1	
		Implement tested		1	
	Weeding is well performed depending on the type of crop	Mechanical method applied		1	
		Chemical method applied		1	
	Fertilizer application is well performed depending on the crop and type of fertilizer	fertilizer application performed		1	
		Dosage applied		1	
		Application time respected		1	
	Spraying is well performed depending on the type of crop	Types of pesticides described		1	
		Methods Applied		1	
Learning outcome 5: Operate small farm machinery in harvesting and handling crops (20%)	Maturity index in the field are well identified referring to the crop and market requirement	Maturity index checked		2	
		Field conditions assessed		1	
		Weather respected		2	
	Small farm machinery is cross checked referring to the operation manual	Linkage system checked		1	
		Implements mounting and locking		2	
		Implements unlocking and dismounting		2	
	Implements are mounted and dismounted according to the activity to be performed	All levers shifted		1	
		Implement adjusted		1	
	Harvesting machines and attachments are well operated according to the crop and operation manual	Quality of harvested product		2	
		Working speed of operator		2	
	Postharvest machines are well operated in accordance with the crop and operation manual	Quality of product handled		2	
		Working speed of operator		2	
	Learning outcome 6: Apply basic maintenance	Systems of small farm machinery are well checked according to the manufacturer manual	Engine checked		1
			Hydraulic system checked		1
			Electrical system checked		1

of farm machinery (10%)	Daily maintenance is well performed referring to the manufacturer manual	Cooling system checked			1
		Transmission system checked			1
		Top up of fluids performed			1
		Greasing performed			1
		Cleaning performed			1
		Filters changed			1
		The fan belt adjusted			1
Total marks 100					
Percentage Weightage				100%	
Minimum Passing line % (Aggregate): 70%					

References:

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