



Agricultural TVET College



Small Scale Irrigation Development Level I

MODEL TTLM

Learning Guide #02

Unit of Competence: Identify Basic Machinery & Equipment

Module Title: Identifying Basic Machinery & Equipment

LG Code: AGR SSII M02 LO1-LO3

TTLM Code: AGR SSII TTLM 1218V2

Nominal Duration: 20 Hours

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|-----------------------|--|--------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 1 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

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|-------------------------------|---------------|--|
| Instructio n Sheet | Unit | Identify Basic Machinery & Equipment |
| | Module | Identifying Basic Machinery & Equipment |
| | LO#1-3 | |

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Prepare basic machinery and equipment for use
- Support basic machinery and equipment operation
- Check, Clean and Store basic machinery and equipment

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Identify and select machinery and equipment in accordance with supervisor's instructions
- Carry out routine pre-operational checks of machinery and equipment
- Identify and report Occupational Health and Safety hazards in the workplace are.
- Identify environmental implication associated with operation and maintenance
- Clean, securing and store *machinery and equipment*
- Identify and report malfunctions, faults, wear or damage to machinery and equipment
- Clean and maintain workplace areas

Learning Activities

1. **Read the specific objectives of this Learning Guide.**
2. **Read the information written in the “Information Sheet”**
3. **Accomplish the “Self-check”.**
4. **If you earned a satisfactory evaluation proceed to the next “Information Sheet”. However, if your rating is unsatisfactory, see your facilitator for further instructions or go back to Learning Activity.**
5. **Submit your accomplished Self-check. This will form part of your training portfolio.**
6. **Read and Practice “Operation Sheets”.**
7. **If you think you are ready proceed to “Job Sheet”.**
8. **Request you facilitator to observe your demonstration of the exercises and give you feedback.**

| | | |
|-----------------------|--|--------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 2 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

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|------------------------------|---------------|--|
| INFORMATION SHEET # 1 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identify Basic Machinery & Equipment |
| | LO#1 | Prepare basic machinery and equipment for use |

Introduction:

Agricultural machinery is any kind of machinery used on a farm to help the farming process. The best-known example of this kind is tractor.

1.1. Identifying and selecting machinery and equipment

Machinery and equipment are identified and selected in accordance with supervisor's instructions.

Types of machinery and equipment

There are many different types of machinery used in the various areas in horticulture and agriculture.

The machine selection depends on:

- the work to be carried out
- the condition of the ground, e.g. how steep or how wet
- proximity to people and buildings where noise, dust or odors can be a problem
- availability of the machine
- How the machine can be transported to the site.

Small engine machinery such as:

- mowers
- brush cutters
- pumps
- air compressor
- generators

Hand tools equipment such as:

- wheelbarrows
- spades
- shovels and forks

Other material like

- sprinkler,
- drip and surface irrigation structure,
- triple pump,
- rope and washer pump,
- solar pump,
- wind mill pump,
- bucket,
- dynamo or electric pump,
- tensiometer,
- infiltrometer,
- water measuring device,
- Farm machinery etc.

I. Mowers:-

☞ It is a simple machine can be operated simply by hand or can be pulled by tractors for removing or leveling lower growing plants and grass.

☞ Mowers are used to cut grass and other forage crops. The cut material is left in a swath. Here

| | | |
|------------------------------|---|---------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 4 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

the grass is cut by the shearing action of a reciprocating knife.

- ☞ The basic principle of cutting remains the same as a scissor i.e. two sharp straight blades shear the stalk of the grass at a certain speed. This action is defined as mowing.

Here we have different types of mowers:-

- ☞ Sickle bar mower,
- ☞ Rotary mowers,



II. Brush cutters:-

- ☞ A brush cutter is a lawn and garden tool used to trim lawn edges, cut back bushes and unruly plants, and maintain a landscape. A brush cutter relies on rotary device that spins a dense plastic string. Spun at a high speed, the string cuts through any vegetation you wish to prune or remove.

Purpose of the Brush cutters

- Used to clear Anyone with wooded, dense or overgrown property,
 - Designed for public works departments and individual property owners,
 - Appropriate for maintaining trails, cutting troublesome brush or periodically clearing meadows.
- ☞ Mowing around trees and shrubs and in uneven or rough terrain that cannot be cut with a conventional mower.



III. An air compressor is a device that [converts power](#) (using an electric motor, diesel or gasoline engine, etc.) into [potential energy](#) stored in pressurized air (i.e., [compressed air](#)).

| | | |
|-----------------------|--|--------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 5 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |



Fig 2. Air compressors

IV. A **tensiometer** measures the force with which water is held in the soil by the soil particles.

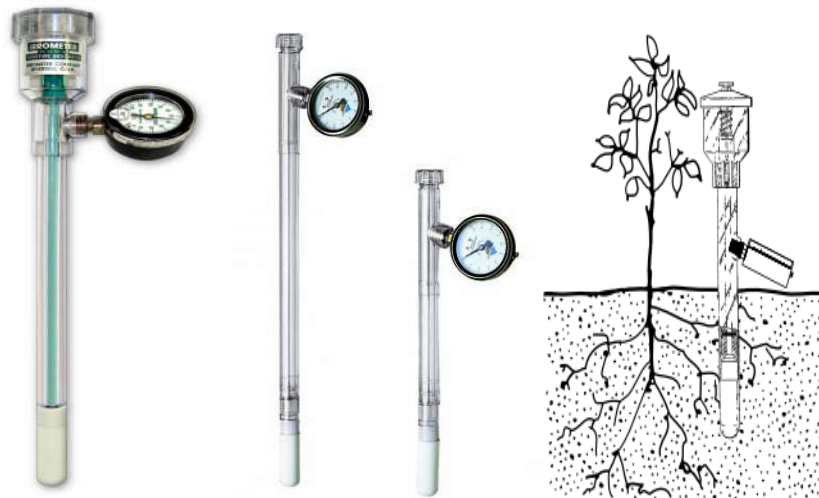


Fig 3. tensiometer

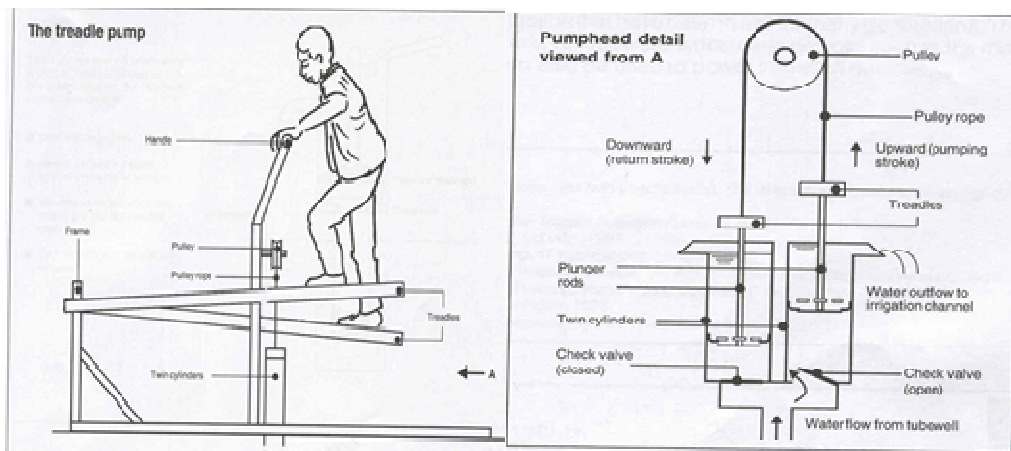
V. Pumps

Are used to transfer of liquid from one place to another place (e.g. water from an underground aquifer into a water storage tank or to the command area).

There are different types of pump depending on source of power (manual. animal, solar. wind, electrical and chemical powered).

Treadle pump

The pump is operated by moving two pedals while standing on the pump and can be operated for several hours as opposed to the more arduous process of hand pumping and hand watering.



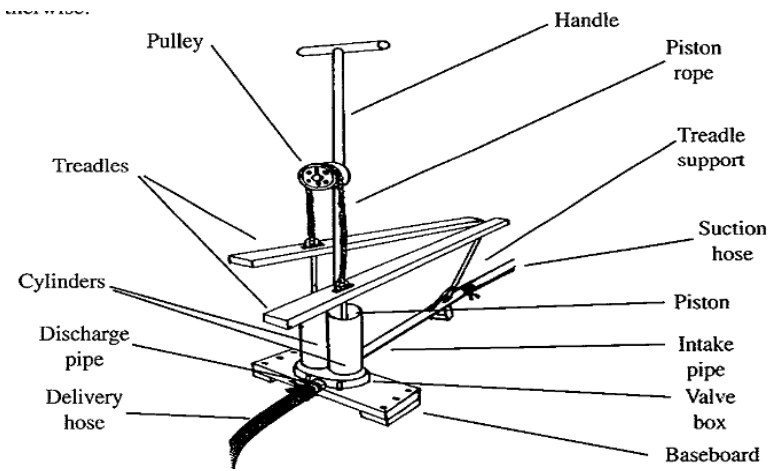


Fig 4. Treadle pump

Rope and Washer pumps

The rope and washer pump is used to lift water from shallow wells and works most satisfactorily when the lift is about 6m. The pump consists of an endless chain on which discs are mounted at the interval of about 25cm.

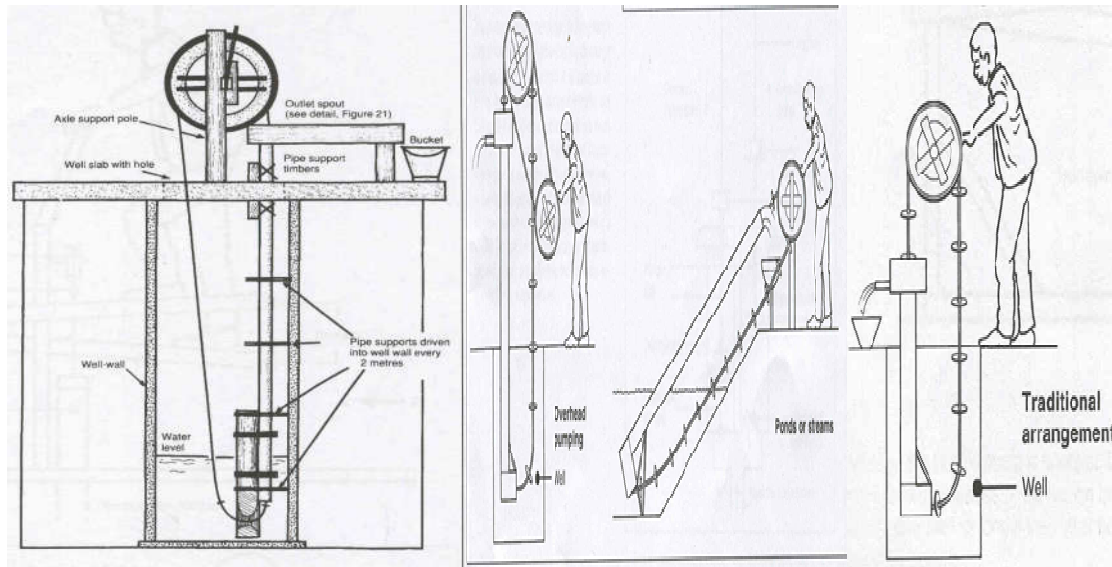
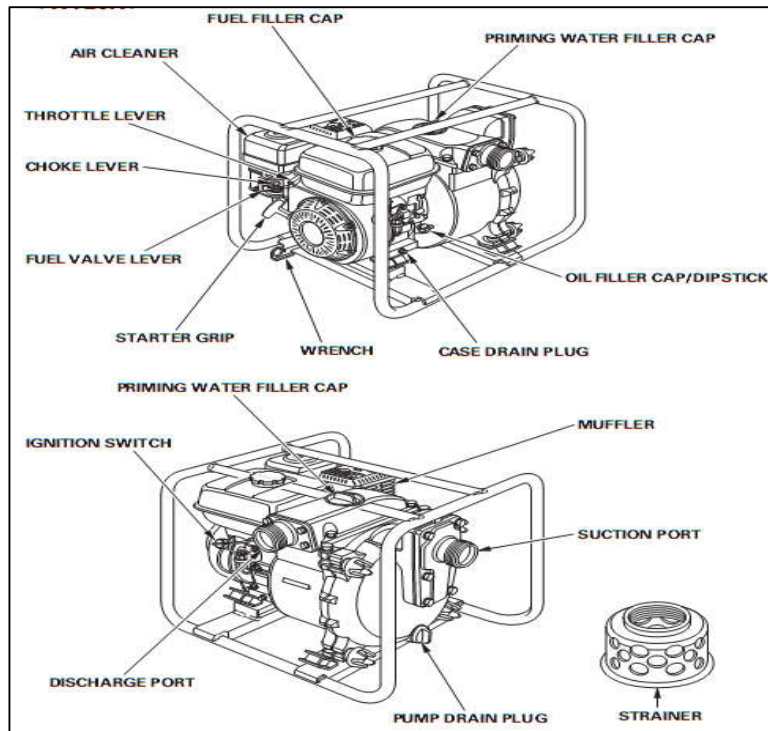


Fig 5. Rope and washer pump

Centrifugal pump (diesel/petrol)



Wind mill pump/Wind pumps are fairly large tower-mounted multi-bladed wind rotors used particularly for raising water from a borehole to provide a water supply or facilitate irrigation in an off-mains location.



Fig.10 Wind mill pump

A **solar-powered pump** is a pump running on electricity generated by photovoltaic panels or the radiated thermal energy available from collected sunlight as opposed to grid electricity or diesel run water pumps.



Fig.11 Solar pump

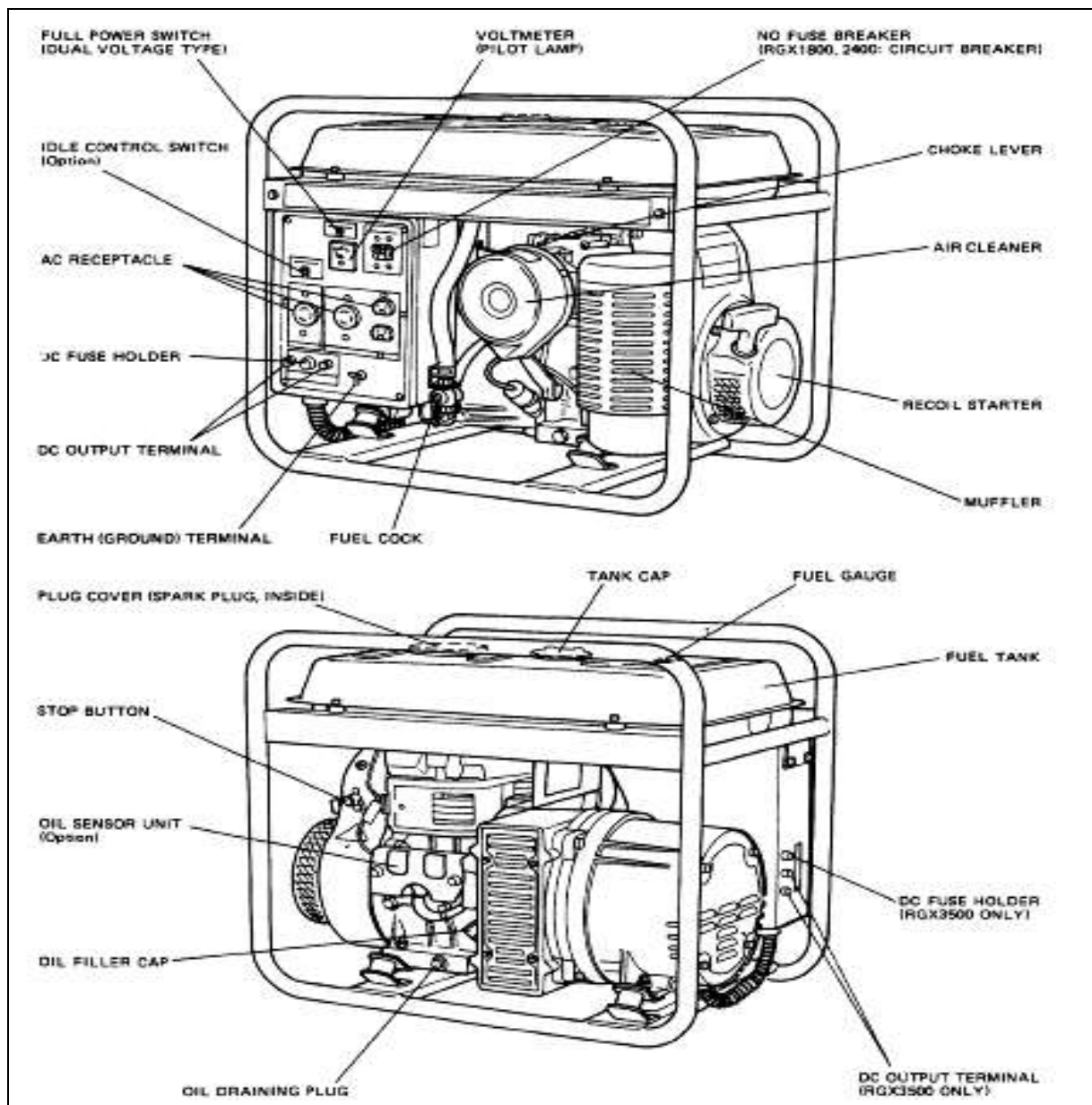


Fig. 12 small, electrically powered pump

Generator is a device that converts motive power into electrical power for use in an external circuit.



Fig .13 Generators



VI. Water measuring device

- Most flow measurement devices and techniques are based on the measurement of head (depth or pressure) or velocity
- Here, the term “flow rate” refers to volumetric rate, or volume per unit time

1 Trapezoidal Flume

Trapezoidal flumes are often used for small flows, such as for individual furrows in surface irrigation evaluations

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 10 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

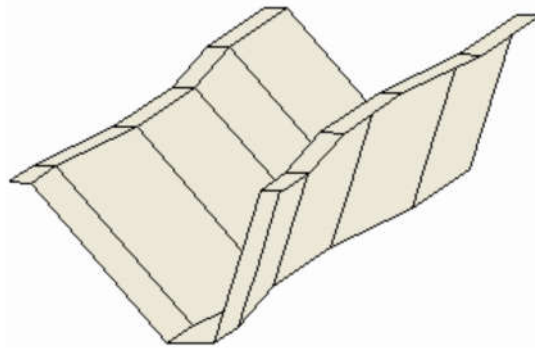


Fig 6. trapezoidal flume

2. Current Meters: Current meters with a rotating unit that senses the water velocity are either vertical- shaft or horizontal-shaft types



Fig 7. Current meter

3. Weirs for Flow Measurement

Weirs are overflow structures built across open channels to measure the volumetric rate of water flow.

Trapezoidal weir



Fig 8. Trapezoidal weir

V-Notch Weirs: Triangular, or V-notch, weirs are among the most accurate open channel constrictions for measuring discharge



Fig 9. 90° V-Notch weirs

VII. Drip irrigation is a type of micro-irrigation that has the potential to save water and nutrients by allowing water to drip slowly to the roots of plants, either from above the soil surface or buried below the surface. The goal is to place water directly into the root zone and minimize evaporation.

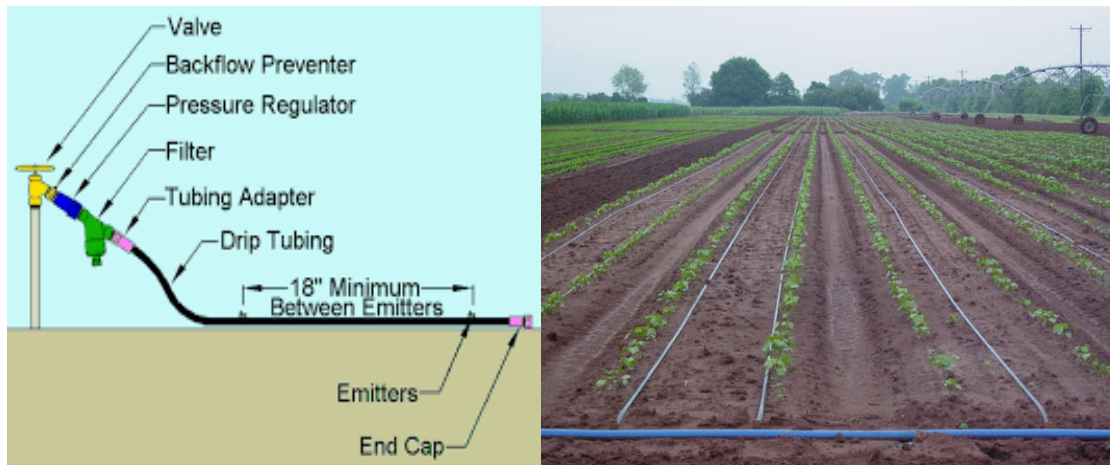


Fig.14 Drip irrigation system

VIII. Sprinkler Irrigation is a method of applying irrigation water which is similar to rainfall. Water is distributed through a system of pipes usually by pumping.

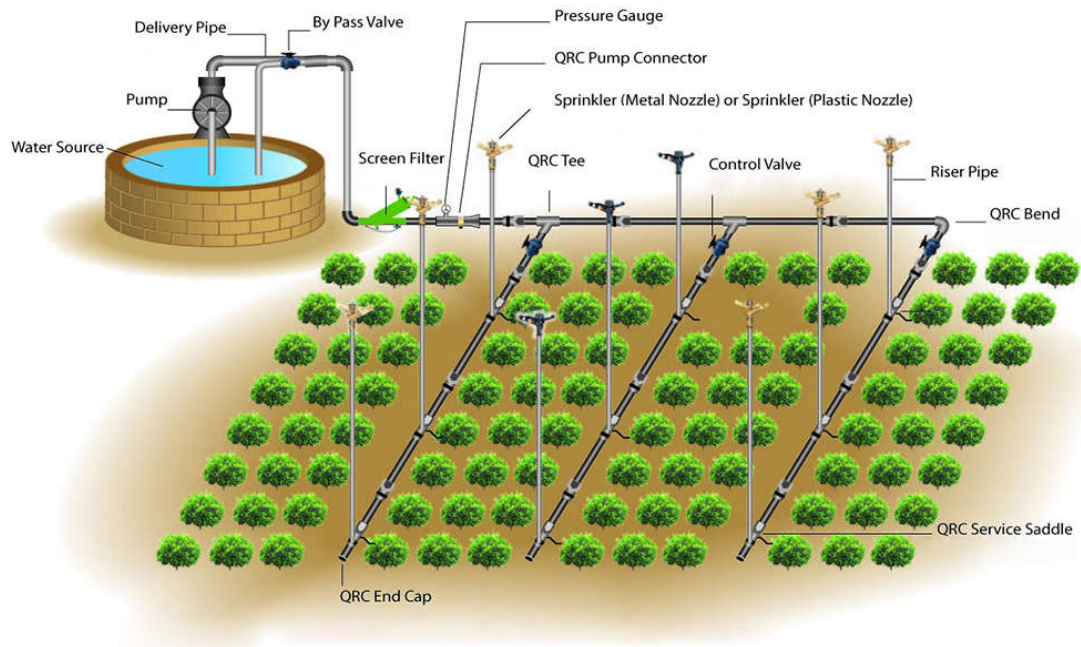
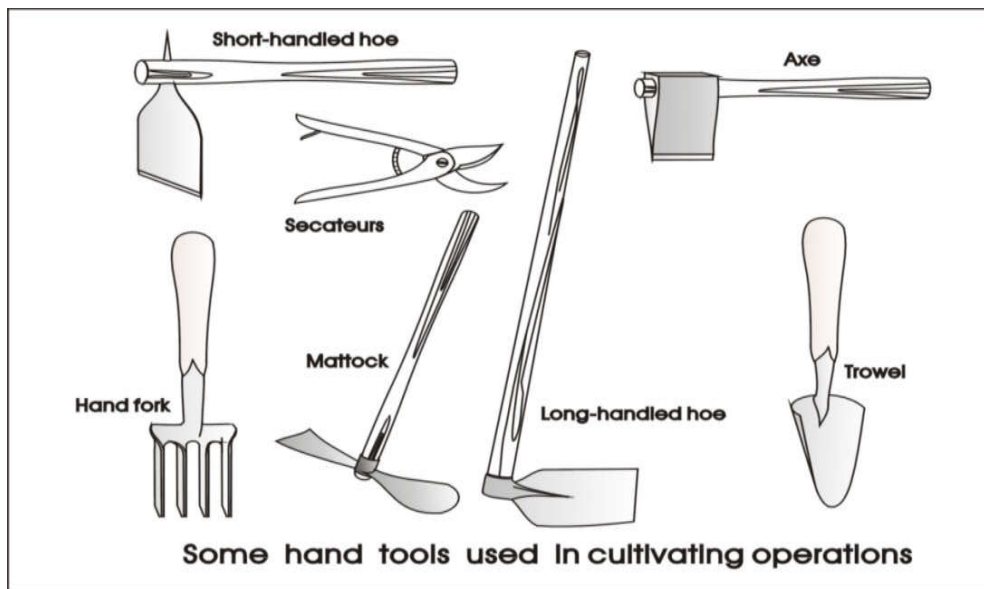
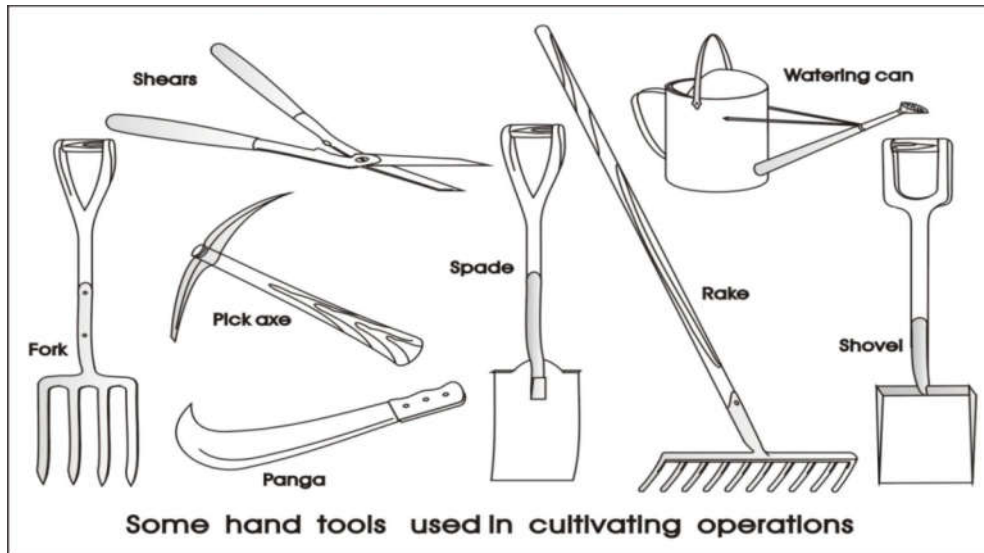


Fig.15 Sprinkler irrigation system

❖ Equipment Such as:-

Hand tools

☞ Some hand tools used in different operation.



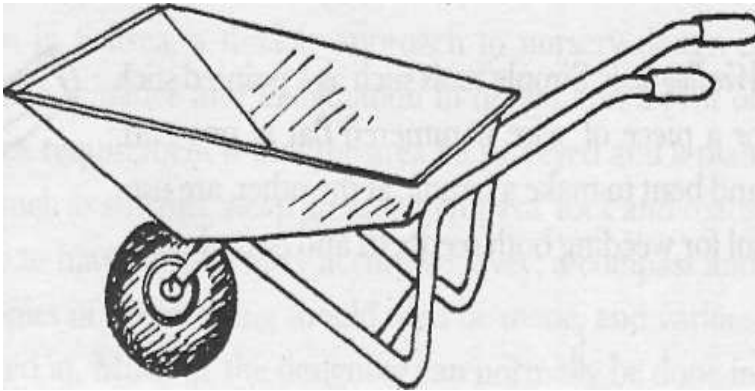
Secateurs:-

☞ They are strong enough to **prune** hard branches of **trees** and **shrubs**, sometimes up to two centimeters thick. They are used in **gardening**, **arboriculture**, **farming**, **flower arranging**.



Wheel barrel:

- ⊞ Used for transferring all kinds of materials in the work site.
- ⊞ Is essential for carrying important tools, seed and seedlings into the field.
- ⊞ Keep tires pumped up, grease all moving parts, wash out soil or rubbish after use and store out of the weather.



Spade:-

- ⊞ There are many jobs in agriculture that require the use of hand tools. A spade, commonly used in gardens, is good for digging because of the flat, sharp shape.
- ⊞ Useful for cutting and digging heavy soil, digging straight-sided, flat-bottomed trenches, or removing a layer of soil.



| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 14 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

Shovels:-

- ☞ Used for moving earth, sieving soil, soil mixing, etc.
- ☞ Shovels are used for digging and lifting loose soil or other substances.
- ☞ A shovel is a [tool](#) for digging, lifting, and moving bulk materials, such as [soil](#), [coal](#), [gravel](#), [snow](#), [sand](#), or [ore](#).



Forks:-

- Used for turning compost, lifting bare-root seedlings, loosening soil.



Rakes

- ☞ A rake, usually with a long handle and a finger-like base, is used in gardening and clean-up.
- ☞ Break up and level the soil; and it has a row of 10-16 teeth and is kitted up with a 1.80 m handle.
- ☞ A rake is a tool used to gather or loosen material or to grade or level a surface.
- ☞ Rakes work a lot like pitchforks in that they can turn over soil so that plants can get more nutrients. The difference is that the prongs on a rake create a right angle next to the handle, where as a pitchfork is only slightly curved.

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 15 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |



Hand Fork:-

The most useful garden tool when [hand weeding](#) to loosen the soil around the weeds and ensure that all of the roots come out. Then afterwards a general scuffle over the surface leaves a tidy finish. It can also be used for planting out.



Pickaxe

- ☞ used to break up hard and stony ground
- ☞ Picks and mattocks are used to work soil that is hard, rocky or root filled.
- ☞ A pick has a pointed tip on one end and a chisel like tip on the other.



Hand Trowel:-For smaller jobs such as planting bulbs and bedding plants in cultivated soil. A stainless steel version is probably best as the blade stays cleaner and is easier to spot if left lying around.

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 16 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |



Hoe:-

The two main types are the draw hoe and the cutting hoe. The draw hoe has its blade set at a right-angle to the shaft and is used to draw soil towards the operator when making planting drills or when mounding-up [potatoes](#).



Panga or Mattock

- are used to cut down stubborn weeds, reeds, tree saplings and can also be used to harvest grain
- Mattocks are used for loosening soil that is root filled.
- Mattocks have an axe-head on one side and a flat hoe like head on the other



Shears:-

Shears are large scissors that farmers and gardeners use to prune their plants. They can be used to cut off dead or dying portions to save the healthy part of the plant.



| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 17 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

This unit excludes:-

- ❖ Ride-on machinery
- ❖ Electrically powered tools
- ❖ Vehicles and chainsaw

1.2. Carry out routine pre-operational checks of machinery and equipment

Agricultural machinery and equipment is tangible personal property that is used directly in cultivating or harvesting a crop, collecting or processing of an agricultural product on the farm area.

What may be involved in routine pre-operational checks of tools or equipments?

This may include routine safety and pre-start checks and preparatory procedures including cleaning, lubricating, and hand sharpening, priming pumps, clearing filters, tightening, basic repairs and adjustments.

Pre-operational checks: On machinery and equipment may include checking

- **Fuels, fuel lines and oils:** check the oil and the fuel line if it is not in good condition change or fill the oil and fuel respectively.
- **Battery electrolyte levels, wheels and tyres pressure:** when servicing the battery or checking the electrolyte level, wear rubber gloves, a rubber apron, and eye protection. Batteries contain sulfuric acid which is destructive. If it comes in contact with your skin, wash it off at once with water. Acid may splash on the skin or into the eyes inadvertently when removing electrolyte caps
The tyre pressure needs to be checked as well; this may be visual and then check with a gauge once a week.
- **Air filters:** check the air filter if there is impurities on it, clean it with appropriate materials like air compressors.



Primary or main filter, Cover, Air cleaner housing and Safety filter (fits inside the primary filter)

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 18 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

respectively.

- **Safety guards:** check the safety guards are located in the appropriate position.

Preparation on equipment may include:

- cleaning, lubricating
- identifying and segregating unsafe or faulty equipment for repair or replacement

Checks are conducted on all materials, tools and equipment with insufficient or faulty items reported to the supervisor. As the business grows and you get more clients and more assignment, you can get more tools and equipment and offer more services. Employers are also required to ensure that those using equipment have sufficient knowledge and training to use it safely.

A maintenance schedule should be in place before going to the work to ensure that your equipment is maintained at least at intervals indicated in the manufacturer’s operating instructions or more frequently if indicated by the risk assessment. Any daily checks should be undertaken as recommended by the manufacturer. This will help prevent problems such as:-

- blockages,
- Leaks or breakdowns, which can increase risks.

The need of pre operational check is: it minimizes the occurrence of hazards on the machine or on the operator.

When you’re buying new equipment it’s worth considering:

- whether there are any dangerous parts and if so whether any guards are supplied with the equipment
- how any emergency-stop buttons work
- whether the environment in which you plan to operate the machinery is suitable for the levels of dust, fumes, noise or vibration it may cause
- whether there are clear instructions and manuals for installation and maintenance

What may be involved in routine pre-operational checks of tools?

This may include routine safety and pre-start checks and preparatory procedures including cleaning, lubricating, and hand sharpening, priming pumps, clearing filters, tightening, basic repairs and adjustments. Machinery and equipment breakdowns, faults or malfunctions will need to be reported to supervisor for repair or replacement to achieve work plan requirements.

RECORDS: Equipment procedures and maintenance guidelines should be kept in a central location for

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 19 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

quick reference when needed. If missing, request complimentary copies from manufacturer or maintenance contractor.

PROPER METHOD OF STORING MATERIALS: Take care of your machinery and equipment, supplies by securing or storing them properly at the close of each business day. These are especially important since your ship Keep your supplies in good condition, out of the way, and choose a moisture free environment. You will be responsible for a wide variety of materials, including ecclesiastical supply items that must be stored. Choose a moisture free environment:

1.3. Identifying and segregating unsafe or faulty machinery and equipment

After pre operational check an operator must identify and report unsafe or faulty machinery and equipment and prepare for repair and maintenance.

This may include dismantling and assembling procedures, testing, tightening, minor adjustments , repairs and routine servicing procedures including:-

- ✓ Lubricating
- ✓ checks of cooling system,
- ✓ fuel level
- ✓ Grease, oil, and battery levels.

It may also include inspections of tyre pressure, fan belts, leads, lines, connections, air filters, air conditioning, brakes, clutch, electrical, gearbox, hydraulics, steering, lighting, transmission, and confirmation of safety guards, PTO stubs and shaft.

Schedules for service, maintenance and repair

All work equipment is maintained in an efficient state, in efficient order and in good repair; where any machinery has a maintenance log, the log is kept up to date; and that maintenance operations on work equipment can be carried out safely.

The profitability of the machine is based on their correct and effective use, as well as their proper service, maintenance and repair.

1. After sale service

This is the responsibility of the dealer in our country/after a certain km/

2. Daily service

This is the task of the driver. He must check oil levels (of the engine, transmission and hydraulics), oil leaks, and radiator leaks, tyres pressure and damage, refuel and cleaning the tractor.

3. Periodical maintenance

This may includes the periodical change of motor oil, motor filter or hydraulic filter and replacement of other parts

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 20 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

4. Machine repair

It must be done soon after an unusual sound reveals. If it is a minor repair, the driver may make it at work place if the problem is serious the machine must be stopped at roadside and a rapid field repair should be organized.

The frequency and nature of maintenance should be determined through risk assessment, taking full account of:

- the manufacturer's recommendations
- the intensity of use
- operating environment (e.g. the effect of temperature, corrosion, weathering)
- user knowledge and experience
- the risk to health and safety from any foreseeable failure or malfunction

1.4. Occupational Health and Safety requirements

What is occupational health and safety?

Occupational health and safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at:

The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations;

- the prevention among workers of adverse effects on health caused by their working conditions;
- the protection of workers in their employment from risks resulting from factors adverse to health;
- the placing and maintenance of workers in an occupational environment adapted to physical and mental needs;
- The adaptation of work to humans.

Occupational Health and Safety hazards in the workplace are identified and reported to the supervisor

Hazard: is a source or potential source of human injury, ill health or disease. Anything which might cause injury or ill health to anyone at or near a workplace is a hazard

Classes of hazard

Hazards are classified into five different types. They are

- **Physical** - includes floors, stairs, work platforms, steps, ladders, fire, falling objects, slippery surfaces, manual handling (lifting, pushing, pulling), excessively loud and prolonged noise, vibration, heat and cold, radiation, poor lighting, ventilation, air quality
- **Mechanical and/or electrical** - includes electricity, machinery, equipment, pressure vessels, dangerous goods, forklifts, cranes, hoists
- **Chemical** - includes chemical substances such as acids or poisons and those that could lead to fire or explosion, cleaning agents, dusts and fumes from various processes such as welding

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 21 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

- **Biological** - includes bacteria, viruses, mould, mildew, insects, vermin, animals
- **Psychosocial environment** - includes workplace stressors arising from a variety of sources.

Occupational Health and Safety hazards associated with equipment operation may include

- exposure to loud noise and fumes, solar radiation, dust
- ergonomic hazards associated with posture and vibration
- hazardous substances (fuels, oils, fertilizer), oil and grease spills
- the presence of bystanders, livestock and wildlife
- uneven and varying terrain gradients, potholes, ditches, gullies, embankments, obstacles
 - rocks
 - logs
 - fences
 - debris
 - buildings
- extreme weather conditions, electricity, overhead hazards such as
 - power lines mechanical malfunctions
 - exposed moving parts
 - other machinery including hydraulics

Occupational Health and Safety requirements include:

- the safe operation and maintenance of machinery and equipment
- manual handling, including safe lifting and carrying techniques
- handling and storage of hazardous substances, and the appropriate use, maintenance and storage of personal protective clothing and equipment
- outdoor work including protection from solar radiation, hazardous noise and organic and other dusts
- identifying and reporting hazards
- projection of people in the workplace

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| Operation Sheet#1 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identify Basic Machinery & Equipment |
| | LO#1 | Prepare basic machinery and equipment for use |

Project title: Operate basic machinery and equipment

Purpose:

| | | |
|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 22 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

- To develop candidate's practical skill, and critical knowledge in operating basic machinery and equipment

Machinery and equipment required:

- Internal combustion pump with full accessories
-

Procedures:

- Placing a pump in appropriate place
- Installing hoses and foot valves (Suction and delivery lines)
- Conducting routine prestart check procedures
 - Checking fuel level, oil, air cleaning system
 - Priming of pump unit
 - Checking un tighten bolts, leakages and another external faults and damages.
- Starting up
- Shutting down
- Conducting routine cleaning activities
- Storing

Precaution:

- ⚠ Don't operate pumps without priming,
- ⚠ Don't fill fuel to the pump during operation
- ⚠ Keep away the pump from fire.
- ⚠ Don't touch exhaust part of the pump during and after operation
- ⚠ Don't touch our skin with oil

Quality Criteria:

- ✓ Follow the routine prestart checks
- ✓ Change the oil according to the manufacturer specification
- ✓ Empty the fuel tank and oil case when we store the pump for a longer period of time.
- ✓ Place and store the pump in appropriate and well aerated area

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|-----------------------|---------------|--|
| SELF-CHECK # 1 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identifying Basic Machinery & Equipment |
| | LO#1 | Prepare basic machinery and equipment for use |

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is machinery? (3point)
2. What is equipment? (2 points)
3. Write the most common types of machinery (5 points)
4. What are the purposes or uses of farm machineries and equipments? (10 points)

| | | |
|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 23 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

Note: Satisfactory rating - 20 points

Unsatisfactory - below 20 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

4. _____

| | | |
|---------------------------------------|---------------|--|
| INFORMATI ON SHEET # 2 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identify Basic Machinery & Equipment |
| | LO#2 | Support Basic Machinery and Equipment Operation |

2.1. Selecting Suitable personal protective clothing and equipment

Identifying hazards in the workplace

Workplace injury is a major cause of concern for all involved in occupational health and safety. The factors which cause workplace accidents and occupational illnesses are called hazards. The need for systematic management of OHS hazards and their attendant risks applies to all organizations and all activities and functions within an organization.

Risk management is a four step process:

1. Identify the hazard
2. Assess the risk associated with the hazard
3. Control the risk
4. Review the process.

The first and most important step in reducing the likelihood of an accident is hazard identification.

This means identifying all workplace situations or events that could cause injury or illness.

| | | |
|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 24 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |


The second step is an assessment of the level of risk of the hazards you have identified. This step involves collecting information and making decisions. It is important you consider the extent of the harm or consequence from a hazard and the likelihood of harm occurring. If your assessment is that an unacceptable risk to health and safety exists, you must introduce controls to reduce the risk to an acceptable level.

There are three categories of control measures you might take. You can

- eliminate the hazard
- minimize the risk
- introduce 'back-up' controls

The third step in effective risk management is to establish and maintain systems which give opportunity for regular evaluation and review procedures (i.e. PPE)

It may not be possible to avoid particular significant hazards during the maintenance of work equipment so appropriate measures should be taken to protect people and minimize the risk. These may include:

- physical measures, eg providing temporary guarding, slow speed hold-to-run control devices, [safe means of access](#), [personal protective equipment](#) , etc
- management issues, including safe systems of work, supervision, monitoring
- personnel competence (training, skill, awareness and knowledge of risk)

Personal protective equipment

Personal protective equipment is to include that prescribed under legislation, regulations and enterprise policies and practices. Face masks are available for rubbing back and painting.

Suitable *personal protective clothing and equipment* is selected, used, maintained and stored in accordance with Occupational Health and Safety requirements.

Select PPE based on the PPE Hazard Assessment

Consider these factors when selecting PPE:

- Type of hazardous materials, processes, and equipment involved
- Routes of potential exposure (ingestion, inhalation, injection, or dermal contact)
- Correct size for maximum protection
- Minimal interference with movement

Personal protective clothing and equipment may include:

- ✓ boots
- ✓ hat/hard hat
- ✓ overalls
- ✓ gloves

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|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 25 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

- ✓ protective eyewear
- ✓ hearing protection]
- ✓ respirator or face mask
- ✓ sun protection, e.g., sun hat, sunscreen

Different types of PPE are described below

Foot protection

Workers must wear closed-toe shoes at all times to protect feet from chemical spills and sharp objects. Steel-toed footwear and puncture-resistant soles. Slip-resistant shoes for anyone who works in wet environments.



Eye protection: Use safety glasses for minor splash hazards, goggles for moderate hazards, and goggles combined with a face shield for severe hazards.



Hand protection: Hand protection is indicated for the possibility of severe cuts, lacerations, or abrasions, punctures, temperature extremes, and chemical hazards. (Nit rile loves are usually a good choice for general use.) Use heavy-duty gloves for non-incidenta contact and gross contamination.



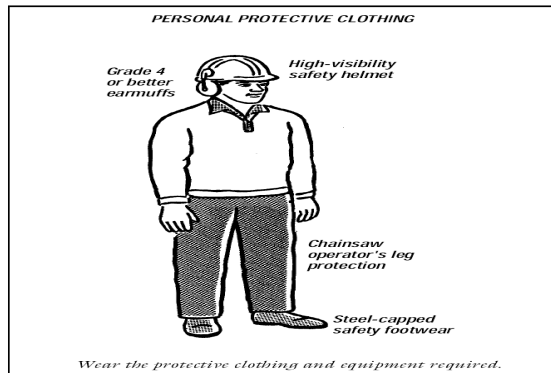
Body protection: Protective clothing includes lab coats, smocks, scrub suits, gowns, rubber or coated aprons, coveralls, uniforms, and pierce-resistant jackets and vests.



Head protection: Hard hats must be worn by electricians, construction workers, and any other

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 26 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

workers when there is a danger of objects falling from above.



2.2. Supporting Machinery And Equipment Operations

critical terms

Operator: a person who operate any machine

Operation: the process of operating different machineries

OPERATION

After pre operational check and maintenance continued safe operation of your equipment depends on regular maintenance and testing of the equipment and its operating and protective controls. The tests and checks out-lined below are designed to determine whether or not the equipment and controls are in good operating condition.

Machinery accidents can be prevented by keeping the machine in good repair, fitting and ensuring all safety equipment are operating with the machine at all times

To avoid any type of machinery-related injury strict safety practices must be employed.

- Never operate machinery under the influence of drugs or alcohol.
- Protective clothing should be worn during the operation of farm machinery. Never wear baggy or loose fitting shirts or pants. Loose clothing is easily caught in rotating machine parts.
- Most machinery is designed for one rider, not two or three. This rule should be strictly enforced. Do not allow anyone to ride on machinery except the driver because they can easily be thrown or knocked off the vehicle.
- Turn off the engine when you are refueling
- Never smoke when you are refueling

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 27 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

- Keep all people away from work areas and working machinery unless they are actively involved in the work.
- Motors should be shut-down on do periodic maintenance checks on the tank, pump, hose, and nozzle; and to abide by safety rules such as no smoking when around the fueling area.
- Whenever parking or leaving a piece of machinery for any length of time; even to check a malfunction; the motor should always be shut off, brakes engaged, the transmission in park-lock or in gear, keys removed and any attachments disengaged.
- Safety guards should always be in place when operating any piece of machinery.
- All wastes must be disposed
- Avoid horse play in the work place
- Long hair must be tied back or covered to keep it always from moving machine

2.3. Completing work

Work is completed to supervisor's satisfaction and in accordance with Occupational Health and Safety requirements.

Why is occupational health and safety important?

Work plays a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is on a plantation, in an office, factory, etc. Therefore, work environments should be safe and healthy. Yet this is not the case for many workers. Every day workers all over the world are faced with a multitude of health hazards, such as:

- ❖ dusts;
- ❖ gases;
- ❖ noise;
- ❖ vibration;
- ❖ Extreme temperatures.

Unfortunately some employers assume little responsibility for the protection of workers' health and safety. In fact, some employers do not even know that they have the moral and often legal responsibility to protect workers. As a result of the hazards and a lack of attention given to health and safety, work-related accidents and diseases are common in all parts of the world.

Work-related accidents or diseases are very costly and can have many serious direct and indirect effects on the lives of workers and their families. For workers some of the direct costs of an injury or illness are:

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 28 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

- ❖ the pain and suffering of the injury or illness;
- ❖ the loss of income;
- ❖ the possible loss of a job;
- ❖ Health-care costs.

It has been estimated that the indirect costs of an accident or illness can be four to ten times greater than the direct costs, or even more. An occupational illness or accident can have so many indirect costs to workers that it is often difficult to measure them. One of the most obvious indirect costs is the human suffering caused to workers' families, which cannot be compensated with money.

Agricultural worker - When spraying crops the worker may be exposed to hazardous chemicals contained in the spray. Many pesticides and herbicides that have been banned in some countries because of their toxic effects are still used in many developing countries. If spraying takes place on a windy day, the spray can be breathed into the lungs and blown on to the skin where it can cause damage. It can also be absorbed into the body through the skin.



So when working with machinery and equipment in work place the operators and the workers must perform their task effectively in line with OHS.

2.4. Identifying and reporting environmental implications

Environmental implications associated with operation and maintenance are identified and reported verbally to the supervisor.

What environmental implications may be associated with maintaining the workplace?

Beneficial impacts may result from maintaining tidy work areas and workshops, thus reducing the likelihood of litter blowing or washing into the external environment. By maintaining clean and tidy work surfaces, buildings and structures, using environmentally responsible cleaning agents and work practices, offensive odors, noise and unsightly areas may be reduced. Prompt identification of faulty tools, equipment and machinery for repair will also reduce their continued use, which may create unnecessary noise and particulate emissions.

Detrimental impacts on the external environment may result from the generation of excessive noise

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 29 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

and run-off of water and cleaning agents from maintenance activities, as well as the failure to promptly segregate waste into disposal containers, process waste materials and keep work areas tidy and free of clutter.

Environmental procedures are followed and waste from maintenance activities is collected, treated and disposed or recycled according to enterprise requirements.

Environmental implications associated with the operation of tools and equipment

- Negative environmental impacts may result from excessive noise and exhaust emissions, the incorrect use and disposal of maintenance debris (oil containers, chemical residues), hazardous substances (fuel, fertilizer), and damage to fauna and flora in natural areas
- Impacts may also include run-off flows of water and cleaning agents from servicing, maintenance and cleaning activities, soil disturbance and dust problems from high activity traffic (including irrigation equipment)
- Environmental pollution

Generally non-mechanical hazards associated with machinery and equipment can include harmful emissions, contained fluids or gas under pressure, chemicals fluids or gas under pressure, chemicals and chemical by-product, electricity and noise, all of which can cause serious injury if not adequately controlled. In some cases, people exposed to these hazards may not show signs of injury or illness for years.

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| SELF-CHECK # 2 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identifying Basic Machinery & Equipment |
| | LO#2 | Support Basic Machinery and Equipment Operation |

Directions: Answer all the questions listed below.

1. What conditions should PPE satisfies? (3 points)
2. what factors to be considered when selecting PPE (3 points)
3. Write at least 5 Personal protective clothing and equipment (5 points)
4. What is importance of storing PPE (4 points)
5. what is the difference between operator and operation (2 point)
6. List at least 4 tools and equipment (2 point)
7. To avoid any type of machinery-related injury what has to be done (5 point)
8. Define environmental effect (1 point)

| | | |
|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 30 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

9. Write at least 4 negative environmental impacts associated with the operation of tools and equipment (4 points)
10. What are the non-mechanical hazards associated with machinery and equipment operations (5 points)?

Note: Satisfactory rating - 34 points Unsatisfactory - below 34 points
 You can ask your teacher for the copy of the correct answers.

Answer Sheet

| |
|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

4. _____

| | |
|----------------------------|--|
| Information Sheet-3 | LO3 Check, clean and store basic machinery and equipment |
|----------------------------|--|

3.1. Detailing and recording machinery and equipment use

Machinery and equipment use is detailed and recorded in accordance with enterprise requirements. Standard Operating Procedures (SOPs), industry standards, production schedules, Material Safety Data Sheets (MSDSs), work notes, product labels, manufacturers specifications, operators manuals, enterprise policies and procedures (including waste disposal, recycling and re-use guidelines),

| | | |
|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 31 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

Occupational Health and Safety procedures, supervisors oral or written instructions, work and routine maintenance plans could be included in enterprise requirements.

3.2. Cleaning, securing and storing *machinery and equipment*

Machinery and equipment are cleaned, secured and stored to manufacturers' specifications and supervisors' instructions. Almost every homeowner has their own lawn and garden equipment to maintain the work property. To help lawn and garden equipment to last longer it's important to store those items properly to insure that they will be in proper working condition for the next time that the owner wants to use them.

1. *Choose a moisture free environment:* the area that you store your lawn and garden equipment should be free of moisture from rain and any type of precipitation because many pieces of lawn and garden equipment have electric motors that will not function correctly if they get wet and it also helps in order to avoid rusting of equipments.
2. *Clean the equipment after every use:* before storing any piece of lawn or garden equipment it's important to clean that equipment thoroughly because it will be easier to use for the next lawn and garden maintenance project.
3. *Keep from children's reach:* depending on the piece of equipment it's important to store it out of a child's reach to insure that they won't want to play with and potentially get injured from that equipment.
4. *Cover if necessary:* many people don't have garages or storage sheds to store lawn and garden equipment. If this is the case with you make sure that you cover your equipment properly to protect it from the elements like rain, snow, dirt and dust.
5. *Keep your equipment within reach:* it doesn't matter if your home has a garage to store law and garden equipment or not. You must store your equipment in a way that makes it easy to reach when you need to use it.
5. *Take extra security measures if necessary:* If lawn and garden equipment has to be stored outside a home owner should take security precautions like investing in a lock and chain to secure their equipment while they are away from their home.
7. *Make sure gas tanks are secure:* Before storing a piece gas powered lawn and garden equipment it's important to insure that gas caps are securely screwed down onto gas tanks so gas won't leak out while it's stored for a long period of time.

3.3. identifying and reporting malfunctions, faults, wear or damage to machinery and equipment

Malfunctions, faults, wear or damage to machinery and equipment are identified and reported in line with enterprise requirements. Since factors vary among installation sites, equipment users must work

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 32 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

closely with each of their suppliers to ensure that proper data is being collected, that the data is being provided to the correct supplier, and that the resulting solutions are feasible. All events (failures) that occur during inspections and tests should be reported through an established procedure that includes collecting and recording corrective maintenance information. The data included in these reports should be verified and then the data should be submitted on simple, easy-to-use forms that failures are tailored to the respective equipment or software.

Collecting the Data

Many problems go unnoticed because insufficient information was provided. example, someone was able to duplicate the problem being reported. There are three common causes for missing essential data:

- Inspection or testing began before a procedure was in place to report problems.
- The reporting form was difficult to use.
- The person who filled out the form had not been trained

Operators and *maintenance personnel* are usually the first to identify problems and, therefore, they should be trained to properly capture all of the information needed for an event report.

Poor working conditions affect worker health and safety

- Poor working conditions of any type have the potential to affect a worker's health and safety.
- Unhealthy or unsafe working conditions are not limited to factories — they can be found
- Poor working conditions can also affect the environment workers live in, since the working and living environments are the same for many workers. This means that occupational hazards can have harmful effects on workers, their families, and other people in the community, as well as on the physical environment around the workplace. A classic example is the use of pesticides in agricultural work. Workers can be exposed to toxic chemicals in a number of ways when spraying pesticides: they can inhale the chemicals during and after spraying, the chemicals can be absorbed through the skin, and the workers can ingest the chemicals if they eat, drink, or smoke without first washing their hands, or if drinking water has become contaminated with the chemicals. The workers' families can also be exposed in a number of ways. Other people in the community can all be exposed in the same ways as well. When the chemicals get absorbed into the soil or leach into groundwater supplies, the adverse effects on the natural environment can be permanent.

Overall, efforts in occupational health and safety must aim to **prevent** industrial accidents and diseases, and at the same time recognize the connection between worker health and safety, the

| | | |
|-----------------------|---|-----------------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 33 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

workplace, and the environment outside the workplace.

Risk management

Risk management programs are cyclical, once current workplace hazards are successfully controlled the process does not stop. Systematic monitoring and reviews must be implemented because of the potential for new hazards to be introduced into a workplace. These hazards can be due to

- The use of new technology, equipment or substances
- The introduction of new work practices or procedures
- A change in work environment (moving to a different office, staff reduction)
- The introduction of new staff with different skill/ knowledge levels.
- Lack of knowledge about how to use machinery and equipment

3.4 . Cleaning and maintaining workplace areas

Workplace areas are cleaned and maintained in line with Occupational Health and Safety and enterprise requirements.

Hazards defined

A hazard is a source or potential source of human injury, ill health or disease. Anything which might cause injury or ill health to anyone at or near a workplace is a hazard. While some hazards are fairly obvious and easy to identify, others are not - for example exposure to noise, chemicals or radiation.

Workers in every occupation can be faced with a multitude of hazards in the workplace. Occupational health and safety addresses the broad range of workplace hazards from accident prevention to the more insidious hazards including toxic fumes, dust, noise, heat, stress, etc. Preventing work-related diseases and accidents must be the goal of occupational health and safety programmer, rather than attempting to solve problems after they have already developed.

Hazards in the workplace can be found in a variety of forms, including chemical, physical, biological, psychological, non-application of ergonomic principles, etc. Because of the multitude of hazards in most workplaces and the overall lack of attention given to health and safety by many employers, work-related accidents and diseases continue to be serious problems in all parts of the world. Therefore, trade unions must insist that employers control hazards at the source and not force workers to adapt to unsafe conditions.

Management commitment to health and safety and strong worker participation are two essential elements of any successful workplace health and safety programmers. The most effective accident and disease prevention begins when work processes are still in the design stage.

Housekeeping is a subject that we continue to write about often. It is also a subject that needs to be

| | | |
|-----------------------|--|---------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 34 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

discussed for obvious reasons. A clean workplace and clean equipment offers a good impression for visitors and outsiders, showing a respect and pride in your workplace. It also enhances the safety in these areas. We continuously reiterate the point that slips, trips and falls are one of the leading causes of injuries in the agriculture industry. Personnel involved with maintenance are not the only ones that should be concerned with clean shop areas. All employees from farm laborers to office personnel should be trained and oriented in maintaining clean areas for all the same obvious reasons. Following are some tips on maintaining clean and organized workplaces:

Floors and other areas -

- Clean oil spills immediately. All floors should be free of debris and those that can't be cleaned regularly should have a coating of anti-slip covering or flooring. Replace worn carpeting, tiles or other floor materials when they become ragged and broken.
- Tools not in use in the shop should be returned to their respective locations not left on the floor or on work benches. Cut down weeds and tall grass around buildings.
 - Do keep floors, staircases clean and clear of waste
 - Keep work areas adequately lighted
 - Inspect & clean tools and machinery regularly
 - Clean up spills immediately

Spill Control: The best spill control method is to stop them before they happen. Organized programs for cleaning and maintaining buildings and equipment is the best way to avoid or at least reduce the potential for spills. Using drip pans and guards where spills could possibly occur is another safeguard. When and if a spill occurs, it is important to follow the Material Safety Data Sheet and abate the spill immediately. Absorbent shale, absorbent socks or even clean soil or sand are good mediums for abating spills. The contaminated materials must be disposed of carefully and quickly.

Tools and equipment: Keeping and maintaining tools and other items of equipment are not only good for locating them for projects, but also helps to enhance the total image of the shop and enables the project to finish faster. Clean and repair all tools with problems Tools that are beyond repair should be removed from service and replaced with new ones so appropriately clean and store equipments.

Waste Disposal: Collecting, sorting and grading scrap metal and wood all are traits of good housekeeping practices. Allowing scrap to remain around the floors or corners of the shops only creates more work - a potential for a trip hazard - and extra time to clean up the whole “mess.” Containers for scrap metal and wood located in convenient areas and good follow up will eliminate idle scrap lying around on the floors and corners of the shop.

| | | |
|-----------------------|--|-----------------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 35 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

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| SELF-CHECK # 3 | Unit | Identify Basic Machinery & Equipment |
| | Module | Identifying Basic Machinery & Equipment |
| | LO#3 | Check, clean and store basic machinery and equipment |

Directions: Answer all the questions listed below

1. Define unsafe or faulty machinery and equipments. (5 points)
2. What is the purpose of identifying and segregating faulty or unsafe machinery and equipments? (5 points)

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|------------------------------|---|----------------------|
| SSID TTLM :version: 1 | Date: December 2018 | Page 36 of 37 |
| | Prepared by: Alage, welyta sodo, O-Kombolcha, A-Kombolcha and Wekro Atvet college Instructors. | |

3. Write the purpose of cleaning work place area (5)

Note: Satisfactory rating - 15 points

Unsatisfactory - below 15 points

You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

| | | |
|-----------------|---------------|--|
| Lap-Test | Unit | Identify Basic Machinery & Equipment |
| | Module | Identifying Basic Machinery & Equipment |
| | | |

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary machinery, irrigation equipment, tools and materials you are required to perform the following tasks within _____ hours.

Task 1: Identify, sort and select machinery and equipment

Task 3: Perform pre-operational checks of machinery and equipment

Task 4: Identify and report occupational health and safety hazards