



KCSE AGRICULTURE NOTES

TOPIC 5: WATER SUPPLY, IRRIGATION AND DRAINAGE



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TOPICS/SUBTOPICS OUTLINE

- ✓ -Farm water sources
- ✓ -Collection and storage of water
- ✓ Pumps and pumping
- ✓ Conveyance of water
- ✓ Water treatment
- ✓ Water uses
- ✓ Importance of irrigation
- ✓ Methods of irrigation
- ✓ Equipment used in irrigation
- ✓ Plant growth under irrigation
- ✓ Maintenance of irrigation equipment
- ✓ Importance of drainage
- ✓ Water pollution, prevention and control
- ✓ Importance of clean water in life



Introduction to Water Supply, Irrigation and Drainage

Water is a very important natural resource.

It is necessary for both crops and livestock.

Uses of water in the farm;

- ✓ Cleaning equipment.
- ✓ Irrigation in dry areas.
- ✓ Processing farm produce, for example, coffee.
- ✓ Drinking by livestock and man.
- ✓ Mixing agro-chemicals such as acaricide, fungicides and herbicides.
- ✓ Providing power in water mills to grind grain crops.
- ✓ Cooling engines.
- ✓ Construction work.

Sources of Water in the Farm

Three major sources of water in the farm are:

Surface water:

Includes water from;

- ✓ Rivers,
- ✓ Streams
- ✓ Dams.

Ground water:

Includes water from;

- ✓ Springs,



- ✓ Wells
- ✓ Boreholes.

Rain water:

This is water tapped in various ways such as;

- ✓ Rooftops
- ✓ Rock surface, when it is raining and stored in various ways.

Collection and Storage of Water

Dams:

These are structures constructed across rivers and channels.

They collect and store water for use during the dry season.

Weirs:

These are structures constructed across rivers to raise the water level for easy pumping.

Unlike in the dams, water flows over the barrier created across the river.

Water Tanks:

These are structures made of concrete, stone, metal sheets and plastics.

They store water from rain or that which has been pumped from other sources.

Tanks should be covered to prevent contamination from dust.

Pumps and Pumping of Water

Pumping is the lifting of water from one point to another by use of mechanical force.

Water is pumped from the various sources and then conveyed to where it is required for use or storage.



Types of Water Pumps

Used to lift water from its source.

Centrifugal pumps

Piston or reciprocating pumps

Semi-rotary pumps and Hydrant

Conveyance of Water

This is the process of moving water from one point, usually the source or point of storage to where it will be used or stored.

Piping;

This is where water is moved through pipes such as;

- ✓ Metal pipes
- ✓ Plastic pipes
- ✓ Hose pipes

Use of Containers:

In this case water is drawn and put in containers, drums, jerry cans, pots, gourds, tanks and buckets .

Which are carried by animals, bicycles, human beings and vehicles.

Use of Canals:

In this case water is conveyed from a high point to a lower one along a gradual slope to avoid soil erosion.

Water conveyed through this way is mostly used for irrigation and livestock.

Water Treatment



Raw water contains impurities which may be dissolved, floating or suspended in water.

These impurities are grouped into three categories, namely:

- ✓ **Physical impurities:** these are dissolved impurities detected by colour, taste and smell.
- ✓ **Chemical impurities:** these are dissolved impurities detected by use of chemical analysis.
- ✓ **Biological impurities:** these are microorganisms in water such as bacteria, viruses and algae.

Importance of Treating Water

- ✓ To kill disease causing microorganisms such as cholera and typhoid bacteria that thrive in dirty water.
- ✓ To remove chemical impurities such as excess fluoride which may be harmful to human beings.
- ✓ To remove smells and bad taste.
- ✓ To remove sediments of solid particles such as soil, sand and sticks.

Methods of Treating Water

- ✓ **Aeration:** this is the removal of smell and odour from water by fine spraying or bubbling of air.
- ✓ **Sedimentation:** this is where water is put in large containers so that solid particles such as sand, metal and others can settle at the bottom.
- ✓ **Filtration:** this is passing water through fine granular materials to remove solid particles and biological substances.
- ✓ **Coagulation:** addition of chemicals which precipitate impurities and help in softening of hard water.
- ✓ **Chlorination:** Sterilization to destroy disease causing organisms.



Irrigation

It is the artificial application of water to crops in dry areas or where water is not enough.

It is one of the methods of land reclamation in case of arid and semi-arid areas.

Factors to Consider in Identifying and Assessing the Potential of Land for Irrigation

Development

- ✓ Topography of the land
- ✓ Soil type
- ✓ Water availability
- ✓ Human factors such as skill, capital availability and economic activities.

Types of Irrigation

Surface irrigation:

- ✓ This includes flood irrigation and basin irrigation.
- ✓ It is used in flat areas.
- ✓ The problem with this method is loss of water through seepage.
- ✓ It also increases soil salinity.

Sub-surface Irrigation:

This involves the use of porous pipes or perforated pipes.

It is used in sloppy areas and where water is inadequate.

Overhead or Sprinkler Irrigation:

It is used in any area which is not steep.



Drip or Trickle Irrigation:

It is used where water is little and in relatively sloppy and flat areas.

Drainage

This is a method of removing excess water or lowering the water table from a marshy water-logged land.

It is also a method of land reclamation.

Importance of Drainage as a Method of Land Reclamation

- ✓ To increase soil aeration.
- ✓ To raise soil temperature.
- ✓ To increase microbial activities in the soil.
- ✓ To reduce toxic substances from the soil.
- ✓ To increase soil volume for exploitation by plant roots.

Methods of Drainage

- ✓ Use of open ditches.
- ✓ Use of underground drain pipes.
- ✓ French drains.
- ✓ Cambered beds.
- ✓ Pumping out water from the soil.
- ✓ Planting tree species which absorb a lot of water for example eucalyptus.

Water Pollution

This is the process by which harmful substances get into the water.

The harmful substance is referred to as a pollutant.



Agricultural practices which pollute water include:

- ✓ Use of inorganic fertilizers.
- ✓ Use of pesticides.
- ✓ Poor cultivation practices such as over cultivation, cultivating along the river banks.
- ✓ Overgrazing which leads to erosion of soil thus causing siltation in water sources.

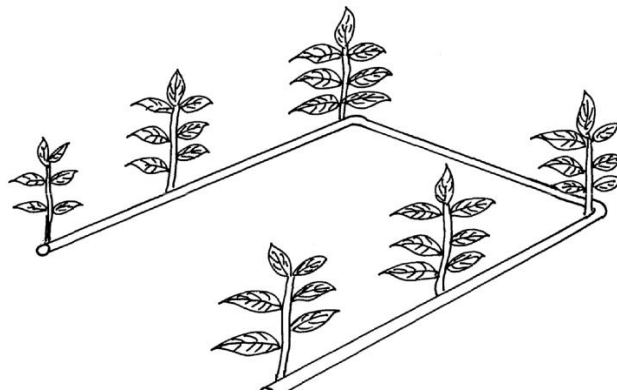
Methods of Preventing Water Pollution

- ✓ Soil conservation measures which minimize soil losses through erosion.
- ✓ Fencing off the water sources.
- ✓ Adopting organic farming practices for example controlling pests and weed using non-chemical techniques.
- ✓ Planting grass along river banks to minimize siltation in rivers.
- ✓ Proper disposal of empty chemical containers.



TOPICAL QUESTIONS

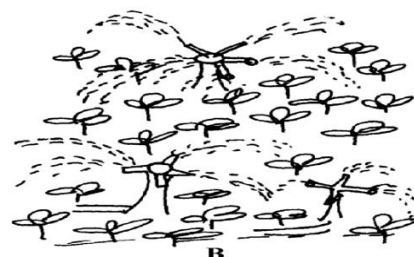
1. State two reasons for treating water for use on the farm
2. State three reasons for draining swampy land before growing crops
3. Use the diagram below of irrigation method to answer the questions that follow.



- a. Identify the method of irrigation
 - b. State four advantages of the above irrigation system
 - c. State three factors that determine the type of irrigation on the farm
 - d. State two disadvantages of the above system of irrigation
4. What is irrigation
 5. Outline three methods of irrigation
 6. List four uses of water on the farm
 7. Give four methods of harvesting water on the farm
 8. Outline the stages involved in water treatment process
 9. List any four uses of water in the farm
 10. State two types of irrigation used in Kenya
 11. Outline four disadvantages of cambered beds
 12. Describe the process of water treatment
 13. Give four roles of drainage as a method of land reclamation



14. Name two types of water pumps which can be used in the farm
15. Name any four examples of working capital in maize production
16. List four types of water pumps which can be used in the farm
17. State four methods of drainage
18. Distinguish between a dam and a weir
19. How do the government control prices of essential farm produce?
20. What is the difference between pumping and piping of water in the farm?
21. List four reasons of draining water logged soils before planting.
22. Give three Agricultural practices which lead to water pollution
23. The diagrams below illustrate some methods of irrigating crops in the field. Study the diagrams and answer the questions that follow:



- a. Identify the methods used ; (23) A, (23) B
 - b. State two advantages of method A over method B
 - c. What material should be inserted at point T
24. Name two farming practice that cause water pollution
 25. Give four reasons for practicing irrigation
 26. State four importance of water to plants
 27. State four reasons for treating water before use
 28. Describe water treatment system in a chemical treatment plant
 29. Name four diseases caused to man by drinking untreated water



30. State the functions of the following chemicals as used in water treatment;

- a. Chlorine.
- b. Aluminum sulphate (Ailum)

31. The diagrams labeled S and T illustrate some methods of draining waterlogged fields; use it to answer the questions that follow:

32. What is the importance of carrying out land reclamation?