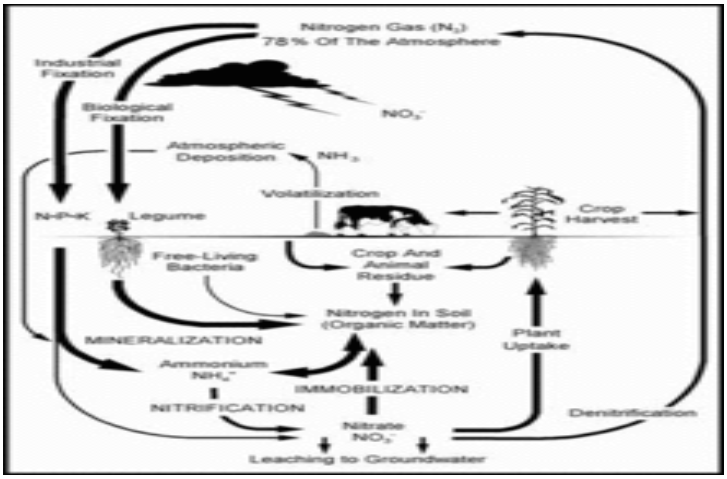
UNIT 3

SOIL MELIORATION

SESSION 9	**LEACHING AS AN AGRICULTURAL CONCERN**

⇨ **STARTER:** Look at the illustration below. With a partner if possible, try to predict exactly what is being discussed.



Step 1. Pre-reading questions: Before reading the following text work with a partner, ask and answer the questions below. Base your answers on your possible knowledge of the topic.

- *What is leaching?*
- *What kind of leaching do you know*?
- *What is groundwater contamination?*
- *Are anthropogenic sources of nitrogen greater than from natural sources or not?*

Step 2. Read the Reading Passage attentively and translate it into Uzbek.

A Do you know what is leaching itself and how does it happen in nature?

In agriculture, **leaching** refers to the loss of plant nutrients from the soil, due

to rain and irrigation. Soil structure, crop planting, type and application rates of fertilizers, and other factors are taken into account to avoid excessive nutrient loss.

B Leaching may also refer to the practice of applying a small amount of excess irrigation, where the water has a high salt content. The drainage must also usually be employed, to carry away the excess water.

C It is important to know that leaching is an environmental concern, because it contributes to groundwater contamination. As water from rain, flooding, or other sources seeps into the ground, it can dissolve chemicals and carry them into the underground water supply. Of particular concern are excess fertilizer, improperly stored animal manure, and biocides (e.g. pesticides, fungicides, insecticides and herbicides).

Step 3. The reading passage has three sections A-C. Now underline the main ideas and key words in them.

Sections	Ideas	Key words
A	*Leaching refers to the loss of plant nutrients; …*	*Leaching, agriculture, plant nutrients, soil structure, excessive nutrient…*
B		
C		

Step 4. Choose the most suitable headings for sections A-C from the list of headings.

1. Section A _____
2. Section B_____
3. Section C_____

List of headings
i. Application rates of fertilizers
ii. Leaching in agriculture
iii. Leaching referring to the practice
iv. Drainage
v. Biocides
vi. Environmental concern contributed to groundwater contamination.

Step 5. Pair-work. Make up the dialogue with your partner on leaching.

Step 6. According to the dialogue and discussions in the class make some notes on the topic, including characteristics, causes and results of leaching in the world and your area. Base your ideas on your own understanding.

Characteristics:_____

_____ .

Causes:_____

_____ .

Results:_____

_____ .

HELP DESK

WHAT DO THESE WORDS MEAN?

leaching – (with reference to a soluble chemical or mineral) drain away from soil, ash, or similar material by the action of percolating liquid, especially rainwater

groundwater contamination – pollution of water held underground in the soil or in pores and crevices in rock

fertilizer – a chemical or natural substance added to soil or land to increase its fertility

high salt content – salt that are held or included in the most part

salinity control – salt regulating

dump – a place where a particular kind of waste, especially dangerous waste, is left

landfill – disposal of waste material by burying it, especially as a method of filling in and reclaiming excavated pits

stored animal manure – animal fertilizer, kept for future use

biocide – a poisonous substance for killing living organisms

pesticide – a substance used for destroying insects or other organisms harmful to plants or animals

fungicide – a chemical that destroys fungus

insecticide – a substance used for killing insects

herbicide – a substance that is toxic to plants, used to destroy unwanted vegetation

SESSION 10	**SOIL IMPROVEMENT: MELIORATION**

STARTER: Look at the pictures below and answer the questions. Share your ideas with your group.

- What can you see in the first picture?
- What agricultural procedure is the machine in the picture used for?
- What kind of mechanized applications have you ever seen?
- What can you see in the second picture?
- What is the difference between the states of soils in the first and second pictures?
- Does the state and preparation of soil affect to the growth of plants?

Step 1. Read the Reading Passage attentively.

As the soil is the end product of nature which is the base of any growing in reality, its state and condition are the most essential matters for today. Unfortunately, many factors, like leaching, pollution, and improperly use of soils affects and reacts the soil and makes much many circumstances needing to be solved. So the salvation of the problems of soils or getting it better is called soil improvement or melioration. *Soil improvement* in its broadest sense is the alteration of any property of a soil to improve its engineering performance. So *melioration* in its broadest sense means “improving, changing and getting smth. better.”, and consequently, *soil melioration* is improving, getting better and remaking of soils, moreover, preparing it for further agricultural procedures. This

may be either a temporary process to permit the construction of a facility or may be a permanent measure to improve the performance of the completed facility.

Various Techniques of Soil Improvement:

1 *Surface Compaction* – construction of a new road, a runway, an embankment or any soft or loose site needs a compacted base for laying the structure.

2 *Drainage Methods* – certain methods are available to control the ground water and ensure a safe and economical construction scheme.

3 *Vibration Methods* – can be effectively used for rapid densification of saturated non-cohesive soils.

4 *Precompression and consolidation* – aim to consolidate the soil before construction.

5 *Grouting and Injection* – grouting is a process whereby' stabilizers, either in the form of suspension or solution are injected into subsurface soil or rock for one or more applications.

6 *Chemical Stabilization* – has been widely used in the form of lime, cement, fly ash and the combination of the above is widely used in soil stabilization.

7 *Soil Reinforcement* – is in the form of a weak soil reinforced by high-strength thin horizontal membranes.

8 *Geotextiles and Geomembranes* – Geotextiles are porous fabrics manufactured from synthetic materials, which are primarily petroleum products and others, such as polyester, polyethylene, polypropylene and polyvinyl chloride, nylon, fiberglass and various mixtures of these.

9 *Other Methods* – include Thermal methods, Moisture barriers, Prewetting, addition or removal of soils, etc.

Step 2. Do the following statements agree with the information in Reading Passage? In boxes 1-4 on your answer sheet write. Time – 10 min.

Yes (Y) *if the statement agrees with the information*

No (N) *if the statement contradicts the information*

NOT GIVEN (NG) *if there is no information on this passage*

Y	*Soil melioration* is the most actual part of agricultural procedures.
	Surface Compaction deals with the certain methods are available to control the ground water and ensure a safe and economical construction scheme.
	Drainage Methods – construction of a new road, a runway, an embankment or any soft or loose site needs a compacted base for laying the structure.
	Other melioration methods are used neither for agricultural preparation of soil, nor for irrigational procedures.

Step 3. Regrouping topic into several parts (paragraphs), choose the headings to each of them.

Understanding of soil improvement	*Paragraph 1*

Step 4. Choose the central title to the topic. Conclude with your ideas.

- Irrigation techniques
- Soil improvement or melioration of soil
- Soil improvement and melioration techniques
- Primary and secondary melioration techniques

HELP DESK

WHAT DO THESE WORDS MEAN?

soil improvement – procedure that makes soil better or is better than something else

melioration – the act or an instance of improving the soil or the state of being improved

vibration – an instance or the state of vibrating, i.d. move with small movements rapidly to and fro

consolidation – making stronger or more stable; combining things into a single unit

grouting – mortar or paste for filling crevices, especially between tiles; fill in crevices with grout

injection – an instance of injecting or being injected; introduce (something) under pressure into a passage, cavity, or solid material

reinforcement – 1) the action or process of reinforcing or strengthening 2) the process of encouraging or establishing a belief or pattern of behaviour

geotextile – any strong synthetic fabric used in civil engineering, as to retain an embankment

SESSION 11	**TILLAGE**

STARTER: Look at the picture and share your ideas with the group.



Step 1. Name the pictures with the given words: mechanizing, draft-animal-powered method, using hand tools. Also write some definitions related to these pictures.

Mechanising – Picture ____: _____

_____ .

Animal-powered method – Picture____: _____

_____ .

Using hand tools – Picture ____: _____

_____ .

Step 2. Read the following passage carefully.

Tillage is also called as "cultivation" and closely connected with the plant-growing and harvesting. Tillage is the agricultural preparation of the soil by mechanical agitation of various types, such as *digging, stirring, and overturning*. We used to divide tillage methods into: human-powered, animal-powered or mechanized tilling methods.

Examples of **human-powered tilling methods** using hand tools include shoveling, picking, mattock work, hoeing, and raking.

Examples of **animal-powered or mechanized work** include ploughing (overturning with moldboards or chiseling with chisel shanks), rolling with cult packers or other rollers, harrowing, and cultivating with cultivator shanks (teeth).

Small-scale gardening and farming, for household food production or small business production, tends to use the smaller-scale methods above; consequently large-scale farming tends to use the larger-scale methods.

Tillage is often classified into two types, **primary and secondary**. There is no strict boundary between them. So the tillage that is deeper and more thorough is a primary tillage and the tillage that is shallower is a secondary tillage. Primary tillage such as ploughing tends to produce a rough surface finish, and secondary tillage tends to produce a smoother surface finish, such as that required to make a good seedbed for many crops.

Step 3. Do the following statements agree with the information in Reading Passage? In boxes 1-5 on your answer sheet write. Time – 10 min.

YES (Y) *if the statement agrees with the information*

NO (N) *if the statement contradicts the information*

NOT GIVEN (NG) *if there is no information on this passage*

	Digging, stirring, and overturning are the forms of tilling.
	Tillage is the agricultural preparation of the water by mechanical agitation of various types.
	Animal powered method is an ancient one and not used in nowadays.
	Tillage is often classified into three types, *primary, secondary and*

	final.
	Primary tillage tends to produce a smoother surface and secondary tillage tends to produce a rough surface finish.

Step 4. Find out the adjective + noun word combinations from the text.	
Adj + n wordcombinations	Paragraphs
agricultural preparation, …	1

Step 5. Fill the following statements using no more than 4 words from the text.

1. Tillage is often classified into _____

   _____ .
2. Small-scale gardening and farming, for household food production or small business production, tends to use _____

   _____.
3. Primary tillage tends to _____

   _____ .
4. Secondary tillage tends to produce _____

   _____ .

Step 5. Talk with your partner about effects and advantages of tillage in agriculture. Write your own explanations and decisions in your note-book using tips mentioned in the reading tasks.

HELP DESK

WHAT DO THESE WORDS MEAN?

tillage – the preparation of land for growing crops ■ land under cultivation

row crop – plants in one line

harrowing – working with a harrow, an implement consisting of heavy frame set with teeth

roller – a cylinder that rotates about a central axis and is used in various machines and devices to move, flatten, or spread something

animal-powered – based on animals` force

raking – drawing together leaves or grass or smooth soil with a rake

hoeing – use a hoe (a long-handled gardening tool with a thin metal blade, used mainly for weeding) to turn earth or cut through weeds

mattock – an agricultural tool shaped like a pickaxe, with an adze and a chisel edge as the ends of the head

hand tool – a tool held in the hand and operated without electricity or other power

agitation – stirring or shaking a liquid briskly

soil – the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles

SESSION 12	**FERTLIZER**

STARTER: Look at the pictures and tell what are being described here.

Step 1. Read the passage carefully and note new words.

Fertilizer (or fertiliser) is any organic or inorganic material of natural or synthetic origin (other than liming materials) that is added to a soil to supply one or more plant nutrients essential to the growth of plants. Conservative estimates report 30 to 50% of crop yields are attributed to natural or synthetic commercial fertilizer.

Fertilizers come in various forms. The most typical form is *solid fertilizer* in granulated or powdered forms. The next most common form is *liquid fertilizer*; some advantages of liquid fertilizer are its immediate effect and wide coverage.

There are also *slow-release fertilizers* (various forms including fertilizer spikes, tabs, etc.) which reduce the problem of "burning" the plants due to excess nitrogen. Polymer coating of fertilizer ingredients gives tablets and spikes a 'true time-release' or 'staged nutrient release' (SNR) of fertilizer nutrients.

More recently, *organic fertilizer* is on the rise as people are resorting to environmental friendly (or 'green') products. Although organic fertilizers usually

contain a lower concentration of nutrients, this lower concentration avoids complication of nitrogen burn harming the plants. In addition, organic fertilizers such as compost and worm castings break down slowly into complex organic structures (humus) which build the soil's structure and moisture- and nutrient-retaining capabilities.

Step 2. Give the explanation of the following statements by your own words.

Fertilizer: _____

_____ .

Solid fertilizer: _____

_____ .

Liquid fertilizer: _____

_____ .

Slow-release fertilizers: _____

_____ .

Organic fertilizer: _____

_____ .

Step 3. Multipal choice.

1. Fertilizer added to the soil to …

a) cultivate the plant

b) grow the plant ☑

c) pick the plant

d) watering the plant

2. Choose the correct form of the fertilizer forms.

a) solid fertilizer, organic fertilizer, slow-release fertilizers, carbon fertilizer

b) liquid fertilizer, organic fertilizer, solid fertilizer, nutrient fertilizer

c) organic fertilizer, slow-release fertilizers, liquid fertilizer, solid fertilizer

d) solid fertilizer, organic fertilizer, carbon fertilizer, nutrient fertilizer

3. Which fertilizer reduced the problem of burning

a) slow-release fertilizers

b) liquid fertilizer

c) carbon fertilizer

d) solid fertilizer

4. Organic fertilizers usually contain a lower concentration of nutrients, this lower concentration avoids

a) growing plants

b) harming plants

c) cultivate plants

d) watering plants

Step 4. Find out Participle II forms from the text, complete the table of their infinitive and past forms.

Paragraph 1	Infinitive	Past	Participle II
1	add	added	added

Step 5. Make some notes on the topic, including fertiliser`s definition and forms, also rising need (demand) for it in the world and in your area. Base your ideas on your own experience.

Definition:_____ .

Forms:_____.

Demand:_____ .

HELP DESK

WHAT DO THESE WORDS MEAN?

fertilizer moisture – wet fertilizer

harm – physical injury, especially that which is deliberately inflicted

nutrient – a substance that provides nourishment essential for the maintenance of life and for growth

oxygen – a colourless, odourless reactive gas, the chemical element of atomic number 8 and the life-supporting component of the air (Symbol: O)

hydrogen – a colourless, odourless, highly flammable gas, the chemical element of atomic number 1 (Symbol: H)

carbon – the chemical element of atomic number 6, a non-metal which has two main forms (diamond and graphite) and which also occurs in impure form in charcoal, soot, and coal (Symbol: C)

liquid – a substance that flows freely but is of constant volume, having a consistency like that of water or oil

solid – firm and stable in shape; not liquid or fluid

SELF-CONTROL on UNIT 3 (total 15 points)

Step 1. VOCABULARY CHECK (5 points). These are the important words that you have studied in Unit 3. You should make sure that you know these words before you go on to Unit 4.

aeration	liquid
agents	loose rock material
aggregate	mattock
biological activity	nutrient
chemical condition	organic constituent humus
clay	oxygen
consistency	pesticide
content	raking
displaced soil	regolith
erosion	relative proportion
fertilizer	row crop
fertilizer moisture	salinity control
fungicide	size
hand tool	specific surface area
harm	stable secondary structures
harrowing	stored animal manure
herbicide	surface-water-gley
high salt content	temperature
hoeing	texture
human use	three-state system
insecticide	tillage
intensive tillage	weathering
iron oxides	
leaching	

Step 2. TRUE-FALSE ACTIVITY (5 points). Which of the following bits of information is given (G) or not given (NG) in Unit 1?

1. Leaching is not dealt with ground and not an environmental concern. _____

2. Mostly weak soils are treated and reinforced with high horizontal membranes. _____

3. Rolling, harrowing and cultivating by shank is called human powered tilling method. _____

4. The most effective fertilizer (organic or nonorganic matter) comes from the USA. _____

5. The most commonly used fertilizer are solid and liquid ones._____

Step 3. COMPREHENSION TASK (5 points). Read and explain the meaning of the following proverbs and wise-sayings on gardening and planting. Underline metaphorical and specific usage of some expressions.

1. To the one, who gives to the land, the land gives back three times more.

2. Body and Land are not two but one.

3. When you have land, you have the world.

4. Do me a favor in the rainy season and I'll payback in the dry season.

5. A hive of bees in May is worth a load of hay.