

# Unit I: Other Farm Related Subjects

## Lesson 1: Understanding the Importance of Managing Soil and Water

# Terms

- Crop residue
- Degradation
- Domestic wastewater
- Erosion
- Freshwater
- Grey water
- Hazardous waste
- Irrigation
- Minimum tillage
- No-till
- Sewage
- Solid waste
- Spent water
- Stewardship
- Streambank management
- Strip cropping
- Terrace
- Tilling
- Topsoil
- Wastewater
- Water conservation

# Why is managing soil important?

- There are many philosophic and economic reasons for managing soil and minimizing its degradation.
- Degradation is lowering the quality of soil.
- The soil is no longer as productive or useful as it once was.
- The reasons for soil management can be categorized into several groups.

# Why is managing soil important?

- Humanitarian reasons
  - These reasons concern human welfare and social reform, in particular providing an adequate supply of nutritious food for the hungry.
  - Providing enough for domestic use requires high soil productivity.
- Economic reasons
  - Economic reasons concern expenses incurred on the farm to produce food and the costs of goods of the consumer.

# Why is managing soil important?

- Stewardship reasons
  - Stewardship refers to our responsibility to manage natural resources to assure an adequate supply for future generations.
  - Stewardship involves the practices of wise use, conservation, and preservation.

# Why is managing soil important?

- Environmental reasons
  - Soils should also be conserved for environmental reasons.
  - It is a societal benefit to have a clean environment with adequate supplies of pure drinking water, clean air, productive soils, and recreational areas

# Why is managing soil important?

- Aesthetic reasons
  - This final category concerns maintaining the environment as a beautiful site to experience.
  - Most people would like to avoid unsightly scars and bare, eroded soils on the landscape.

# What is soil erosion and what can be done to prevent it?

- ***Erosion*** is the wearing away of soil by water, wind, and other sources.
- Soil erosion is the greatest threat to soil productivity and one of the largest sources of pollution in our water.
- ***Topsoil***, the most valuable layer of soil, is usually the first to disappear due to erosion.

# What is soil erosion and what can be done to prevent it?

- Water erosion often begins with raindrops.
- To a soil particle, a raindrop is like a bomb falling from the sky.
- Raindrops can reach speeds of 30 kilometers per hour.
- When rain falls, millions of drops fall to the ground and splash soil particles as high as 1 meter into the air and splatter them as far as 1.5 meters away.
- As the water runs off the land, it often carries soil along with it into other water sources.
- The steeper the slope, the faster the water will run, which in turn digs up and carries away more soil.

# What is soil erosion and what can be done to prevent it?

- Wind is also responsible for soil erosion.
- Soil particles that are unsheltered can be picked up and carried away.
- Any exposed soil surface is vulnerable, especially in dry conditions and dry climates.
- Wind can carry soil over a greater distance than water in a short amount of time.
- When it is dry and windy, huge clouds of soil can blow across the land and cause dust storms.

# What is soil erosion and what can be done to prevent it?

- Erosion can cause many problems.
  - Erosion carries away the most fertile, productive soil.
  - It breaks down the soil and reduces the organic matter.
  - When water carries soil away into other water sources, the soil becomes a pollutant known as sediment. If you've ever seen a muddy lake or river, you've seen the effects of soil erosion.
  - Fertilizers and pesticides can be carried along with the soil into water sources.

# What is soil erosion and what can be done to prevent it?

- As runoff increases, the soil is cut through, leaving rills (channels) that can become gullies.
- Crops and vegetation of any kind can be damaged, covered with soil, and uprooted because of erosion. This results in crop loss, reduced productivity, and reduced yields.
- Soil erosion can also damage structures by washing away roads and weakening building foundations.
- On steep slopes, erosion can cause landslides to occur.

# What is soil erosion and what can be done to prevent it?

- Soil is a very precious natural resource that takes a considerable amount of time to form.
- We must do what we can to conserve soil.
- While soil erosion can never be stopped, it can be controlled.

# What is soil erosion and what can be done to prevent it?

- One of the best ways to control soil erosion by water and wind is to protect the soil with healthy vegetation.
- Roadside ditches, waterways, and sloping areas are often planted with grass or other plants to help hold the soil in place.
- This vegetative area can also help hold back and filter out fertilizers and pesticides that could otherwise become water pollutants.
- Planting trees also provides a sheltered area for soil.

# What is soil erosion and what can be done to prevent it?

- Construction sites often cover bare soil with straw until something more permanent is established to protect the soil.
- Straw bales are sometimes used in rows to form a small wall to slow water runoff.
- Once the construction is done, grass and other plants are usually put in place to control erosion.

# What is soil erosion and what can be done to prevent it?

- In the past, farmers plowed their fields after harvest to mix the plant stems and leaves, known as *crop residue*, with the soil.
- This is called *tilling*.
- Today, many farmers leave the crop residue on the ground to help keep the soil in place.
- Farmers use a variety of tillage methods based on the conditions of the land.
- Since they make their living from the land, farmers understand the importance of protecting the soil.

# What is soil erosion and what can be done to prevent it?

- ***No-till*** farming involves leaving crop residue on a field at all times. The soil is not turned over or worked when the new crop is planted.
- ***Minimum tillage*** involves working the soil but leaving some crop residue in place as the new crop is planted.

# What is soil erosion and what can be done to prevent it?

- Terracing is a management practice used on sloping land such as hillsides.
  - A ***terrace*** is a ridge that follows the contour of the land to slow runoff.
  - Terraces serve the same purpose as speed bumps in parking lots.
- ***Strip cropping*** is an erosion control method in which different kinds of crops are planted in strips across a hillside.
  - These strips that are contoured with the slope of the land help slow runoff.

# What is soil erosion and what can be done to prevent it?

- ***Streambank management*** practices are used to help prevent soil from eroding along the banks of water.
- Rocks are often put strategically in place along rivers, streams, and lakes to control soil erosion.
- Planting willow trees can also help control erosion around water because the roots will hold the soil in place.

# EXAMPLES OF SOIL EROSION



**Rills**



**Gullies**



**Landslide**



**Outwash**

# EXAMPLES OF SOIL EROSION



**Wind Erosion**



**Wind Erosion**

# SOIL CONSERVATION PRACTICES



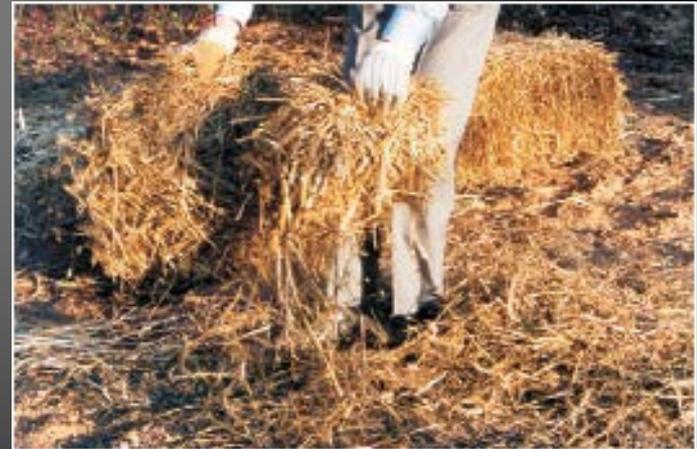
Healthy vegetation along a road to control erosion.



A newly installed terrace to slow water runoff.



No-till soybeans growing through corn crop residue.



Covering newly prepared lawn with straw to control erosion.

# SOIL CONSERVATION PRACTICES



Strip cropping.



Rocks placed along a streambank to control soil erosion.

# Why is managing water important?

- Water has many uses. It plays an important role in many aspects of human life. Several areas in which water exerts an influence are:
  - Life Processes—water is essential for living organisms in carrying out the functions of life.
  - Plants use water in major life processes such as photosynthesis and temperature regulation through transpiration.

# Why is managing water important?

- Animals use water in metabolism and in body fluids.
- Humans need water to stay alive.
- The human body is 65 percent water, with blood and plasma being 92 percent water, and muscle tissue being 80 percent water.
- The body maintains a certain water content; death results in more than 20 percent of the water is lost.
- If not enough water is supplied naturally, a crop producer may have to irrigate land.
- ***Irrigation*** is the addition of water by mechanical means.

# Why is managing water important?

- Daily Living—water is used in daily living activities.
  - The amount people use varies from one location to another.
  - A family in the city uses 800 liters of water every week on average. The main uses include drinking, washing, and cooking.
  - A family in the village uses 1300 liters of water every week on average. The main use is for farming.

# Why is managing water important?

- Climate—water moderates the temperature of the earth.
- Because water has a high heat capacity, it can regulate and transfer heat.
- Cities near large bodies of water have climates moderated by the water.
- Extreme temperature changes are found in locations on land far away from water.

# Why is managing water important?

- Manufacturing—the making of steel, refining oil, producing paper, processing food, and many other activities in manufacturing require large amounts of water.
- More efficient manufacturing processes can reduce the amount of water required.
- Some paper mills use nearly 150 kiloliters of water to make 900 kilograms of paper.

# Why is managing water important?

- Transportation—rivers, oceans, canals, and other bodies of water are used to transport raw products and manufactured materials.
- Rivers and canals often use barges guided by tug boats.
- In transportation, water is not used or changed into another form.

# Why is managing water important?

- Recreations—swimming pools and water parks often require the use of scarce freshwater from wells or other sources.
- ***Freshwater*** is water that has little or no salt, with the salt content being less than 3.0 parts per thousand.
- Where possible, water is reconditioned and used in recreational facilities.

# How can we conserve water?

- While we use a lot of water for many different things, we need to remember that water is a limited natural resource.
- No “new” water is made.
- The water we have is recycled by means of the water cycle.
- We have access to only a small amount of fresh water.
- Many areas have enough water to supply their needs.
- However, water shortages may occur due to factors such as drought, flood, pollution, population growth, industrial needs, and others.
- When this happens, or better yet before it happens, conservation of water is needed.

# How can we conserve water?

- Water conservation is using water-saving methods to reduce the amount of water needed and increase the water supply for optimum long-term economic and social benefits.
- Conservation of water can ensure that supplies of fresh water will be available for everyone, today and tomorrow.
- Every drop counts.
- Every individual can make a difference.

# How can we conserve water?

- Conserving water makes sense, but it often involves changing habits which have evolved over time. Habits can be very hard to break.
  - Begin by simply turning off water whenever it is not being used.
  - Fill the bathtub with less water.
  - A capped bottle filled with rocks (or something to weigh it down) will take up space in the toilet tank and reduce the amount of water available to flush.
  - The volume of water needed to water plants or the lawn can be reduced by watering the early morning or late evening and by watering less often and more carefully.

# How can we conserve water?

- Fix leaky faucets.
- Keep a bottle of cold drinking water in the refrigerator instead of running water until it becomes cool.
- When washing dishes by hand, use a sink full of rinse water rather than letting the water run.
- Use a hose with no leaks and an on/off nozzle or use buckets when washing automobiles and buildings.

# Why is managing waste important?

- All processes that occur produce some kind of waste.
- It is important that means for managing the waste in an efficient and sanitary way are developed and conducted.
- There are several different kinds of wastes that are generated through a variety of activities.
- It is important to be able to identify them in order to know the proper management technique to follow.
- Some of the types of waste are:

# Why is managing waste important?

- Wastewater—*wastewater* is used water that contains dissolved or suspended matter.
  - It is produced by homes, factories, farms, and other places where water is used.
  - Wastewater can damage the environment.
  - Streams and lakes can be destroyed by wastewater.
  - Factories and farms treat water before it is released to assure that it causes little or no damage.
  - Water released into a stream or lake should not appreciably change the natural conditions in the stream or lake.
  - There are different kinds of wastewater. They are:

# Why is managing waste important?

- Spent water—*spent water* is water that has been used and can no longer serve the purpose for which it was used because of contamination.
- Domestic wastewater—*domestic wastewater* is the wastewater produced by humans in their daily lives.
- Grey water—*grey water* is the water produced by bathing, cooking, and washing dishes and clothes.
- Sewage—*sewage* is the wastewater produced by residential and commercial sources.

# Why is managing waste important?

- Solid waste—***solid waste*** is garbage, refuse, sludge, and other discarded material.
  - Solid wastes are non-liquid materials that do not dissolve in water or other solvents.
- Hazardous waste—***hazardous waste*** is waste that is potentially dangerous to human health or the environment.
  - The materials may be solid, liquid, or vapor wastes.

# Review/Summary

- Why is managing soil important?
- What is soil erosion and what can be done to prevent it?
- Why is managing water important?
- How can we conserve water?
- Why is managing waste important?