**Introduction: What is Tillage?**

Mechanical Disturbance

Tillage is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the soil in preparation for \_\_\_\_\_\_\_\_\_\_\_

Planting

**Purpose**

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The first soil tillage operation after the last harvest

**Primary Tillage is** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Effects of Primary Tillage-**

Breaks

1.\_\_\_\_\_\_\_\_\_ up compacted soil layers

Weeds Residue

2. Buries \_\_\_\_\_\_\_\_\_\_ and crop \_\_\_\_\_\_\_\_\_\_\_

Infiltration

3. Enhances water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Soil Erosion

4. May cause \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ if done excessively

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equipment | Description | Best Use | Advantages | Disadvantages |
| Moldboard Plow | Turns over the \_\_\_\_\_\_\_\_ top layer of soil  Entire | In \_\_\_\_\_\_\_\_\_ residue fields and for breaking new ground or \_\_\_\_\_  Heavy | Excellent \_\_\_\_\_\_ Control, Completely buries \_\_\_\_\_\_\_\_\_  Residue  Weed  Sod | High \_\_\_\_\_\_ Use, soil erosion risk, reduces \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_  Matter  Organic  Fuel |
| Chisel Plow | Loosens soil but leaves \_\_\_\_\_\_\_\_\_\_ on the surface  Shanks  Residue | For Breaking up \_\_\_\_\_\_\_\_\_\_\_\_\_\_ soil without excessive soil \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Disturbance  Comapcted | Reduced soil \_\_\_\_\_\_\_\_\_\_\_\_ (compared to moldboard plow)  Erosion | Doesn’t fully bury \_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_  Residue  Weeds |
| Ripper/Subsoil Plow | Uses deep \_\_\_\_\_\_\_\_ to break up the soil \_\_\_\_\_\_\_ below the surface without \_\_\_\_\_\_\_\_\_\_ the soil over  Turning  Deep | For breaking up \_\_\_\_\_\_\_\_\_\_\_\_\_\_ soil layers  Compacted | Relieves soil \_\_\_\_\_\_\_\_\_\_\_\_, improves \_\_\_\_\_\_\_\_\_\_\_\_, preserves soil \_\_\_\_\_\_\_\_\_\_\_\_  Structure  Drainage  Compaction | High \_\_\_\_\_\_\_\_\_\_\_\_\_\_ requirements, does not mix residue  Horespower |

The process of preparing the soil or planting after primary tillage

**Secondary Tillage is** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Effects of Secondary Tillage-**

Clods Primary

1.Breaks up large \_\_\_\_\_ from \_\_\_\_\_\_\_\_\_ tillage

Seed Soil

2. Improves \_\_\_\_\_\_\_-to-\_\_\_\_\_\_\_\_ contact

Competition

3. Reduces weed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Moisture

4. Helps with \_\_\_\_\_\_\_\_\_\_\_\_\_\_ conservation

Soil

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equipment | Description | Best Use | Advantages | Disadvantages |
| Field Cultivator | Uses rows of \_\_\_\_\_\_\_ to aerate the soil while breaking up \_\_\_\_\_\_\_\_\_ clods  Large  Shanks | For preparing a \_\_\_\_\_\_\_\_\_\_ and even \_\_\_\_\_\_\_\_\_ and for light \_\_\_\_\_\_ control  Weed  Seedbed  Smooth | Helps incorporate \_\_\_\_\_\_\_\_\_\_\_\_\_ and fertilizers, low fuel and horsepower requirements  Herbicides | Less effective in \_\_\_\_\_\_\_\_\_-residue fields and has a limited penetration \_\_\_\_\_\_\_\_\_\_  Depth  High |
| Disk Harrow | Uses rows of \_\_\_\_\_\_\_\_ \_\_\_\_\_ to slice through the soil and mix \_\_\_\_\_\_\_\_\_\_  Residue  Concave Disks | For Breaking \_\_\_\_\_\_ of dirt and \_\_\_\_\_\_\_\_\_\_ soil after primary tillage  Smoothing  Clods | Good for incorporating residue and \_\_\_\_\_\_\_\_\_\_\_\_. Can be adjusted for different \_\_\_\_\_ conditions  Soil  Herbicides | Multiple \_\_\_\_\_\_\_\_\_\_\_\_ may be needed,  Passes  High risk of \_\_\_\_\_\_\_\_\_\_\_\_  Compaction |
| Rolling Basket/ Soil Conditioner | Rollers with metal \_\_\_\_\_\_ break up small \_\_\_\_\_\_ and \_\_\_\_\_ the soil surface  Clods Firm  Bars | For final soil preparation before \_\_\_\_\_\_\_\_\_\_\_\_  Planting | Prevents soil \_\_\_\_\_\_\_\_\_, enhances \_\_\_\_\_\_\_-to-\_\_\_\_\_\_\_ contact  Seed Soil  Crusting | Very limited affect on \_\_\_\_\_\_ compaction. Requires \_\_\_\_\_\_\_\_\_\_\_ tillage for best results  Secondary |

Reflection Questions

1. Emilia has been farming the same fields for years, and she has noticed her crops aren’t growing as well. Her soil seems hard and compacted, especially below the surface. Water pools in her field after heavy rain instead of draining properly. She doesn’t want to disturb the topsoil too much but needs to break up the hardpan. **What tillage implement should she use?**

Ripper/Subsoil Plow

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1. Jake’s field is almost ready for planting but there are still some small soil clods that could make seed-to-soil contact uneven. He needs something to firm the soil and create a uniform planting surface. **What tillage implement should he use?**

Rolling basket

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Carlos used a chisel plow in the fall to loosen his soil, but now in the spring, his field is too rough and cloddy to plant soybeans. He needs to break up the clumps and create a smooth, even seedbed so that his planter works efficiently. **What tillage implement should he use?**

Field Cultivator **or** Disk Harrow

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1. Amanda just bought a piece of land that has never been farmed before. It is covered in thick grass and weeds, and she wants to grow soybeans next year. She needs to completely break up the soil and bury the plant material to start fresh. **What tillage implement should she use?**

Moldboard Plow

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_