

Unit D: Agricultural Equipment Systems

Lesson 2: Operating, Calibrating, and Maintaining Agricultural Tillage Systems and Equipment

Terms

- Clean tillage
- Compaction
- Conservation tillage
- Floatation
- Minimum tillage
- Mulch tillage
- Power hop
- Primary tillage
- Secondary tillage
- Tillage
- Traction

















Objective #1

What is the purpose of tillage systems and equipment used in agriculture?

General Tillage Goals

CONSERVE ENERGY

- Tractors
- Tillage
- Harvest and transport
- Crop drying
- Fuel storage and handling
- Alternate energy sources

WATER MANAGEMENT

- Water management
- Irrigation
- Drainage

CONSERVE SOIL

- Cover crop
- Strip crop
- Crop rotation
- Residue management
- Tillage
- Contour furrows
- Terraces
- Windbreaks
- Mulch and manure

What is *tillage*?

- Mechanical, soil stirring actions carried on for the purposes of nurturing crops
- ***Primary tillage***
 - A deep, at least 6”, operation that loosens the soil to reduce soil strength and mix residue and fertilizers into tilled layer
- ***Secondary tillage***
 - Used to kill weeds, cut and cover crop residue, incorporate herbicides and prepare a pulverized seedbed at a depth 5” or less

Tillage Equipment



Chisel Plow



Subsoiler or V-Ripper



Disk



Plow

Tillage Equipment



Disk Harrow



Combination Tool



Field Cultivator



Row-Crop Cultivator



Rotary Hoe



Objective #2

What tillage systems and equipment are used in agriculture?

Tillage Systems

- ***Conservation tillage***
 - Field operations required for profitable crop production while minimizing soil erosion
 - Leaves at least 30% residue cover
- ***Conventional tillage***
 - Sequence of tillage operations traditionally used in your area
 - Leaves less than 15% residue cover

Tillage Systems

- ***Clean tillage***
 - Operations which prepares a seedbed having essentially no residue on the surface
- ***Minimum tillage***
 - Minimum soil manipulation necessary for crop production

Tillage Systems

- Reduced tillage
 - Less intensive and less aggressive than conventional
 - Number of operations is decreased or tillage implements require less energy
- ***Mulch-till***
 - Conservation tillage that tills the entire soil surface
 - At least 30% of residue remaining



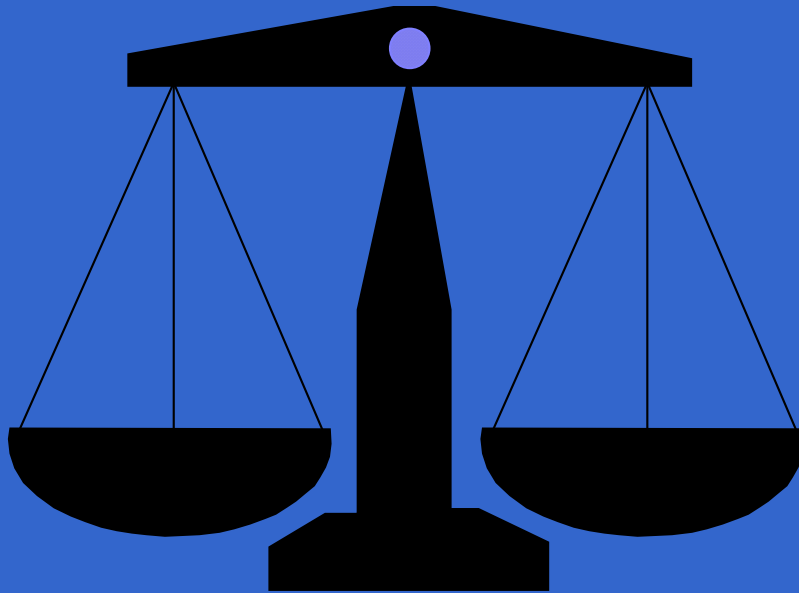
Objective #3

How is tillage equipment calibrated?

Traction, flotation, soil compaction

- ***Traction***
 - Linear force, pull or draft resulting from torque applied to tractor tires
- ***Floatation***
 - Ability of tires to stay on top of the soil surface
- ***Compaction***
 - Firming of soil caused by wheel traffic

Adding weights to the tractor



- Additional weights may be required to gain maximum drawbar pull and sufficient traction
- Adding ballast (weight) to drive wheels and front end most common way to improve traction

Effective ballast

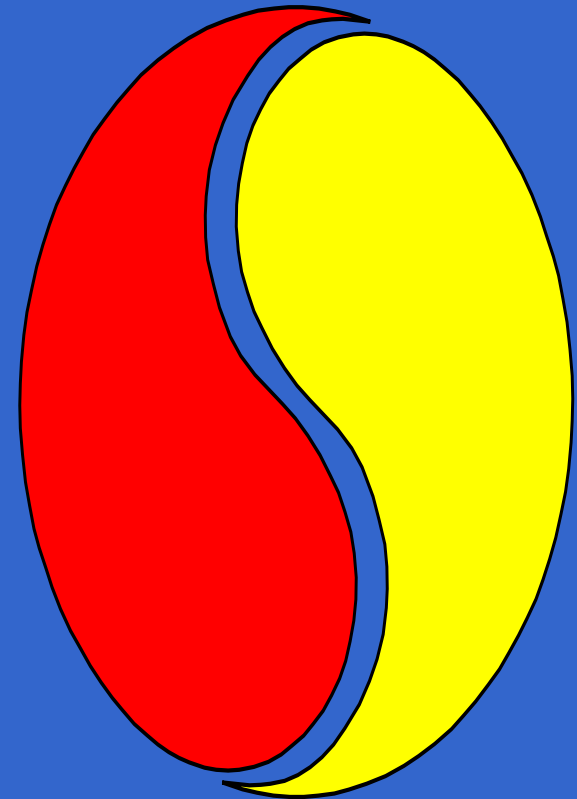
- Two-wheel drive tractors
 - Distribute 25 to 35% of weight on front with 75 to 65% of weight on rear
- Mechanical front wheel drive tractors
 - Split 35 to 40% on front and 65 to 60% of weight on rear

Four-wheel drive tractor weights

- Standard towed implements
 - 51 to 55% on front and 49 to 45% on rear
- Hitch mounted implements
 - 55 to 60 % on front and 45 to 40% on rear
- Towed implements causing high down loads on drawbar
 - 55 to 65% on front and 45 to 35% on rear

Tire tread indications for proper weighting of the tractor

- Too much weight used
 - Tire tracks are sharp and distinct
- Too little weight is used
 - Tire marks entirely wiped out
- Proper weight
 - Cleats in tire pattern is shifted but tread pattern is visible



Balancing tractors



- ***Power hop***
 - MFWD and 4WD tractors may experience simultaneous loss of traction and a bouncing, pitching ride under high drawbar loads

Considerations for tillage implements

- Properly adjust implements to save time and fuel
- Most problems with tillage tools caused by improper adjustment or faulty component
- Instructions in owner's manual should be followed to obtain top performance
- Problems can be prevented with simple maintenance at the beginning of the season

Safety Considerations

- No safety device can replace a careful operator
- Match equipment to the tractor
- Provide proper tractor ballast and weight split for tractor stability
- Match hydraulic connects
- Park implement on a firm flat surface
- Don't permit people between tractor and implement

Safety

- Always lower implement to ground when not in use
- If working on equipment in raised position, block so it won't fall
- Use proper size pins and secure with a clip
- Never carry riders on tractor or implement
- Check wings before transporting
- Transport in narrowest configuration



Objective #4

How is tillage equipment maintained?

Preventative Maintenance



- Minimizes the chances for breakage, costly repair bills, and loss of time
- All moving parts in Contact with other parts require lubrication at point of contact
- If dirt will collect do not lubricate as the dirt will wear the part faster

Preventative Maintenance

- Consult operator's manual for lubricating instructions and location
- Proper use of field machinery decreases operating costs
- Checking & repairing machinery during off season saves time & money



Simple Maintenance Operations

- Lubricate according to instructions, clean grease fittings to avoid forcing dirt into bearings
- Clean, inspect, and lubricate or repack wheel and coultter bearings
- Examine hydraulic hoses, couplings, and cylinders for wear, damage or leaks
- Check for loose or missing bolts and nuts

More maintenance

- Replace worn, dull, or cracked soil engaging components
- Check and replace bent or cracked components
- Check alignment of soil engaging parts
 - Level the implement side to side and fore and aft
 - Measure vertical distances to check
- Check safety trips and reset mechanism
- Make certain all tires are inflated

Review

- What is the purpose of tillage systems and equipment used in agriculture?
- What tillage systems and equipment are used in agriculture?
- How is tillage equipment calibrated?
- How is tillage equipment maintained?