



Tillage Equipment Information Sheet

Conservation Practice Information Sheet (IS-MO344)

Tillage Equipment

PRIMARY TILLAGE

Moldboard Plow – One of the oldest primary tillage tools

Purpose – lifts, fractures, and inverts the soil; buries residue

Plow depth - generally $\frac{1}{2}$ of width of bottoms

Number of bottoms – 1 to 12 generally

Note spacing and size of bottoms on the plow

Plow Parts –plowshare, shin, moldboard, trash boards (covering blades), frog (attaching structure), landside, and frame

Residue burial – 90 to 100 percent



Subsoilers – Primary tillage tool

Purpose – to shatter compacted subsurface layers

Operating Depth – 12 to 30 inches, locate compaction layer and set shank depth 1.5 times as deep

Shanks – straight, parabolic, or bent leg (slant shank)

Tillage Speed – under 4 mph

Power requirement – 30 to 50 HP per shank

Common Subsoilers –

Rigid, wide spaced shanks

Inline or v-shaped frame (more energy efficient)

Normally, 3 to 13 shanks

Shank paths correspond to subsequent crop rows

Requires a strong frame and stout shanks

Requires dry soil to be effective

Visible surface and residue disturbance, residue burial 20 to 60 percent



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Paraplows (not so common)

Narrow rigid, slant shank (bent-leg) subsoiler

Fractures and loosens soil from 12 to 16 inch depth

Little surface disturbance, residue burial 10 to 40 percent

Bedder Shaper

Purpose – implement that flattens ridges and shapes the bed in preparation for planting

Types of bedder shapers

Middlebuster – two lister bottoms (similar to moldboard plows) working to build a ridge or eventual planting bed, usually allows planting 2 rows between furrows

Disk Hipper – disk blades are used to build the ridges

Ripper Hipper – any type of bedder attached to subsoil shanks

Residue – 70 to 95 percent buried





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Disk Harrows – concave cutting blades mounted on a common shaft to form a gang; leveling tillage tool while sizing and burying residue; surface is smooth and runoff is likely to occur; may have primary tillage gang (front) and secondary tillage gang (rear) on the same frame

- Types - Offset disks, tandem disks, single gang disks, and plowing disk
 - Size and weight are important to use
 - Operating speed – 4 to 6 miles per hour
 - Operating depth – four to six inches (generally $\frac{1}{4}$ of disk diameter), depth controlled by gauge wheels
 - Power requirement – 14 HP per foot of working width
 - Smaller disks often on outside end of gangs to feather soil movement
- Primary Tillage Disk (look at spacing and size of disks)
 - 9 to 11 inch disk spacing
 - Disks 24 to 26 inch diameter
 - Gangs of disks at more aggressive tilt angle of 20 to 25 degrees
 - Heavier frame and more residue clearance (more weight per disk)
- Secondary Tillage Disk (narrower spacing and smaller disks)
 - 7 to 9 inch disk spacing
 - Disks 20 to 24 inch diameter
 - Gangs of disks set at tilt angle of 15 to 20 degrees
 - Lighter frame and lower profile
- Plowing Disk (usually a single gang disk)
 - 11 to 12 inch disk spacing
 - Disks 30 to 32 inch diameter
 - Monstrous frame with lots of clearance and weight
- Disk shapes – cone or spherical; solid or notched
 - Cone shaped disks – deep cups; cut and invert soil with little mixing while burying significant surface residue
 - Spherical disks – shallower cups; cut, invert and mix soils leaving more surface residue than cone shaped disks
 - Notched disk edges penetrate better than solid disk edges





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Common disks:

Offset disks – Frame with two gangs of disks working the full width; the front gang throws soil to the right, the second gang throws soil to the left; usually a primary tillage implement

Tandem disk – Frame with four gangs of disks with two in front and two in the rear, gangs are mounted opposed to each other; both front gangs throw soil to the outside of the implement while the rear gangs throw soil to the center; may be a primary or secondary tillage implement

- Both offset and tandem disks till the soil twice with each pass

- Generally, the offset disk is built heavier than a tandem disk

Single gang disks – May be a stand alone implement but usually mounted on a combination tillage implement to cut residue and move some soil

Chisel Plows – Primary tillage often as a combination tool

Chisel points – spike, straight, twisted shovels, and sweeps in a variety of widths; points do wear out and need to be changed

Straight and spike points – narrow points (2” to 3”) used to loosen soil, kill weeds, and remove surface compaction; usually reversible merely by unbolting from chisel shank and turned upside down; field is left in a ridged condition

Twisted points or shovels – narrow (3” to 5”) points with either a right or left-hand twist (equal number on implement); used to loosen soil, kill weeds, remove surface compaction, and cover residue; field is left in a ridged condition

Sweeps – broad (5” to 20”) low crowned points with wings that lift and loosen soil, undercut weeds and residue, and cover minimal residue; field may be relatively smooth



High frame clearance and stout C-shaped shanks
Shanks may be spring-mounted to vibrate and shed residue
Shank spacing - usually 12 to 16 inches in a staggered pattern
Tillage speed – 5 to 7 miles per hour
Tillage depth – 4 to 8 inches
Power Requirement – 15 to 20 HP per shank
Soil must be dry for the working depth for best results



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SECONDARY TILLAGE

Field Cultivators – Kill weeds, incorporate fertilizer or chemicals, and level the seedbed; a primary tillage tool when surface residue is light

Shanks are lighter and more numerous than chisel plow shanks

Shank configuration

Shanks - C-shape, K-shape, S-shape, or coil shank shape
usually made of spring steel

Spring-mounted or bolted solid

Ranks of shanks (4 ranks are common) mounted under the frame

Shanks are spaced from 20 to 40 inches apart in each rank

Ranks are staggered from the front to the rear of the implement

Normal spacing is 3 to 7 inches in this staggered pattern (looking from the front to the rear of the implement)

May have bolt on points or small shovels for each shank; points, shovels, and sweeps must be replaced due to wear and abrasion of tillage

Lower profile and lighter frame than a chisel plow

C-shank cultivators have the best residue clearance

Heavy residue that has not been sized with tillage may plug implement

Tillage speed – 5 to 7 miles per hour

Tillage depth – 3 to 5 inches



Harrows – Secondary tillage for seedbed preparation or light surface cultivation; used to level the soil surface, promote surface drying, pulverize surface clods, and disturb germination of small weeds; often incorporated on combination tillage tools to “dress” the field

Types – Many types with staggered teeth with rigid spikes, coil spring wires, flat-spring bars, s-shaped spring bars, and interlocking bars

Spike-tooth harrow

Spring-tooth harrow

Coil-tine harrow

Rotary harrow

Drags or Leveling Bars



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Roller harrow

Combination of spring-tooth harrow and roller packer commonly called a cultipacker

Tines – usually pointed to the rear to shed residue

Frame – rigid or flexible

Operating depth – 1 to 2 inches

Operating speed – 4 to 7 miles per hour



Spike tooth harrow

Common rotary harrow



Seedbed Conditioner – may be stand alone or combination tools for secondary tillage; main purpose is final preparation of the seedbed; various combinations of disks, field cultivators, harrows, cultipackers, basket rollers, and leveling bars – almost any configuration may be found!

Land Plane or Float – an implement used mostly on surface or flood irrigated land to establish the final land grade prior to planting; consists of a long wide frame with a centered drag bar or blade to move soil from high areas to low areas; the field is usually land planed in at least three different directions to remove minor surface imperfections and improve the flow and distribution of irrigation water; sometimes used as a seedbed conditioner to firm the soil surface and destroy clods (not a desired condition if wind erosion is anticipated)



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Row Crop Cultivator – a secondary tillage implement for tilling between crop rows to control weeds or incorporate fertilizer or pesticides; the frame and cultivating tools must pass through standing crop rows without crop damage; less use of this implement in the past ten years of GMO crops

Tool Options – shanks with shovels or sweeps, spring teeth, and ground driven rotary finger teeth



Anhydrous Applicator – implement used to inject and incorporate anhydrous ammonia fertilizer; easily identified in the field by the trailing tank of anhydrous ammonia; uses chisel shanks or narrow knives to inject the fertilizer; narrow knives disturb the least amount of residue; should be spring applied for corn or cotton crops





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Combination Tillage Tool – expect any combination of primary and secondary tillage implements to create a one-pass tillage system that may also include planting

Horizontal Tillage – normal conventional tillage with combination tools of disks and chisel plow; generally leaves a shear-plain at the maximum depth of tillage; may need a secondary tillage pass prior to planting

Vertical Tillage – generally combination tools of coulters and subsoilers as a primary tillage implement; generally need to harrow prior to planting to level the seedbed

Planting Equipment

Conventional – drills or planters designed to operate on soil surfaces with little or no residue to impede the planting process

Ridge Till – crops are planted on ridges formed during row cultivation of the previous crop; Tillage does not occur from harvest to the planting of the next crop

Strip Till and Zone Till – tillage in a narrow band where seed will be placed, the remaining area between rows is not tilled, crop residue is maintained on the soil surface

No Till – a one pass system of planting with NO tillage; no field wide tillage occurs from the harvest of the previous crop to the planting operation; must be less than 30 percent of the area between rows disturbed by tillage

NOTE: Be careful to find out exactly what implement or implements are being used on the farm; ask to see the equipment if the terminology does not mean anything to you. Be wary of colloquial terms used across Missouri. For example, the term “Do All” means a different tillage implement depending on where you are in the state. A “Do All” in the Bootheel Region is an implement (bedder shaper) to construct a bed for cotton planting while a “Do All” in the northern part of the state is often a Case IH 568 Du-All configured with a field cultivator or rolling chopper, followed by ranks of spike tooth harrows, and then a rolling basket or leveling bar.

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