1992

Cultivators For Conservation Tillage

Robert Grisso  
*Virginia Polytechnic Institute and State University, rgrisso@vt.edu*

Paul J. Jasa  
*University of Nebraska at Lincoln, pjasa1@unl.edu*

Elbert C. Dickey  
*University of Nebraska at Lincoln, edickey1@unl.edu*

Follow this and additional works at: [http://digitalcommons.unl.edu/biosysengfacpub](http://digitalcommons.unl.edu/biosysengfacpub)
CULTIVATORS FOR CONSERVATION TILLAGE

Cultivation, a proven weed control method, should be used primarily to control weeds, rebuild ridges, or aerate poorly drained or crusted soils. Cultivating just to stir the soil usually dries the soil and can result in lower yields during drier cropping conditions. For example, cultivating during warm and windy conditions can result in ¼ to ¾ inches of soil moisture loss.

The main difference between a conservation tillage cultivator and a conventional cultivator is the ability to handle residue and penetrate the soil. By definition, conservation tillage should leave at least 30 percent of the soil surface covered with crop residue after planting. Conservation tillage includes several tillage systems that have preplant tillage operations to loosen the soil as well as no-till and ridge plant systems.

Cultivator Components

Conservation tillage cultivators look much like conventional cultivators. However, the three to five shovels per row of a conventional cultivator generally are reduced to a single shank having a wide sweep or horizontal disk. To allow residue to flow past this shank, a coulter is usually mounted in front of it to cut the residue.

The coulter, barring-off disks and sweep are positioned so that residue can easily flow through a conservation tillage cultivator.

Robert D. Grisso, Extension Agricultural Engineer; Paul J. Jasa, Extension Engineer; Elbert C. Dickey, Extension Agricultural Engineer-Conservation, Department of Biological Engineering, University of Nebraska-Lincoln
Shovels located adjacent to the rows on a conventional cultivator have been replaced with barring-off disks. These disks cut residue and can be set to move soil either toward or away from the row and control weeds in areas not undercut by the wide sweep. Some manufacturers use an extra-wide sweep to eliminate the need of barring-off disks.

The point of the sweep must be operated below the soil surface at a depth sufficient to keep soil moving over the sweep. This helps avoid plugging because the residue is carried by the soil through the cultivator. However, excessive depth can cause soil slabling and poor weed control because weeds are still rooted in chunks of soil.

Soil penetration must be considered when selecting a cultivator for no-till and ridge plant systems. The cultivator must carry enough weight to penetrate untilled soil and to cut large amounts of residue. Manufacturers often make this weight available with heavier and stronger shanks, frame members and tool bars. Down pressure springs are often used to transfer weight from the tool bar to the individual row units.

Conservation tillage cultivators usually have flexible row units with independent depth control. As such, these cultivators have a depth gauge wheel or depth band adjacent to the coulter to control the operating depth of each row unit. To maintain the proper operating angle of the sweep and to allow operation through uneven surface conditions, individual row units are often attached to the tool bar by a wide, stable parallel linkage.

**Ridge Plant Considerations**

Cultivation is an integral part of ridge plant systems and is used for controlling weeds and rebuilding the ridge. Two cultivations or a cultivation and a ditching operation in furrow irrigated fields are usually necessary to rebuild the ridges.

The first cultivation should be early and relatively deep (2 to 4 inches below the bottom of the furrow) to kill weeds and loosen the soil. A deep cultivation at early crop growth stages has less of a chance of pruning or damaging crop roots than a deep cultivation later in the season and will keep the cultivator operating below residue between the rows. This will also provide plenty of soil to carry the residue over the sweeps. The second cultivation or ditching operation when the crop is taller provides additional weed control and is used for rebuilding the ridge with the previously loosened soil. In cases where most of the ridge remains after planting, a second cultivation may not be necessary since only a little soil needs to be moved to rebuild and reshape the ridge. In this case, the first cultivation can be used for both weed control and ridge maintenance.

![peak-shaped ridge](https://via.placeholder.com/150)

A peak-shaped ridge is easier to make, but difficult to keep a planter on. To form a rounded or flat-topped ridge, soil should be pushed to the row rather than thrown. The height of the ridge should be 6 to 8 inches after cultivation. Because of weathering and settling, these ridges will be from 4 to 6 inches high the following spring.

Ridging or furrowing wings, attached behind the center sweep or horizontal disk are used to build rounded or flat-topped ridges. Most wings can be raised out of the way when not in use by repositioning a pin or bolt. These wings push the soil from the sweep or disk to the row area. For furrow irrigators, a shovel-type ditcher, rather than a disk-hiller, should be used to build or maintain the ridge. Caution is needed because disk-hillers tend to form peak-shaped ridges.

Traditionally, adjustment and use of crop shields have not been of much concern, especially during the second cultivation. However, with ridge plant, the crop shields can play an important role by helping control the ridge shape. Since the crop may be relatively tall at second cultivation, the use of open-top shields is necessary.

Remember, ridge building is a slow process. Don't expect to build a 6- or 8-inch ridge the first year. This would require moving a lot of soil. Start with a 4- to 6-inch ridge. If the ridges are not torn down or damaged from wheel traffic or livestock, more soil can be added each year to the ridge. Thus, the goal of an 8-inch ridge may be a process requiring 2 to 3 years.

The number of rows on the cultivator or ditching implement and the planter must be the same. This ensures that all ridges within a single pass of the planter are parallel and equally spaced. If a planter straddles a guess row from the previous season's ridging operation, it is difficult to keep the planter on the ridges.

**Other Cultivator Considerations**

Several other cultivators that use rolling spiders or disk gangs can be successfully used in residue covered fields. Some conventional cultivators can be modified to handle residue but may not have sufficient strength to carry the extra weight for penetration. Most cultivators built for ridge plant or conservation tillage are rugged and heavy. They can also be used to apply anhydrous ammonia or liquid nitrogen before planting or at cultivation. This can make a conservation tillage cultivator more cost effective because it can do more than one job.

Remember, fields that are planted using conservation tillage methods require cultivators that can handle residue and penetrate the soil.