



## Tillage Options After CRP

### SUMMARY

- Landowners have a variety of tillage options for CRP land.
- Make tillage decisions based on conservation concerns, farming objectives, and plant and soil conditions.

Tillage options for land being removed from the Conservation Reserve Program (CRP) need to be considered carefully in order to maintain the soil benefits achieved through this program. Determining appropriate tillage for a specific land area begins with a review of conservation concerns and objectives of the entire farm operation as well as a careful assessment of plant and soil conditions on-site.

### Pre-tillage Assessments

Highly erodible land removed from CRP is still subject to conservation compliance. Decisions on what crop is planted should be based on objectives for the entire farm. Establishing a stable cropping and tillage system, such as a forage crop for grazing or implementing no-till with a cover crop rather than row crop with aggressive tillage can limit soil loss. Although a no tillage system often is required for general row crop production on sloping ground, other conservation tillage systems can be considered on moderate slopes immediately following cover crops. Check requirements for specific fields with your local Natural Resources Conservation Service (NRCS) office.

Scout the field to assess the quantity, quality, and variety of plants present. The variety of significant grasses, legumes, weeds, or brush in the field impacts weed management and can affect decisions on timing of mowing or tillage. Observe the amount of thatch cover and density of root mass near the soil surface that equipment must handle.

Check for animal mounds or eroded gullies that may have changed topography in parts of the field. Although many years without tillage have given the soil a desirable tilth and structure, planting equipment will be difficult to manage if surface roughness is a problem. If fertility levels are low, fertilizer attachments on

the planter or tillage to incorporate nutrients are desirable. If pH levels are low, tillage may be needed to incorporate lime.

Tillage objectives frequently include weed control, incorporating soil amendments, and seedbed preparation. Pre-plant tillage may not be required if vegetation is controlled by herbicides and the planter can uniformly place seed in untilled soil.

No one prescribed set of field operations is best for all circumstances. Not all techniques and equipment will work in all conditions. Stay flexible by keeping in mind that the general goal is to establish a healthy crop in an environmental manner while minimizing competition from other pests. Regardless of tillage methods, plant in a timely manner with attention to management details. If you delay planting CRP acres until the end of planting season and do not check seed depth and placement, then do not expect plants to be as tall or vigorous as those in other fields.

### No-Tillage

Wisconsin research has shown that yields of corn no-tillage planted into alfalfa/grass with a fall vegetation kill are comparable to or greater than yields in moldboard or chisel plow systems. Delaying vegetation kill until spring after a hay harvest increases corn yield risk compared to full width tillage.

Mowing and perhaps baling in late summer or fall, or, if tall vegetation is present, in the spring, helps minimize excessive plant cover that might challenge machinery and the subsequent crop. Because herbicide is more effective if applied to an actively growing crop, schedule grass mowing so that plant regrowth is active at the time of chemical application.

Existing, but infrequent, animal mounds only a few inches high may cause little planting inconvenience. However, if mounds are frequent or higher than a few inches, tillage with a disk or harrow may be needed to level areas where mounds occur. Some suggest leveling these mounds somewhat by using rotary mowers and thus possibly avoiding the need for tillage. This is not recommended. However, if you wish to use rotary mowers for this purpose, first check with your dealer. Power transmission elements should be protected (e.g., with a clutch or shear bolt). Do not attempt to remove more than about two inches from the top of mounds. Damage or excessive wear may occur if many mounds are present. To prevent further changes of roughness, do not allow grazing animals access to the field during the prior fall, or before winter or spring thaws of the ground surface.

If nitrogen is required for the subsequent crop, nitrogen injection rather than broadcast will minimize nitrogen immobilization and potential nitrogen loss due to surface runoff. Adjust planter fertilizer attachments to place nutrients as deeply as possible on low testing soils. Extra ballast may be required on the planter frame if attachments won't penetrate as deeply as desired.

Research at the National Soil Tilth Laboratory and Iowa State University has shown a yield advantage for corn when a six-inch wide, residue-free band is left over the row in heavy residue. Row cleaner attachments may need to be set at a slightly greater depth than when used in cornstalks if surface thatch is significant. Zone or strip-tillage is another option if the soil is relatively flat. It helps leave loose soil for furrow closing as well as a residue-free

band over the row. Two popular methods of zone or strip-tillage used in row crop rotations are

- late fall tillage by an anhydrous applicator followed by spring planting in the tilled zones and
- multiple coulters attached to the planter.

If the first method is used, be sure that anhydrous placement is below seed depth. Regardless of method, be aware that the performance of previously applied residual herbicide may be affected by row cleaning.

Heavy thatch and dense root mass can make it more difficult for seed opener penetration and closure of the seed furrow by wheels or disks. Dry surface soil due to late planting or delayed spring weed kill may hinder furrow opener penetration and closure.

Check behind the planter to assure that seed is placed at the proper depth with good seed-soil contact. If seed is shallow, make sure planter depth wheels are in firm contact with the soil. Planter units resting on a seed opener rather than depth wheels can obtain additional downforce for penetration from downpressure springs on the planter's parallel links and/or extra weight added to the planter units. To obtain full effect of down pressure springs, it may be necessary to add weight to the planter toolbar. Adequate opener penetration also may be aided by adding extra ballast to the planter units. Although weight may be added to unused insecticide boxes, these may be in use for first-year insect control. Check seed depth with row units in their lightest configuration (seed hopper and insecticide box almost empty) when deciding if extra downforce is required.

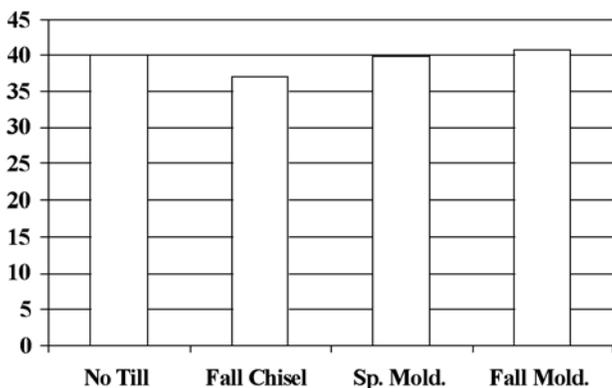


Figure 1. First year soybean yield from land previously in CRP, Marion Co., 1995

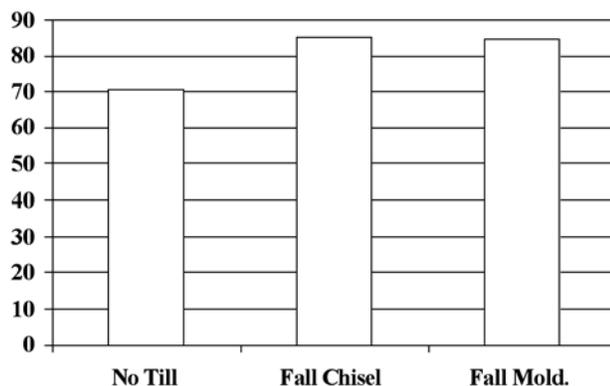


Figure 2. First year corn yield from land previously in CRP, Marion Co., 1995.

Make sure that the seed furrow is closed. Additional downspring pressure can be added to closing wheels or disks for closure. If furrow sealing is a problem, consider using:

- multiple coulters ahead of the seed opener to loosen soil,
- furrow closing discs to cover the seed, and/or
- cast iron closing wheels for additional downforce on the furrow.

Planting corn requires more precision in seed placement and residue management over the row, compared to planting soybeans. If CRP land is primarily grass, planting soybeans may be a better choice than corn and may simplify demands on the planter or drill. This was shown in replicated tillage study established on a south central Iowa field that had been in a mixture of brome and red clover for the previous 17 years. First-year yields of soybeans and corn showed that although all tillage systems had similar soybean yields, corn yield was greater for full width tillage systems (figures 1 and 2). Vegetation was burned down with herbicide the previous fall. Planting of the plots was delayed until June due to wet weather. In a second study of row crop after CRP two years later in central Iowa, first year soybean yields in a fall chisel system were greater than in no-tillage or moldboard plow systems (figure 3). First year corn at this site had greater yields with full width tillage systems (figure 4).

As noted in the earlier study, corn planted into CRP may in some instances respond favorably to tillage in the first year. A possible initial first year yield increase, however, should be balanced against altering longer term soil tilth

for subsequent production years. Long term soil health and yields in subsequent years may be adversely impacted by destruction of macropores and mineralization of organic matter due to tillage.

### Rodent Control\*

Ground squirrels frequently eat seed corn, particularly after planting and early sprouting. Planting soybeans or reducing habitat by weed control at least one to two weeks before planting may help control damage. Expect feeding to be heavier if grass areas are adjacent and are mowed. Ground squirrels prefer shorter grass areas--keeping it tall prevents them from seeing very far and they tend to avoid such unmowed areas. Gas cartridges may help kill woodchucks and ground squirrels but will not work well unless all entrance holes are sealed. Phostoxin or Fumitoxin (aluminum phosphide) pellets placed in the hole may reduce ground squirrel populations prior to planting. However, they are restricted to use by commercial applicators and are not labeled for use within the crop area.

### Full Width Tillage

Soil tilth and structure are improved during CRP years. Although full width primary tillage with a chisel plow, disk, or moldboard plow have negative impact on soil tilth, limited and careful use of light tillage may offer some help in specific cases, such as leveling the soil surface, killing vegetation, incorporating lime, fertilizer, or herbicide, and speeding mineralization of organic nitrogen from surface plants. Soil conditions often are more uniform throughout the field at planting. Less demand is put on operation and adjustment of the planter.

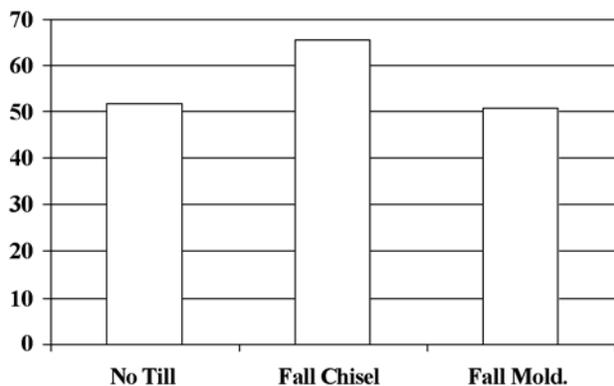


Figure 3. First year soybean yield from land previously in CRP, Jasper Co., 1997.

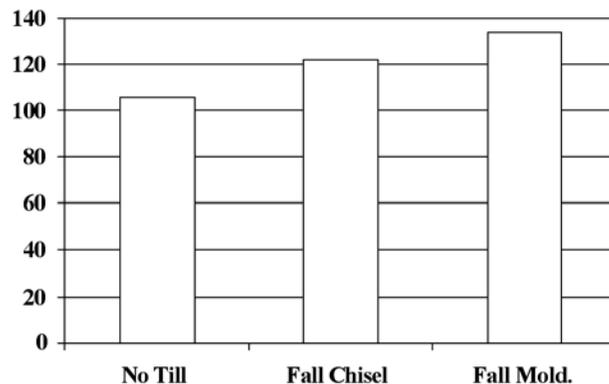


Figure 4. First year corn yield from land previously in CRP, Jasper Co., 1997.

*This bulletin is part of a series to help CRP contract holders assess the land-use options available to them when the contracts expire. The series is funded in part by the Leopold Center for Sustainable Agriculture. Other bulletins in the series and additional information are available at county ISU Extension offices.*



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Full width tillage systems, however, leave less surface residue for erosion protection. On highly erodible fields, use of full width tillage may require forage or small grain to be used in the subsequent crop rotation or no-tillage to be used in subsequent years when row crops follow each other. Although infiltration rate may be increased immediately after tillage, infiltration typically decreases in tilled fields in subsequent years due to destruction of macropores and lack of plant residue to prevent surface crusting.

Consider tillage objectives before using a full width tillage system. If animal mounds are the only reason for tillage, till only deep enough to level them and consider tilling only those parts of the field where mounds are present. Be aware that variable soil conditions in tilled and untilled areas require operator attention to planter adjustment when moving from one area to another. Shallower, slower, less aggressive tillage leaves more surface residue but may not adequately incorporate soil amendments or herbicide. If a chisel plow is used, twisted shovels invert and bury more sod than straight points. However, straight points leave a smoother surface with less need for secondary tillage.

For forage crop establishment, a choice of full width tillage or interseeding depends more on the status of the existing crop, establishment characteristics of the new plants, and intended use, than on erosion control. Closely spaced plants, once established, will limit soil loss. Ground leveling may be necessary for hay harvest but not if the land is strictly grazed. The choice of a desirable drill or planter for metering, depth control, and seed coverage depends on the type of seed being planted.

## **Equipment and Economic Considerations**

A purchase of additional equipment adds significant production costs on a per acre basis unless it can be charged against production costs over enough acres and years. Most producers will want to use machinery that is already owned. If a no-tillage system is to be used on a relatively small portion of the farm and existing equipment and experience is with full width tillage, hiring a local custom operator with a suitable no-tillage planter or drill and experience can be a good choice. If no-tillage practices will be followed on the land in subsequent years and the acreage justifies it, the purchase of no-tillage planter or drill attachments or other conservation tillage equipment may be reasonable.

For equipment that will be used for several years (e.g., 4 to 10 years) anticipate that about 20 to 35 percent of the initial list price of equipment will become a part of annual production costs on those acres for which it is used. For example, \$5,000 of purchased equipment adds \$1,000 to \$1,750 to the annual cost of crop production. If the equipment is used annually on 100 acres, this adds \$10 to \$17.50 per acre to production costs.

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