Conservation Practices

Conservation crop rotation is a system for growing several different crops in planned succession on the same field, including at least one soil-conserving crop such as perennial hay. Including a soil-conserving crop in the rotation reduces the risk of soil erosion and runoff to nearby waters. **Conservation crop rotations in** Nebraska typically include row crops alternating with small grains or hay.

Small grains, hay and row crops grown in rotation. Photo courtesy USDA NRCS.

Contour farming is growing crops "on the level" across or perpendicular to a slope rather than up and down the slope. The rows running across the slope are designed to be as level as possible to facilitate tillage and planting operations on the contour. By doing this each row creates a series of breaks or barriers to water as it runs down slope which slows it and reduces the potential for water erosion.

Farming on the contour, rows are perpendicular to the slope. Photo courtesy USDA NRCS.

Stripcropping is growing strips of row crops such as corn and soybeans alternate in a planned rotation with equal-width strips of close-growing crops such as forages, small grains or sod, all arranged systematically across a field.

In **contour stripcropping**, crop strips alternate down a slope on the contour (across or perpendicular to the slope) to reduce soil erosion and runoff.

Alternating strips of row crops and forage on the contour. Photo courtesy USDA NRCS.

Cover crops are grasses, legumes or forbs planted to provide seasonal soil cover on cropland when the soil would otherwise be bare—i.e., before the crop emerges in spring or after fall harvest.

Common cover crops in Nebraska include rye and other small grains, radish and rapeseed, and cocktail mixes. Cover crops are best suited to areas of the state with plenty of water available in the soil for both the cover crop and the main crop.

Rye cover crop growing in sweet corn stubble in late fall. Photo courtesy Mark Zumwinkle, MDA.

Using cover crops can be difficult because of the small window of opportunity to establish them. Nebraska farmers have nonetheless found creative ways to utilize cover crops, such as:

=After harvesting corn silage
=After harvesting corn or soybeans
=Over-seeding into a standing crop like soybeans and corn
=In organic systems with diverse crop rotations

The fact sheet Are You Covered? provides more information about windows of opportunity for cover cropping in Nebraska.

Cover crops have many different uses and names, depending on the main purpose being served:

- A **winter cover crop** is planted in late summer or fall to provide soil cover over winter. In Nebraska, winter cover crops are commonly planted after harvest primarily to reduce wind and water erosion.
- A **catch crop** is a cover crop planted after harvesting the main crop, primarily to reduce nutrient leaching.
- A **smother crop** is a cover crop planted primarily to outcompete weeds. In Nebraska rye cover crops commonly serve this purpose.
- A **green manure** is a cover crop incorporated into the soil while still green, to improve soil fertility. Currently green manures are used primarily by organic growers.
- Cover crops can serve as **short-rotation forage crops** when used for grazing or harvested as immature forage (green chop).

Living mulches are similar to cover crops. Living mulches are interplanted with a cash or commodity crop but stay alive throughout production of the main crop. They are typically used with specialty crops, including orchard and nursery crops.

Why plant cover crops on your land?

Environmental benefits

- Reduces wind and water erosion when the soil would otherwise be bare - in early spring prior to planting, in fall after harvest, over winter or between vegetable crops
- Improves water and soil quality by adding soil organic matter; this creates an open soil structure that allows water in more easily, reducing runoff
- Protects groundwater quality by preventing nitrogen from leaching into the water table

Practical benefits

- Provides supplemental forage for grazing livestock
- Stores significant nitrogen for use by the next crop and enhances overall soil fertility
- Suppresses weeds by shading the soil and using moisture that would otherwise be available for weeds; deep-rooting cover crops also loosen and aerate compacted soil
- Helps soil retain moisture for use by primary crops; cover crops on the soil surface reduce evaporation
- Attracts beneficial insects

Conservation tillage is any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and runoff. To provide these conservation benefits, at least 30% of the soil surface must be covered with residue after planting the next crop. Some conservation tillage methods forego traditional tillage entirely and leave 70% residue or more.

Conservation tillage is especially suitable for erosion-prone cropland. In some agricultural regions it has become more common than traditional moldboard plowing.

Conservation tillage methods include **no-till**, **strip-till**, **ridge-till** and **mulch-till**. Each method requires different types of specialized or modified equipment and adaptations in management.

- **No-till** and **strip-till** involve planting crops directly into residue that either hasn't been tilled at all (no-till) or has been tilled only in narrow strips with the rest of the field left untilled (strip-till). This practice provides the most soil protection and the most soil moisture retention, resulting in better overall soil condition.
- **Ridge-till** involves planting row crops on permanent ridges about 4-6 inches high. The previous crop's residue is cleared off ridge-tops into adjacent furrows to make way for the new crop being planted on ridges. Maintaining the ridges is essential and requires modified or specialized equipment.
- **Mulch-till** is any other reduced tillage system that leaves at least one third of the soil surface covered with crop residue.

No-till soybeans growing in wheat stubble. Photo courtesy USDA-ARS.

Why practice conservation tillage on your land?

Environmental benefits

=Reduces soil erosion by as much as 60%-90% depending on the conservation tillage method; pieces of crop residue shield soil particles from rain and wind until new plants produce a protective canopy over the soil

=Improves soil and water quality by adding organic matter as crop residue decomposes; this creates an open soil structure that lets water in more easily, reducing runoff

=Conserves water by reducing evaporation at the soil surface

=Conserves energy due to fewer tractor trips across the field

=Reduces potential air pollution from dust and diesel emissions

=Crop residue provides food and cover for wildlife

Practical benefits

- Fewer trips across the fields saves time and money (lowers fuel, labor and machinery maintenance costs) and reduces soil compaction that can interfere with plant growth
- Optimizes soil moisture, enhancing crop growth in dry periods or on droughty soils

Grass waterways are a type of conservation buffer; they downhill grassed channels, generally broad and shallow, designed to prevent soil erosion while draining runoff water from adjacent cropland. As water travels down the waterway, the grass vegetation prevents erosion that would otherwise result from concentrated flows. Grass waterways also help prevent gully erosion in areas of concentrated flow.

Looking upslope at a grass waterway between fields.
Photo courtesy USDA NRCS

Grass Filter Strips are planted strategically between fields and surface waters (rivers, streams, lakes and drainage ditches) to protect water quality. They slow runoff from fields, trapping and filtering sediment, nutrients, pesticides and other potential pollutants before they reach surface waters.

Grass filter strips in Nebraska typically range from 20 to 120 feet wide, depending on site characteristics, landowner goals, applicable regulations and voluntary conservation program requirements. Wider filter strips provide greater wildlife habitat benefits. Ongoing management of grass filter strips is needed to maintain the health of the vegetation and to repair rills running through the strip or channels that may develop along the edges.

Grass filter strips are also useful in meeting manure application setback requirements in the Nebraska feedlot rules and Nebraska Department of Environmental Quality best management practice recommendations for herbicide and pesticide use. Setbacks may be mandatory when using products that contain the herbicide atrazine.

Birdseye view of an agricultural landscape with grass filter strips and other types of conservation buffers.
Photo courtesy USDA NRCS.

Why establish filter strips on your land?

Environmental Benefits

=Helps protect surface water quality by trapping and filtering sediment, nutrients, pesticides and pathogens in agricultural runoff

=Helps protect groundwater quality by preventing contaminants from leaching into the water table

=Creates food and cover for wildlife and may connect existing fragmented habitat for small birds and animals. (Wider strips are recommended to prevent entrapment by predators in narrow corridors.)

=May help stabilize eroding banks

=May reduce downstream flooding

Practical Benefits

=Provides an alternative for marginal, flood-prone cropland along creeks and streams

=Can be used for haying or grazing unless prohibited by conservation program rules

=Straightens irregular fields, keeps farm machinery away from steep banks and avoids the need to plant end-rows where crop yields are often lower due to soil compaction

=Serves as a turning and parking area, facilitating season-long access to fields (especially remote fields), which custom applicators appreciate

=May reduce flood damage on adjacent cropland

=May lower expenses for drainage ditch maintenance

=Aids compliance with setback requirements for manure application and certain herbicide labels

=Creates a highly visible sign of good stewardship

=Provides habitat for important pollinator species that many crops rely upon, such as bees

Field windbreaks are linear plantings of trees/shrubs designed to reduce wind speed in open fields, preventing soil erosion and protecting adjacent crops from wind damage.

Field windbreaks are typically planted in multiple rows perpendicular to prevailing winds. On the downwind side of a well-established windbreak, wind is generally slowed for a distance of 10 times the height of the trees. Old field windbreaks may need renovation to function properly, including removal and replacement of selected trees/shrubs.

Why establish or renovate field windbreaks on your farm?

Environmental benefits

- Reduces soil erosion from wind
- Protects water and air quality by providing a barrier against airborne soil, chemical drift, odors and dust
- Provides wildlife food, cover and travel corridors
- Diversifies agricultural landscapes
- Sequesters carbon

Practical benefits

- Protects crops from wind damage
- May increase crop yields by 10% or more, especially in dry years
- May improve crop photosynthesis and water use efficiency due to micro-climate changes in temperature and humidity
- Improves irrigation efficiency
- Helps manage snow drifts and soil moisture by dispersing snow more evenly across cropland
- Provides opportunities for additional income from salable tree/shrub products such as nuts, berries and decorative floral material
- Adds scenic interest to fields and may increase property values

A system of connected field windbreaks. Photo courtesy USDA NRCS.

A **terrace** is an earthen embankment, ridge or ridge-and-channel built across a slope (on the contour) to intercept runoff water and reduce soil erosion. Terraces are usually built in a series parallel to one another, with each terrace collecting excess water from the area above. Terraces can be designed to channel excess water into grass waterways or direct it underground to drainage tile and a stable outlet.

There are three main types of terraces.

- **Broad-based terraces** are designed to be entirely farmed; they are generally suitable for long, uniform gentle slopes of up to 6% or so.
- **Grassed back-slope terraces** are designed to be farmed on the front slope of the ridge but the back slope is graded to a steep pitch and grassed; they are generally suitable on slopes up to 15%.
- With **narrow-based terraces**, the entire ridge is grassed instead of just the back slope, and both sides of the ridge are steeply pitched; the narrow ridges require only a small part of the field to be removed from production.

No-till corn planting on terraced land. Photo courtesy USDA NRCS.

Why install terraces on your land?

=Reduces soil erosion by breaking long slopes into a series of shorter ones
=Protects water quality by intercepting agricultural runoff
=Helps prevent gully formation by directing runoff to stable outlets
=Makes it easier to farm steep slopes
=Improves soil quality and productivity by improving moisture retention and reducing soil erosion

A **water and sediment control basin** (WASCOB) is a small earthen ridge-and-channel or embankment built across (perpendicular to) a small watercourse or area of concentrated flow within a field. They are commonly built in a parallel series with the first ridge crossing the top of the watercourse and the last ridge crossing the bottom, or nearly so. They are designed to trap agricultural runoff water and sediment as it flows down the watercourse; this keeps the watercourse from becoming a field gully and reduces the amount of runoff and sediment leaving the field.

WASCOBs are similar to terraces in form and function, but the two practices are not interchangeable. Whereas terraces (and other contour practices, such as contour stripcropping and contour buffer strips) work best on relatively uniform slopes, WASCOBs are generally reserved for fields with irregular topography where contour practices would be difficult to implement or likely to fail.

While terraces generally extend all the way to field edges, following the contour of a slope in a ribbon-like pattern, WASCOBs from a distance look more like short, straight slivers, just long enough to bridge an area of concentrated flow. WASCOBs are generally grassed. The runoff water detained in a WASCOB is released slowly, usually via infiltration or a pipe outlet and tile line.

Looking upslope at a series of parallel **water and sediment control basins** built across a small watercourse on a cropped hillside. Photo courtesy MN NRCS.

Why install WASCOBs on your land?

=Reduces agricultural runoff and sediment loading in nearby streams

=Prevents small areas of concentrated flow from becoming field gullies

=Helps control erosion on areas of hilly land where slopes are not uniform enough for practices that follow the contour, such as terraces

=Improves the farmability of cropland with irregular topography