

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

**RESIDUE MANAGEMENT, SEASONAL**

(Acre)  
CODE 344

**DEFINITION**

Managing the amount, orientation, and distribution of crop and other plant residues on the soil surface during part of the year, while growing crops in a clean tilled seedbed.

**PURPOSES**

This practice may be applied as part of a conservation management system to support one or more of the following:

- \* Reduce sheet and rill erosion.
- \* Reduce soil erosion from wind.
- \* Manage snow to increase plant available moisture.
- \* Provide food and escape cover for wildlife.
- \* Allow timely cycling of high volumes of residue.
- \* Maintain or improve soil organic matter content and tilth.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all cropland and other land where crops are grown.

This standard includes residue management methods practiced during the part of the year from harvest until residue is buried by tillage for seedbed preparation.

This practice does not apply to fields using conservation tillage since residues are not incorporated (no-till) or only partially incorporated (ridge-till, slot-till, mulch-till).

**CRITERIA**

**General Criteria Applicable to All Purposes Named Above:**

Loose residue to be retained on the field shall be uniformly distributed on the soil surface. Where combines or similar machines are used for harvesting, they shall be equipped with spreaders capable of

redistributing residues over at least 80 percent of the working width of the header.

Residues shall not be burned unless burning is the only economically viable method to control disease problems and only when the disease organisms are identified and found to exceed threshold levels.

**Additional Criteria to Reduce Sheet and Rill Erosion**

The amount of residue needed to reduce erosion within the soil loss tolerance (T) or any other planned soil loss objective, shall be determined using current approved erosion prediction technology. Partial removal of residue by means such as baling or grazing, shall be limited to retain the amount needed. The remaining residue shall be maintained on the surface through periods when sheet and rill erosion has the potential to occur, or until planting, whichever occurs first. Calculations shall account for the effects of other practices in the conservation management system.

Any tillage that occurs during the management period shall be limited to methods that leave residue on the surface and maintain the planned cover conditions.

**Additional Criteria to Reduce Soil Erosion from Wind**

The amount of residue needed to reduce erosion within the soil loss tolerance (T) or any other planned soil loss objective, shall be determined using current approved wind erosion prediction technology. Partial removal of residue by means such as baling or grazing, shall be limited to retain the amount needed. The remaining residue shall be maintained on the surface through periods when soil erosion by wind has the potential to occur, or until planting, whichever occurs first. Calculations shall account for the effects of other practices in the conservation management system.

Any tillage that occurs during the management period shall be limited to methods that leave residue on the surface and maintain the planned cover conditions.

### **Additional Criteria to Manage Snow to Increase Plant Available Moisture**

Stubble shall be left standing as high as possible by the harvesting operation, but not less than 6 inches in any case.

Stubble shall be maintained in a standing orientation over winter to trap and retain snow. Any tillage that occurs during this period shall be limited to undercutting tools such as blades, sweeps, or deep tillage implements such as rippers or subsoilers.

Loose residue may be removed providing that the remaining residue is left standing.

### **Additional Criteria to Provide Food and Escape Cover for Wildlife**

The amount of residue, height of the stubble, and length of the management period necessary for meeting habitat requirements for the target species or wildlife population shall be determined using an approved habitat evaluation procedure.

Residues shall not be removed unless it is determined by the habitat evaluation procedure that such removal will not adversely affect habitat values.

Tillage shall be delayed until the end of the management period to maintain the food and cover value of the residue.

### **Additional Criteria to Allow Timely Cycling of High Volumes of Residue**

When excessive amounts of residues are produced by crops such as rice or irrigated small grains, the excess may be removed by baling or other means.

Incorporate residues to achieve partial soil contact and fertilize with nitrogen to prevent nitrogen tie up for the next crop and to speed up decomposition.

### **Additional Criteria to Maintain Soil Organic Matter Content and Tilth**

Adequate kinds and amounts of residues will be produced and managed to maintain or enhance soil organic matter and soil aggregate stability. Other composts, manure's, green manure's, mulches, and amendments may also be used to provide the amount needed.

## **CONSIDERATIONS**

In rainfall erosion areas, plants or crops are managed to maintain adequate surface residues during the critical erosion periods but there is less than 30 percent residue cover remaining after planting. Tilling with chisels or sweeps for weed control or using a herbicide will help maintain maximum residues on the surface.

In wind erosion areas, plants or crops are managed to maintain adequate surface residues during the critical wind erosion periods but there are less than 1000 pounds per acre of flat, small grain residue equivalent on the surface. Weeds should be controlled with blades or sweeps or herbicides. Utilize moisture and tillage on irrigated land just prior to planting to minimize erosion.

Trees and vines are managed to maintain shreddable prunings and leaf residue on the soil surface during the critical erosion periods.

Under irrigation, high amounts of residues are produced on rice and they break down very slowly. Irrigated small grain when double cropped with fall vegetables presents a residue disposal problem. Bale or use other ways of removal for excessive amounts of residue where applicable. Rolling, disking and flooding are ways used to enhance the cycling of rice residue. Moisture and partial soil contact are essential for rapid decomposition. Adding 20 # nitrogen per ton of residue is used to prevent nitrogen tie up for the next crop and speed up decomposition. The nitrogen added would be available in a slow release form for the next crop but it would also reduce some of the soil aggregation benefits of the residue when compared to not adding nitrogen.

Excess removal of plant residue by baling or grazing often produces negative impacts on resources. These activities should not be performed without full evaluation of impacts on soil, water, animal, plant, and air resources.

Production of adequate amounts of crop residue necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties, by the use of cover crops, and by adjustment of plant populations and row spacing.

Residues with wide Carbon-Nitrogen ratios and fibrous root systems are the best and work the fastest to improve aggregation and OM levels. These include the feed grains mainly. Legume residues have very positive impacts. Shallow tap rooted, low residue, non-legumes, mainly vegetable crops with high fertility

levels have the highest negative impacts to soil aggregation. Increased amounts of tillage, aeration, and nitrogen reduces organic matter levels when soils are irrigated and have high temperatures. Leaving all crop residues in the field will usually maintain long-term soil fertility, tilth, and water intake rates as compared to removing the residues.

When planting on a clean seedbed, exposure to erosion can be minimized by completing tillage and planting in a single operation, or by performing primary tillage no more than three days before planting.

When planting on a clean seedbed in areas with limited moisture, moisture for germination can be increased by completing tillage and planting in a single operation, or by performing primary tillage no more than three days before planting.

The effectiveness of stubble to trap snow increases with stubble height. Variable height stubble patterns may be created to further increase snow storage.

The value of residue for wildlife habitat can be enhanced by leaving rows of unharvested crop standing at locations in the field and maintaining standing stubble.

Maintain residues on the soil surface during critical erosion periods. Standing field and row crop residues are usually most effective in controlling wind erosion during idle and fallow periods. Residues distributed evenly on the soil surface provide maximum protection from wind and water erosion as compared to incorporating them into the soil.

Leaving all crop residues in the field will maintain long-term soil fertility, tilth, and water intake rates as compared to removing the residues.

Heavy crop residues on fields used for two or three crops annually can make seedbed preparation difficult. Alternating a high residue crop with a low residue crop can reduce this problem.

Burning of crop residues should be avoided but may be needed infrequently when disease problems appear.

Surface residues help retain moisture near the soil surface and minimize crust formation. Surface residues will improve air quality during the dry, windy seasons.

Un-decomposed residues in the soil can tie up Nitrogen needed by the next crop, especially on soils low in

available Nitrogen. This can be overcome by applying fertilizer at planting time. Up to 30 pounds of Nitrogen per ton of air dry residues may be required when residues are incorporated into the soil and another crop will be planted immediately.

Shred or chop coarse residues before incorporating in the soil.

### **Endangered Species Considerations**

Determine if installation of this practice with any other proposed practices will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravels and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example, there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

### **Water Quantity**

This practice has an insignificant effect on the quantity of surface and ground water.

**Water Quality**

When this practice is employed, raindrops are intercepted by the residue reducing detachment, soil dispersion, and soil compaction. Erosion may be reduced and the delivery of sediment and associated pollutants to surface may be reduced. Reduced soil sealing, crusting and compaction allows more water to infiltrate, resulting in an increased potential for leaching of dissolved pollutants into the ground water.

Crop residues on the surface increase the microbial and bacterial action on or near the surface. Nitrates and surface-applied pesticides may be tied-up and less available to be delivered to surface and ground water. Residues trap sediment and reduce the amount carried to surface water. Crop residues promote soil aggregation and improve soil tilth.

**PLANS AND SPECIFICATIONS**

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit.

Specifications shall be recorded using approved certification sheets, job sheets, or other acceptable methods.

Identify the critical erosion period(s) that crop residues are needed to control wind or water erosion. Name the residues and indicate if they will be standing or flat. Indicate the minimum amounts of residues needed.

**OPERATION AND MAINTENANCE**

No operation and maintenance requirements have been identified for this practice.