NATURAL RESOURCES CONSERVATION SERVICE

INTERIM CONSERVATION PRACTICE STANDARD

RESIDUE MANAGEMENT, DIRECT SEED

(Acre)

CODE 777

DEFINITION

Managing the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops in narrow slots, or tilled or residue free strips in soil previously untilled by full-width inversion implements.

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 irrigation-induced erosion.

Reduce wind erosion.

Maintain or improve soil organic matter content.

Conserve soil moisture.

Manage snow to increase plant available moisture or reduce plant damage from freezing or desiccation.

Provide food and escape cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

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

This standard includes tillage and planting methods commonly referred to as, direct seed, slot plant, row till, zone till, no-till, or strip till.

CRITERIA

General Criteria Applicable to All Purposes Named Above

Loose residues 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 distributing residue over at least 80 percent of the working width of the header.

Planters or drills shall be equipped to plant directly through untilled residue or in a tilled seedbed prepared in a narrow strip along each row by planter attachments such as rotary tillers, sweeps, multiple coulters, or row cleaning devices.

Residues shall not be burned, or disturbed by full-width tillage operations except as follows:

Disturbance caused by seedbed preparation, planting, and fertilizer placement shall be between one third and two thirds of the seeded row width. When disturbance exceeds two thirds of the row width refer to Residue Management, Mulch Till 329B.

If row cultivation or spot treatment for weed escapes, leveling ruts, or similar operations become necessary, tillage shall be limited to undercutting operations which minimize burial of surface residue.

All pest management practices associated with this practice will be consistent with the appropriate criteria in Conservation Crop

Rotation (328) and Pest Management (595).

Pesticides used in performing direct seeding shall be registered and applied in accordance with authorized uses, directions on the label and other Federal, State and local requirements.

Additional Criteria to Reduce Sheet and Rill Erosion

The amount of randomly distributed, flat 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. Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Reduce Irrigation Induced Erosion

To reduce erosion induced by furrow irrigation, planting will be in undisturbed crop or cover crop residue that is within the wetted perimeter of the furrow.

To reduce erosion induced by sprinkler irrigation, planting will be into undisturbed crop or cover crop residue that has been maintained on the soil surface.

The amount of residue needed to reduce erosion induced by furrow and sprinkler irrigation within the soil loss tolerance (T) or any other planned soil loss objective, shall be determined by using the current approved erosion prediction technology. Calculations shall account for the effects of other conservation practices in the management system.

Additional Criteria to Reduce Wind Erosion

The amount and orientation of residue needed to reduce erosion within the soil loss tolerance (T) or 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.

Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Maintain or Improve Soil Organic Matter Content

The amount of residue needed to achieve the desired soil condition, shall be determined using the current approved soil conditioning index procedure. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed. Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Conserve Soil Moisture

A minimum quantity of 50 percent residue cover shall be maintained throughout the year. Residue shall be evenly distributed and maintained on the soil surface. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed.

Additional Criteria to Manage Snow to Increase Plant Available Moisture or Reduce Plant Damage From Freezing or Desiccation

Stubble shall be left standing as high as possible by the harvesting operation, but not less than 6 inches when average or above average residues from the crop are present. Stubble shall remain standing over winter to trap and retain snow. Loose residue may be removed providing that the remaining residue is left standing.

When crops are planted in the fall, the width of the tilled strip or slot shall be between one third and two thirds of the row width, in order to reduce the disturbance of standing stubble.

Additional Criteria to Provide Food and Escape Cover for Wildlife

Residue height, amount, and time period shall be determined using an approved habitat evaluation procedure. Use Washington Biology Technical Note No. 14, Aquatic and Terrestrial Habitat Evaluation Guide to evaluate and determine criteria for wildlife food and cover. Residues shall not be removed unless it is determined by the habitat evaluation procedure that removal would not adversely affect habitat values.

CONSIDERATIONS

Direct Seeding may be practiced continuously throughout the crop sequence, or may be managed as part of a system, which includes other tillage and planting methods such as mulch till. Selection of acceptable tillage methods for specific site conditions may be aided by an approved Soil Tillage Suitability Rating.

Many growers have found a good "rule of thumb" is to leave stubble height at harvest no longer than the spacing between openers on their drill or seeder. This reduces problems with clearance and residue "pinning" or plugging.

High residue cover in direct seeding can increase pest problems and reduce crop yields unless a suitable crop rotation is used that will break or disrupt pest life cycles.

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

Maintaining a continuous direct seed system will maximize the improvement of soil organic matter content. Also, when direct seeding is practiced continuously, soil reconsolidation provides additional resistance to sheet and rill erosion.

Temporary N deficiency may occur with initial direct seeding as microorganisms temporarily immobilize N during the initial phases of decomposition. Additional N application above minimum crop requirements may be necessary until C:N ratios are stabilized and equilibrium is established in the crop rotation. Research has shown that banding fertilizer with direct seeding can help reduce N immobilization.

Direct seeding within 10 days after herbicide application may increase the transmission of root disease to the seeded crop due to the "green bridge" effect.

The effectiveness of stubble to trap snows or reduce plant damage from freezing or desiccation increases with stubble height. Variable height stubble patterns may be created to further increase snow storage.

Leaving rows of unharvested crop standing at intervals across the field can enhance the value of residues for wildlife habitat.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

No operation and maintenance requirements, national in scope, have been identified for this practice.

REFERENCES

Soil Disturbance in No Till and Direct Seed Planting Systems, Washington Agronomy Technical Note #43

Pacific Northwest Conservation Tillage Handbook Chapter 2, Systems and Equipment, Chapter 3, Residue Management, Chapter 10, Irrigated Systems, Northwest Extension

Bulletin, University of Idaho, Oregon State University and Washington State University.

Crop Residue Management to Reduce Erosion and Improve Soil Quality, Northwest, May 1995, USDA, Agricultural Research Service, Conservation Report Number 40.

Pacific Northwest Weed Control Handbook revised annually, Cooperative Extension Service, University of Idaho, Oregon State University, and Washington State University.

Estimating Small Grain Residue, Washington NRCS, Agronomy Technical, Note #10.

Section I, Erosion Prediction, Washington NRCS, Field Office Technical Guide.