

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CONSERVATION CROP ROTATION

(Acre)

CODE 328

DEFINITION

Growing crops in a recurring sequence on the same field

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 soil erosion from wind
- Maintain or improve soil organic matter content and soil tilth and reduce soil compaction
- Manage plant nutrients
- Improve water use efficiency
- Manage saline seeps
- Manage plant pests (weeds, insects, diseases)
- Provide food for domestic livestock
- Provide food and cover for wildlife

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land where crops are grown.

This standard does not apply to pastureland, hayland, or other land uses where crops are grown occasionally only to facilitate renovation or re-establishment of perennial vegetation. It does not apply to land devoted to orchards, vineyards, and nurseries.

CRITERIA

General Criteria Applicable to All Purposes

Crops shall be grown in a planned, recurring sequence as outlined in Operation and Maintenance.

Crops shall be adapted to the climatic region, the soil resource, and the goals of the producer. Adapted crops and varieties, listed in Kansas State University Cooperative Research and Extension, or other appropriate university publications or other approved sources, shall be selected.

A conservation crop rotation may include crops planted for cover, pest management, or nutrient enhancement.

Additional Criteria to Reduce Sheet and Rill Erosion

Crops shall be selected that produce enough above and below ground plant biomass to control erosion within the soil loss tolerance (T) or any other planned soil loss objective.

The amount of biomass needed shall be determined using current approved erosion prediction technology. 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, crops or cover crops shall be selected that are grown within the wetted perimeter of the furrow, or which produce the amount of residue needed to be maintained in the furrow to achieve the soil loss objective. The amount of residue needed shall be determined by approved research.

To reduce erosion induced by sprinkler irrigation, crops or cover crops shall be selected that develop surface cover or canopy rapidly, or that produce the amount of residue needed to be maintained on the soil surface to achieve the soil loss objective. The amount of residue needed shall be determined by approved research.

Additional Criteria to Reduce Soil Erosion From Wind

Crops shall be selected that produce biomass in amounts adequate, and at the appropriate time, to control erosion to within the soil loss tolerance (T) or other planned soil loss objective.

The amount of biomass needed shall be determined using current approved wind erosion prediction technology. Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Maintain or Improve Soil Organic Matter Content

Crops shall be selected that produce the amount of plant biomass needed to maintain or improve soil organic matter content.

If partial removal of residue by means such as baling or grazing occurs, enough residue shall be maintained to achieve the desired soil organic matter content goal.

Cover and green manure crops planted specifically for soil improvement may be grazed, as long as grazing is managed to retain adequate biomass.

Burning crop residues will not be used as a cropping management practice for this criteria.

Including deep-rooted crops that are able to penetrate compacted soil layers in the crop rotation can reduce soil compaction. This practice must be accompanied with the management practices that control implement traffic, and grazing impacts.

Additional Criteria to Manage the Balance of Plant Nutrients

Crop selection and sequence shall be determined using an approved nutrient balance procedure.

When crop rotations are designed to add nitrogen to the system, nitrogen-fixing crops shall be grown immediately prior to or interplanted with nitrogen-depleting crops.

To reduce excess nutrients, crops or cover crops having rooting depths and nutrient requirements that utilize the excess nutrients shall be grown.

Additional Criteria to Improve Water Use Efficiency

Selection of crops and varieties, sequence of crops, or the annual decision to plant a crop or to fallow, shall be determined using an approved water balance procedure.

Additional Criteria to Manage Saline Seeps

Crops grown in the recharge area of saline seeps shall be selected for rooting depths and water requirements adequate to fully utilize all plant available soil water. Summer fallow will not be used. Crop selection and sequence shall be determined using an approved water balance procedure.

If excess subsoil moisture exists below the rooting depth of crops commonly grown in the recharge area, deep-rooted perennial crops shall be established for the number of years needed to dry the soil profile.

Crops grown in the discharge area of saline seeps shall be selected for their tolerance to salinity levels in the discharge area.

Additional Criteria to Manage Plant Pests (Weeds, Insects, Diseases)

Crops shall be alternated to break the pest cycle and/or allow for the use of a variety of control methods. Affected crops and alternate host crops shall be removed from the rotation for the period of time needed to break the life cycle of the targeted pest.

Resistant varieties, listed by Kansas State University or other appropriate and approved sources, shall be selected where there is a history of a pest problem.

Additional Criteria to Provide Food for Domestic Livestock

Crops shall be selected to balance the feed supply with livestock numbers. The needed amount of selected crops shall be determined

using the Livestock-Forage Balance Data Form (KS-ECS-528A), as an approved procedure.

Additional Criteria to Provide Food and Cover for Wildlife

Crop selection to provide either food or cover for the targeted wildlife species will be grown, managed, or left unharvested, as per the needs of the targeted wildlife as determined by an approved habitat evaluation procedure and habitat management plan.

CONSIDERATIONS

When used in combination with Conservation Practice Standards 589B, Cross Wind Stripcropping, or 585, Contour Stripcropping, the crop sequence should be consistent with the stripcropping design.

When used in combination with Residue Management practices (codes 329A, 329B, 329C, or 344), selection of high residue producing crops and varieties, use of cover crops and adjustment of plant population, and row spacing can enhance production of the kind, amount, and distribution of residue needed.

Where maintaining or improving soil organic matter content is an objective, the effects of this practice can be enhanced by managing crop residues, tillage practices, utilizing animal wastes, or applying mulches to supplement the biomass produced by crops in the rotation.

Where excess plant nutrients or soil contaminants are a concern, utilizing deep rooted crops or cover crops in the rotation can help recover or remove the nutrient or contaminant from the soil profile.

Where precipitation is limited, seasonal or erratic moisture can be conserved for crop use by maintaining crop residues on the soil surface to increase infiltration and to reduce run-off and evaporation. Where winter precipitation occurs as snow, additional moisture can be obtained for crop use by trapping snow with standing residue, windbreaks, or other barriers.

Where improving water use efficiency on deep soils is a concern, rotating or combining deep-rooted crops with shallow rooted crops can help utilize all available water in the soil profile.

Crop damage by wind erosion can be reduced with this practice by selecting crops that are tolerant to abrasion from wind blown soil or tolerant to high wind velocity. If crops sensitive to wind erosion damage are grown, the potential for plant damage can be reduced by crop residue management, field windbreaks, herbaceous wind barriers, intercropping, or other methods of wind erosion control.

Where pesticides are used, consider application methods and the crop rotation to avoid negative impacts on the following crop due to residual herbicides in the soil or adverse affects on aquatic wildlife or habitat through run-off.

Soil compaction can be reduced by adjusting crop rotations to include deep rooted crops that are able to extend to and penetrate the compacted soil layers, as well as avoiding crops that require field operations when the soils are wet.

Crop plantings may be developed to benefit particular communities, species, or life stages of wildlife. Food plots or crops for wildlife could be provided as part of a habitat restoration project as an initial food and cover source for wildlife until food and cover producing vegetation becomes established.

Careful consideration should be given to pesticide use if applied to crops raised for wildlife.

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.

A conservation crop rotation plan shall be designed and certified on Form KS-ECS-328.

OPERATION AND MAINTENANCE

Rotations shall provide for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons. Acceptable substitutes are crops having similar properties that meet the criteria for all the resource concerns identified for the field or treatment unit.

In areas where summer fallow is practiced, the decision to plant a crop or fallow shall be made annually based on soil moisture at planting time. Fields shall be fallowed only when soil moisture is not adequate to produce a crop. If moisture supply is adequate but limited, short-season shallow rooted crops shall be selected and grown. Deep-rooted crops shall follow shallow rooted crops in subsequent years, if needed, to utilize all plant available water in the root zone.