NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CONTOUR ORCHARD AND OTHER PERENNIAL CROPS

(Ac.)

CODE 331

DEFINITION

Planting orchards, vineyards, or other perennial crops so that all cultural operations are done on or near the contour.

PURPOSE

- Reduce soil erosion
- Reduce transport of sediment and other associated contaminants
- Increase infiltration

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where orchards, vineyards, or other perennial crops are to be established. For annually planted crops use the practice Contour Farming (330).

CRITERIA

General Criteria Applicable to All Purposes

Overland flow from adjacent sites shall be diverted as necessary to ensure the proper functioning of this practice.

Temporary erosion control measures shall be applied as necessary to disturbed or cleared land until the planting is established.

Overland flow from adjacent fields shall be diverted as necessary to ensure the proper functioning of this practice.

For sprinkler or trickle-irrigated plantings, the maximum row length of orchard crops shall not exceed the maximum allowable lateral line length.

Row Grade. The row grade will be aligned as closely to the contour as feasible, but the maximum row grade shall not exceed:

- one-half of the up-and-down hill slope percent used for conservation planning, or
- 10 percent, whichever is less.

Up to a 25% deviation from the design row grade is permitted within 150 feet of a stable outlet.

When the row grade reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line and used for layout of the next contour pattern.

The row grade shall not be less than 0.2 percent on soils with slow to very slow infiltration rates (hydrologic soil group C or D) or where the crop to be planted will be damaged by ponded water conditions for periods of less than 48 hours.

Up to 3 percent row grade is permitted within 150 feet of the approach to a grassed waterway, field border or other stable outlet.

Critical Slope Length. This practice shall not be installed on a hill slope that is longer than the critical slope length.

When the critical slope length is exceeded, the slope length shall be divided through the use of diversions, terraces, or other structures to shorten slope lengths.

The critical slope length shall be determined using currently approved erosion prediction technology.

Stable Outlets. Runoff from contour rows shall be delivered to a stable outlet. ***Acceptable stable outlets include grassed waterways,***

field borders, filter strips, water and sediment control basins, or underground outlets for terraces and diversions.

CONSIDERATIONS

This practice is most effective on slopes between 2 and 10 percent. It will be less effective in achieving the stated purpose(s) on slopes exceeding 10 percent and in areas with 10-year EI (EI = total storm energy times the maximum 30-minute intensity) values greater than 140.

Fields that are cut by gullies or have strongly undulating topography are not well suited for this practice because of the difficulty of meeting the row grade criteria.

A topographic survey will usually be needed to see if the desired planting pattern will fit the slopes.

Avoid applying this practice on areas that have evidence of mass movement or have the potential for landslides.

Following the level contour may not be desirable where slow drainage may increase disease problems or where furrows could fill with water and overtop.

Planting orchards and fruit areas on the contour generally requires a bench or terrace to be constructed to provide access to the growing trees or shrubs. The bench or terrace may reduce surface runoff and increase the opportunity for infiltration. Either inward sloping or outward sloping benches may be appropriate.

Inward sloping benches reduce runoff. The reduction depends on the amount of surface storage and the intake rate of the soil.

Where inward sloping benches are used, potential contaminants will be trapped against the slope. With some rainfall events, the bench can provide as much as 100 percent trap efficiency.

Where outward sloping benches are constructed for drainage purposes, runoff may be more or less than from the unbenched condition. The degree of runoff reduction will depend on the angle of the outward slope, the amount of cover on the bench at the time of runoff, the amount of storage available, the intake rate of the surface soil, and the amount of water received (either rainfall or irrigation).

The amount of potential contaminants retained on outward sloping benches depends on the slope of the bench and the amount of cover. In addition, outward sloping benches are subject to erosion caused by runoff from benches immediately above them.

Contouring can improve access to fields, facilitate maintenance and improve energy efficiency.

This practice works best as a system in combination with vegetative ground cover and appropriate irrigation conveyance practices, where applicable.

Vegetative ground cover, particularly in alleys between rows of trees/vines, in row furrows, and on terraces and diversions can increase infiltration, reduce runoff, aid in controlling erosion, provide habitat for beneficial species and pollinators, and facilitate nutrient cycling. ***Refer to the West Virginia Pollinator Handbook for information regarding species that are beneficial to establish between rows in vineyards, alleyways, etc. Select species that augment the existing crop bloom period. Select multiple species where feasible.***

Where sites are disturbed, temporary erosion control measures should be applied until the planting is established.

Reduced surface runoff may increase the opportunity for increased infiltration. Soil moisture may be increased, providing additional water for transpiration. Where transpiration is less than available soil water, excess infiltration may percolate below the orchard root zone. Excess irrigation water may increase the percolating water supply.

Contoured orchards and fruit areas may reduce erosion, sediment yield, and nutrient and pesticide concentration in surface runoff.

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for each field.

Specifications for establishment and operation of this practice shall be prepared for each field according to the Criteria, Considerations, and Operation and Maintenance described in this standard. The plans shall include, as a minimum:

- Percent land slope used for conservation planning;
- The minimum and maximum allowable row grades for the contour system. ***Identify the planned grades for tree or vine rows and the allowable deviation from the contour for the planting pattern on each field;***
- A sketch map or photograph of the field showing:
  - ◊ the approximate location of the baselines used to establish the system
  - ◊ the location of stable outlets for the system
- Specify the location of water disposal practices.

Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

Evaluation of the conservation system using the currently approved water erosion prediction technology will be documented in the plan.

OPERATION AND MAINTENANCE

Maintenance needed for this practice includes:

- Periodic inspection and repairs to runoff water outlets
- Protecting uphill and downhill farm roads from erosion, and
- Maintaining adequate vegetative cover to control erosion.

REFERENCES

Foster, G.R., D.C. Yoder, G.A. Weesies, D. K. McCool, K.G. McGregor, and R.L. Binger. 2003. *User's Guide – Revised Universal Soil Loss Equation (RUSLE2)*. Version 2. USDA. http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

Renard, K. G., G. R. Foster, G. A.. Weesies, D. K. McCool, and D. C. Yoder. 1997. *Predicting soil erosion by water: A Guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE)*. Agriculture Handbook 703. USDA.