Conservation Crop Rotation

Conservation Practice Specification Guide MA-328

General Specifications

Specific conservation crop rotation requirements are prepared utilizing RUSLE2 (Revised Universal Soil Loss Equation, Ver.2) software in accordance with the NRCS Field Office Technical Guide. Refer to Massachusetts NRCS "Conservation Crop Rotation" (328) conservation practice standard and technical information regarding RUSLE2 (see references).

All crop rotations must have a positive Soil Conditioning Index (SCI); the SCI is embedded in the RUSLE2 software. There are three subcomponents of the SCI: 1) soil organic matter additions; 2) intensity of field tillage operations that mineralize soil organic matter; and 3) the amount of soil erosion.

The conservation crop rotation practice is considered applied when the most soil conserving crop has been planted at least once in each specified field, or when it is clear the specified crop ratio is currently in place for all affected fields or treatment units. The most soil-conserving crop is the crop with the lowest overall erosion potential.

After the most soil-conserving crop is established, it must be rotated with the other crops according to the planned rotation. Weather conditions, unexpected herbicide carryover, and marketing considerations may affect year to year cropping decisions. These conditions may require a change in the scheduled rotation. A simple adjustment to rotations can often be made by following these guidelines:

- Crop substitution is permitted only if an equal or more soil-conserving crop is planted. In addition, any requirements for crop residue cover must also be met when planting the substitute crop and in following years.
- For vegetable farm crop rotations, a summer cover crop must be grown in one of the years.
- To reduce insect and disease pressures in vegetable rotations, members of the same family (See Table 17 below) may not be planned in consecutive years, members of the *Solanaceous (nightshade)* family (tomatoes, potatoes, peppers, eggplants) may only be planned once every three years,
- Small grains and hay can always be used to replace any row crop or low-residue crop.
- Corn harvested for grain with residues left in the field can always be used to replace any other low-residue producing crop.
- For crop rotations that include hay, the rotation can be lengthened by maintaining the existing hay stand for additional years to reduce erosion and/or increase soil organic matter.
- Crop sequences cannot be lengthened with additional years of annual crops without working with NRCS prior to planting the crop.

Examples of crop rotations used by vegetable farmers in the Northeastern region of the US can be found on pages 49-54 of "**Crop rotation on Organic Farms : A Planning Manual."** See references below.

The following tables are located in the "2011 Midwest Vegetable Production Guide for Commercial Growers."

Table 17. Botanically Related Vegetables

Alliums	Corn	Cucurbits	Crucifers	Goosefoot Family	Legumes	Nightshade Family
Garlic	Dent corn	Cucumber	Cabbage	Beet	Dry bean	Eggplant
Onion	Sweet corn	Muskmelon	Cauliflower	Chard	Lima bean	Pepper
		Pumpkin	Broccoli	Spinach	Pea	Potato
		Summer squash	Brussels sprout		Snap bean	Tomato
		Watermelon	Horseradish		Soybean	
		Winter squash	Kale			
			Radish			
			Rutabaga			

Table 18. Classification of Vegetable Crops According to Their Adaptive Field Temperatures

Cool-season		Warm-season	
Hardy[1]	Semi-Hardy	Tender	Very Tender
Asparagus	Carrot	Snap bean	Cucumber
Broccoli	Cauliflower	Sweet corn	Eggplant
Cabbage	Chinese cabbage	Tomato	Lima bean
Horseradish	Lettuce		Muskmelon
Onion	Potato		Okra
Pea			Pepper
Spinach			Pumpkin
			Squash
			Watermelon

[1] Hardy crops are most tolerant of cool temperatures and frost. Very tender crops are most susceptible to frost and cool temperatures.

Considerations

When used in combination with Residue Management practices, use of high residue crops and cover crops and adjustment of plant population and row spacing can enhance production of the kind, amount, and distribution of residue required.

Reduced tillage practices, utilizing animal wastes, or applying mulches will also help to maintain or improve soil organic matter levels.

Selecting deep rooted crops or cover crops (e.g., alfalfa or radish) in the rotation can help recover or remove excess nutrients or contaminants from the soil profile. Deep-rooted crops can also help utilize all available water in the soil profile and penetrate compacted soil layers.

Soil moisture can be conserved for crop use by maintaining crop residues on the surface or by trapping snow with standing residue, windbreaks, or other barriers.

Unharvested crop rows and crop residues can provide over-wintering wildlife with

valuable food and cover. Careful consideration should be given to pesticide use if applied to crops raised for wildlife.

Herbicide applications, where used, should be carefully planned to avoid negative impacts on the following crop.

Care should be taken, especially during site preparation and maintenance, to avoid adverse effects to significant cultural resources. Follow NRCS state policy for considering cultural resources during planning and maintenance.

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.

References

ATTRA: Organic Crop Production Overview. 2004. George Kuepper and Lance Gegner, editors. https://attra.ncat.org/attra-pub/summaries/summary.php?pub=66

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Managing Cover Crops Profitably. 3rd ed. 2007. USDA Sustainable Agriculture Research and Education Program. http://www.sare.org/publications/covercrops/covercrops.pdf

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