Field Border (Feet) 386

DEFINITION

A strip of permanent vegetation established at the edge or around the perimeter of a field.

PURPOSES

Apply this practice to accomplish one or more of the following:

- Reduce erosion from wind and water.
- Protect soil and water quality.
- Manage pest populations.
- Provide wildlife food and cover and pollinator habitat
- Increase carbon storage.
- Improve air quality.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applied around the perimeter of fields. Its use can support or connect other buffer practices within and between fields. Field borders may also apply to recreation land or other land uses where agronomic crops including forages are grown.

CRITERIA

General Criteria Applicable to All Purposes

Establish field borders around field edges to the extent needed to connect other resource needs and producer objectives.

Base the minimum field border width on local design criteria specific to the purpose or purposes for installing the practice.

Establish the field borders to adapted species of permanent grass, legumes, and/or shrubs that accomplish the design objective so they do not function as host for diseases to the field crop.

Plants selected for field borders will have the physical characteristics necessary to control wind and water erosion to tolerable levels on the field border area.

Approved local criteria and planting methods are required for seedbed preparation, seeding rates, dates, and depths. Follow seeding recommendations in MSU-Extension Bulletin 2107, Seeding Practices for Michigan Crops, or other references approved for Michigan use based on plant hardiness zone adaptation and intended purpose.

For Grasses and Legumes, refer to: the NRCS Michigan, Electronic Field Office Technical Guide (eFOTG), Section IV, Agronomy Job Sheet 386 and *Establishing Cool Season Grasses and Legumes for Conservation Cover and Establishing Prairie Grass Buffer Strips*. Refer to Reference #4 for the eFOTG website. Also see Table 1 – Planting Table for Grasses and Legumes in the Appendix of 386. d).

For Shrubs, refer to: NRCS Michigan eFOTG standard 380 Windbreaks and Shelterbelts and NRCS Michigan Job Sheet, *Weed Control for Tree and Shrub Establishment (612)*. Also see Conservation Tree/Shrub Suitability Groups (CTSG) found in NRCS Michigan eFOTG, Section II, K Forestry Information.

Smooth ephemeral gullies and rills present in the planned border area as part of seedbed preparation. Shape all rills and ephemeral gullies located immediately up slope to ensure more of a sheet flow into the planned border area.

Additional Criteria to Reduce Erosion from Wind and Water

Time the establishment of field border, in conjunction with other practices, so that the soil is protected during the critical erosion period(s).

Establish stiff-stemmed, upright grasses, grass/legumes, or forbs to trap transported wind or water borne soil particles.

Determine the amount of surface and/or canopy cover needed using Revised Universal Soil Loss

Equation 2 (RUSLE2) or Wind Erosion Prediction System (WEPS) or the current approved water and wind erosion prediction technology. Calculations shall account for the effects of other practices in the management system.

Wind Erosion Reduction. Locate borders to provide a stable area on the windward edge of the field as determined by prevailing wind direction data.

Select one of the species or seed mixtures from Table 1 to create a stable wind border.

Maintain the grass or forb height to one foot or taller during the critical erosion period and use a minimum planned width of 15 feet to create a stable border for wind erosion.

If the planned grass height is less than one foot, use a minimum planned width of 25 feet to create a stable border for wind erosion.

Water Erosion Reduction: Locate borders to eliminate sloping end rows, headlands, and other areas where concentrated water flows will enter or exit the field.

Orient plant rows as closely as possible to perpendicular to sheet flow direction.

Additional Criteria to Protect Soil and Water Quality

Do not burn the field border if the main goal of the field border is to protect soil and water quality.

Reducing Runoff and Increasing Infiltration. Locate borders around the perimeter of the field or, as a minimum, install borders to eliminate sloping end rows, headlands, and other areas where concentrated water flows will enter or exit the field.

Water Quality - Adsorbed, Dissolved, and Suspended Contaminants: As a minimum, locate field borders along the edge(s) of the field where runoff enters or leaves the field.

The minimum design width is 30 feet and has a stem density/retardance of moderate to high (e.g., equivalent to a good stand of wheat). Refer to NRCS Michigan Filter Strip (393) Standard for additional design criteria. Design field border width, species, etc. according to the procedure in the Filter Strip (393) Standard for this purpose.

Design border widths to comply with all applicable state and local regulations regarding manure and chemical applications.

Reducing Soil Compaction from Equipment Parking and Traffic: Design border widths to accommodate equipment turning, parking, loading/unloading equipment, grain harvest operations, etc. A minimum width of 30 feet is required for this purpose.

Select legumes that are tolerant of heaving injury and turf grass species tolerant of wheel traffic. Use sod forming cool season grasses only to maintain plant health and vigor.

Additional Criteria to Manage Pest Populations

Provide a Harbor for Beneficial Insects (e.g. insects, mites, etc.) Include appropriate plants that attract beneficial organisms that prey on target pests.

Schedule all mowing, harvesting, pesticide applications and other disturbance activities to accommodate life cycle requirements of the beneficial organisms.

Provide a harbor for beneficial organisms that prey on target pests. Native flowering plants that attract beneficial insects are listed in Table 2.

Include herbaceous plants that attract beneficial insects.

Non-native annuals that provide nectar and shelter are: buckwheat, sweet alyssum, faba bean, dill, and coriander.

See Planning Considerations for including shrubs.

Provide a Habitat to Cause Pests to Congregate. Select plants for the field border that attract pests. (E.g. alfalfa strips planted to lure lygus bugs away from a cotton crop)

To provide a network of habitats for beneficial insects, link larger buffers with smaller ones. A field border of any width is better for beneficial insects, mites, and spiders than without. Refer to NRCS Michigan, Agronomy Job Sheet: Conservation Buffers and Beneficial Insects, Mites, and Spiders.

Additional Criteria to Provide Wildlife Food and Cover

Establish plant species that provide wildlife food and cover for the target wildlife species (refer to NRCS Michigan Wildlife Upland Habitat Management (645) Standard). Refer to NRCS Michigan Biology Job Sheets: Shrub Plantings for Wildlife, Wildlife Corridor Development, or Wildlife Food Plots.

Schedule mowing, harvest, and weed control and other management activities within the field border to accommodate reproduction and other life cycle requirements of target wildlife species.

Maintain a vegetative successional state to accommodate target wildlife species requirements.

Additional Criteria to Increase Carbon Storage in Biomass and Sequestration in the Soil

Establish plant species that will produce the greatest above and below ground biomass for the site (see Michigan RUSLE 2 model for a positive Soil Conditioning Index). A larger index number means more carbon is sequestered.

Maximize the width and length of the herbaceous border to fit the site and increase total biomass production.

Do not burn if the main goal of the field border is carbon storage.

Do not disturb the roots of the established vegetation with tillage.

Additional Criteria to Improve Air Quality

Establish plant species with morphological characteristics that optimize interception and adhesion of airborne particulates. Select plants with persistent roots and residue that stabilize soil aggregates and capture airborne soil particles.

Establish species resistant to damage from equipment traffic.

Orient shrub rows as closely as possible perpendicular to the prevailing wind direction during the period of concern.

CONSIDERATIONS

Consider planting field borders around the entire field, not just the field edges where water enters or leaves the field, for maximizing multiple resource protection.

Establishing a narrow strip of stiff-stemmed upright grass at the crop/field border interface can increase soil particle trapping efficiency of the field border. Refer to NRCS Michigan Filter Strip (393) Standard for grasses that are applicable.

Native plants are best suited for wildlife and pollinator habitat enhancement and provide other ecological benefits where adapted to site conditions and when consistent with producer objectives.

Include plants that provide diverse pollen and nectar sources to encourage local pollinator populations.

Use field borders as corridors to connect existing or planned habitat blocks.

Maintain suitable habitat for specifically desired wildlife species by prescribed burning, strip disking, or selective herbicide application according to specifically desired wildlife species.

Use field borders to comply with required field setback distances applicable to manure and chemical applications.

Frost seed field borders with legumes to increase plant diversity, soil quality, and wildlife benefit.

Redirect concentrated flow water within the borders using water bars or soil berms.

When selecting plant species for a field border, consider the plant's tolerance to:

- Sediment deposition.
- Chemicals planned for pest application.
- Drought.
- Equipment traffic.

Design border widths to match the required field application setback widths for easier management (i.e., land-use and management changes occur on the same location).

Establish plant species that will have the desired visual effects and that will not interfere with field operations or field border maintenance.

Consider the amount of shading that the field border or portions of the field border may experience and select species for those locations accordingly.

The use of perennial plant species as opposed to annual species provides a longer period of resource protection.

Consider installing a contour buffer system, no-till system, or other conservation practices on adjacent upland areas to reduce surface runoff and excessive sedimentation of field borders.

If installation or maintenance of the practice has potential of affecting cultural resources (archaeological, historic, historic landscape, or traditional cultural properties), follow NRCS Michigan eFOTG, Section II, Cultural Resources Info-1 Cultural Resources Information Policy and Procedure.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the Criteria included in this standard. Specifications will describe the requirements for applying this practice to meet the intended purpose. Record practice specifications on NRCS Michigan Field Border (386) Conservation Practice Job Sheet. Include all of the following components in the specifications:

- Field border widths and lengths based on local design criteria.
- Field border location(s) within the field(s) or farm boundary.
- Recommended species and plant density.
- Site preparation requirements.
- Timing and method of planting.
- Liming or fertilizer requirements.
- Operation and maintenance requirements.

OPERATION AND MAINTENANCE

Field borders require careful management and maintenance for performance and longevity. Plan or apply the following O&M activities as needed:

- Repair storm damage.
- Remove sediment or crop residue from above or within the field border when accumulated material either alters the function of the field border or threatens the degradation of the planted species survival.
- Shut off sprayers and raise tillage equipment to avoid damage to field borders.
- Shape and seed border areas damaged by animals, chemicals, tillage, or equipment traffic.
- Maintain desired vegetative communities and plant vigor by liming, fertilizing, mowing, disking, or burning and controlling noxious weeds to sustain effectiveness of the border.
- Repair and reshape ephemeral gullies and rills that develop in the border.
- Perform minimally invasive tillage (e.g. Para plowing) in rare cases, where soil compaction and vehicle traffic have degraded the field border function. Till to decrease bulk density and increase infiltration rates for reestablishment of vegetation growth and field border function.
- Fertilize, mow, harvest, and control noxious weeds to maintain plant vigor.
- Schedule field border mowing, harvesting, and weed control to accommodate wildlife nesting season of grass nesting birds.
- Avoid vehicle traffic when soil moisture conditions are saturated.
- Pesticide applications on nearby fields must comply with label restrictions concerning buffer areas and setbacks.

REFERENCES

1. Fielder, A., J. Tuell, R. Isaacs, D. Landis Ed. 2007. MSU-Extension Bulletin E-2973, Attracting Beneficial Insects with Native Flowering Plants. Web: www.ipm.msu.edu/plants/home.htm for the latest research.

2. Renard, K.G., G.R. Foster, G.A. Weesies, K.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), Agricultural Handbook Number 703.

3. Revised Universal Soil Loss Equation Version 2 (RUSLE2) website (checked May 2007):

http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm.

4. Natural Resources Conservation Service (NRCS) Michigan Electronic Field Office Technical Guide (eFOTG)

TABLE 1 – Planting Table for Grasses and Legumes

Planting table for recommended species of grasses and other forbs.

Species or Seeding Mixture	Cool/ Warm Season	Seeding Rate (Lb/Acre)	Established Density (Stems Per Ft^2)	Minimum Mowing Height (In.) 1/	Sediment Trapping	Nutrient Trapping
Smooth Bromegrass	Cool	15-30	50	4	Y	
Garrison Creeping Foxtail	Cool	6-10	70	4		Y
Orchardgrass	Cool	10-15	70	4	Y	Y
Reed Canarygrass	Cool	10	50	4	Y	Y
Tall Fescue **	Cool	15-25	60	4	Y	
Tall wheatgrass	Cool	8-12		6	Y	
Prairie grasses Intermediate Wheatgrass	Cool	8-12	60	4	Y	
Big Bluestem	Warm	10-20*	40-50	12		Y
Eastern Gamagrass	Warm	8*	40	12	Y	Y
Indiangrass	Warm	10-15*	40-50	12		Y
Switchgrass	Warm	5-10*	50	12	Y	

Planting table for grasses and legumes. Recommended species of grasses, legumes, and other forbs.

Species or Seeding Mixtures	Cool/ Warm Season	Seeding Rate (Lb/Acre)	Established Density (Stems Per Ft^2)	Minimum Mowing Height (In.)	Sediment Trapping	Nutrient Trapping
Timothy Alfalfa	Cool	5-10 6-10	60	4	Y	Y
Bromegrass Alfalfa	Cool	6-12 6-10	60	4	Y	Y
Orchardgrass Alfalfa	Cool	2-5 6-10	60	4	Y	Y
2/ Wildflowers	Native Forbs	8-11	3/ Variable	See Species Guide		Y

1/ Do not cut less than this height before and after establishment.
2/ Sow either as a solid border or a spot seeding.
3/ could be required annually in the fall to spread and re-seed some species.
* Pounds of PLS - Pure Live Seed.
** Do not include tall fescue if area is planned for grazing or forage.

TABLE 2 – Herbaceous Plants for Beneficial Insects *	
Wild strawberry	Fragaria Virginiana
Golden Alexanders	Zizia aurea
Canada anemone	Anemone canadensis
Penstemon/hairy beardtongue	Penstemon hirsutus
Angelica	Angelica atropurpurea
Cow parsnip	Heracleum maximum
Sand coreopsis/lanceleaf tickseed	Coreopsis lanceolata
Shrubby cinquefoil	Potentilla fruticosa
Indian hemp	Apocynum cannabinum
Late figwort	Scrophularia marilandica
Swamp milkweed	Asclepias incarnata
Culver's root	Veronicastrum virginicum
Yellow coneflower	Ratibida pinnata
Nodding Wild Onion	Allium cernuum
Meadowsweet	Spiraea alba
Yellow giant hyssop	Agastache nepetoides
Horsemint/spotted beebalm	Monarda punctata
Missouri ironweed	Vernonia missurica
Pale Indian plantain	Cacalia atriplicifolia
Boneset	Eupatorium perfoliatum
Blue lobelia	Lobelia siphilitica
Pale-leaved sunflower	Helianthus strumosus
Riddell's goldenrod	Solidago riddellii
New England aster	Aster novae-angliae
Smooth star	Aster laevis

* Source: See Reference #1.