

Field Border (Acres) 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 – Resource Concern (SOIL EROSION - Sheet, rill, & wind erosion)
- Protect soil and water quality – Resource Concerns (SOIL QUALITY DEGRADATION – Compaction and WATER QUALITY DEGRADATION – Excess nutrients in surface and ground waters)
- Provide wildlife food and cover and pollinator or other beneficial organism habitat – Resource Concern (INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation)
- Increase carbon storage – Resource Concern (SOIL QUALITY DEGRADATION –Organic matter depletion)
- Improve air quality – Resource Concern (AIR QUALITY IMPACTS - Emissions of Particulate Matter - PM - and PM Precursors)

CONDITIONS WHERE PRACTICE APPLIES

This practice is applied around the **inside** 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.

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. No plant listed by the state as a noxious or invasive species shall be established in the field border.

Seedbed preparation, seeding rates, dates, depths, fertility requirements, and planting methods will follow seeding recommendations in MSU-Extension Bulletin 2107, Seeding Practices for Michigan Crops, or other MSE Extension bulletins approved for Michigan use.

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.

Eliminate ephemeral gullies and rills present in the planned border area during seedbed preparation. Shape all rills and ephemeral gullies located immediately up slope to ensure sheet flow across the planned border width.

Additional Criteria to Reduce Erosion from Wind and Water

To reduce soil erosion, install field borders in conjunction with other practices, 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. Soil erosion 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 during the critical erosion period(s).

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

Maintain grass or forb height to a minimum of one foot during the critical erosion period.

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.

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 vegetation 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 border widths to comply with all applicable state and local regulations regarding manure and chemical applications. Design field border width, species, etc. according to the procedure in the Filter Strip (393) Standard regarding manure and chemical application to meet the applicable State of Michigan Right to Farm GAAMPS.

Reducing Soil Compaction from Equipment

Parking and Traffic: Field border widths will be designed to meet equipment needs such as turning, loading or unloading during grain harvest, etc. A minimum width of 30 feet is required for this purpose.

Select legume varieties 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 Provide Wildlife Food and Cover and Pollinator or other Beneficial Organism Habitat

Select species that provide adequate habitat, food source and/or cover for the wildlife species of interest. The minimum width for this purpose shall be 30 feet. Schedule mowing, harvest, weed control, and other management activities within the field border to accommodate reproduction and other life cycle requirements of target wildlife species. Vehicle traffic should be avoided in the field border area.

For beneficial organisms (e.g. predatory and parasitic insects, spiders, insectivorous birds and bats, raptors, and terrestrial rodent predators) that prey on target pests, select diverse plant species that meet dietary, nesting and cover requirements for the intended species, at least during the critical period for control of target pests, and ideally year round.

The optimal vegetative successional state shall be maintained to accommodate target wildlife species' requirements.

When wildlife and/or pollinators are a concern, a lower percent groundcover than would be needed if protecting soil and water quality was the only goal is acceptable as long as the soil resource concern is also adequately addressed (i.e. no excessive soil

loss). This may be achieved by simply increasing the field border width.

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.

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 (i.e. a positive soil condition index will be achieved). [Use the Michigan NRCS RUSLE 2 model to calculate a positive soil conditioning index.](#)

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

Do not burn field border.

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 mitigate the generation of airborne particulates.

Establish species resistant to damage from equipment traffic.

Establish species resistant to damage from equipment traffic.

CONSIDERATIONS

Design border widths to comply with all applicable State and local regulations regarding manure and chemical application setbacks.

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 and other airborne particulate trapping efficiency of the field border. Refer to NRCS Michigan Filter Strip (393) Standard or Vegetative Barrier (601) 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.

When enhancement of wildlife habitat is a purpose, plant species diversity should be encouraged. Plantings that result in multiple structural levels of vegetation will maximize wildlife use.

Include native plants that provide diverse pollen and nectar sources to encourage local pollinator populations. Where possible, reestablish the native plant community for the site.

Organic producers may have to submit plans and specifications to their certifying agent for approval prior to installation, as part of the organic producer's Organic System Plan.

Use State-approved plant species that provide wildlife food and cover for the target wildlife species and/or pollinator habitat.

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

Prescribed burning, prescribed grazing, strip disking, or selective herbicide applications are management tools that can be used to maintain suitable habitat for specifically desired wildlife species, provided that such management activities do not compromise the purpose(s) of the practice.

To minimize wildlife mortality and habitat degradation, turn or drive machinery on field borders only when necessary, at low speed, and with implements fully raised. If extensive turning/traffic will be necessary on the field border during the nesting season, mortality may be reduced by mowing it early to reduce its attractiveness as a nesting site, if alternative nesting cover is available.

Overseed the field border with forbs for increased plant diversity, soil quality, pollinators, and wildlife benefits.

Water bars or berms may be needed to breakup or redirect concentrated water flow within the field borders.

In selecting plant species, among other items, consider the plant's tolerance to:

- Sediment deposition
- Pesticides
- 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 in 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 **native** perennial plant species as opposed to annual species provides a longer period of resource protection.

Additional Considerations for Organic Systems

Where genetic drift is a concern, use buffer vegetation to create a barrier between the pollen producing crop and the crop that must be protected or increase the distance between them so that cross-pollination is less likely.

Organic producers may have to submit plans and specifications to their certifying agent for approval prior to installation, as part of the organic producer's Organic System Plan.

PLANS AND SPECIFICATIONS

Applicable to All

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(s). Record practice specifications on NRCS Michigan Field Border (386)

Conservation Practice Job Sheet. Include all of the following components in the specification:

- 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. Paraplowing) 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.
 - When managing for wildlife, maintenance activities that result in disturbance of vegetation should not be conducted during the primary nesting, fawning and calving seasons. Activities should be timed to allow for regrowth before the growing season ends whenever possible.
 - Periodic removal of some products such as medicinal herbs, nuts, and fruits is permitted provided the conservation purpose is not compromised by the loss of vegetation or harvesting disturbance.
 - Avoid vehicle traffic when soil moisture conditions are saturated.
 - Maintain records of the field border maintenance as needed by the land user.
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)
 5. Baumgartner, J ET. Al. Biodiversity Conservation – An Organic Farmer’s Guide. 2005. Wild Farm Alliance.
<http://www.wildfarmalliance.org>
 6. K. G. Renard, 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.
 7. OMRI Organic Seeds Database. Organic Materials Review Institute.
<http://www.omri.org/seeds>
 8. Revised Universal Soil Loss Equation Version 2 (RUSLE2) website (checked May 2007):
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm.
 9. Sources of Organic and Untreated Non-GMO Seeds. National Sustainable Agriculture Information Service.
<http://attra.ncat.org/sorg/seeds.html>
 10. USDA-AMS National Organic Program National List of Allowed and Prohibited Substances.
<http://www.ams.usda.gov/AMSV1.0/nop>
 11. USDA-AMS National Organic Program Regulations, 7 CFR Part 205.
<http://www.ams.usda.gov/AMSV1.0/nop>

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.

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.) <u>1/</u>	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
<u>2/</u> Wildflowers	Native Forbs	8-11	<u>3/</u> 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	<i>Zizia aurea</i>
Canada anemone	<i>Anemone canadensis</i>
Penstemon/hairy beardtongue	<i>Penstemon hirsutus</i>
Angelica	<i>Angelica atropurpurea</i>
Cow parsnip	<i>Heracleum maximum</i>
Sand coreopsis/lanceleaf tickseed	<i>Coreopsis lanceolata</i>
Shrubby cinquefoil	<i>Potentilla fruticosa</i>
Indian hemp	<i>Apocynum cannabinum</i>
Late figwort	<i>Scrophularia marilandica</i>
Swamp milkweed	<i>Asclepias incarnata</i>
Culver's root	<i>Veronicastrum virginicum</i>
Yellow coneflower	<i>Ratibida pinnata</i>
Nodding Wild Onion	<i>Allium cernuum</i>
Meadowsweet	<i>Spiraea alba</i>
Yellow giant hyssop	<i>Agastache nepetoides</i>
Horsemint/spotted beebalm	<i>Monarda punctata</i>
Missouri ironweed	<i>Vernonia missurica</i>
Pale Indian plantain	<i>Cacalia atriplicifolia</i>
Boneset	<i>Eupatorium perfoliatum</i>
Blue lobelia	<i>Lobelia siphilitica</i>
Pale-leaved sunflower	<i>Helianthus strumosus</i>
Riddell's goldenrod	<i>Solidago riddellii</i>
New England aster	<i>Aster novae-angliae</i>
Smooth star	<i>Aster laevis</i>

* Source: See Reference #1.