PASTURE AND HAY PLANTING

CONSERVATION DESIGN SHEET - Pasture Series 512

Natural Resources Conservation Service

Michigan

WHAT IS PASTURE AND HAY PLANTING?

Planting native or introduced forage species such as grasses, legumes, or other herbaceous plants.

PURPOSES

Planting various forages for their health, vigor, and persistence as a feed source for domestic livestock is the main purpose of this conservation practice. Reducing soil erosion may also be a purpose for a pasture and hay planting.

WHERE THIS PRACTICE APPLIES

This practice may be applied on lands where forage production and/or conservation is needed and feasible.

CONSIDERATIONS

Forage species and their cultivars should be selected based on the purpose of the manager for the forage. Harvest method will influence forage species selection. Different species selection may be required for grazing livestock in the former continuous grazing system compared to a

managed or prescribed grazing system. Species selection for forages harvested mechanically for hay may differ in species to those harvested for silage to reach maximum feed potential.

Climatic conditions and soil conditions should be considered when choosing the forage species. Monoculture pasture and hay plantings are discouraged. Keep mixtures simple with one or two legumes, along with one or two grasses. When using mixed species, make sure the species are as compatible as possible in palatability, maturity, season to be grazed, long or short lived perennial, etc. (see table). NRCS can give technical assistance on plant species selection.

When seeding legumes, ensure the proper inoculant is used at planting time for each specific legume seed used. It is best to inoculate just prior to planting. Birdsfoot Trefoil may need double the recommended inoculant.

Consider potential herbicide carryover when selecting the species of the pasture and hay planting. Legumes are extremely sensitive to triazine herbicide carryover which could be released by liming low pH soils. Delay seeding legumes for 1 year if more than 1 pound active ingredient triazine was used the previous year.

Warm season grasses can be a good and valuable choice for pasture and hay in Michigan. NRCS is awaiting Michigan State University (MSU) results of research trials, as well as NRCS Plant Materials Center trials for recommendations. Some of the needed Michigan data would be mechanical harvest management for feed quality, grazing harvest management, and seed rates and planting dates as it relates to the feed and grazing management. Details of warm season grass management for wildlife purposes can be found in NRCS conservation practice standards Conservation Cover (327) and Upland Wildlife Habitat Management (645).

NEW SEEDING ESTABLISHMENT

Take soil samples according to Michigan State University Extension (MSUE) recommended methods. For best results, soil samples should not be taken when the soil is saturated with water, frozen, or very dry. Lime and fertilize according to MSUE recommendations based on an MSUE approved lab's soil test results. Lime should be used at a rate that would bring the soil pH up to at least 6.0.

New seedings can be established conventionally with tillage, by no-till method, frost seeding, or dormant seeding. Frost seeding and dormant seeding will only be successful with a few forage species. Red Clover and Birdsfoot Trefoil are the most successful species at frost seeding. See NRCS conservation practice standard Pasture and Hay Planting (512) for details.

IMPROVING AN EXISTING STAND

Using a pasture and hay planting to improve an existing stand can only be successful if the existing stand is properly prepared. The existing stand should be weakened in the fall or early winter by close overgrazing, close hay harvesting, selective herbicides, or tight mowing with very light tillage. This allows a late fall or early spring improvement seeding. This can be done with a dormant, frost, broadcast, or no-till method of seeding.

OPERATION, MANAGEMENT, AND MAINTENANCE

Spring Seedings

The pasture and hay planting should be mowed, clipped, or sprayed for weed or

insect control as scouting and pest management methods dictate. It is important, however, to not mow shorter than 4 inches at any time during the seeding year. Weeds should be mowed before they reach 1 foot tall, but not more often than once per month. The goal is to avoid shading of the new seedlings by weeds or undesirable plants and to prevent weeds from producing viable seed.

Late Summer or Early Fall Seedings

Do not mow this seeding until the following year. When mowing is done the following year, do not mow closer than 4 inches. Use pesticides the following year only if needed to control serious weed or insect infestations. Weeds and insects may be controlled with proper harvest management by mechanical methods or by "top grazing" with livestock. See the NRCS conservation practice standard Forage Harvest Management (511) for details. By using this standard as well as Prescribed Grazing (528A), Nutrient Management (590), and Pest Management (595), pasture and hay fields should remain productive for long periods of time.

TABLE 1 - Recommended Seeding Rates for FROST Seeding Into an Existing Grass or Legume Sod ****

Species	Rate (lb./acre)		Expected Established Plants *
	Seeded Alone	As Part of Seed Mixture	Plants per Square Foot
Red Clover	6 - 12 ***	4 - 8	2 - 5
Birdsfoot Trefoil	6 - 8 ***	3 - 4	6 - 9 (in 2nd year)
Ladino Clover	2 - 3	1 - 2	1 - 2
Alsike Clover	2 - 4	1 - 2	2 - 3
Perennial Ryegrass	6 - 10 **	4 - 6	10 - 12
Orchardgrass	3 - 4	1 - 2	4
Smooth Bromegrass		Not recommended for frost seeding	
Timothy	Not recommended for frost seeding unless certain conditions or soils exist		
	If so, 8 - 10	5 - 7	3 - 4
Reed Canarygrass	Not recommended for frost seeding		

* Expected plants based on "alone" seeding rates.

** Use higher rate in "bare ground" situations and lower rate in existing sods. Only in unique and rare situations should ground be bare in a January through March time period. This should only be done where there is no chance of wind erosion, water erosion, or runoff causing damage to natural resources. If crop residue cover is less than 50 percent, use the bare ground rate.

*** Red Clover and Birdsfoot Trefoil Frost seeded together into existing pasture should have the rate cut to 4 to 8 pounds and 3 to 6 pounds per acre respectively.

**** Frost Seeding is rarely successful in very coarse textured soils such as sands, loamy sands, or very low organic matter sandy loams.

TABLE 2 - Harvest Management - First Year

Forage	First Year Clipping/Grazing Height
Alfalfa	20 inches
Smooth Bromegrass	10 inches
Reed Canarygrass	10 inches
Red Clover	8 inches
Tall Fescue	12 inches
Orchardgrass	10 inches
Timothy	10 inches
Birdsfoot Trefoil	12 inches
Perennial Ryegrass	8 inches

TABLE 3 - Crop Use Information
(E = Excellent; G = Good; F = Fair; P = Poor)

Crop	Annual or Perennial	Pasture (Grazing)				Palatability[1]	Maturity *Early* *Medium* *Late*	Provides *Mid*, *Early*, or *Late* Extended Grazing
		Hay	Silage	Continuous	Prescribed			
LEGUMES								
Alfalfa	Perennial	E	E	P	E	E	E-M	M
Alsike clover	Short-lived perennial	G	G	P	G	E	L	M
Birdsfoot trefoil *	Perennial	G	E	G	G	E	M-L	M
Hairy vetch	Winter annual	Used primarily as a cover crop					E-M	M
Kura clover	Perennial	G	G	E	E	E	M-L	M
Ladino clover	Perennial	F	G	E	E	E	E-L	M
Mammoth red clover	Short-lived perennial	F	G	P	P	G	M-L	M
Medium red clover	Short-lived perennial	G	E	P	G	E	M-L	M
Sweet clover	Biannual	F-P	G	P	F	F	N/A	N/A
GRASSES								
Kentucky bluegrass	Perennial	G	G	E	E	E	E	N/A
Orchardgrass	Perennial	E	G	E	E	F	E-M	M
Perennial ryegrass	Short-lived perennial	E	E	E	G	E	E-M	L
Red top	Perennial	F	F	F	F	F		N/A
Reed canarygrass *	Perennial	E	E	G	E	G	M-L	E & L
Smooth bromegrass	Perennial	E	F	F	E	E	M-L	N/A
Tall fescue 1/	Perennial	G	G	G	G	F-P	M-L	L
Timothy	Perennial	E	E	F	G	E-G	L	N/A
ANNUAL FORAGES								
Chicory	Short-lived perennial	P	P	G	G	G-P	E-M	E & M
Millets	Annual	F	F	F	G	G-F	M	M
Rape	Annual	P	P	F	G	G-F	M	E
SorghumXSudan	Annual	P	G	F	G	G-F	M	M
Sudangrass	Annual	P	F	F	G	G-F	M	M
Turnips	Annual	P	P	G	G	G	L	L & Very L

1/ Palatability will improve with the newer varieties that are disease-free.
* When planting these species, one should use the newest disease-resistant varieties if no other plant species will meet the planting goal.

TABLE 4 - Crop Description, Relative Tolerance of Established Forages to Environmental Hazards, and Ease of Establishment
(E = Excellent; G = Good; F = Fair; P = Poor)

Crop [1]	Cold Frost	Soil Drought	Wet-ness	pH	Acid-ity	Estab-lishment	Growth Habit	Minimum Drainage	Minimum Fertility	Anti-Quality
LEGUMES										
Alfalfa	G	G	P	6.6-	7.2	G-E	T	WD	H	B
Alsike clover	F	P	G	6.0-	6.5	F	M	PD	M	B
Birdsfoot trefoil	G	F	G	6.0-	6.8	P	M-S	SPD	M	T
Hairy vetch	F	F	F	5.8-	6.5	G	VINY	MWD	M	B
Kura clover	E	F	G	5.5-	6.2	P	M-S	SPD	M	B
Ladino clover	F	P	G	6.0-	6.5	G	S	PD	M	B
Mammoth red clover	P	F	F	6.2-	6.8	G	M	SPD	M	B
Medium red clover	G	F	F	6.2	6.8	G-E	M	SPD	M	B
Sweet clover	G	G	P	6.8	7.2	F	T	MWD	M	C
GRASSES										
Kentucky bluegrass	E	P	G	5.8-	6.5	P	S	SPD	M	
Orchardgrass	F	G	F	5.5-	8.2	G	M-T	SPD	M	
Perennial ryegrass [2, 3]	P	P	G	5.0-	8.3	E	M-S	SPD	H	
Red top	E	G	F	5.4-	6.2	F	S	VPD	H	
Reed canarygrass [3]	E	G	E	5.8	8.2	P	T	VPD	M	A
Smooth bromegrass	E	G	F	5.8-	6.5	F	M-T	MWD	H	A
Tall fescue [4]	F	G	G	5.4-	6.2	G	T	SPD	M	ET
Timothy	E	F	E	5.4-	6.2	F	M-T	PD	M	
ANNUAL FORAGES										
Annual ryegrass	P	P	G	5.6-	6.2	E	M-S	SPD	M-H	
Chicory	F	F	F	5.0-	8.3	G	S	MWD	H	G
Millets	P	G	P	6.2-	6.8	G	T	MWD	M-H	
Rape/Kale	E	F	F	5.3	6.8	G	S	MWD	L-M	G
SorghumXSudan	P	E	P	6.0-	6.5	E	T	MWD	M-H	CG
Sudangrass	P	E	P	6.0	6.5	E	T	MWD	M-H	CG
Turnips/Swedes	E	F	F	5.3	6.8	G	S	MWD	L-M	G, P

Growth Habit: T = Tall; M = Moderate; S = Short

Anti-Quality (components that could be present in some varieties):
A = Alkaloids (decrease palatability)
B = Bloat potential
C = Coumarin (hemorrhagic agent, formed during spoilage of hay)
CG = Cyanogenic Glycosides (may form hydrogen cyanide-HCN poisoning; also Prussic Acid Poisoning)
ET = Endophyte Toxicity (reduce blood circulation to appendages "dry gangrene")
G = Glycosides (decrease palatability)
P = Photosensitization (sunburn on animals with light color hair, reduce animal performance)
T = Tannins (decrease palatability)

Footnotes
1 - Select erect varieties for hay and prostate varieties for pasture.
2 - Select the more winter hardy varieties for use in Michigan.
3 - Select the low-alkaloid varieties to improve palatability.
4 - Select the endophyte-free varieties to improve animal performance.

Primary production for legumes is spring, summer, and early fall.
Primary production for cool season grasses is early spring; late fall for short grasses; and spring, early summer, and fall for tall grasses.
Birdsfoot Trefoil and Sweet Clover may spread in certain soils and conditions in Michigan. Mixed stands generally have less insect and disease damage than monoculture stands.
Introduce grazing animals to brassica pastures slowly (over 3 to 4 days). Avoid abrupt changes from dry summer pastures to lush brassica pastures, such as turning hungry animals into brassicas for the first time. Brassica crops should not constitute more than 75 percent of the animal's diet. Supplement with dry hay if continually grazing brassicas or allow grazing animals to access familiar grass pastures while grazing the brassicas.

PASTURE AND HAY PLANTING SPECIFICATIONS 512

Farm _____ **Field(s)** _____ **Tract** _____ **Date** _____

Name _____ **Acres** _____ **Township** _____ **County** _____

Previous Crop _____ **Prior Herbicide** _____ **Assisted By** _____

REQUIREMENTS

Purpose: __ Reduce Erosion; __ Provide Feed for Livestock; __ Improve Livestock Health;

__ Extend Grazing Season; __ Balance Forage When Low; __ Winter Stored Feed Supply;

_____ Other (specify); For Wildlife Food and Cover see standards 327 & 645

Seedbed Preparation Method _____ _____ _____	**Apply Lime, Fertilizer, and/or Manure based on MSUE recommendations from Soil Test:** _____ _____
Planting Method_____	**Weed Control Methods Recommended:** _____

%Purity % Germ. based on seed tag*1* _____ _____	**Soil Loss by RUSLE** **BEFORE** _____ **AFTER** _____	**OPERATION AND MAINTENANCE NEEDED** _____ _____ _____ _____ _____

Field No.	Recommended Plant Species	Recommended Rates - PLS*1*	Bulk Rates Needed*1*	Seeding Depth	Seeding Dates

1 Most certified and licensed Michigan seed companies selling cool season grasses and legumes have documented >95 percent purity and > 95 percent germination for all species sold. In these cases, use their bulk rates as equal to PLS.

TABLE 5 - Seed Mixtures for Pasture and Hay
Seeding Rates of Pure Live Seed Per Acre 1/

Legume Seed (if one legume only use high rate)				Grass Seed (in mixes use lower rate)3/					
Primary Legume		**Secondary Legume**		**Orchard Grass**	**Tall Fescue 2/**	**Smooth Brome grass**	**Reed Canary grass**	**Timothy**	**Kentucky Bluegrass**
Alfalfa	8-10			4-6	6-8	4-6		2-4	
Alfalfa	12-18	(hayland only)							
Alfalfa	6-8	Red Clover	2-4	4-6	6-8	5-7		2-4	
Alfalfa	4-6	Red Clover	2	3					
Alfalfa	6-8	Ladino Clover	1/4	4-6	6-8	5-7		2-4	
Red clover	6-8			4-6	8-10	5-7		2-4	
Red clover	4-6	Ladino Clover	1/4	4-6	8-10	5-7		2-4	
Red clover	6-8				8-10				
Red clover	6-8	Alsike Clover	2	4-6	8-10	5-7	3-5	2-4	
Alsike clover	3-5	Ladino Clover	1/4	4-6	8-10	5-7	3-5	2-4	
Birdsfoot trefoil 5/	5			2-4		4-6	6-8	2-4	2-4
Red Clover	6-10	Ladino Clover	1/2	4-6		4-6		2-4	
Alfalfa 4/	4	Red Clover	2	3					
Birdsfoot Trefoil 5/	3	Alsike Clover	2	4					
One Grass Only3/				16		10	14 6/		

1/ Make sure the minimum adequate drainage and area planting dates for the specific site are correct for the species chosen (Table 4). Most certified and licensed Michigan seed companies selling cool season grasses and legumes have documented > 95 percent purity and > 95 percent germination for all species sold. In these cases, use their bulk rates as equal to PLS.

2/ Endophyte free varieties.

3/ Additional grass seed species may be added to these first choices of grass seed species if determined by the conservation planner. If this is done, use the lower rate of PLS of the additional species but no lower than 50 percent. Perennial Ryegrass takes special management and should be seeded at 15-20 pounds alone or 6 to 8 pounds per acre with 2 compatible legumes.

4/ This is a special mix for droughty, sandy soils. Annual Ryegrass at 2 pounds PLS/acre can be added for quick forage in the seeding year OR Perennial Ryegrass can be added at 2 pounds PLS/acre for increased perennial forage quality.

5/ These mixes can be used on organic soils that are drained.

6/ For non-drained organic soils, use appropriate varieties of Reed Canarygrass with Timothy as a quick germination forage. Only Reed Canarygrass, Tall Fescue, Smooth Bromegrass, and Timothy can take 30 days of spring flooding. New seedings shall not be grazed until at least 30 days after emergence. Birdsfoot Trefoil and Sweet Clover may spread quickly in certain soils and conditions in Michigan.

Mixed stands generally have less insect and disease damage than monoculture stands.