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Improving Forage Productivity on a Shoestring Budget

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Welcome to the MSU Forage Connection

This web site is the homepage for the MSU Forage Research Program and an information hub for forage production and use in Michigan and the Great Lakes region.

Forages are the third most valuable agronomic crop in Michigan, encompassing over 3.5 million acres dedicated to permanent grasslands. In addition to traditional use as livestock feed, forage crops improve soil health via use in crop rotations or as cover crops, are a vital link in preserving water quality, and provide biofuels. Forage crops thus have a direct or indirect connection to many facets of Michigan agriculture and to ecosystem services that affect all residents.


We hope you will enjoy exploring these connections through this website.

Recent Publications

- 2013 Michigan Forage Variety Test Report
- 2014 MSU Weed Control Guide
- Great Lakes Grazing Newsletter, Vol. 3 (Issue 5), Oct. 2014

Helpful Links


- MSUE Ag News
- Michigan Hay Sellers List
- MSU Weeds page
- MSU Soil Fertility page
- MSU Emiroweather
- MSU Soil and Plant Nutrient Testing Lab
- Midwest Cover Crops Council



Will my alfalfa survive the coming winter?

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Step 1

Assessment & Planning


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What do you have to work with?

1. What plant species are already present?
 - Grasses? Legumes? Forbs?
 - Weeds?
2. How are you using the forage?
 - Hay? Haylage? Pasture?
 - All of the above?
 - What species animal?
 - Production class of animal?
 - Yield expectations?
 - Potential income?
3. Site characteristics
 - Soil type and yield potential?
 - Wet? Droughty? Rocky? Slope?
 - Length of growing season?
4. Available resources
 - Equipment - Owned? Leased? Borrowed?
 - Labor?
 - Money?
5. Time frame
 - Can you afford slow progress?
 - Do you need fast return?

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NRCS Pasture Condition Score Sheet

1. Percent desirable plants
2. Green plant cover
3. Plant species diversity
4. Plant residue ground cover
5. Plant vigor
6. Percent legume
7. Uniformity of use
8. Percent livestock concentration areas
9. Soil compaction
10. Erosion

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Step 2


Better management of what you already have

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Better Management Strategy #1
Improve
Soil Health and Fertility


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Don't Guess. Soil Test!

- Soil test gives you a known target for improvement
- Basic soil test cost = \$11 (MSU Soil & Plant Nutrient Lab)
 - pH, P, K, Mg, Ca, and CEC, with recommendations
 - Soil OM for \$5 more
- Get separate soil sample for land units with similar history, use, and land characteristics (such as individual pastures)
- Test forage lands at least every three years

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Soil pH

Target pH

- Grass, 6.0
- Clover & trefoil, 6.5
- Alfalfa, 6.8


Things that cause low soil pH

1. Native soil condition (weathered, glacial soils)
2. Application of N fertilizer
3. Destruction of SOM
4. Erosion of topsoil

Things that can increase soil pH

1. Lime
2. Increased SOM

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Soil nutrients deficient?


Sources of soil nutrients

- Commercial fertilizer (N, P, K, Mg, S, B)
 - 46-0-0 (urea) \$457/ton = 23¢/lb
 - 0-46-0 (TSP) \$400/ton = 20¢/lb P_2O_5
 - 0-0-60 (potash) \$480/ton = 24¢/lb K_2O
- Lime (Mg, Ca)
- Gypsum (Ca, S)
- Compost (all)
- Manure (all)
- Animal feed supplements like grain, hay, minerals (all)

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Better Management Strategy #2 Managed Grazing





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Maximize days on pasture

Stored forage (hay and haylage) is more expensive than pasture

1. Use rotational management for better control of harvest
2. Plant annuals (aka cover crops)
3. Bale grazing
4. Graze crop residues
5. Stockpiling



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Costs – Fence, water, and TIME

1. Electric fence more affordable than permanent fence
2. Buy a good charger (\$600 and up)
3. Water often the most problematic
4. What is the value of your time?



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Use your livestock to control nutrient return

- Move hay feeding sites around the pasture
- Unroll round bales
- Use portable water and mineral sources
- Use rotational stocking to control where manure is dropped
- Harvest hay on your most fertile land and feed it on your worst land



Manure and OM dispersal after a winter of feeding hay on pasture
(Upper Peninsula Research & Extension Center)

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Stockpiling

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How to Manage a Forage Stockpile

- Set aside pastures to accumulate mass for later grazing
- Stockpiling can be done at any time of year
- How to stockpile grasses for fall/winter use
 - Graze through mid/late July
 - If no legumes in pasture, apply 30-50 lb N/acre
 - Rest pasture for 60+ days while growth accumulates
 - Resume grazing in October after growth has stopped
 - Use strip grazing to control utilization and reduce waste
- Any forage can be stockpiled, but quality of most declines sharply with duration of stockpiling time
- Some species retain quality better into the winter
 - Tall fescue
 - All brassicas, but especially rape and kale

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Better Management Strategy #3 Weed Control



But wait! Is it a Weed or is it Feed?

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Weed Control Options

1. Cultural methods (everything previously discussed helps maintain a healthy stand that outcompetes weeds)
2. Herbicides (spray, wick, spot treat)
3. Hand removal
4. Mowing
5. Mixed species grazing
6. Overseeding to increase desirable plants


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Step 3

Diversify Your Forage Base

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Perennial Forage Seed Costs


Species	Stand years	lb/A	\$/lb seed	\$/acre	Potential DMY (tons/stand)	Seed cost/ton DMY
Alfalfa	4	12-16	\$3.40 - 7.80	\$41 - 125	10.5	\$4 - 12
Red clover	2	8-12	\$1.76 - 3.82	\$14 - 46	3.0	\$5 - 15
White clover	5	2-4	\$3.92 - 10.75	\$8 - 43	6.0	\$2 - 7
Birdsfoot trefoil	5	4-10	\$4.80 - 6.80	\$19 - 68	14.0	\$2 - 5
Alsike clover	2	4-6	\$2.60 - 3.40	\$11 - 21	2.5	\$5 - 9
Orchardgrass	5	10-15	\$2.00 - 5.20	\$20 - 78	14.7	\$2 - 6
Tall fescue	5	10-15	\$1.52 - \$5.06	\$16 - 51	13.4	\$2 - 4
Festulolium	3	25-35	\$2.16 - 4.40	\$54 - 154	9.0	\$6 - 17
Timothy	5	6-12	\$1.92 - 4.04	\$12 - 49	10.7	\$2 - 5
Smooth brome	10	12-15	\$3.50	\$42 - 52	20.0	\$3 - 4

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Add legumes to thinning grass stands


- N replacement value up to 180 lb/acre with 30% legume
- At 23¢/lb, 180 lb of fixed N is worth \$41.40/acre
- Improved forage distribution across season
- Improved forage nutritive value



White Clover



Birdsfoot trefoil



Red Clover


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Why Use Certified Seed?

1. Improved varieties have known growth traits and genetics!
2. Certified seed production is carefully regulated to prevent genetic drift away from original variety traits
3. What is VNS seed? (“variety not stated” aka “common” aka “Vernal”)
 - Old seed
 - Overstocked seed
 - From certified seed fields more than 5 years old
 - Seed from anyone who felt like harvesting seed
 - Do you feel like gambling?

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Why Use Improved Varieties?

The 1st criteria for choosing forage species and variety is not yield.
It is adaptation to the local growing conditions!
 Well-adapted forages will out-yield and outlive poorly adapted ones.

- Whether overseeding or starting a new stand, choose varieties placing above the average for yield or hardiness in local tests.
- “Local growing conditions” are changing. Use recent test results.
- How much is an extra ton of forage worth?
 - Best alfalfa yields ~1 ton/acre/yr more than Vernal
 - Current alfalfa hay price, \$200 - \$250/ton in Michigan
 - Over 4-yr stand life, the better variety yields 4 tons/acre more
 - The added yield is worth \$800 – 1000 over 4 yr stand life


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Why Use Treated Seed?


1. Coatings may include:
 - Lime and hydration agents
 - Micronutrients
 - Rhizobial bacteria (legumes)
 - Fungicides
2. Legume inoculants (Rhizobial bacteria)
 - Bagged alfalfa/clover inoculant costs ~13-30 cents per pound
1. Coated seed is planted at the same lb/acre as uncoated seed

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Frost Seeding

- Renovation method that uses frost action to bury broadcast seeds (broadcast seeder cost \$40-400)
- Success requires:
 - 1) Freezing temperature at night with daytime thaw
 - 2) Moist soil that forms “honeycomb” ice crystals at surface
 - Sandy or dry soils not suitable
 - Less effective when snow melt is late
 - 3) Good spring soil moisture to allow seedlings to compete
 - 4) Control of spring forage “flush” to prevent shading of seedlings
 - Better success in pastures than hayfields



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Plant at the right time

Avoid frostseeding onto deep snow

Ideal timing - Frostseed frozen bare ground just before surface begins thawing in daytime

If drilling, go as early as you can get on the ground





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Fields for frostseeding or early drilling are best prepared in the fall

- Soil to seed contact is essential
- Need some exposed soil
- Overgraze or mow short
- Chain drag or light disk to disturb soil

These fields are suitable for frostseeding

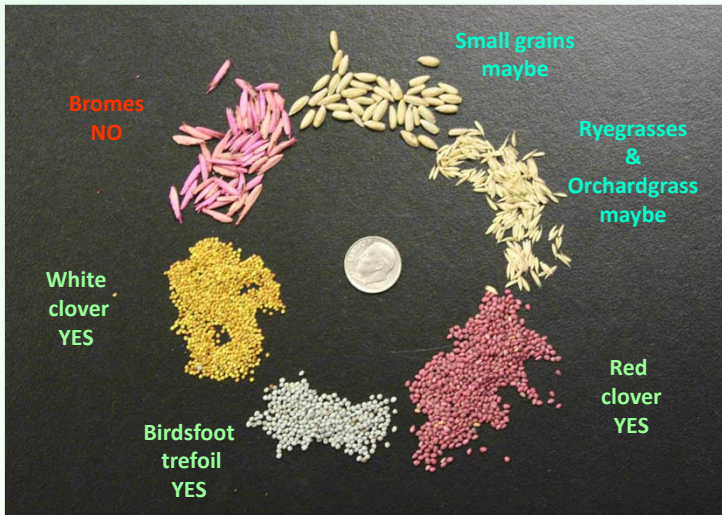
This one is suitable for early season drilling, but not frostseeding

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Use appropriate species for frost-seeding

Best frost-seeding candidates have small-to-medium-sized, slick seeds




Species	Suitability
Bromes	NO
White clover	YES
Birdsfoot trefoil	YES
Red clover	YES
Small grains	maybe
Ryegrasses & Orchardgrass	maybe

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Tread-in Seeding

- Broadcast seed onto site with reduced residue, any time of year with good soil moisture
- High stocking density, short time
- Stock density needs to be high enough that the entire site will be trampled within 2-3 days.
- Hoof action will create soil-seed contact.
- Do not use on very muddy sites because seed will be pushed too deep & soil will compact.



Orchardgrass stand established by tread-in method in silvopasture

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Reduced Tillage Seeding

No-till seeding


1. requires control of existing forage during establishment
2. herbicide burn before seeding (glyphosate or paraquat)
3. heavy grazing before and controlled grazing after seeding
4. Pasture drills can often be rented

Disrupt the soil surface to suppress sod and improve soil seed contact

1. light disking
 1. Goal: scratch soil and expose ~25%
 2. Best done before seeding
 3. Plant using no-till drill or broadcast
 4. Can repeat disking after broadcast seeding
2. heavy harrowing
3. heavy hoof traffic



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Great Lakes Forage & Grazing Conference

March 12, 2015
East Lansing, Michigan
“Improving Soil with Forages”
Keynote Speaker: Doug Peterson, NRCS

Other speakers:
Dr. Lisa Tiemann
Ben Bartlett
Dr. Kim Cassida
Jerry Lindquist
Phil Kaatz

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Questions?



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