

# Improving Pastures with No-Till Methods

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# Playing 20 questions...

- What are your goals?
- What is the site like?
- How are you going to use this?
- How do you harvest forages?
- What species are you feeding?
- What are your future plans?
- What equipment is available?





## ***The role of plant diversity:***

- **Greater likelihood of something green and growing more days of the year**
- **Interlaying of different leaf types**
- **More solar energy captured more days of the year**
- **More diversity, more resilience**



## Enhancing Thinning Hayfields or Pasture

Its good to know and correct the underlying problem:

- Low fertility and soil pH?
- Soil compaction issues?
- Over grazing or too low of mowing height?
- Too frequent of mowing and harvesting?
- A combination of factors?

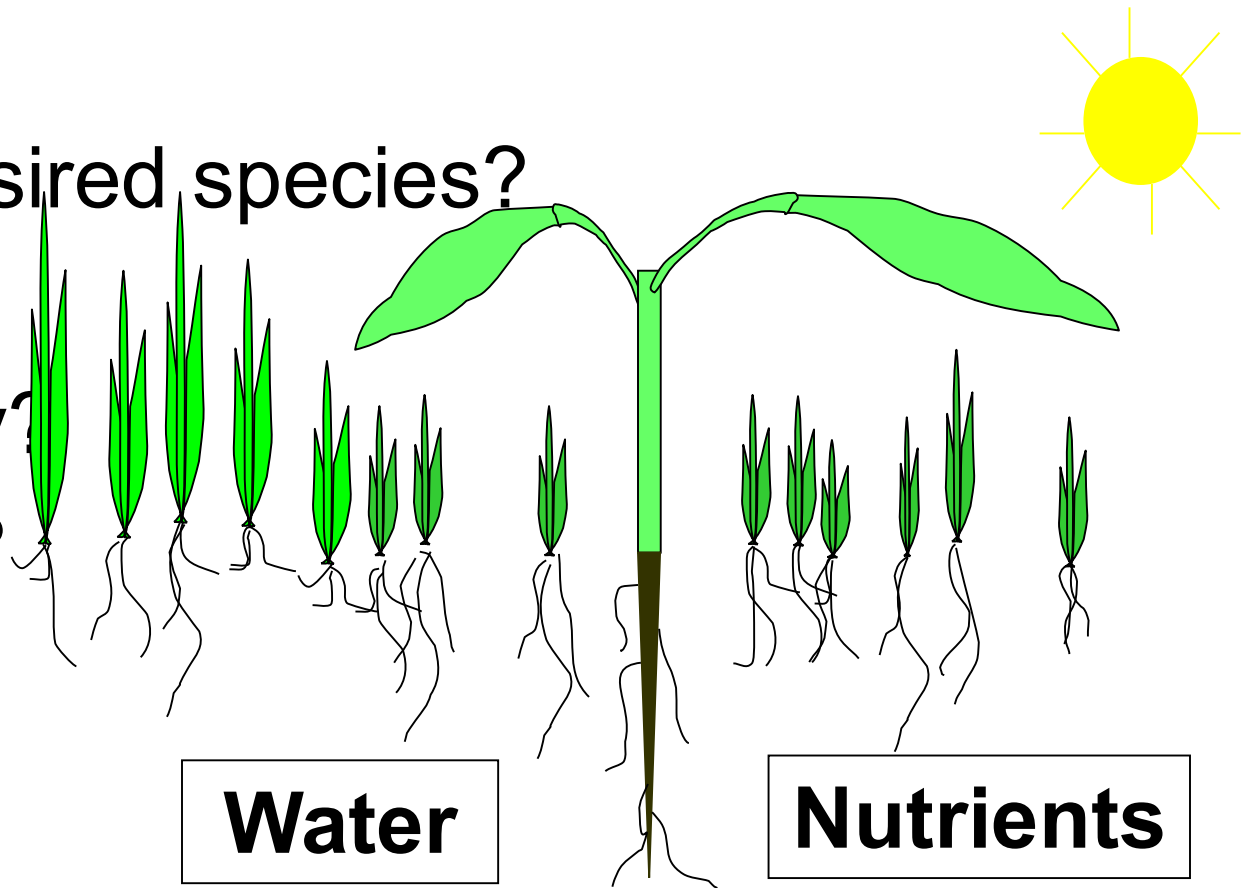
Credit Sid  
Bosworth, UVM

# Soil Compaction



## Which weeds are problems?

- Poisonous?
- Suppress desired species?
- Lower yield?
- Lower quality?
- Unpalatable?



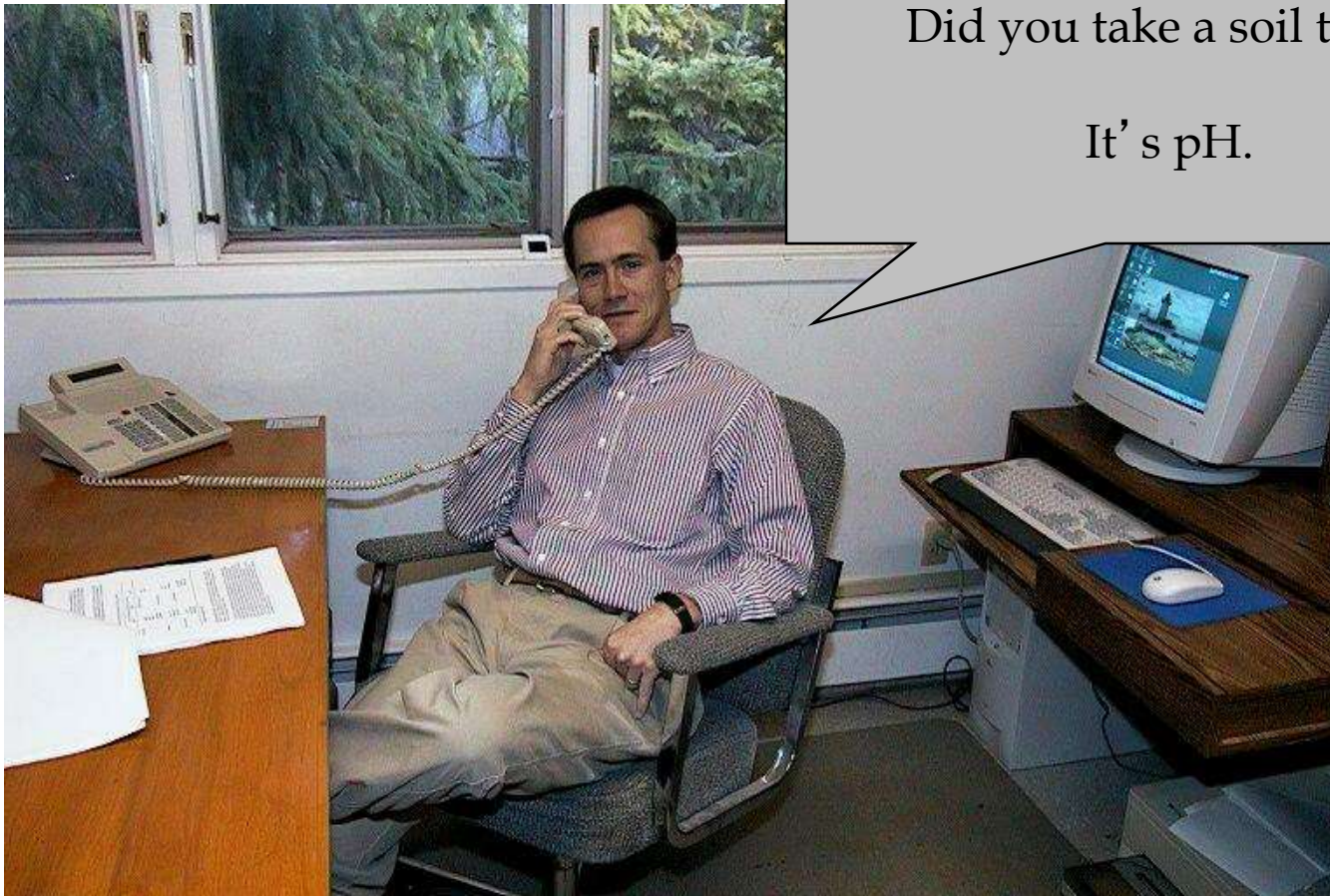
# Can't Do Without This:

- 10 - 15 cores/area, mix in bucket



**Healthy soils....Healthy plants....Healthy animals!**

# Look for the Obvious





# Soil fertility and pH

## Summary of UVM Soil Tests for Hay and Pasture in Vermont

- ~1/3 were significantly acidic
  - Reduced N fixation
  - Aluminum toxicity
- ~1/3 were low in potassium
  - Important for winter hardiness
  - Pest/disease resistance
- More than 1/4 were actually LOW in phosphorus
  - Reduced yield
- Some had all of the above!

Source: Dan Hudson





# When is the best time to apply lime? Anytime!



## Timing:

- Fall
- Spring
- Summer

**Maine  
Commercial  
Applicators**

# Surface applied lime

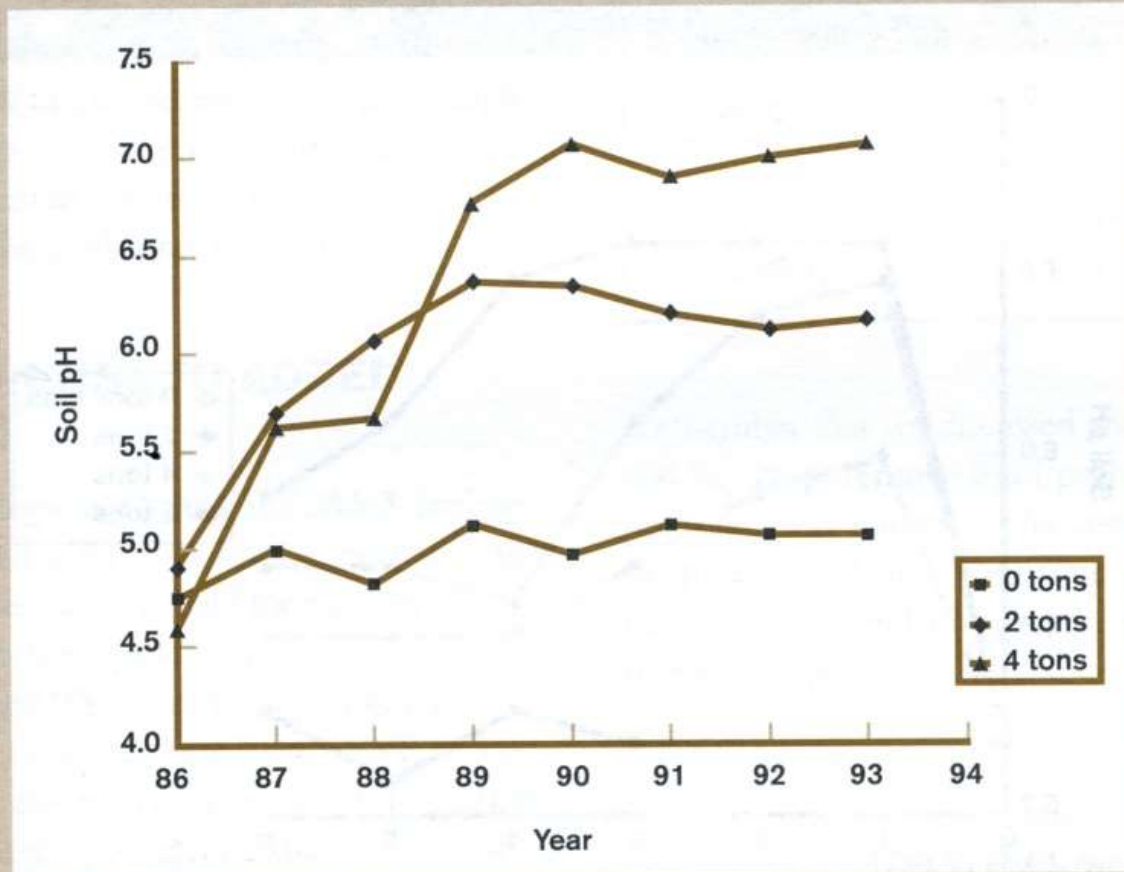


Figure 3-12. When lime is surface-applied the change in soil pH is relatively slow in the top 2 inches of the soil, but the change is relatively long lasting. Two tons of lime were applied in 1986 to the 2- and 4-ton treatments. An additional 2 tons were applied to the 4-ton treatment in 1988.

# Seeding new forage species...

## Basic rules

- 1) Make sure soil fertility is appropriate for what you want to grow
- 2) Seed at the time of year when the species you desire will grow the best (perennial cool season forages...spring or late summer)
- 3) Sow and correct depths and establish good soil to seed contact
- 4) Minimize competition from other plant species (weeds or current forages)



# Improving pastures through management

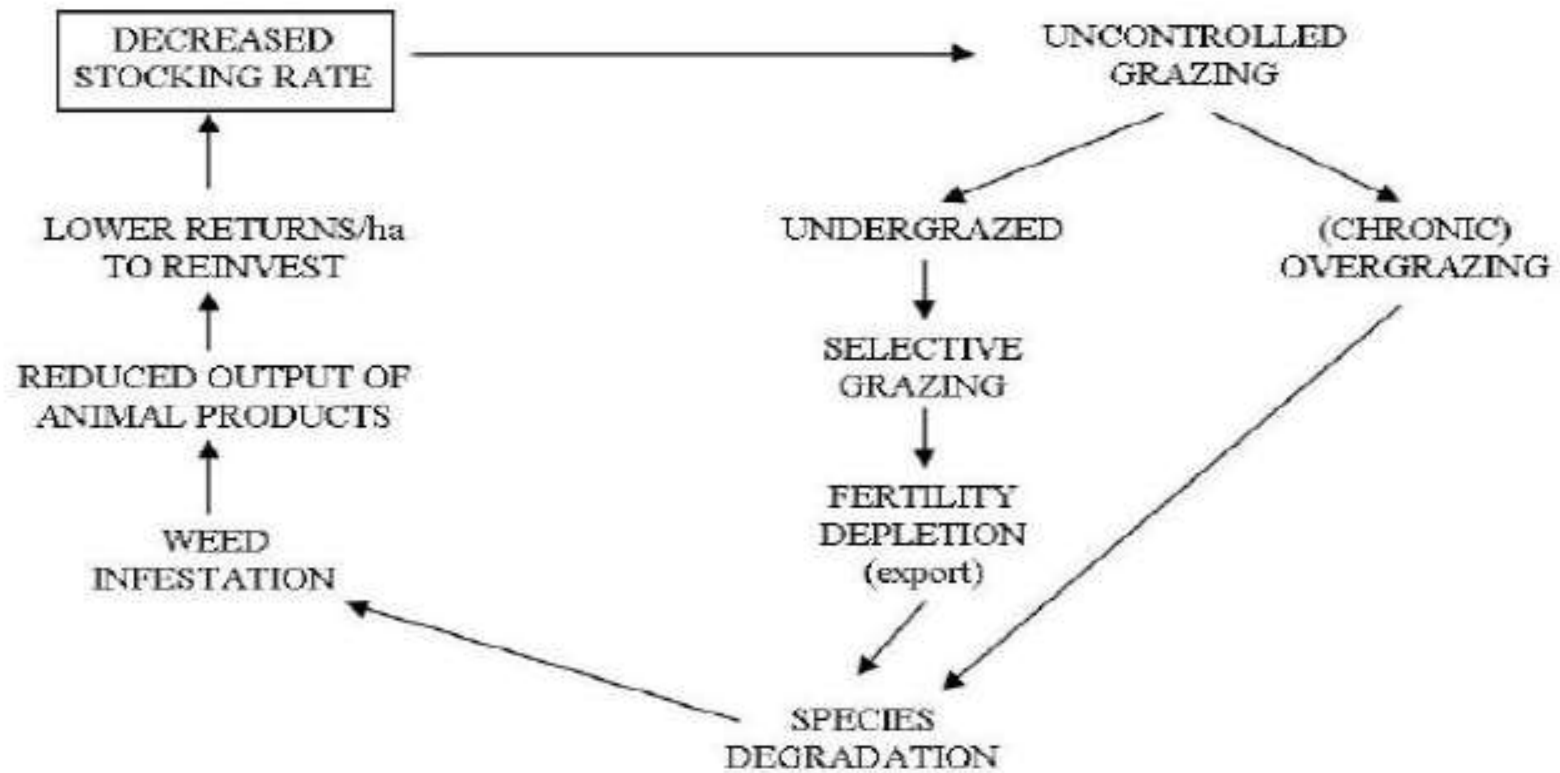
## Crashing Pasture Syndrome



- Poor yield
- Low quality
- Weedy

Is it over grazing or under grazing?

## CYCLE OF POVERTY

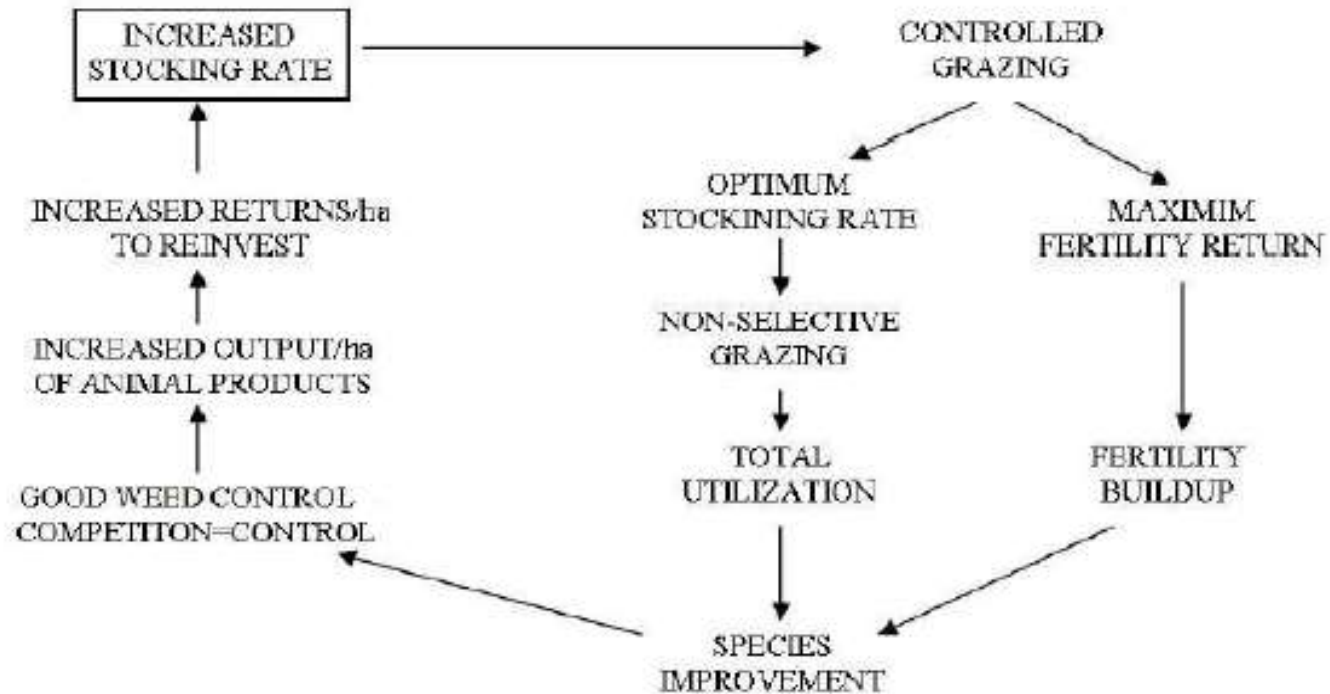


*Figure 1.5 How uncontrolled grazing contributes to the "Cycle of Poverty".*

*Adapted from Thomas and Goit 1986*



## CYCLE OF PLENTY



*Figure 1.6 How controlled grazing contributes to the "Cycle of Plenty".*

*Adapted from Thomas and Goit 1986*

# Intense rotation - little chance of selection



*Intensively*  
grazed by  
sheep, for 2  
days

# Frost Seeding...low tech wonder or wishful thinking...

- Good soil contact
  - Minimize thatch
  - Better heaving with clay
- Sufficient moisture
- Good fertility
- Limited competition



Photo: Dan Hudson, UVM Extension  
Agronomator Blog March 19, 2013

# Estimating Legume Content



11% legume,  
89% grass



25% legume,  
75% grass



46% legume, 41%  
grass, 13% weeds

Source: Rayburn, Edward B., and James T. Green. 2014. Visual reference guide for estimating legume content in pastures. *Forage and Grazinglands* 12(1)

# Frost seeding works best when..

- Bare soil is present..ie little or no thatch
- Larger seeds work better, so legumes have a better chance of success than grasses
- Usually use cheap seed
- Competition during establishment can be managed—either mowing or grazing
- Can alter species composition in a pasture setting

## Using Animals to seed pastures

- Many principles the same as with frost seeding
- Use managed grazing as a technique to work seed into ground
- Controlling vegetation is important.
- Can revitalize “waste” areas, winter yards, etc.
- Use to introduce season extending crops such as brassica sps.

# Hoof-n-tooth reseeding



Picture from Hay  
and Forage Grower

# Using No-till to Establish Pasture Grasses and Forages





# Increased Usage of No Till

## Benefits of No-Till:

- Soil quality benefits
  - Increased organic matter
  - Reduces risk of soil erosion and runoff
  - More stable soil aggregates
  - Increase in earthworms and other soil microbes
  - Increased carbon sequestration
- Soil moisture conservation
- Reduced field time and fuel

# Basics of no-till drills

- Heavy machinery
  - 300-600 lbs/ft of width
- slit/close/press wheel
- 4-6-8 inch spacing--double drill?
- Too dry--depth
- Too wet--slit may not close
  - "want to see some seeds on the ground"

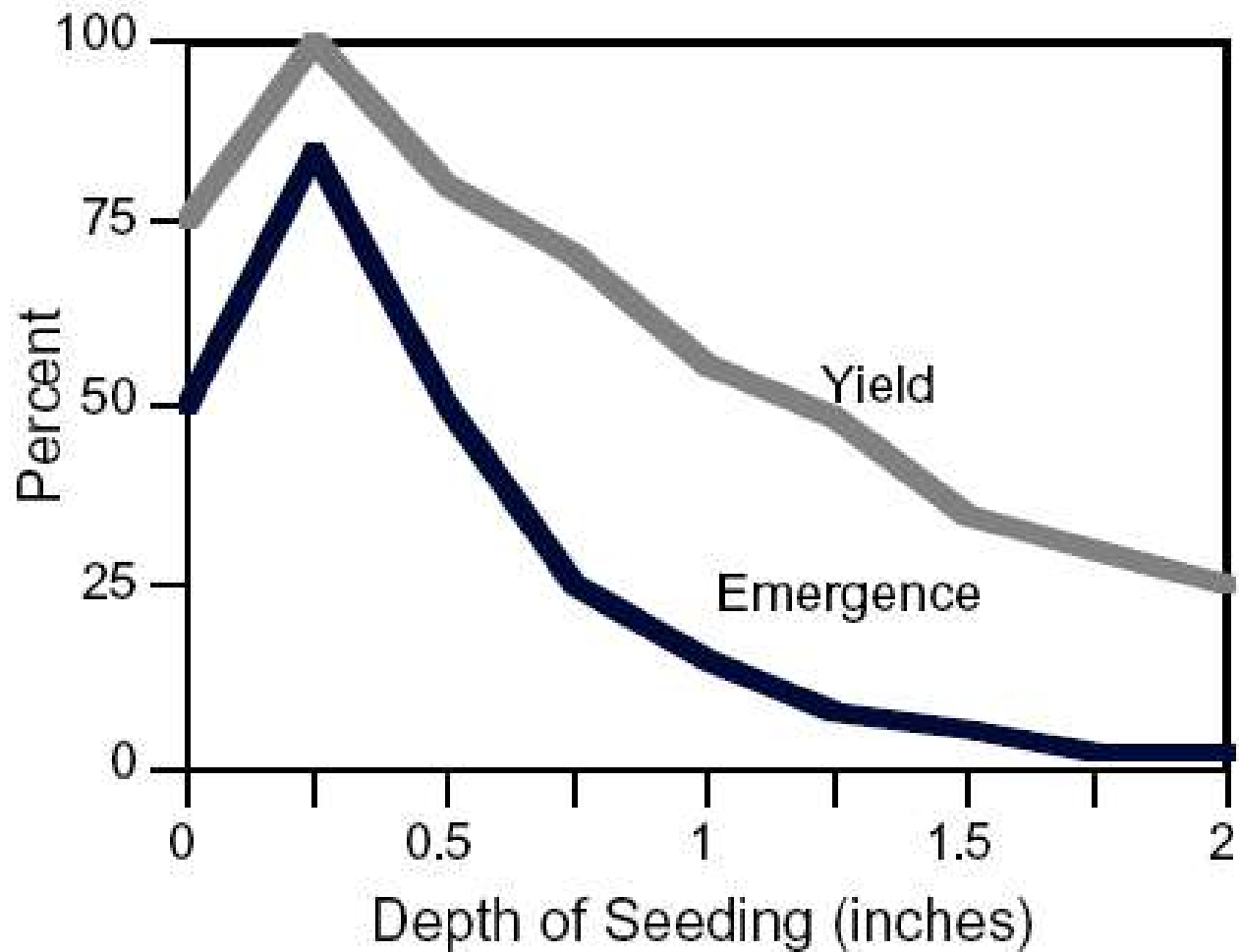


# Using No-till to Establish Pasture Grasses and Forages

## Considerations and Issues:

- Soil fertility and pH
- Pre-seeding vegetation management
- Seeding date
- Seed depth control
- Seed quality
- Seed-to-soil contact
- Post germination vegetation control
- Insect pests
- Field smoothness





*Effect of seeding depth on birdsfoot trefoil emergence and yield. (Source: Cornell Univ. Agric. Exp. Stn. Memoir 261)*

# Using No-till to Establish Pasture Grasses and Forages

## Enhancing Thinning Hayfields or Pasture

- Forage species tolerant of shade and good seedling vigor
- Need good seed-soil contact
- Soil moisture is critical
- Existing grasses and weeds compete for light



# Using No-till to Establish Pasture Grasses and Forages

## Enhancing Thinning Hayfields or Pasture

When interseeding with either grasses or legumes, it is best to select species which have some tolerance to shading\*:

- Red clover
- Ladino clover
- Italian ryegrass/festulolium
- Orchardgrass
- Meadow fescue

\* Other species can be successful but need heavier suppression of existing sod

<b>Seeding Rates and Mixtures to Improve Existing Hay and Pasture Stands by Drilling</b>	
<b>Mixed Hay</b>	
<b>Plant Species and Mixtures</b>	<b>lb/acre</b>
Orchardgrass	6-10
Red Clover	3-4
-----	
Tall Fescue	5-10
Red Clover	6-8
-----	
Timothy	4-8
Red Clover	6-8
-----	
Alfalfa into Grass Sod	10-15
-----	
Red Clover into Grass Sod	6-10
<b>Pasture</b>	
<b>Plant Species and Mixtures</b>	<b>lb/acre</b>
Orchardgrass	6-10
Red Clover	4-6
-----	
Ladino Clover	1-2
Tall Fescue	5-10
Red Clover	4-6
-----	
Ladino Clover	1-2
-----	
Alfalfa into Grass Sod	10-15
-----	
Red Clover into Grass Sod	6-10



An aerial photograph of a field showing rows of young plants in reddish-brown soil. The plants are arranged in straight, parallel lines, and the soil between the rows is uneven and appears to have some debris or roots exposed. A black text box is overlaid on the left side of the image.

**Seeding depth is critical**

**Firm seedbed**

**Soil moisture**

**Weed competition**





Pictures courtesy of  
Kate Parsons

















# Enhancing Thinning Hayfields or Pasture

Influence of sod suppression with glyphosate (0.55 lb a.i./A) on establishment of legumes in grass pasture in western Minnesota (averaged over 2 years, two sampling dates and four no-till planting methods) (Cuomo et al., 2001).

	<b>Sod suppression</b>	<b>No suppression</b>
	<b>Percent stand</b>	
Alfalfa	52	4
Birdsfoot trefoil	33	0
Kura clover	25	1
Red clover	42	2
LSD (0.05)	3.6	

Leep, Richard et. al. 2003, Extension Bulletin E-2880, Michigan State Un.

# Enhancing Thinning Hayfields or Pasture

## Suppressing Existing Vegetation



- Herbicide options
- Close, frequent mowing
- Heavy grazing (hoof and tooth method)



# No-Till Established Rye in Sod Without Herbicide

Pictures taken Oct 12,  
2017



Plowed and tilled



# No-Till Established Alfalfa After Corn

Picture taken July 9,  
2015



Credit: Rico Balzano, UVM  
Extension



**No-Till Established Alfalfa with Barley After Rye**

**Picture taken July 1, 2015**

**Credit: Rico Balzano, UVM Extension**

# No-Till Failure of Switchgrass Seeding



Soil disturbance opens up  
the weed seedbank

Witchgrass dominating



# When Are Weeds a Problem?



Photo: Leslie J. Mehrhoff,  
University of Connecticut,  
Bugwood.org

- Non-forage species have value, may not affect yield
- Need to take when weeds affect pasture productivity
  - Poisonous species
  - Low palatability
  - Aggressive growth

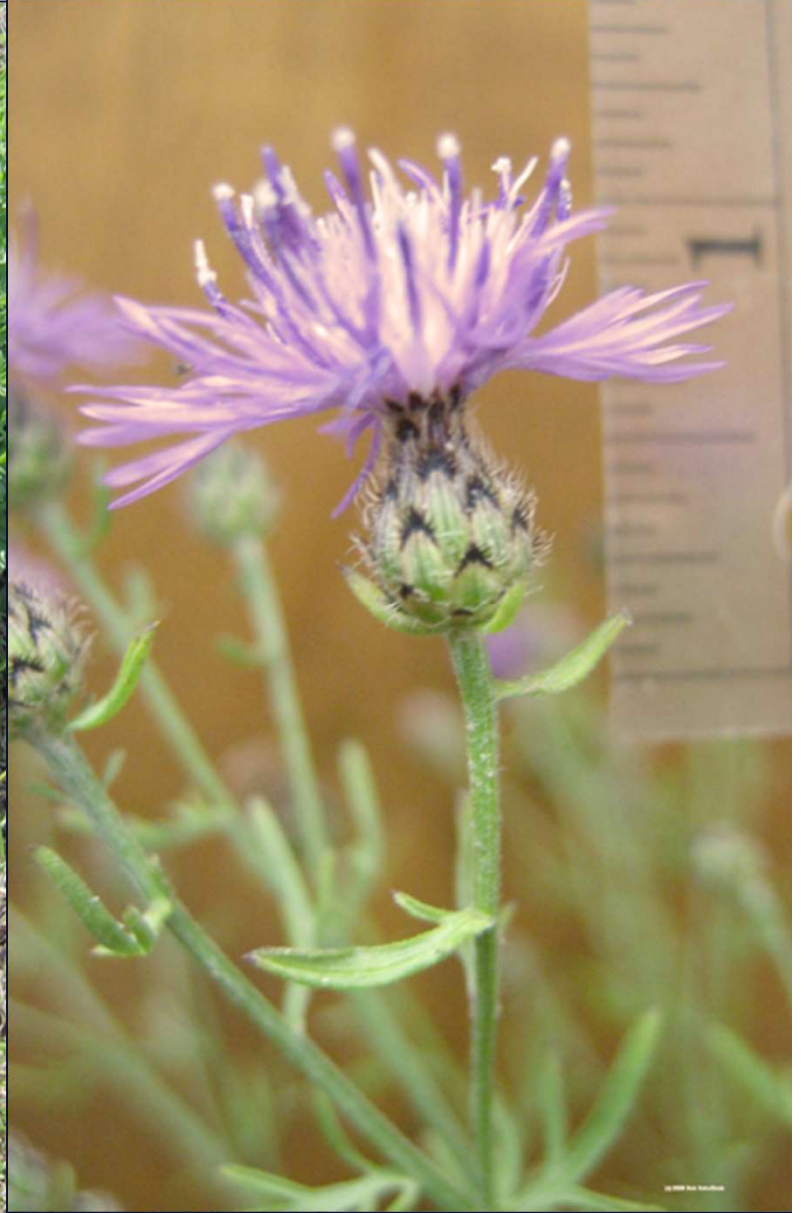
Table 1. The most problem weeds in Vermont based on a 2010 survey of 49 farms.

<u>Weed Species</u>	<u>Weeds Ranked As A Farm's Top Five Weeds</u>					<u>Overall Ranking</u>	<u>Weighted Ranking</u> %
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>		
	<i>Number of Responses</i>						
Bedstraw, smooth	16	5	6	2	2	1	19.2%
Milkweed, common	5	7	9	4	5	2	14.4%
Canada thistle	3	8	2	3	2	3	9.4%
Goldenrod	3	3	4	7	1	4	8.4%
Bull thistle	5	0	7	1	0	5	7.4%
Burdock	3	3	2	2	3	6	6.2%
Buttercup	1	6	1	3	2	7	6.2%
Horsenettle	3	3	1	1	1	8	5.1%
Curly dock	1	4	0	2	0	9	3.9%
Wild carrot	2	1	2	1	0	10	3.4%
Knappweed, spotted	3	1	1	0	0	11	3.4%
Plantains	1	1	1	1	2	12	2.5%
Wild chervil	1	1	1	0	2	13	2.2%
Dandelion	1	1	0	0	1	14	1.5%
Pokeweed	0	1	0	1	2	15	1.2%
Cinquefoil species	0	0	1	2	1	16	1.2%
Spurge, leafy	1	0	0	1	0	17	1.1%
Wild parsnip	0	0	1	1	0	18	0.8%
Nightshade, eastern black	0	0	0	1	3	19	0.8%
Dogbane, hemp	0	1	0	0	0	20	0.6%
Chicory	0	0	1	0	0	21	0.5%
White campion	0	0	0	1	0	22	0.3%
Yellow rattle	0	0	0	1	0	23	0.3%

## Where are you now?



- Pasture stand
- Weed types
- Weed distribution, especially . . .
  - Field edges, wet/rocky areas, slopes
  - Around waterers, under trees, walkways
- Management options and cost



Images: [extension.missouri.edu](http://extension.missouri.edu)

Smooth Bedstraw<sup>VT1</sup>  
(*Galium mollugo* L.)

- Perennial
- Invasive and opportunistic
  - Now also seen in better-managed hayfields
- Competitive, usually not grazed



## IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

- Carefully read the section “**Restrictions in Hay or Manure Use .**”
- It is mandatory to follow the “**Use Precautions and Restrictions**” section of this label.
- Manure and urine from animals consuming grass or hay treated with this product may contain enough aminopyralid to cause injury to sensitive broadleaf plants.
- Hay can only be used on the farm or ranch where product is applied unless allowed by supplemental labeling.
- Consult with a Dow AgroSciences representative if you do not understand the “Use Precautions and Restrictions”. **Call [1-(800) 263-1196] Customer Information Group.**

## Forage and Manure Management

