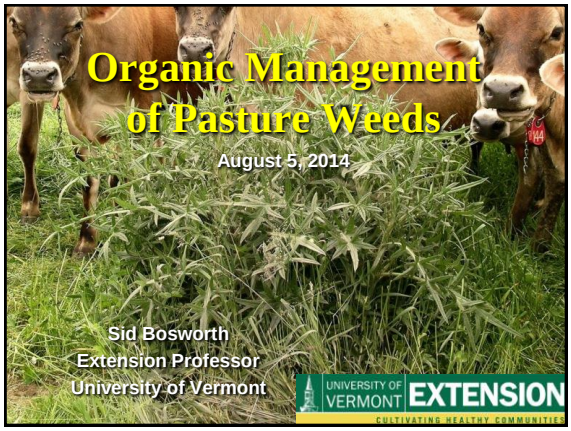


Organic Pasture Weed Management

Outline for Webinar

- Introduction
- Prevention Strategies
- Control Strategies
- Final Thoughts

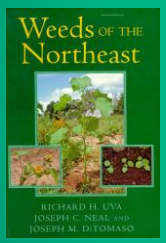
Organic Pasture Weed Management

Organic Pasture Weed Management

What do you need to know about your weeds when it comes to management:

- **Life cycle**
- **Propagation**
- **Competitiveness**
- **Tolerance to mowing**
- **Forage Quality**
- **Palatability**
- **Toxicity**

Weeds of the Northeast



Softcover: ≅ $30.00

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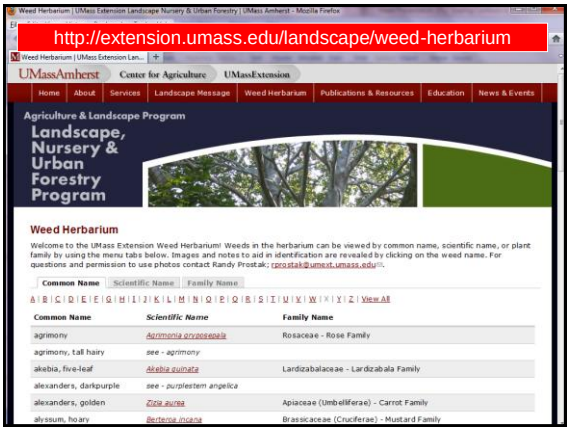


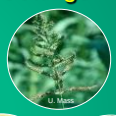
Past Webinar on Pasture Weeds

http://www.extension.org/pages/25242/webinars-by-eorganic#.U9oKoGP3V0J

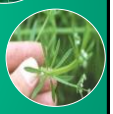
Organic Pasture Weed Management

Weed Problems in Pasture Settings

Weeds due to sudden changes
- Tillage and establishment
- Extreme weather event

Weeds due to a slow response to inadequate management/soil conditions
- Scrub encroachment
- Unpalatable herbaceous or grassy weeds

Introduction of exotic species
- Wind, flooding
- Feed, hay
- Birds, purchased livestock


Organic Pasture Weed Management

Methods of Weed Management

- Prevention verses Control
- Cultural Weed Management
- Mechanical Control/Management
- Biological Control/Management
- Organic Chemical Opportunities

Cultural Weed Management

The best weed control in pasture is from competition by a strong stand of forage

Weed Prevention Practices

Cultural Management of Weeds

- Preventative approach
  - Grazing management
  - Soil pH and fertility
  - Species/variety selection and overseeding

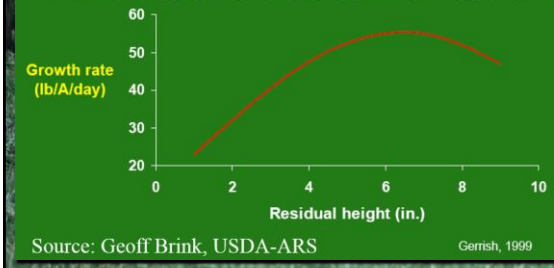
CULTURAL WEED MANAGEMENT

Graze to the Optimum Residual Height

CULTURAL WEED MANAGEMENT

Graze to the Optimum Residual Height

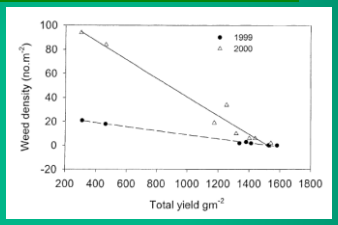
Residual height affects pasture growth rate



Source: Geoff Brink, USDA-ARS Gerrish, 1999

Weed Prevention

Maintain over 1300 lbs dry matter /acre

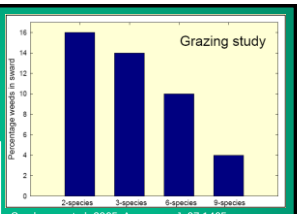


"Overall, the present results suggest that maintaining productive pasture communities over 150 gm^{-2} of aboveground biomass and an evenly distributed array of forage species may effectively reduce weed invasion. Increasing forage species diversity could be a potentially useful cultural method for controlling weeds in pasture ecosystems."

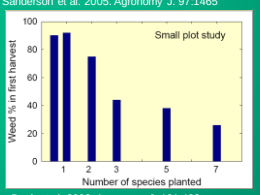
B.F. Tracy, M.A. Sanderson / Agriculture, Ecosystems and Environment 102 (2004) 175–183

Weed Prevention

Pasture Plant Species Diversity Can Help Reduce Weeds



Sanderson et al. 2005. Agronomy J. 97:1465



Deak et al. 2009. Agronomy J. 101:408

Cultural Weed Management

Soil pH and Fertility

- The addition of lime and fertilizer may help prevent weeds by improving pasture growth, density and competitiveness.
- Adding fertilizer to poor, weedy pastures without first controlling the weeds can often "feed" the weeds.
- It pays to soil test

Animal Diversity And Weed Management

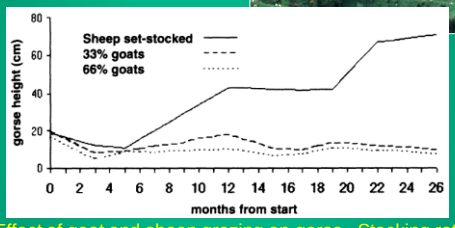
Multi-Livestock Species Grazing

As a general principle, using only one animal specie under the same continuous management can eventually result in undesirable plant species in the system.

Plant Preference

Cattle	Grasses
Sheep	Forbs
Goats	Browse

Multiple Livestock to Manage Weeds



Effect of goat and sheep grazing on gorse. Stocking rate comparable amongst treatments (9 to 11 stocking units/ha)

Rolston, M. P., M. G. Lambert, and D. A. Clark. 1982. Weed control options in hill country. Proc. New Zealand Grassl. Assoc. 43:196-203.

Weed Prevention Practices

Be on the look out for newly introduced weeds at the field, farm or regional level.

This Canada thistle was introduced to this field via a purchased round bale

Weed Prevention Practices

By the next year…

Eradication is possible for small patches

Weed Prevention Practices

Develop an animal isolation protocol

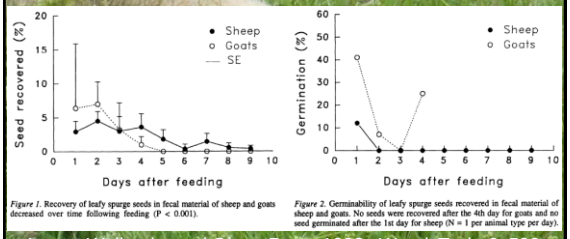


Figure 1. Recovery of leafy spurge seeds in fecal material of sheep and goats decreased over time following feeding ($P < 0.001$).

Figure 2. Germinability of leafy spurge seeds recovered in fecal material of sheep and goats. No seeds were recovered after the 4th day for goats and no seed germinated after the 1st day for sheep ($N = 1$ per animal type per day).

Lacey, Wallander and Olson-Rutz. 1992. Weed Tech. 6: 599

May want to isolate animals for five to six days

Controlling Existing Pasture Weeds

is next but before we go there…

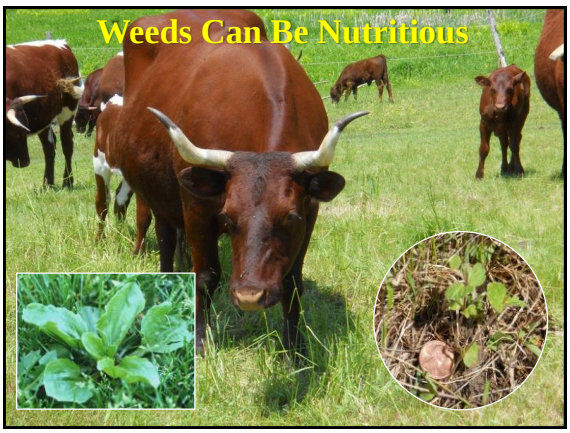
Any Questions or Comments

Controlling Existing Pasture Weeds

Cost/Benefit Analysis

- Costs can be high
  - Mechanical, chemical, extra fencing
  - Reduction in animal gain/sacrifice animals
- Benefits are hard to measure
  - Depends on weed density and forage use
  - Weed intake and nutritional value

Weeds Can Be Nutritious



Weeds Can Be Nutritious

Table 1. Crude protein and in vitro dry-matter digestibility (IVDMD) of selected broadleaf and grassy weeds and three forage species.[a]

Weed	% Crude protein	% IVDMD
Broadleaves		
Henbit (*Lamium amplexicaule*)	20.1–16.2	78–75
Virginia pepperweed (*Lepidium virginicum*)	31.9–17.1	86–63
Curly dock (*Rumex crispus*)	29.9–16.1	73–51
Redroot pigweed (*Amaranthus retroflexus*)	23.9–10.6	73–64
Jimsonweed (*Datura stramonium*)	25.1–16.5	72–59
Grasses		
Cheat (*Bromus secalinus*)	23.4–13.8	81–61
Little barley (*Hordeum pusillum*)	23.6–13.8	82–62
Fall panicum (*Panicum dichotomiflorum*)	19.0–7.2	72–54
Yellow foxtail (*Setaria lutescens*)	17.5–14.3	73–57
Large crabgrass (*Digitaria sanguinalis*)	14.3–6.4	79–63
Forages		
Ladino clover 'Regal'	27.2–23.2	81–83
Tall fescue 'Kentucky 31'	22.1–12.5	78–67
Rye 'Wrens Abruzzi'	27.9–13.4	79–70

[a]Range of values corresponds to samples evaluated from the vegetative stage to fruiting stage (broadleaves or forbs) or heading (grasses). Palatability for these weed species was not determined. (Adapted from Bosworth et al. 1980, 1985)

Controlling Existing Pasture Weeds

But many weeds are unpalatable or toxic

Controlling Existing Pasture Weeds

Complete Renovation and Crop Rotation

For arable land, periodically rotating pastures with annual forage crops may be a viable economic option.

Controlling Existing Pasture Weeds

Complete Renovation and Crop Rotation

This organic dairy in central Vermont rotates with Japanese millet and other annual crops.

Controlling Existing Pasture Weeds

Altering Grazing Regimes

Controlling Existing Pasture Weeds

Altering Grazing Regimes

Relative numbers of wall barley seed heads produced under four grazing regimes over three years. From Hartley et al. (40). (Reproduced by permission of the New Zealand Plant Protection Society).

Grazing regime	Pre-trial	1st year	2nd year	3rd year
Farm practice[a] (heads/m^2)	135	18.7	14.2	22.1
Farm practice[a] (%)	100	100	100	100
Continuous set-stocked[b]	111	24	0.4	0
Medium rotationally grazed[c]	98	41	18	29
Hard/lax rotationally grazed[d]	107	37	1	0.1

[a]Twenty wether (castrated male) sheep/ha, increased by 50% in spring to represent lambing. Sheep set-stocked in spring (August to December) and autumn and rotationally grazed in winter and summer.

[b]Pasture maintained at 2 to 4 cm high.

[c]Pasture grazed for 1 wk out of 3 to reduce pasture cover to 750 kg/ha.

[d]As c, but grazed to 500 kg/ha in spring and autumn and less hard in summer and winter.

Hartley, M. J., G. C. Atkinson, K. H. Bimler, T. K. James, and A. I. Popay. 1978. Control of barley grass by grazing management. Proc. New Zealand Weed Pest Control Soc. 31:198-202.

Using Livestock to Control Weeds

Using Livestock to Control Weeds

Popay, Ian and Roger Field. 1996. Grazing animals as weed control agents. Weed Technology 10: 217- 231.

Potential Benefits

- More effective weed control than herbicides
- Improved pasture quality
- Less effect on non-target weeds
- Some natural fertility return
- Reduced pesticide residues
- 'Environmentally' friendly
- Lower direct costs
- Conversion of weeds to animal product

Potential Costs

- Capital costs of animals
- Extra fencing, water and animal care needs
- Loss of animal condition or liveweight gain
- Reduced value in animal products such as wool
- Damage to non-target species
- Uneven fertility return
- Damage to soil structure
- Spread of weed seeds in feces, on hair or hooves

Using Livestock to Control Weeds

Thistles

Using Livestock to Control Weeds

Thistles

Total flowers/plant in late summer (February; New Zealand) for thistle species grazed by goats and sheep for 2 yr. Adapted from Rolston et al. (98). Table reproduced by permission of the New Zealand Plant Protection Society.

	Flowers/plant		
	Bull thistle	Canada thistle	Marsh thistle
All goats, set stocked	1	0	—
66% goats, 33% sheep, set stocked	0.1	0	3
33% goats, 66% sheep, set stocked	1	0	2
All sheep, set stocked	35	1.1	61
All sheep, mob grazed	8	1.9	31

Rolston, M. P., M. G. Lambert, and D. A. Clark. 1982. Weed control options in hill country. Proc. New Zealand Grassl. Assoc. 43:196-203.

Using Livestock to Control Weeds

Canada Thistle

Hartley, M. J., L. A. Lyttle, and A. I. Popay. 1984. Control of Californian thistle by grazing management. Proc.New Zealand Weed Pest Control Conf. 37:24-27.

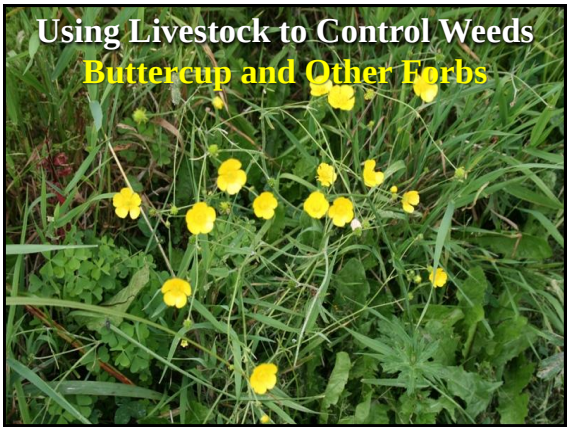
Effect of one year's sheep grazing treatments on populations of Canada thistle shoots. Adapted from Hartley et al. (42). Table reproduced by permission of the New Zealand Plant Protection Society.

Spring treatment	Summer treatment	Thistle shoots in Sept. 1982	Thistle shoots in Sept. 1983
		Nos./m^2	% of those in Sept. 1982
Lax set-stocked	Lax rotationally grazed	3.4	131
	Medium rotationally grazed (MRG)	3.4	70
	MCPB[a] + MRG	2.1	7
	Thistles mown + MRG	1.6	65
Hard set-stocked throughout		2.3	56
Lax rotationally grazed throughout		2.3	169
Medium rotationally grazed throughout		2.3	54
Hard rotationally grazed throughout		1.8	5
Least significant difference (5% level)			42

[a]MCPB [4-(4-chloro-*o*-tolyoxy)butyric acid] applied at 1.5 kg ai/ha in December 1993.

Using Livestock to Control Weeds

Buttercup and Other Forbs



Using Livestock to Control Weeds

Rushes

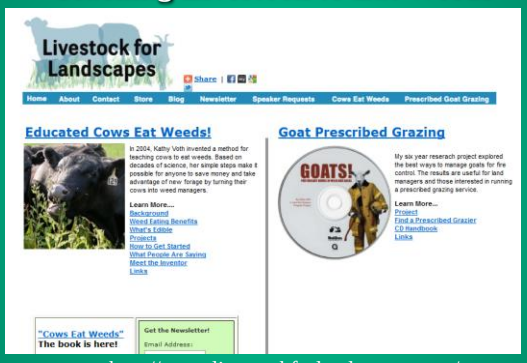
Mean height of rush clumps following grazing by goats and sheep beginning in early 1979. From Rolston et al. (98). Table reproduced by permission of the New Zealand Plant Protection Society.

	Plant height		
	Feb. 1980	July 1980	Feb. 1981
	cm		
All goats, set stocked	40	14	20
66% goats, 33% sheep, set stocked	54	28	38
33% goats, 66% sheep, set stocked	96	84	93
All sheep, set stocked	86	104	105
All sheep, mob grazed	48	43	60

Rolston, M. P., M. G. Lambert, and D. A. Clark. 1982. Weed control options in hill country. Proc. New Zealand Grassl. Assoc. 43:196-203.

Teaching Livestock to Eat Weeds

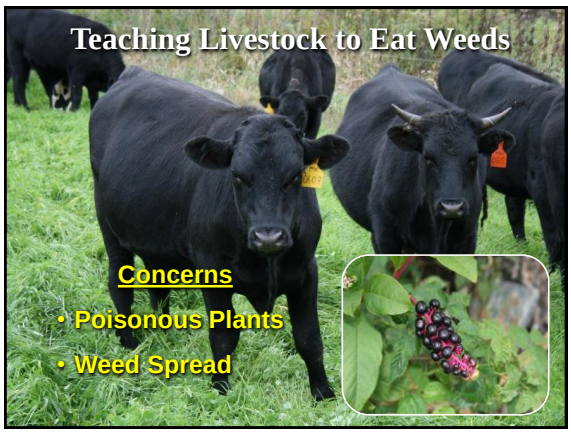
Teaching Livestock to Eat Weeds



http://www.livestockforlandscapes.com/

Teaching Livestock to Eat Weeds

Teaching Livestock to Eat Weeds



Concerns

- Poisonous Plants
- Weed Spread

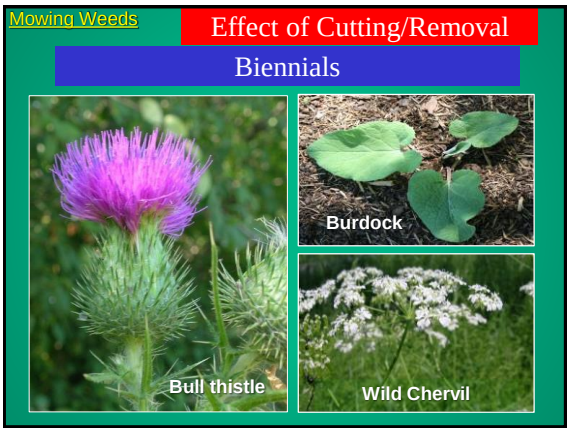
Controlling Existing Pasture Weeds

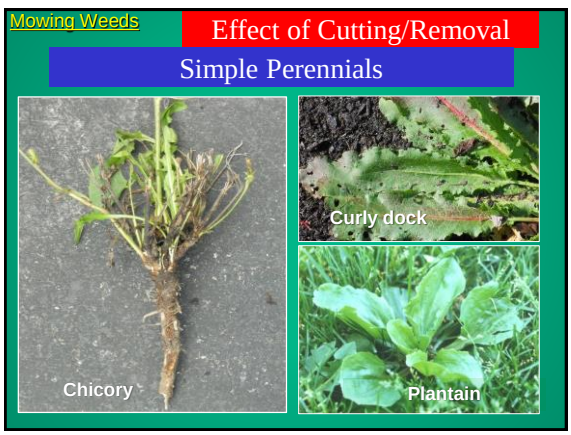
Any Questions or Comments


Weed Control
Mowing/Clipping Weeds
Control:
Preventing seed production
Stressing perennial and biennial plants
Management:
Reducing competition and biomass
http://pineplainstractor.com/index.php?main_page=popup_image&pID=70


Weed Control
Mowing/Clipping Weeds
Preventing seed production


Weed Control
Mowing/Clipping Weeds
Preventing seed production
Bedstraw


Mowing Weeds
Effect of Cutting/Removal
Biennials
Burdock
Bull thistle
Wild Chervil


Mowing Weeds
Effect of Cutting/Removal
Simple Perennials
Curly dock
Chicory
Plantain


Mowing Weeds
Effect of Cutting/Removal
Creeping Perennials

Organic Chemical Weed Control

- Natural or Non-Synthetic chemical products are available
- Check for Organic Approval
- Available natural herbicides have little to no selectivity and they must be applied in relatively large quantities.
- Mostly act as burn down products
- Most effective on young, annual weeds
- Little scientific literature is available on the use and environmental impact of natural products in organic agriculture.

Acetic Acid
Fatty Acids
Essential Oils
Clove Oil
Pine Oil
Lemongrass Oil
Others

Multiple Tactics to Weed Management

"many little hammers"

- **Prevention**
- **Cultural Practices**
- **Mechanical/Cultivation**
- **Biological Control**
- **Chemical**

You must not fight too often with one enemy, or you will teach him all your tricks of war.

- Napoleon I (1769-1821) Napoleon Bonaparte.

Organic Management of Pasture Weeds
Final Thoughts

- The best weed control is prevention using good management practices.
- If problem weeds make up more than 50% of the pasture, it is time to renovate.
- Using grazing alone can reduce but probably not eliminate problem weeds.
- Combining cultural practices with mechanical control can improve results.

Organic Management of Pasture Weeds

Questions?