



# Drought Issues Related to Alfalfa

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# Topics to be covered

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- Stand regrowth in dry parts of the field
- How soil moisture will effect regrowth this spring
- Effect of drought on forage quality.
- Thin alfalfa stands – reseed or interseed?

# How alfalfa grows

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- When alfalfa is cut or enters winter
  - Roots die back
  - Roots must regrow ahead of top growth for high yield
- Good soil moisture needed
  - For root regrowth in March
  - For growth after cutting during first two weeks

# Water Stress

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- Will occur when available soil moisture decreases below 50% of capacity.
- Water stress results in reduced evapotranspiration and usually reduced yield.
- This lost yield can never be "made up" by irrigating more or more rain than necessary following the stress!

# Moisture deficit

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- inhibits cell enlargement
- delays plant maturity (if early)
- decreases plant height
- increases leaf to stem ratio
- increases stem N%, decreases leaf N% (results have varied)
- generally decreases NDF
- effect varies with drought severity/timing



- Drought-stressed alfalfa will bloom right after cutting

# High temperature increases NDF

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Night temperature influence on alfalfa quality

	Night Temp.	ADF %	NDF %
<b>Mountain</b>	<b>45°F</b>	<b>28.2</b>	<b>35.5</b>
<b>Lowland</b>	<b>70°F</b>	<b>31.9</b>	<b>39.1</b>

(Kay and Horrocks, 1993)

# Higher temperature reduces NDF digestibility

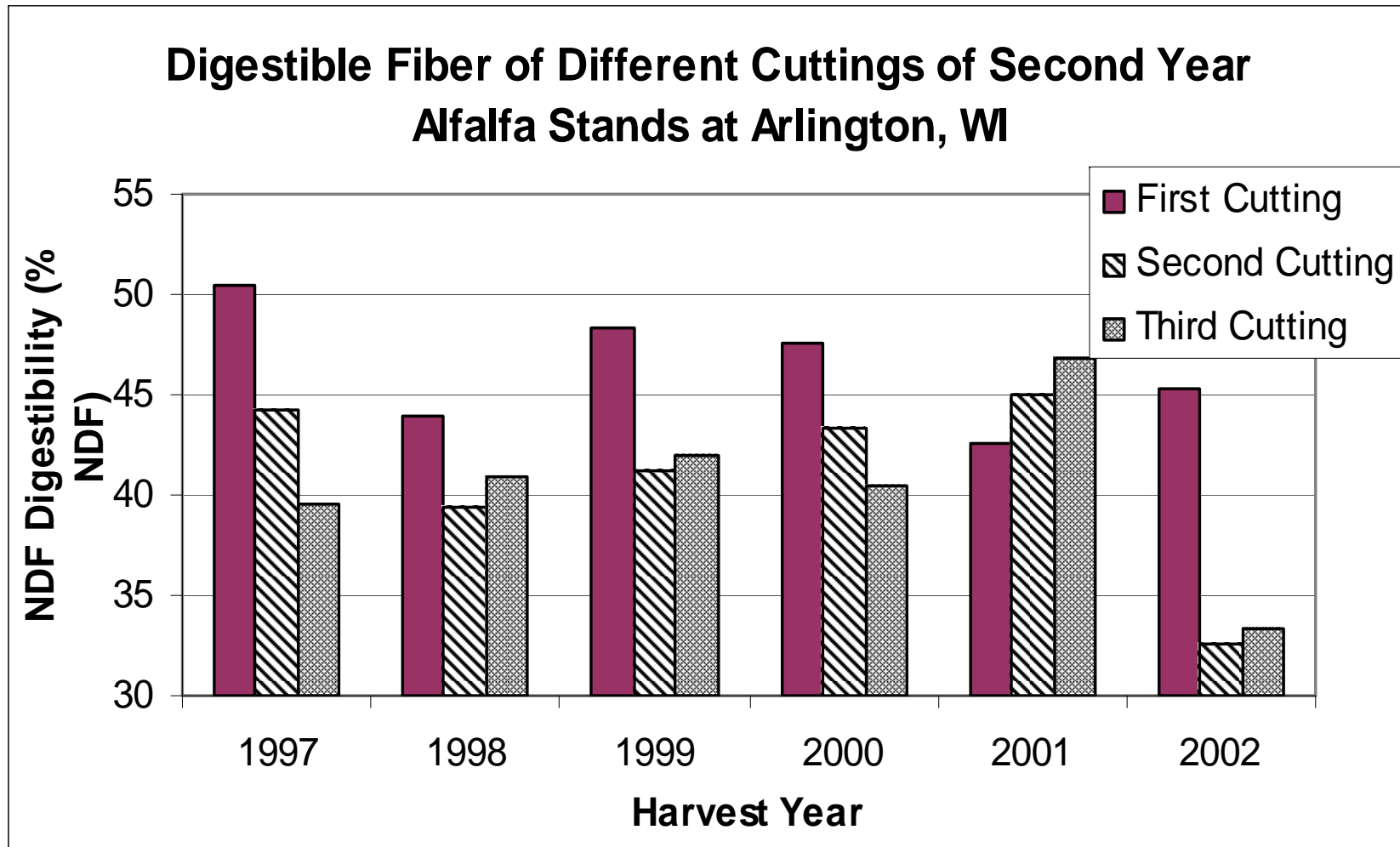
Effect of daily high temperature on chemical and digestibility characteristics of alfalfa

Plant Part	NDF %		NDF digestibility	
	72°F	90°F	72°F	90°F
<b>Leaf</b>	<b>10.1</b>	<b>10.6</b>	<b>42.0</b>	<b>22.2</b>
<b>Stem</b>	<b>42.0</b>	<b>41.9</b>	<b>36.0</b>	<b>29.9</b>

(Wilson, 1991)



# Higher temperature reduces NDF digestibility



# Increasing Temperature of the Growing Environment

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- decreases stem diameter
- accelerates rate of maturity
- increases lignification
- decreases plant height
- decreases leaf to stem ratio
- decreases digestibility

# Alfalfa Water Use

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- Mature, healthy alfalfa with an extensive crown and root system, can better withstand adverse conditions.
- Younger stands have less as well developed crowns and root structures and are more prone to water stress.
- Diseased stands will suffer be more prone to water stress

# Diseased plants suffer more drought stress

Aphanomyces reduces root growth and potential to take up water



Healthy

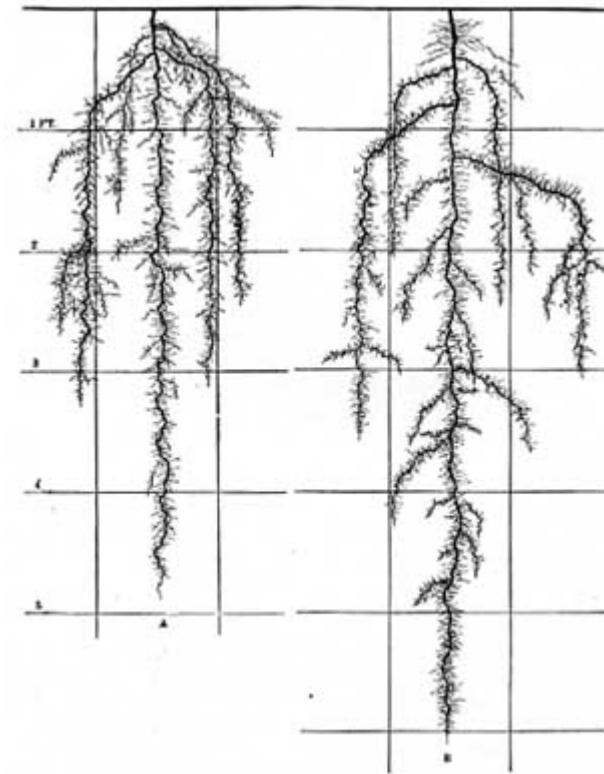
Infected



Drought stress due to Aphanomyces

# New seedlings may be stunted by drought

- Dry land plants (left)
  - Less root depth
  - Less root system
  - Shallow branching
  - Fewer nodules



Dry land

Good moisture

# Effect of Seeding Year Drought on Future Yields

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- 3 years of Alfalfa Variety Trials at Arlington
- 30 to 40 entries per year
- 2011 drought during year

Year planted	2012 Yield (t/a)
2009	8.42
2010	7.63
2011	5.92

2011 seeding yielded 1.6 to 2.4 t/a less than seeding from previous years

# Drought effect on Winter Survival

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- Alfalfa roots store starch for the winter survival and spring growth
- Fully charged crown and roots
  - under normal conditions, survive winter well.
- Plants more stressed in the fall
  - more vulnerable to the environment.

# Frequent cutting effects

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- Frequent cutting at immature stage
  - reduces root diameter of the crown (*29% by two cuttings at early bud against one cutting at full bloom*).
  - reduces stored products in the root and crown, and leaves the plant in a weakened state.
- Each successive premature cutting results in increased detrimental effects.

**For good stand survival,  
let at least one cutting go to 10% bloom**



# Harvesting drought stressed alfalfa

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- If stand is over 10 inches tall and flowering, harvest **if economic** to do so.
  - let the plants approach 100% bloom before harvest
  - mow at normal cutting height;
    - no advantage to raising the cutting height, it will simply reduce harvested yield.

# Harvesting drought stressed alfalfa

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- If stand is 10 inches or shorter and flowering, **do not cut**.
  - Let regrowth come through existing growth.
  - Mowing will not increase regrowth but adds labor and fuel costs and increases wheel traffic damage.
- Scout and control potato leaf hopper, army worm and other insects.

# Harvesting drought stressed alfalfa

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- Drought stressed new seedings
  - Should not be harvested during the season (after first cutting)
  - May be harvested in late August if adequate growth is present to harvest.
  - A late fall cutting may also be taken

# What can you do in Spring 2013?

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- Evaluate alfalfa stands and replant if necessary for top yield
- Plant alfalfa with oat or ryegrass cover crop to increase early season yield
- Prepare to fertilize alfalfa after first cutting.
- Maximize pasture use.
  - Fertilize
  - Allocate forage (small paddocks).

# Poor Alfalfa Stands Seeded in 2012

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- What is a poor stand?
  - Want 20 plts/sq ft
  - Want 55 stems/sq ft



# Poor Alfalfa Stands Seeded in 2012

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## ○ Alternatives to Improve Stand

### Interseeding alfalfa

- ✓ Minimal autotoxicity
- ✓ Competition from existing plants
- ✓ Therefore interseeding will improve stand only slightly



# Poor Alfalfa Stands Seeded in 2012

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## ○ Alternatives to Improve Stand

### Interseeding clover

- ✓ Minimal autotoxicity
- ✓ Get good stand for 2 years
- ✓ Poor drying for hay or haylage



# Poor Alfalfa Stands Seeded in 2012

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## ○ Alternatives to Improve Stand

### Interseeding grass

- ✓ Minimal autotoxicity
- ✓ Orchardgrass, tall fescue slow to establish – provide yield next year





# Poor Alfalfa Stands Seeded in 2012

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## ○ Alternatives to Improve Stand

### Disc and reseed alfalfa

- 1) No autotoxicity
- 2) No competition
- 3) Can use cover crop to increase early season yield



# Summary

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- Last year's drought weakened stands for winter survival
- Diseased stands weaker than non-diseased
- Evaluate stands early (both hay fields and pasture )
  - 2013 new alfalfa seedings can be reseeded
  - Older alfalfa stands may need to be turned over if less than 55/stems ft<sup>2</sup>
- Fertilize alfalfa with potassium and sulfur
- Maximize pasture use (fertilize, subdivide)