

Grasses in the Northeast

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Northeast Issues:

- 1. Species/Cultivar selection**
- 2. Grass in mixture with alfalfa**
- 3. Grass biomass**

**Focus exclusively on perennial grasses
for harvest & storage.**

The Primary Livestock Industry is Dairy

For dairy Cattle we need

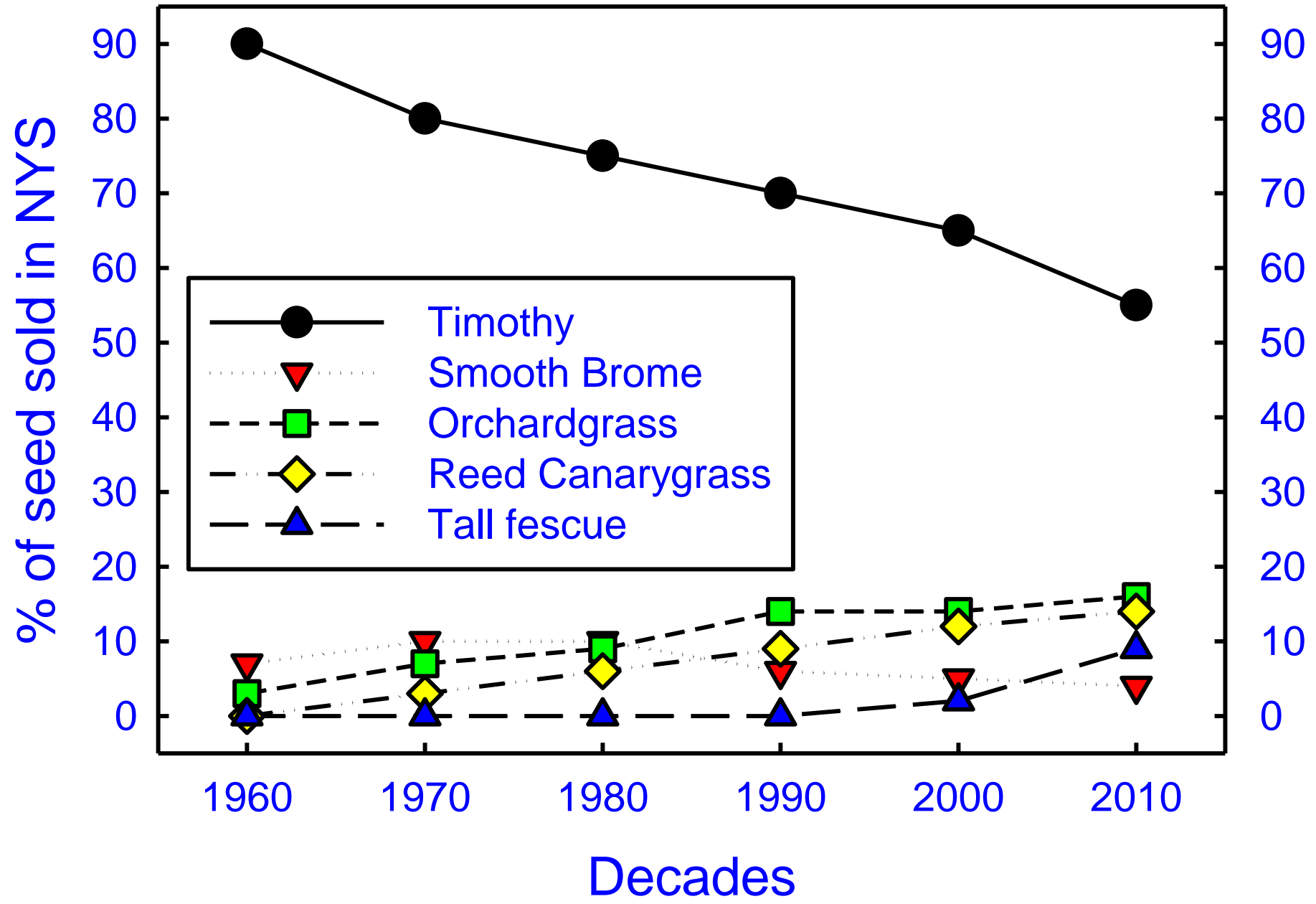
Optimum Quality

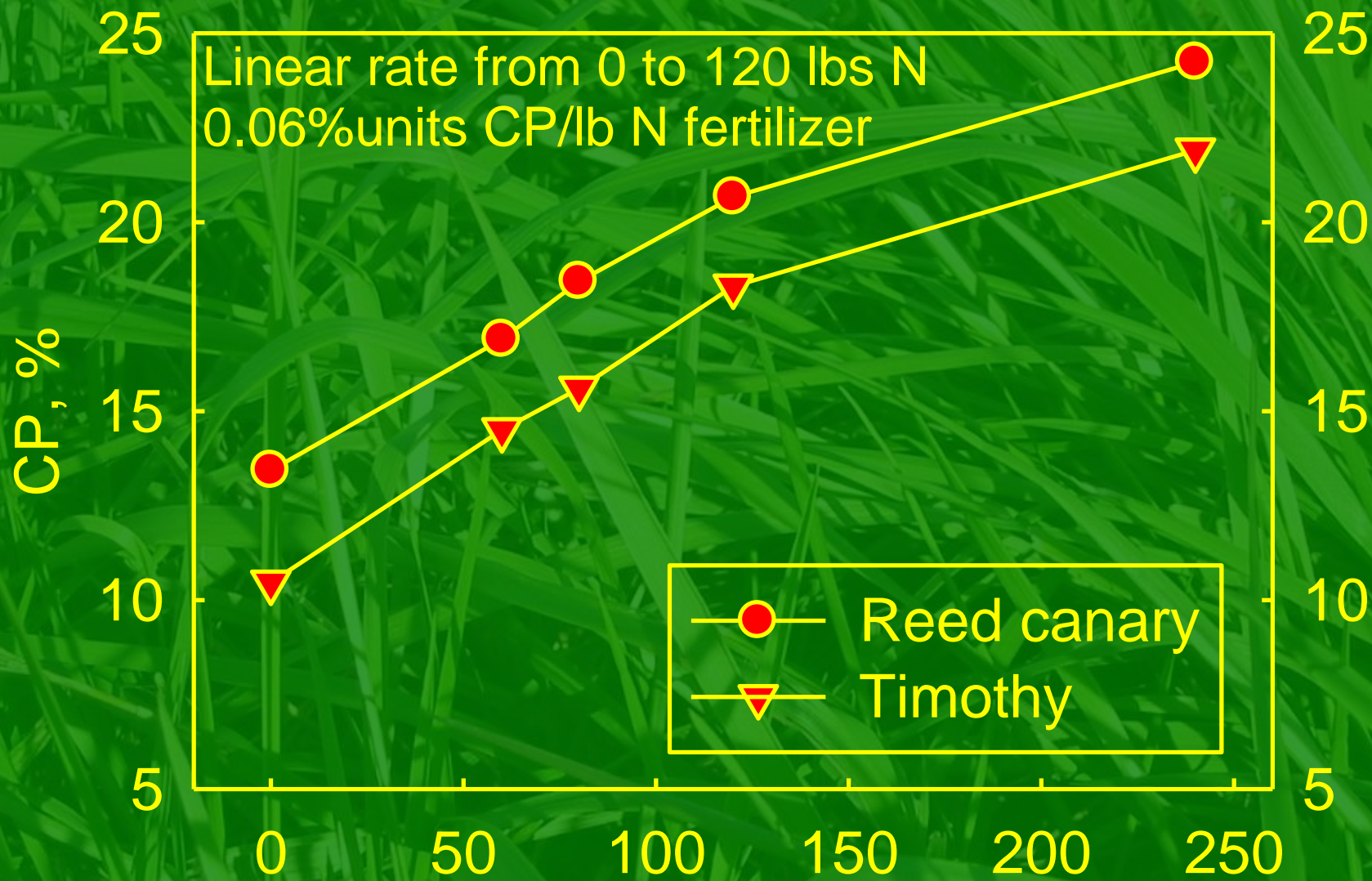
and we want

Maximum Yield

Much of the Northeast
has soil drainage issues.

Grass seed sold in NY (estimate)





Spring N application, lbs actual N/acre

Reed canary is 2.5% units higher in CP.

(Average of 3 sites, 3 years, 4 reps)

Species Selection Program

A database of potential yields was created for each forage species under each soil type in NY and PA.

Species selection is based on primarily on soil drainage, but also is use-specific.

www.forages.org (NY)

www.forages.psu.edu (PA)

What about Cultivar selection?
for Yield (& Persistence)

Harvest management for Optimum Quality

**What is our Harvest Date Target
for lactating dairy cow forage?**

There is no optimum for:
IVTD, NDFD, RFQ, Milk/acre etc.
to identify a target harvest date.

We define Target Date for harvest based on **NDF.**

There is an optimum forage NDF for a given class of livestock.

Optimum is **50-55% NDF for grass for lactating dairy cattle.**

Cultivar Evaluation

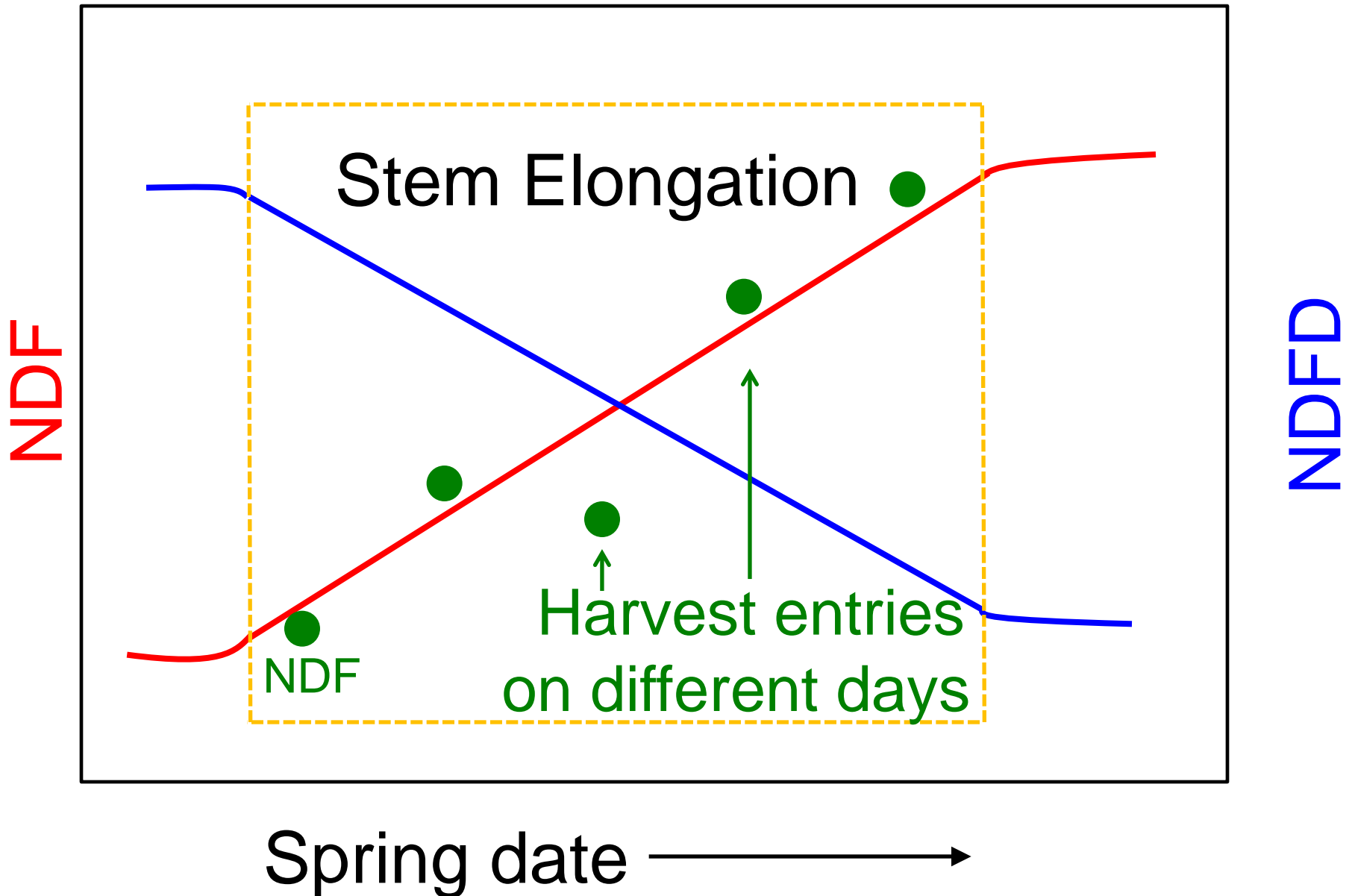
We need a method to effectively compare cultivars for quality.

Harvest all on one day.

Harvest on different days.

The system should be applied to spring growth.

Grass development in Spring is linear



**Dedicated plots for 3-4 cultivars provide
4-5 sampling time points in spring.**

NDF increases 1.0 units/day, \pm 0.2

NDFD decreases 0.9 units/day, \pm 0.2

**Harvest Cultivar Trial at optimum
NDF (50-55%) for mean of the trial.**

(Cherney et al., Crop Sci. 51:2878. 2011)

40 tall fescue cultivars harvested May 11, 2012 and ranked for NDF.

NDF adjusted to heading date of each based on 0.91 units/day.

NDF accumulation is a function of morphology and age.

'Heading date' is 5 heads visible in a plot.

NDF, May 11

NDF, at Heading

Late Maturing:
Fuego
Courtenay
Bariane

Trial mean = 55% NDF

Early Maturing:
Atlas
Orygun
Au Triumph

14	51.0
1	52.8
35	53.4
5	54.0
4	54.1
31	54.2
25	54.4
28	54.5
19	54.7
16	55.1
20	55.1
7	55.2
34	55.3
24	55.3
33	55.3
13	55.3
38	55.3
15	55.4
39	55.5
23	55.6
40	55.8
12	55.8
30	55.9
21	56.0
26	56.0
17	56.0
36	56.1
37	56.1
10	56.2
22	56.4
32	56.5
27	56.9
8	57.0
9	57.1

1	49.9
16	50.2
25	50.5
37	52.2
31	52.3
13	52.4
15	52.5
22	52.5
19	52.7
12	52.9
14	52.9
26	53.1
20	53.2
24	53.3
33	53.3
23	53.7
40	53.8
30	53.9
21	54.0
17	54.1
10	54.3
32	54.5
27	54.9
8	55.1
9	55.2
28	55.4
4	56.0
5	56.9
34	57.2
36	58.1
35	58.3
7	59.2
38	59.2
39	59.4

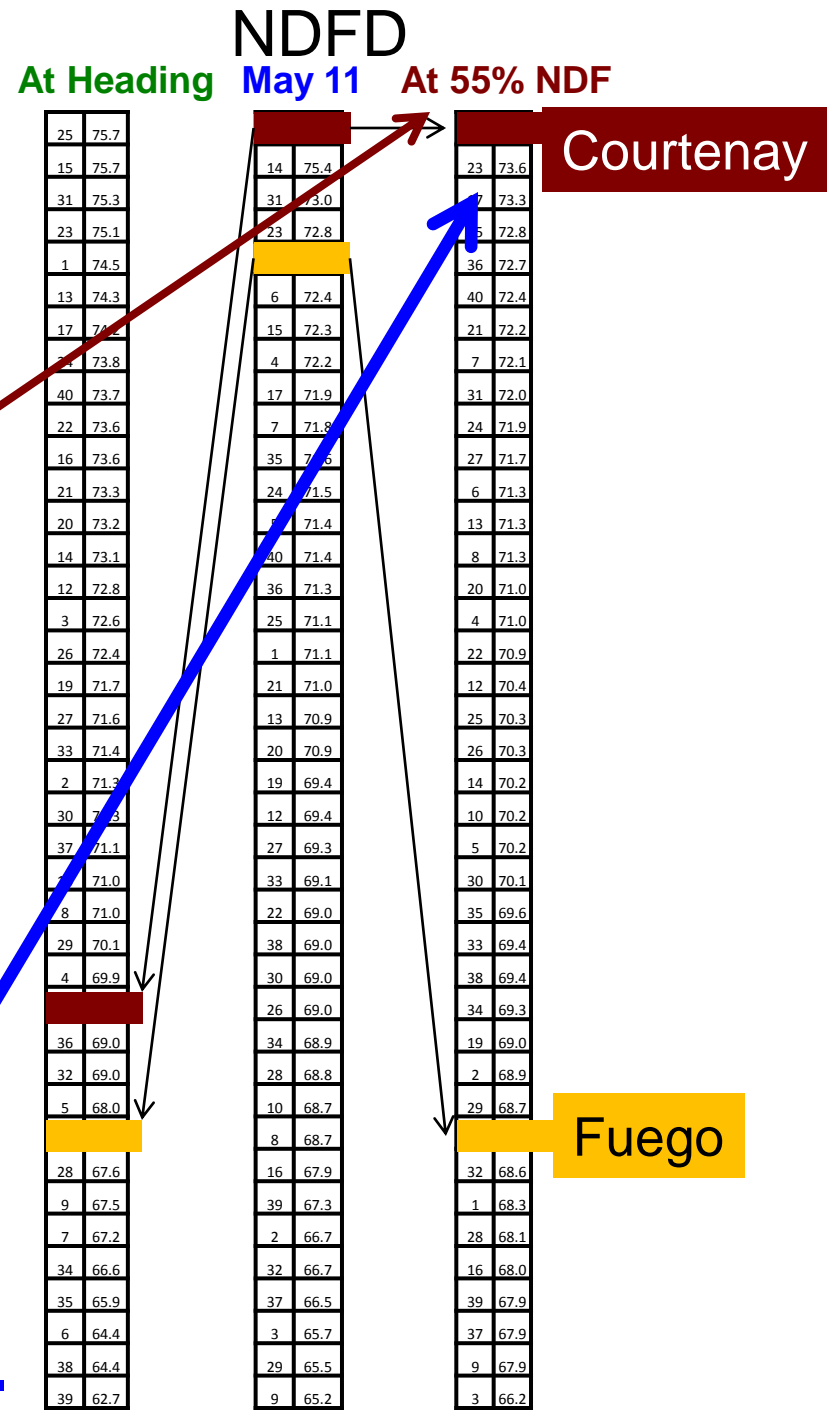
Lowest
49.5%

Highest
61.0%

NDFD adjusted to
 Heading date of each
 cultivar, based on
 -1.15 units NDFD/day.

Or NDFD adjusted to
 55% NDF date of each
 cultivar, based on
 -1.15 units NDFD/day
 and 0.91 units NDF/day.

Maximum NDFD at
 optimum NDF is the goal.



Observations

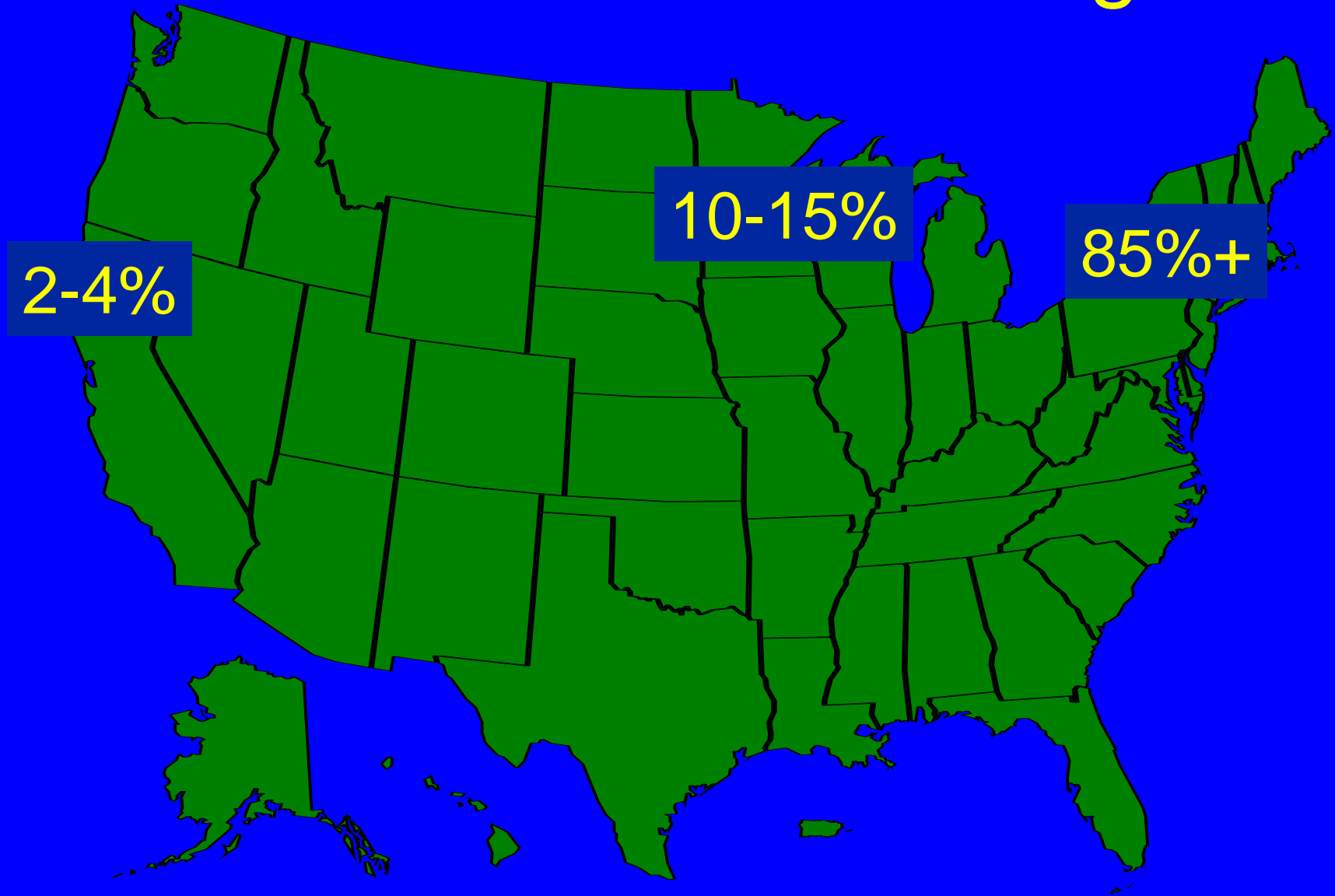
Heading date is the only obvious target
(‘Heading date’ is mid-late boot stage)

If a trial is harvested when $\frac{1}{2}$ of the entries are ‘headed’, trial NDF is 50-55%.

If a field has an early maturing cultivar then heading date may be a target.

Optimum Quality to a farmer means optimum NDF with maximum NDFD.

Alfalfa acres sown with grass



Evaluation of Alfalfa-Grass Quality in the Spring

Develop a simple tool for estimating
NDF content of alfalfa-grass mixtures.

Quality equations were developed
based primarily on:

- a. **maximum alfalfa height** and
- b. **percentage of grass** in the mixed stand.

(Parsons et al., Agron. J. 98:1081. 2006)

(Parsons et al., Crop Sci. 46:2446. 2006)

(Parsons et al., Forage & Grazinglands 2006)

Stand NDF

Max. alfalfa height, in.

%Grass in the stand (dry matter basis)

	10	20	30	40	50	60	70	80	90
14	23.5	26.7	29.9	33.1	36.3	39.5	42.7	45.9	49.1
15	24.3	27.5	30.7	33.9	37.1	40.3	43.5	46.7	49.9
16	25.1	28.3	31.5	34.7	37.9	41.1	44.3	47.5	50.7
17	25.9	29.1	32.3	35.5	38.7	41.9	45.1	48.3	51.5
18	26.8	30.0	33.2	36.4	39.6	42.8	46.0	49.2	52.4
19	27.6	30.8	34.0	37.2	40.4	43.6	46.8	50.0	53.2
20	28.4	31.6	34.8	38.0	41.2	44.4	47.6	50.8	54.0
21	29.2	32.4	35.6	38.8	42.0	45.2	48.4	51.6	54.8
22	30.1	33.3	36.5	39.7	42.9	46.1	49.3	52.5	55.7
23	30.9	34.1	37.3	40.5	43.7	46.9	50.1	53.3	56.5
24	31.7	34.9	38.1	41.3	44.5	47.7	50.9	54.1	57.3
25	32.5	35.7	38.9	42.1	45.3	48.5	51.7	54.9	58.1
26	33.4	36.6	39.8	43.0	46.2	49.4	52.6	55.8	59.0
27	34.2	37.4	40.6	43.8	47.0	50.2	53.4	56.6	59.8
28	35.0	38.2	41.4	44.6	47.8	51.0	54.2	57.4	60.6
29	35.8	39.0	42.2	45.4	48.6	51.8	55.0	58.2	61.4
30	36.7	39.9	43.1	46.3	49.5	52.7	55.9	59.1	62.3
31	37.5	40.7	43.9	47.1	50.3	53.5	56.7	59.9	63.1
32	38.3	41.5	44.7	47.9	51.1	54.3	57.5	60.7	63.9
33	39.1	42.3	45.5	48.7	51.9	55.1	58.3	61.5	64.7
34	40.0	43.2	46.4	49.6	52.8	56.0	59.2	62.4	65.6
35	40.8	44.0	47.2	50.4	53.6	56.8	60.0	63.2	66.4

6 days to harvest

Optimum NDF

Mixed Alfalfa-Grass Stand Conclusions

Alfalfa height and percent grass in a mixed stand can tell you stand NDF.

Harvest based on goals for mixed stand NDF.

We hope to have a program that estimates % grass in a mixed stand.

Feeding Trial Conclusions

Cows on grass-based diets can produce milk similarly to cows on alfalfa-based diets.

The best forage for lactating dairy cows is a grass-alfalfa mixture.

(Cherney et al., J. Dairy Sci. 87:2268. 2004)

(Cherney et al., J. Dairy Sci. 86:3983. 2003)

(Cherney et al., J. Anim. Feed Sci. 11:555. 2002)

(Jonker et al., J. Appl. Anim. Res. 21:81. 2002)

Bioheat from Grasses in the Northeast

NY and New England = 80% of the nation's heating oil demand.

Over $\frac{1}{2}$ of the liquid fossil fuel in the Northeast is used for heating.

New York has more tons of 'old' grass available for heating than wood.

Grass combustion is a high efficiency, simple alternative.

State of the Union Address by President Bush

Comments on cellulosic ethanol:

“Our goal is to make this new kind of ethanol practical and competitive within six years.”

Only -132 days left!

This resulted in 2 major impacts on grass in the Northeast.

The impact of cellulosic ethanol on grass

- 1. Tens of millions of dollars for switchgrass.**
- 2. Combustion was not selected as a pre-ordained bioenergy technology.**



U.S. Bioenergy policy offers economic incentives for specific pre-ordained technologies, rather than rewarding desired outcomes.



Currently over 20 demonstrations in the NE

- 1. Emissions are very sensitive to fuel composition and appliance settings.**
- 2. Appliances exist that can sufficiently control emissions from grass pellets.**



Elemental composition is the major issue for combustion.

A wide-angle photograph of a harvested grass field. The foreground is filled with a dense layer of cut, dry grasses. In the middle ground, a line of tall, thin trees stands against a clear blue sky. The overall scene is bright and open.

Chlorine content in harvested grasses in our studies has ranged from 0.01% to 1.35%.

Improving Grass for Biomass Combustion

Breeding/Genomics vs. Management for elemental composition

Chances for Improvements

	<u>Breeding</u>	<u>Mgmt.</u>
Next 10 years:	1X	15X
Next 20 years:	5X	20X

Improving Grass for Dairy Cattle

Breeding/Genomics vs. Management
for forage quality

Chances for Improvements

	<u>Breeding</u>	<u>Mgmt.</u>
Next 10 years:	10X	5X
Next 20 years:	20X	5X

The Future of Grass in the Northeast:

Grass biomass will smolder until 2022.

Alfalfa-grass will survive the RR tsunami.

**Pure grass stands may increase,
due to nutrient management issues
on dairy farms.**

www.forages.org/grass

The best forage is a
grass-alfalfa mixture.

THE END