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Wheat 2012

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- Modern crop production is the elimination of limiting factors
- Knowledge is the most valuable input
- Repeating mistakes is very expensive
- Continuous improvement is a key management goal

Wheat 2011

- Prices present a profit/cash flow opportunity
- corn/wheat/soybean rotation increases corn & bean yields 15% to 40% (A. Journal, 2002)
- Lowers fixed costs (25% reduction in acres planted increase fixed costs by 40%: U. of Ill.)
- Reduced risk: we usually get moisture in winter
- Lost markets

Producing Wheat in 2012 = Cash Flow

Yield Bu. /A	Costs/A	$/A Net @ $7.00/ bu.	Acres needed for **$20K** in July 2012	$ to produce
40	$158	$59	338	$53,404
80	$280	$168	119	$33,320

PREHARVEST EXPENSES	UNIT	PRICE	Amt.		Total /acre	Total/ bushel	% of production	# of Bu
Seed wheat	Unit	$ 14.50	3.0		$ 43.50	$ 0.54	12.0%	6.2
Seed Treatment	Bu.	$ 3.50	3.0		$ 10.50	$ 0.13	2.9%	1.5
Nitrogen	lbs.	$ 0.55	140		$ 77.00	$ 0.96	21.2%	11.0
Phosphate	lbs.	$ 0.80	50		$ 40.00	$ 0.50	11.0%	5.7
Potash	lbs.	$ 0.48	80		$ 38.40	$ 0.48	10.6%	5.5
Sulfur	lbs.	$ 0.25	12		$ 3.00	$ 0.04	0.8%	0.4
Fertilizer Application	Acre	$ 7.00	3		$ 21.00	$ 0.26	5.8%	3.0
Lime	Ton	$ 40.00	0.2		$ 8.00	$ 0.10	2.2%	1.1
Chemicals								
Herbicides	Acre	$ 13.00	1		$ 13.00	$ 0.16	3.6%	1.9
Insecticides	Acre	$ 2.50	2		$ 5.00	$ 0.06	1.4%	0.7
Fungicides	Acre	$ 12.00	1		$ 12.00	$ 0.15	3.3%	1.7
micronutrients	Acre	$ 4.00	1		$ 4.00	$ 0.05	1.1%	0.6
Chemical Application	Acre	$ 6.50	1		$ 6.50	$ 0.08	1.8%	0.9
Fuel, Oil, Lube	Acre	$ 2.00	1		$ 2.00	$ 0.03	0.5%	0.3
Repairs	Acre	$ 5.00	1		$ 5.00	$ 0.06	1.4%	0.7
Preharvest Labor	Hour	$ 10.00	0.88		$ 8.80	$ 0.11	2.4%	1.3
Crop Insurance	Acre	$ 16.00	1		$ 16.00	$ 0.20	4.4%	2.3
Scouting	Acre	$ 7.50	1		$ 7.50	$ 0.09	2.1%	1.1
Other Costs	Acre	$ -	1		$ -	$ -	0.0%	0.0
				Subtotal:	$ 321.20	$ 4.02	88.3%	45.9
Production Interest	A.P.R.	7%		Interest	$ 11.24	$ 0.14	3.1%	1.6
TOTAL PREHARVEST EXPENSES	$ 4.16	per Bu.		Total:	$ 332.44	$ 4.16	91.4%	47.5

Returns to Wheat/ DC Beans

WHEAT BREAK EVEN PRICE	$ 4.55	per Bu.
MARKET PRICE TODAY	$ 7.00	per Bu.
Gross Income	$560	
Variable Expenses	$364	
Contribution to fixed expenses	**$196**	
% return to variable costs	53.9%	

10 year average return = 30%

DC BEANSBREAK EVEN PRICE	$ 5.30	per Bu.
MARKET PRICE TODAY	$ 13.00	per Bu.
Gross Income	$ 546	
Variable Expenses	$ 223	
Contribution to fixed expenses	$ 323	
% return	145.1%	

Climbing the Yield Ladder

1982 : state avg. yield = 38 bu/acre

Mid-80's: Seeding rates and seed depth, fall fertility

Late 80's: Control fall insects/ early weed control

1990's: fungicide seed treatments: apply Karate with topdress N

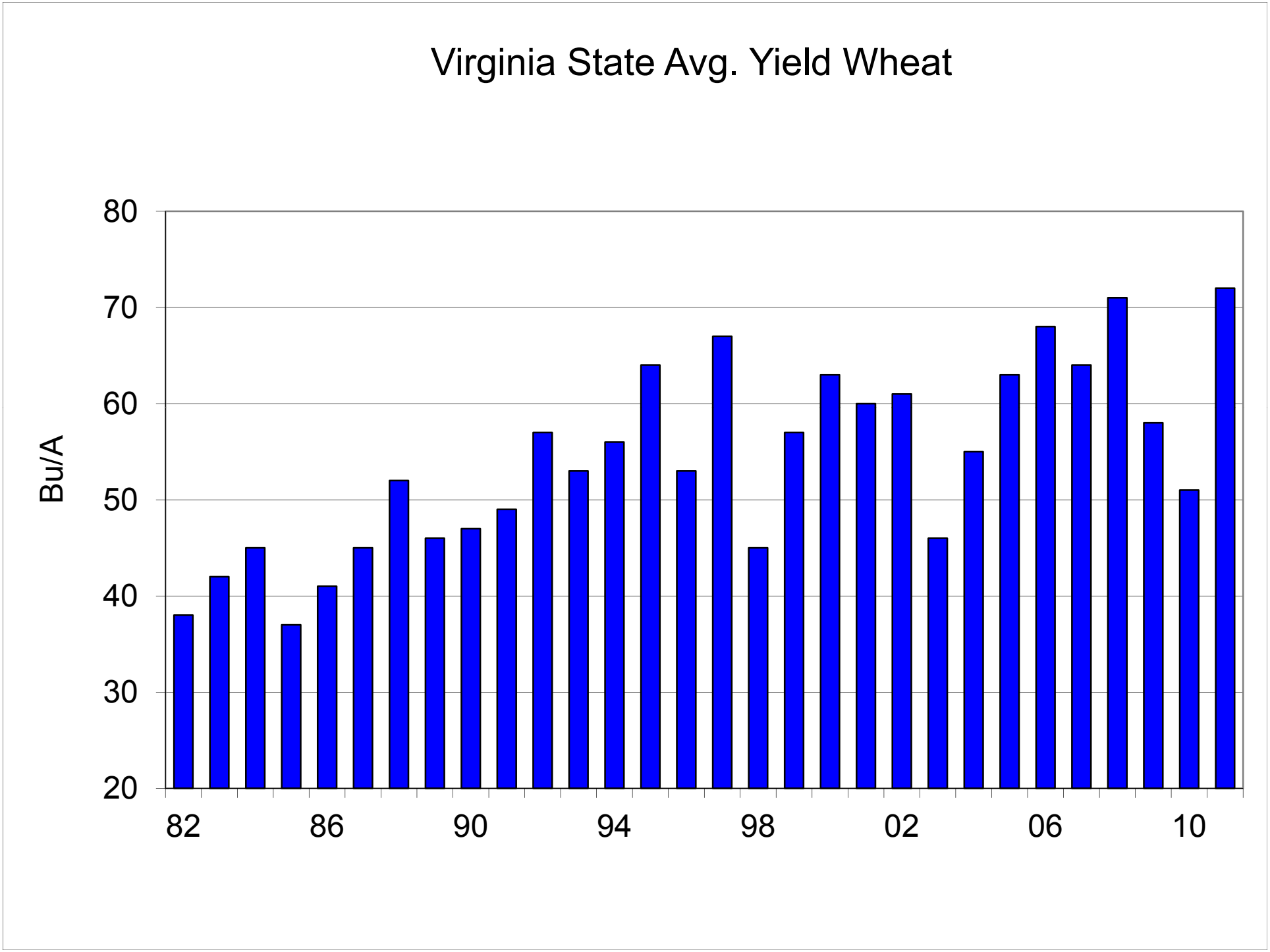
2000 & 2001: Understanding planting schedule

2003: Selecting for scab resistance

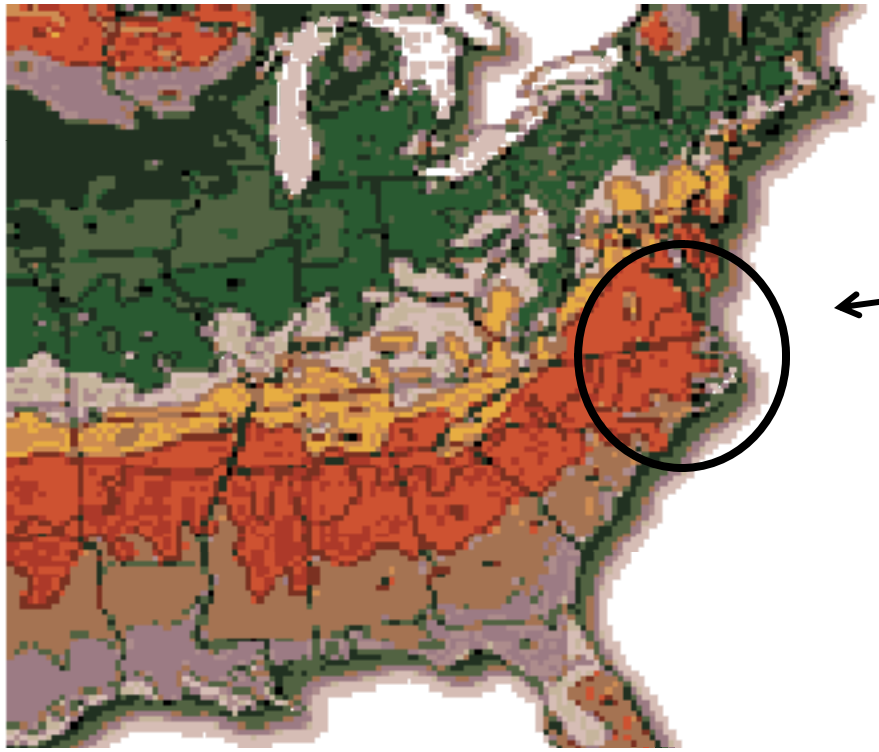
2004: Splitting winter/spring fungicides

2010: seed treatment for warm soils

2011: the value of insecticide seed treatments


Virginia State Avg. Yield Wheat
Bu/A
80
70
60
50
40
30
20
82
86
90
94
98
02
06
10

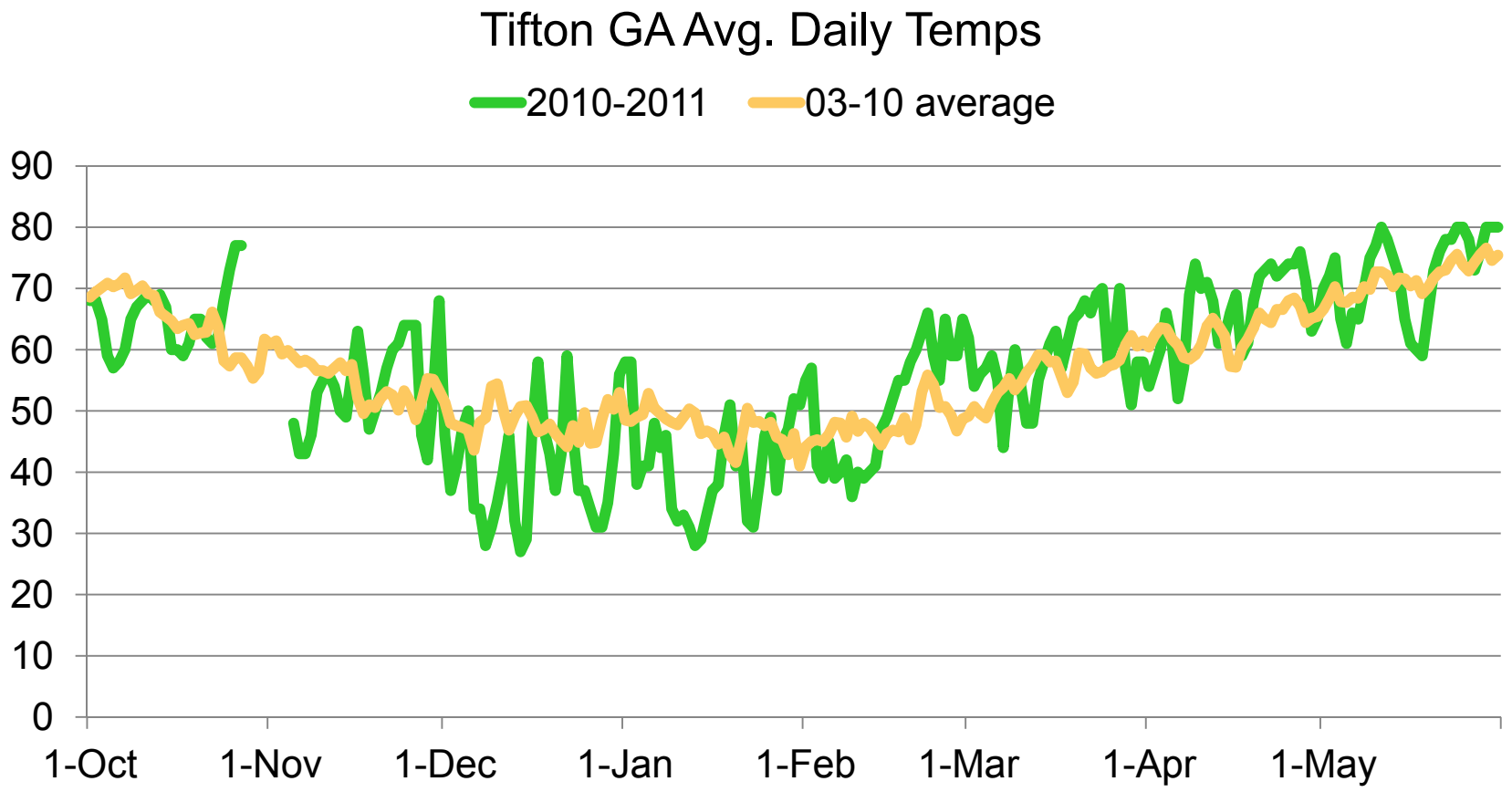
Climate:



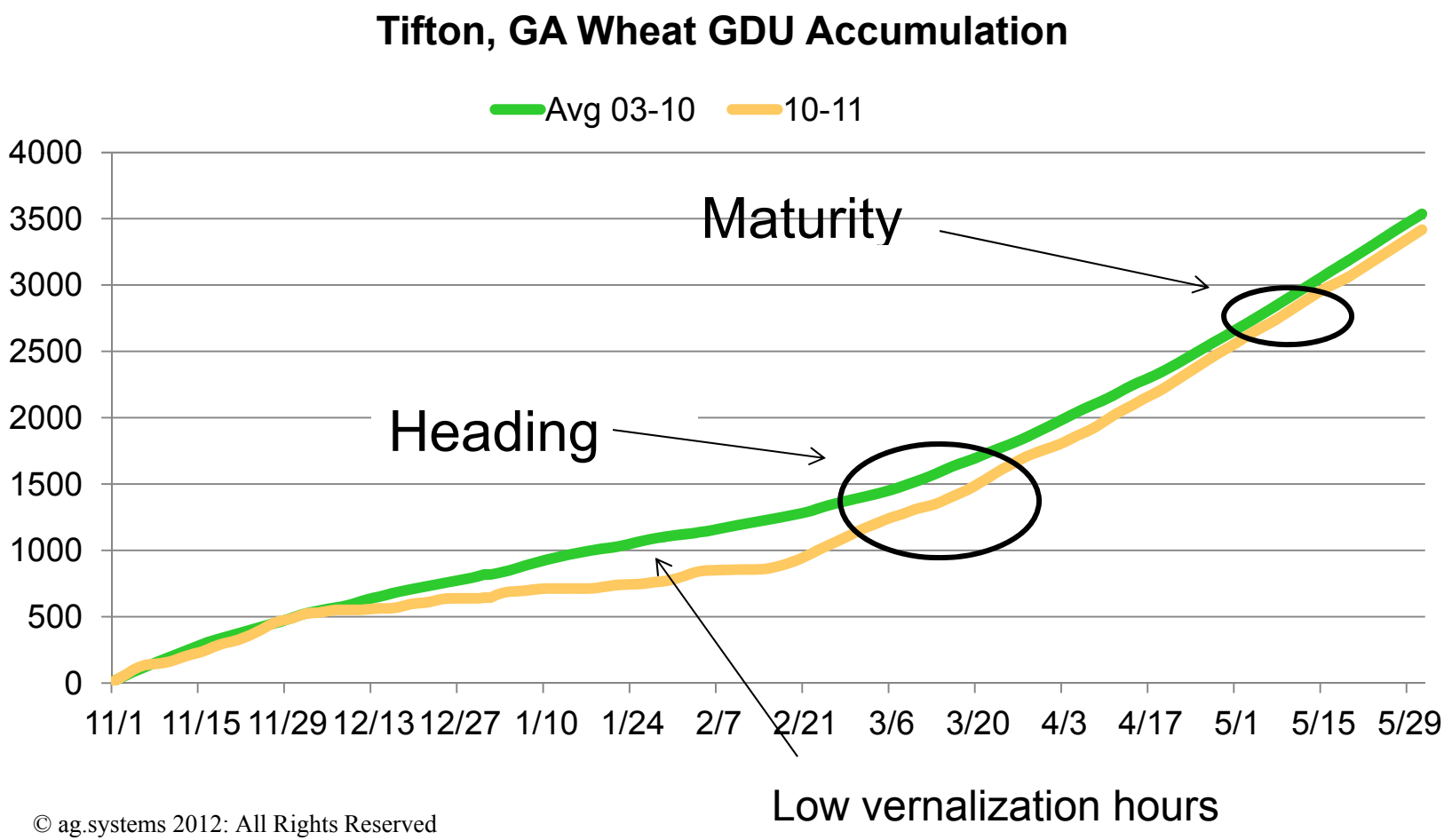
Rainfall

Rain Tifton, GA	2003	2004	2005	2006	2007	2008	2009	2010	2011	Avg
Jan	1.0	2.4	2.1	4.7	3.8	2.8	1.5	5.6	2.7	2.9
Feb	4.9	5.2	3.5	5.2	2.9	5.8	0.7	2.6	2.5	3.7
Mar	9.6	0.4	9.1	1.1	1.7	2.5	9.6	1.7	2.1	4.2
April	4.8	2.7	6.5	1.9	1.7	2.4	8.5	3.9	1.3	3.8
May	4.1	3.9	1.3	3.0	0.3	0.5	4.0	3.9	0.6	2.4
Total	24.4	14.6	22.5	15.9	10.5	14.0	24.3	17.7	9.2	17.0

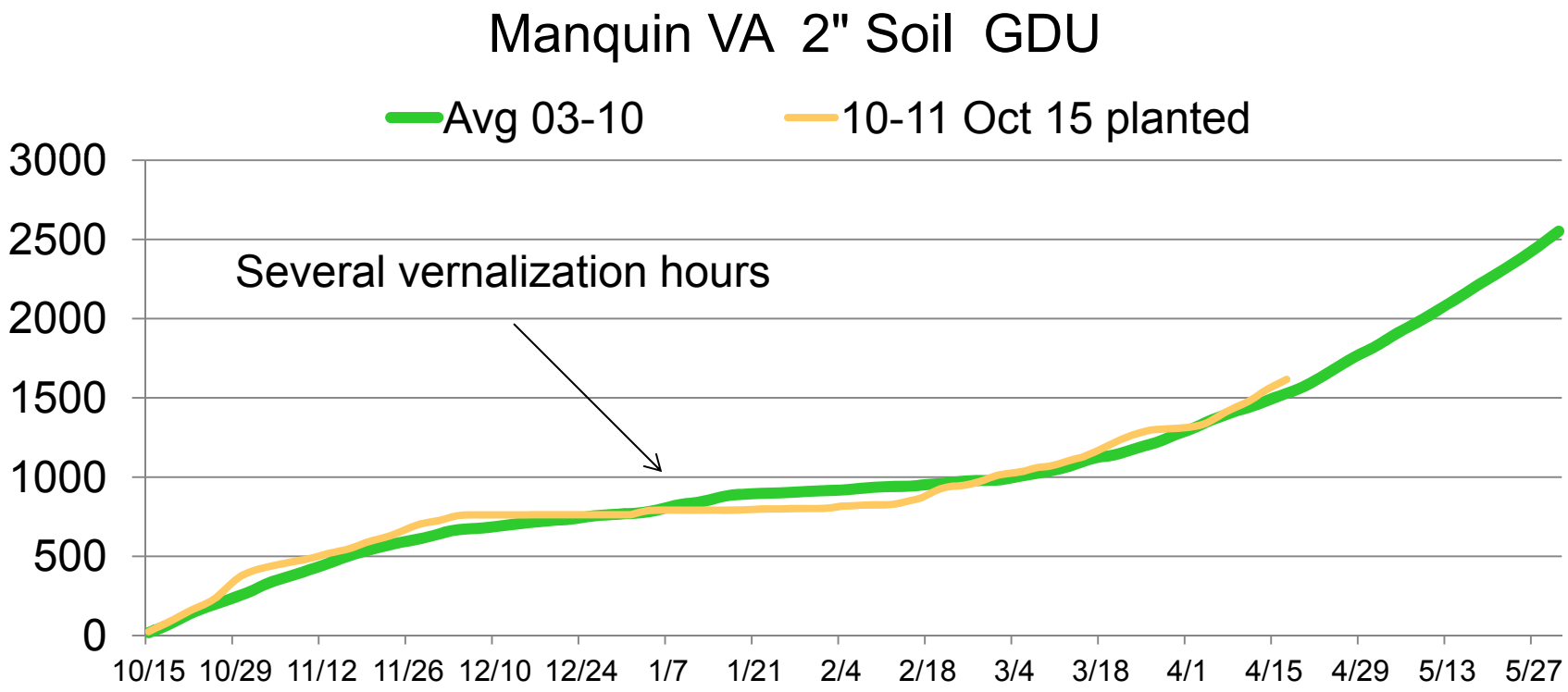
Temperatures



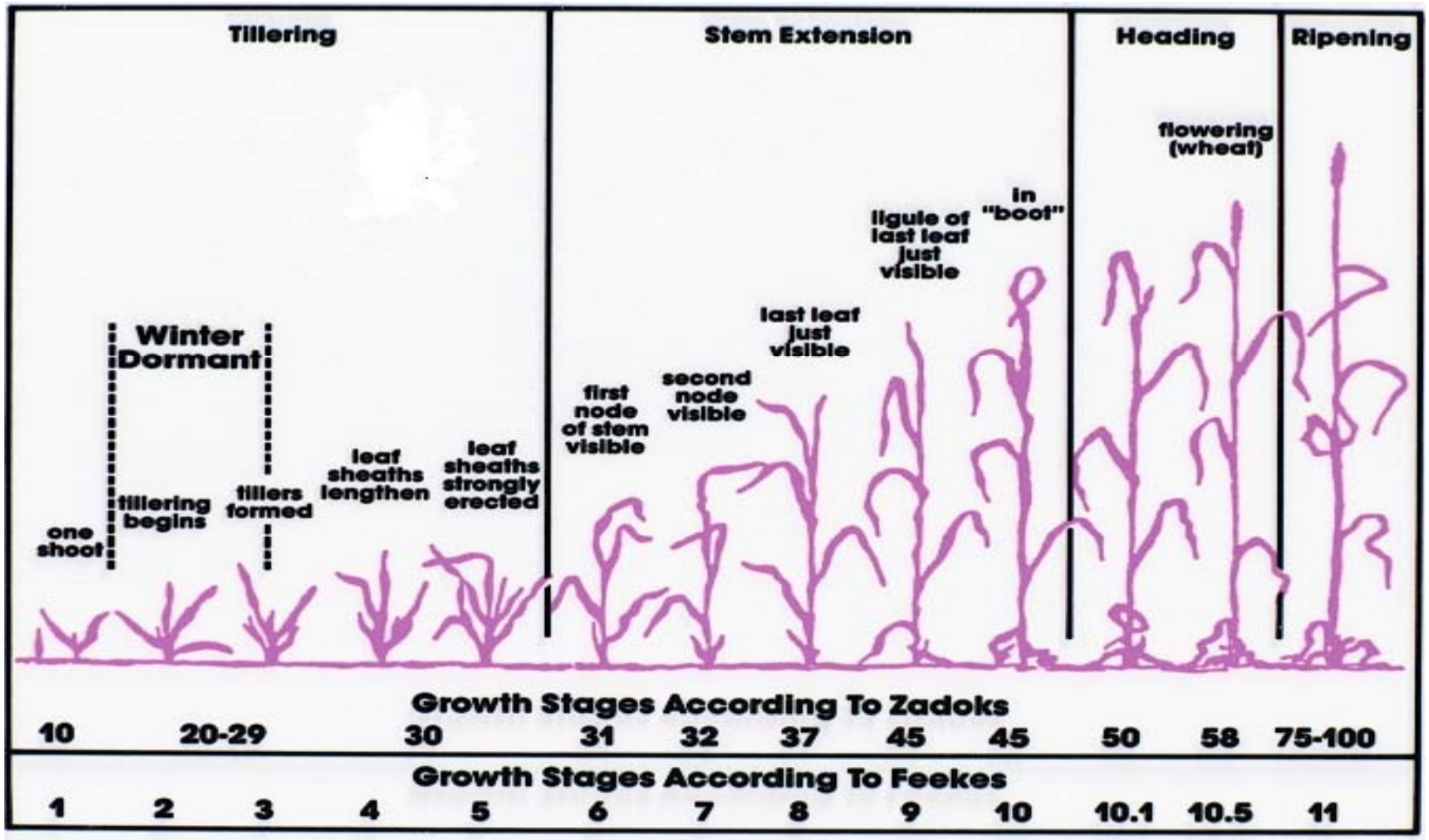
Tifton Wheat GDUs



Manquin, VA GDUs



Wheat Growth Stages



Fall Wheat Recommendations

- Variety Selection
- Seed Treatment
- Field Considerations
- Planting Success
- Fertilizer Solutions
- Stop Bugs & Weeds

65% of your yields will be determined when the drill pulls out of the field

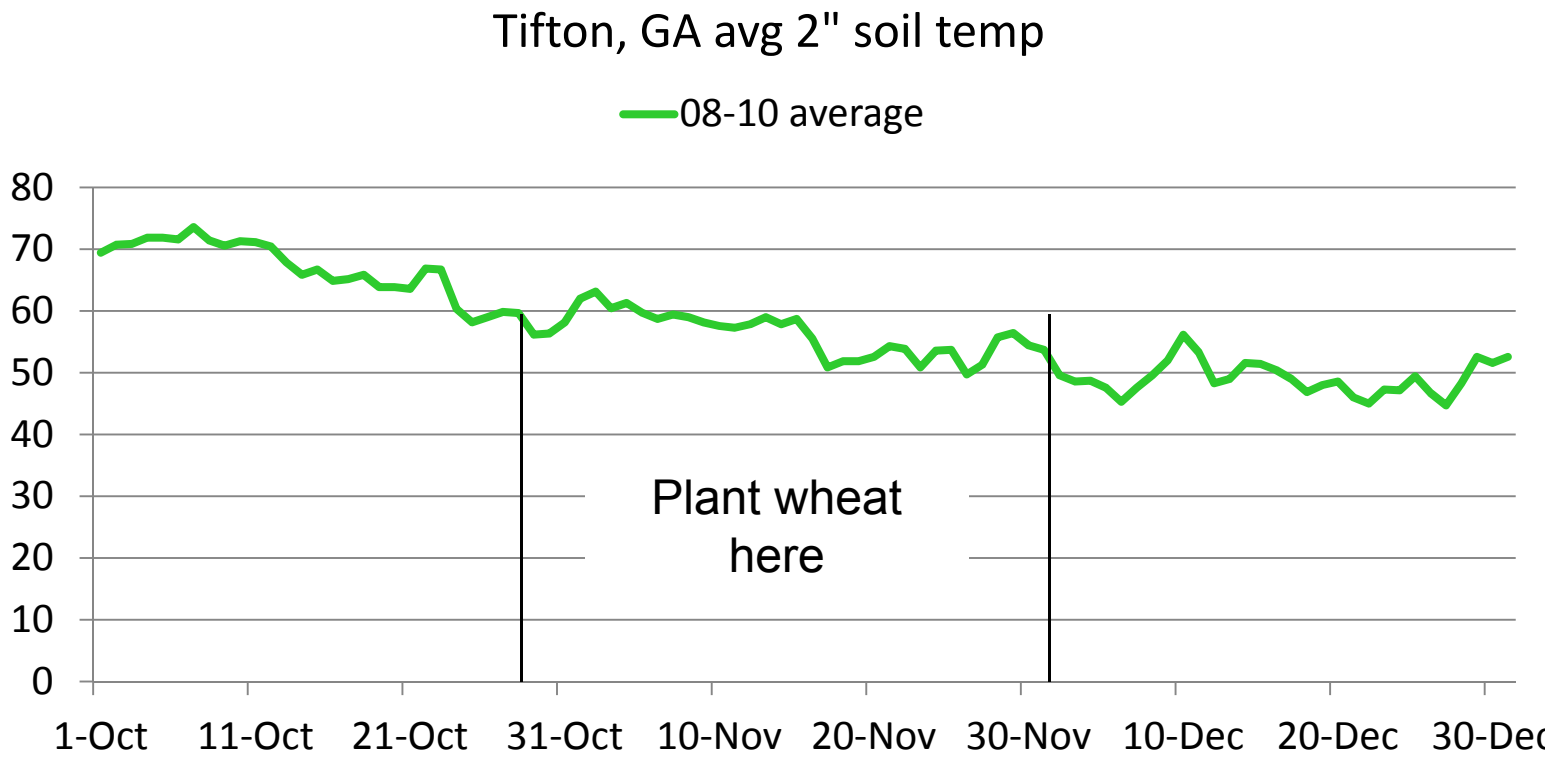
Four Things to Avoid

Four Things Will Ruin Wheat Profits:

- Root Rots
- Hessian fly
- Spring freeze damage
- Scab

All four are fall decisions

Optimum Planting Dates



Wheat Variety Selections

- Heading Date
  - planting date
  - manage to avoid freeze damage

Early-heading variety on left, late heading variety on right: planted same day, same amount of nitrogen: photo on 02/02.

Planting Sequence

Late Heading	Medium Heading	Early Heading
Nov 1 to Nov 10	Nov 10 to Nov 20	Nov 20 to Nov 30

Early Planting Date

Group 1 Brands	Variety	Bu/A	Heading Dates 50% (JD)
Delta Grow	4100	86.5	96
Delta King	9410	85.2	95
Armor	5110	84.8	97
Delta King	7830	78.9	94
public	Roane	78.4	95
AR	PAT	76.9	97
Delta Grow	4500	73.3	95
Ag Alumni	5057	72.3	94
Dixie Bell	DB3440	58.6	98
Avg		77.2	96

Group 2 Brands	Variety	Bu/A	Heading Dates 50% (JD)
Delta King	7710	86.7	93
Dixie	989	83.2	91
USG	3665	81.6	91
Progeny	133	76.3	93
Progeny	166	75.2	93
Coker	Beretta	74.8	91
Progeny	145	74.3	92
Dixie	900	71.2	92
AR	SABBE	71.1	93
Progeny	185	68.4	90
Terral	TV8558	68.2	90
Armor	260Z	66.6	90
Delta Grow	5200	65.6	92
Terral	TV8466	58.8	91
FFR	556	54.6	90
Pioneer	26R22	50.0	93
Pioneer	26R15	49.6	93
FFR	8302	48.8	93
Avg		68.1	92

Early planted wheat : right window

Wheat Groups

Group 3 Brands	Variety	Bu/A	Heading Dates 50% (JD)
Delta King	GR9108	70.3	89
Dixie Bell	DB7440	69.3	89
Delta King	9577	67.6	89
UGA	4E-16	66.9	87
Cropland	554W	58.1	89
Hornbeck	3266	51.0	87
AGS	2050	50.5	88
public	Chesapeake	46.5	89
AGS	2000	44.7	86
Coker	Magnolia	43.1	87
Coker	Panola	42.3	89
Terral	TV8331	36.9	92
Cropland	8302	36.3	91
AR	10-1	28.1	88
Coker	9553	28.1	87
AGS	2010	20.5	86
AR	7-2	20.1	89
USG	3342	14.7	91
Avg		44.2	89

Group 4 Brands	Variety	Bu/A	Heading Dates 50% (JD)
Terral	LA841	60.8	85
Pioneer	26R87	56.6	85
UGA	4E-26	49.3	85
Terral	LA842	48.9	85
AGS	2060	48.0	85
UGA	4E25	39.1	85
USG	3209	22.7	81
AVG.		46.5	84

Early planted wheat : wrong window

Planting Sequence

Planting a variety in the correct planting window is key for high yields

Late Heading	Medium Heading	Early Heading
Nov 1 to Nov 10 USG 3251 USG 3438	Nov 10 to Nov 20 USG 3555 USG 3409	Nov 20 to Nov 30 USG 3120

Heading date and maturity are not the same thing

2011 Prince George Wheat Variety Plots

Cooperators: **Producer:** Brandon Plantation, Todd Price
Extension: Scott Reiter, Prince George

Previous Crop: No-till corn
Soil Type: Pamunkey loam
Planting Date: October 22, 2010
Fertilizer: 40-60-80 at planting
40-0-0-5S early topdress
70-0-0-8S GS 30-31 topdress
Crop Protection: **Herbicide:** Gramoxone + 2,4-D burndown, Harmony Extra SG 0.75 oz/A January, Osprey 3.75 oz/A February
Insecticide: Tombstone 2 oz/A with burndown
Fungicide: Fitness 4 oz/A GS 30-31, Prosaro 7 oz/A @ heading
Check Hybrid: Pioneer 26R15
Harvest Date: June 15, 2011

Treatment or Variety	Test Weight	% Moisture	Yield @ 13.5 % Moisture
Pioneer 26R15 -- Check	58.1	12.0	110.1
SS 8600	60.3	12.6	110.8
SS 560	58.9	13.4	109.7
USG 3120	60.6	12.0	108.5
USG 3251	59.6	12.8	120.7
Shirley	58.9	12.8	110.0
Dynagro 9042	59.2	12.6	119.1
Progeny 185	58.9	12.6	99.7
Featherstone VA258	58.5	12.4	110.1
Branson	59.2	12.4	117.1
Oakes	60.6	13.0	109.9
Merl	59.9	12.8	110.5
Jamestown	61.3	12.6	108.9
Pioneer 26R20	60.3	12.0	107.9
Pioneer 26R22	59.2	12.4	117.3
Pioneer 26R15 -- Check	58.1	11.8	108.5

2011 Westmoreland Wheat Variety Demonstration Plot

Cooperators:	**Producer:**	F.F. Chandler, Jr.
	Extension:	Keith Balderson, VCE Middle Penninsula
		Livvy Gill, Summer Intern
	Agribusiness:	Cooperating Seed Companies, Curtis Packett and Rusty Green, CPS
Previous Crop:	Corn	
Soil Type:	Kempsville loam and Rumford and Tetotum Soils	
Planting Date:	October 26, 2010 No-till	
Fertilizer:	40-0-0-15 in late January	
	60-0-0-8 in late March	
Crop Protection:	Harmony and Osprey in January	
	3 oz. per acre Headline in second nitrogen application	
	7 oz. per acre Prosaro and 2 oz. per acre Tombstone at flowering	
Harvest Date:	July 1, 2011	

Treatment or Variety	Test Weight	% Moisture	Yield (bu./Acre@13.5%
USG 3251	56.0	13.8	94.36
USG 3120	56.5	13.1	94.95
Progeny 185	56.0	13.9	91.98
SS 560	56.0	13.7	88.70
SS 8600	56.5	12.8	94.04
VCIA Jamestown	57.0	13.0	90.83
VCIA Merl	57.0	13.9	91.63
Dyna-Gro Shirley	56.0	13.5	95.04
Dyan-Gro 9042	56.0	13.0	95.94
Featherstone VA 258	56.0	13.1	92.31
Agripro Oakes	56.0	13.7	87.82
Agripro Branson	56.0	14.1	90.03

USG Varieties

2011 Plains, GA		no fungicide	w /fungicide
USG	3438	88.8	84.1
USG	3251	82.9	92.4
USG	3409	82.0	90.0
USG	3770	87.5	91.7
USG	3555	81.0	84.0
all plots		81.6	85.3

Wheat Variety Selections

- While there can be a one month planting window, no variety has an optimum window wider than two weeks (10 days?)
- Plant later heading varieties first, shorter heading varieties last
- Watch vernalization requirements
  - Longer vernalization = planting earlier
- Select for disease resistance

Wheat Variety Selections

- Foliar resistance
  - Leaf rust
  - Stripe rust
  - Septoria
- Virus resistance
  - Bugs: BYDV
  - Soil: spindle streak and mosaic

Wheat Variety Selection: Summary

- Select varieties for scab *tolerance*
- Match varieties to planting window
  - heading date
  - manage to avoid freeze damage
- Understand varieties' disease resistance
- Understand varieties' yield potential

Seed Treatments

Seedling disease hurts yields….

- Pythium
- Rhizoctonia
- Fusarium

wheat is growing out of Pythium infection on the two plants on the left. Plants on right are permanently damaged.

Pythium Root Rot: cool soils

Prescott, J.M., P.A. Burnett, E.E. Saari et al. 1986. Wheat Diseases and Pests: A Guide for Field Identification. CIMMYT. Mexico, D.F., Mexico.

- Photo: normal plant at left; 50% infection in middle, 75% infection at right
- Infection is greatest:
  - wet, compacted soils
  - low in phosphorus availability
  - previously cropped to cereals or grasses.

Pythium in Fall, 2008

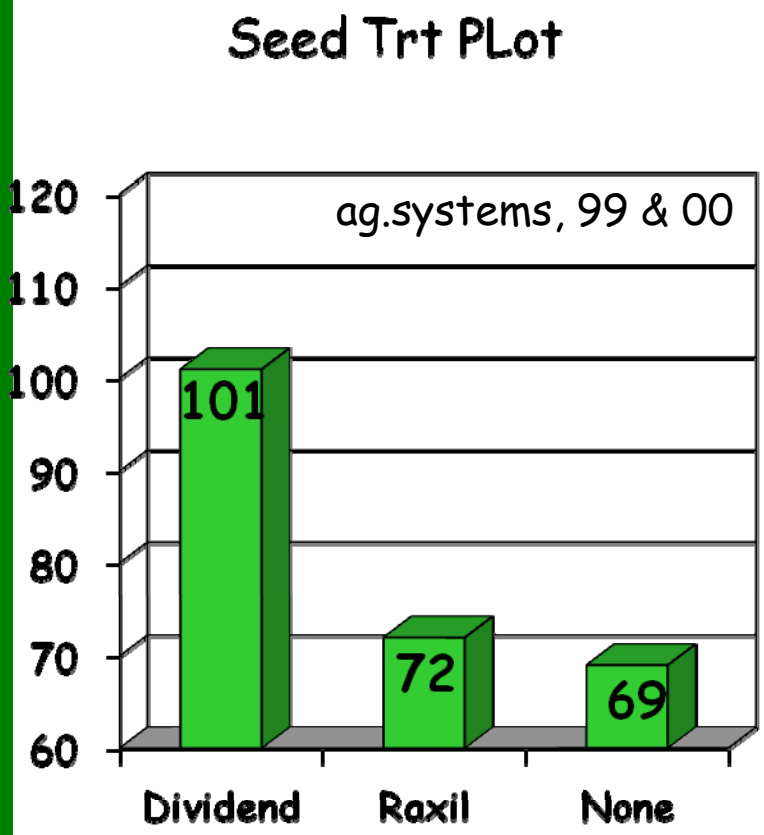
- Pythium in top photo; normal at right

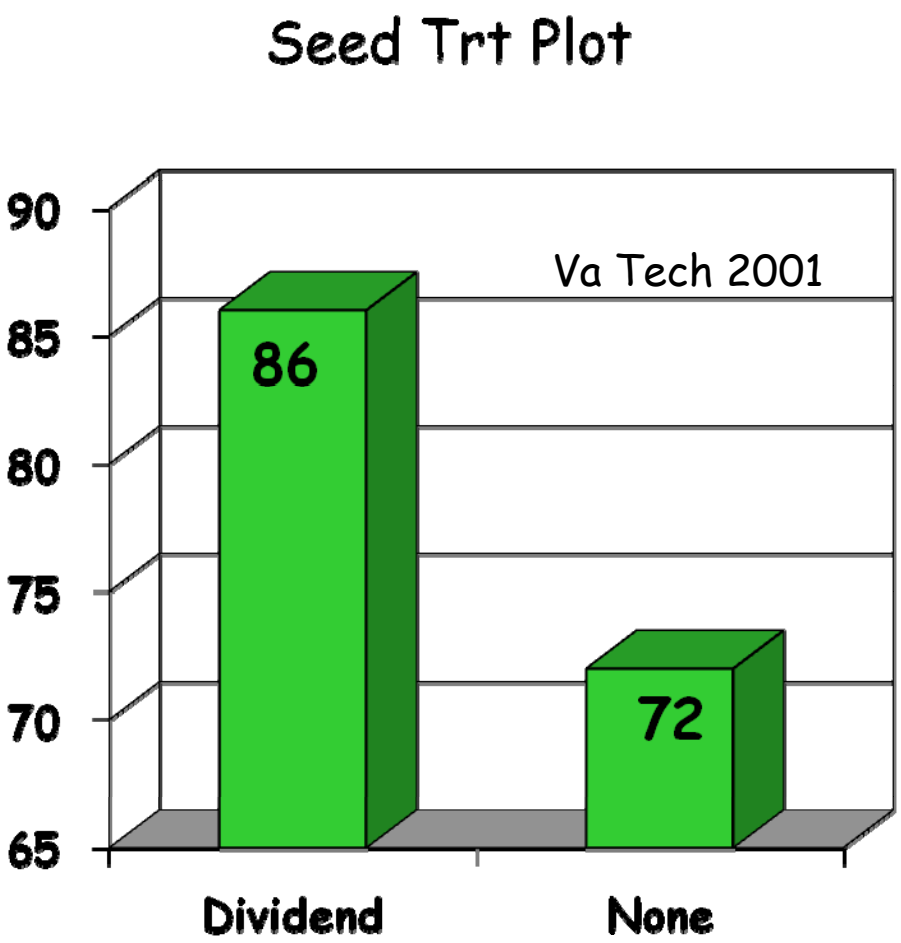
Common Root Rot: warm soils

- Common root rot, seedling blight and pre-maturity blight caused by soil fungi
- 10% yield losses
- Losses are due to a reduction in plants, seed size and number.

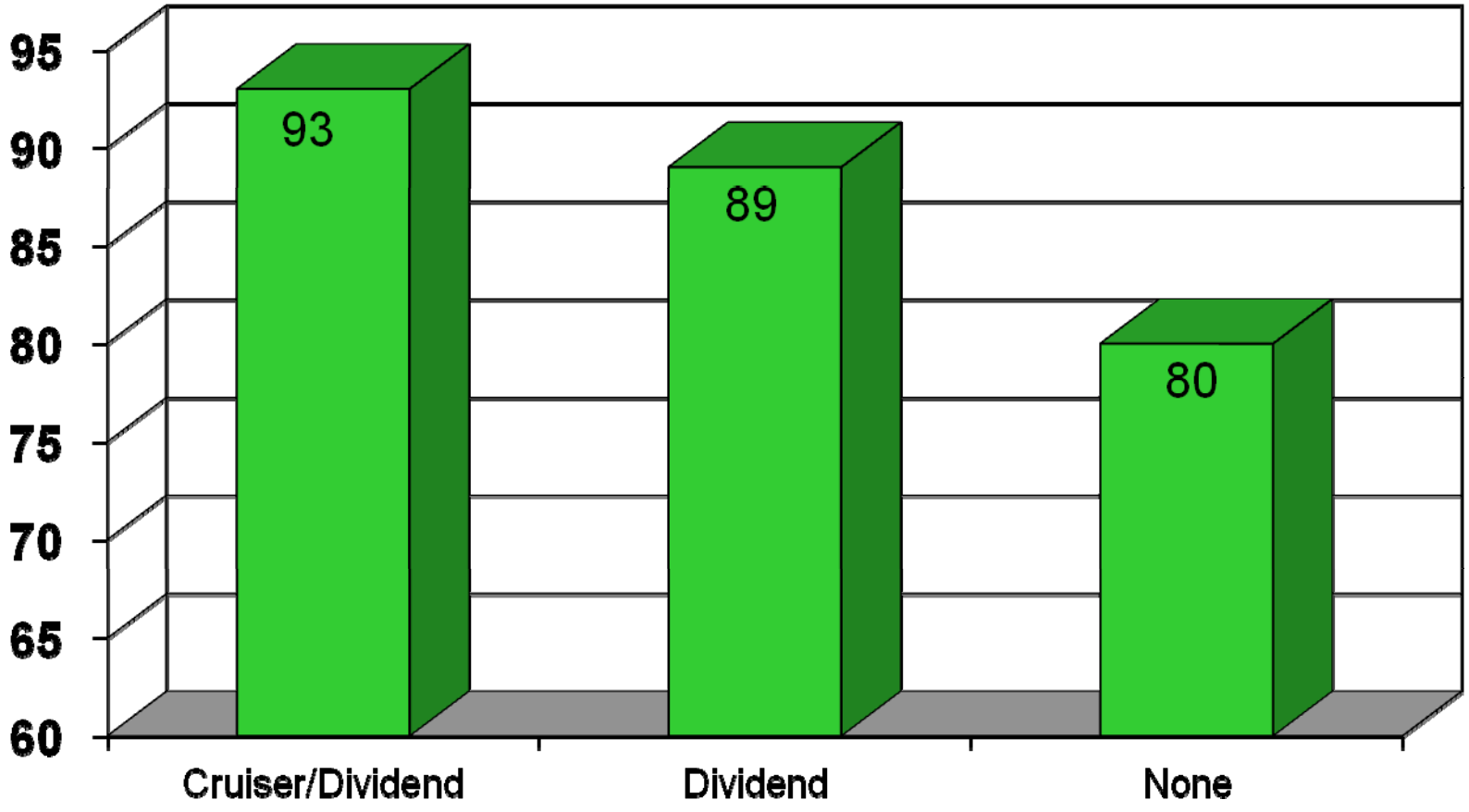
Common Root Rot in 2010

Value of Seed Treatments





Value of Seed Treatments in 2006



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Fall Diseases Costs $$$….

- Treating seed with Dividend reduced fall diseases by 72% and increased plant stands by 24% (APS, Plant Management 2003)
- Root infections and seedling diseases are the one thing we cannot address post

Seed Treatments: Why Variation?

AgPLUS™	Avg. Yield	Avg. Uniformity	Num Flds	Total Acres
Dividend Extreme	45.9	66	104	1,685
None	41.2	63	68	895

11% response

NCSU Table 3: Fungicidal Seed Treatment Yields Combined Across All Three Locations

Treatment	Brixey (bu/acre)	Smith & Barkley (bu/acre)	Evans (bu/acre)	Average (bu/acre)
Untreated	69.2	65.6	50.3	**61.7 a**
Dividend Extreme	67.2	61.3	51.0	**59.8 a**
Proceed	63.5	63.1	51.7	**59.4 a**

Average yields followed by the same letter do n

No response

Root Rot

- Bipolaris and two Fusarium, one of which also causes scab
- Warm soils (2” soil temperatures above 60^0F)
- When seedlings are infected and dry weather occurs between flag-leaf emergence and heading, plants can actually die or be severely damaged
- Current commercial seed treatments do not stop all diseases (?)

Wheat Seed Treatments: Vizor

- Most seed treatments are for cool, wet soils
- Our problem is warm soils and cool soils
- Three root diseases cause problems when soil tempts are > 60^0 F

	Dividend Extreme (2 oz. /cwt rate)	Vizor
number of fungicides	2	3
half-life (days)	40	200
Bipolaris control	suppression	control
Fusarium C. control	no	control
Fusarium G. control	no	control

Vizor: New from Renwood Farms

Photos from NC (left) and Virginia (right) showing Vizor treated wheat compared to 'standard treatments".

Seed Treatment

- Vizor- 3 way fungicide treatment
- Vizor Plus – Visor plus Insecticide
- Vizor ST – Visor with micronutrients pop-up (photo)
- Vizor 5 – Visor with insecticide and pop-up

ST treatment on right: note root emergence and elongation

Field Considerations

- Drainage: keep water away
  - Deep tillage
- Previous Crop
  - Sorghum
  - Wheat
- Ryegrass: control early and often

Planting Success: Plant 1” Deep

Maximum Wheat Seeding Rates (Lbs per Acre)

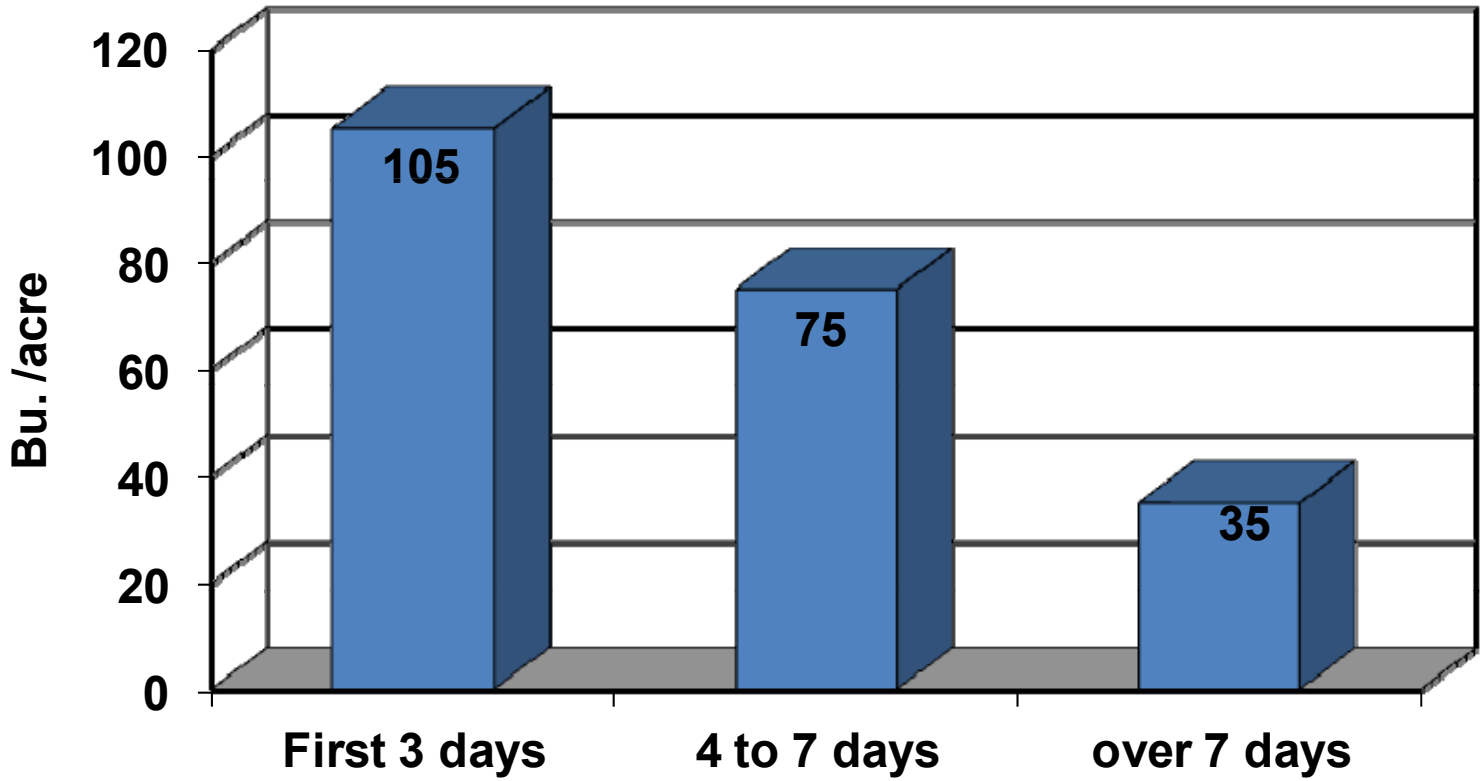
Seed Size (seed/lb)	% Germination 90 %	80 %	70 %
10,000	157	177	202
11,000	142	160	182
12,000	131	147	168
13,000	121	136	155
14,000	112	126	144
15,000	104	117	134
16,000	98	110	126
17,000	92	103	118
18,000	87	98	112
19,000	82	92	105
20,000	78	88	100

Univ. of Georgia : 2007: rates = 1.2 to 1.7 million seeds per acre

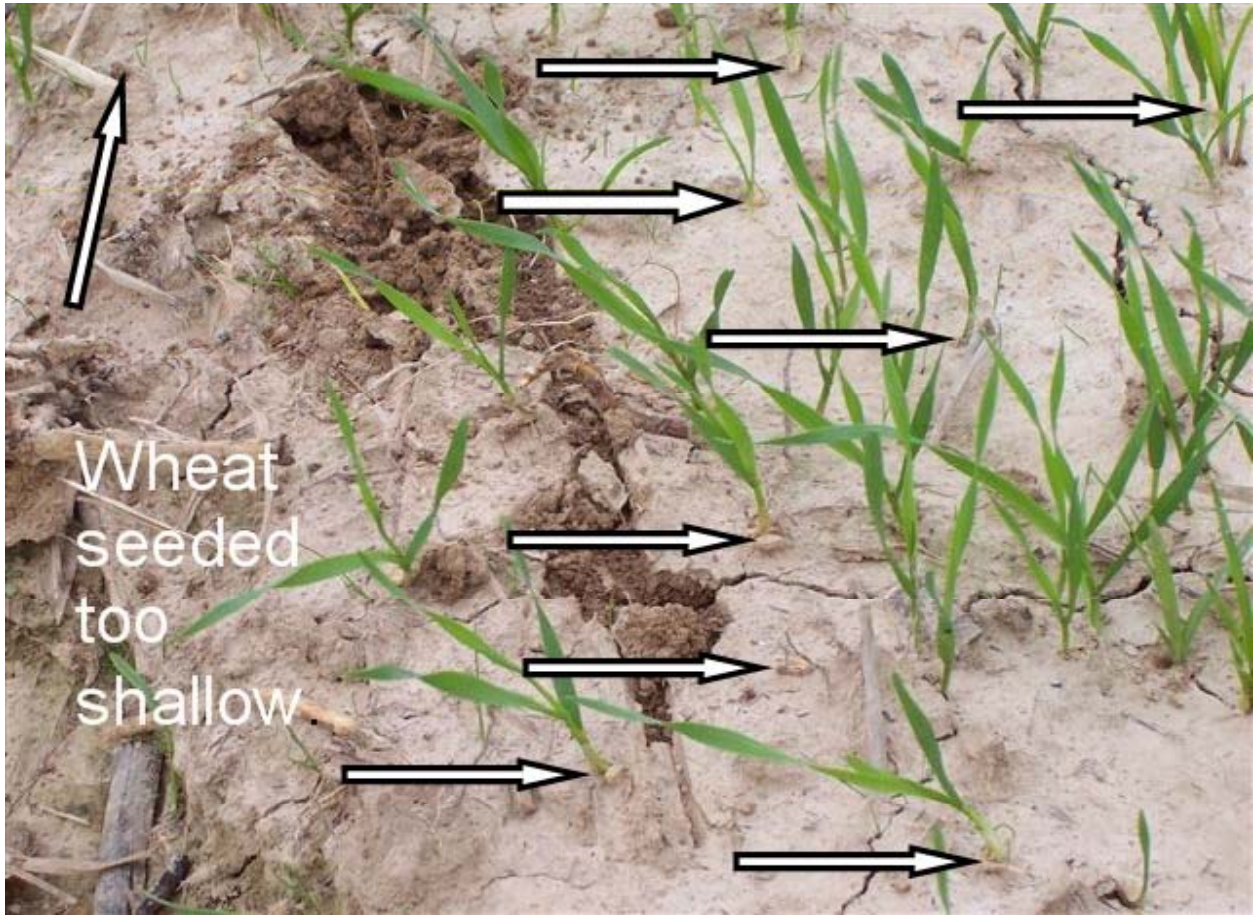
Planting Success: Firm Seedbed

Loose soil means poor depth control

The Value of Even Emergence



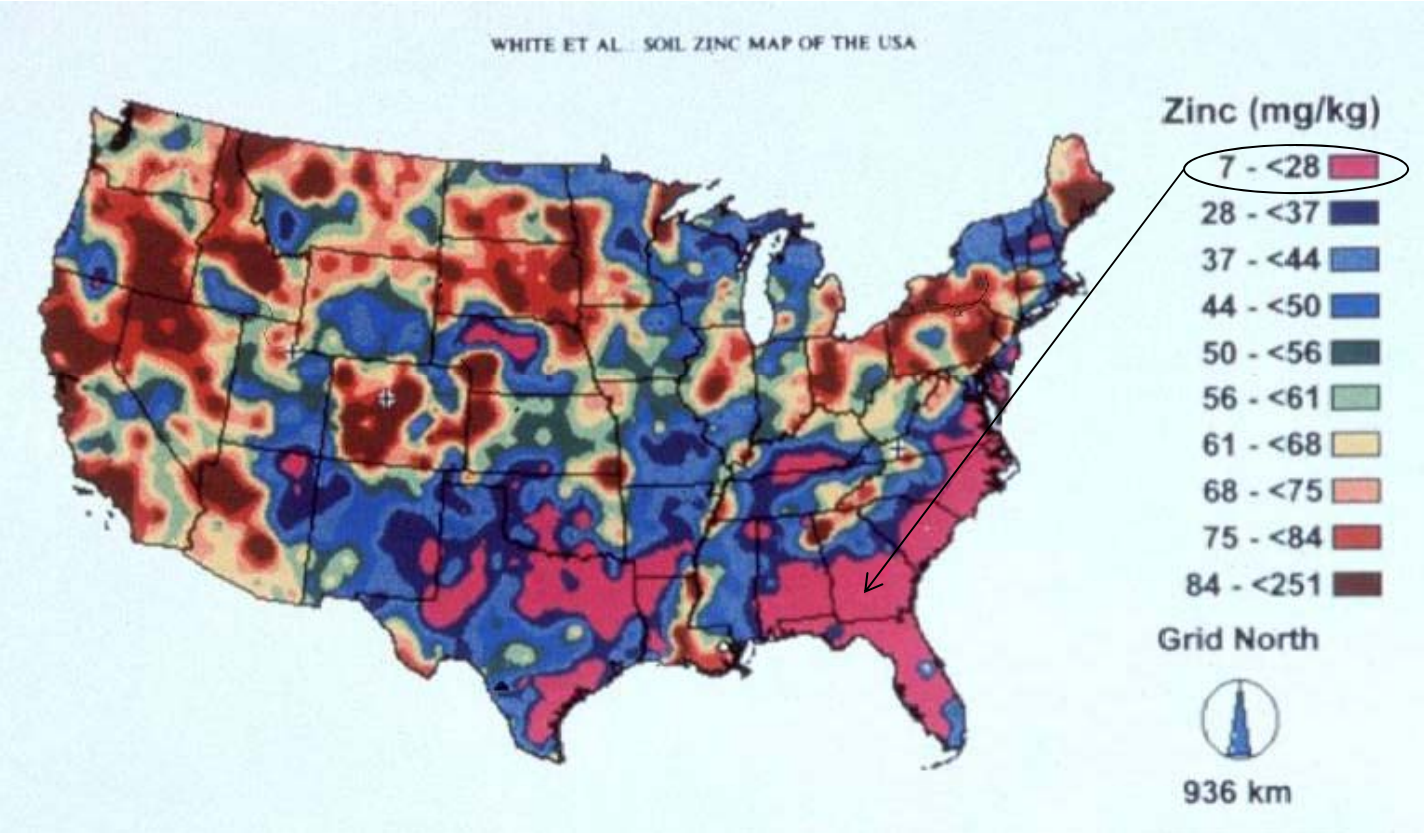
Seeding Depth is Key



Plant Nutrition for Disease Protection

- Phosphorous: roots/maturity
- Potassium (chlorine): reduces leaf diseases
- Sulfur: balance with N
- Zinc: low levels cause problems in hot weather
- Manganese: key to reduce take-all, plant health
- Copper: low levels = freeze damage

Soil Zinc Map



Soil zinc levels are naturally low

Watch for Fall Aphids

- Can lower yields by 33%
- Can vector virus (barley yellow dwarf)
- Can kill tillers (greenbug)
- Early planted most vulnerable
- Can treat seed with ***Vizor Plus*** or apply Karate® as a post-emergence at two to three leaf stage.

Watch for Fall Hessian Fly

- Pressure is significantly increased after a dry summer
- Volunteer grasses act as “green-bridge”
- To limit losses treat seed with ***Vizor Plus*** or apply Karate® as a post-emergence at two to three leaf stage

Wheat Weeds

Beat early in the game

- Weeds compete for nutrients, damage yields with light

Several use two-shot

- Use Harmony Extra, add banvel for larger weeds

Ryegrass

- Finesse early
- Axial (w/ N): Prowl?
- Osprey for bluegrass
- Avg. daily tempts =45^0

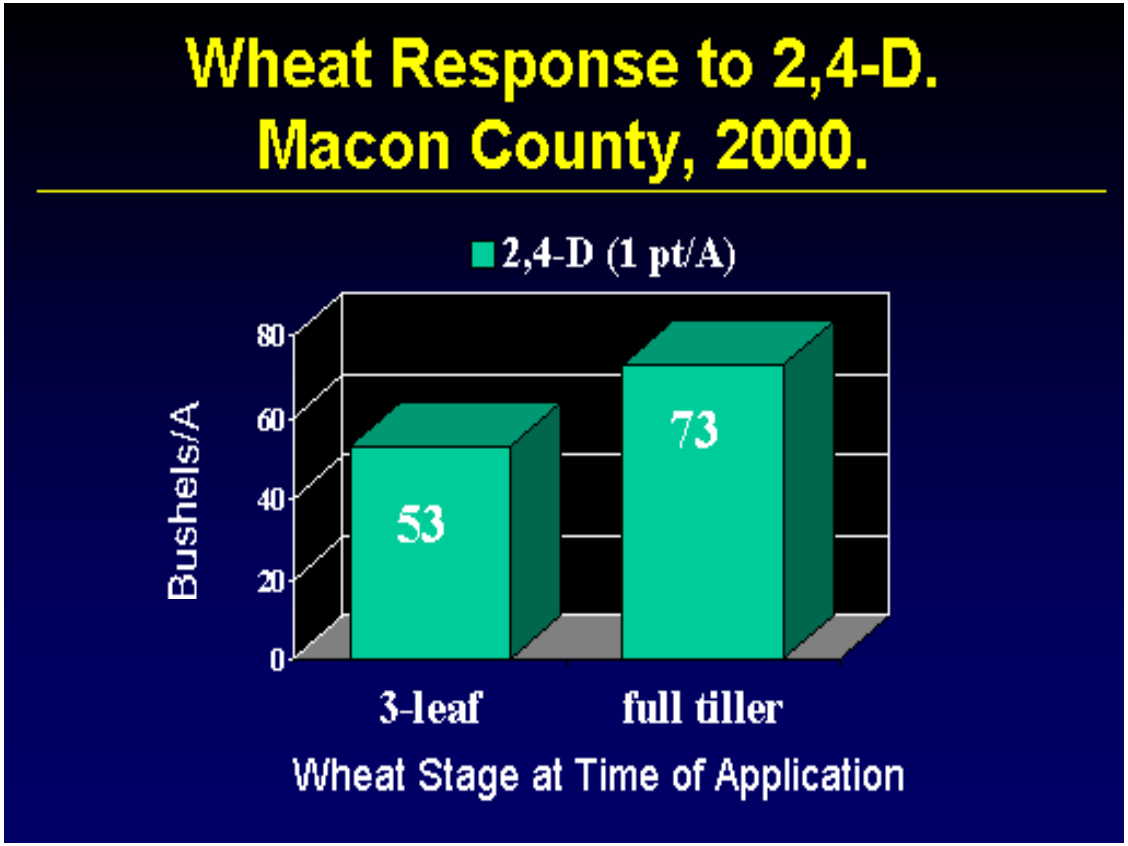
Wheat Weeds: 2, 4-D Lowers Yields

Winter wheat yield reduction in response to herbicides applied at four growth stages in absence of weeds.

		----------Growth stage at application----------			
	Rate	Fall	Tillering	Boot	Headed
Treatment	*ozs/A*	*----------% yield reduction----------*			
2,4-D ester	8	13	13	6	4
2,4-D ester	16	30	15	23	22
Dicamba	4	0	0	14	7
Dicamba	8	3	3	50	3

Adapted from Robinson and Fenster, 1973. Agro. J. 65:749-751.

Wheat Weeds: 2, 4-D Lowers Yields



University of Georgia

What's Next?

- Monitor crop for tillers (01/15 to 02/15)
- Check for weeds and ryegrass
- Look for manganese problem areas
- Look for mildew and leaf Septoria
- Plant tissue sample at GS5
- Topdress with N: S?, Mn?, B?, ZN?
- Topdress with Karate
- Topdress with Headline/ Quadris?
- Check for late diseases (no strobi's)

Winter and Spring Wheat Mgt

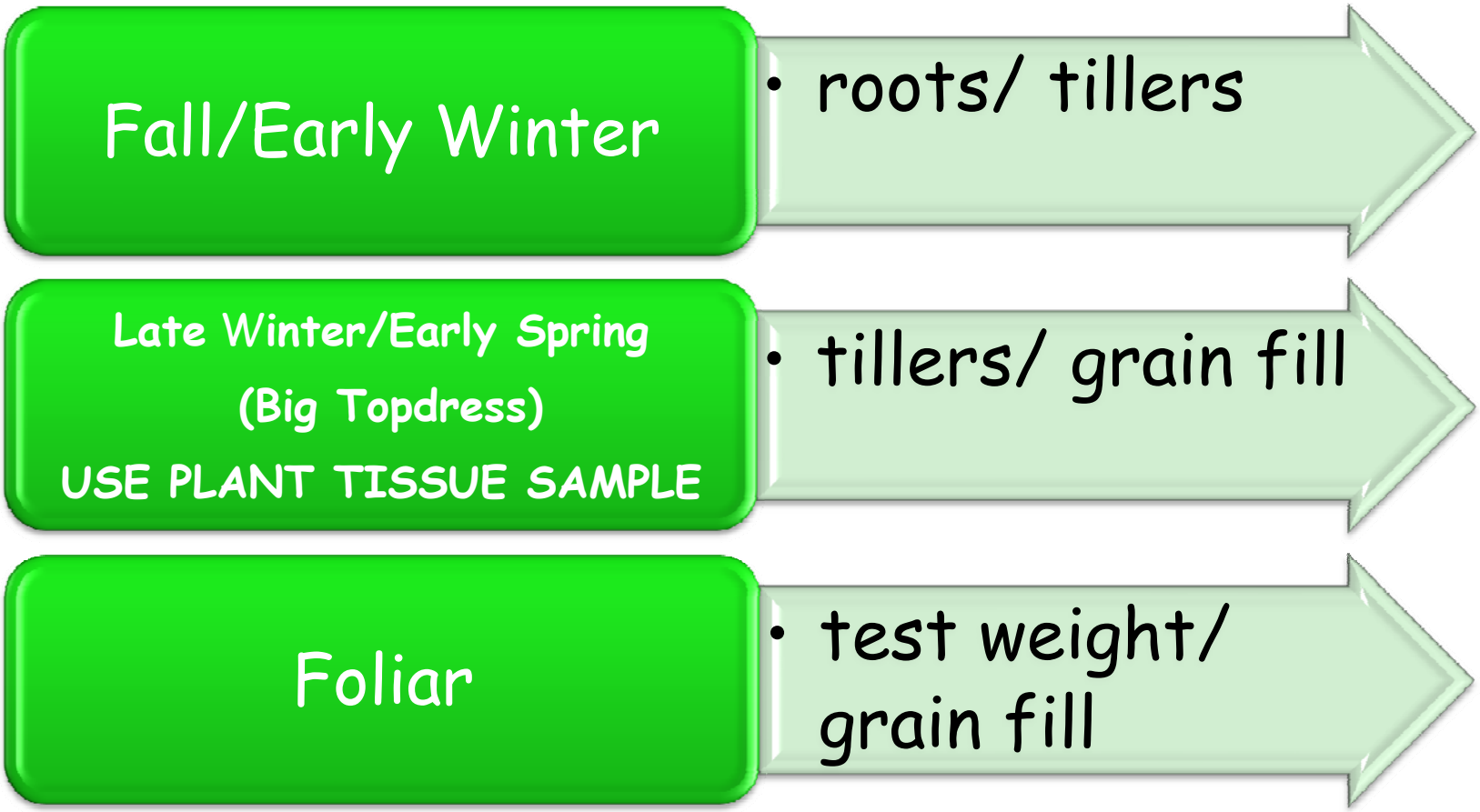
Manage topdress fertilizer and nitrogen (35% of yield potential)

Balance plant food (tissue sampling)

Protect yields

Control diseases	Control weeds	Control insects

Nitrogen is the Key to Yields!



Nitrogen is the Key to Yields!

- Goal: 1.25 lbs. to 1.5 N/acre to produce 1 bu. of wheat
  - 25 % to 35% reduction in N fertilizer
- Too much = lodging
- Too little = lower yields

Wheat Tillers

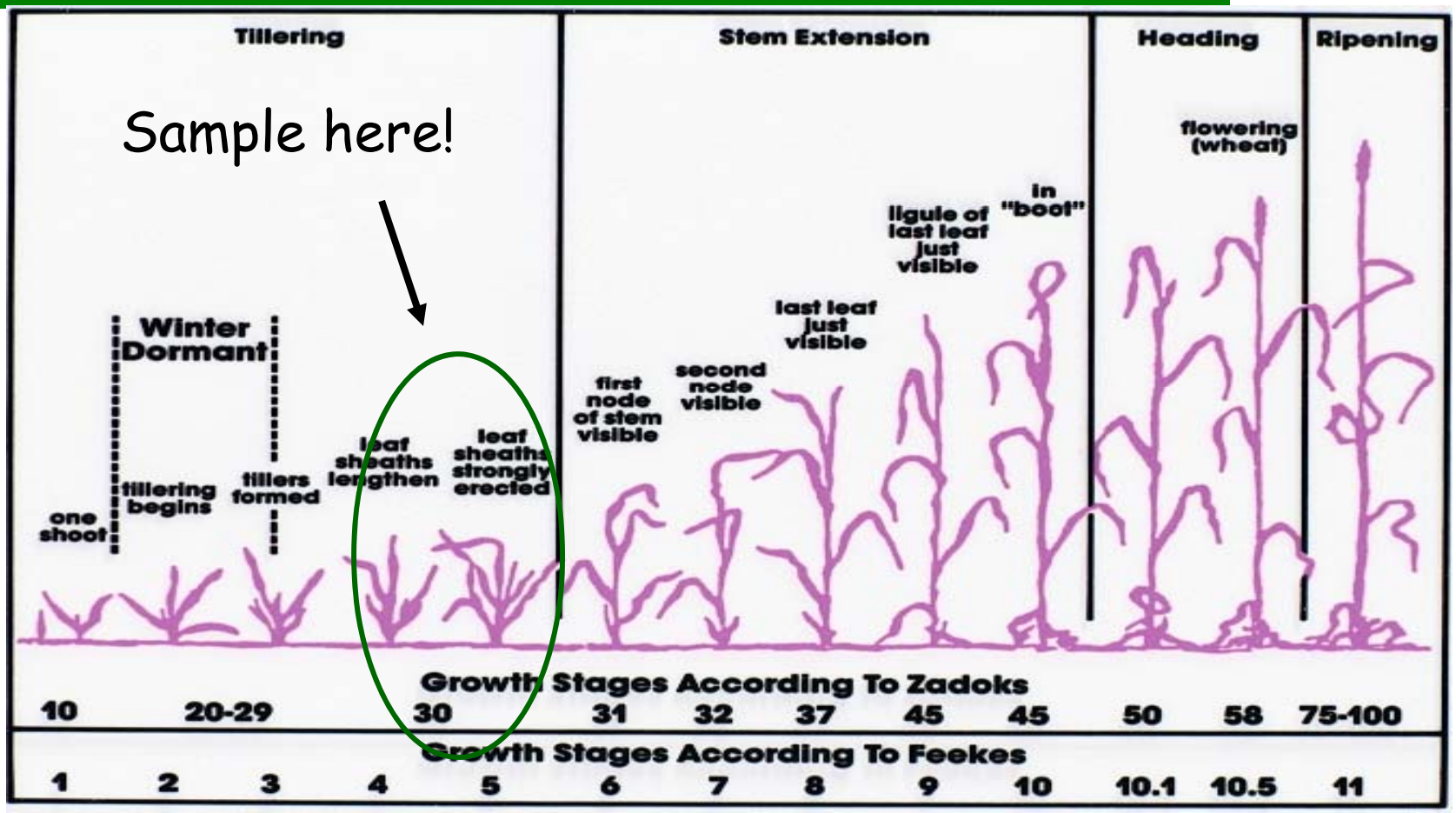
- Check between 01/15 and 02/15
- > 100 tiller /sq. ft. (19.2” in 7.5” drill)
- Supply more N if <100
- Three leaves /tiller to count
- More than 8 tillers = problem (usually boron)

Winter Topdress N ?

- Count tillers ft/sq (19.2” in 7.5” row)
- Three leaves /tiller to count
- Determine if N is needed

TILLERS/ Sq. FT	LBS./A N	LBS. /A S
LESS THAN 50	60	7
51 TO 70	50	6
71 TO 100	40	5
MORE THAN 100	0	0

Big Topdress



Plant Tissue Samples: Wheat

- Plants will make “holes” just prior to jointing: about ½” above soil line
- Jointing means heads are above soil line
- Once joints appear, wheat will remain flat if traffic occurs

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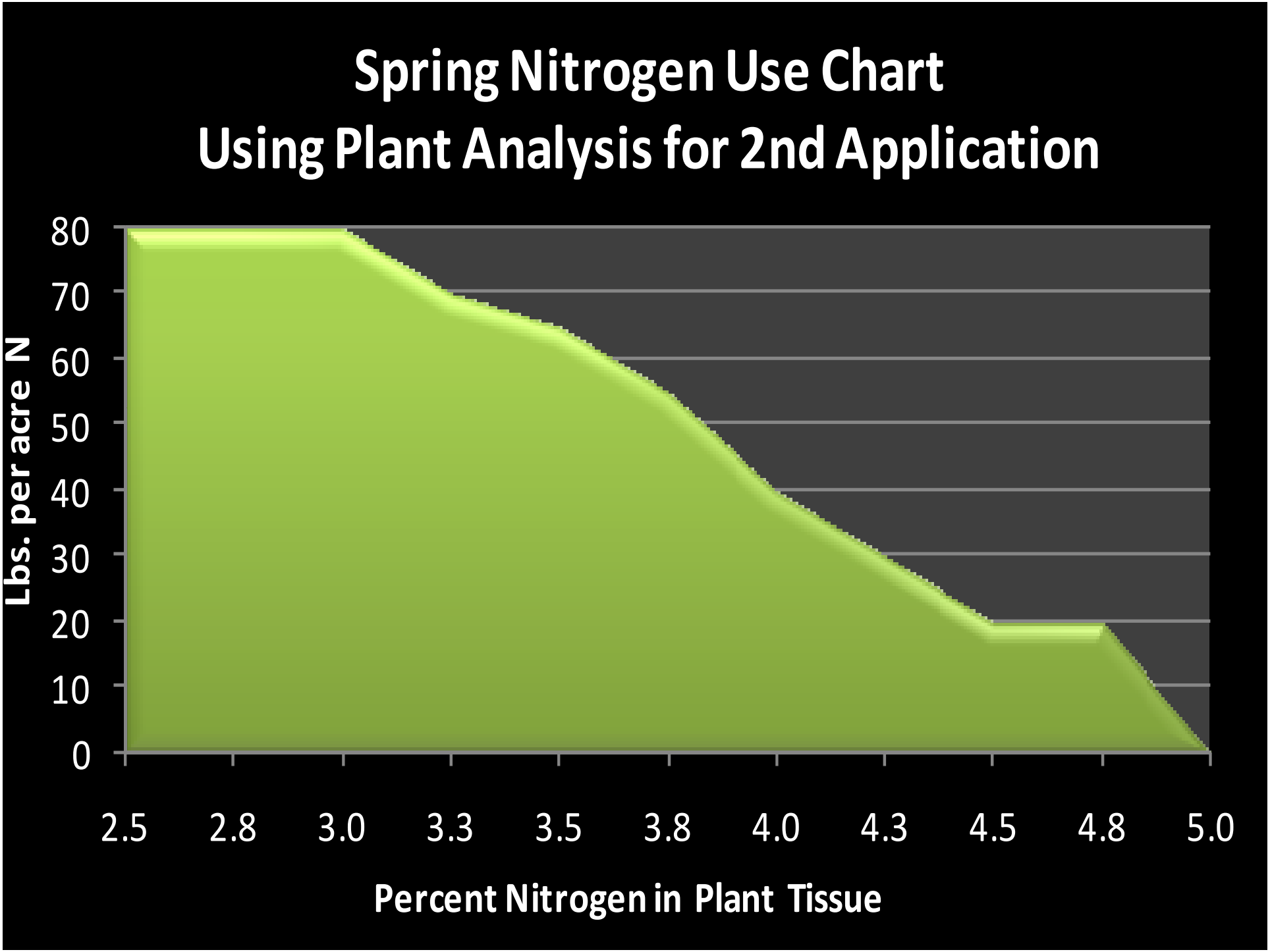
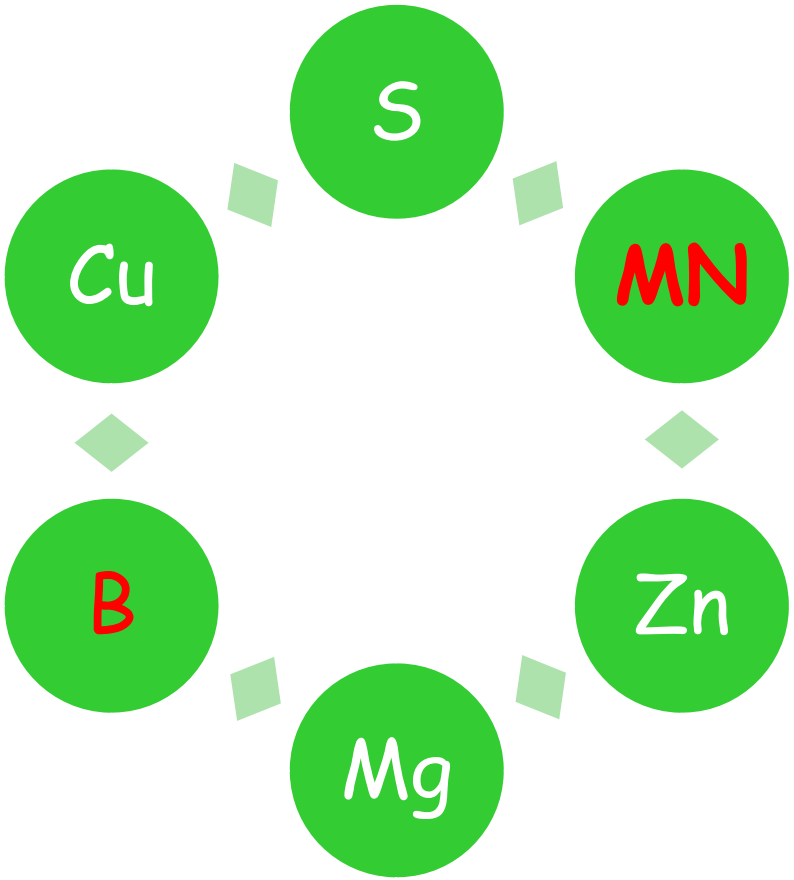

Spring Nitrogen Use Chart
Using Plant Analysis for 2nd Application
Lbs. per acre N
80
70
60
50
40
30
20
10
0
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
Percent Nitrogen in Plant Tissue

Plant Tissue Samples: Limiting Elements

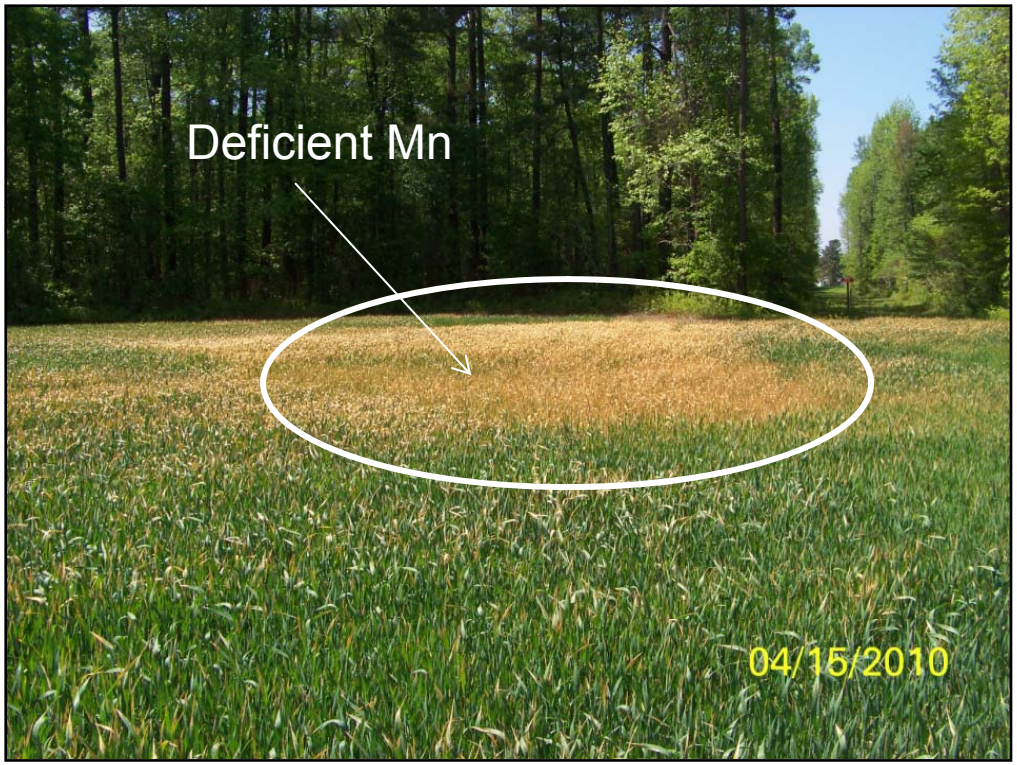


Plant Tissue Samples: Limiting Elements

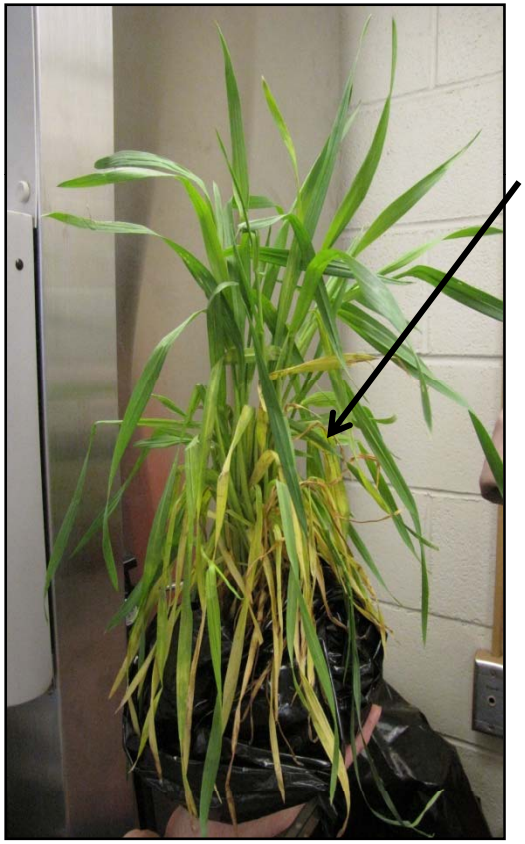
- Zinc: maturity, ripening
- Boron; flowering and kernel numbers
- Manganese: disease resistance
- Copper: low levels = freeze damage
- Magnesium: impacted by cool temps: photosynthesis

Manganese (Mn) in 2010

- Very low/ deficient plant manganese levels in wheat causes excessive burn when applying nitrogen solutions

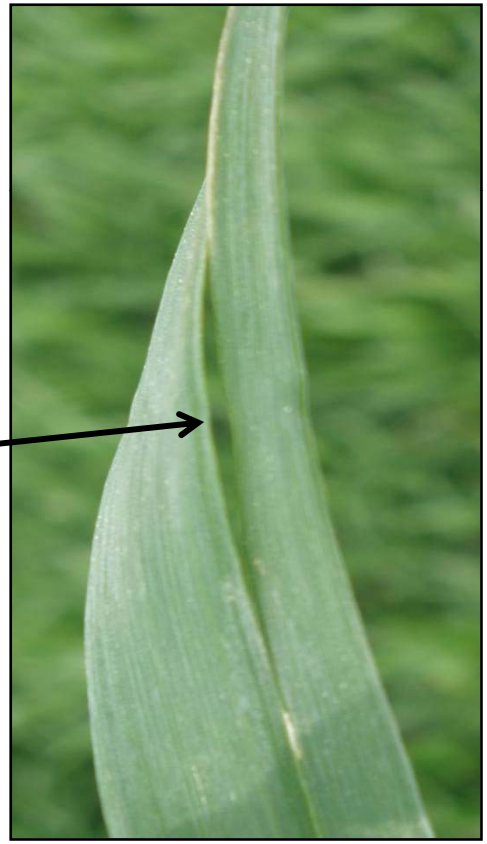


Other Nutrients Lacking in Wheat



Magnesium deficiency of wheat

Boron deficiency of wheat



Wheat Micronutrients

Manganese

- Usually have to apply twice
- Once in winter and again with main topdress
- Use 13% EDTA at 1 #/ acre each time
- For normal use, add ½ #/acre with topdress N

Boron: apply ½ lb. /acre

Magnesium: apply 20 lbs. Epsom salts

Foliar N

- Plant tissue samples will reveal if more N is needed
- Samples taken of flag leaf after fully unfurled
- 1 # Foliar N = 4# Ground N

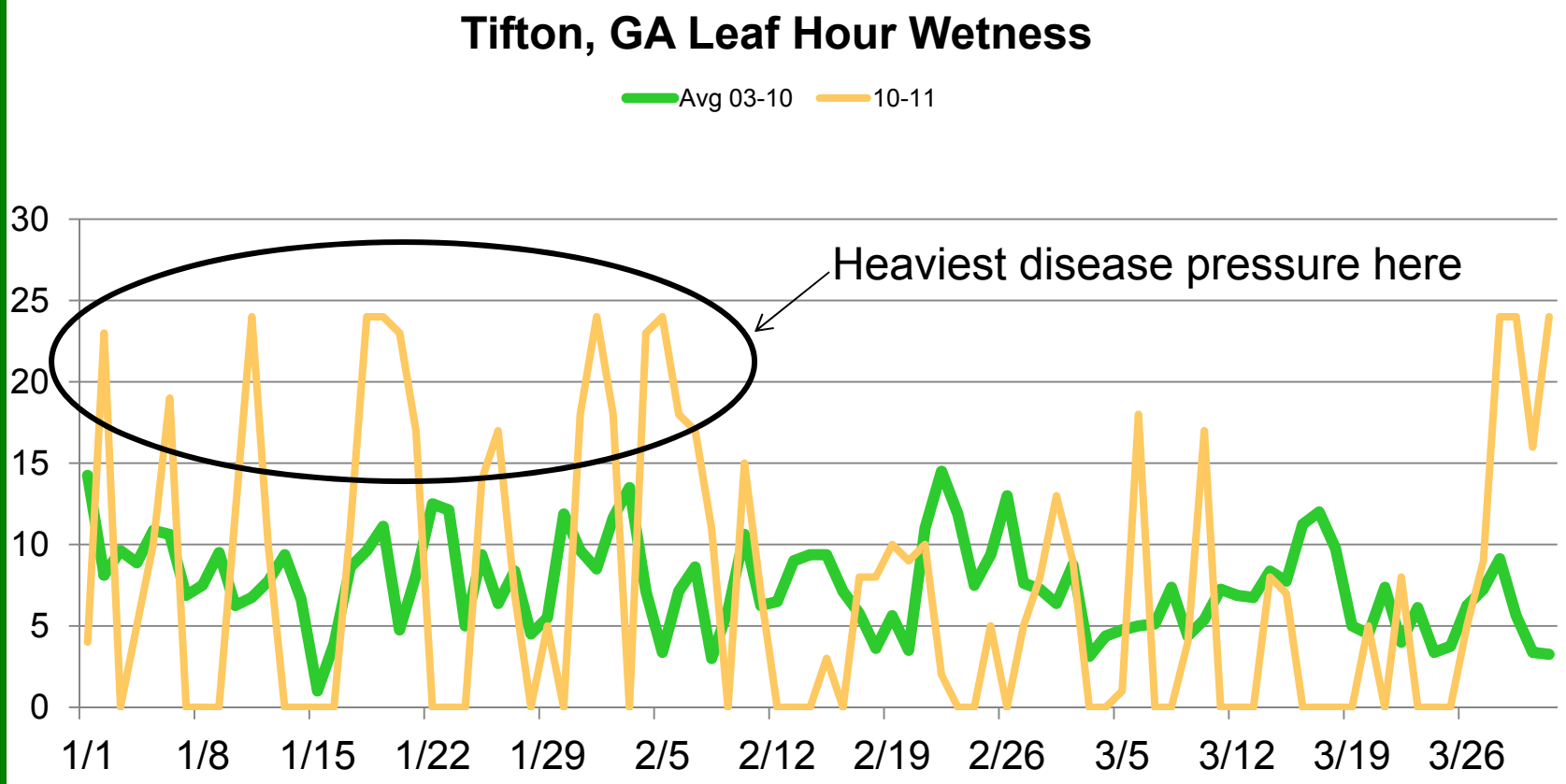
Wheat Diseases

Entered weather data into disease models

Found diseases much earlier than previously thought

Cool-season (winter) wheat diseases vs. warm season (spring) wheat diseases

Wheat Weather: Winter



Winter Disease Infections

Septoria, Tan Spot and Powdery Mildew

↓

Cool-season diseases (40^0 F)

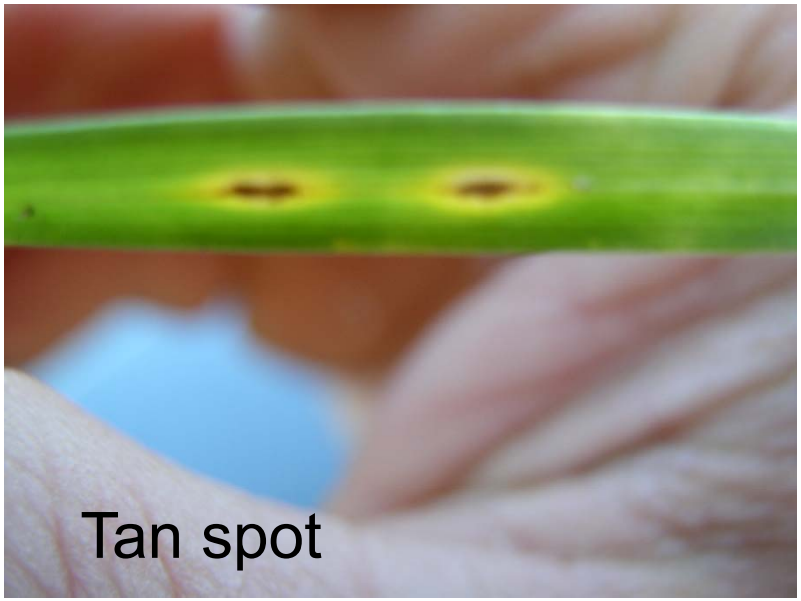
↓

Lowers yields by 20%

↓

Losses are greatest when infection occurs prior to heading

Winter Diseases



Early Leaf Disease Infections

Fungicide 2004 (heavy pressure)	Yield Bu/Acre	Moist	TW
Fungicide applied at F5 & F10	81.4	13.0	57.4
Applied at F10 only	74.6	13.3	57.7
None	67.2	13.8	55.1

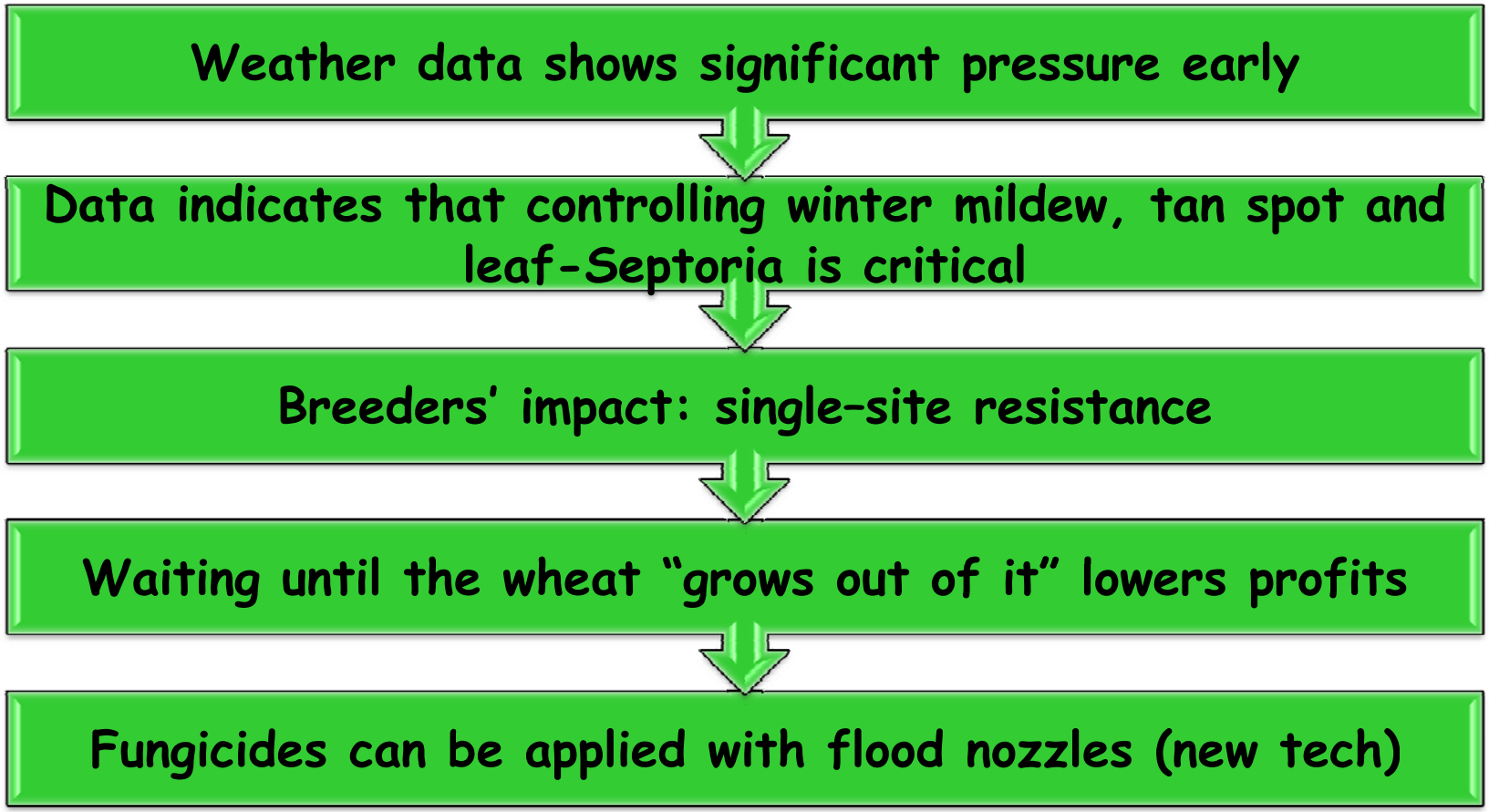
Early Leaf Disease Infections

Fungicide 2006 (light pressure)	Yield	Moist	TW
Applied at F5	132.1	13.1	63
Applied at F5 & F10	129.7	13.3	59
None	125.0	13.1	61

Early Leaf Disease Infections

Fungicide 2008 (very heavy pressure)	Yield	Moist	TW
Applied at F5	94	14.7	59
None	71	14.1	58

Winter Diseases



Spring Diseases

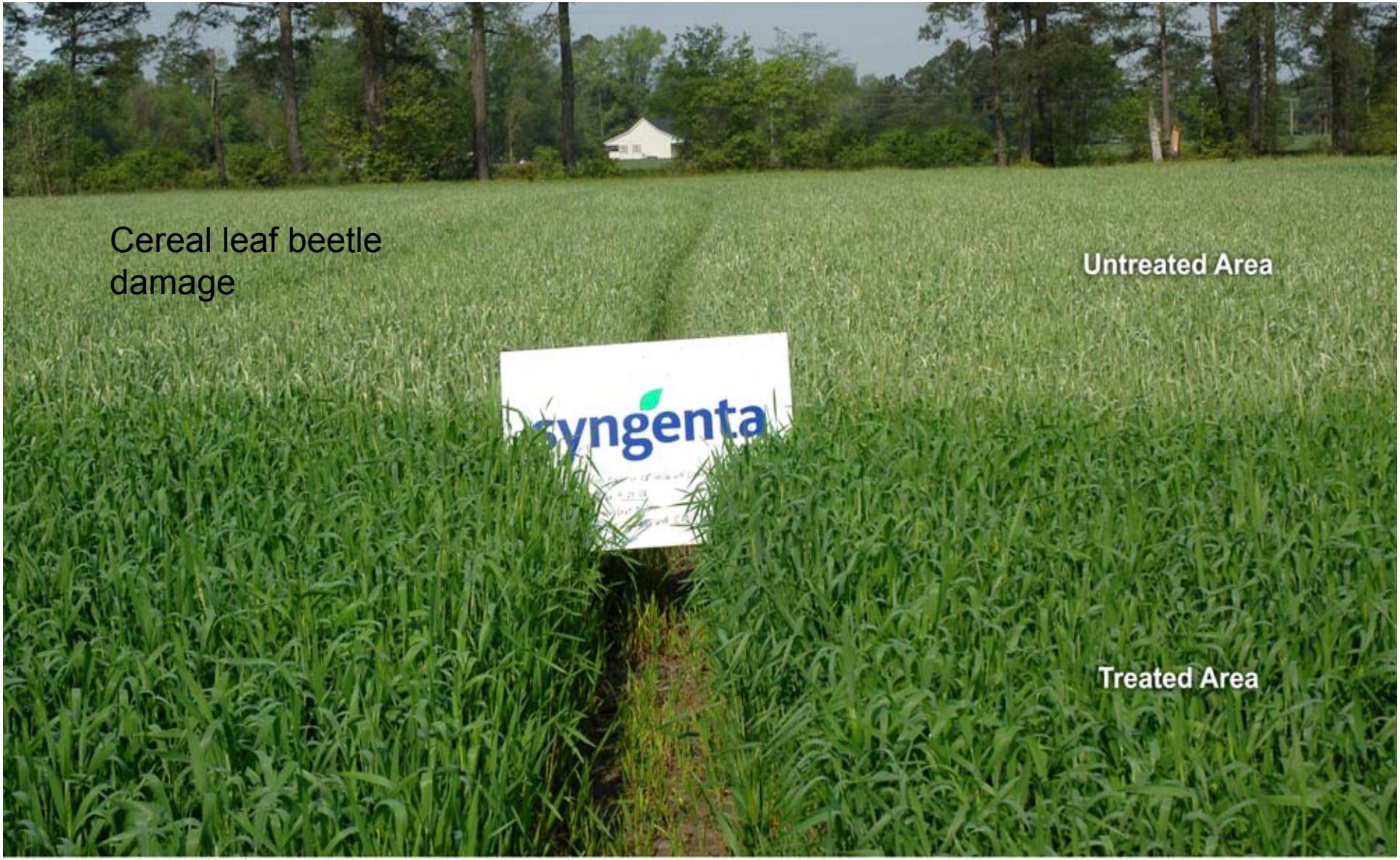
- May or may not need a late fungicide application depending on leaf wetness and variety
- Some varieties need an application because of susceptibility to glume blotch, scab and rust (warmer temperatures)

Wheat Diseases

- Cool-season diseases: apply on all fields
  - Tan-spot, mildew, leaf Septoria
  - Apply Quilt/ Quadris/Headline/Tilt around GS5 @ ½ to full rate
  - Can apply with topdress Nitrogen (not U32)
  - Wheat varieties: break resistance or no resistance
- Warm–season diseases: apply by variety
  - Rust, glume blotch (head Septoria), scab
  - Apply Caramba or Prosaro (no strobi)
  - Some varieties have solid resistance

Spring Insects

- Use Karate® 1.5 to 1.9 ozs. with topdress nitrogen in the spring @ GS5
  - Controls Hessian fly, cereal leaf beetle, armyworms, aphids
  - Applications before GS 5 are likely to not workwork



Karate Z application made at 1.5 ozs/Acre with Liquid N topdress on 3/20/08

Observation and pics taken on 4-29-08

Treated Area = No Cereal Leaf Beetles

Untreated Area = Heavy Infestation with CLB's

Syngenta Karate® with Zeon Technology™

Karate with Zeon Technology™ is a Restricted Use Pesticide.

Harvesting/ Storing Wheat

- Easy to dry (harvest at 20% moisture)
- Chop straw for DC beans, cotton, etc.
- Moisture = TW loss (4%-10% in 4 days)
- Milling quality drops fast at maturity
- Treat with Storicide if storing

Climbing the Yield Ladder

1982 : state avg. yield = 38 bu/acre

Mid-80's: Seeding rates and seed depth, fall fertility

Late 80's: Control fall insects/ early weed control

1990's: fungicide seed treatments: apply Karate with topdress N

2000 & 2001: Understanding planting schedule

2003: Selecting for scab resistance

2004: Splitting winter/spring fungicides

2010: seed treatment for warm soils

2011: the value of insecticide seed treatments; state average = 72 bu/acre