

# New Zealand Wheat Tour



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Beyond Agronomy

# On the menu

- Lessons from Guinness World Record Holder
- Genetic potential of wheat
- 180 bu/ac hard red spring wheat agronomy
- Pushing wheat yields in Alberta
- 207 bu/ac barley agronomy



# Mike Solari “I came alive at 65”



210 bu/ac



90 kernels/head



# Senescence



# Solar Capture





# Genetic Potential of Wheat

- 220 plants M2
- 3 heads per plant
- 30 florets x 6 kernels per floret
- 60 gram TKW
- 220 plants x 3 heads/plant x 180 kernels/head x  
50 grams/TKW ÷ 100,000 = 71.28 T/ha
- 1057 bu/ac!

# Common Threads in GWR

1. Crops were sown into pea stubble.
2. Crops had a deep ripping application down to 15 inches.
3. Nitrogen application, growth regulators and fungicides were applied at the same growth stages in a very prescriptive manner.
4. Crops had a history of “grass break” crops (ie. grass rotation) within two years.
5. No micronutrients were applied.
6. Soil fertility levels were unexpectedly low in calcium, magnesium, potassium and phosphorus.
7. Soil organic carbon or organic matter was 3% in the top six inches.

# Apples vs Apples

## New Zealand

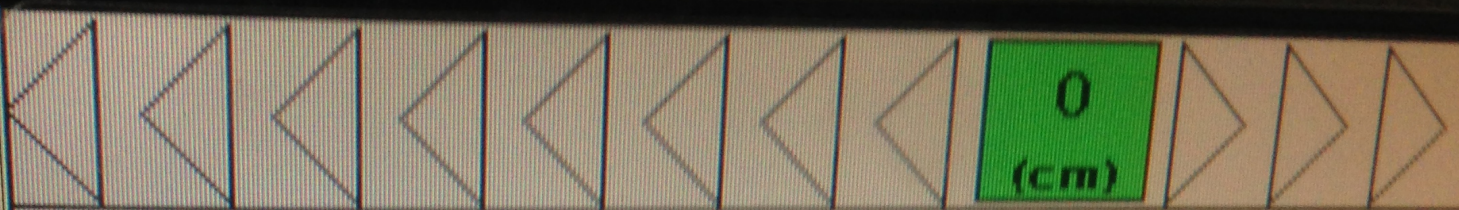
- 125 plants M2
- Main stem + 3 tillers
- 60 kernels/head
- TKW 50 grams
- $125 \times 4 \times 60 \times 50 \div 100,000 = 15 \text{ T/ha}$
- 222 bu/ac



## Alberta

- 400 plants per m2
- Main stem + 2 tillers
- 32 kernels/head
- TKW 40 grams
- $400 \times 3 \times 32 \times 40 \div 100,000 = 15.36 \text{ T/ha}$
- 227 bu/ac

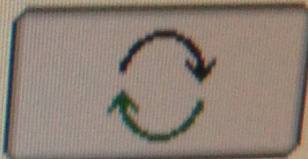
180 bu/ac HRS







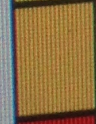
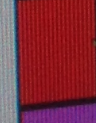
12557.1    
inst.  
(kg/ha)

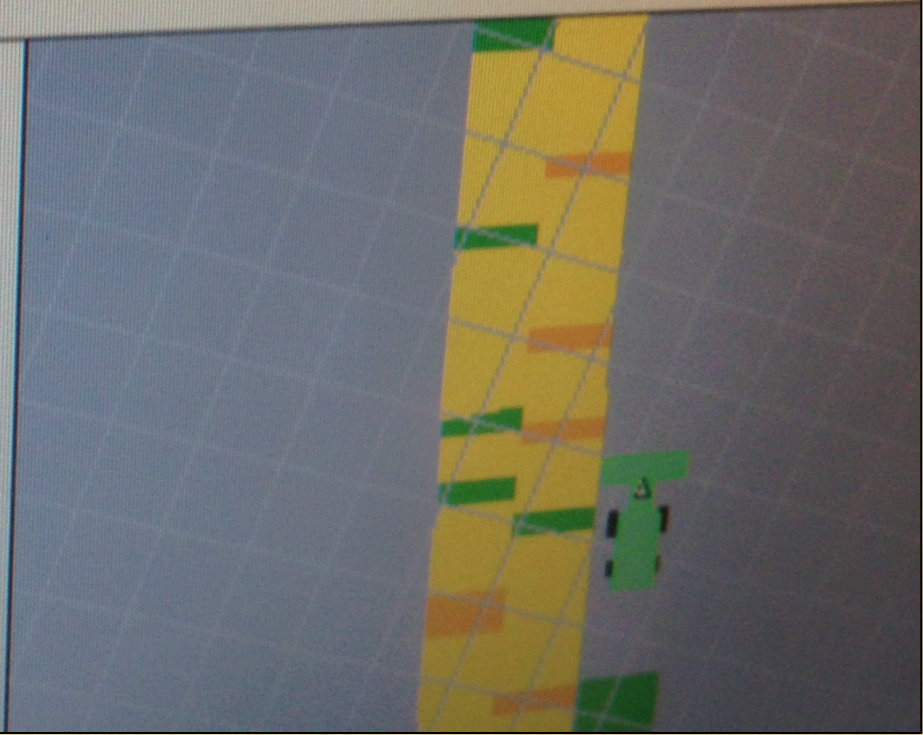
dry



Yield

kg/ha

	13000.0
	11333.3
	9666.6
	8000.0



# Field Records - 180 bu/ac

- Previous crop: Ryegrass seed
- Soil type: Silty loam
- Field prep: Plowed, cultivated twice and rolled prior to sowing
- Planted: September 7th, 2012 Sunflower double disk 7.5" drill
- Fertilizer pre-plant: 90 lb/ac urea broadcast applied
- 225 lb/ac of 0N-5P-15K-14S-13Ca applied pre-plant, broadcast and incorporated
- Variety: Morph
- Seeding rate: 107 lb/ac aiming for 20 plants ft<sup>2</sup>
- Plants stand: 40 heads ft<sup>2</sup>

# Field Records - 180 bu/ac

- Post seed: 20 days, Firebird 140 ml/ac, 240 ml/ac Starane Extra
- GS 30: Applied PGR, Cycocel 800 ml/ac + Opus 120 ml/ac
- GS 31: 110 lb/ac of urea
- Flag leaf minus 1: 110 lb/ac urea, 12 days later than first app
- Flag leaf: Commett (strob) 160 ml/ac + Opus Ultimate (Tria) 160 ml/ac
- Boot stage: 135 lb/ac urea
- Flowering: Commett 160 ml/ac + Folicur 160 ml/ha + Seguris Flexi 500 ml/ac

# Field Records - 180 bu/ac

- Total N: 205 lbs/N/ac
- Harvested March 2nd, 2013 or 180 days
- Rainfall & Irrigation: 380 mm + 120 mm (20")
- Field was under variable rate irrigation and the pre-plant fertilizer was variable rate applied.
- Cost of Inputs: \$1,000/ha NZ  
Gross margin: 12 T/ha x \$450/T = \$5,400/ha  
Net margin: \$4,400/ha or \$1,780/ac NZ



# Residue Management

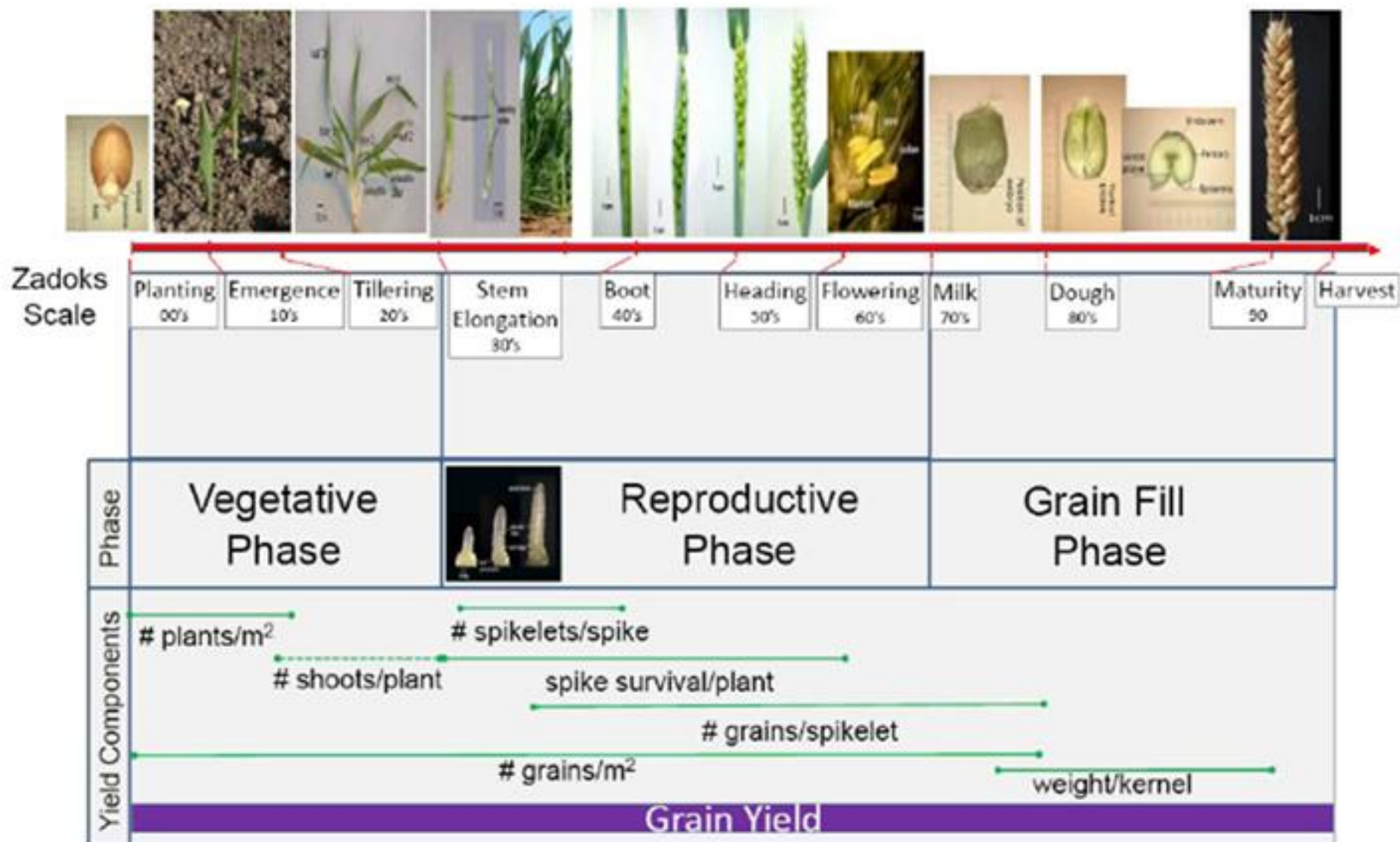




# Pushing wheat yield



# Cereal developmental timeline



# Wheat Growth – Three Hills, AB

- May 1: Planting
- May 15: 1 leaf
- **Jun 1: 3 leaf**
- **Jun 15: 5 leaf 2 tiller**
- **Jun 20: First node**
- **Jun 30: Flag leaf**
- **Jul 5: Boot stage**
- **Jul 10: Flowering**
- Jul 15: Watery ripe
- Jul 25: Milky dough
- Aug 5: Soft dough
- Aug 15: Medium dough
- Aug 25: Hard dough

# Yield Contributions

- Top two leaves = 65%
- Heads = 20%
- Leaf 3 & 4 = 10%
- Stem: 5%
- 52 bu/ac (GS 39)
- 16 bu/ac (GS 60)
- 8 bu/ac (GS 30)
- 4 bu/ac (GS 30-39-60)

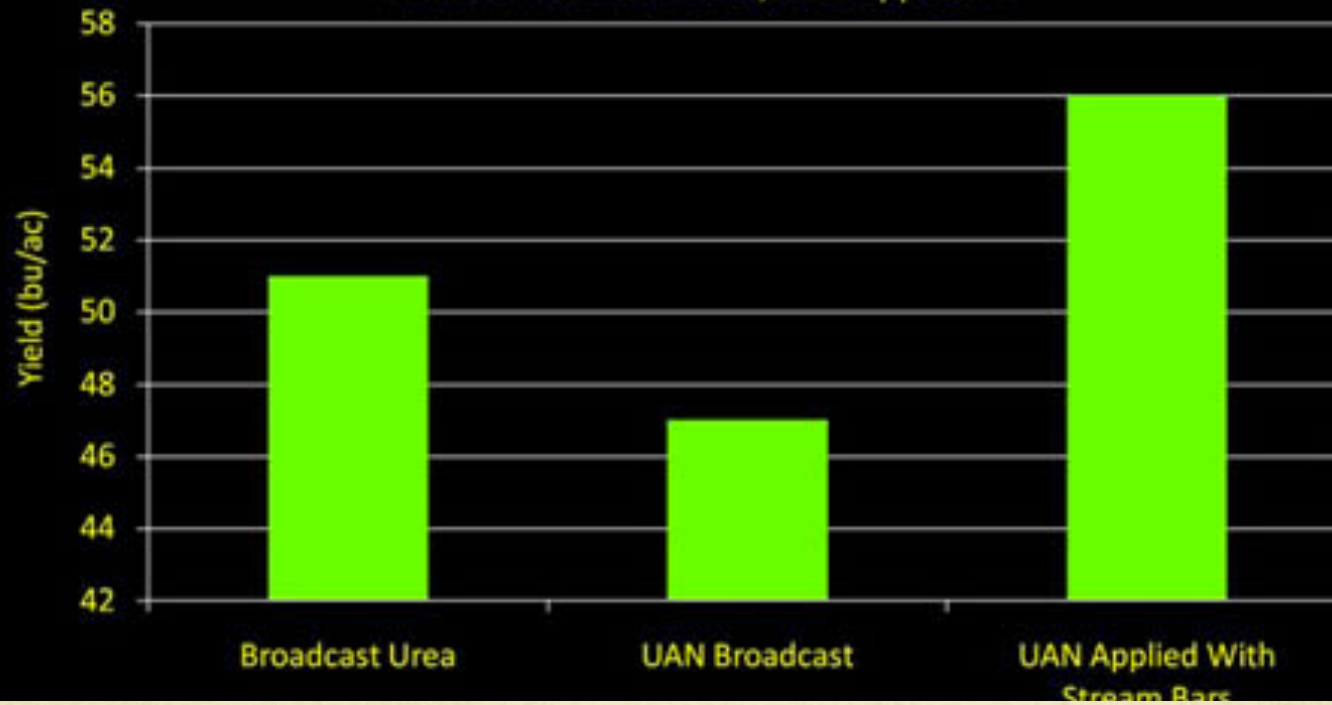
# 2008-2010 Average

	Yield (bu/ac)		
	90N	120N	150N
No fungicide	<b>93.0</b>	96.7	99.4
+ T3 fungicide	99.9	<b>105.1</b>	108.6
+ T1 + T3	99.7	106.2	<b>111.1</b>

Source: Peter Johnson OMAFRA SMART trials

# Nitrogen Application Research.

All treatments had 60 lb/ac of applied N



Source: [www.needhamag.com](http://www.needhamag.com)



# Split nitrogen applications



Source: [www.needhamag.com](http://www.needhamag.com), <http://www.fastsprayers.com/8200-side-fold-applicator/>

**92 bu/ac**

**103 bu/ac**

Source: Peter Johnson, OMAFRA

05/12/2008

# Goals

- Focus on growth stages to manipulate wheat
- Understand narrow window of N application
- Multiple fungicides combined with split N
- 4R's of nitrogen management

# Big yield barley production





# 22 Kernels/Head



# View from above



# Barley 207 bu/ac Agronomy

- Variety: Tavern
- Seeding rate: 123 lbs/ac
- Seed weight: 49 g/tkw
- Seed treatment: Raxil MD
- Seeding date: September 9th, 2012
- Field prep: Disked once and rolled with one light tyne cultivation prior to seeding
- Previous crop: Kale
- Pre-plant fert: 0- 7.7 - 7.5 - 9.3 – 9.3 @ 180 lbs/ac + 41% Flexi N urea coated with 5.2% magnesium @ 90 lbs/ac
- Herbicide: Hussar (idosulfuron- methyl-sodium) @ 150 g/ha



# Barley 207 bu/ac Agronomy

- Tillering (GS 25): Applied 100 lbs N/ac as urea (4 weeks after planting)
- Stem elongation (GS 30): Applied 160 ml/ac Proline (prothioconazole) fungicide
- Awns emerging (GS 50): Applied 160 ml/ac Proline + 140 ml/ac Seguris Flexi (SDHI) fungicide + 400 ml/ac Terpel (mepiquat chloride+chlorethephon) PGR
- Rainfall: 17 inches (4 inches soil + 10 inches rainfall + 3 inches irrigation)
- Kernels: 22 kernels per head
- Harvest date: March 4, 2013

# Take home

- Understand our constraints
- Focus on combination of fungicide and nitrogen
- Drive yield through kernel # and weight
- Row spacing critical to hitting top yields