Growing Confidence




# SOYBEAN AGRONOMY


## BRUCE MURRAY

DEKALB AGRONOMIST EASTERN MANITOBA

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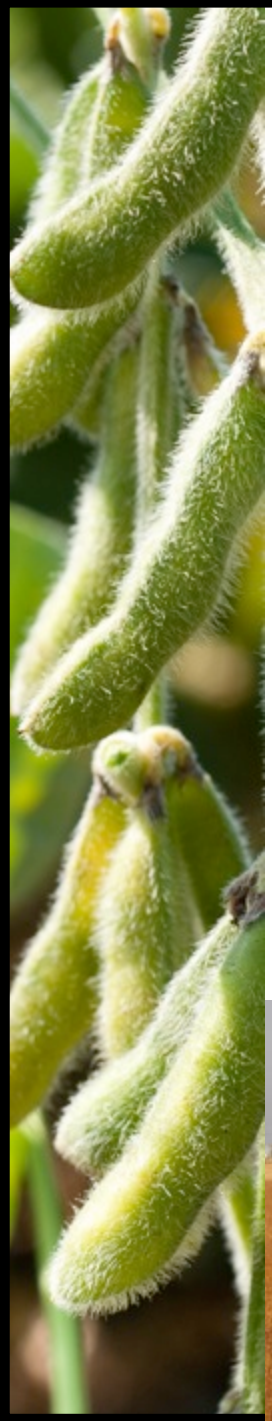

# Soybean Agronomy Outline

- Choosing a variety
  - Heat Units versus Relative Maturity
- Planting Soybeans
  - Equipment
  - Row spacing
- Spraying Soybeans
- Soybean Insects
- Soybean Diseases
- Crop Rotation
- Volunteer Canola Control

# Choosing a Variety

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# Heat Units versus Relative Maturity

# Crop Heat Units versus Relative Maturity

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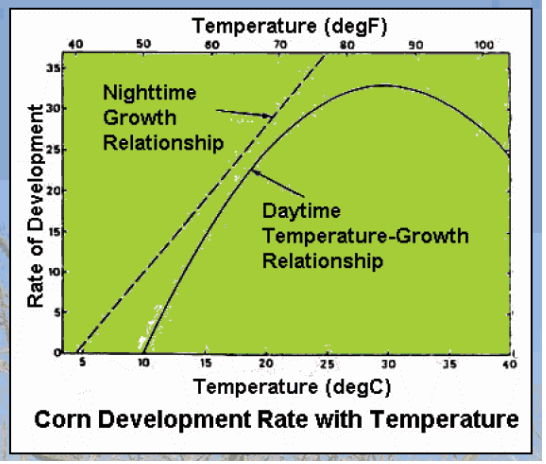
- **Crop Heat Units**
  - CHU is based on air temperature
    - (X+Y/2) = Daily CHU accumulation
    - X = Night time low above 4.4 °C
    - Y = Day time high below 30 °C, above 10 °C
    - Accumulation starts on the last of 3 consecutive days of 12.8 °C
    - Accumulation ends on the first occurrence of -2 °C

## CHU Base Temperatures

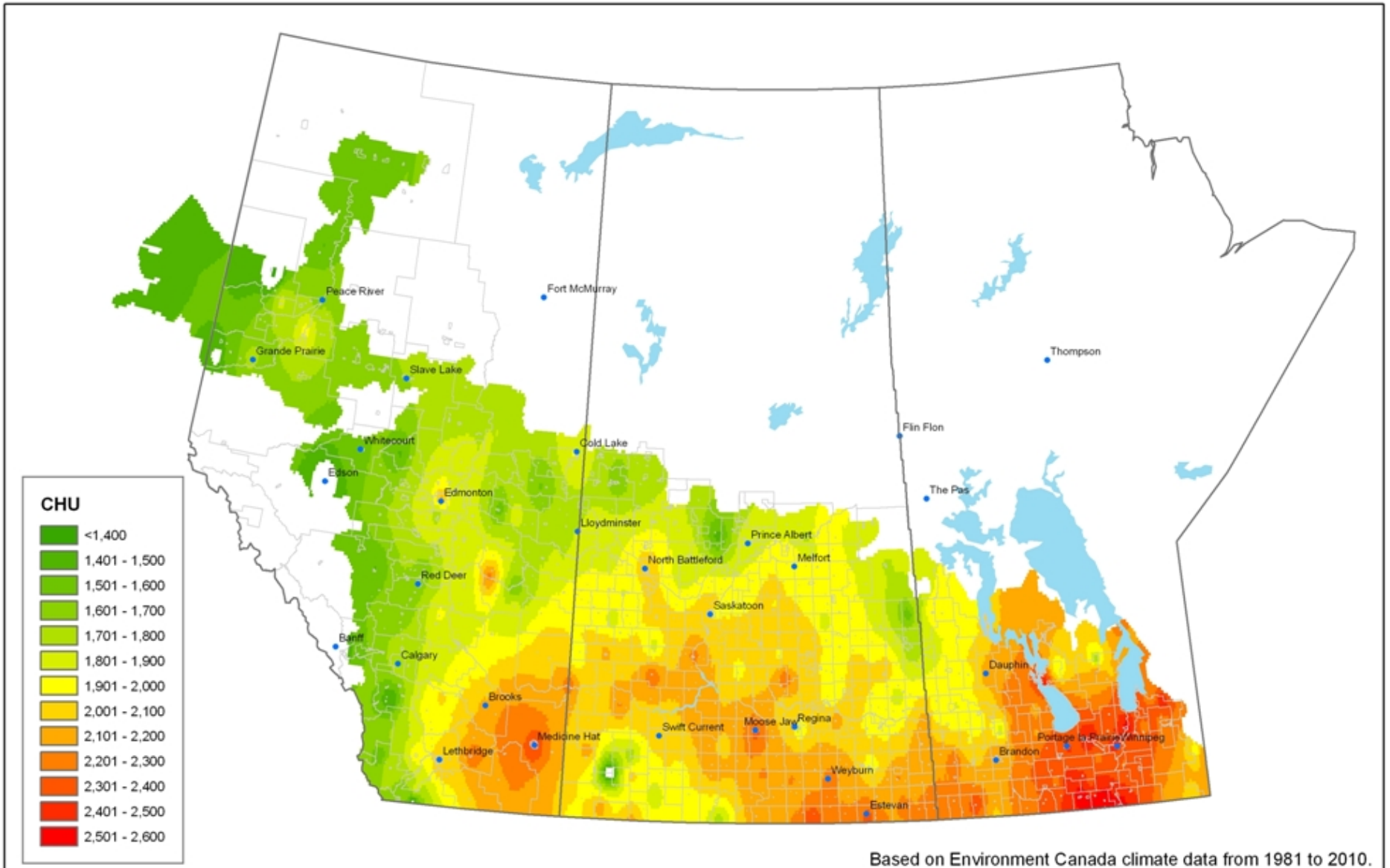
- Daytime min = 10°C
- Daytime max = 30 °C
- Nighttime min = 4.4 °C



Corn Development Rate with Temperature

# Average accumulation of CHU from May 15 to 25% risk of first fall frost

WIN
Weather INnovations Incorporated




Based on Environment Canada climate data from 1981 to 2010.

# Average accumulation of CHU from May 15 to 25% risk of first fall frost

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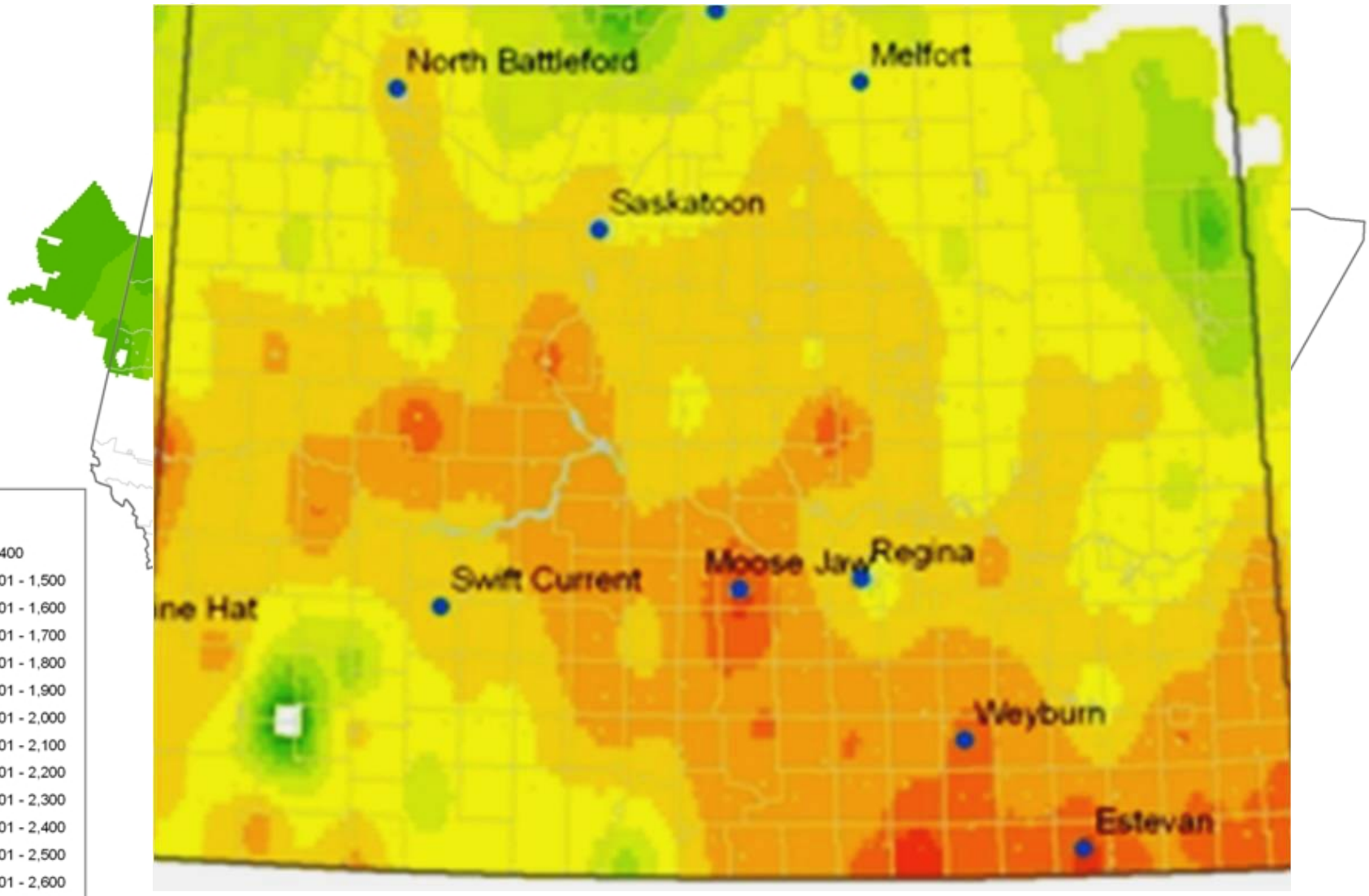


Based on Environment Canada climate data from 1981 to 2010.

# Crop Heat Units vs Relative Maturity

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## What about day length?

- Duration of sunshine
- The lower sun angle reduces the intensity of the incoming rays by 30% when the sun is at 45°

- Photosensitivity
  - e.g. Soybeans
  - Is the CHU the right approach?


# Crop Heat Units versus Relative Maturity

- **Relative Maturity**
  - Based on physiological maturity
  - The date 95% of the pods have turned colour
  - i.e. 95% on Sept 1st, 0.1 maturity
- Soybean maturity related to daylight & heat
  - Sunlight key to strong soybean crop
  - Soybeans start flowering around June 21st
  - Good to use a combination of CHU and RM

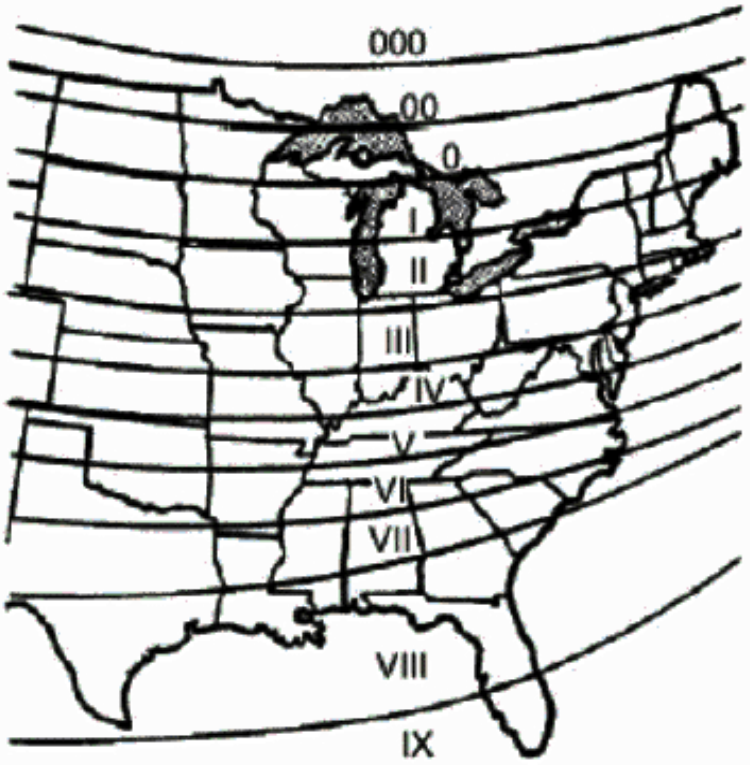
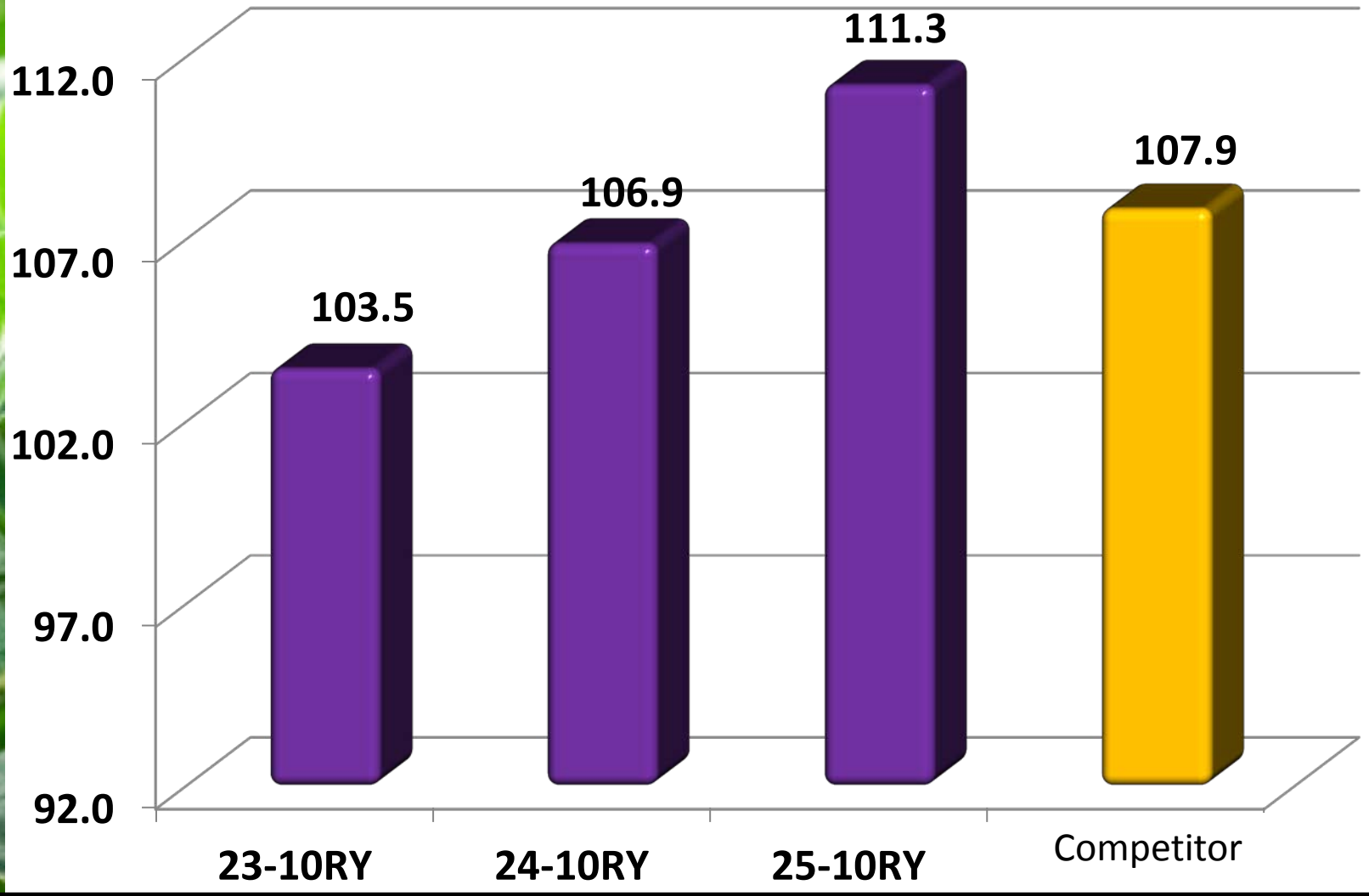
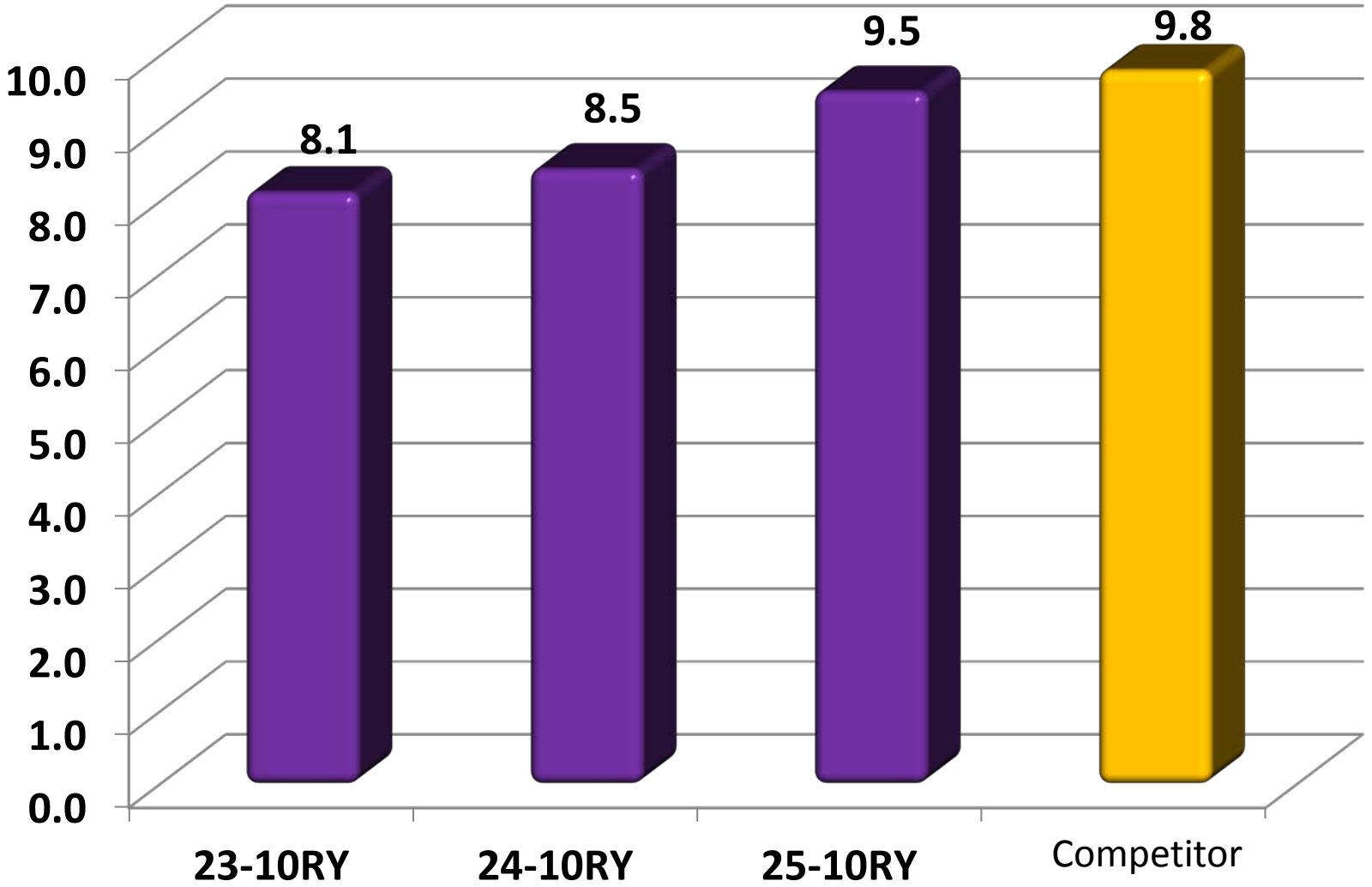



Fig.7. Soybean maturity zones

# 2012 Days to 95% Pod Colour Change (n=21)

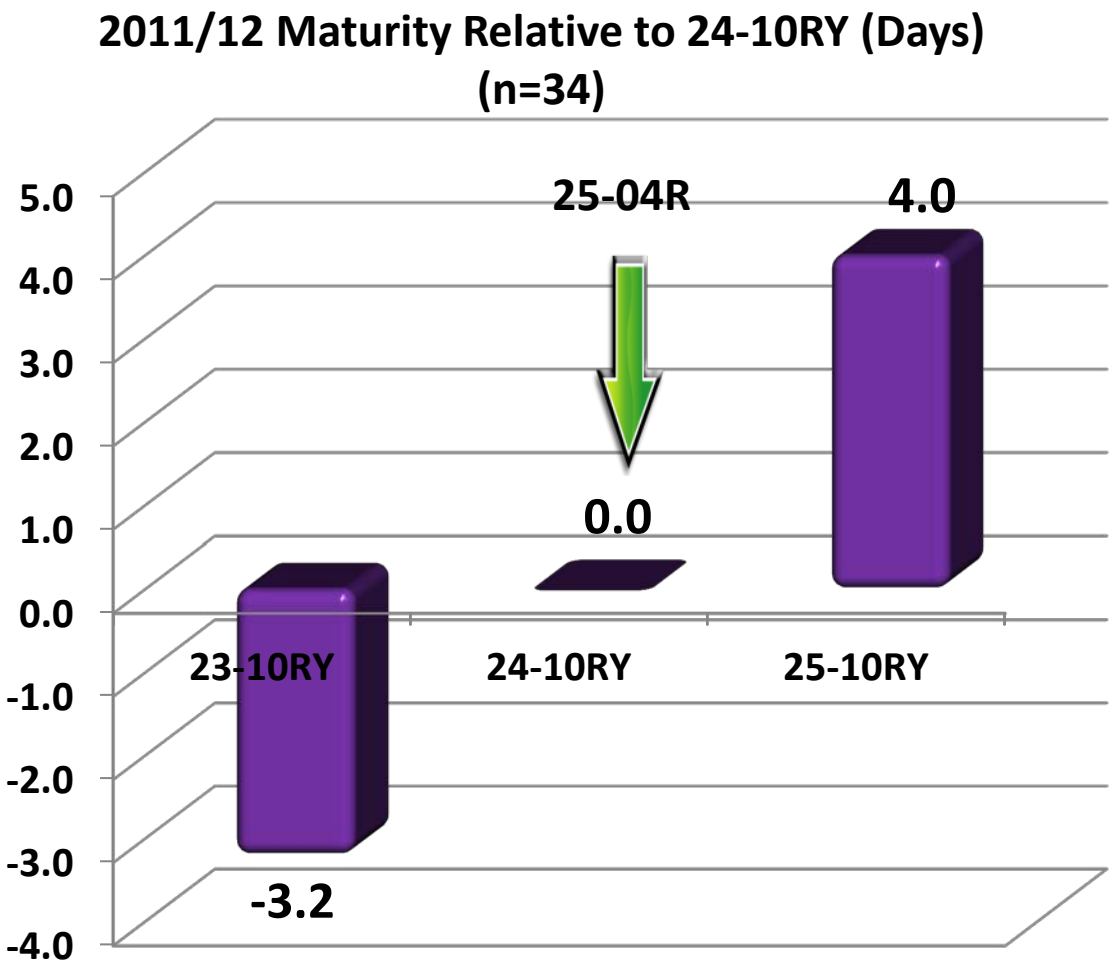


# 2012 % Seed Moisture (n=25)



# DEKALB Soys

- 23-10RY
  - 2325 CHU
  - 0.01 RM
- 24-10RY
  - 2425 CHU
  - 0.05 RM
- 25-10RY
  - 2500 CHU
  - 0.09 RM



# Seed - Manitoba Tables

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## Western Manitoba Soybean Adaptation Trial

***Comments:***

The Adaptation Soybean variety trial was tested and the data donated by the Manitoba Pulse Growers Association.
Soybeans do not qualify for MASC's AgriInsurance at Roblin or Hamiota.
In 2012, trials were located at Boissevain, Carberry, Melita, Roblin and Hamiota. However, Boissevain and Carberry trials were lost due to weather issues and the Melita and Roblin trials were harvested but data was deemed unacceptable for publication.

**Variety Descriptions**

| Variety | Company Heat Units | Yield % Check | Site Years Tested | Days to1 Maturity +/- Check | 2012 Yield: % of 23-10RY Hamiota |
|---|---|---|---|---|---|
| 23-10RY | 2325 | 100 | 6 | 0 | 100 |
| Pekko R2 | 2325 | 101 | 6 | 1 | 103 |
| NSC Libau RR2Y | 2375 | 90 | 1 | 1 | 90 |
| 900Y71~ | 2450 | 97 | 6 | 1 | 98 |
| 004R21 | 2425 | 102 | 6 | 2 | 93 |
| 900Y61~ | 2425 | 96 | 6 | 2 | 88 |
| Bishop R2 | 2450 | 87 | 1 | 2 | 87 |
| Vito R2 | 2450 | 97 | 1 | 3 | 97 |
| 24-10RY | 2425 | 97 | 6 | 4 | 94 |
| 32004R2Y | 2425 | 110 | 6 | 4 | 112 |
| Sampsa R2 | 2425 | 99 | 6 | 4 | 92 |
| HS 006RYS24 | 2450 | 100 | 6 | 4 | 88 |
| **Experimental lines that have been supported for registration in Canada** | | | | | |
| HX 007RY32 | | 81 | 1 | 3 | 81 |
| LS 002R23 | | 94 | 1 | 3 | 94 |
| NSM EXP 1225 R2 | | 91 | 1 | 1 | 91 |
| SC2375R2 | | 95 | 1 | 4 | 95 |
| TH 33003R2Y | | 95 | 1 | 3 | 95 |
| **CHECK CHARACTERISTICS** | | | | **23-10RY (bu/acre)** | 60 |
| 23-10 RY | | 50 bu/ acre | 6 site years | 125 days to maturity | CV% 6.1<br>LSD% 9.5<br>Sign Diff Yes |

1 Maturity ratings based only on 2012 data at the Hamiota location.

# Planting Soybeans

- Date
- Depth
- Population

# Planting Soybeans

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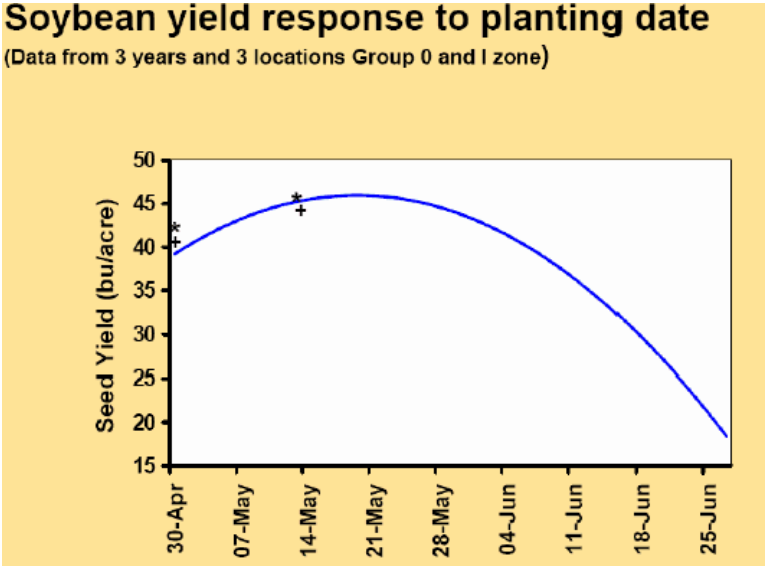
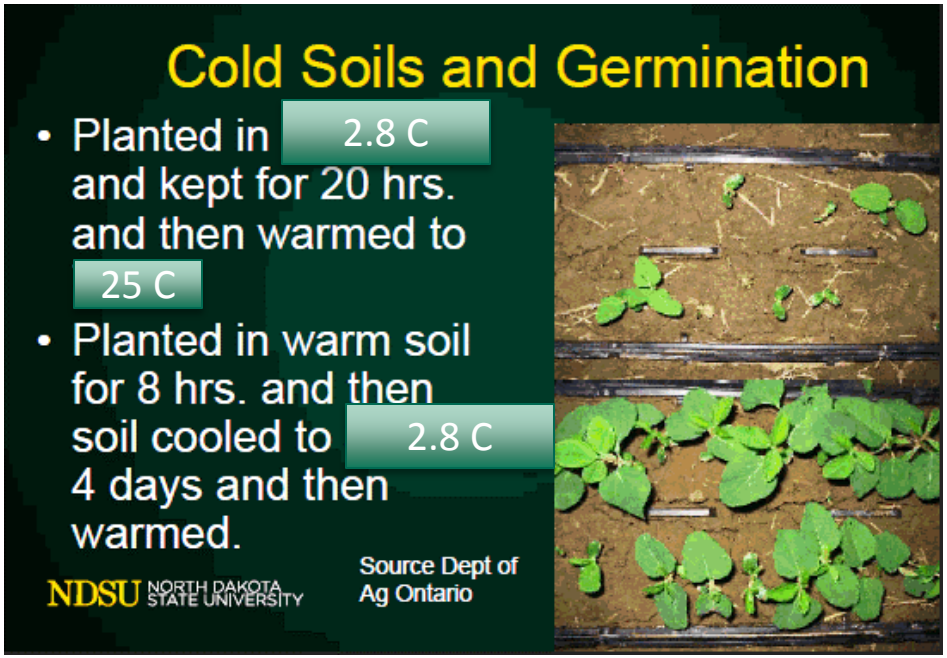
- Date
  - Soybeans start flowering around June 21st
  - Early seeded plants put on more vegetation growth
  - Early seeding will help to raise pod height
  - First 48 hours critical
    - You want warm soil temperatures to ensure vigorous growth and emergence
    - Ideal soil temperature around **8-10°C**
  - Mid May not a bad average planting time



# Planting Soybeans

- Imbibitional Chilling Injury (ICI) will occur with cool soil temperatures i.e. cool water
  - Soy seed absorbs 60% of body weight in moisture
- Time of day the beans are planted may even have an influence
- Seed treatment has helped overcome some cool temperature stresses



# Planting Soybeans

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- Spring Frost
  - Soybean can handle some frost
    - -2.8°C for a short period of time
    - Protected early due to water in the cotyledons and low to the ground
    - At risk due to epigeal emergence
    - Trash cover worse
    - Anything colder probably looking at replant.

# Planting Soybeans

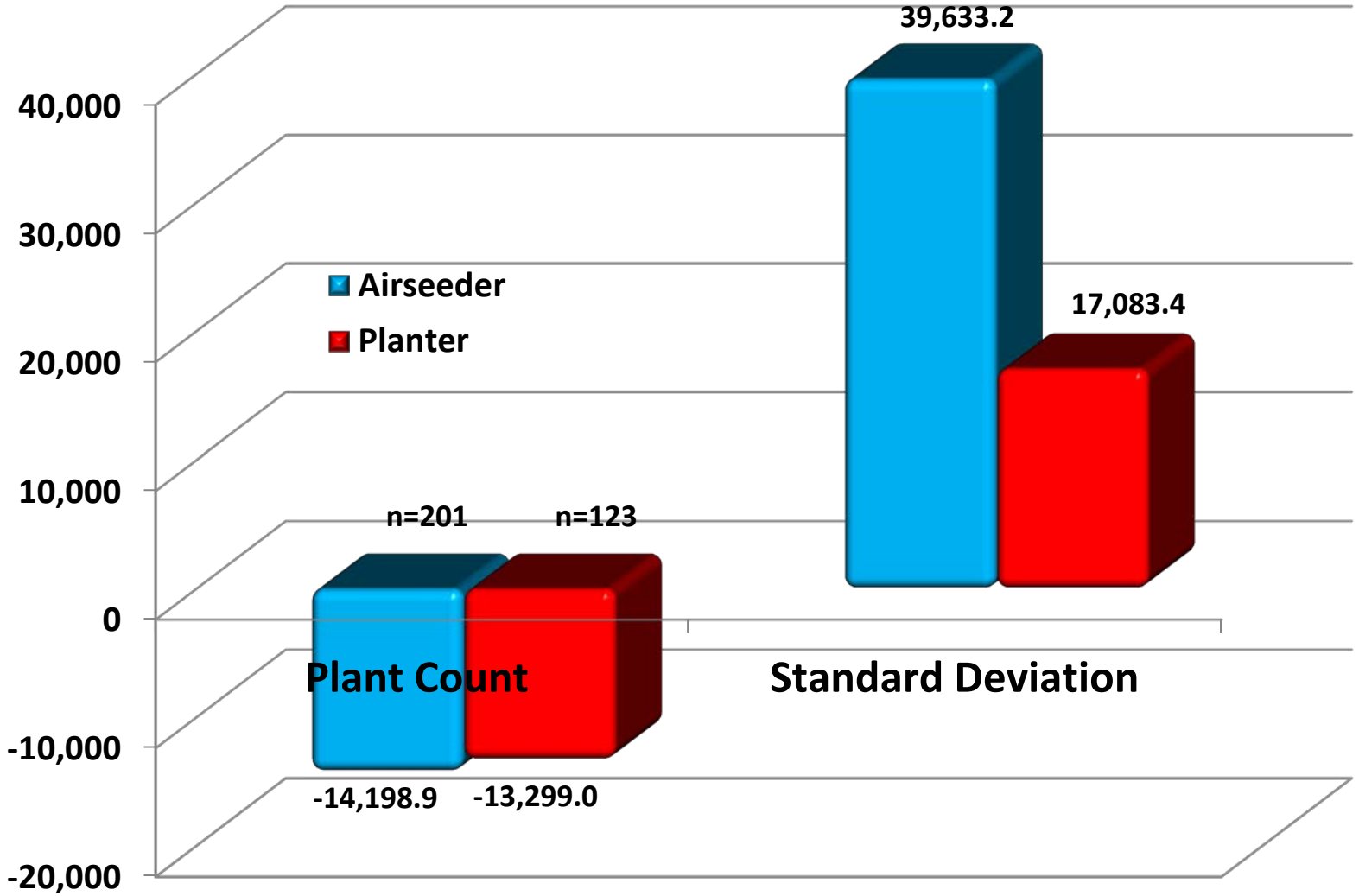
- **Depth**
  - ¾ to 1 ½ inch deep
    - Shallower the quicker out of the ground
  - Plant into moisture
    - Absorbs 60% of body weight in moisture
  - Need to ensure that the soybeans can push out of the ground
    - More soybeans together, the greater the push
    - Important in areas prone to crusting

# Planting Soybeans

- Population, It really depends…
  - Safe recommendation
    - 180,000 to 220,000
  - Soil
    - Heavier soil = higher population
  - Row Spacing
    - Narrow rows = higher population
  - Equipment
    - Seed to soil contact
    - Spacing of the seed
  - Seed Treatment
    - With a proven seed treatment you may be able to lower planting populations
  - Time of Year
    - Late planting need higher populations
  - Variety
    - Bushy vs. slender variety
  - Equipment
    - Air seeder vs Planter

# Planting/Seeding Equipment

# Difference from Seeding Rate (2011 & 2012)

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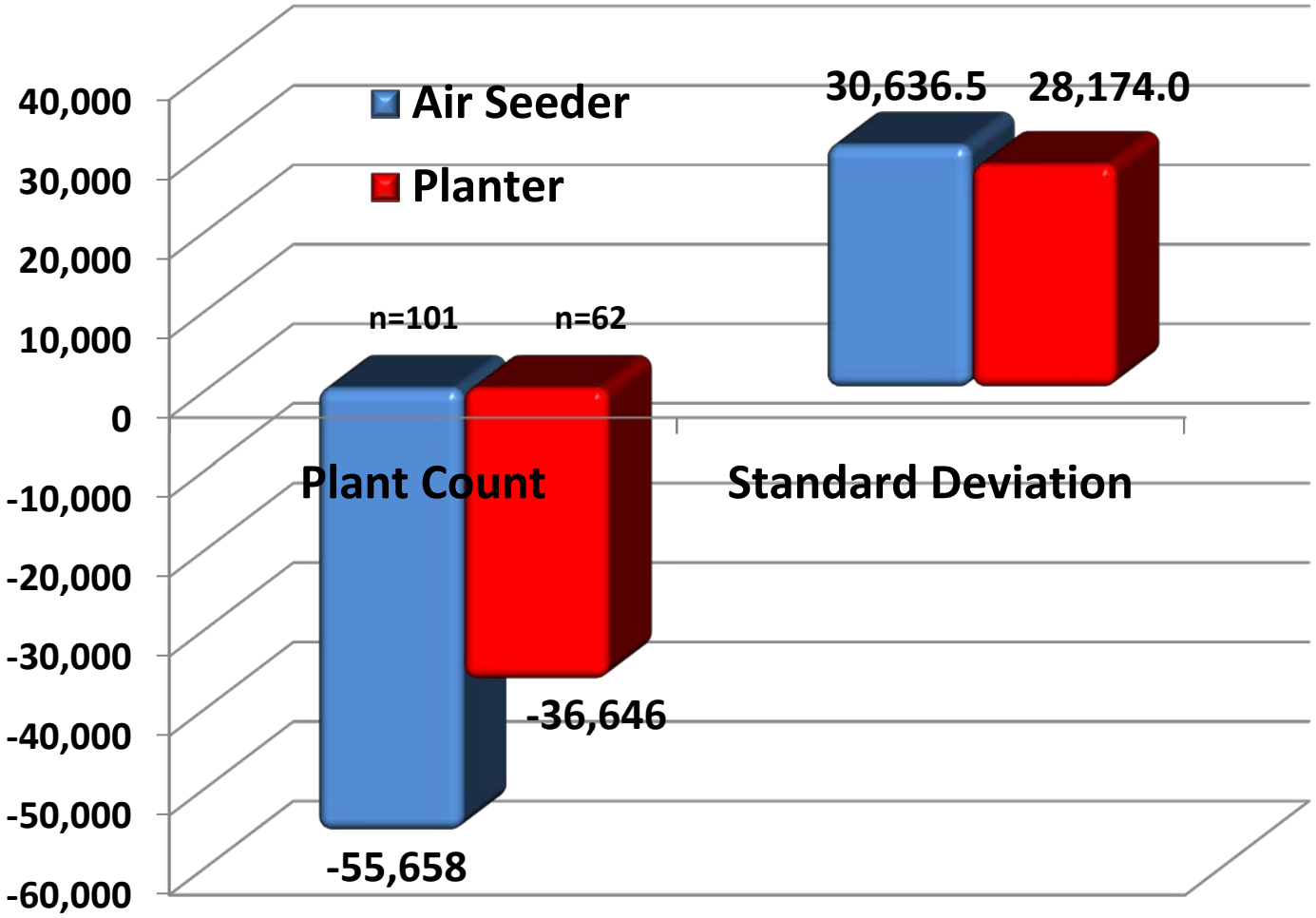
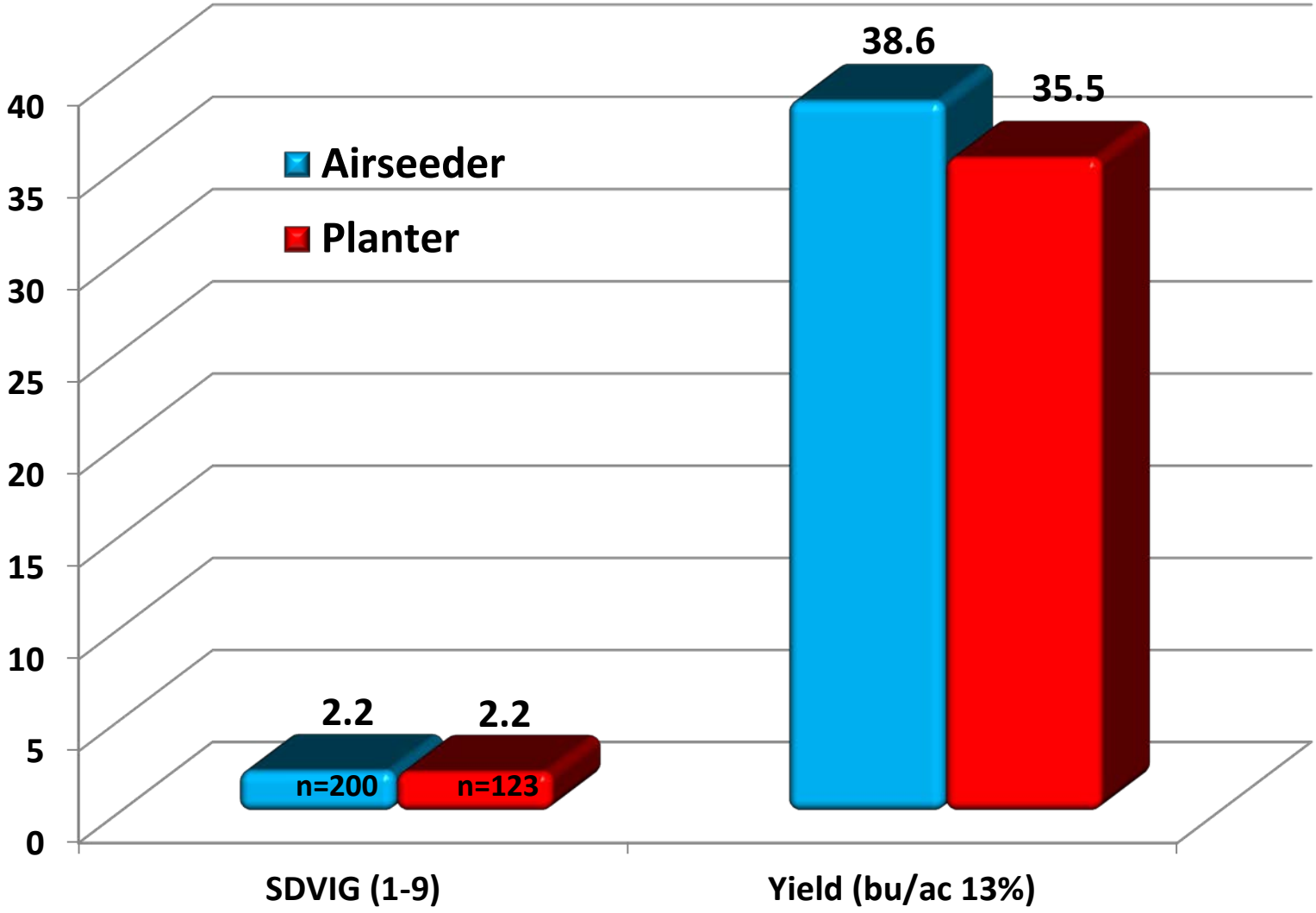
# Difference from Seeding Rate (2013)



# Seedling Vigor and Yield 2011 & 2012

(all data points)

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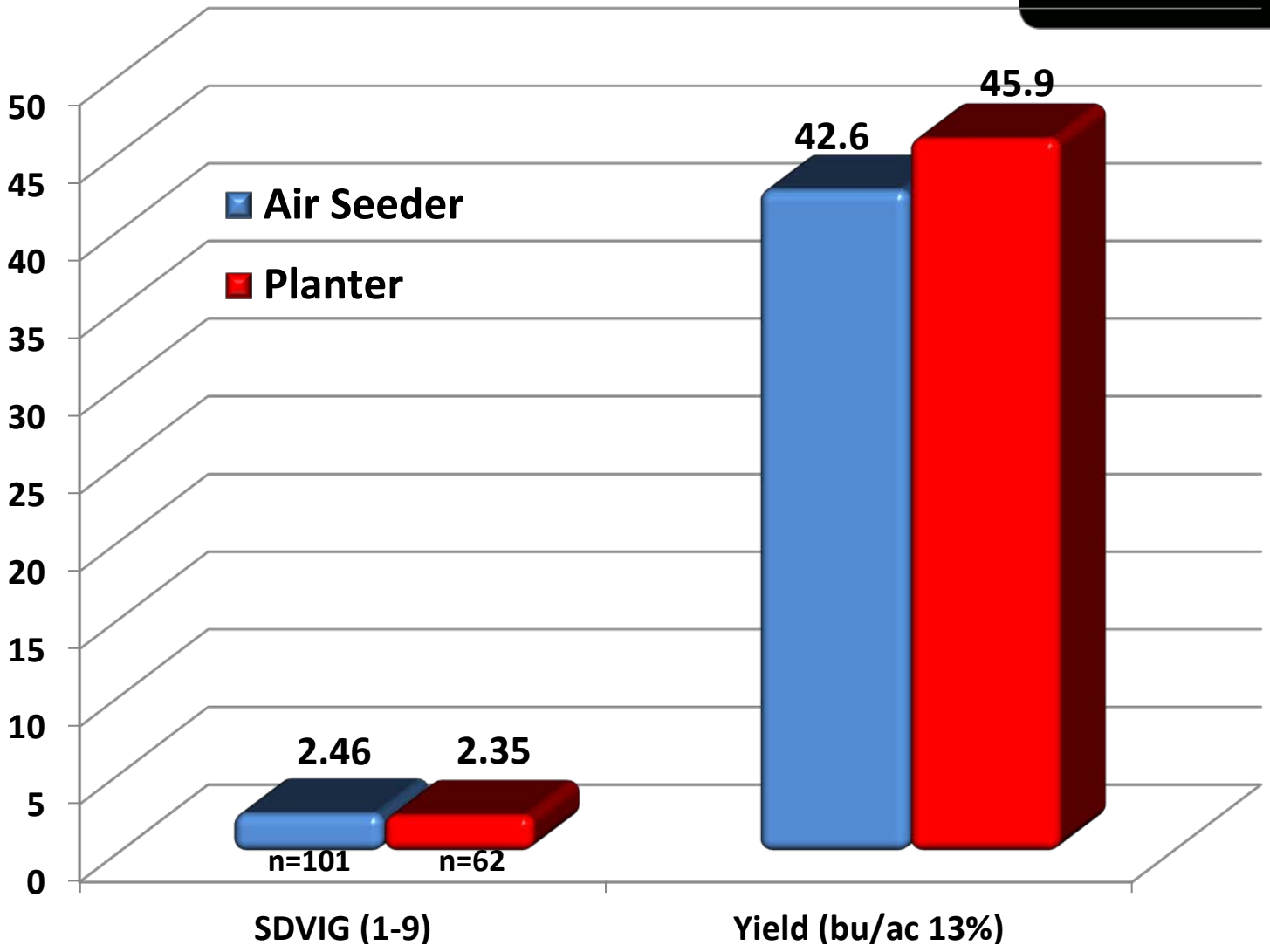
# Seedling Vigor and Yield 2013

(all data points)

Growing Confidence



Airseeder 200,000
Plants/acre
30” row

Planter 178,000
Plants/acre
30” row

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# Row Spacing????

# 2011 & 2012 Plant Height (inches)

(all data points)

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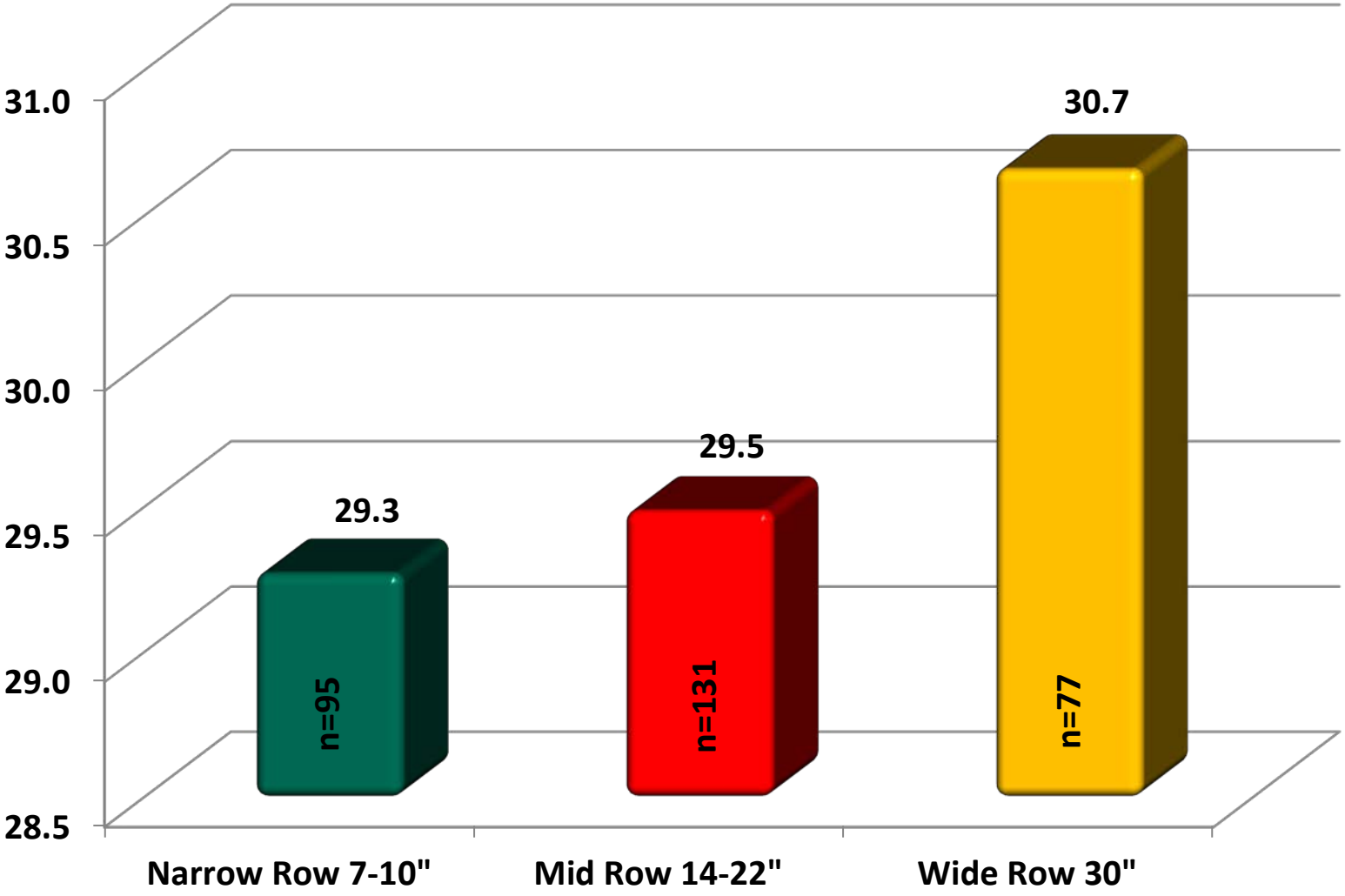
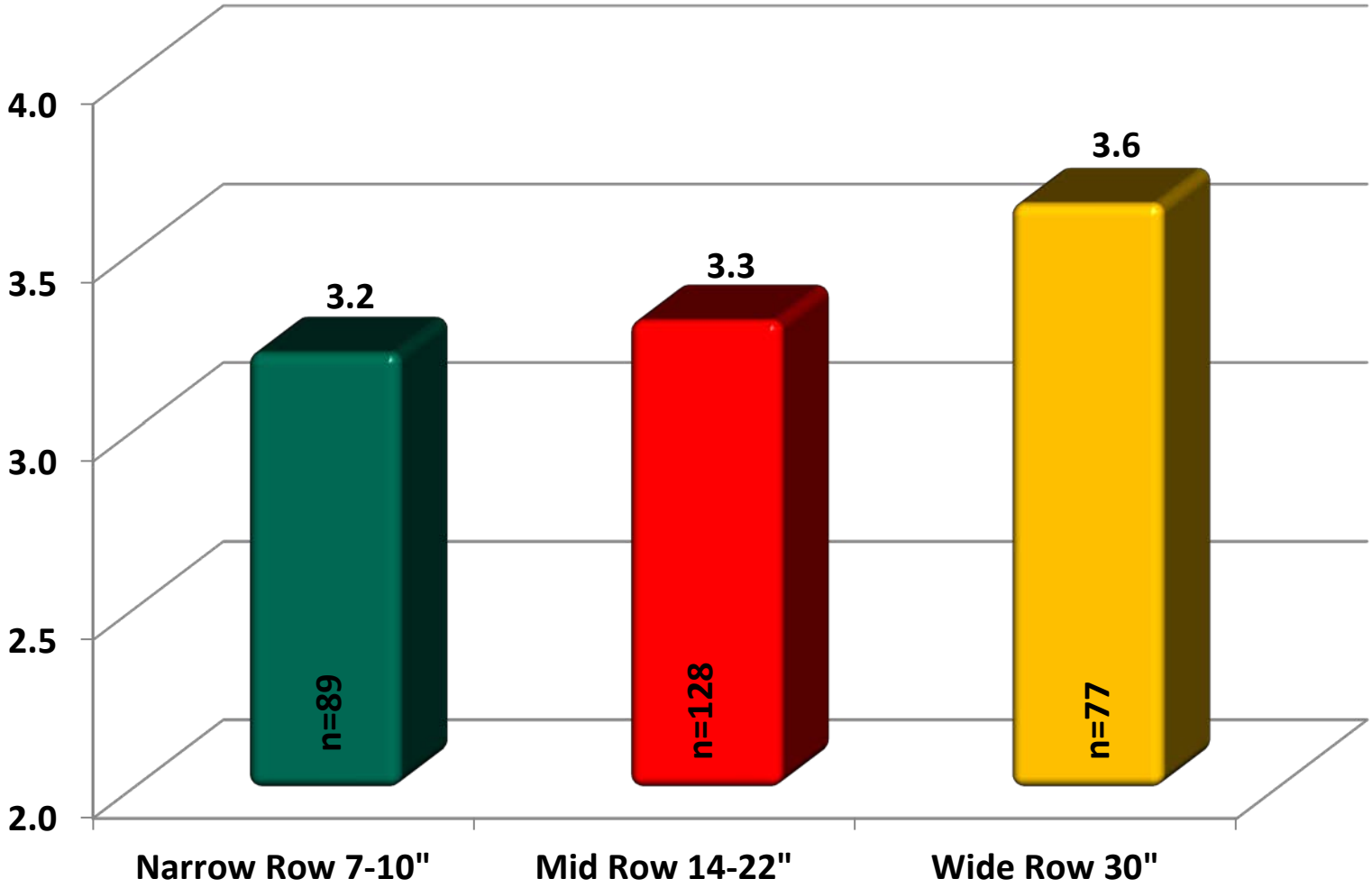


# 2011 & 2012 Pod Height (inches)

(all data points)

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# 2011 & 2012 % Seed Moisture

(all data points)

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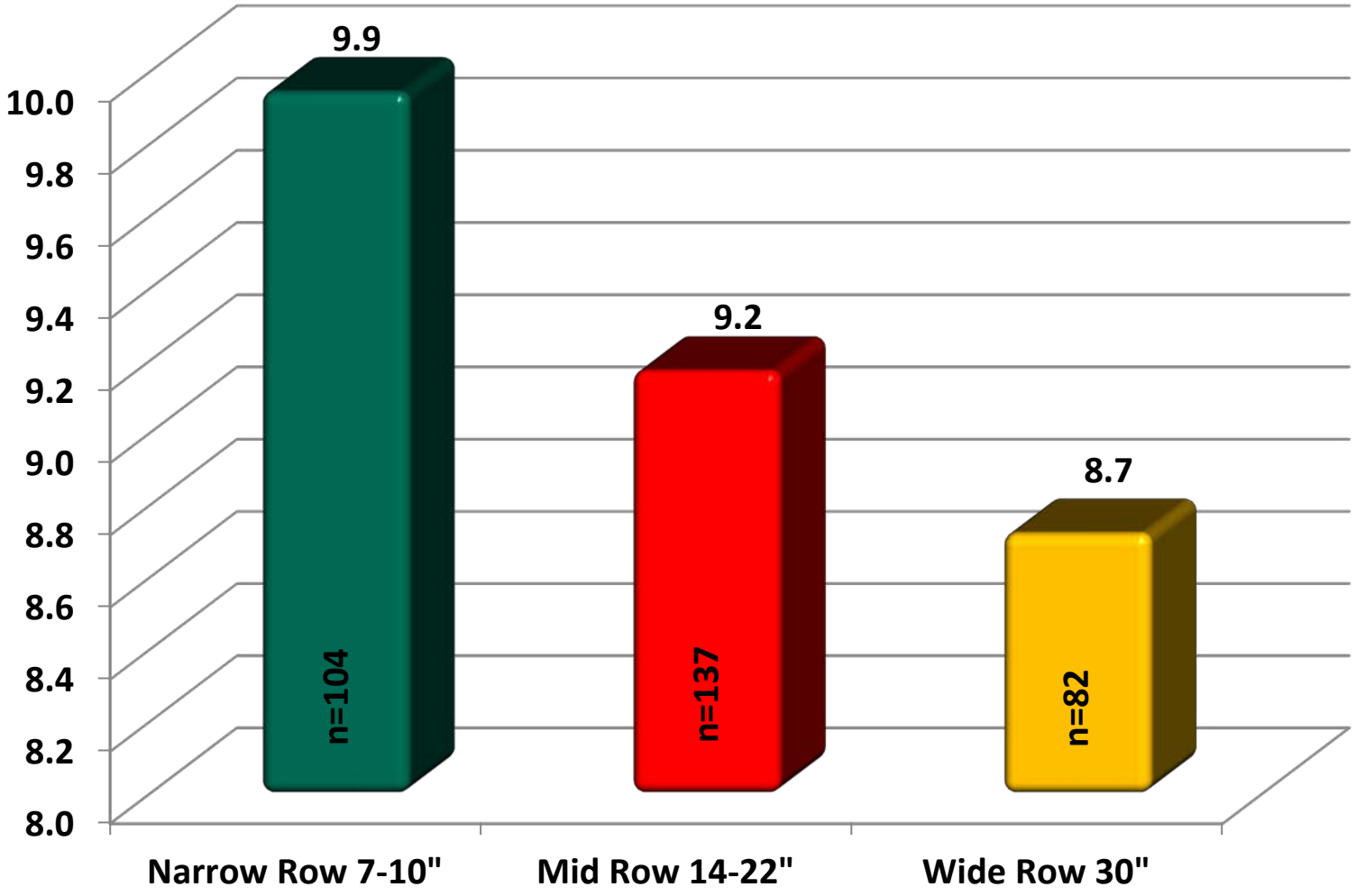

# 2011 & 2012 Yield 2011 & 2012 (bu/ac, 13%)

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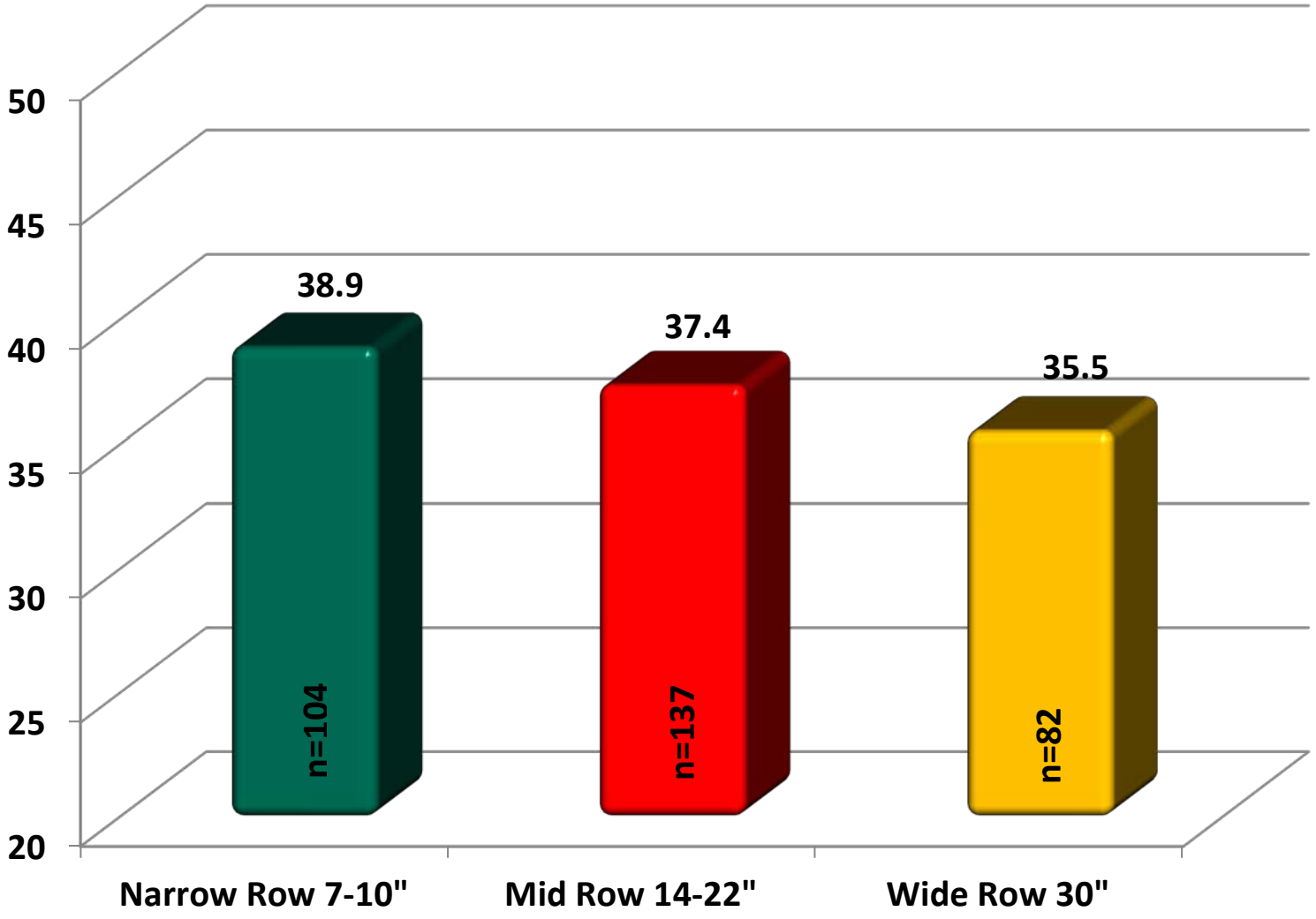
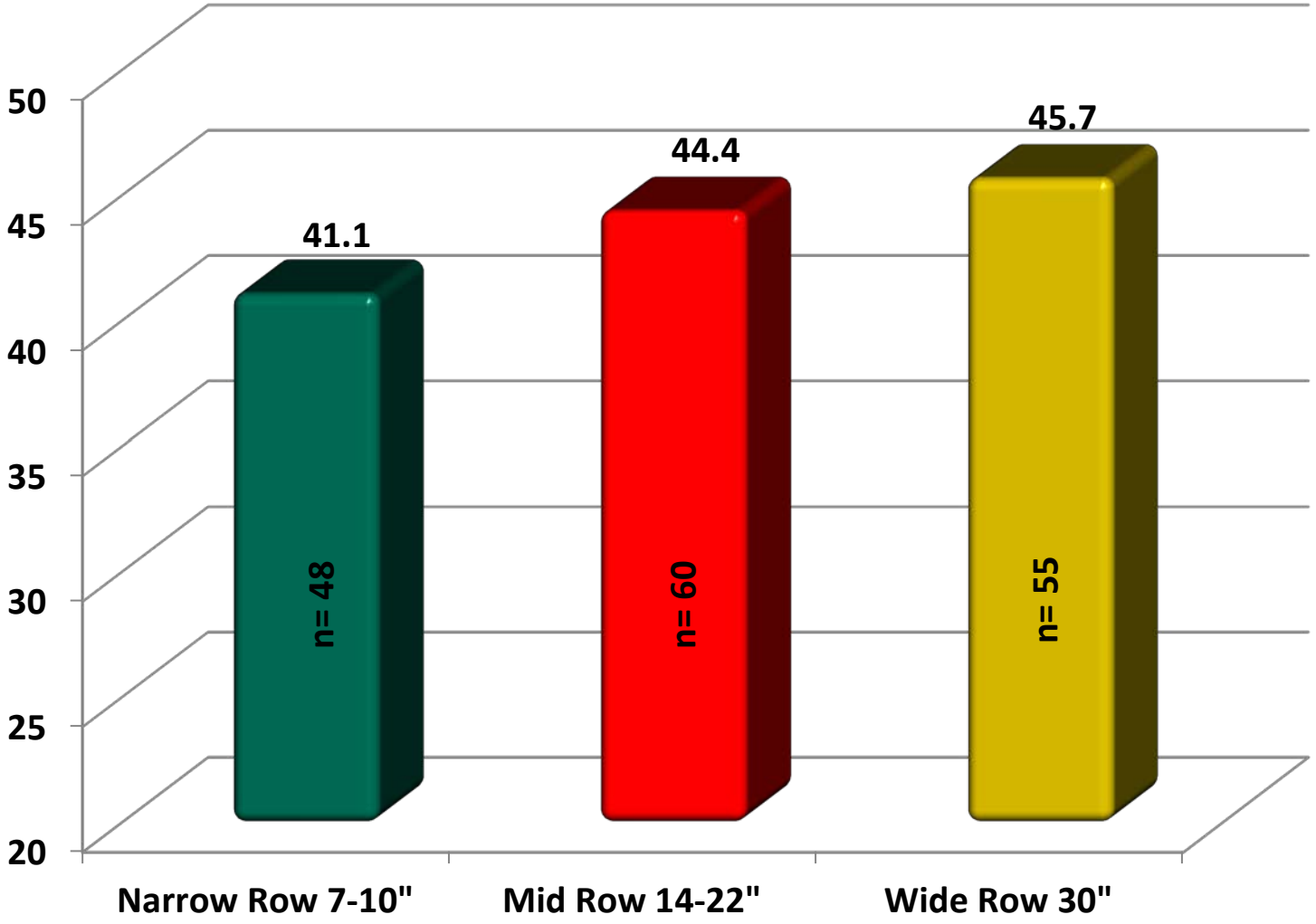


# 2013 Yield and Row Spacing (13% Moisture)

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genuity
ROUNDUP READY 2 YIELD®
SOYBEANS

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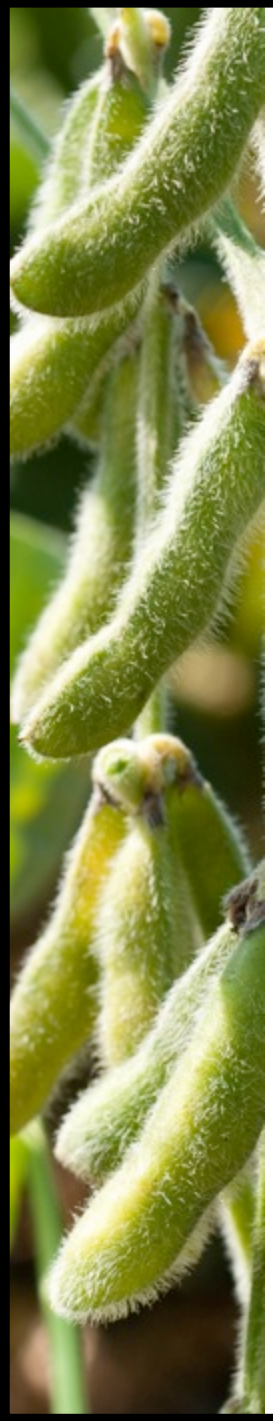
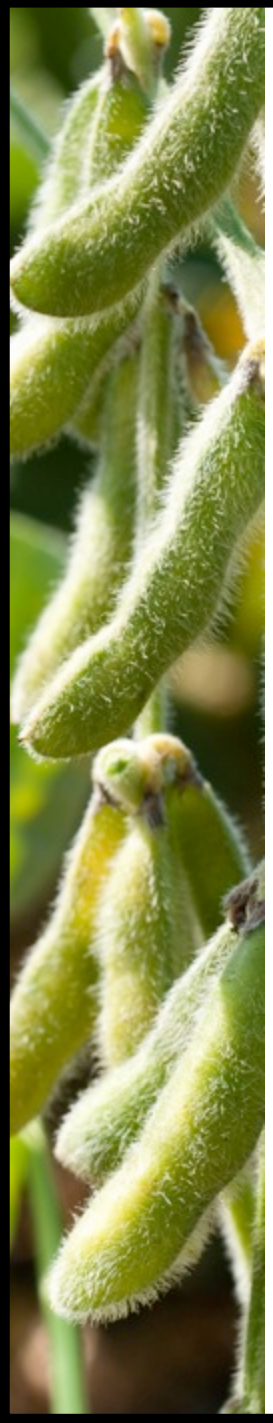
# SPRAYING SOYBEANS



# Spraying Soybeans

- **Start Clean, Stay Clean**
  - Burndown
    - Key to a good start for the soybeans
    - Prevents problems with planting/seeding
- Critical Weed Free Period
  - 1st to 3rd trifoliate-leaf stage (V2-V3)
- Best Practice is a good burndown, with a tank-mix partner, followed by 2 in-crop applications of a Roundup® agricultural herbicide



# Roundup Agricultural Herbicide Recommendation

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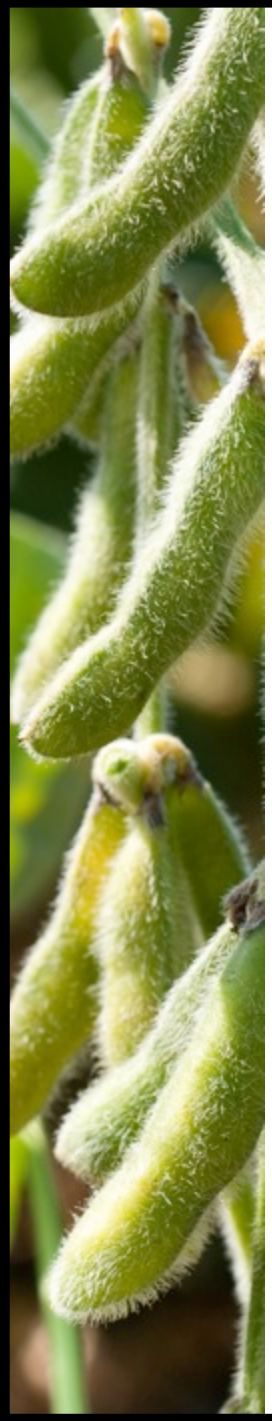
- Roundup WeatherMAX® label has specific recommendations for Genuity® Roundup Ready 2 Yield® soybeans
- Expect the same excellent crop safety and weed control as with Original Roundup Ready® soybeans
- Use rate range is from **0.67 – 1.89** L/ac applied from ***first trifoliate to flowering*** (earlier safe)
- Lower rate of 0.67 L/ac may be applied once or twice, higher rates of 1.35 or 1.89 L/ac applied only once.
- Do not apply the 1.89 L/ac rate to soybeans that do not have the RR2Y trait



# Roundup Ready Soybeans

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| Start Clean | | Stay Clean | | |
|---|---|---|---|---|
| **Option** | **Pre-plant Burndown or tillage** | **Post-emergent** | **Where volunteer glyphosate tolerant corn exists** | **Where volunteer glyphosate tolerant canola exists** |
| 1 | For enhanced burndown, tank-mix Roundup Transorb® HC with **Valtera, or Heat®** | Roundup WeatherMAX® | Apply Roundup WeatherMAX plus Assure® II or Centurion® in-crop | Include Heat® in the weed control program pre-seed for soybeans to control early flushes of volunteers. For post-emergent applications, include **Basagran®, ViperADV, Pursuit or Odyssey** |
| 2 | | Tank-mix Roundup WeatherMAX with **Basagran®, ViperADV, Pursuit® or Odyssey®** | | |

*only in RRV of Mb

# Soybean Insects

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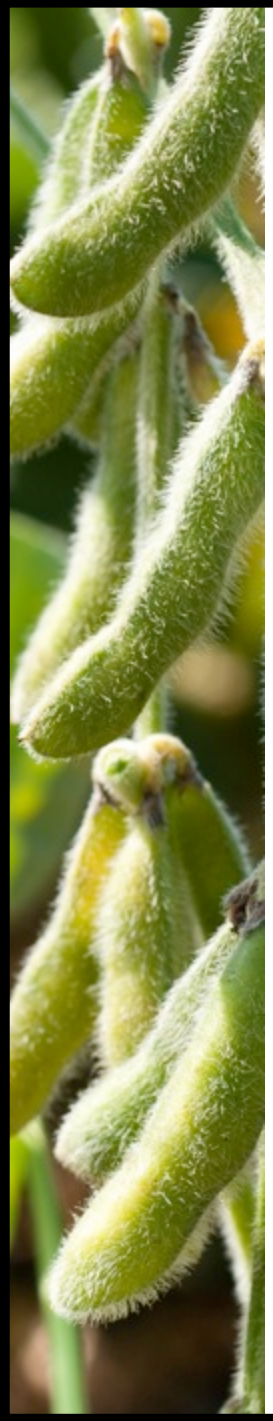
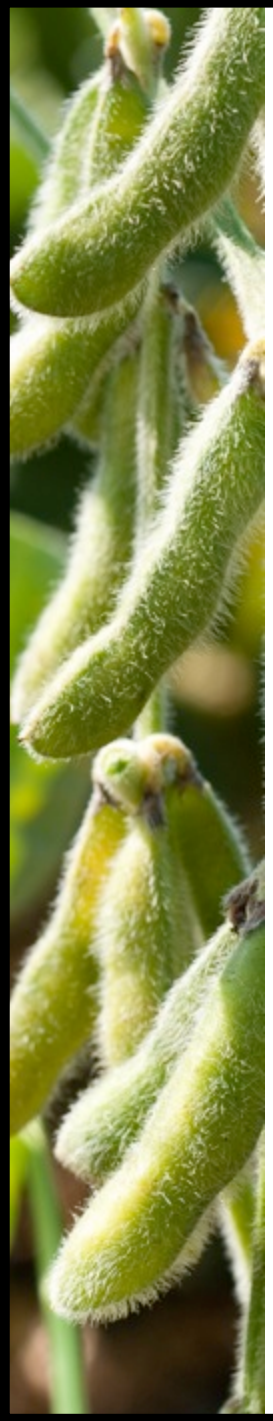


# Soybean Insects

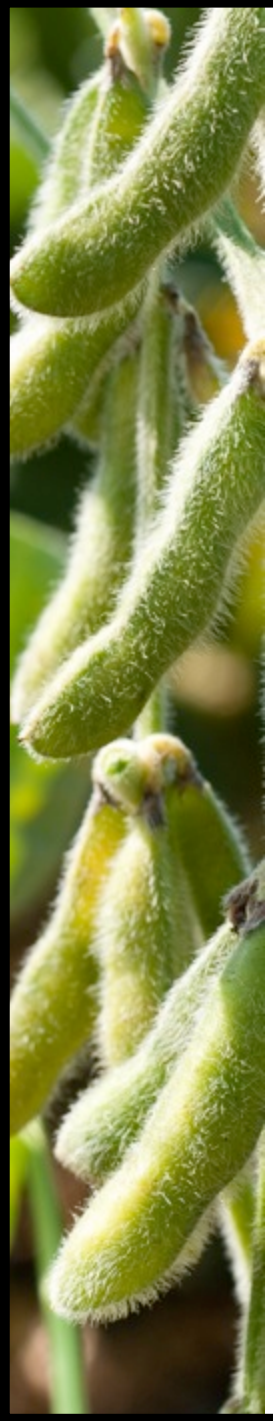
- Early Insect Feeders
  - Seed Corn Maggots, Wireworm
  - More prone when it's a cold, wet spring
    - Seed treatment will help
- Sucking Insects
  - Soybean Aphids, Two-Spotted Spider Mites
  - Drought, usually blown in from the US
  - Monitoring and Spraying
- Defoliating Insects
  - Grasshoppers, Armyworms
  - Minor concern
    - must defoliate large amount of leaf area to be economic



# Soybean Aphid

- Not a native pest
  - Blows in from the south
- **Economic Threshold** actually 670 aphids per plant
- **Action Threshold** is set at 250 aphids per plant (7 days of lead time before population will reach 670)
- Critical plant stages (first flower to the start of seed set)
- Scout 30 plants per field ( 6 plants in 5 areas of the field)
- Spray with high water volumes
  - Matador, Silencer, Cygon or Lagon
- Seed treatment like CruiserMaxx may help

# Soybean Diseases



# Soybean Diseases

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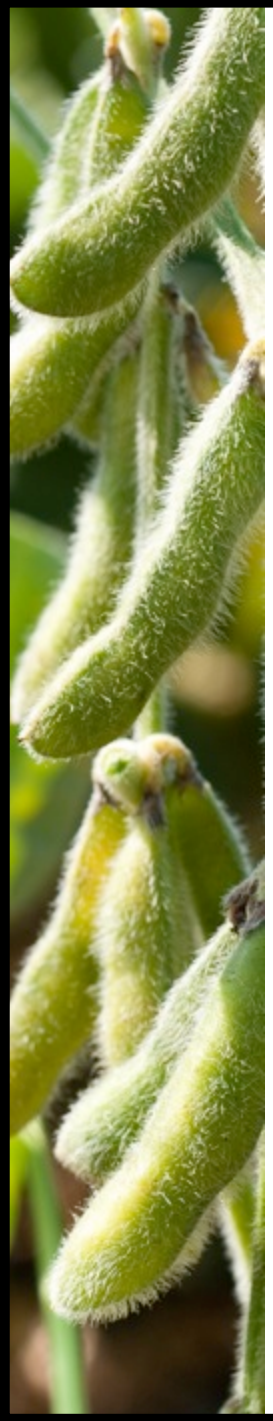
## Soybean diseases in Canada

| Major diseases | MB | Canada | Pathogen |
|---|---|---|---|
| Soybean cyst nematode (SCN) | ? | √ | *Heterodera glycines* |
| Phytophthora root rot (PRR) | √ | √ | *Phytophthora sojae* |
| Rhizoctonia and Fusarium root rots | √ | √ | *Rhizoctonia solani, Fusarium spp.,* |
| White mold/Sclerotinia stem rot (SSR) | √ | √ | *Sclerotinia sclerotiorum* |
| Seed rot, Damping-off, Seedling blight | √ | √ | *Pytium* spp., *Phomopsis* and *Diaporthe* spp., *R. solani, Fusarium* spp., *P. sojae* |
| Stem Canker, Pod and stem blight/Phomopsis seed rot | ? | √ | *Phomopsis* and *Diaporthe* spp. |



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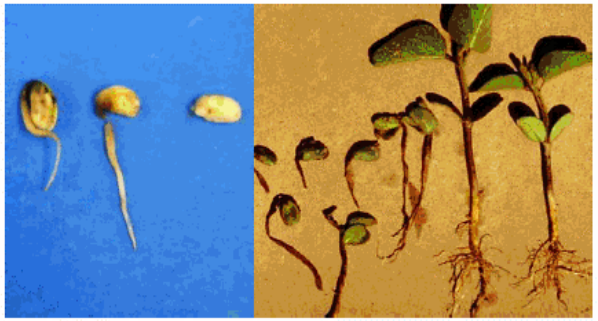
# Soybean diseases in Canada

| Minor diseases | MB | Canada | Pathogen |
|---|---|---|---|
| Sudden death syndrome (SDS) | ? | √ | *Fusarium solani f.sp. Glycines* |
| Brown spot | √ | √ | *Septoria glycines* |
| Downy mildew | √ | √ | *Peronospora manshurica* |
| Powdery mildew | √ | √ | *Microsphaera diffusa* |
| Frogeye leaf spot | √ | √ | *Cercospora sojina* |
| Purple seed stain and leaf blight | √ | √ | *Cercospora kikuchii* |
| Bacterial leaf blight | √ | √ | *Pseudomonas savastonoi pv. glycinea* |
| Soybean mosaic (SMV) | √ | √ | *Soybean mosaic virus* |

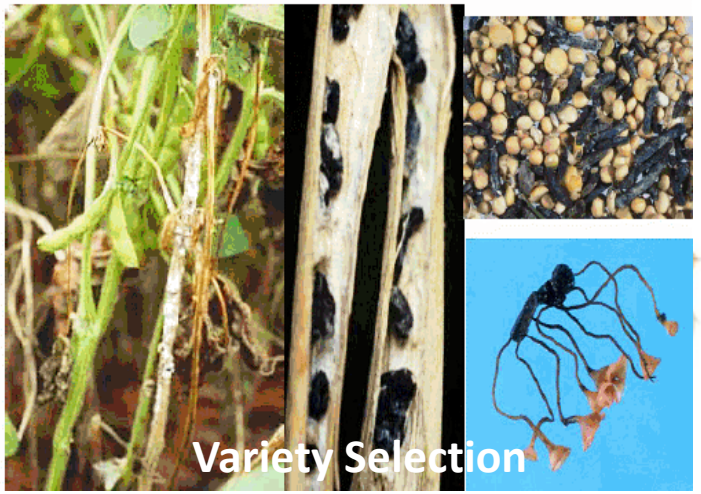
# Major soybean diseases in Manitoba

- Phytophthora root rot (PRR)

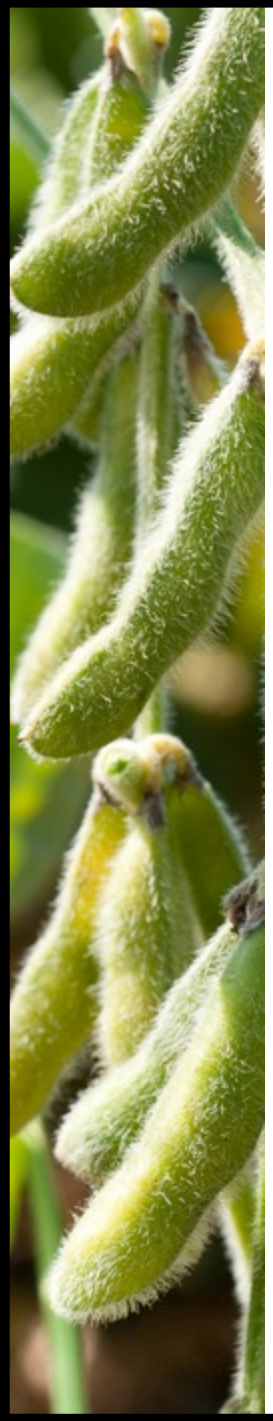

- Seed rot, Damping-off, Seedling blight



- White mold/Sclerotinia stem rot (SSR)




- Rhizoctonia and Fusarium root rots



# Soybean Diseases

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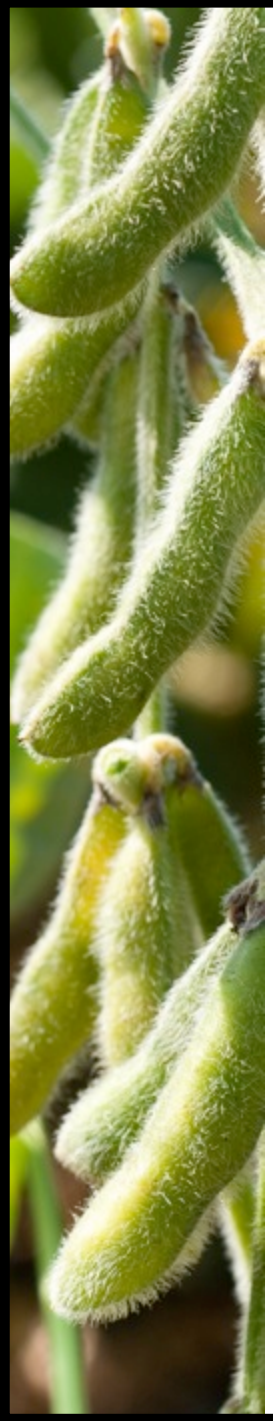
## Timeframe for soybean disease development in Manitoba

| | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|
| Seed rot, Damping off, Seedling blight | X | X | | | |
| Rhizoctonia and Fuarium root rots | X | X | X | | |
| Phytophthora root rot | X | X | X | X | |
| White mold/Sclerotinia stem rot | | | X | X | X |



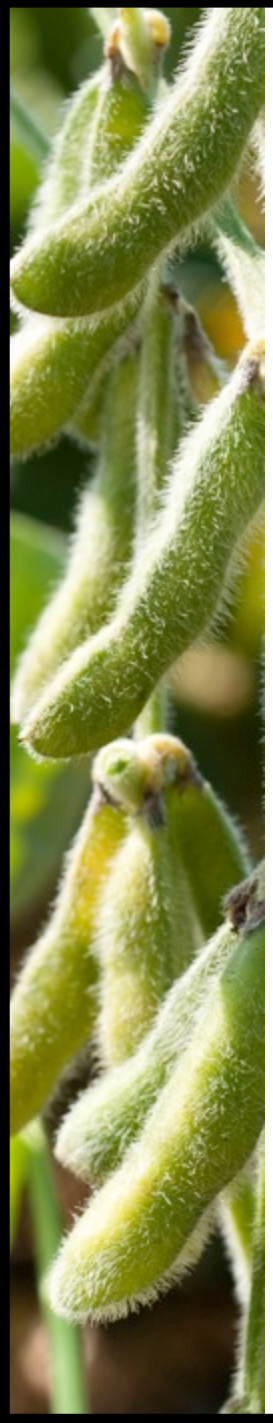
# Seed Treatments

Growing Confidence

## Summary: Seed treatment products for soybean root diseases

| Product | Active ingredients | Formulation | Disease Controlled | | | |
|---|---|---|---|---|---|---|
| | | | PRR | PSR | R/FRR | SD/SB |
| Agrox B-2 / Agrox CD | captan + diazinon | WP | | | | + |
| Agrox FL | captan | FS | | | | + |
| Apron FL / Allegiance FL | metalaxyl | L | + | | | + |
| Apron Maxx RTA | fludioxonil + metalaxyl-M | L | + | + | + | + |
| Cruiser Maxx Beans | thiamethoxam + metalaxyl-M + fludioxonil | LS | + | + | + | + |
| Maxim Liquid PSP/ Maxim PSP/Maxim MZPSP | fludioxonil / fludioxonil / fludioxonil + mancozeb | L / DP / DP | + | + | + | + |
| Thiram 75WP | thiram | WP | | + | + | + |
| Trilex AL | trifloxystrobin + metalaxyl | SC | + | + | + | + |
| Vitaflo 280 | carbathiin + thiram | LS | | + | + | + |

PRR = Phytophthora root rot, PSR = Phomopsis seed rot, R/FRR = Rhizoctonia and Fusarium root rots, and SD/SB = Seed decay and Seedling blight caused by Pythium and other fungi.
WP = wettable powders, FS = flowable suspension, L = liquid, LS = liquid suspension, DP = dry powder, and SC = suspension concentrated.



# Crop Rotation

Growing Confidence

## Current Crop

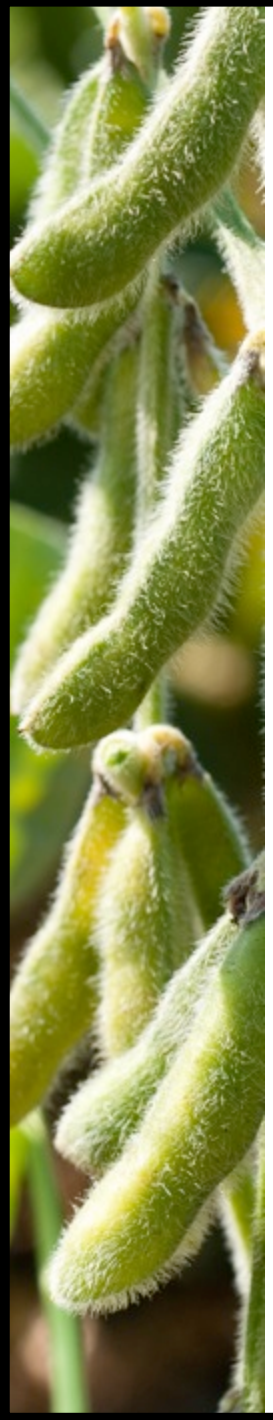
| Previous Crop | HRW | HRS | Barley | Oat | Canola | Flax | Soybean | Corn |
|---|---|---|---|---|---|---|---|---|
| HRW | 67 | 83 | 102 | 101 | 95 | 106 | 103 | 84 |
| HRS | 89 | 88 | 100 | 101 | 104 | 103 | 102 | 96 |
| Barley | 88 | 90 | 87 | 93 | 100 | 98 | 95 | 87 |
| Oats | 88 | 89 | 87 | 84 | 92 | 95 | 104 | 97 |
| Canola | 104 | 103 | 105 | 104 | 84 | 88 | 102 | 97 |
| Flax | 86 | 96 | 106 | 99 | 100 | 77 | 89 | 91 |
| Soybean | NSD | 105 | 107 | 102 | 87 | 99 | 104 | 98 |
| Corn | NSD | 109 | 102 | 108 | 104 | 100 | 98 | 89 |

**Yield Response 120 acres or more (% of 2000 - 2012 average)**

*NSD- No Sufficient data

* Source MASC 2013

# Volunteer Roundup Ready® Canola What Can You Do?



DEKALB

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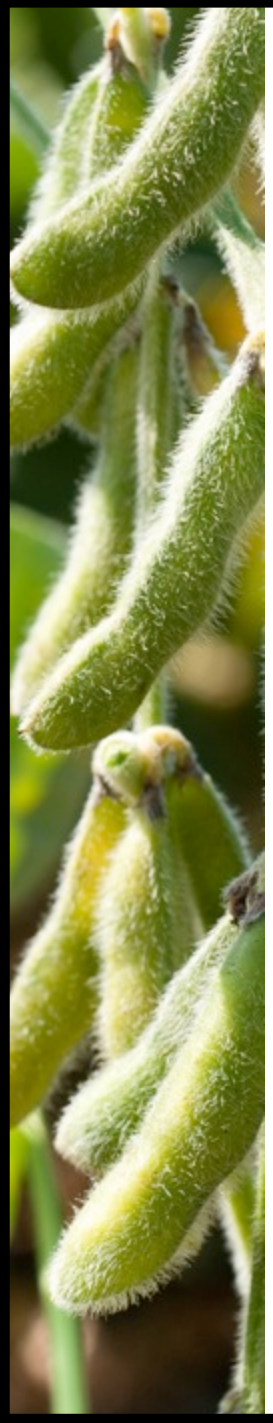
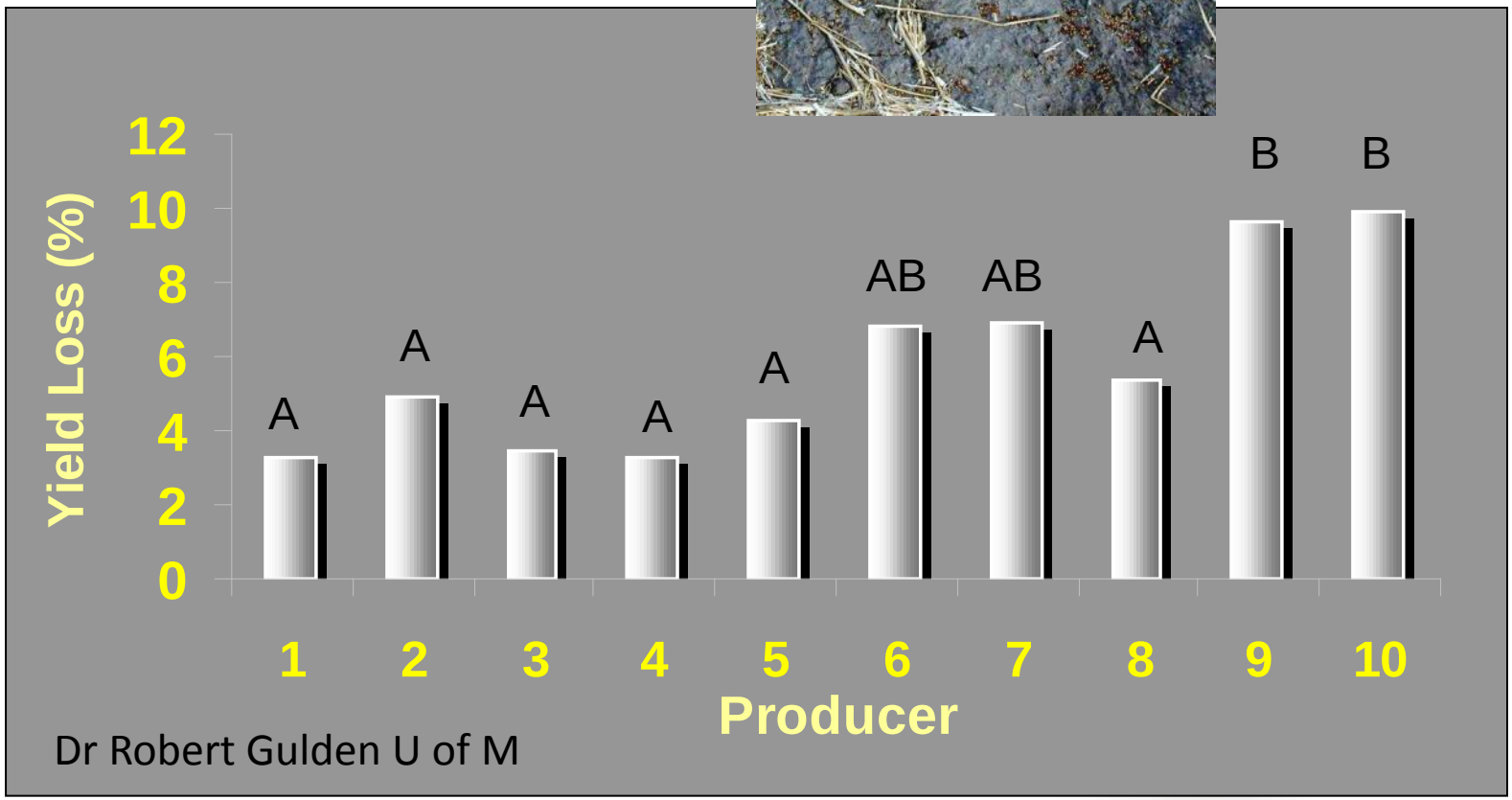
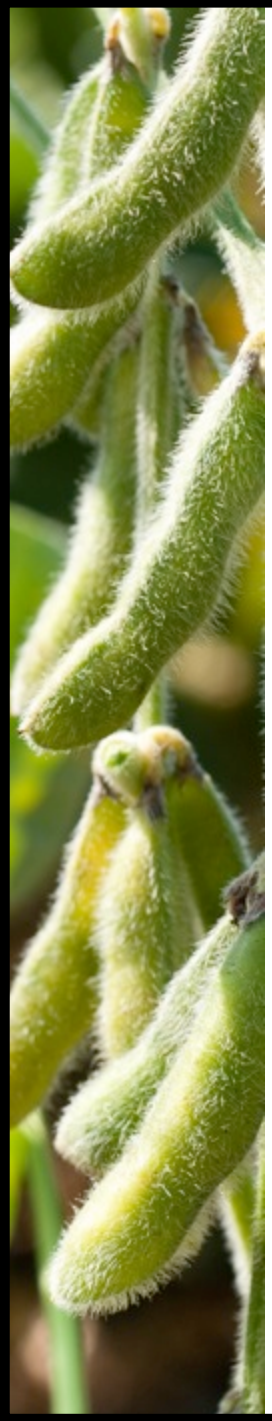


# Volunteer Canola Management Starts at Harvest

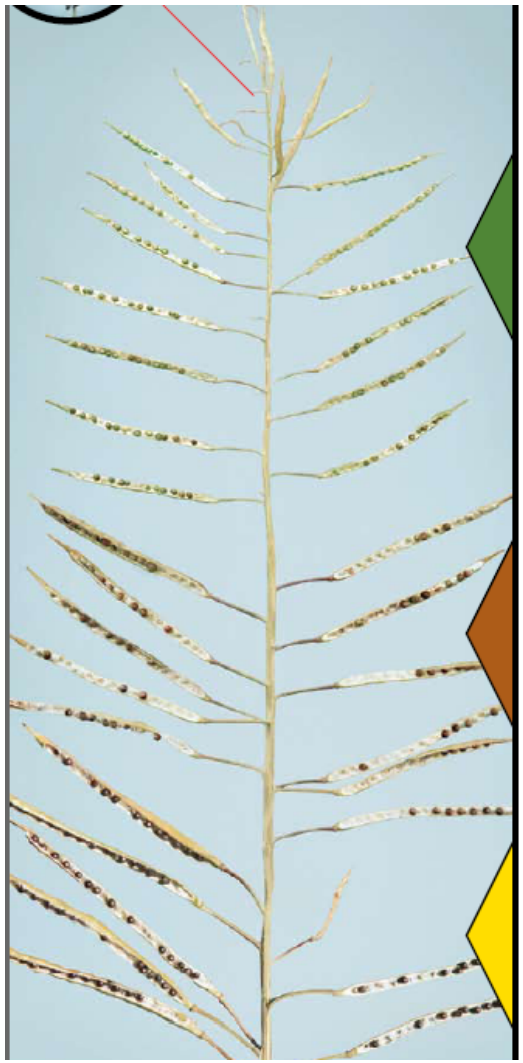
Growing Confidence





DEKALB

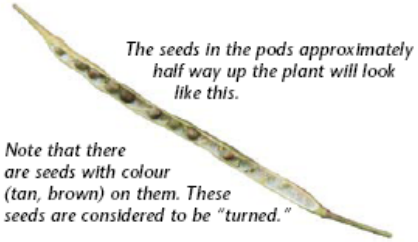
Growing **Confidence**



## Illustration for determining seed colour change

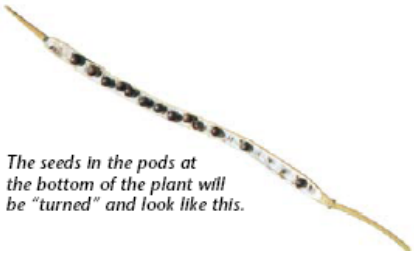
*The seeds in the pods near the top of the plant will look like this.*

*The seeds are still green, but firm. They will not crush when rolled between the thumb and forefinger.*



*The seeds in the pods approximately half way up the plant will look like this.*

*Note that there are seeds with colour (tan, brown) on them. These seeds are considered to be "turned."*



*The seeds in the pods at the bottom of the plant will be "turned" and look like this.*

Swathing at the proper seed colour change optimizes the yield potential of any canola variety while reducing green seed and improving oil content.

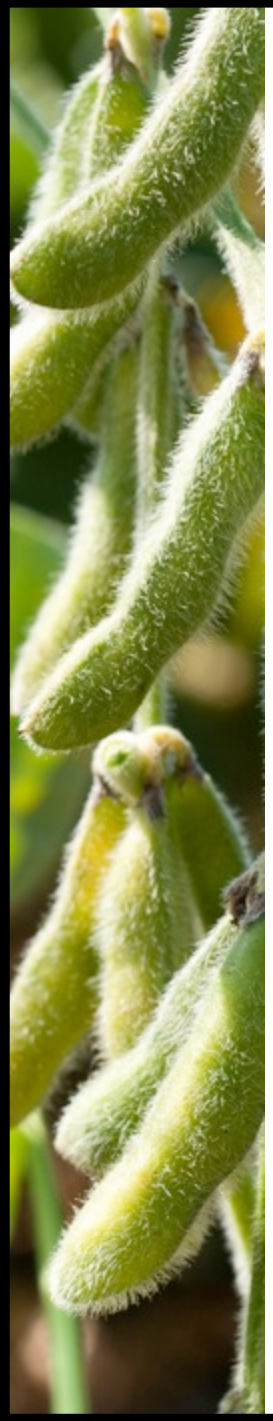
The seeds of a canola plant approach physiological maturity and will complete filling at about 40% moisture, and then slowly turn from green to light yellow, or reddish-brown to brown-black, depending on the variety. This curing process starts from the bottom of the main stem. Seed colour change will then progress up the main stem as moisture content is reduced.

Seeds within the pod will change colour an average of 10% every two to three days. Under hot, dry conditions, seed colour change can occur more rapidly but may take longer at cool temperatures.

## Assessing Your Field

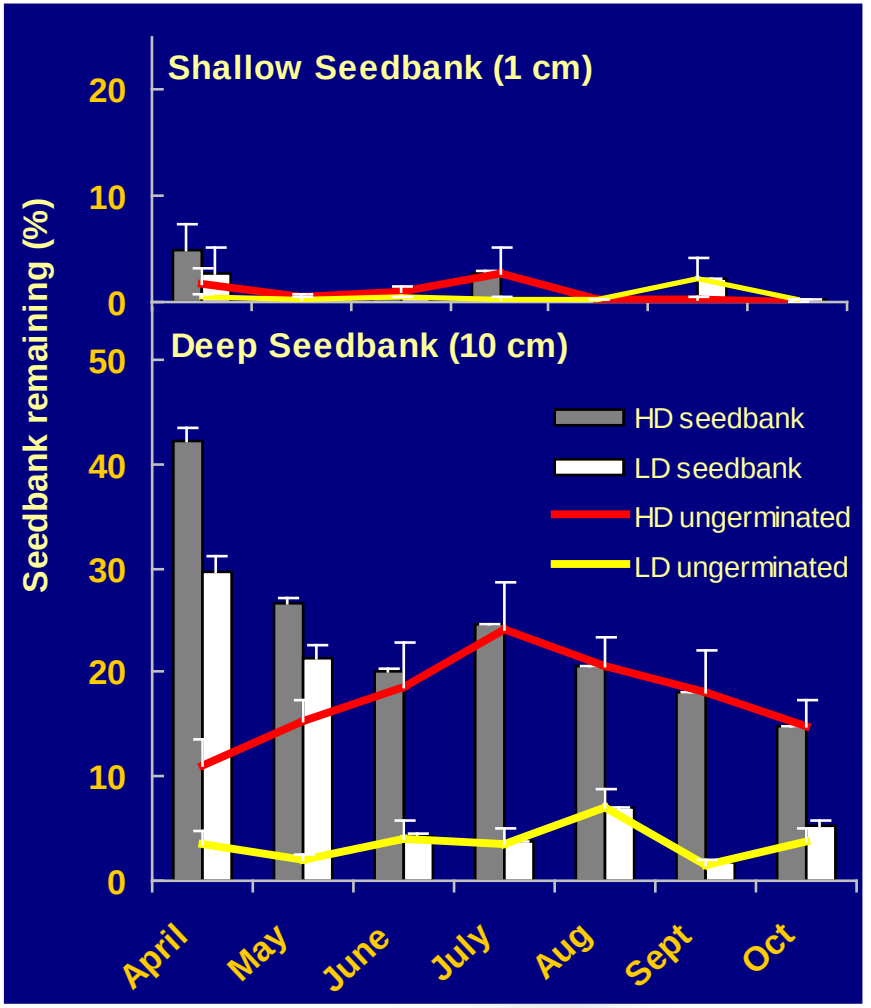
1. Begin inspecting a canola field approximately 10 days after flowering ends.
2. Sample various parts of the field to make an accurate assessment of the overall maturity of the crop. Stand on the road or in the back of a truck box to compare low lying to higher elevated areas of the field, taking note of how each area appears.
3. Walk out and sample at least five plants in those areas.
4. **Use the illustration (left)** to assist in determining seed colour percentage on the main stem. Include seeds with small patches of colour (spotting). Most of the seeds in the top pods will be firm, and roll without being easily crushed between the thumb and forefinger.
5. Once all areas are sampled, average out the percent seed colour change for that particular field.
6. Continue inspections every two to three days.

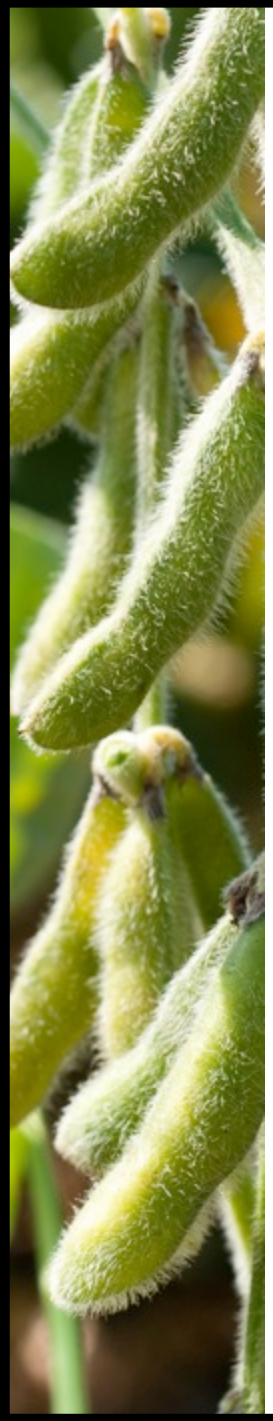
Note: Some fields, or large areas within a field with low plant populations may have plants with numerous branches. Assess not only the main stem, but side branches as well to ensure seeds that have not changed colour are firm with no translucency.



# Tillage

- In general - avoid seed burial
- Deep burial of seed will promote dormancy
- In some instances fall tillage could help
- “It Depends”





# Volunteer Longevity

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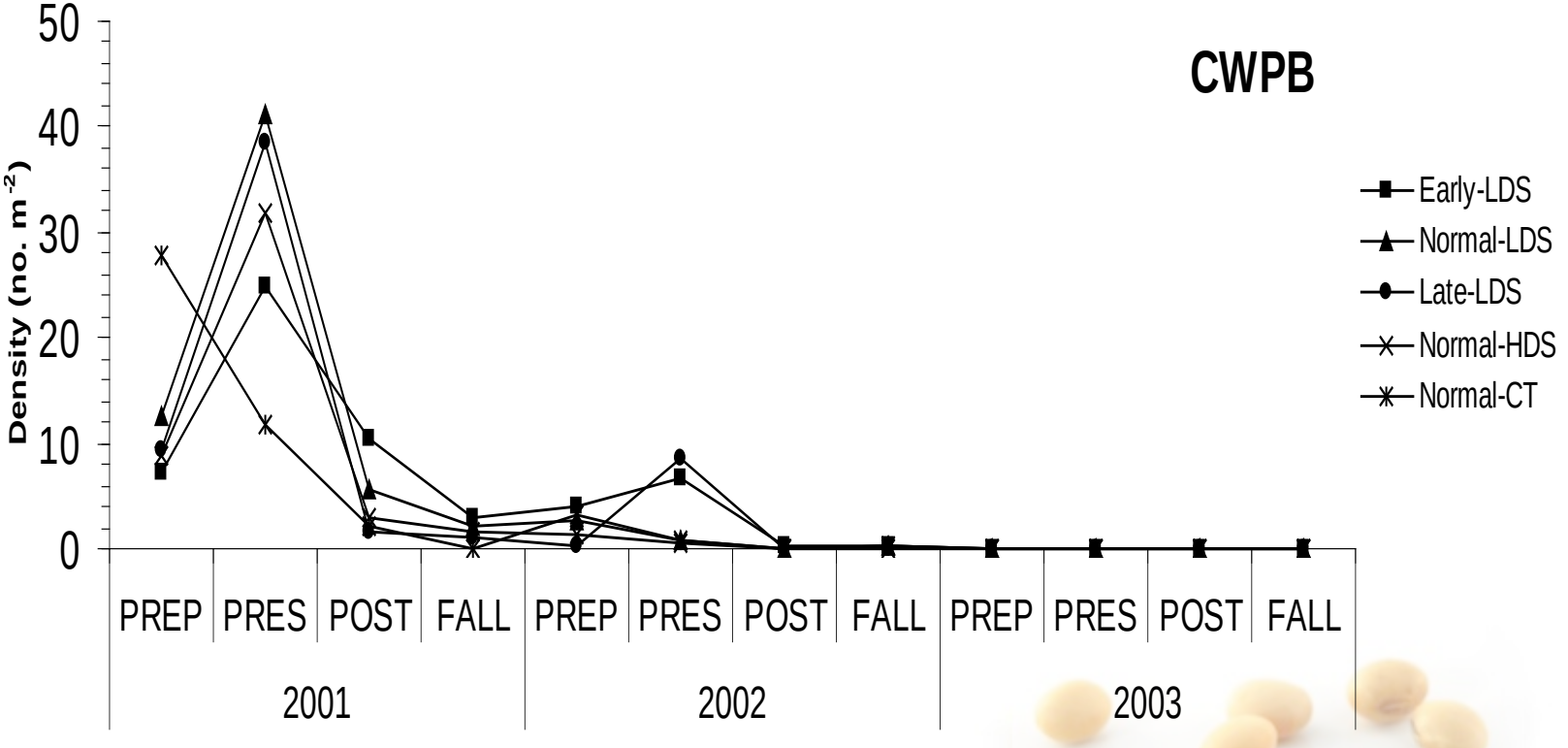
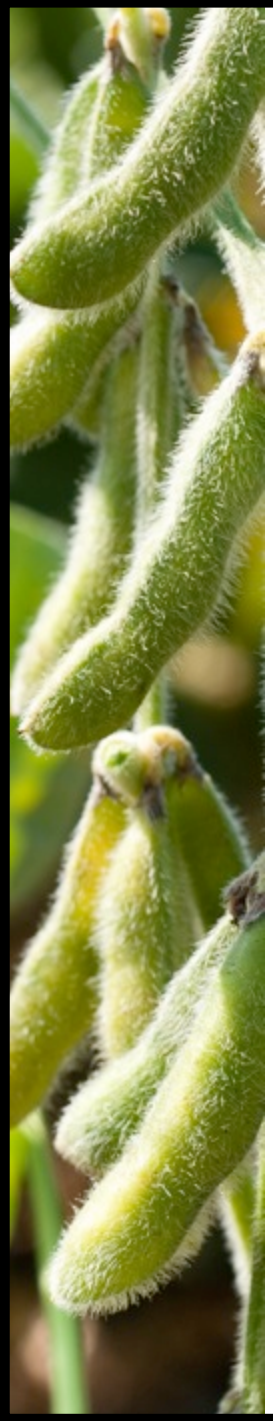



*4H locations = Beaverlodge, Lacombe, Brandon, Winnipeg

Harker et al. Agron J. 2006, 98:107-119



# Spraying Out Spring Hardened Canola

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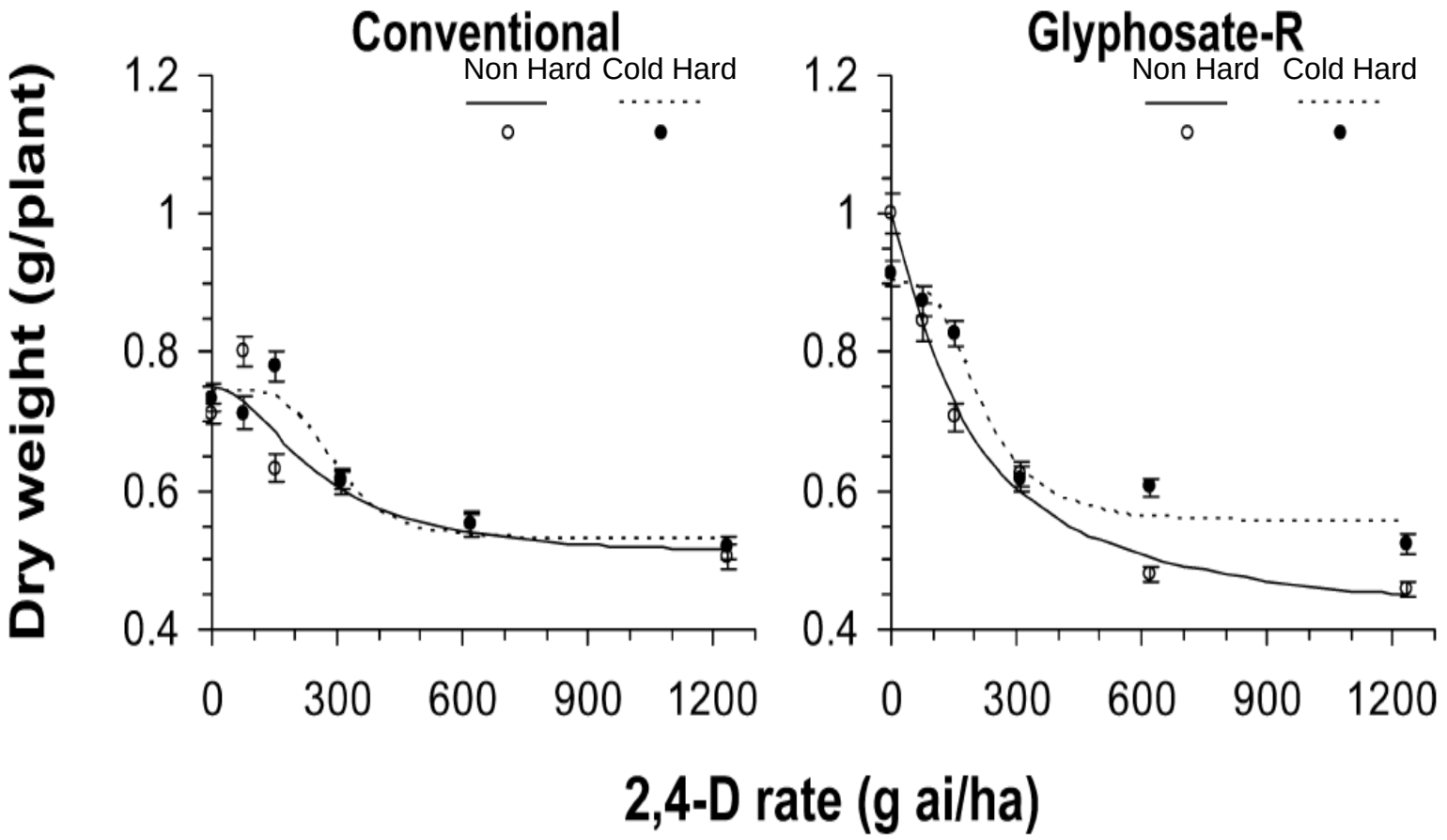
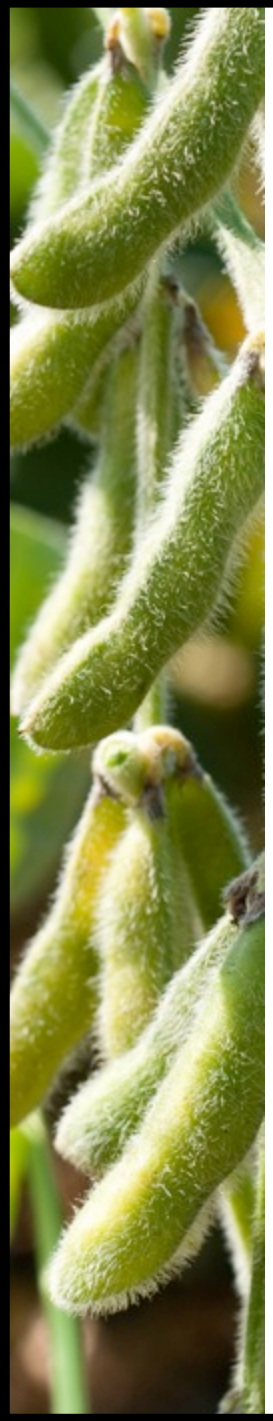



Légère et al. Weed Tech. 20:485-493



# Staging is Important

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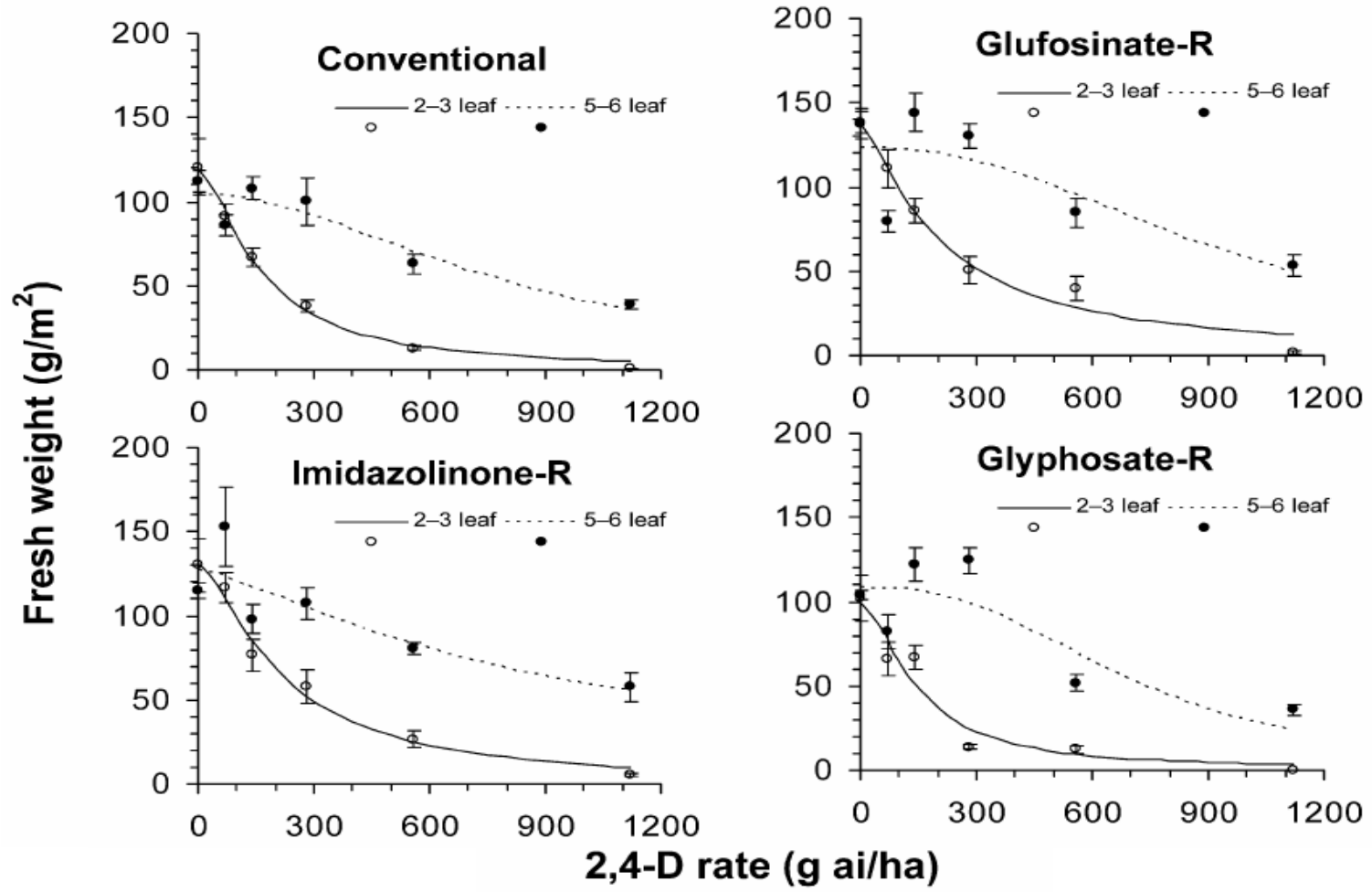
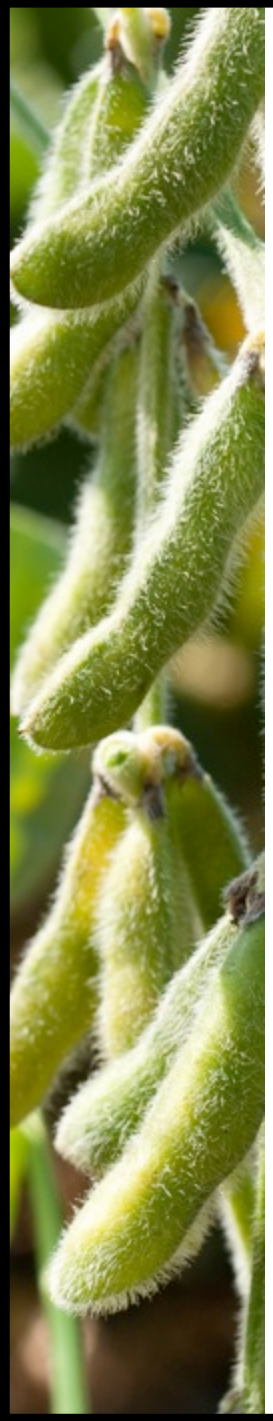



Légère et al. Weed Tech. 20:485-493



# Roundup Ready Soybeans – Roundup Ready® Canola Options

DEKALB
Growing Confidence

| Start Clean | | Stay Clean | | |
|---|---|---|---|---|
| **Option** | **Pre-plant Burndown or tillage** | **Post-emergent** | **Where volunteer glyphosate tolerant corn exists** | **Where volunteer glyphosate tolerant canola exists** |
| 1 | For enhanced burndown, tank-mix Roundup Transorb® HC with **Heat® or Valtera** | Roundup WeatherMAX® | Apply Roundup WeatherMAX plus Assure® II or Centurion® in-crop | Include Heat in the weed control program pre-seed for soybeans to control early flushes of volunteers. For post-emergent applications, include **Basagran®, Viper ADV, Pursuit or Odyssey** |
| 2 | | Tank-mix Roundup WeatherMAX **with Basagran®, Viper ADV, Pursuit® or Odyssey®** | | |

# Questions