

# So You Want to Grow Corn

Battle River Research Group  
March 15 2017



# Nutrient Requirements for Beef Cattle

**1400 lb (635 kg ) (BCS 3.0)**

	<u>CP (%)</u>	<u>TDN (%)</u>	<u>NEm (Mcal/d)</u>
<b>1<sup>st</sup> trimester</b>	7	49	10.7
<b>2<sup>nd</sup> trimester</b>	8	51	12.5
<b>3<sup>rd</sup> trimester</b>	9	54	15.2

**(adapted from NRC 2000)**

# Composition of corn varieties (%) (Alberta and Saskatchewan, 2011)

<u>Hybrid</u>	<u>Location</u>	<u>DM</u>	<u>CP</u>	<u>ADF</u>	<u>Lignin</u>	<u>TDN</u>	<u>Starch</u>
39M26	Lacombe	20.5	7.89	30.54	2.64	64.52	14.8
39F44	Camrose	36.4	7.59	29.33	2.73	65.22	16.3
39F45	Olds	29.13	7.01	25.76	2.04	67.28	17.6
M26/57	Westlock	29.41	9.26	30.03	2.65	64.81	14.5
P7213	Meskanaw	44.47	9.3	27.08	2.26	66.51	15.3
P7213	Birch Hills	39.45	8.5	30.08	2.44	64.78	11.8

8 ton Barley Crop  
(SWATH GRAZING)

**\$/Acre**

Field preparation	2.10		
Preseed burn & app	7.00		
Seed	14.00		
Seeding	11.17		
Fertilizer	18.15		
In crop herb & app	19.50		
Swathing	11.96		
Land			
Rent	30.00	\$/lb DM	
	<u>\$ 113.88</u>	<u>\$ 0.020</u>	

12 ton Corn crop  
(CORN GRAZING)

**\$/Acre**

Field preparation	2.10		
Preseed burn & app	7.00		
Seed	80.00		
Fertilizer	22.69		
Seeding	11.17		
In crop herb & app	14.00		
Land Rent	30.00	\$/lb of DM	
	<u>\$ 166.96</u>	<u>\$ 0.020</u>	

**Grazing Expenses**

**\$/Cow/Day**

Feed	\$ 0.61		
Labour	\$ 0.13		
	<u>\$ 0.74</u>		

**\$/Cow/Day**

Feed	\$ 0.60		
Labour to allocate new feed	\$ 0.13		
	<u>\$ 0.72</u>		

## **Input & Grazing Costs**

Table 3 shows all the production and grazing costs associated with this study.

**Table 3. Corn & Barley Grazing Expenses**

<b>Crop Production Expenses</b>	<b>Corn (\$/Acre)</b>	<b>Barley (\$/Acre)</b>
Field preparation (harrow & packing)	7.00	7.00
Seed	78.31	14.00
Seeding	14.00	14.00
Herbicide & application	11.53	12.38
Fertilizer	9.78	9.78
Swathing	10.00	10.00
Land Rent	25.00	25.00
<b>Total Crop Production Expenses (A)</b>	<b>155.62</b>	<b>92.16</b>
<b>Grazing Expenses</b>		
Fence & water depreciation	1.10	1.10
Labour & equipment for fencing & hauling water	60.07	60.07
Minerals & salt	3.27	3.27
<b>Total Estimated Grazing Expenses (B)</b>	<b>64.44</b>	<b>64.44</b>
<b>Total Expenses (A + B)</b>	<b>220.06</b>	<b>156.60</b>
<b>Total Pounds Gained/Acre</b>	<b>230.73</b>	<b>152.78</b>

Total expenses calculated for the corn were \$4841.32 and total beef production was calculated at 5076 pounds of gain. Therefore the cost per pound gained from grazing the corn was **\$0.98** (\$4841.32/4931 lbs). Total expenses for the barley were \$2,415.00. The cost per pound gained for the barley was **\$1.62** (\$2,415.00/152.78 lbs).

## Corn Grazing Calculator

*Input your numbers in Yellow cells*

**Expected yield - silage equivalent** 14 tons/acre @ 70% mstr.

Equals: 4.2 tons/acre DM

Equals: 8400 Lbs/acre DM

Estimated waste

20%

Estimated net feed/acre A 6720 lbs/DM

## Corn Grazing Calculator

*Input your numbers in Yellow cells*

**Expected yield - silage equivalent** 8 tons/acre @ 70% mstr.

Equals: 2.4 tons/acre DM

Equals: 4800 Lbs/acre DM

Estimated waste

20%

Estimated net feed/acre A 3840 lbs/DM

### Estimated feed requirement/day

Average cow size/lbs 1300 lbs

Estimated feed intake as % of body weight 3.0%

Average daily requirement/cow B 39 lbs/DM

Estimated cow days/acre C=A/B 172 CDA

### Estimated feed requirement/day

Average cow size/lbs 1300 lbs

Estimated feed intake as % of body weight 3.0%

Average daily requirement/cow B 39 lbs/DM

Estimated cow days/acre C=A/B 98 CDA

### Acre (Paddock size) requirement:

Herd size 60 Cows

Grazing Period 60 Days

(3-5 days recommended)

Estimated herd/days/acre 2.87 Days

Total acres(paddock size) required D 20.893 Acres

### Acre (Paddock size) requirement:

Herd size 60 Cows

Grazing Period 60 Days

(3-5 days recommended)

Estimated herd/days/acre 1.64 Days

Total acres(paddock size) required D 36.563 Acres



# Water Use in Forage Crops

Crop	Water Used		Reference
	kg H <sub>2</sub> O/ kg DM	% of Alfalfa	
Alfalfa (C3)	844	100	Bennett and Doss, 1963
Bromegrass (C3)	828	98	Martin et al., 1973
Crested wheatgrass (C3)	678	80	Martin et al., 1973
Soybean (C4)	584	69	Nielsen, 2011
Tall Fescue (C3)	583	69	Bennett and Doss, 1963
Wheat/Barley/ Oats (C3)	505	60	Martin et al., 1976
Orchardgrass (C3)	418	50	Bennett and Doss, 1963
Sudangrass (C4)	380	45	Martin et al., 1973
Corn (C4)	372	44	Martin et al., 1976
Sorghum (C4)	271	32	Martin et al., 1976
Coastal Bermuda (C4)	265	31	Doss et al., 1962

Teutsch C. Using mixtures of summer forages for improved forage yields in dry conditions. *J Anim Sci* 2013;91(E-Suppl 2)/*J Dairy Sci* 96(E-Suppl 1): 406. [abstract 358].



# Understanding Corn Maturities

- There is no industry standard for measuring corn maturities in North America
- Every company therefore expresses their maturity ratings differently
- Understanding maturities is key to selecting the right corn product for your farm
- Base your choices on local data. Corn products can perform differently in different environments



# Selecting the Right Hybrid

- Keys to selecting the right product
  - What is your end purpose: grazing, silage, HMEC, grain
  - Has the product been grown or tested in your area
  - What is the average CHU for your area
  - What are you going to plant with
  - How will your land be prepared
  - What crop are you following

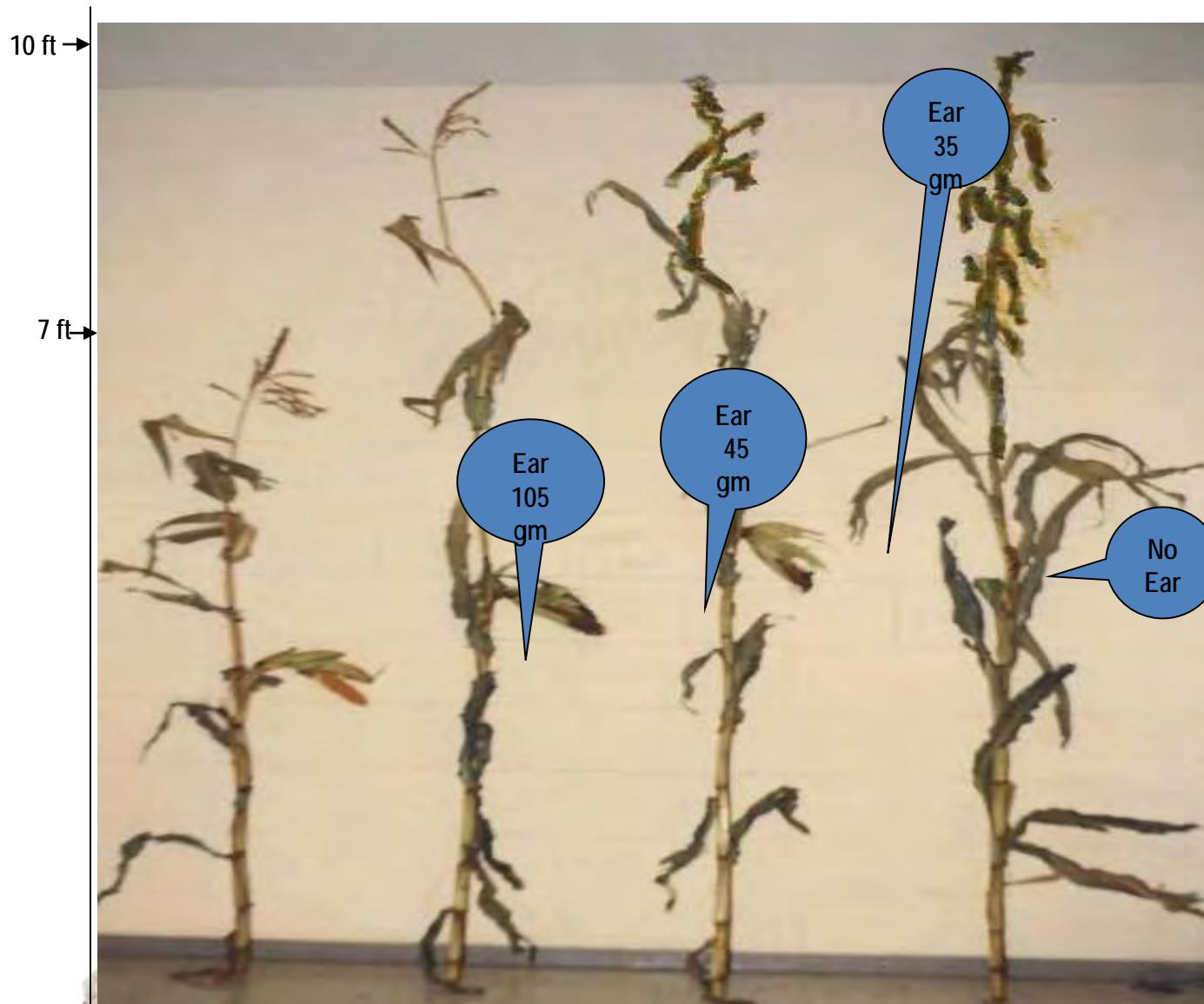




2001

Ponoka, AB

**Plant Height**  
 vs  
**DM Weight**



<u>Variety</u>	Pio 39N03	Pio 39K72	Pio 3984	Amaizing Graze
Heat Unit Rating	2000	2150	2150	2600?
<i>DM Weight (whole plant)</i>	<i>210 grams</i>	<i>170 grams</i>	<i>145 grams</i>	<i>140 grams</i>
DM weight in %	100%	81 %	70%	67%



# Quality of Corn Plant Parts...



<u>Part</u>	<u>% of DM</u>	<u>NDF (%)</u>	<u>Digestibility</u>	
			<u>NDF</u>	<u>DM</u>
Tassel	<1	78.4	53.4	63.5
Leaf sheaths	6.1	78.1	60.3	69.0
Husk	5.8	80.5	69.5	75.4
Leaf blades	8.5	66.7	73.2	82.1
Cobs	12.1	89.3	31.9	39.2
Stalk	18.3	66.5	61.5	74.4
Grain	48.5	11.8	89.7	90.0



# Planter vs. Air Seeder

Kenton, Manitoba - 2008

Product	Planting Method	Plant Population	Silage Weight (30% DM)	Whole Plant Moisture
Hybrid A	Planter	29,900 ppa	16.75	70.5%
Hybrid A	Air Seeder	29,900 ppa	14.80	71.9%
Hybrid B	Planter	29,900 ppa	16.80	66.8%
Hybrid B	Air Seeder	29,900 ppa	13.23	68.7%



# Plant Populations

- Early corn responds better to higher populations.
- Depending on region and level of early stress – best results observed between 28,000 and 34,000 ppa.
- 32000 is the general rule
- Increase population by 10% if seeding in cold wet soils



# Fertility

- Grain Requirements

PLANT NUTRIENT	Lbs/Bu
Nitrogen	1-1.25
Phosphate	.4
Potassium	.3
Sulfer	.1

- Silage Requirements

PLANT NUTRIENT	Lbs/MT @ 30% DM
Nitrogen	8
Phosphate	4
Potassium	8
Sulfer	1

15 ton Corn Silage will use: 120 lbs N – 55 lbs P – 120 lbs K

**Table 1. Nutrient uptake by the growing crop and removal in the harvested portion of selected crops.**

Crop	Unit	Uptake (removal)		
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>Cereals</b>				
Barley	lb/bu	1.53 (1.10)	0.61 (0.40)	1.46 (0.35)
Oats	lb/bu	1.38 (0.80)	0.40 (0.25)	1.60 (0.20)
Corn	lb/bu	1.18 (0.75)	0.63 (0.44)	1.41 (0.29)
<b>Wheat</b>				
10% protein <sup>1</sup>	lb/bu	1.55 (1.10)	0.67 (0.50)	1.47 (0.35)
12% protein	lb/bu	1.83 (1.30)	0.67 (0.50)	1.47 (0.35)
14% protein	lb/bu	2.12 (1.50)	0.67 (0.50)	1.47 (0.35)
<b>Oilseeds</b>				
Canola	lb/bu	3.12 (1.88)	1.30 (0.91)	2.05 (0.46)
Flax	lb/bu	2.58 (2.00)	1.42 (1.10)	2.00 (0.65)
Sunflower	lb/cwt	3.90 (2.80)	1.43 (1.10)	2.03 (0.60)
Soybean <sup>2</sup>	lb/bu	5.80 (4.00)	1.00 (0.80)	4.40 (1.40)
<b>Pulses</b>				
Field peas <sup>2</sup>	lb/bu	3.36 (2.40)	1.45 (1.20)	3.00 (0.71)
Lentils <sup>2</sup>	lb/bu	3.01 (2.00)	0.90 (0.62)	2.57 (1.10)
<b>Root Crops</b>				
Potatoes	lb/cwt	0.63 (0.35)	0.27 (0.15)	0.77 (0.56)
Sugar beets	lb/ton	9.57 (4.00)	2.49 (1.50)	17.82 (6.60)
<b>Forages<sup>3</sup></b>				
Alfalfa <sup>2</sup>	lb/ton	56	15	60
Bromegrass	lb/ton	36	13	59
Fescue	lb/ton	38	18	52
Timothy	lb/ton	38	14	62
Barley silage	lb/ton	40	13	29
Corn silage (67% water)	lb/ton	8.30	3.60	8.30

<sup>1</sup> At same moisture content as grain yield measured.

<sup>2</sup> Legume crops obtain most of their N from atmospheric N fixation.

<sup>3</sup> Forage yield on a dry matter basis.



05/28/2013

# Safe Rates of Starter/Popup Fertilizer

Placement	Sandy Soils	Non-Sandy Soils
	10-34-0 (gal/acre) <sup>6</sup>	
With the seed (pop-up)	5	5
1/4 to 1/2 inch from the seed	10	10
1 inch from the seed	20	40
2 inches or more from seed	20+	40+

Product	Salt Index, lb/gal	Value Relative to 10-34-0
Ammonium polyphosphate 10-34-0	2.28	1
7-21-7	3.04	1.33
Urea ammonium nitrate 28-0-0	6.75	2.96
Urea ammonium nitrate 32-0-0	7.78	3.41
Ammonium thiosulfate 12-0-0-26	30.9	13.55



# Prior to Planting

- Soil Preparation
- Soil Types
- Uniformity of Soil
- Tillage depth and seed placement
- Soil Clods
- Air pockets
- Residue Management



# Stand Establishment/ Emergence

- Minimum soil temperature 8-10C
- Seeding Depth – 1.5"- very imp
- 1-5 day weather – do not plant if expecting cold rain/snow
- Proper seed placement – spacing
- Even emergence – effect of runts



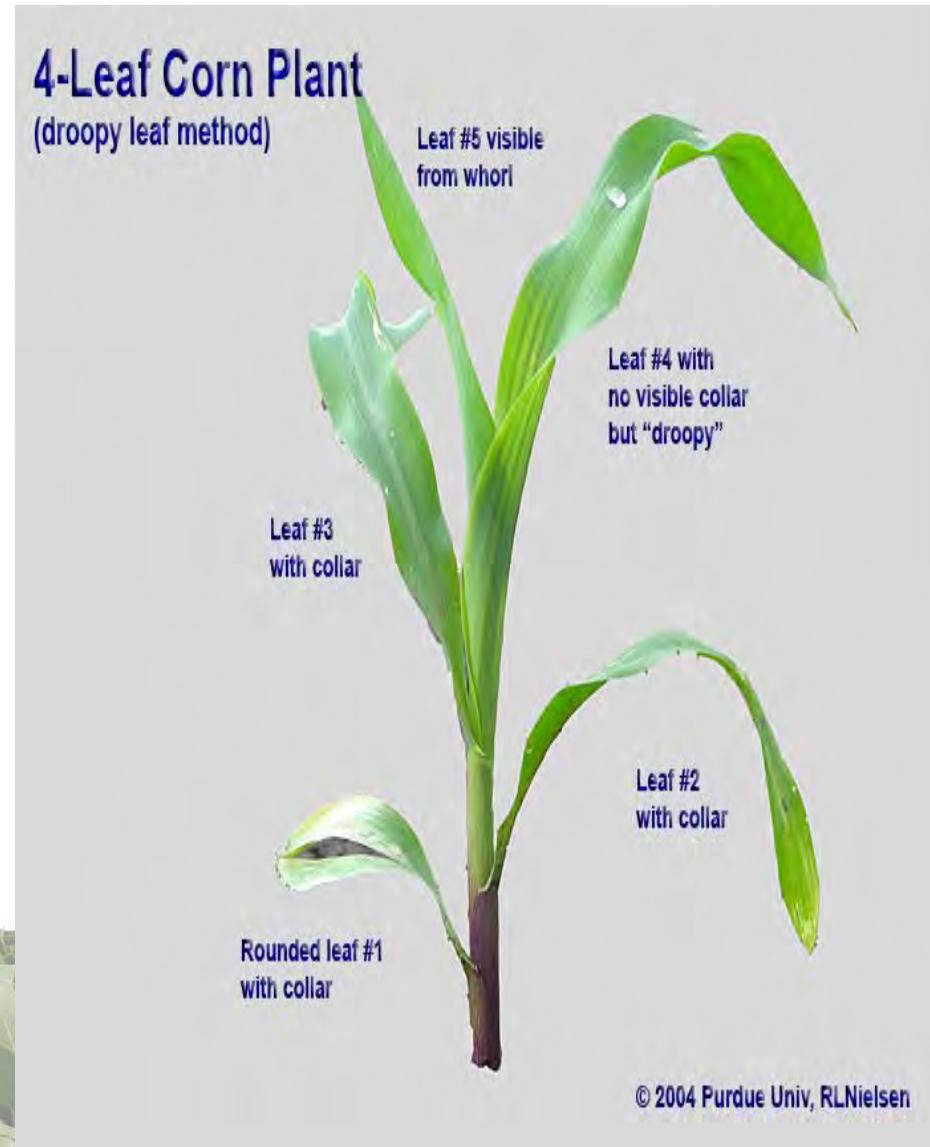
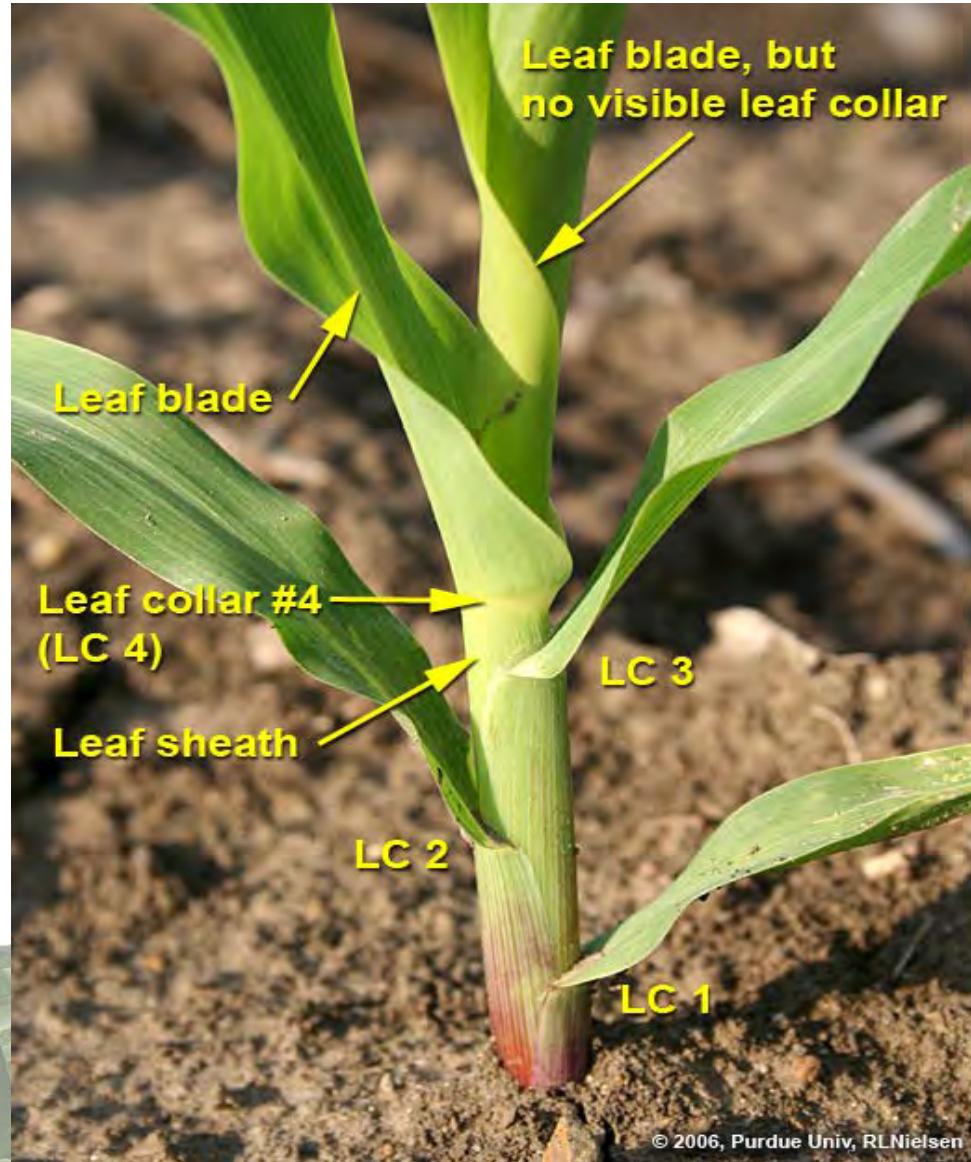


# Cold Chill





# How to Stage a Corn Plant



# Early Season Frost



# Frost at V2

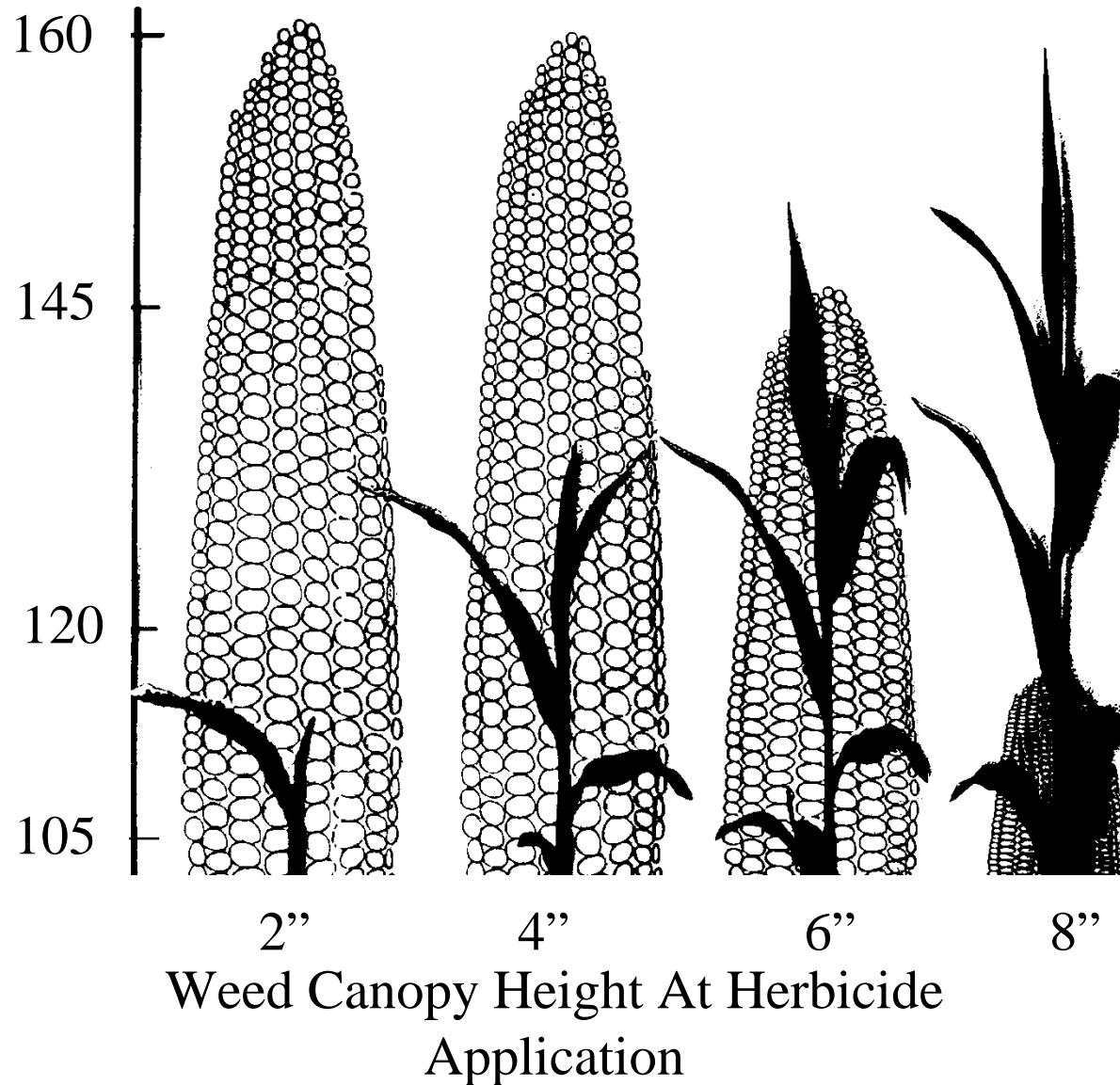


# Frost at V4



# Herbicide Timing effect on Corn Yield

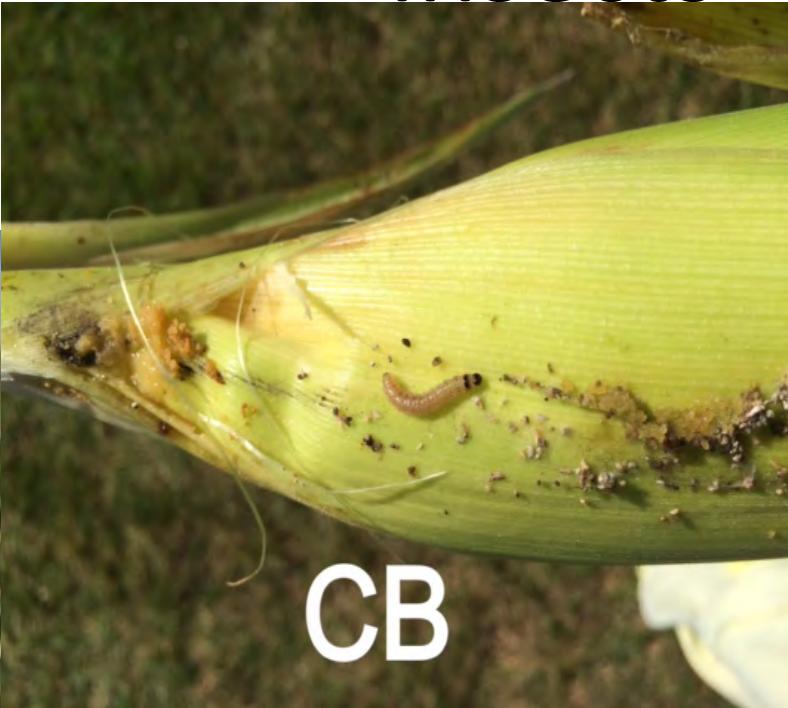
- Weed competition in corn is most damaging early in the growing season.
- Corn yields are reduced when weeds are allowed to grow past 4”.
- Herbicide application needs to occur before weed canopy exceeds 4” for consistent weed control and maximum corn yield.



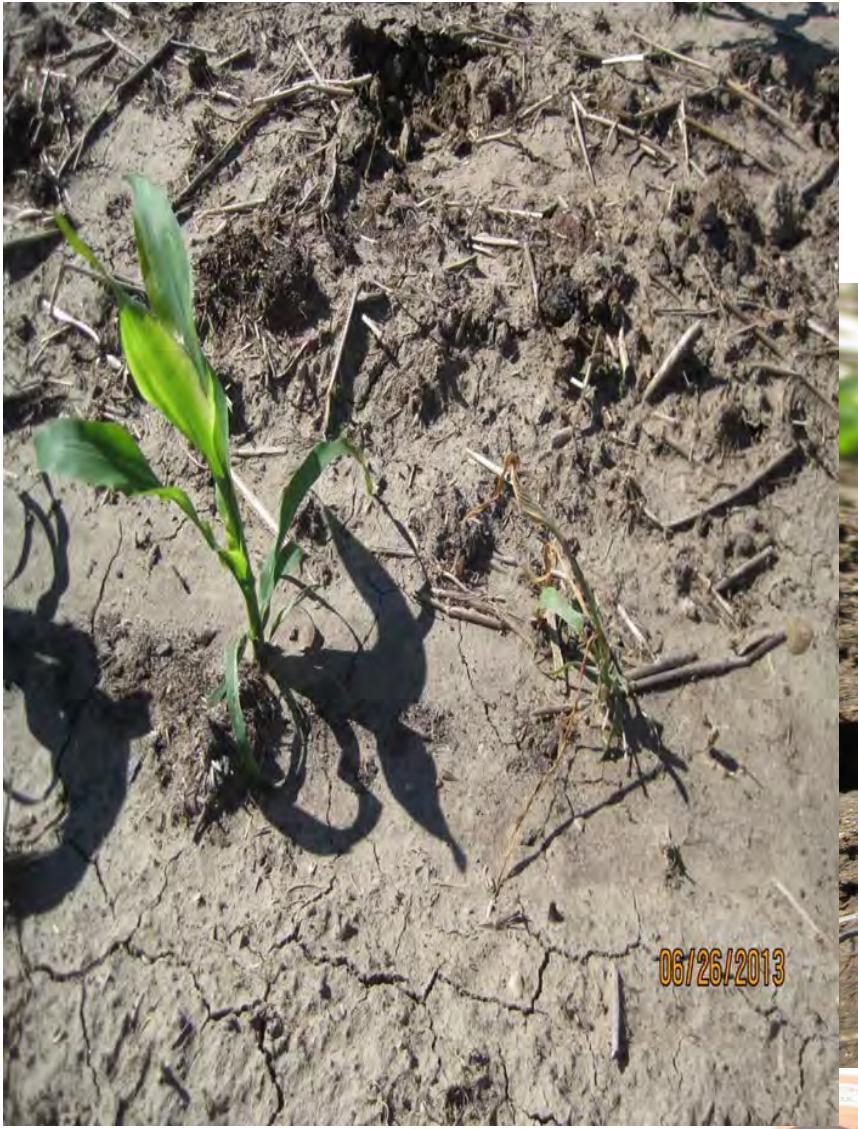




# Insects



# Insects





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