Hemp Agronomy

HEMP PRODUCTION SERVICES

From Our Fields to Your Brand


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RESEARCH AND DEVELOPMENT

HGI – Actively breeding hemp since 1998. Global leader in hemp grain variety development

TOP QUALITY SEED

International standards / CSGA high yielding / short stature / ease of harvest

SEED VARIETIES

Suited to your climate, latitude and farming operation

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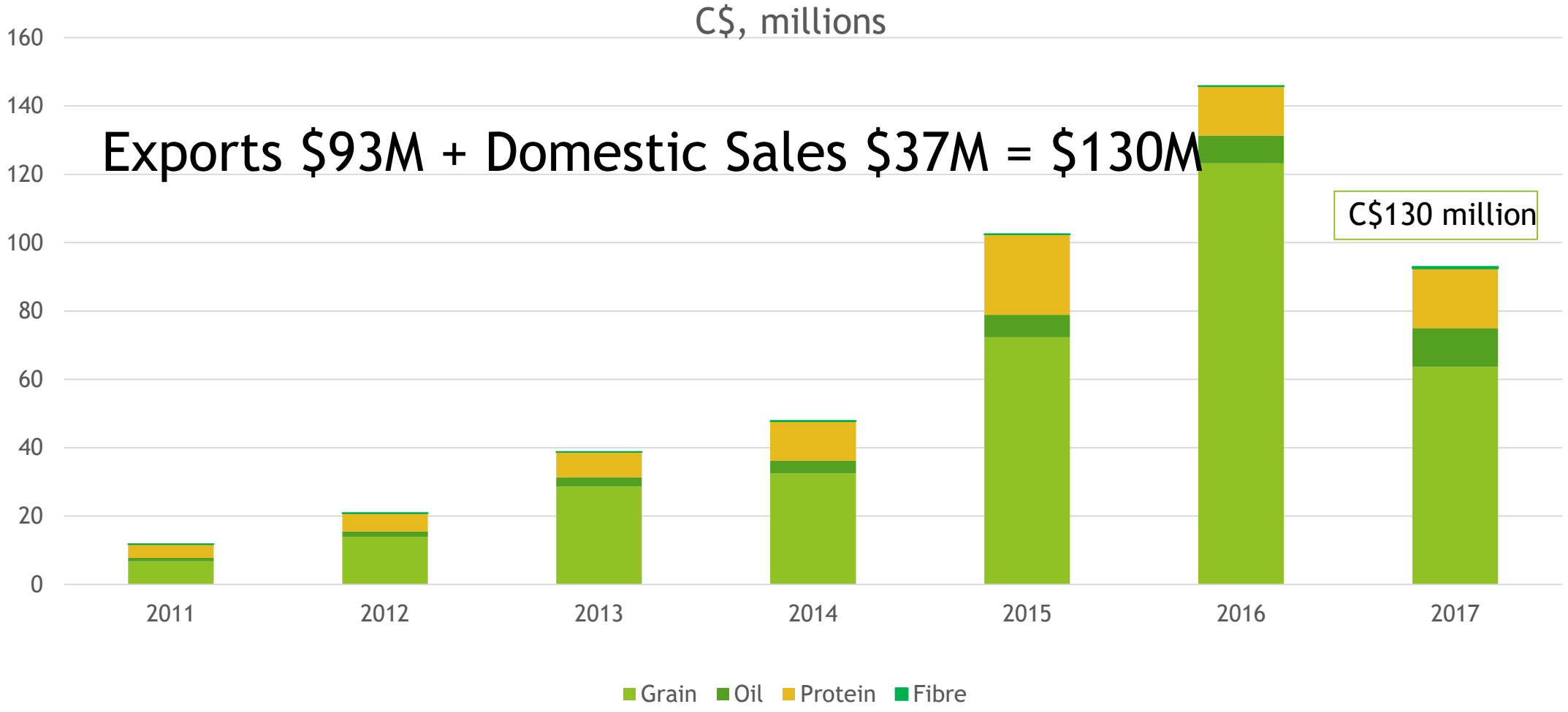
Plant Genetics for the *Natural World*

Canadian hemp exports 2011 to 2017



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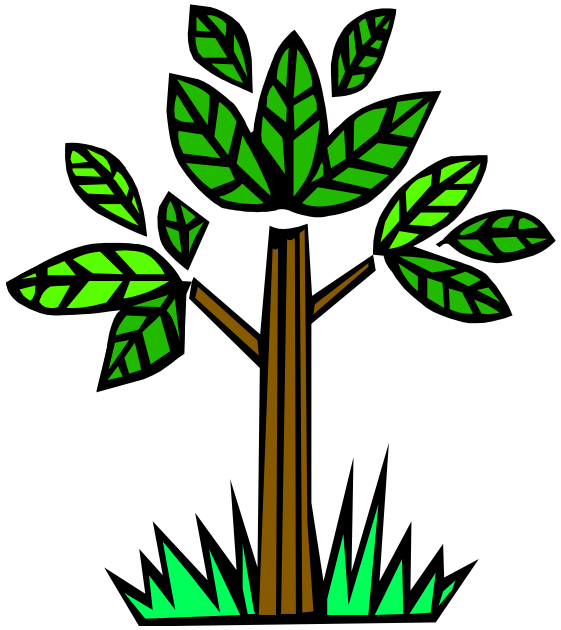
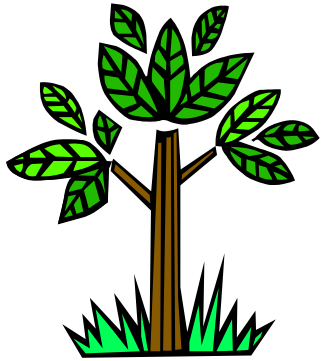
What is Industrial Hemp?



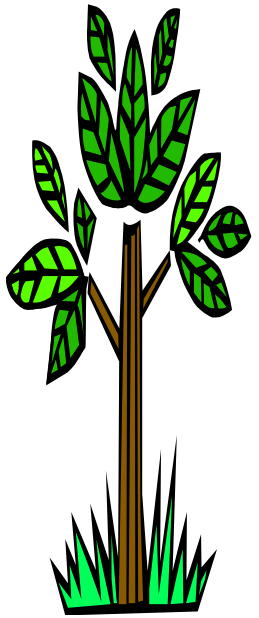
Cannabis Hemp

-only plant family to contain cannabinoids over 85

Grain



Dual Purpose



Fiber

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Producing Quality Hemp Products

- What is the market demanding?
- How can you supply quality hemp?
- Systematic approach is required to maximize quality;
  1. Proper Planning
  2. Agronomics,
  3. Harvest & Storage Practices.

Hemp Oil Flow Chart

Raw Hempseed

Cleaning

Crush / Extraction

Filtration

Hempseed Oil

Pack Under Nitrogen

Quality Control

Package Ready

Hemp Powder
50%, 33% and 23%

Separation

Milling / Grinding

Press Cake

Hemp Powder Flow Chart

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Microbiological Limits

Peroxide Value	Less than 4 meq/kg
Standard Plate Count	<100,000 CFU/g
Total Coliforms	<1000 CFU/g
Fecal Coliforms	Negative=LOD<10CFU/g
E. coli	Negative=LOD<10CFU/g
Salmonella	Negative
Staphylococcus A	Negative
Mold & Yeast	<1000CFU/g
Gluten	Less than 20ppm
THC	Less than 10ppm
Pesticide Residue	Nil

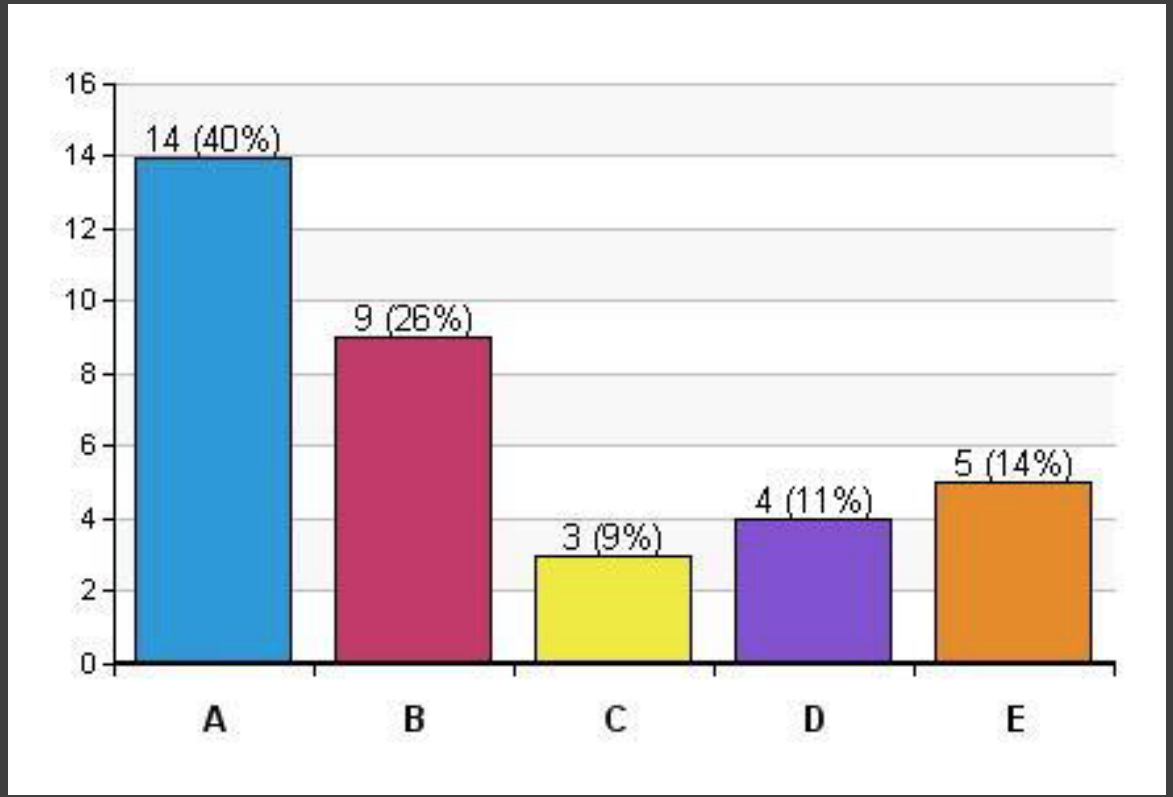
Agronomy

- Field selection
- Crop Rotation
- Variety Selection
- Seeding
- Fertility
- Weed Control
- Harvest

iClicker Question

How many acres of hemp do you typically plant?

A. Less than 200
B. 200 to 500
C. 500 to 700
D. 700 to 1,000
E. More than 1,000



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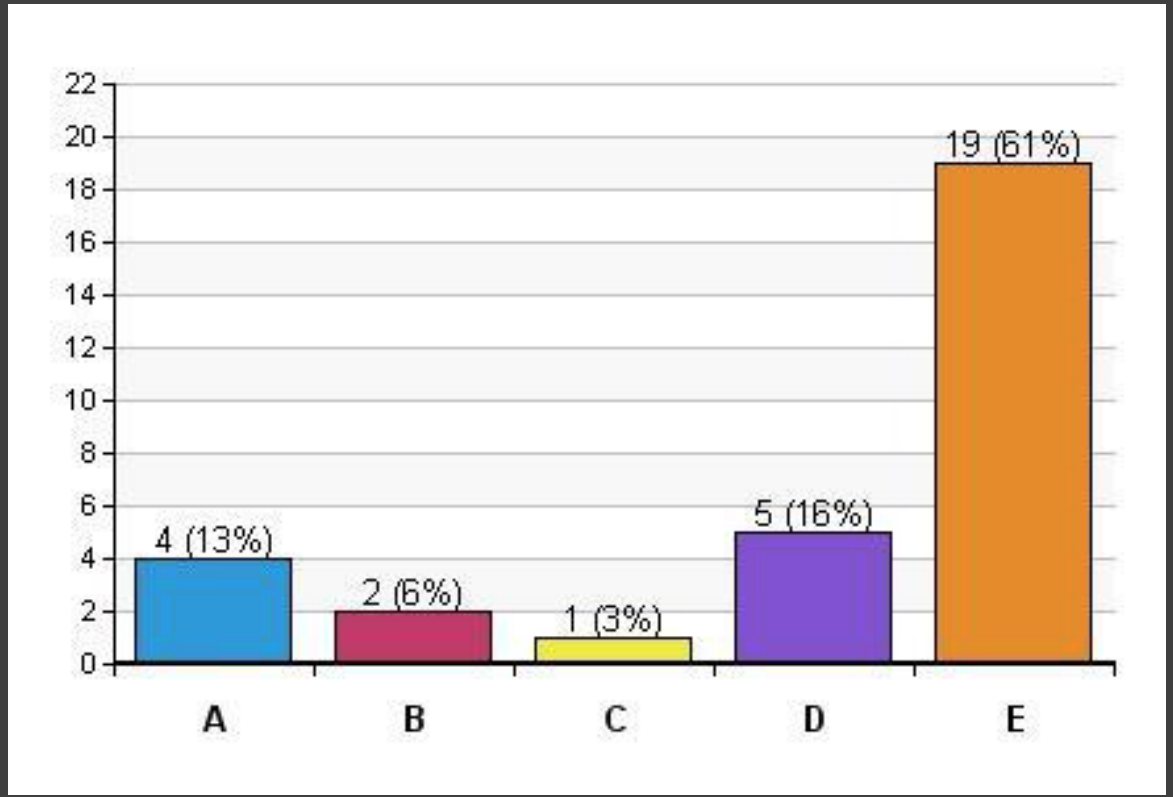
Seeding -Field Selection

- Crop Rotation history
- Herbicide history – No residual herbicides
- Fertility – N, P, K, and S levels
- Weeds – Problem weeds
- Trash Management

iClicker question

How do you select the field you want to grow hemp on each year?

A. Weed Pressure
B. Soil type
C. Proximity to yard
D. Field Drainage
E. Crop Rotation



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Field Selection Criteria

- Crop Rotation history
- Herbicide history – No residual herbicides
- Fertility – N, P, K, and S levels
- Weeds – Problem weeds
- Trash Management

Soil Properties

- Moderate soil texture (loam, clay loam)
- Heavy clay should be avoided mainly due to excess moisture
- Sandy soils will work with adequate moisture
- Non-saline
- Good tilth
- Good surface and internal drainage

Excess Water

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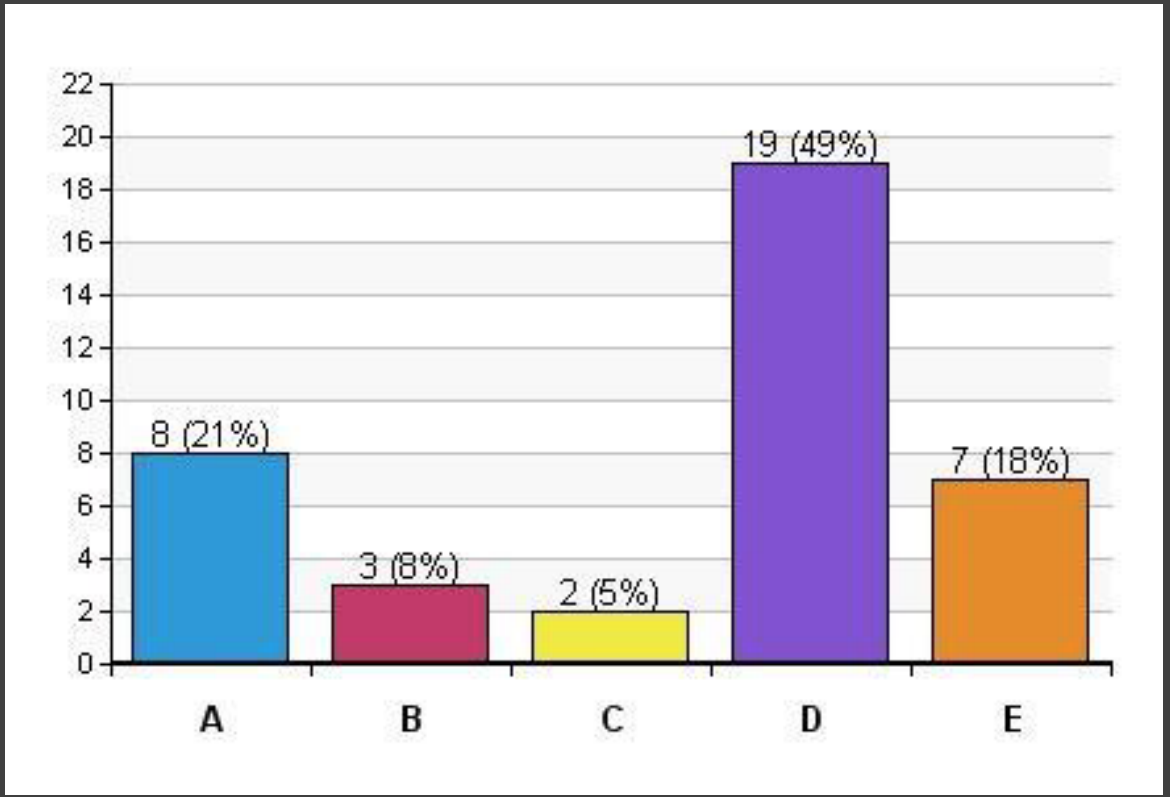
iClicker Question

Crop rotation: what crop do you like to have before hemp?

A. Wheat
B. Oats
C. Canola
D. Pulse Crop
E. None of the above



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Variety Selection

- Hemp research data is somewhat scarce
- Try to get localized data
- The more site years the better the data
- Strip trials are not always enough...ask if its replicated and what the Coefficient of Variation (CV) and Least significant difference (LSD)

Variety Descriptions

Variety	Yield % Check	Site Years Tested	2015 Yield: % of CRS-1 Roblin
Alyssa	82	13	-
Anka	81	10	-
Canda	110	18	86
CanMa	88	3	-
CFX-1	93	18	106
CFX-2	94	17	92
CRS-1	100	21	100
Delores	98	19	103
Finola ~	60	16	83
Grandi `	97	1	97
GranMa	78	1	78
Joey	117	13	92
Jutta	94	8	-
Katani `	98	1	98
Picolo `	95	1	95
Silesia	75	11	75
X59 ~	101	12	81
Varieties that are being evaluated for approval			
Debbie	94	11	95
Judy	64	1	64

CHECK CHARACTERISTICS				
			CRS-1 (lb/acre)	1763
CRS-1	1548	21	CV%	9.2
	lb/acre	site years	LSD%	12
			Sign Diff	Yes
			Seeding Date	21-May
			Harvest Date	14-Sep

- University of Kentucky
- Cornell University
- Penn State
- North Carolina State
- University of Vermont

- North Dakota State
- Morrisville State
- Purdue
- Minnesota
- Washington State
- Lehigh Valley
- Vermont
- Colorado

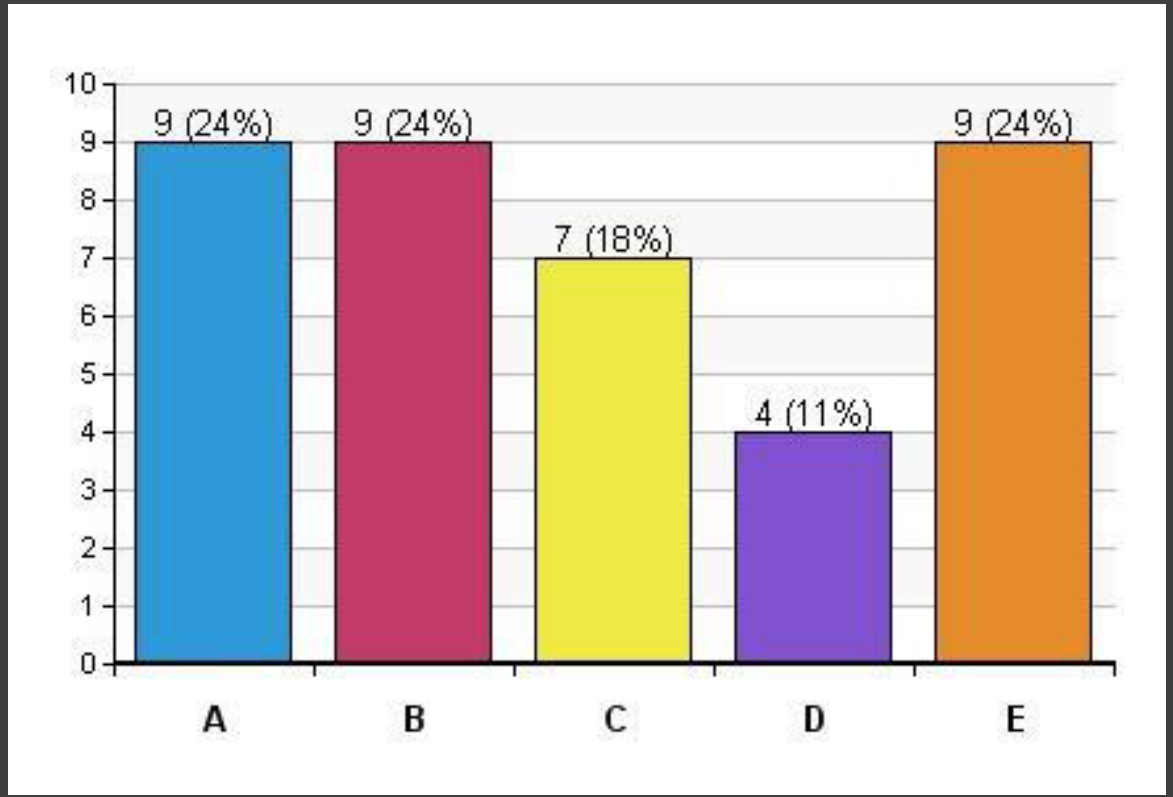
Variety Selection Criteria

- Yield
- Height
- Disease susceptibility
- Herbicide tolerance
- Maturity
- Shelling

iClicker Question

What is your preference in the height of the crop when choosing a hemp variety for growing?

A. As short as possible
B. Shorter to medium height
C. Medium to taller height
D. As tall as possible
E. Its all about the yield baby!!



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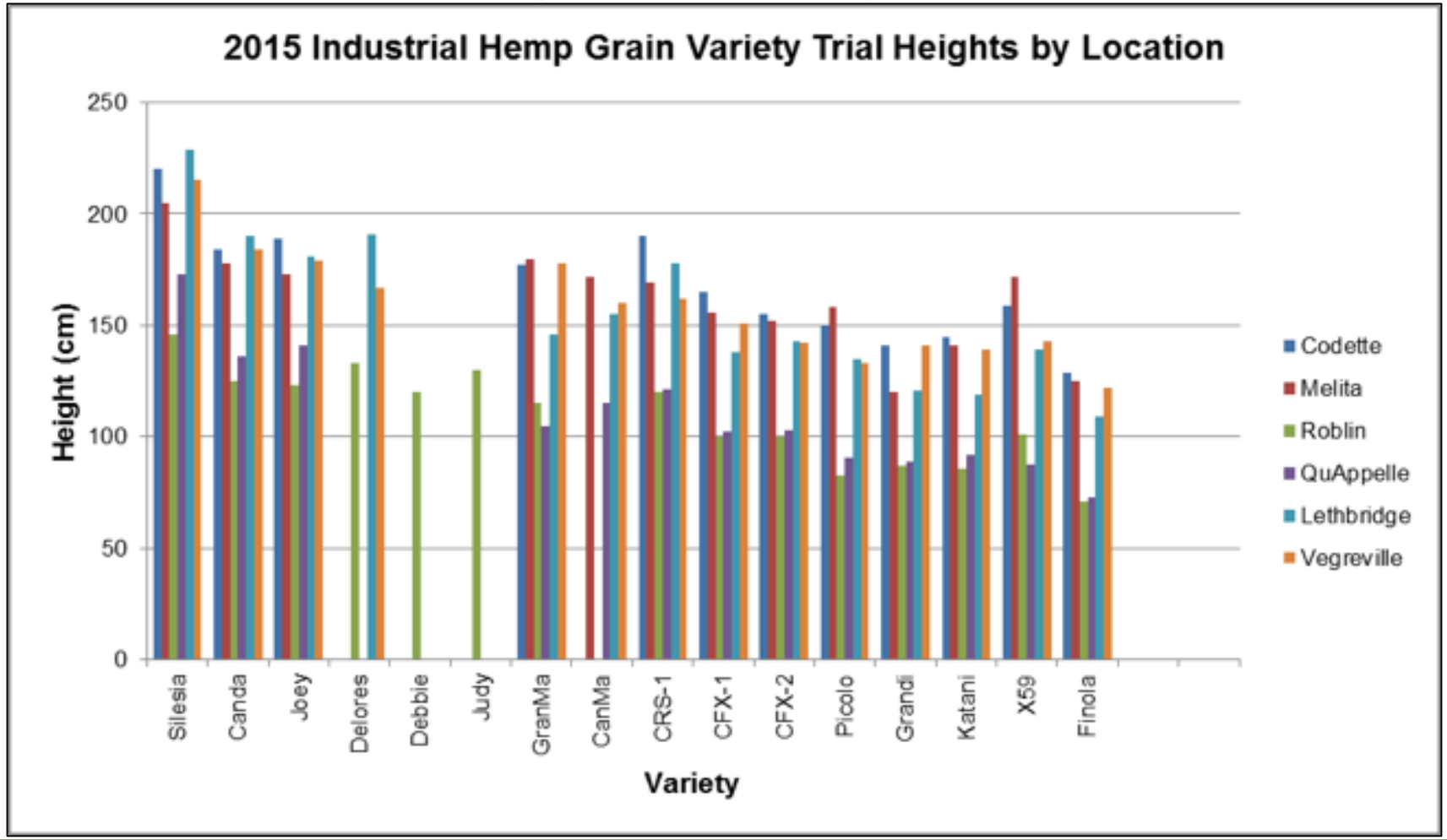
Plant Height Variety x Location



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Seeding

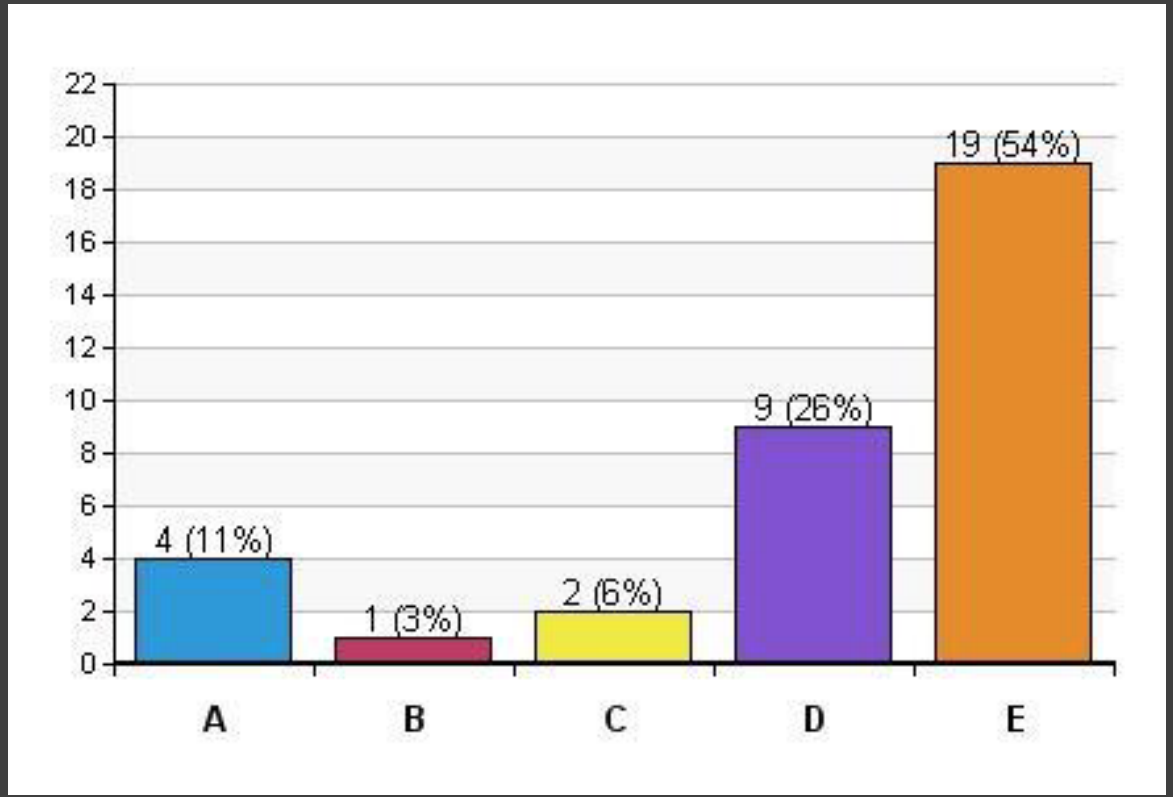
- Seed Shallow - ~ ½ inch
- 20-25 lbs/acre seeding rate for grain
- Higher seeding rate for Fibre
- Warm Soils – above 50-55 degrees F
- Equipment – Low fan speed for air seeders


Twin Valley
BOURGAULT

iClicker Question

What is your seeding rate for hemp grain?

A. 15 pounds per acre or less
B. 20 pounds per acre or less
C. 20 to 23 pounds per acre
D. 23 to 25 pounds per acre
E. Over 25 pounds per acre



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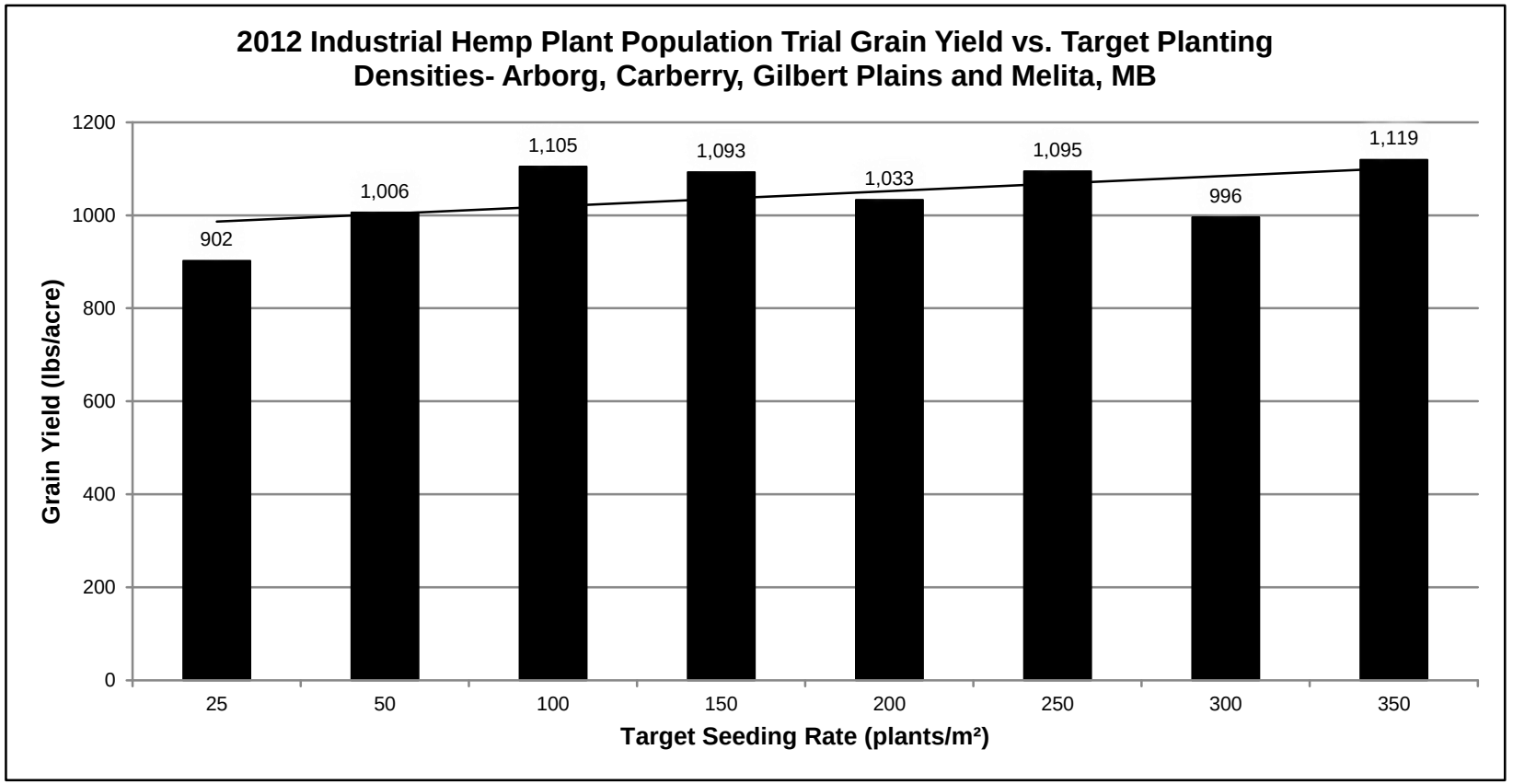
Seeding rate

- Plant population
- Higher seeding rates may lower yield due to promoting long internodes and suppressed branching
- Hemp (single stalk annual) suppress later branching when grown in thick stands

Optimum Seeding Rate - Grain



Source: Mb. Diversification Centers

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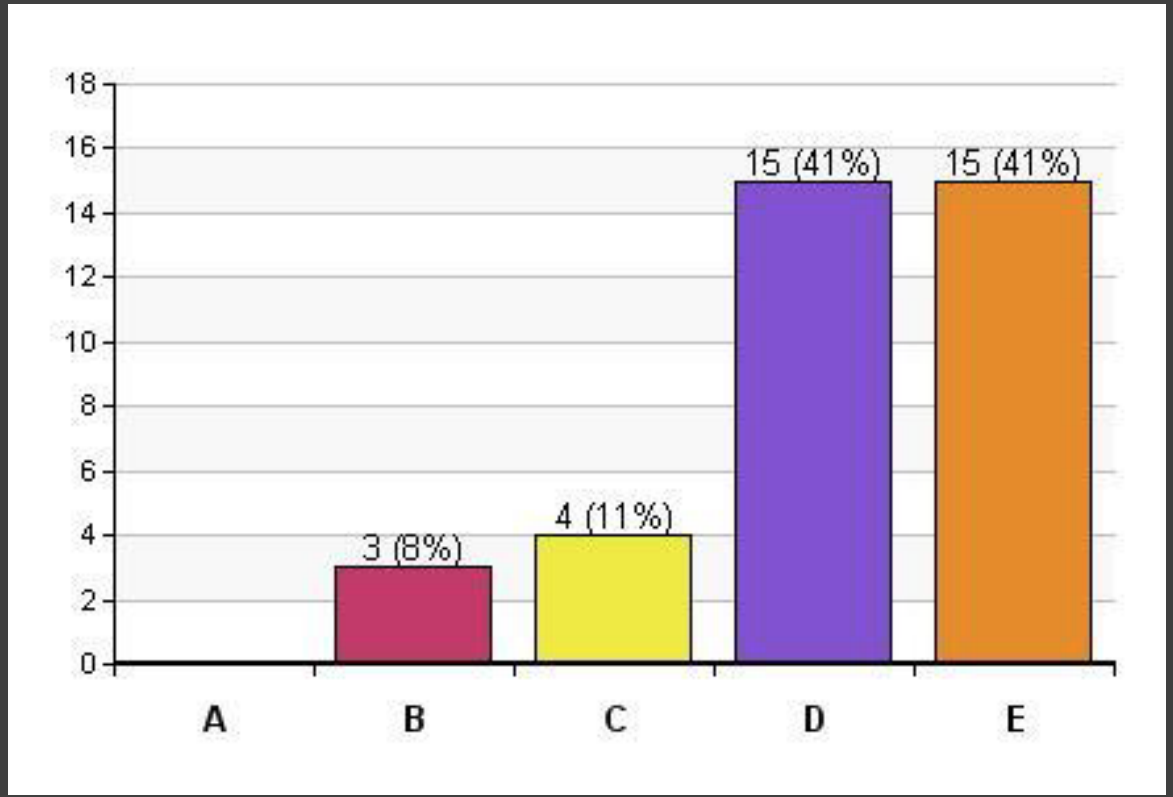
iClicker Question

When do you like to seed?

A. As soon as I can get on the land
B. Early May (May 1-10)
C. Mid May (May 11 - May Long Weekend)
D. Late May (May 20-May 31)
E. Early June (June 1-15)



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Daylight sensitive
Seeded mid-June

This plant is 6 inches tall and has started the reproductive cycle after June 21st.

Seeding date Trial

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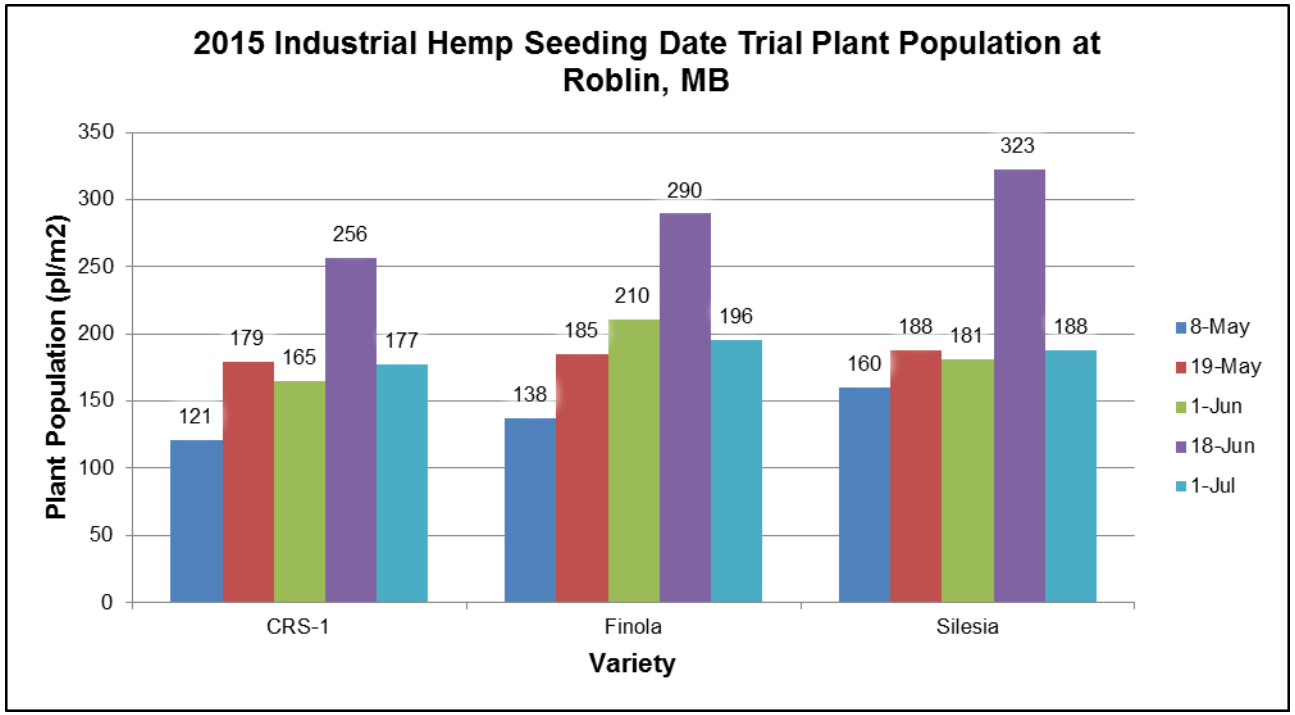
Seeding date trial plant counts; 250pl/m2 target



CV %	27.3
LSD	33.8
R-Square	0.6819
Alpha Level	0.05

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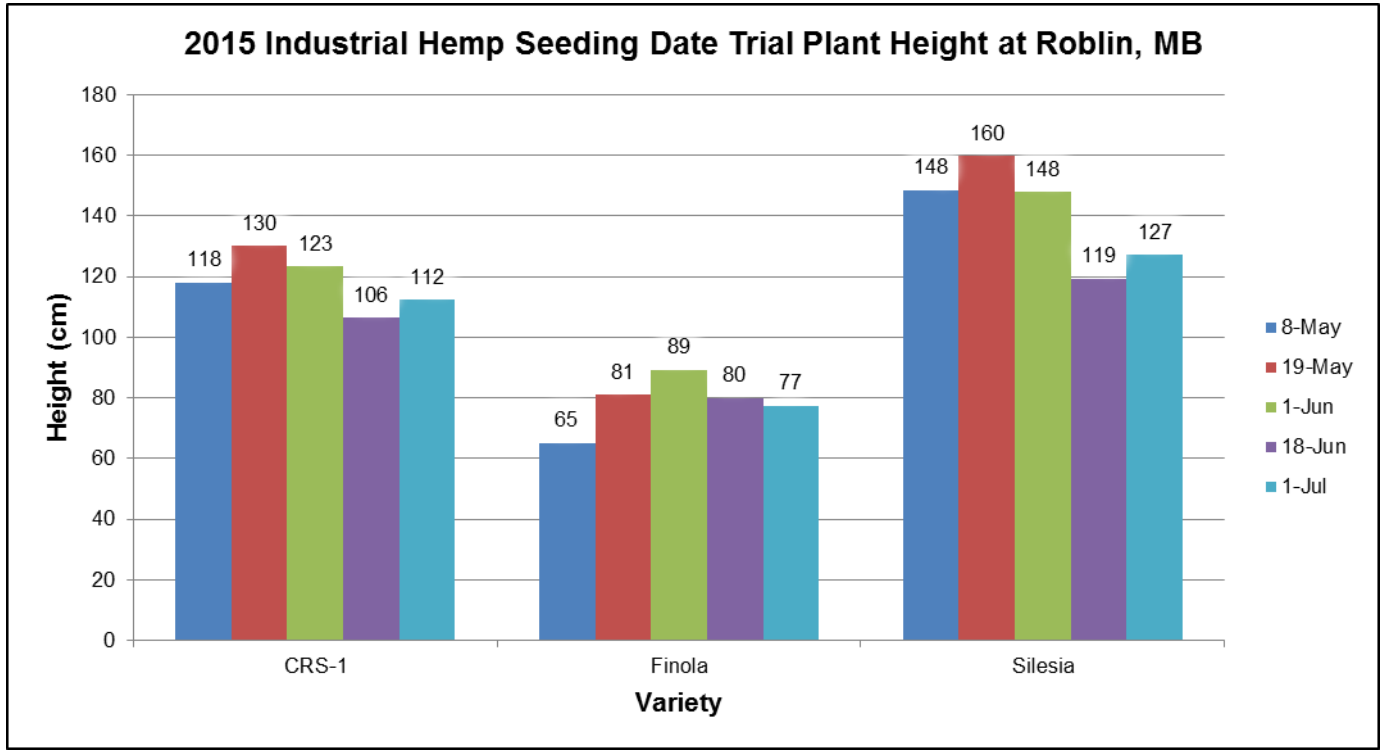
Seeding date trial - plant height



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Fertility

- Hemp responds well to N, P, K and S when soil nutrients are low

	Total Plant (Kg.ha)		Grain (Kg/ha)		Uptake
Nutrient	**Hemp**	**Canola**	**Hemp**	**Canola**	**Hemp/day**
N	200	120	40	65	6.7
P	47	50	19	35	1.56
K	211	75	10	17	6
S	14	20	3	12	

Fertility

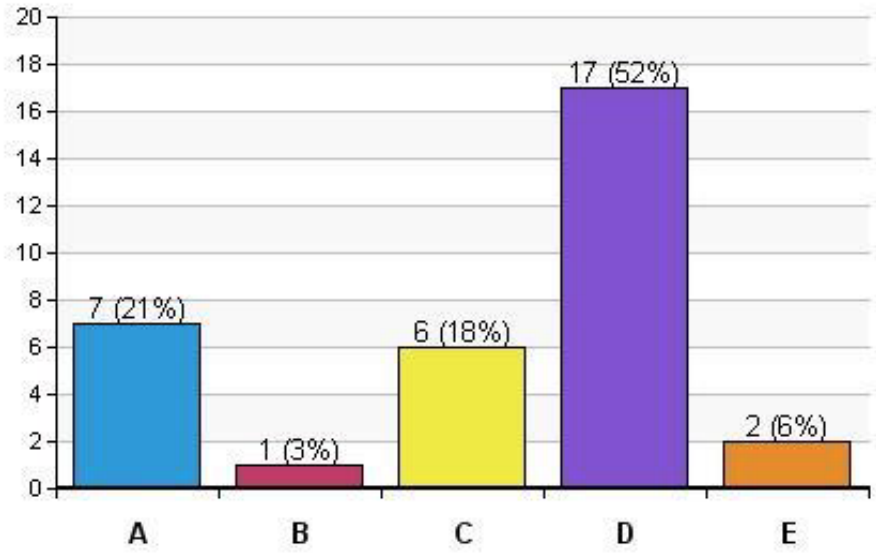
Nitrogen Concerns

- On going research is needed for up to date response information
- We need field research information to fine tune N fertilizer application… 4-R's Right rate, right form, right placement, right time

iClicker Question

What is your single biggest challenge when growing hemp?

A. Weeds
B. Disease
C. Regulations
D. Harvest management
E. Managing dry-down storage



Disease - Sclerotinia

Botrytis – White mold

Insects

Frost – May 30th 2015 -4.7 C

Same Frost on Soybeans and Flax

Hail

Recovery from hail injury

Wind

- Can be a problem when hemp is in the elongation stage
- Less fibre within the stalk to prevent breakage

Wind prior to harvest

Can shell excessively if you get a wind event(s) prior to harvest

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Harvest Management

- Timing of Harvest
- 10 to 20% moisture
- Cracking
- Frost
- Dry to below 10% for safe storage

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H2O FIRE-PR
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Straight Combining

Goal : Smooth uniform feeding

Problems:

- Fibers wrapping on moving parts

Solutions:

- Correct Timing!!
- New Combines – no Modifications
- NEW knife and guards
- Draper headers best

Drying

#1 priority is to dry the hemp to <9%

Dry Low + Slow to avoid toasting the hemp

Factors for bacterial & mold growth

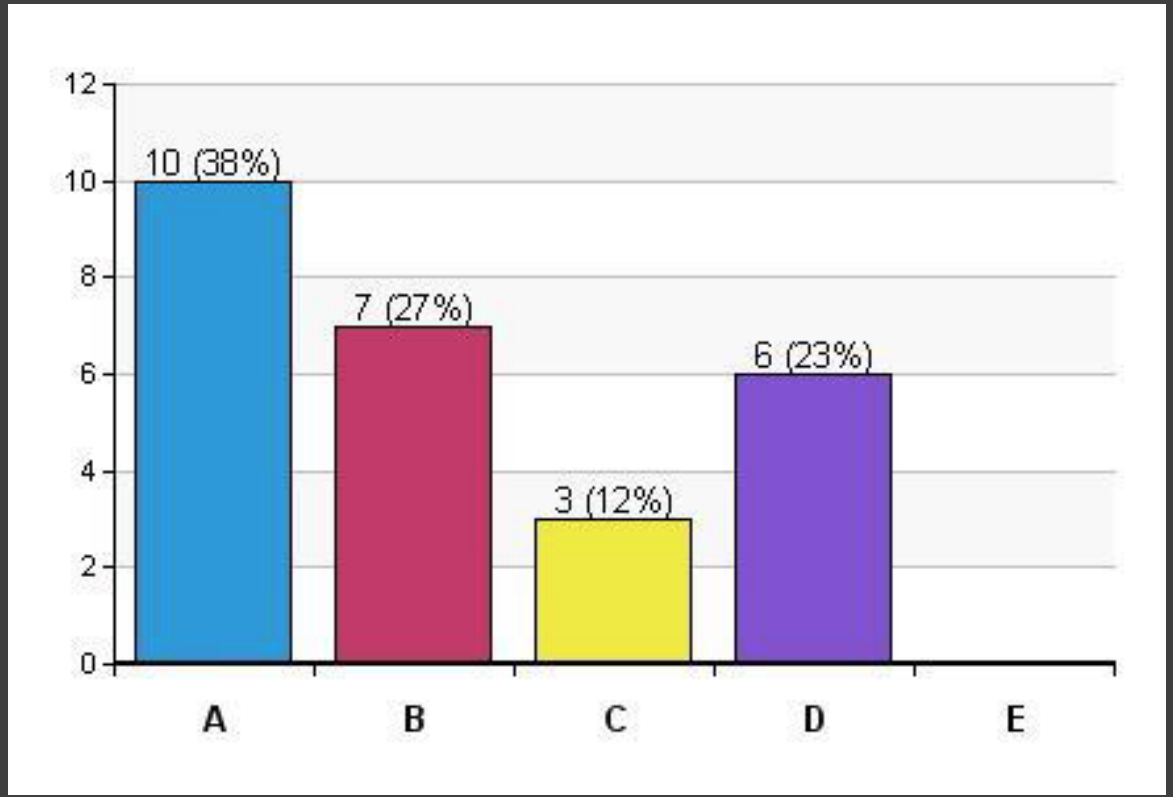
Time	Temperature	Moisture

Higher moisture + Higher temperatures = Ideal conditions conducive for development of bacteria and molds

iClicker Question

Conditioning: What dry down practice do you use to prepare your hemp for storage?

A. Aeration only
B. Aeration with supplemental heat
C. Grain dryer
D. Combination of grain dryer and aeration
E. None of the above



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Storage & Handling

- Long Term Storage - Cold and dry grain
- Minimize Damage - Operate augers at capacity and slowest possible speeds

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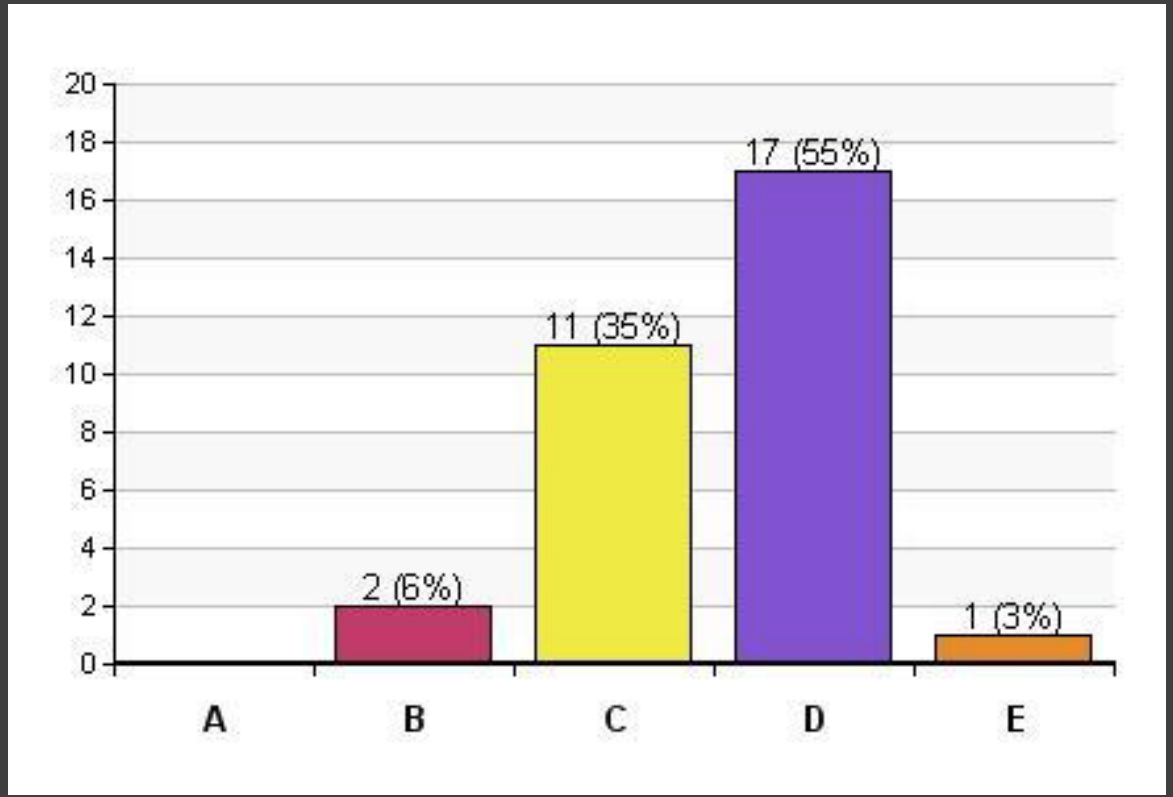
iClicker Question

To what moisture do you dry the crop for initial safe storage? (what you are comfortable in storing the grain, not necessarily the processor's maximum limit)

A. Greater than 11%
B. 10 to 11%
C. 9 to 10%
D. 8 to 9%
E. Less than 8%



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Storage & Handling

Prevent Contamination

- Clean harvest and handling equipment
- Clean out the bins
- Eliminate opportunities for rodents, birds, and other pests

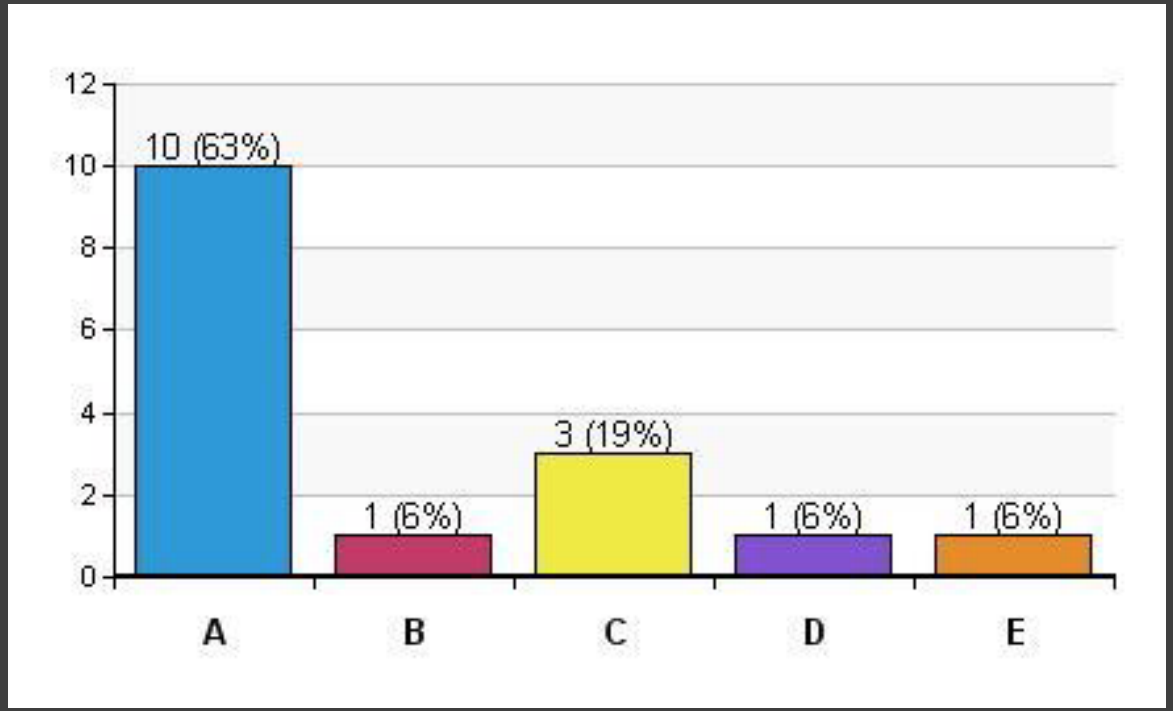
Prevent Spoilage & Monitor

- Invest in moisture cables

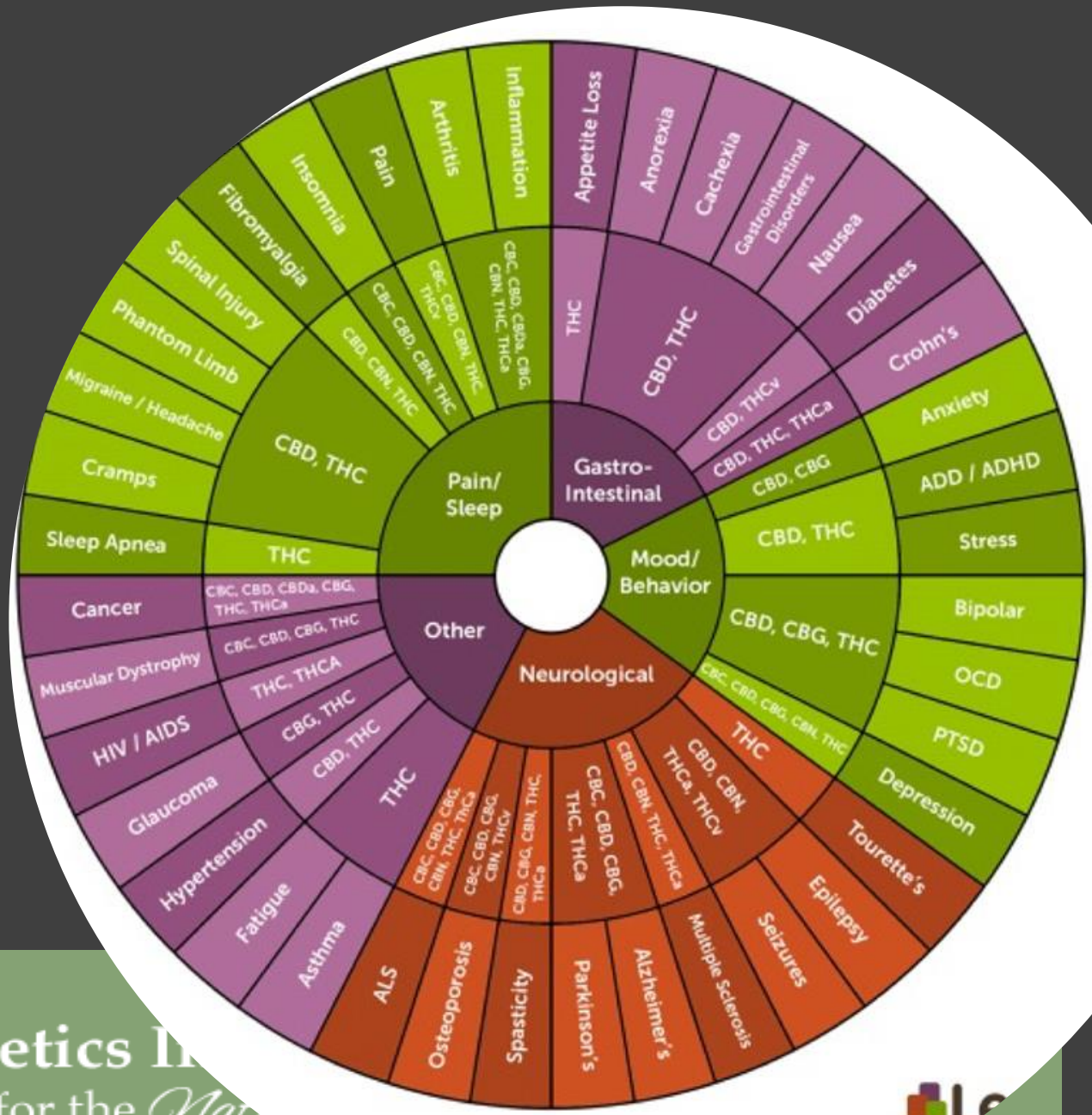
iClicker Question

Drying temperatures used (Grain Temp);

A. 120 F or 50 degrees C
B. 130 F or 55 degrees C
C. 140 F or 60 degrees C
D. 150 F or 65 degrees C
E. Above 160 F or 70 degrees C



CBD - Cannibidiol



Hemp Genetics I
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Trichomes in Hemp

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CLAAS
960
JAGUAR
CLAAS
960
JAGUAR

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Wittrock Landtechnik
600
ORBIS
CLAAS


Hi-X
COMPACTOR
Orkel

Chaff Collection

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Cleaned
Chaff

Full Plant Biomass

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