NC STATE UNIVERSITY

Oilseed Production for Biodiesel in North Carolina

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&
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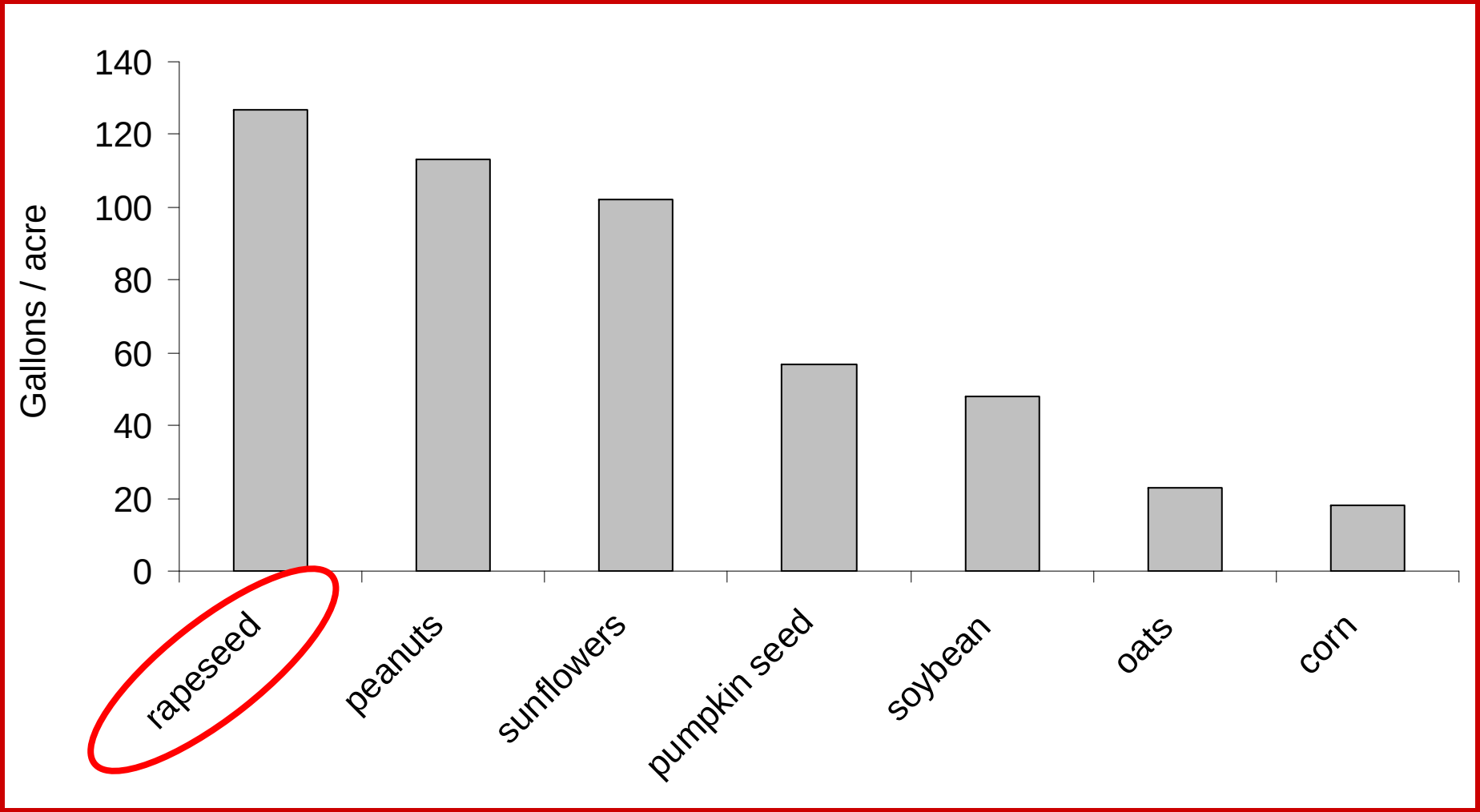
GOLDEN LEAF

The “best” oilseed for biodiesel production in NC is canola.

Why canola?

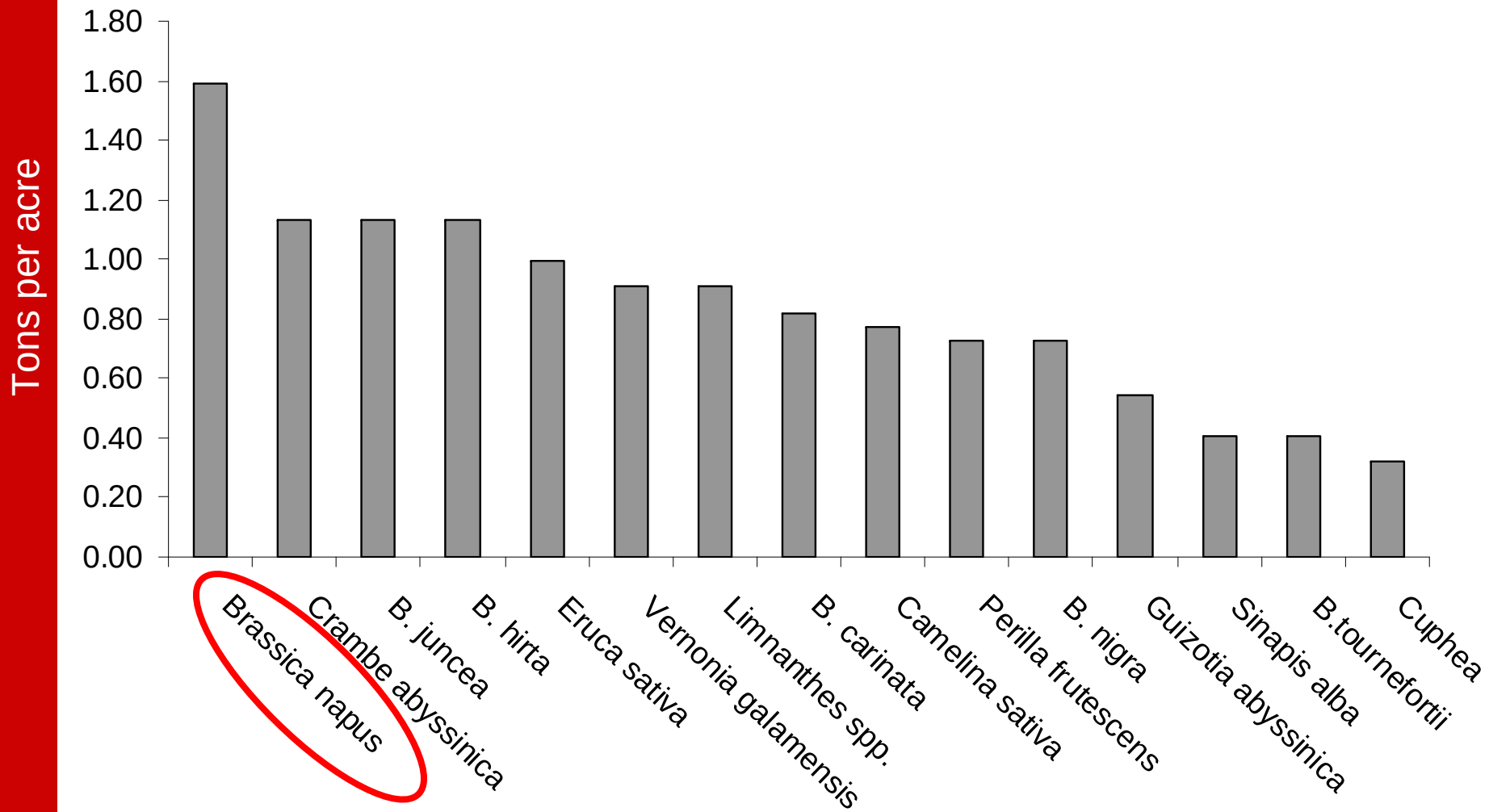
High yielding oilseeds like Jatropha and Oil Palm *will not* grow in NC.

Canola produces the highest oil yield per acre of any temperate crop we have.



People get excited about "alternative" oilseeds.

It is the highest yielding oilseed for temperate zones we have!




Meadow Foam
Canola

Other oil sources

Cellpharm tubular reactor

New Mexico State University

Algae produces over 10 times the yield of crops, but infrastructure is intensive and expensive.

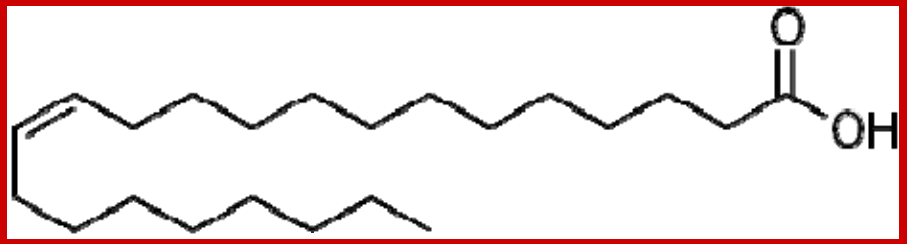
What is Canola?

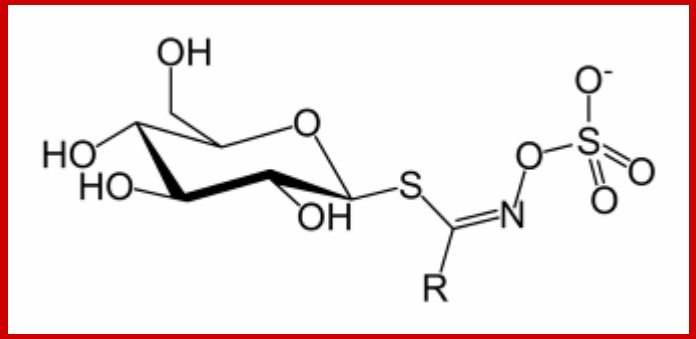
Canola (*Brassica napus*), also called Rapeseed.

Related to turnip, rutabaga, cabbage, brussels sprouts and mustard.

Rapeseed has been grown for thousands of years.

Oil contains *erucic acid* and seeds contain *glucosinolates.*





These have potential negative health effects and a bitter taste.

Dr. Baldur Stefansson of the University of Manitoba bred a variety with both a low erucic acid content and a low level of glucosinolates.

This was named *Canola*

*Can**a**dian **o**il **l**ow **a**cid*

Where is canola grown?

Canola

One million acres in the U.S.

North Dakota produces 90%.

Montana, Minnesota, Oklahoma and Kansas.

Canada 13 Million acres.

Australia 3.7 million acres.

Rapeseed grown in Europe, China and India

What do we use it for?

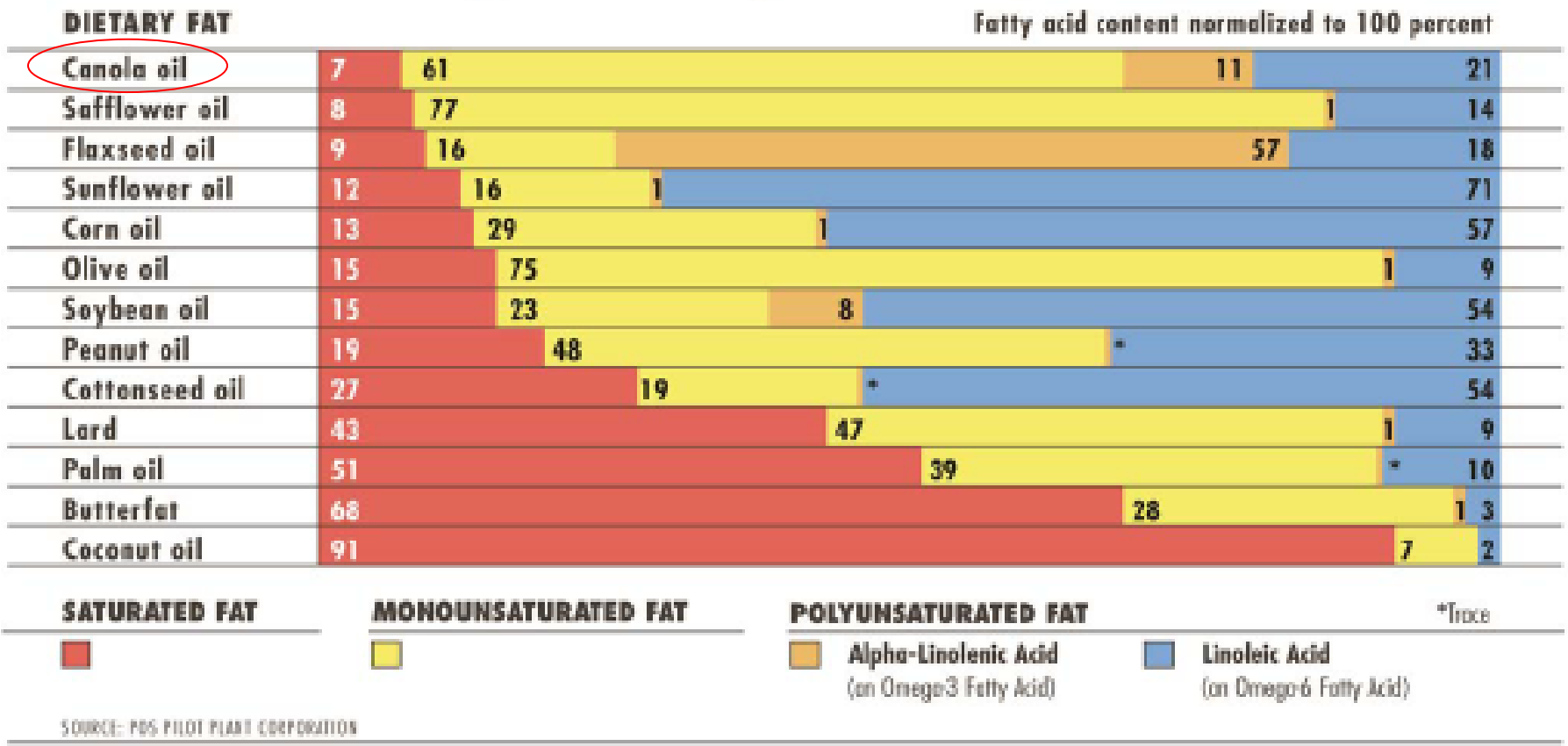
Edible Oil

Low saturated fat

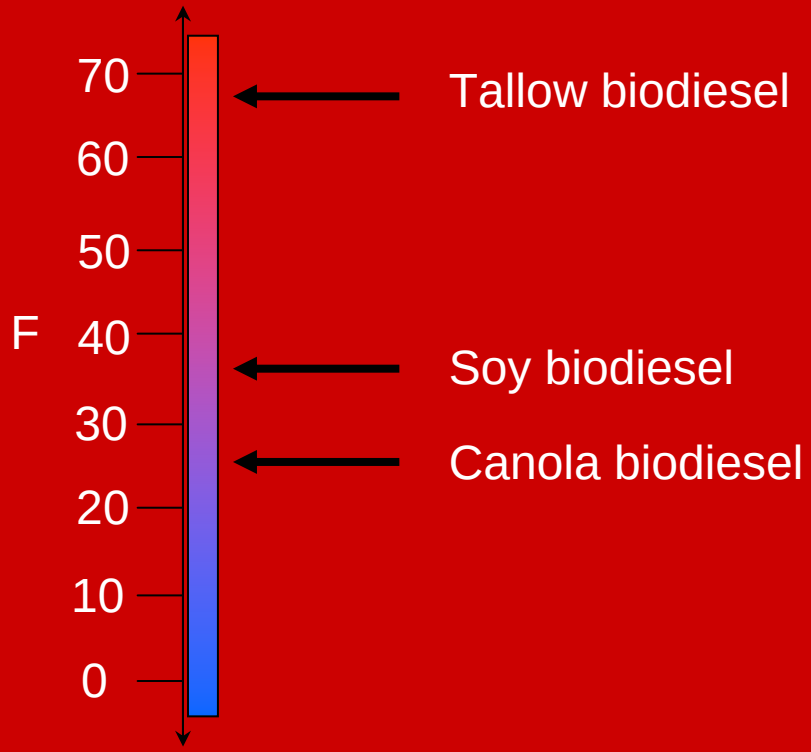
High monounsaturated oil content (almost 60%)

Omega-3 fatty acids (61% Oleic Acid)

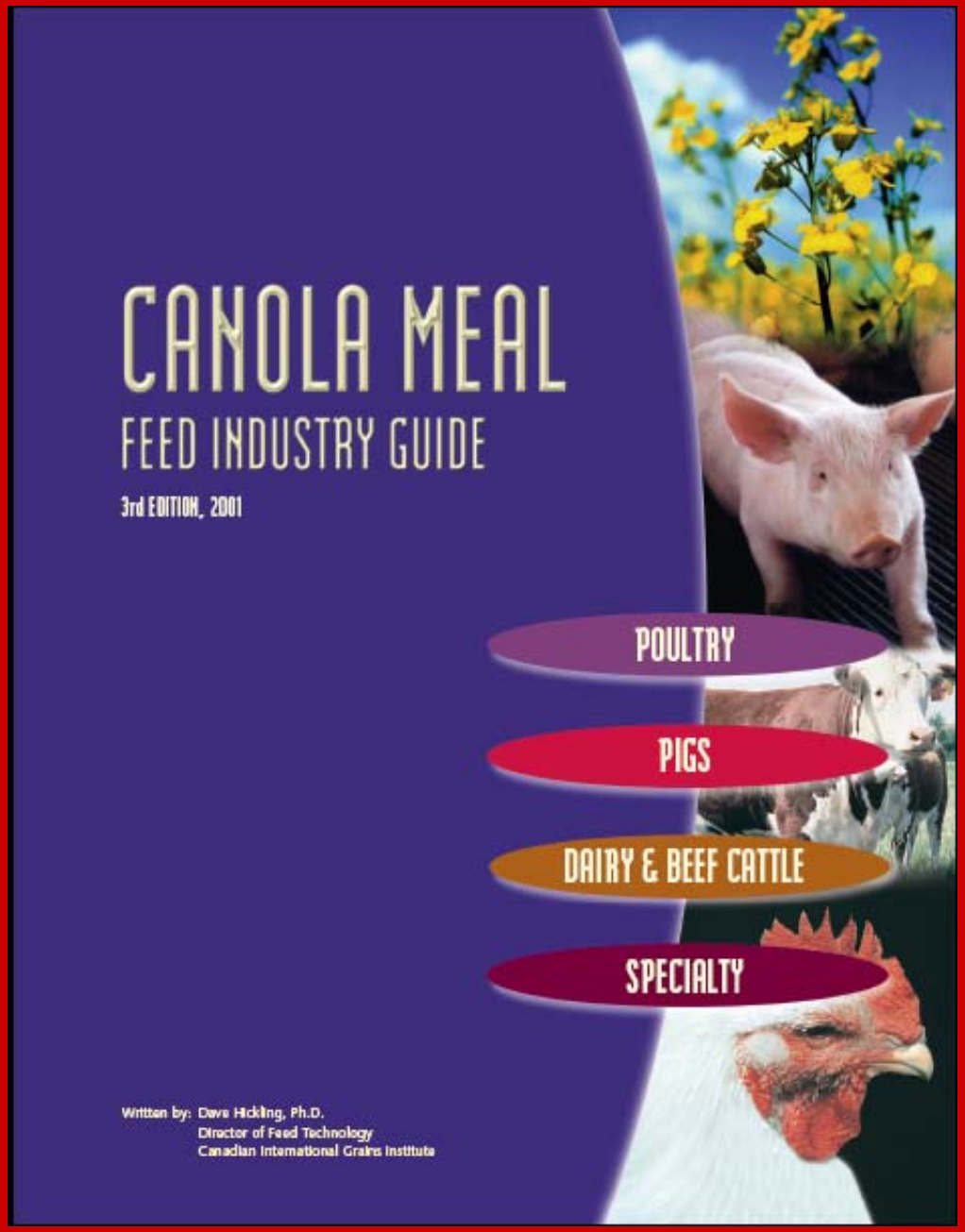
Comparison of Dietary Fats



Low saturated fat content means improved cold weather performance.

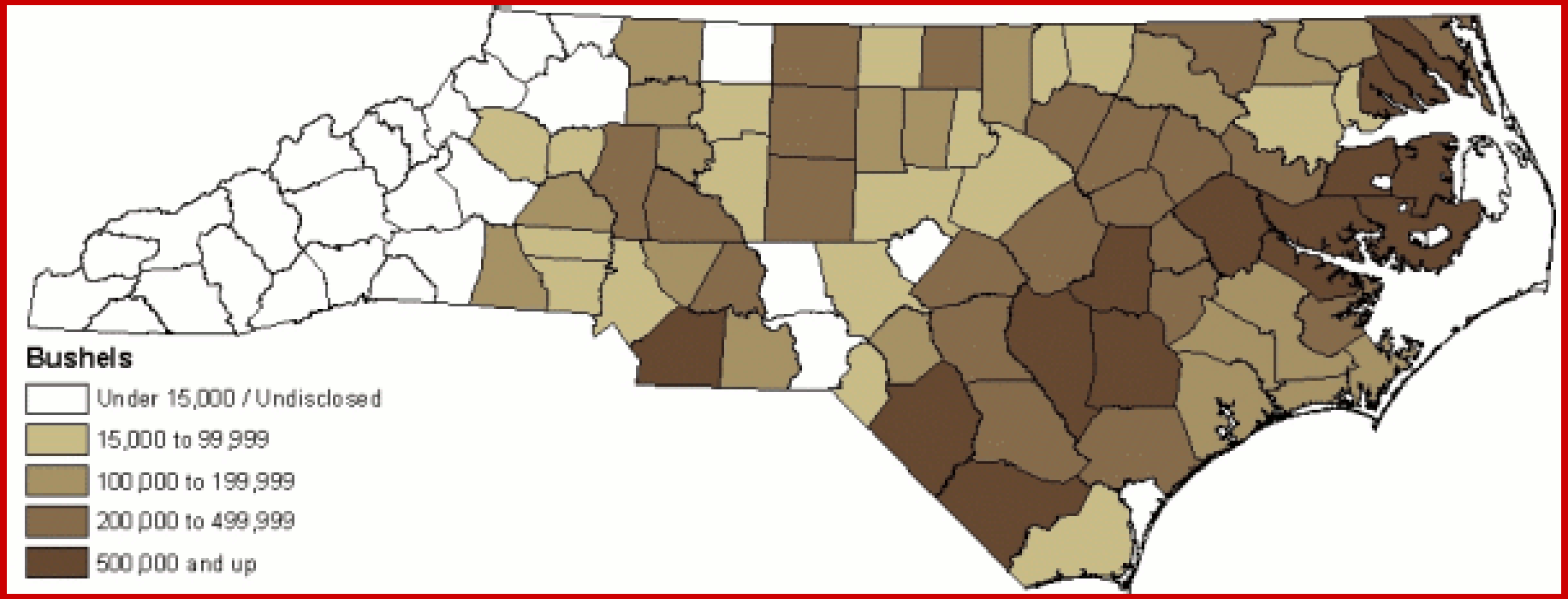


Meal


CANOLA MEAL
FEED INDUSTRY GUIDE
3rd EDITION, 2001
POULTRY
PIGS
DAIRY & BEEF CATTLE
SPECIALTY
Written by: Dave Hickling, Ph.D.
Director of Feed Technology
Canadian International Grains Institute

Canola Production in North Carolina

USDA Wheat production in NC

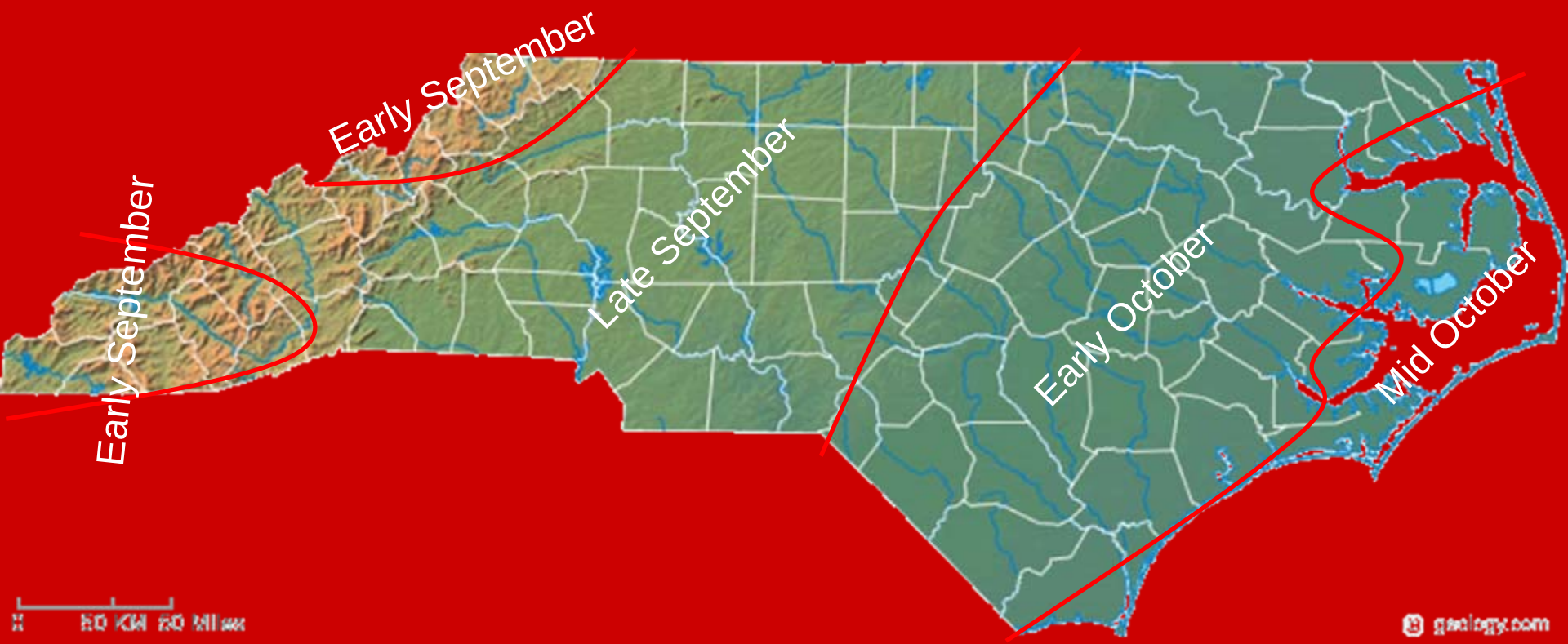


420 thousand acres of winter wheat produced in North Carolina.

Some of this could be used for Canola production.

What are the planting dates for NC?

Plant six weeks before first killing frost.



Medium textured and well-drained soil.
Sow ½ to 1 inch deep.
6 to 14 inch row spacing.
5 to 8 lbs per acre.

Open Grounds Farm 2006
7 lb/acre
Greatplains 3000 planter.

Poor seed bed preparation can lead to poor establishment.

Canola has an excellent ability to compensate for planting density.

Nutrient application

Ask NCDA for rape/canola recommendation.

Nutrient requirements similar for wheat except for Nitrogen and Sulphur.

Nitrogen 20-25% more than wheat (top-dress in Spring)

Sulphur is required by Canola due to S-containing proteins. If soil has less than 25 lbs per acre S add and additional 25 lbs.

Apply P, K and micronutrients preplant.

Crop growth

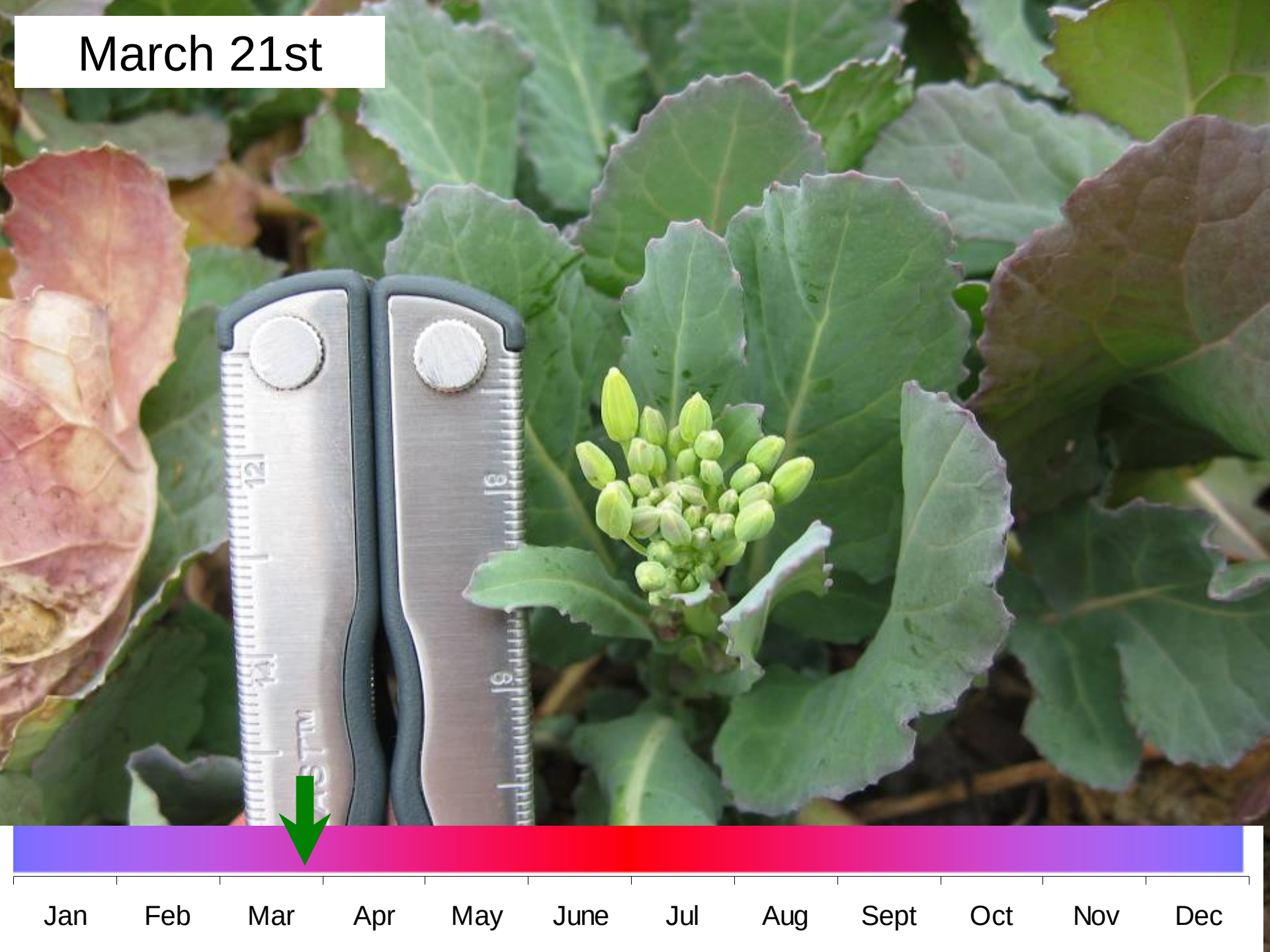
October 12th


October 17th
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec

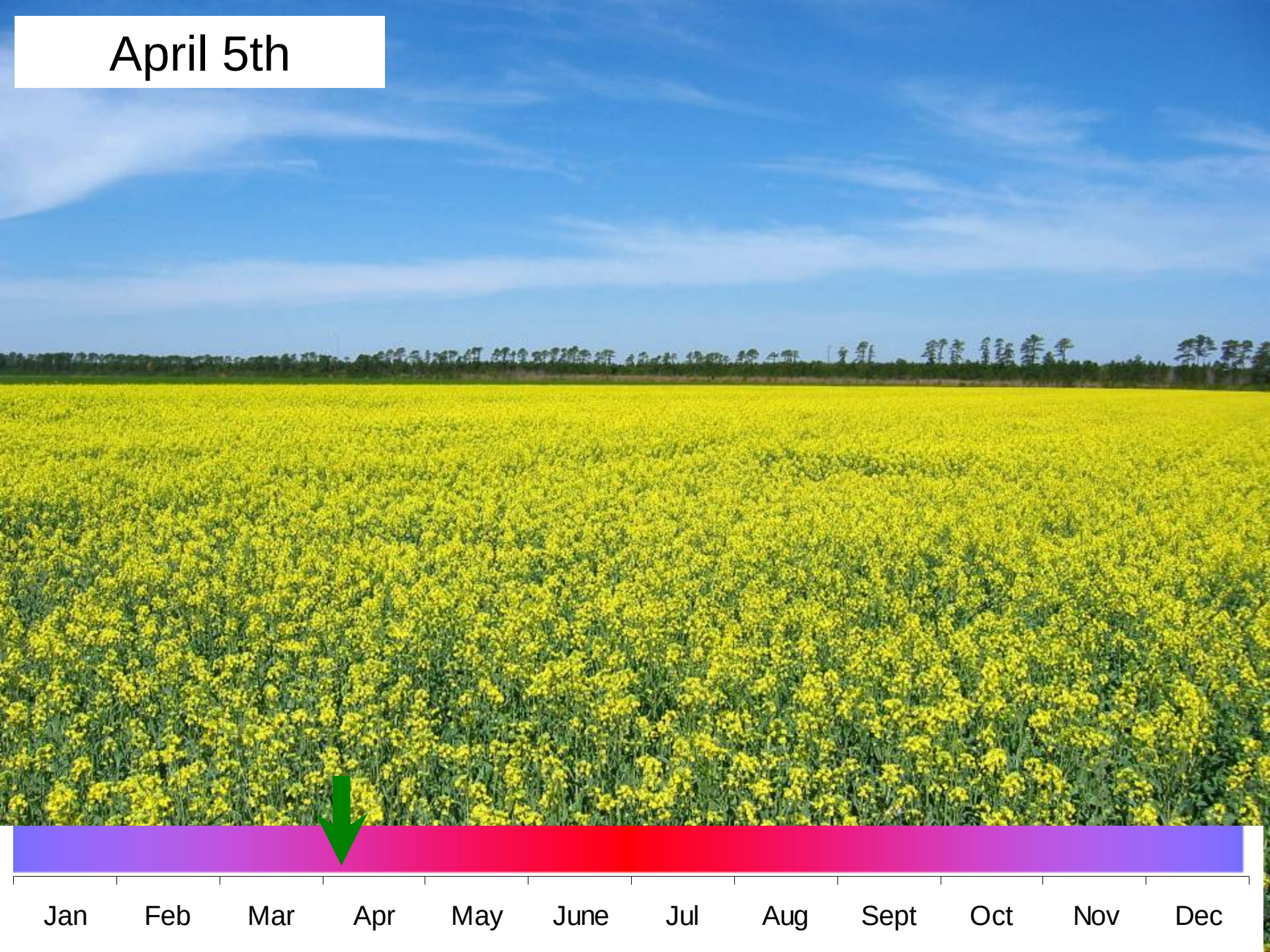
October 30th

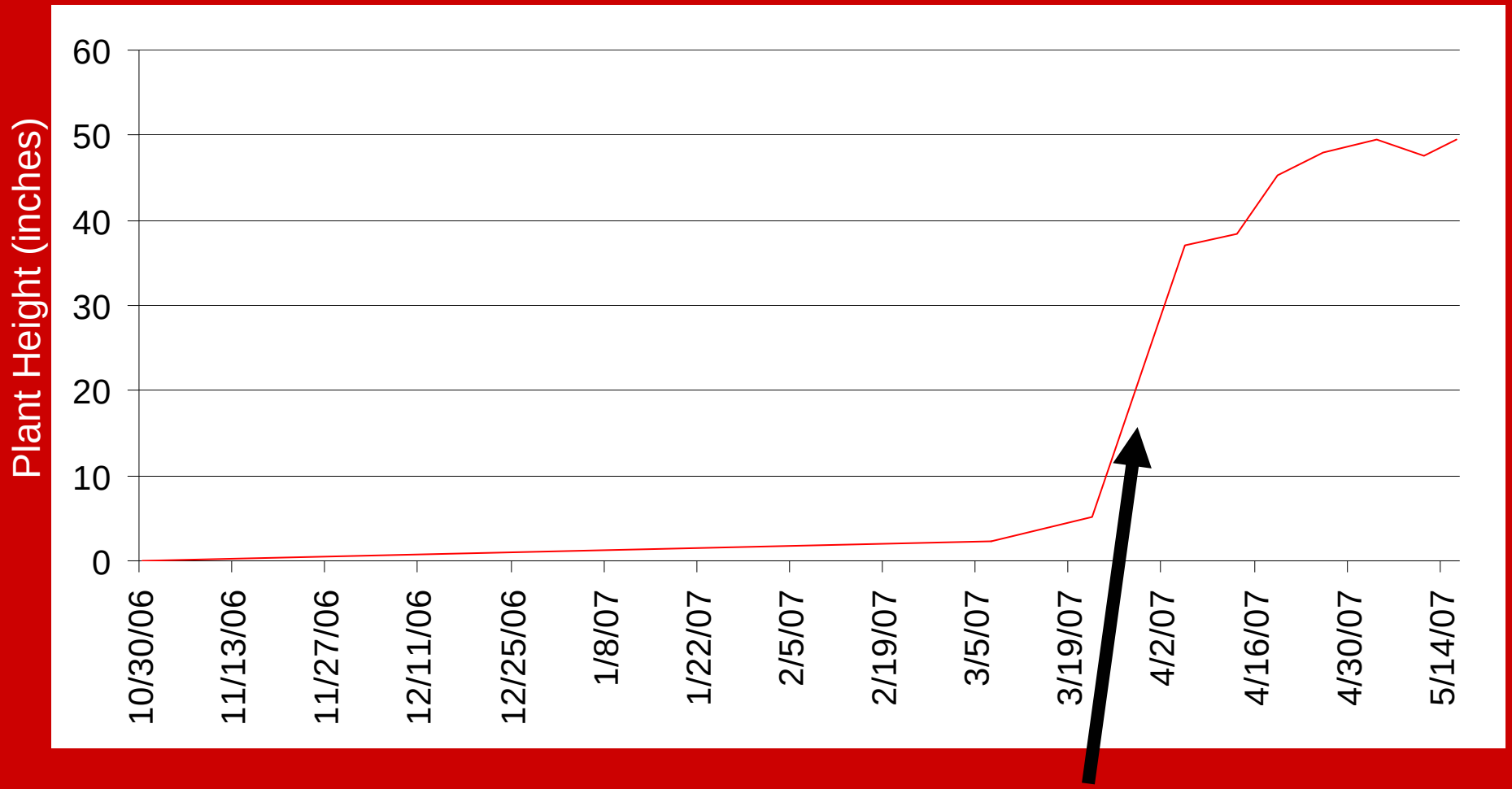

November 17th
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec


February 19th
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec


March 21st
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec

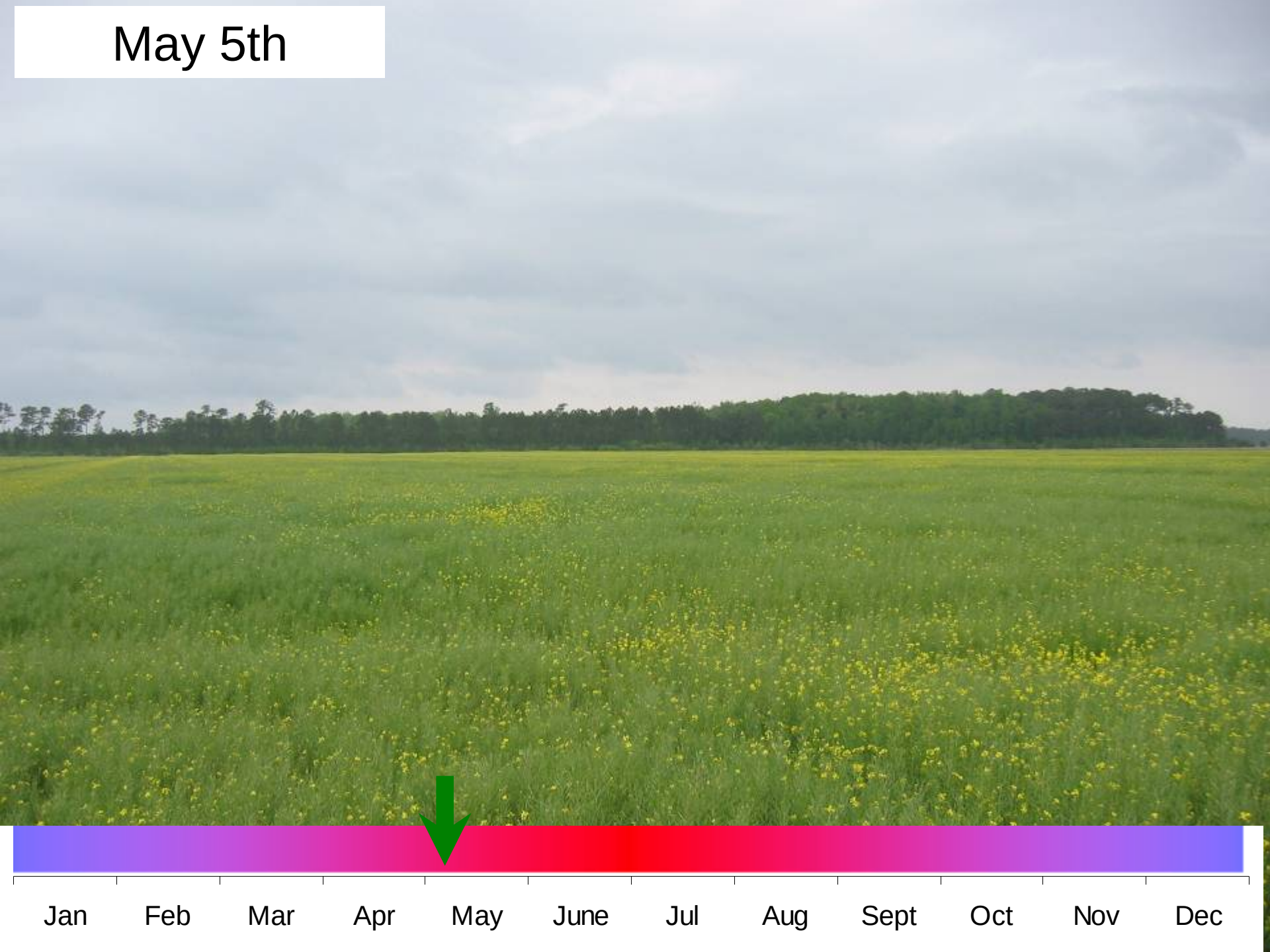
April 5th



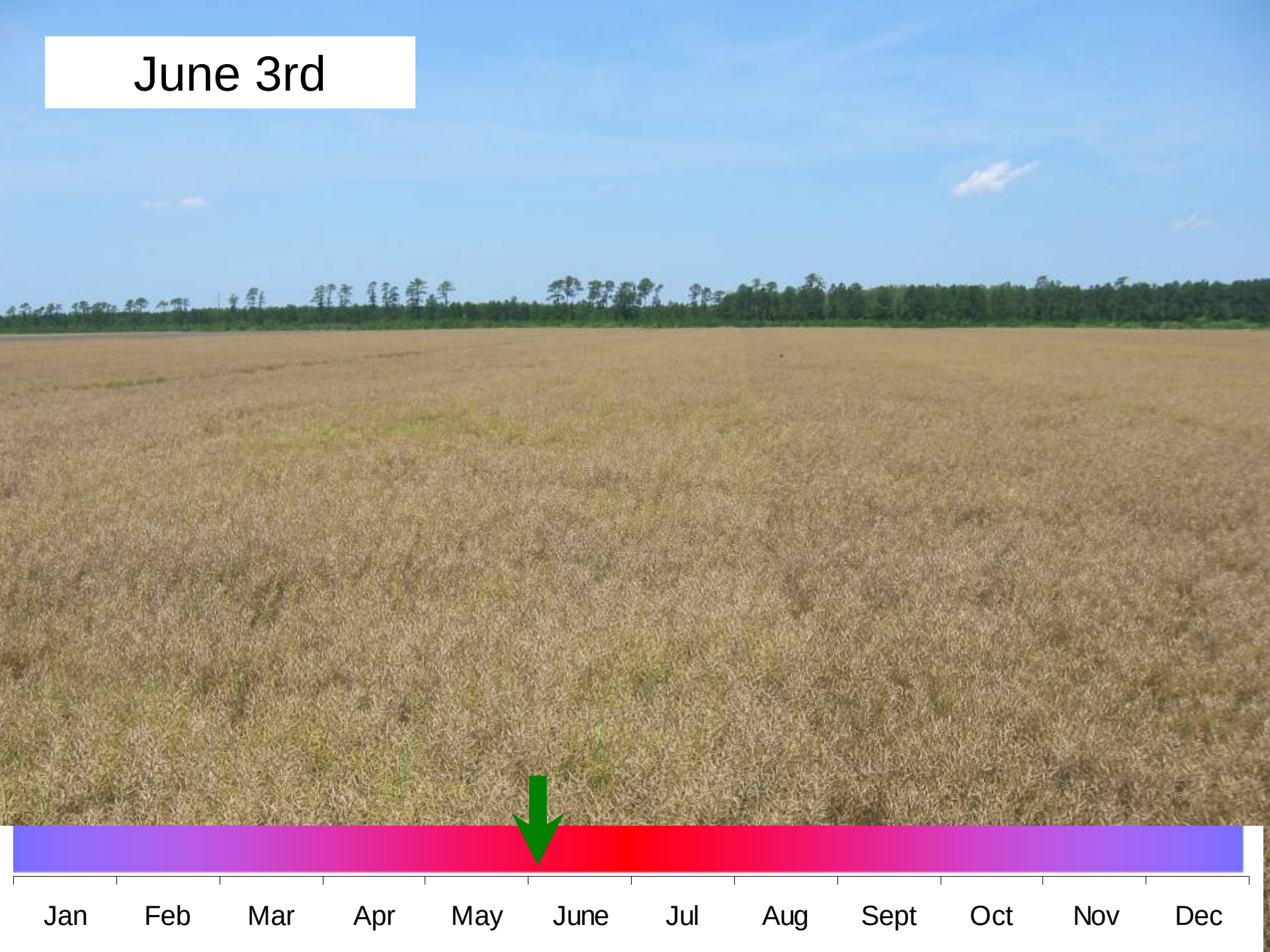


5 inches to 37 inches in 14 days!

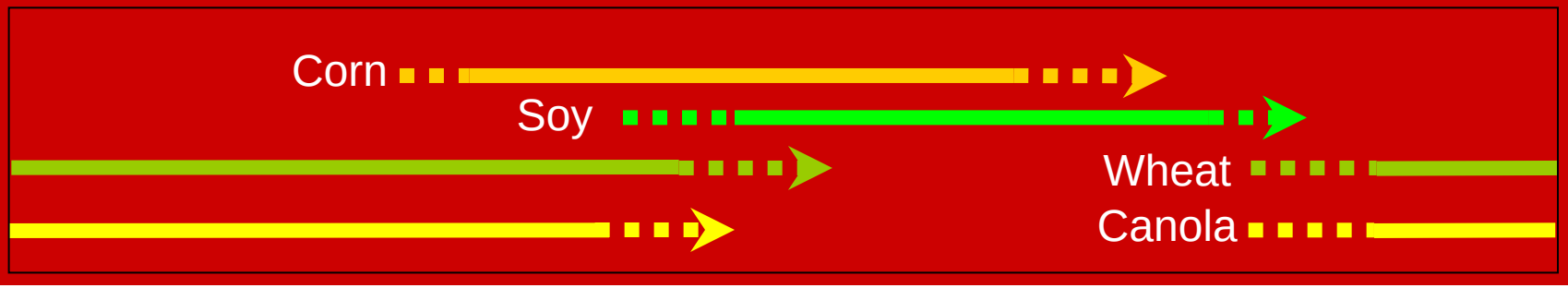
May 5th

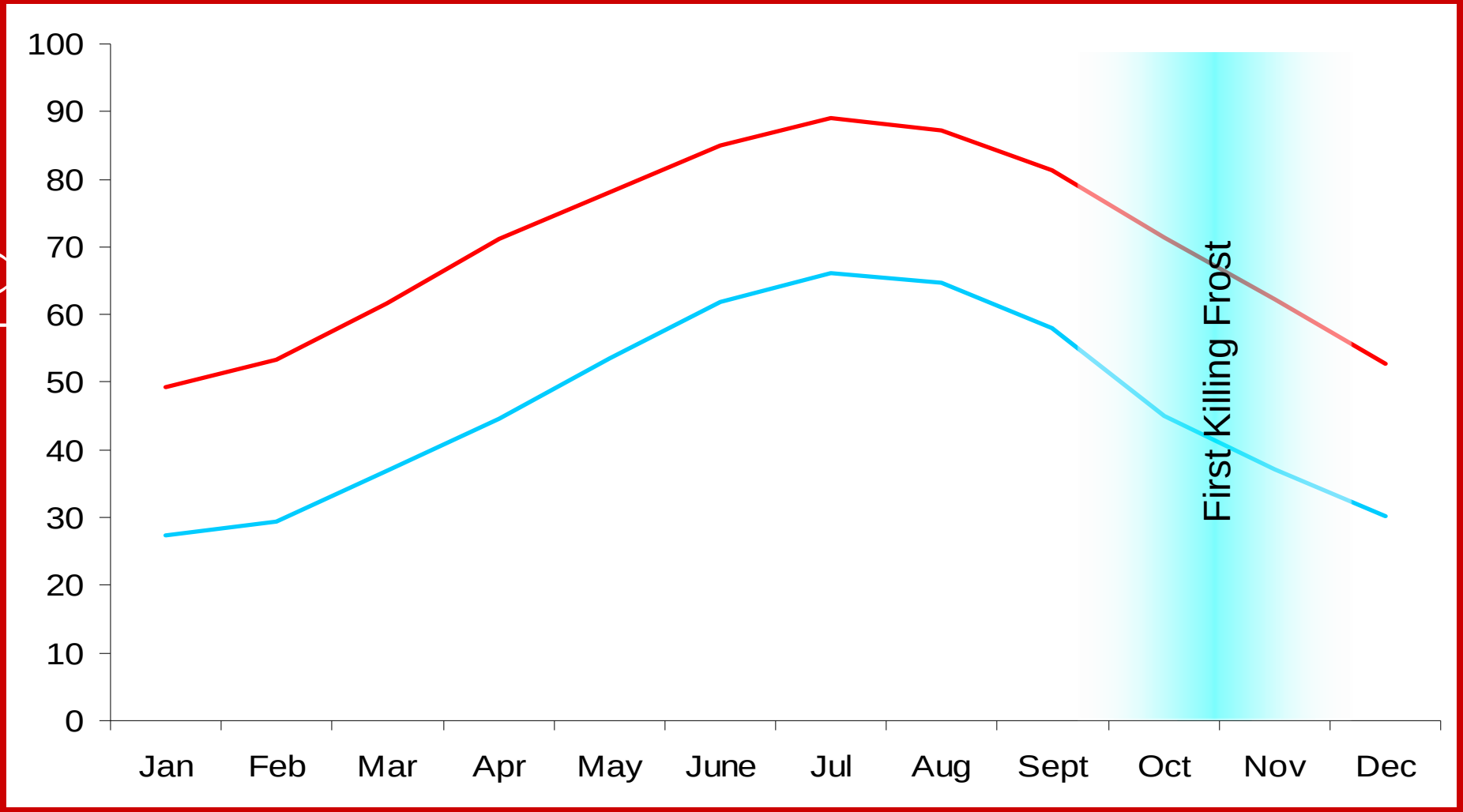


June 3rd



How could canola fit into existing NC rotations?


Corn
Soy
Wheat
Canola


Temp (F)
100
90
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec
First Killing Frost

How do we harvest canola?

Don’t Panic!

Harvest at 8 to 10% moisture. Dryers? 11 to 13%.
(Get a moisture meter!)

but…

Canola that is ready should be harvested ASAP!

Canola is an indeterminate crop and has a certain amount of overly mature and immature seeds at harvest. Stems will still be partly green.

Combine setup information can be found at the Oklahoma State University website.

Correct storage of canola is critical!!!

If seed is binned at above 25°C 8.3% moisture is too high for long-term, safe storage.

Monitor bin regularly to prevent moulds and heat damaged.

Install fans to aerate bins if necessary.

The small size and free flowing characteristics of canola mean that high quality construction is necessary to prevent leakage.

Volunteer canola can be very competitive with subsequent crops. Reduce the loss of seed during harvest.

Pests and Diseases

Labeled weed treatments for canola

Pre-plant soil herbicides - Trifluralin, Glyphosate and Sonolan.

Post-emergence grass control – Sethoxydim, Quizalofop & Clethodim.

Wild mustard and radish a problematic. It is important to control seed production early.

Blackleg

Figure 7. Blackleg Stem Lesions

Photo by Beth Hoar

Sclerotinia

Alternaria

Figure 31. *Alternaria* on Canola Pods

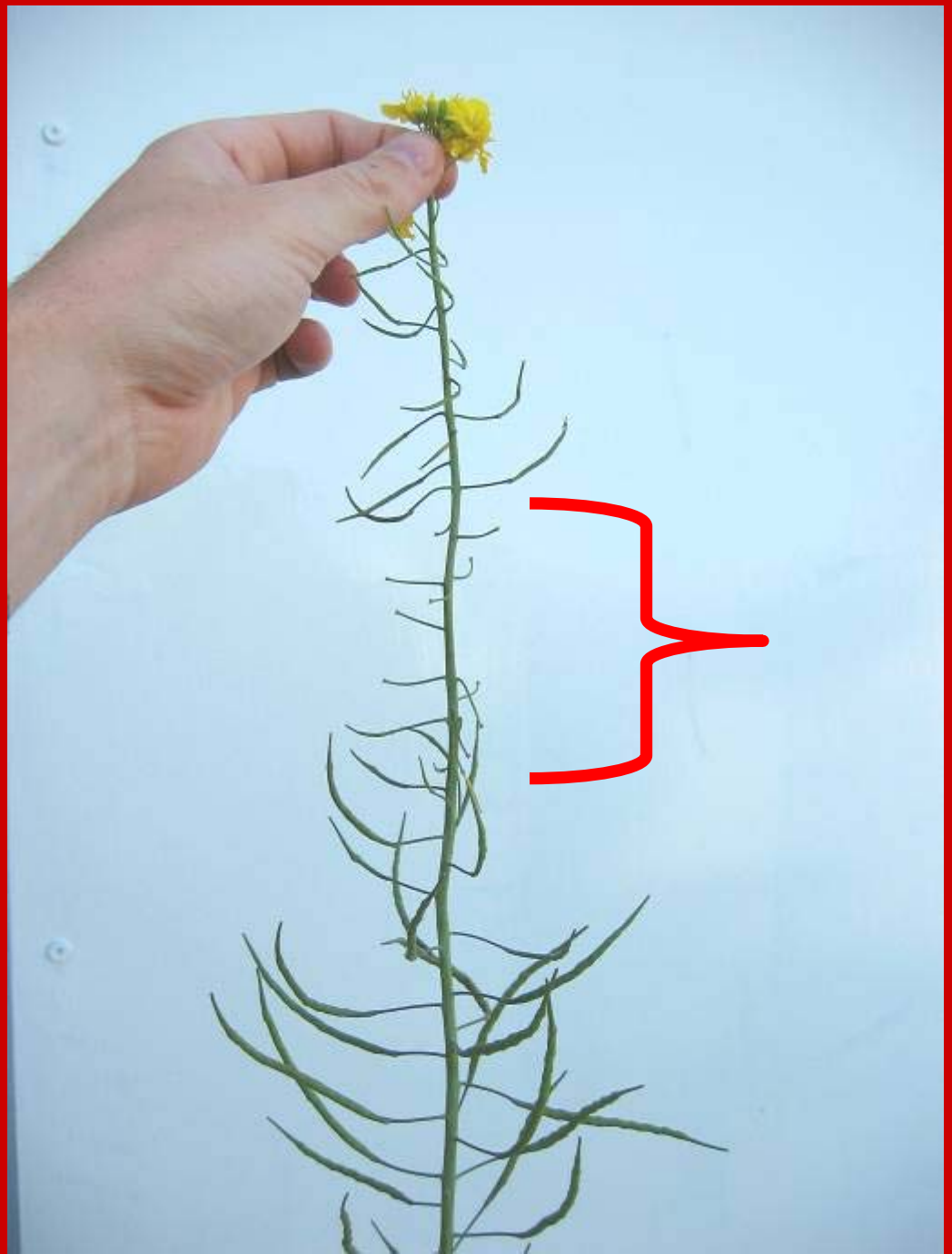
Photo by Beth Hoar

Disease Management Method

Disease	Plant Breeding	Rotation	Seed Treatment	Field Treatments
Blackleg	Yes	Yes	Yes	Yes
Sclerotinia	No?	Yes	No	Yes
Alternaria	No	No	Yes	No
Mildew	Yes	Yes	Yes	No

Cabbage seedpod weevil

What about frost?



Freeze damage

What about drought?

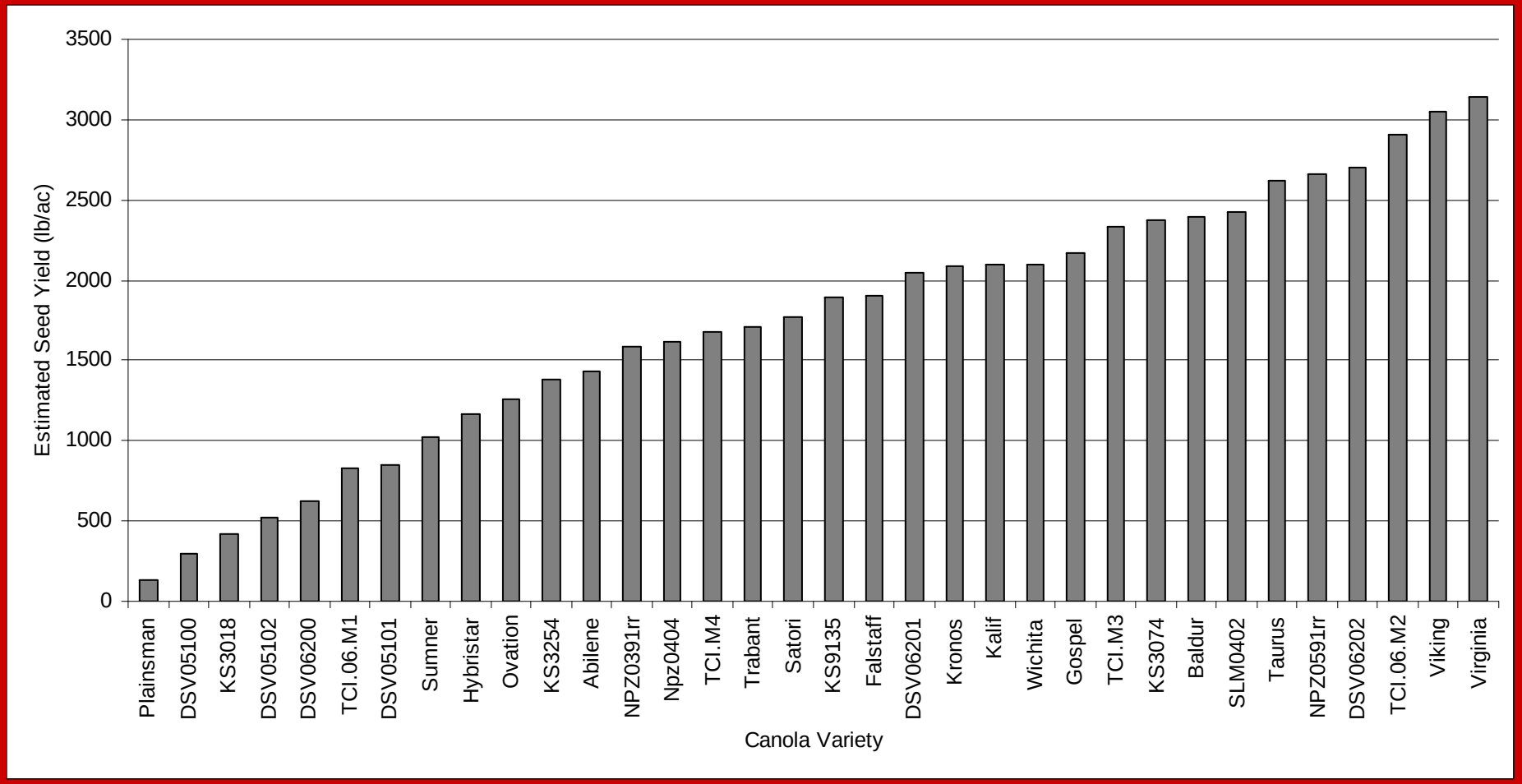
Economics

		Price ($/bu)				
lb/acre	bu/acre	4	5	6	7	8
1000	20	-150.37	-130.37	-110.37	-90.37	-70.37
1250	25	-130.37	-105.37	-80.37	-55.37	-30.37
1500	30	-110.37	-80.37	-50.37	-20.37	9.63
1750	35	-90.37	-55.37	-20.37	14.63	49.63
2000	40	-70.37	-30.37	9.63	49.63	89.63
2250	45	-50.37	-5.37	39.63	84.63	129.63
2500	50	-30.37	19.63	69.63	119.63	169.63
2750	55	-10.37	44.63	99.63	154.63	209.63
3000	60	9.63	69.63	129.63	189.63	249.63

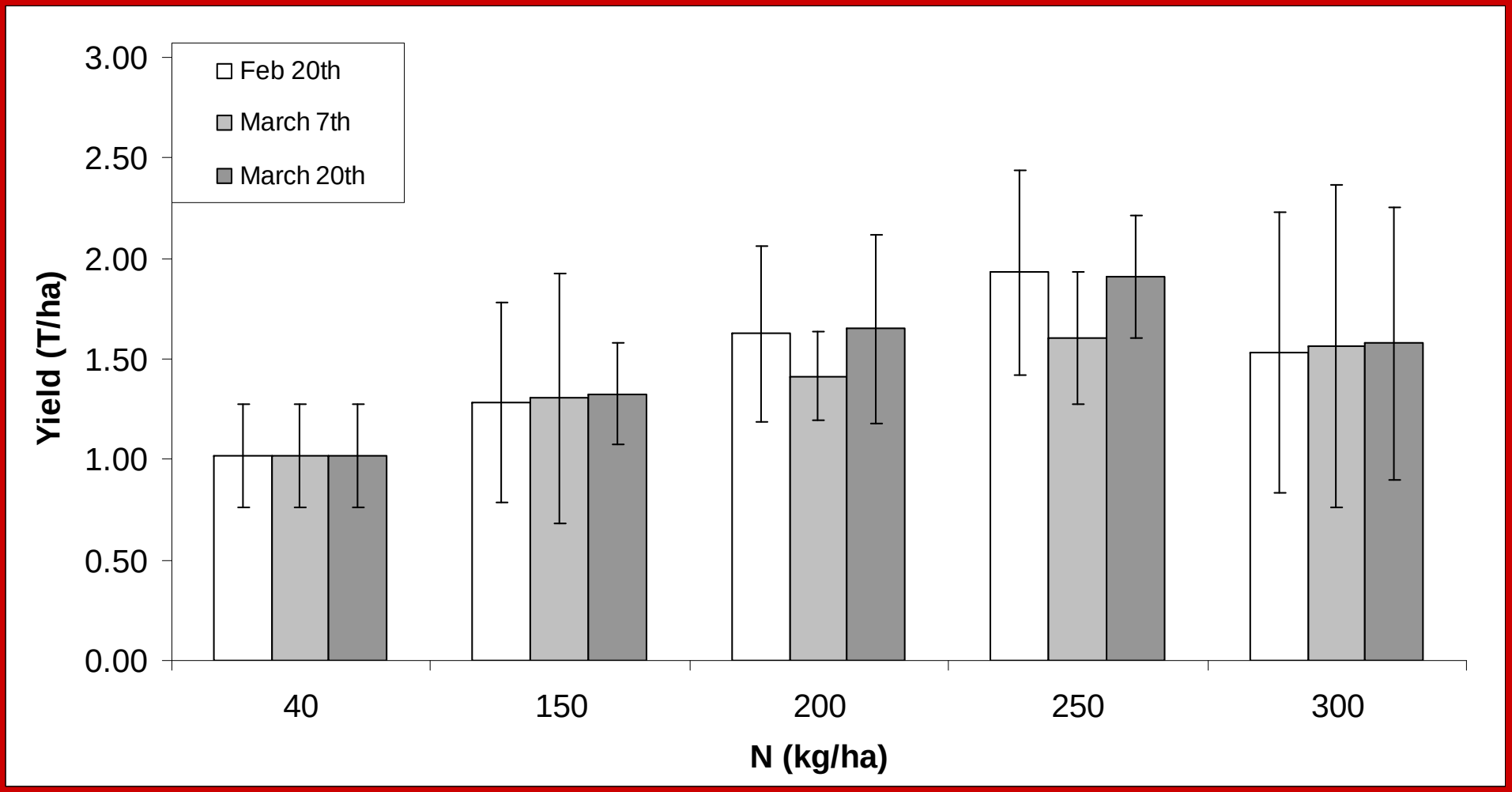
Capital Costs	
Oil press, filter, cleaner, and power source	$13,500
Installation costs	$5,050
Seed, oil, and meal storage	$11,000
Total Capital Cost	**$29,550**
Annualized capital cost[1]	$3000
Operating Costs	
Cost of feedstock [2]	$79,000
Labor[3]	$4,666
Electricity[4]	$1,087
Annual maintenance[5]	$369
Overhead[6]	$596
Total Operating Cost	**$88718**
Annual (Operating) Cost / Gallon of Crude Oil 7.6 lbs of oil= 1 gallon--	**$4.43/gallon $.55 /lb**
Returns	
**Canola meal[7]	$61,000
Total Net cost	**$29,668**
Annual Net (Operating) Cost / Gallon of Crude Oil	**$1.49/gal $.20/lb**

NCSU Canola Research

Variety Trial


Estimated Seed Yield (lb/ac)
3500
3000
2500
2000
1500
1000
500
0
Plainsman
DSV05100
KS3018
DSV05102
DSV06200
TCI.06.M1
DSV05101
Sumner
Hybristar
Ovation
KS3254
Abilene
NPZ0391rr
Npz0404
TCI.M4
Trabant
Satori
KS9135
Falstaff
DSV06201
Kronos
Kalif
Wichita
Gospel
TCI.M3
KS3074
Baldur
SLM0402
Taurus
NPZ0591rr
DSV06202
TCI.06.M2
Viking
Virginia
Canola Variety

Fertilizer Trial


Feb 20th
March 7th
March 20th
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Yield (T/ha)
40
150
200
250
300
N (kg/ha)

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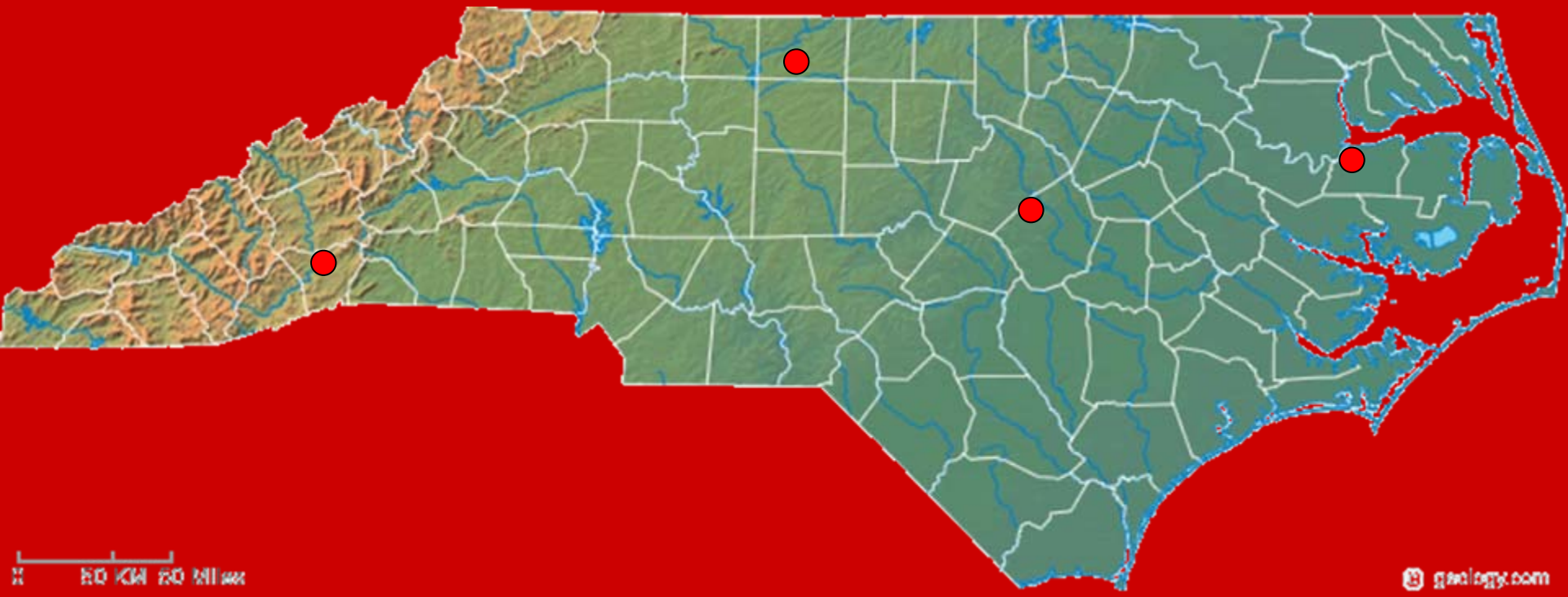
Research Sites for 2007/2008



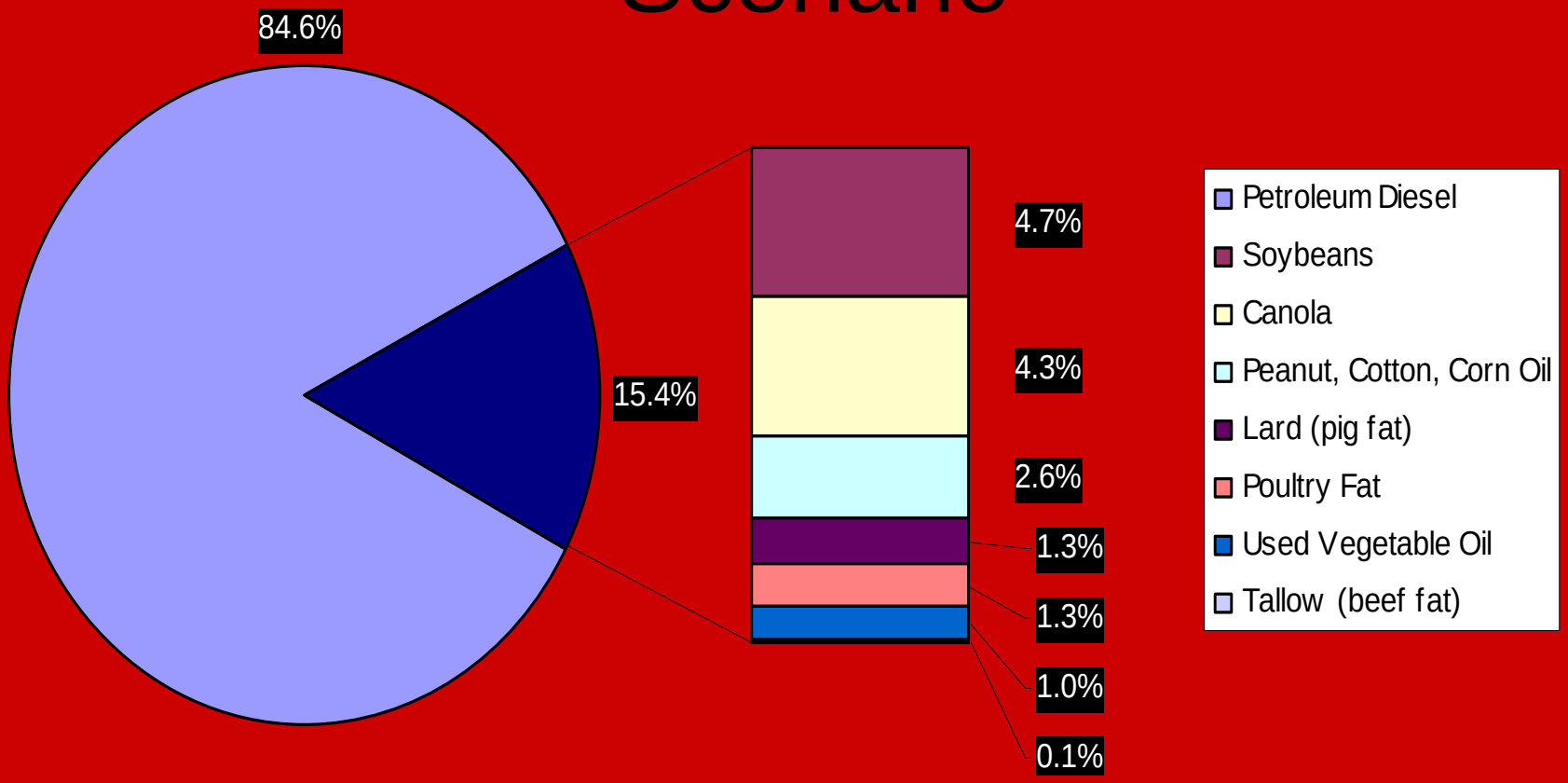
What about on-farm fuel production using Canola?

Average diesel fuel use on a U.S. farm is 9 gal/acre

Average Canola oil production is approximately 110 gal/acre

So less than 10% of the farm area is needed to grow fuel.

NC Petroleum Diesel Displacement Scenario



If we used all these sources we could only displace 15.4% of our diesel usage.

Useful organizations:

U.S. Canola Association
http://www.uscanola.com/

Canola Council of Canada
http://www.canola-council.org/portal.html

oakanola
http://www.canola.okstate.edu/factsheets/f2130/index.htm

Canola - The University of Georgia
http://www.caes.uga.edu/commodities/fieldcrops/canola/

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North Carolina State University

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