



Saskatchewan
Ministry of
Agriculture

Seeding Rate, Row Spacing & Seeding Speeds Crop Opportunity & Scott Research Update March 8th, 2012

Sherrilyn Phelps, MSc., P.Ag., CCA

**Regional Crop Specialist – North Battleford
Saskatchewan Ministry of Agriculture**



Saskatchewan
Ministry of
Agriculture

Topics to Cover

- Seeding rates
- Row spacing
- Seeding speeds





Seeding Rates

- Why rates are important?
 - Maximize yield potential
 - Maximize net revenue
 - Weed competition
 - Crop uniformity
 - Shorten crop maturity
 - Lodging





But really...

- Seeding rates are
 - The one thing we have the most control over
 - Simple to calculate (do ahead so know targets)
 - Most impact on crop establishment
 - Easy to set equipment for and calibrate
 - Important for return on investment



Saskatchewan
Ministry of
Agriculture

Plant Density is more important than actual seeding rate!!!

70 plants/m²



40 plants/m²

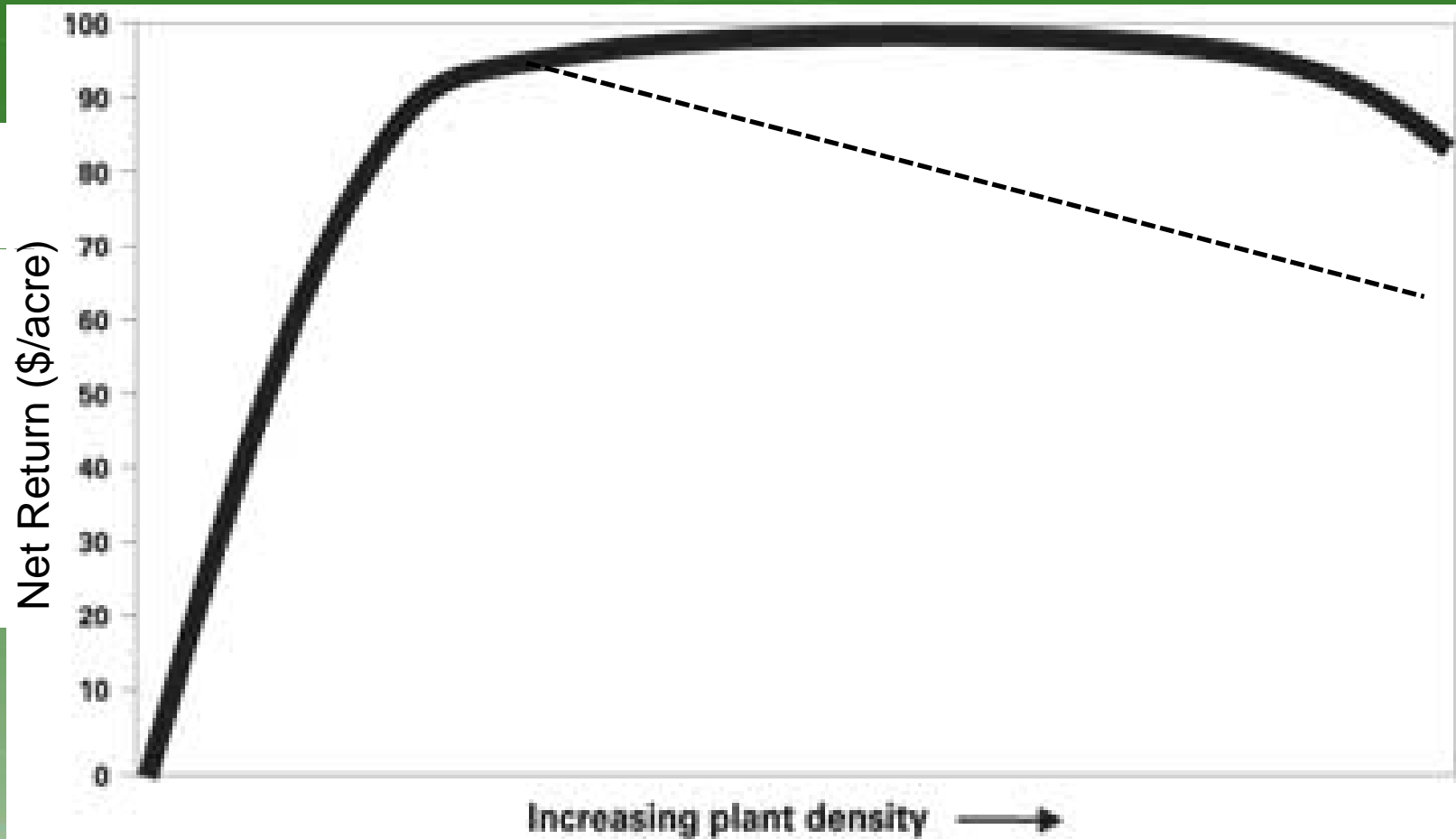


Gone... bushel and a peck!



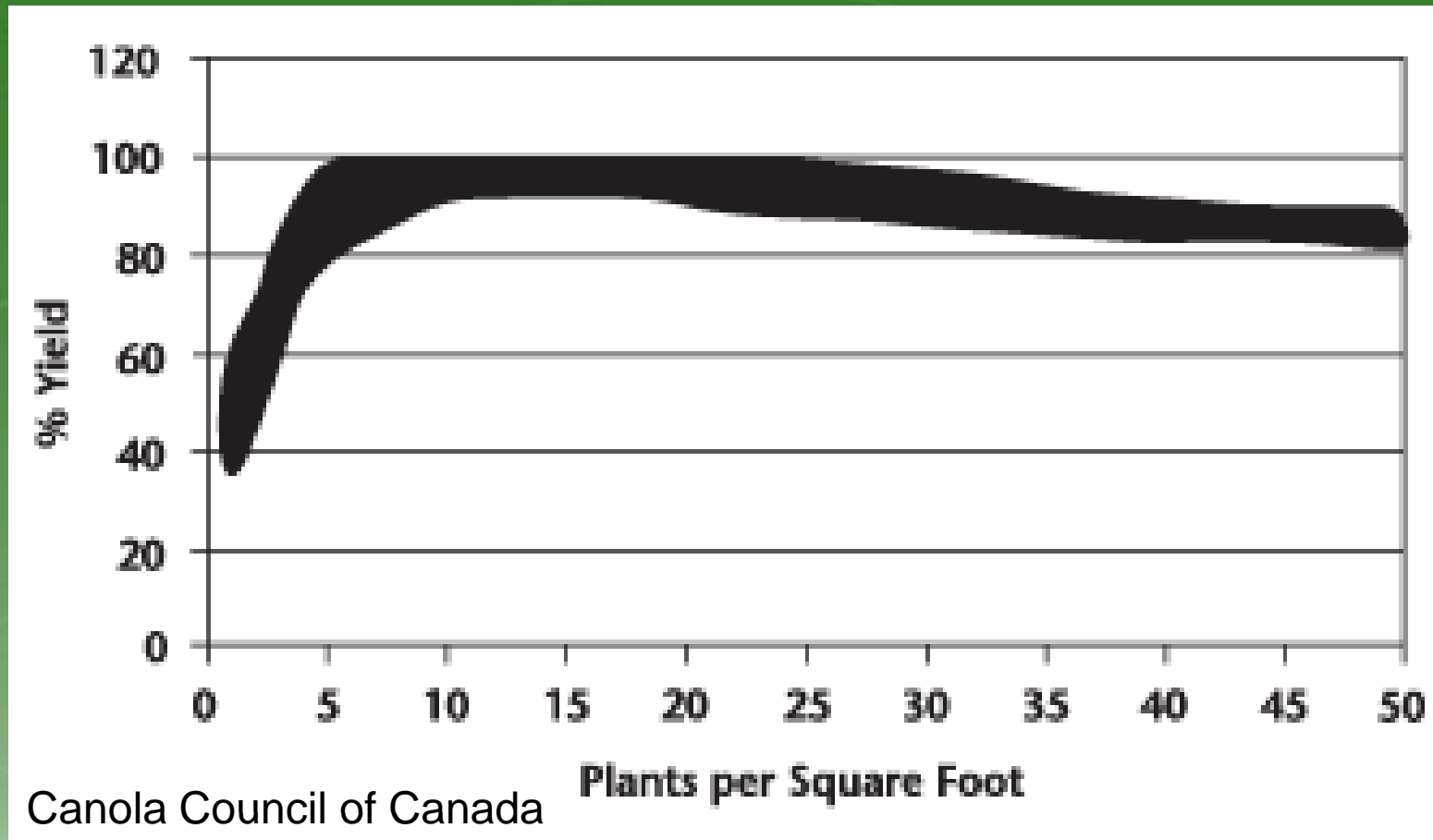
Saskatchewan
Ministry of
Agriculture

Typical Plant Density Response Curve



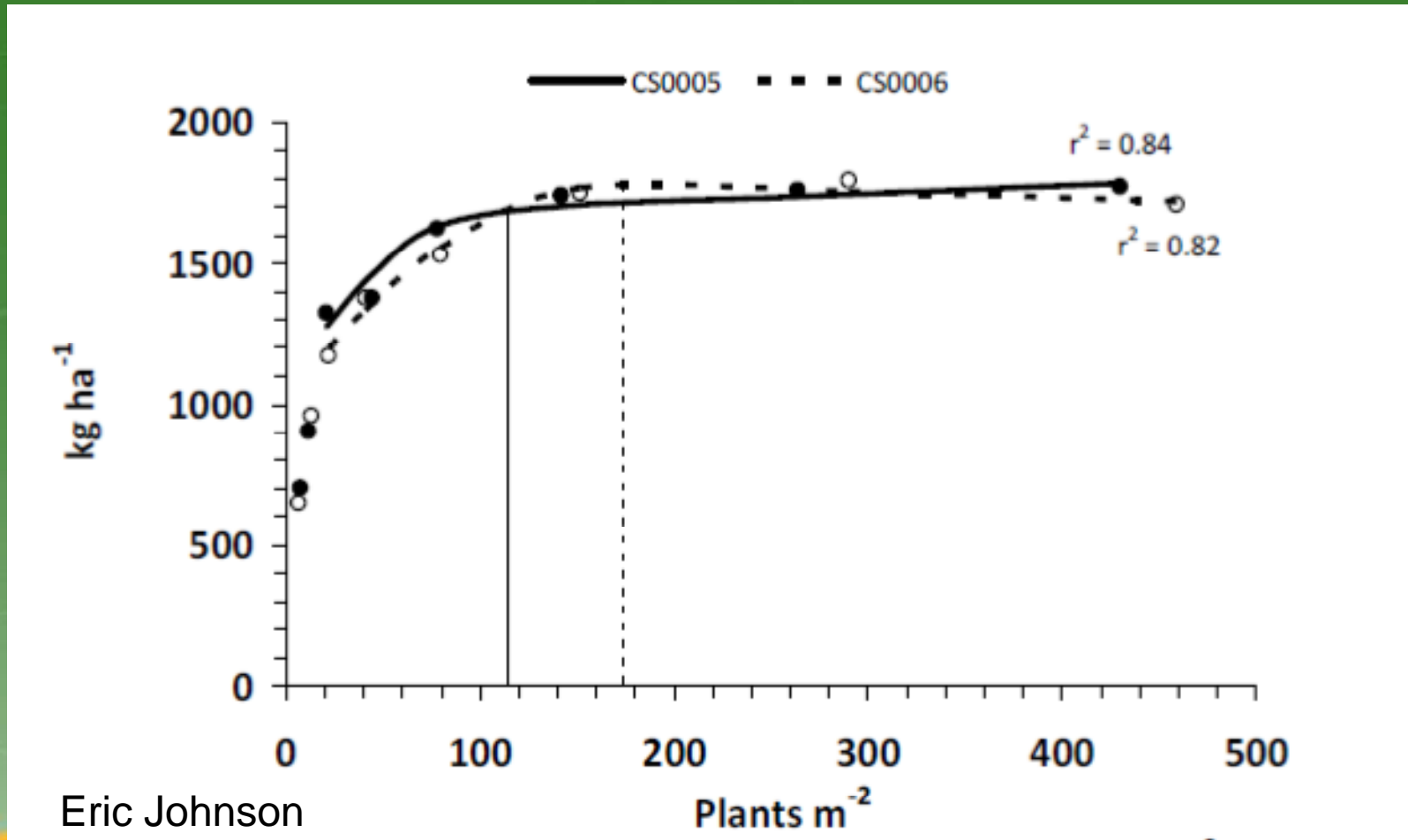


Canola





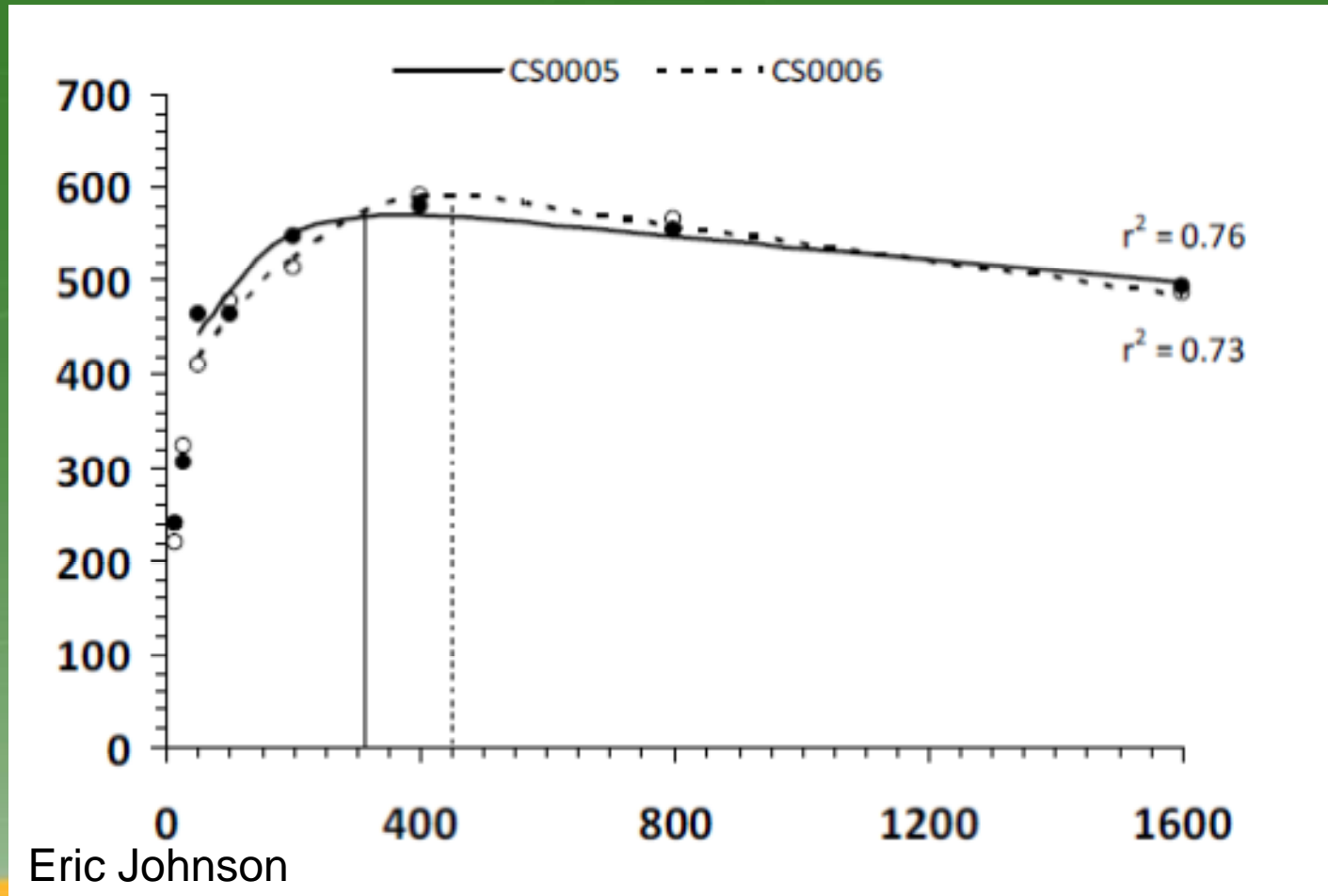
Camelina Yield



Eric Johnson



Camelina Net Return





Target Plant Population

Crop	Target (#/m ²)
HRS Wheat	250
CPS Wheat	
Durum	210-250
SWS Wheat	
Barley	
Oat	215-320
Pea	85
Lentil	105-147

Crop	Target (#/m ²)
Canola	100
Flax	300-400
Camelina	114 – 173
B. Carinata	80 – 170



Calculating Optimum Seeding Rates

- Focus on plant densities and adjust seeding rates to obtain desired plant population
- Calculate high and low range so easier to calibrate equipment
- Need to know:
 - Germination (%)
 - 1000 kernel weight (grams)
 - Expected emergence (%)
 - Population you want to target (plants/m²)



Formula

Seeding rate (kg/ha) = $\frac{\text{target population} \times \text{TKW}}{\text{expected seedling survival}}$

$$\begin{aligned} \text{I.e. Wheat} &= \frac{250 \times 35}{85} = 103 \text{ kg/ha (92 lbs/acre)} \\ &= \frac{240 \times 35}{85} = 99 \text{ kg/ha (88 lbs/acre)} \end{aligned}$$



TKW

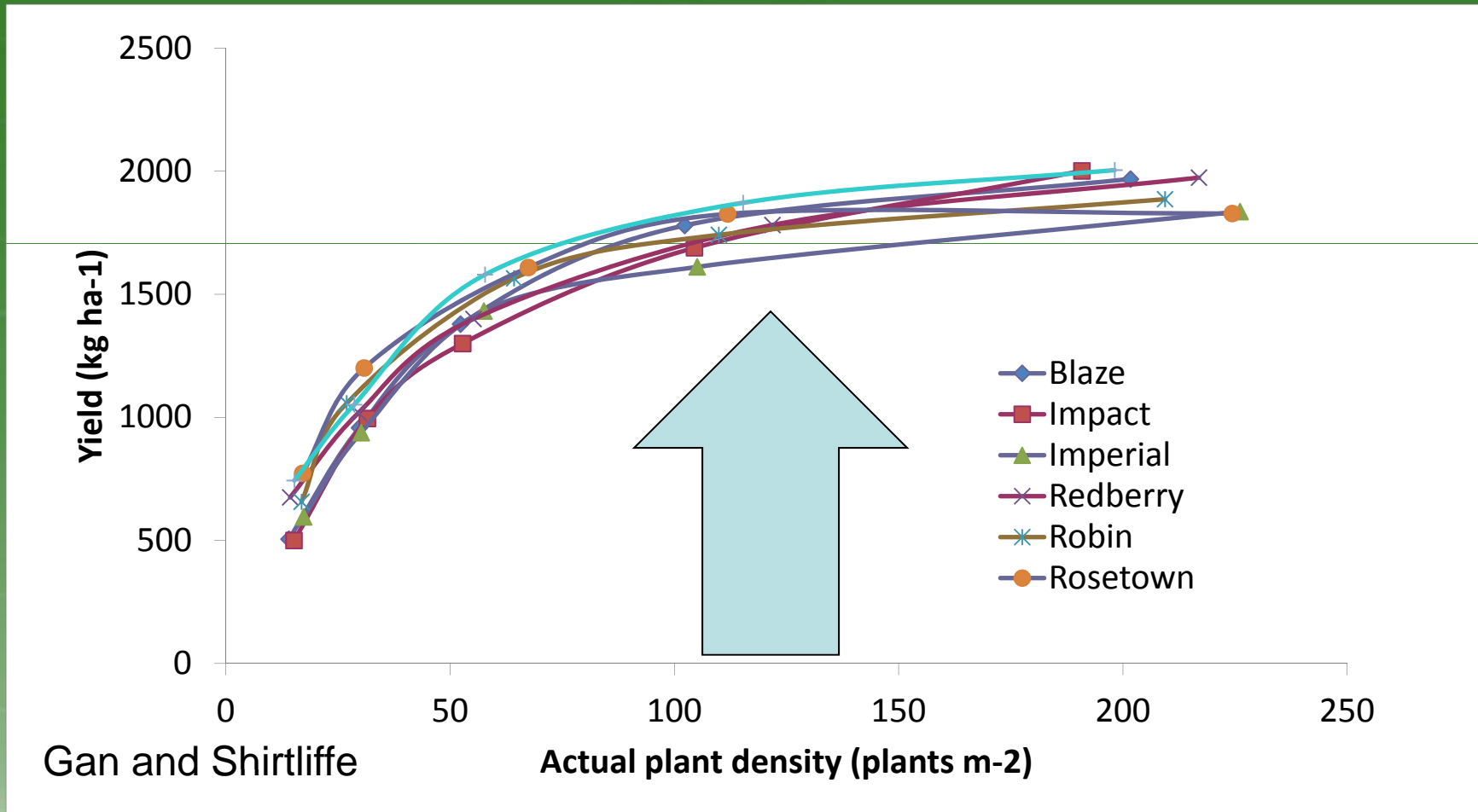
- Thousand kernel weight (grams) = weight of 1000 kernels
- Can do yourself or get done at lab
- Some seed suppliers will have the TKW
- Why important?
 - Seeds vary in size – variety, environment



Lentil Variety	Class	TKW (g)	lb/ac	\$/acre
CDC Sedley	LG	68	100	\$ 34.90
CDC Glamis	LG	60	88	\$ 30.80
CDC Imagreen	MG	57	84	\$ 29.26
CDC Meteor	MG	51	75	\$ 26.18
CDC Milestone	SG	37	54	\$ 18.99
Eston	SG	33	48	\$ 16.94
CDC Redberry	SR	42	62	\$ 21.56
CDC Imperial	ESR	30	44	\$ 15.40
Germination >95%, target 125 plants/m ² , 80% survival. \$0.35/lb				



The effect of seed size on yield density relationship in red lentil





Effect of seed size = \$

Pea Variety	Seed size (g/1000)	Seed rate		
		Kg/ha	lb/ac	\$/acre
Alfetta	290	290	259	\$ 51.71
Topeka	260	260	232	\$ 46.36
Eclipse	250	250	223	\$ 44.58
CDC Bronco	230	230	205	\$ 41.01
SW Cabri	210	210	187	\$ 37.45
Miser	190	190	169	\$ 33.88

Targeting 85 plants/m², using 85% emergence rate (95% or > emergence),
\$12/bushel for seed

(Yantai Gan, AAFC Swift Current)

S. Phelps



Canola

	Plant Population (plants/m ²)					
	10	20	40	60	80	100
TKW	seeding rate needed (kg/ha)					
3	0.6	1.2	2.4	3.6	4.8	6
4	0.8	1.6	3.2	4.8	6.4	8
5	1	2	4	6	8	10

Using 50% emergence rate (5 lbs/acre = 5.6 kg/ha)



TKW (grams)

Crop	TKW (grams)
HRS Wheat	31 – 38
CPS Wheat	39 – 50
SWS Wheat	34 – 36
Barley 2R	40 – 50
Barley 6R	30 – 45
Oat	30 - 45

Crop	TKW (grams)
B. Rapa	2 – 3
B. Napus	2.5 – 5.5
Flax	5 – 6.5
Pea	125 – 300
Lentil	30 – 80
Camelina	1

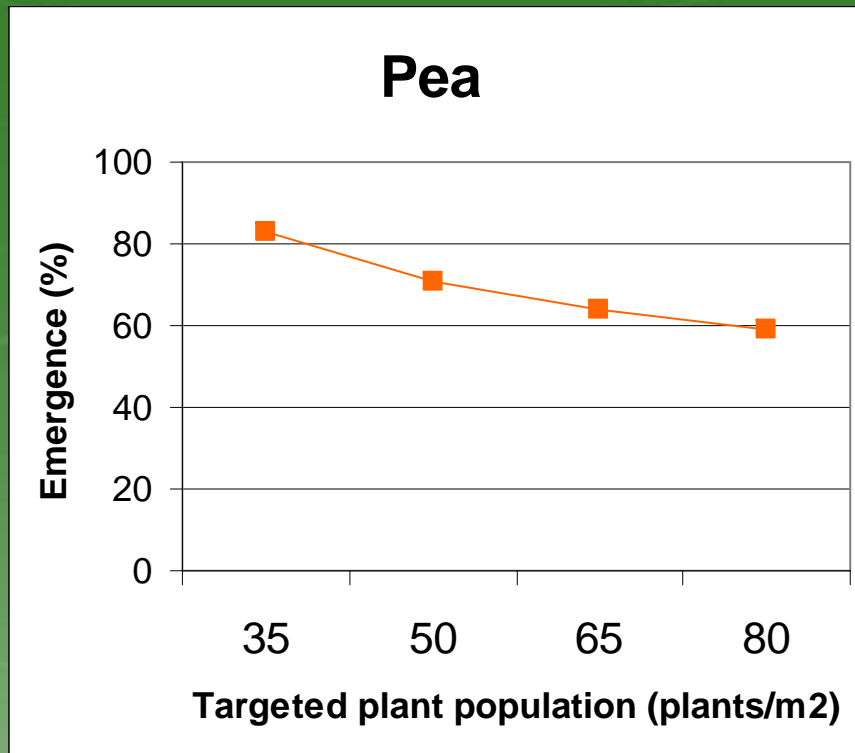


Expected emergence

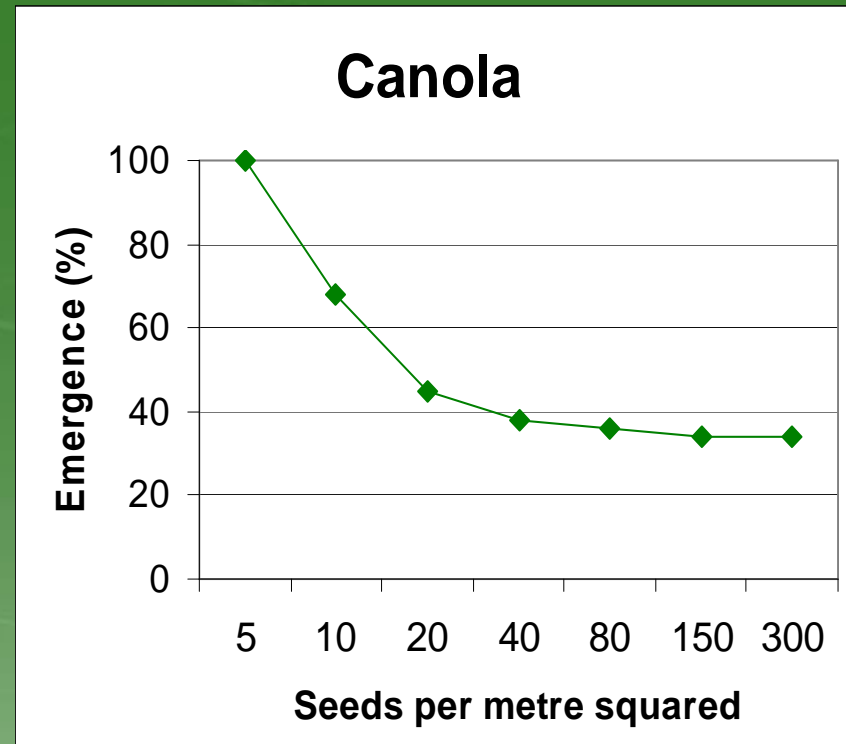
- How many of the viable seeds actually survive to produce a plant?
- Rarely 100%
- Damaged by handling, diseases, insects, adverse conditions, poor vigor.....
- Percent emergence goes down as plant populations increase



Emergence decreases as seeding rates increase



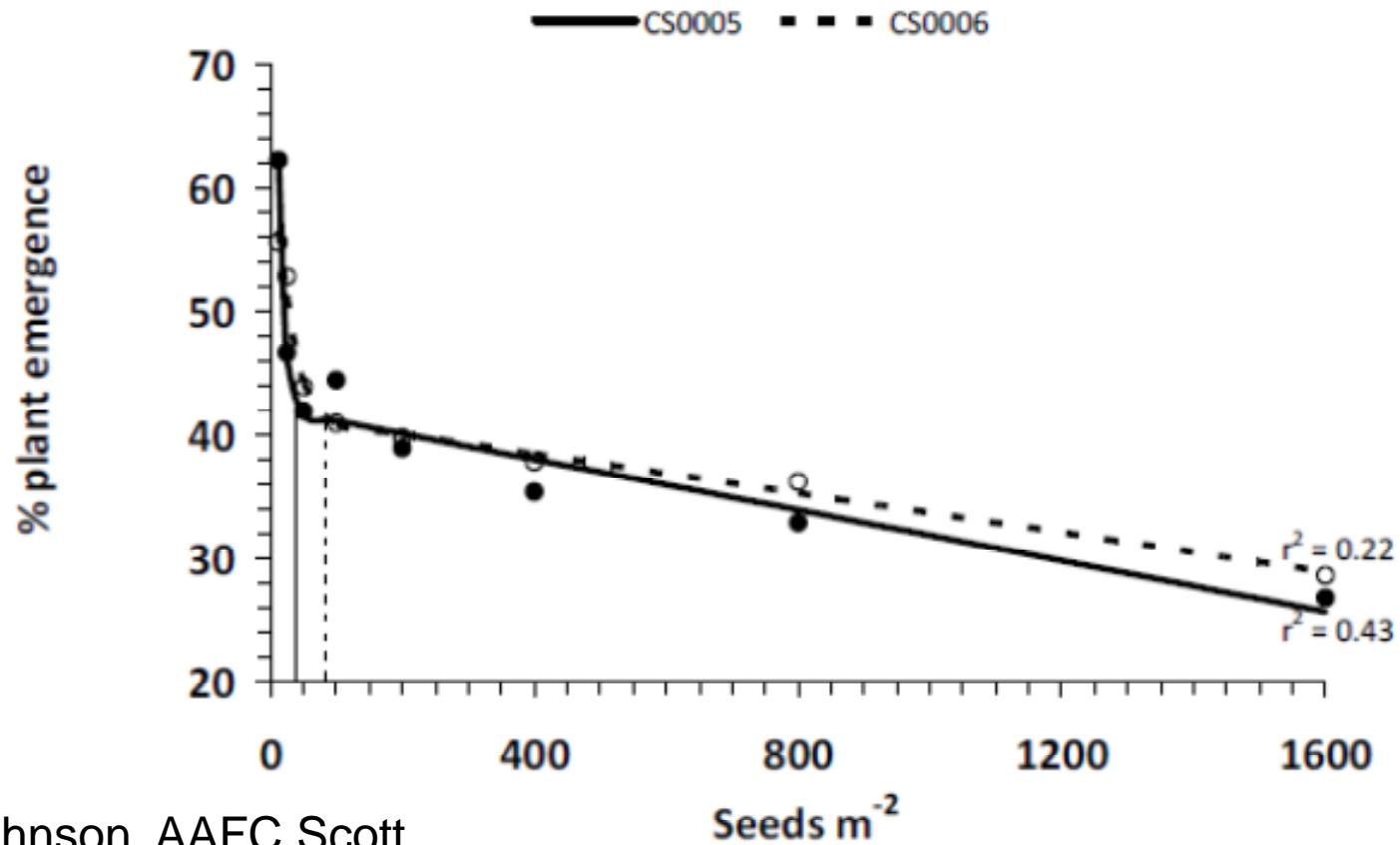
Gan, 1998 to 2000, 2 locations



Davey, 2010 & 2011, 5 locations



Camelina



Eric Johnson, AAFC Scott



Crop	Expected Emergence
Cereals	80 to 90%
Pulses	80 to 95% (60 to 95)
Oilseeds	40 to 60%



Saskatchewan
Ministry of
Agriculture

Row Spacing

S. Phelps



Impacts of Row Spacing

- Considerations:

	Wider	Narrower
– Soil disturbance	less	more
– Residue clearance	more room	less room
– Swathing	weaker	holds better
– Seed placed fert.	less safety	more safety
– Fertilizer – mid	further	closer
– Fertilizer – side	> crop adv	



Impacts of Row Spacing

• Considerations:	Wider	Narrower
– Moisture	more evap.	Less evap.
– Sunlight	> reflected	>intercepted
– Weed control	less comp.	more comp.
– Disease	open canopy	closed canopy
– Horsepower needed	less	more
– Cost	less	more

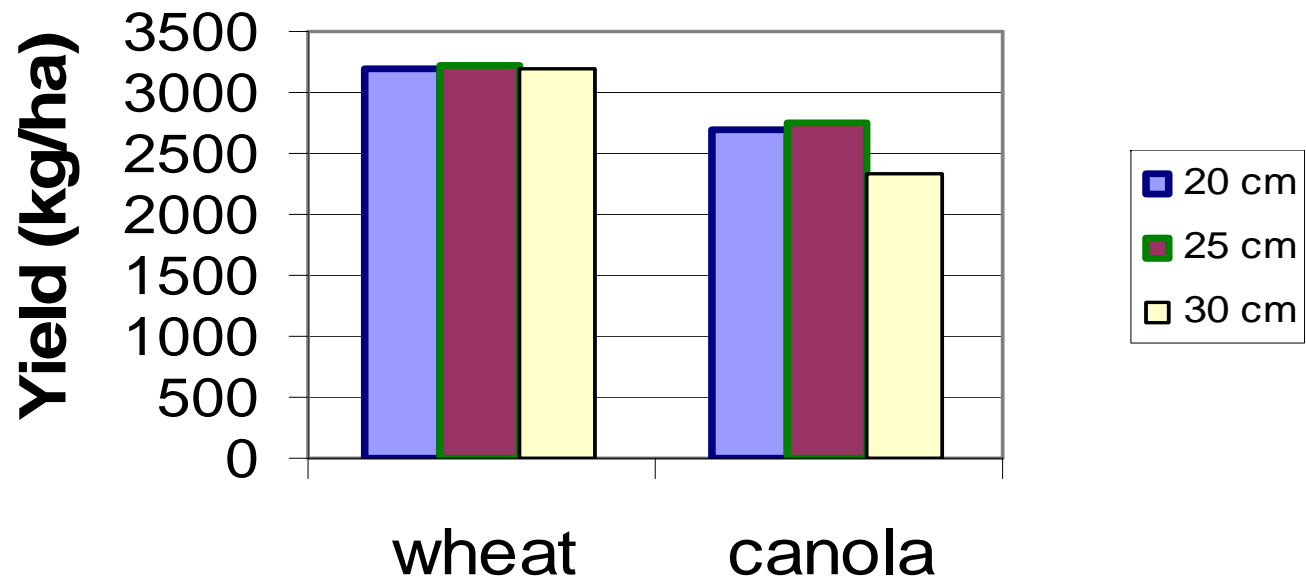


Row Spacing

- Belief that there is no impact of row spacing
- Why...
 - Equipment limitations = hard to do research
 - lots of research on row spacing but ...
 - limited to narrow range
 - Often only two spacings compared (20 vs 30 cm)



Alberta Agriculture 1998-2000

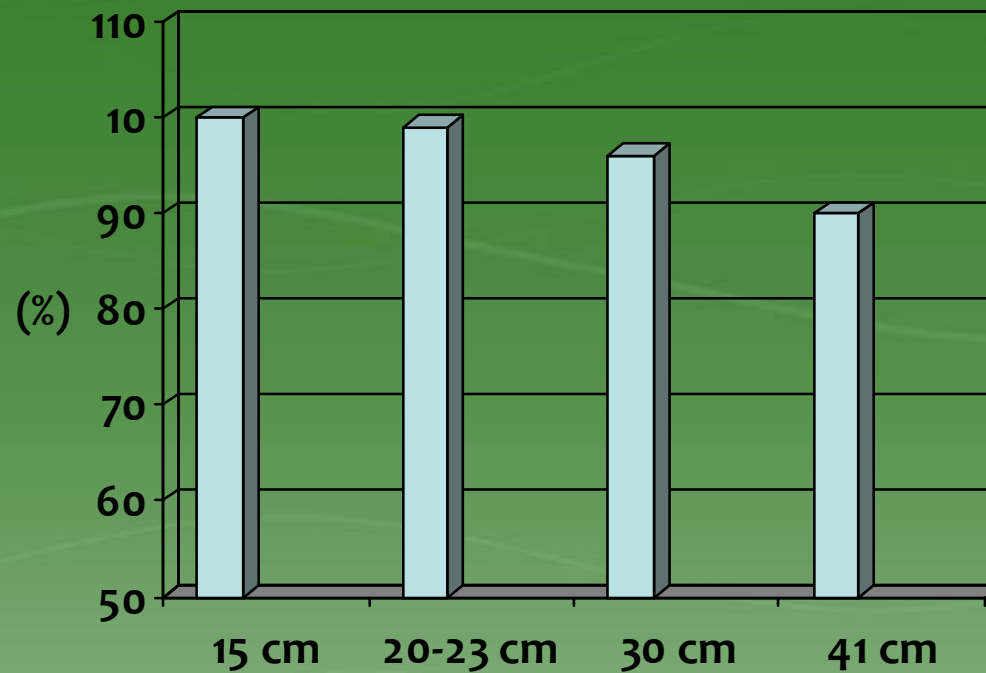




Saskatchewan
Ministry of
Agriculture

Canola

Yield Response in Canola

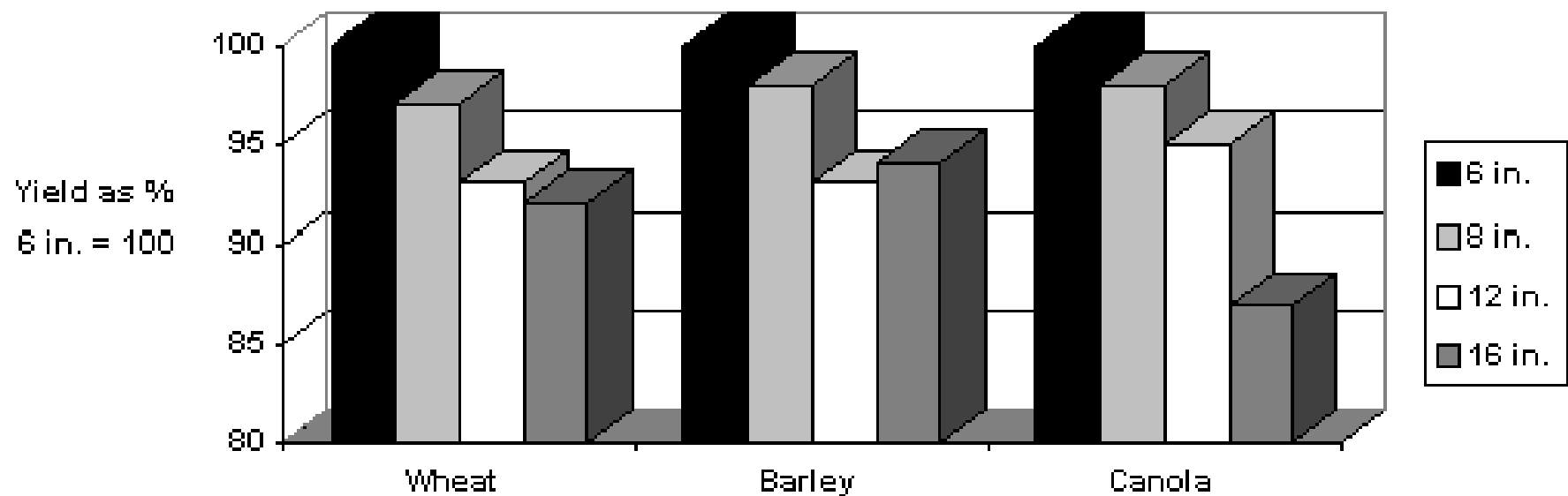


Canola Council of Canada Production Centres



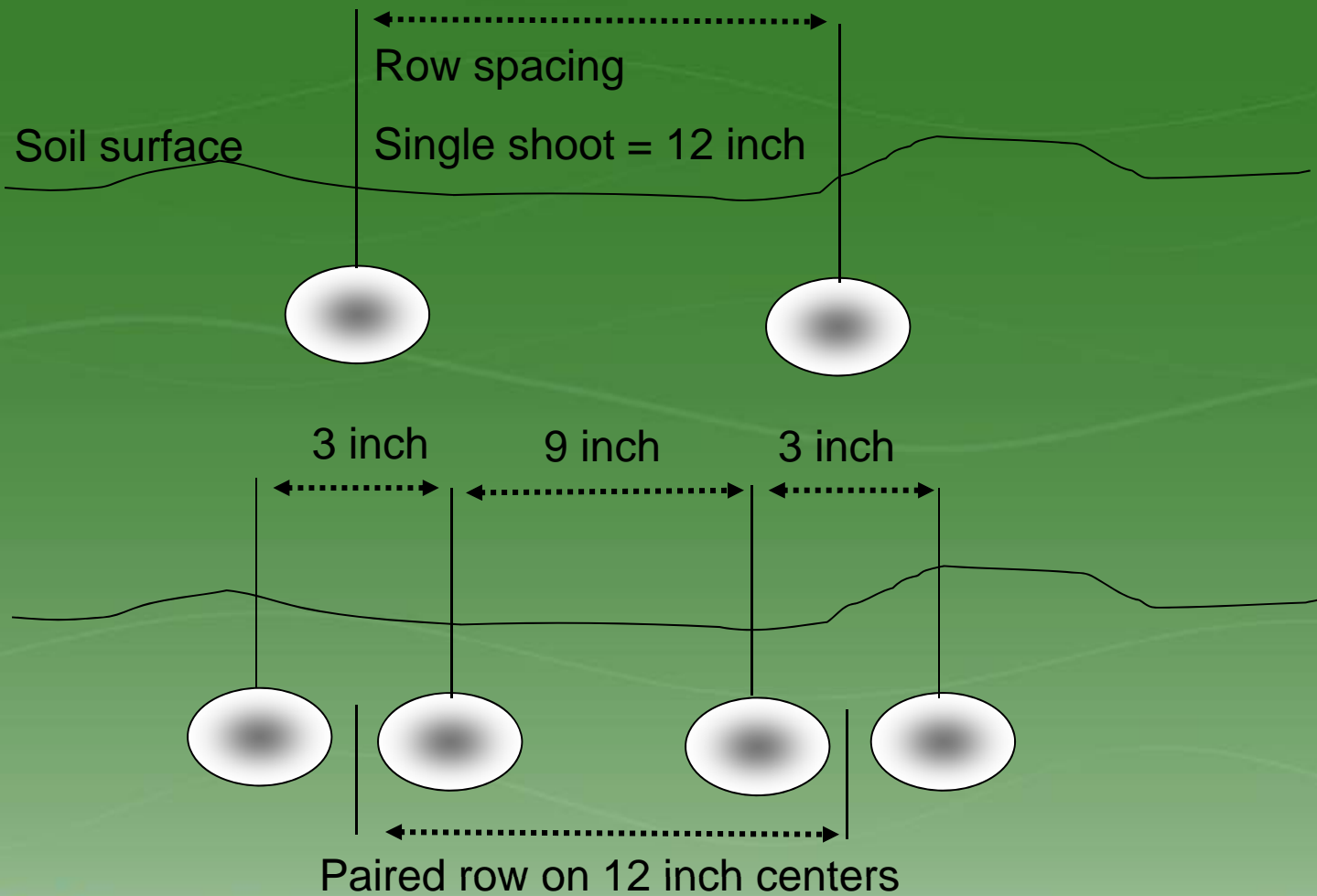
Row Spacing

Crop Yields by Row Spacing
PAMI 1993-95





Effect of Equipment





Seeding Speeds

Speed can affect:

- Seeding depth (uniformity between plants)
- Row burial (uniformity between rows)
- Seed and fertilizer separation
- Bunching and clumping in field
- Ultimately affect plant density



Saskatchewan
Ministry of
Agriculture

ADOPT Project 2011

OBJECTIVE

- To demonstrate the influence of opener type and seeding speed on canola emergence using field scale equipment



Locations

- 17 producers
 - Disc (2)
 - Knife (2)
 - Atom jet (3)
 - Paralink (3)
 - Seed Hawk (3)
 - Spoon (1)
 - Paired row (2)
- Locations
 - Wilkie , Scott, Leipzig (6)
 - North Battleford
 - Meadow Lake/Goodsoil (2)
 - Rosthern
 - Melfort (2)
 - Tisdale (2)
 - Star City
 - Paddockwood
 - Simpson



Data Collection

- Surface residue before and after seeding
- Video clips during seeding
- Plant counts at 7 and 21 DAS
- Seeding depth
- Yield



Saskatchewan
Ministry of
Agriculture

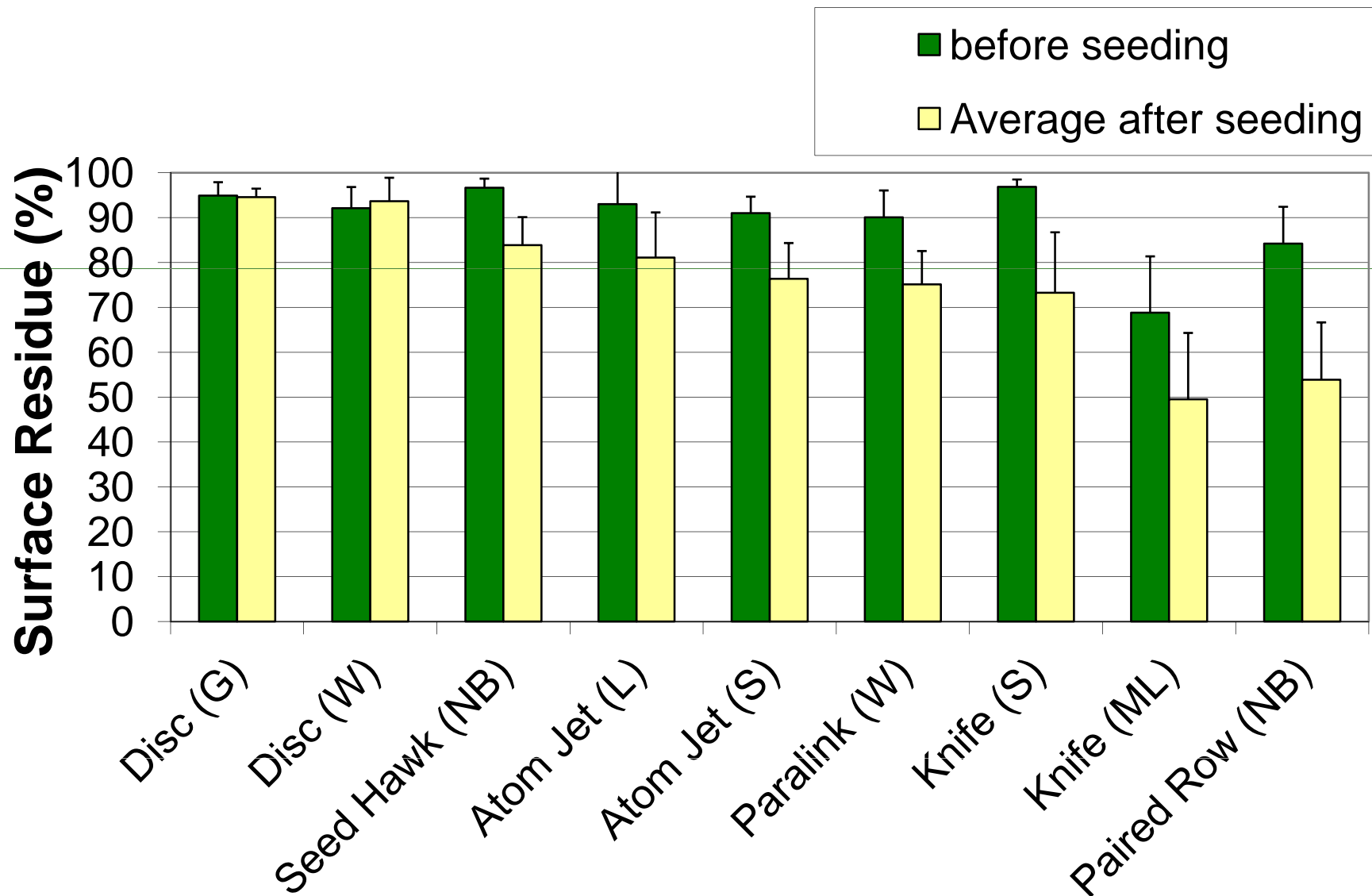
Surface Residue Measurements



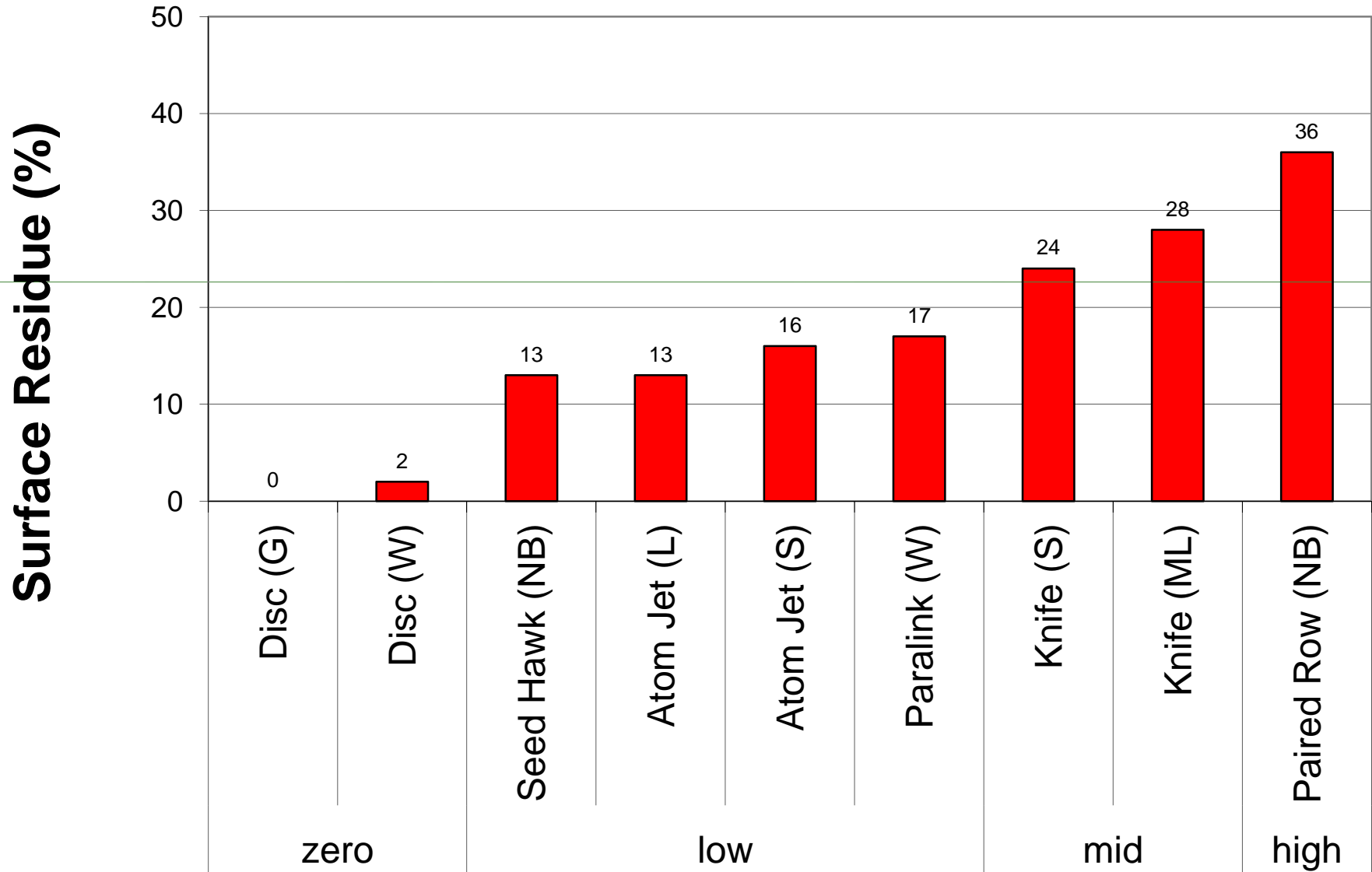
S. Phelps



Surface Residue



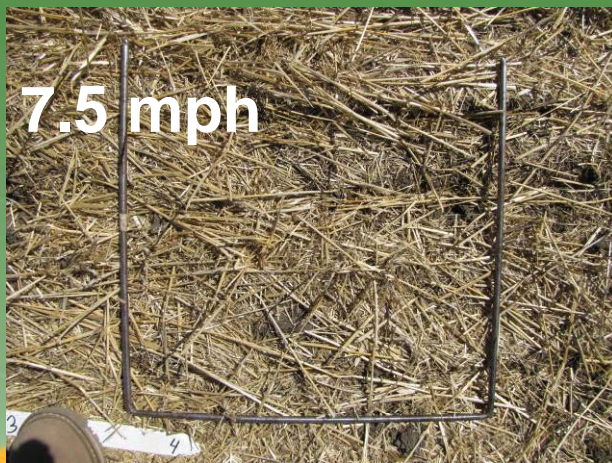
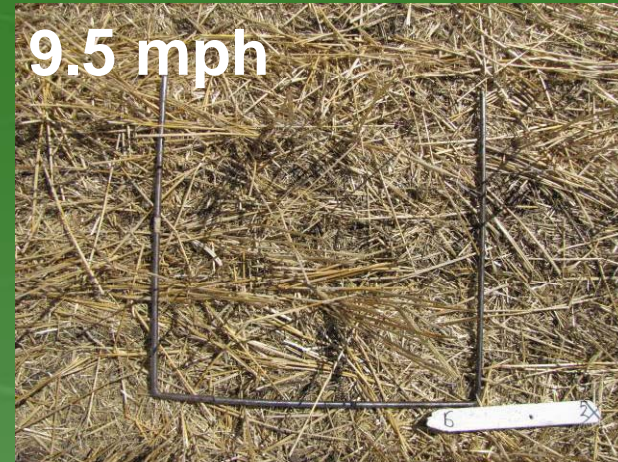
Average Loss In Surface Residue Across All Speeds





Saskatchewan
Ministry of
Agriculture

Disc Drills





Saskatchewan
Ministry of
Agriculture

Bourgault Paralink

3.5 mph

4.5 mph

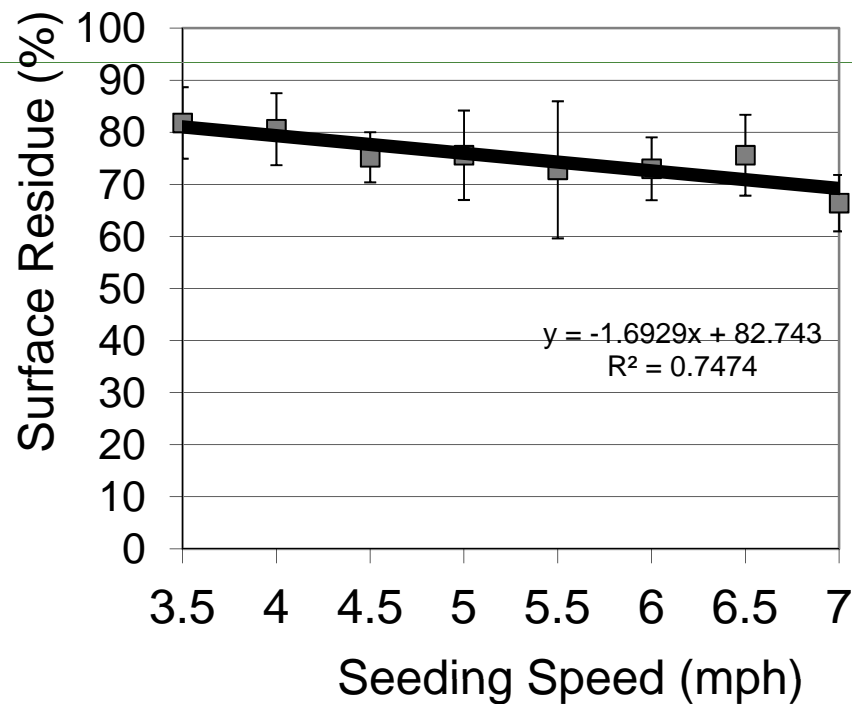
6.0 mph



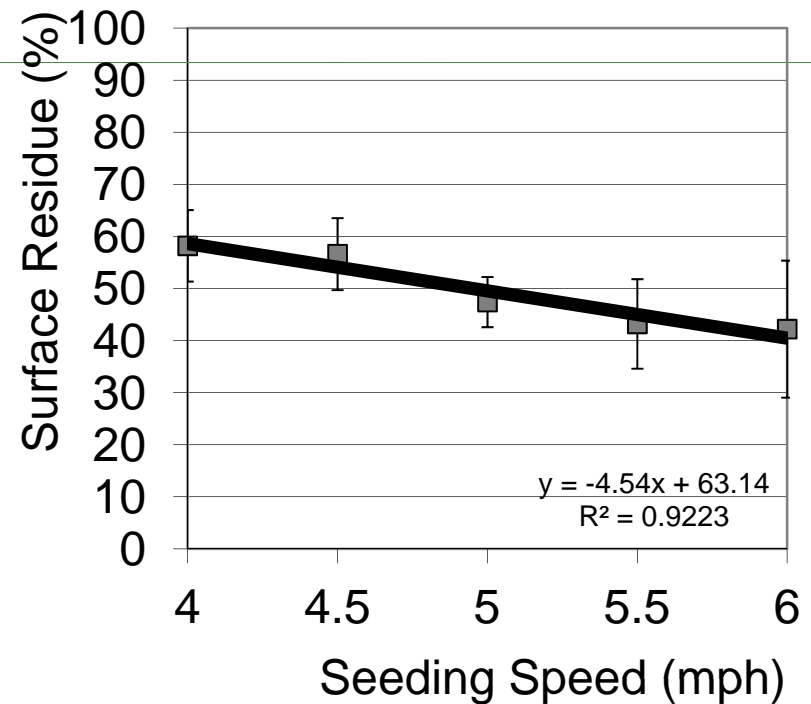


Effect of speed on residue

Wilkie



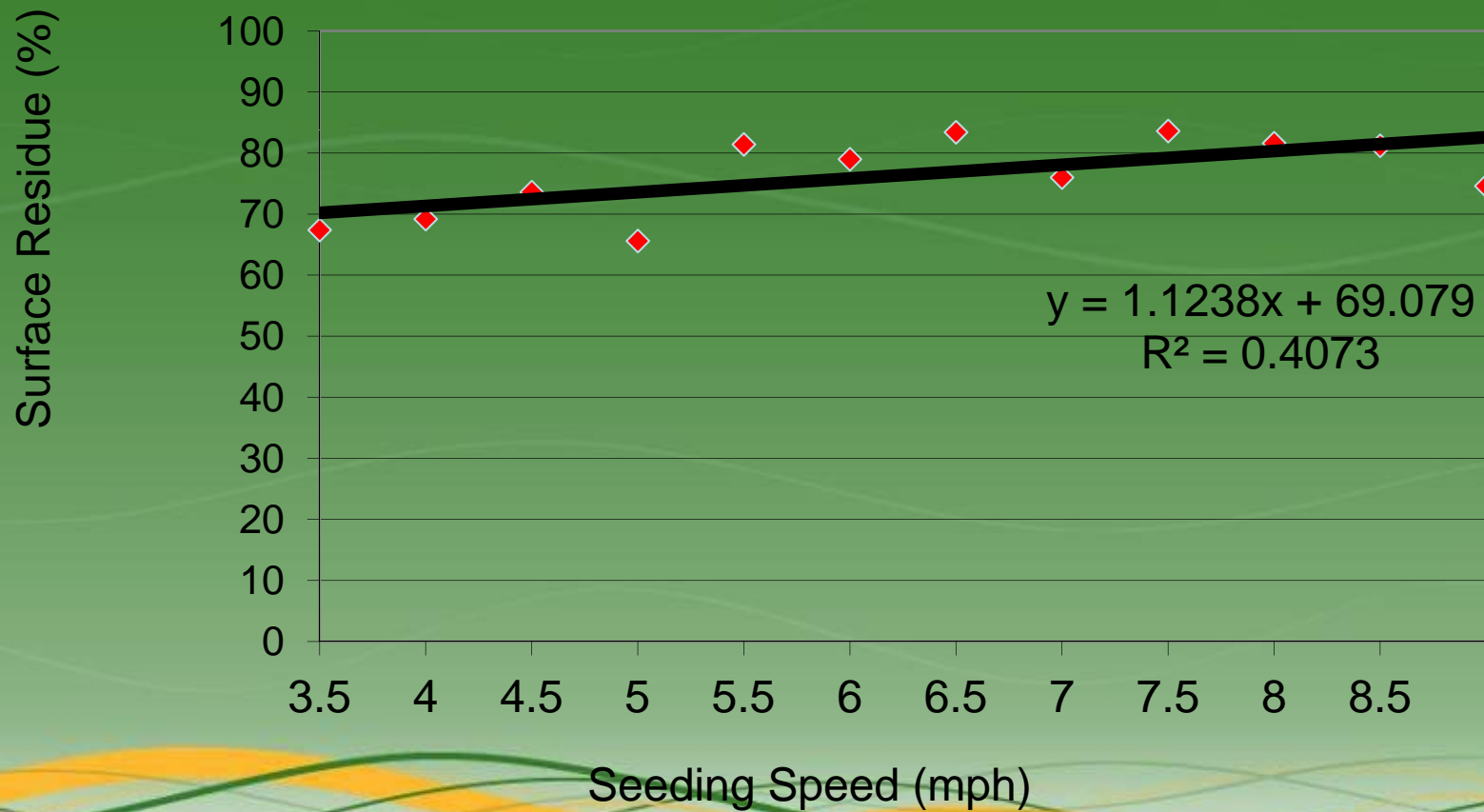
Meadow Lake





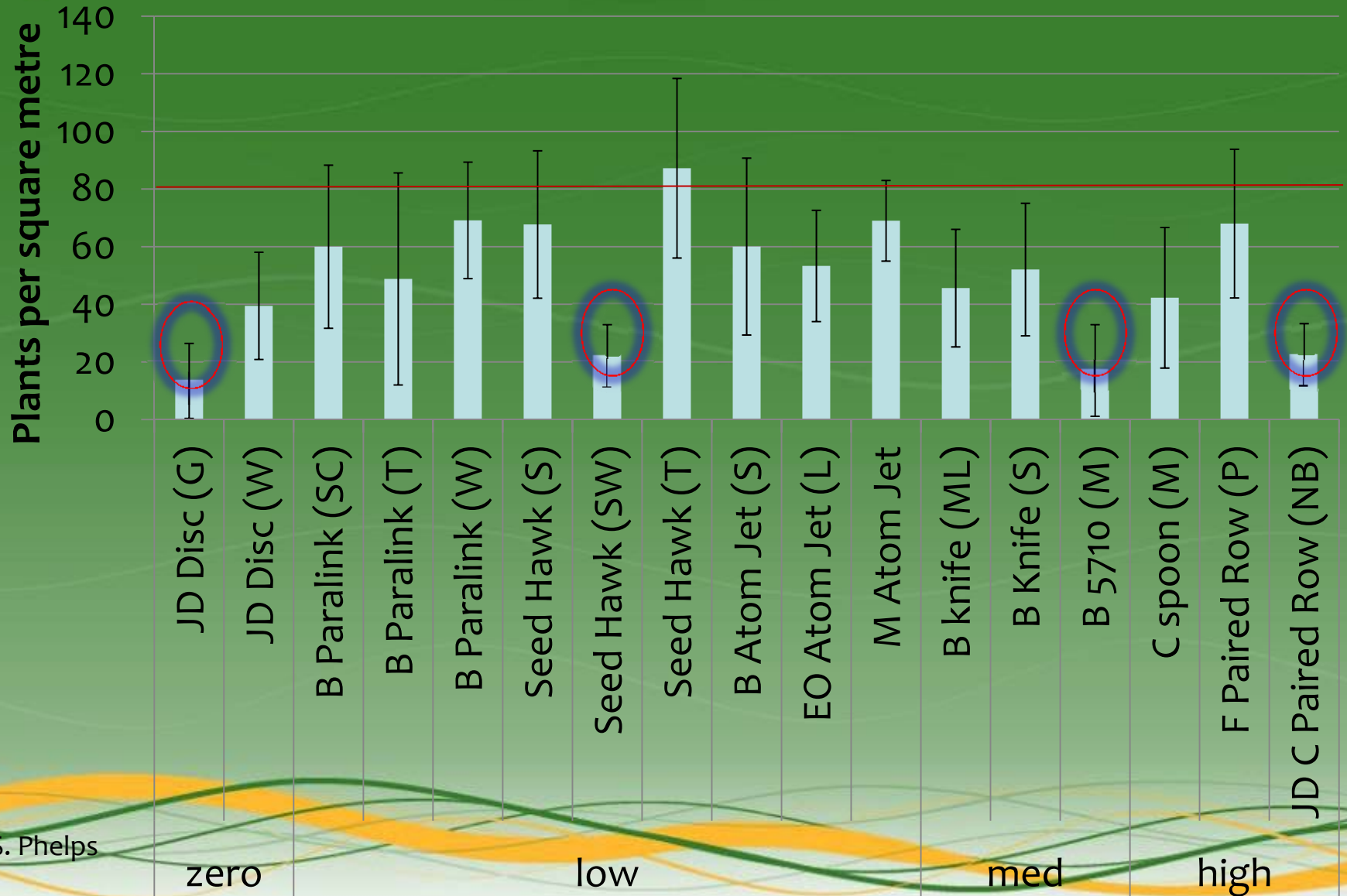
Not always negative....

Scott





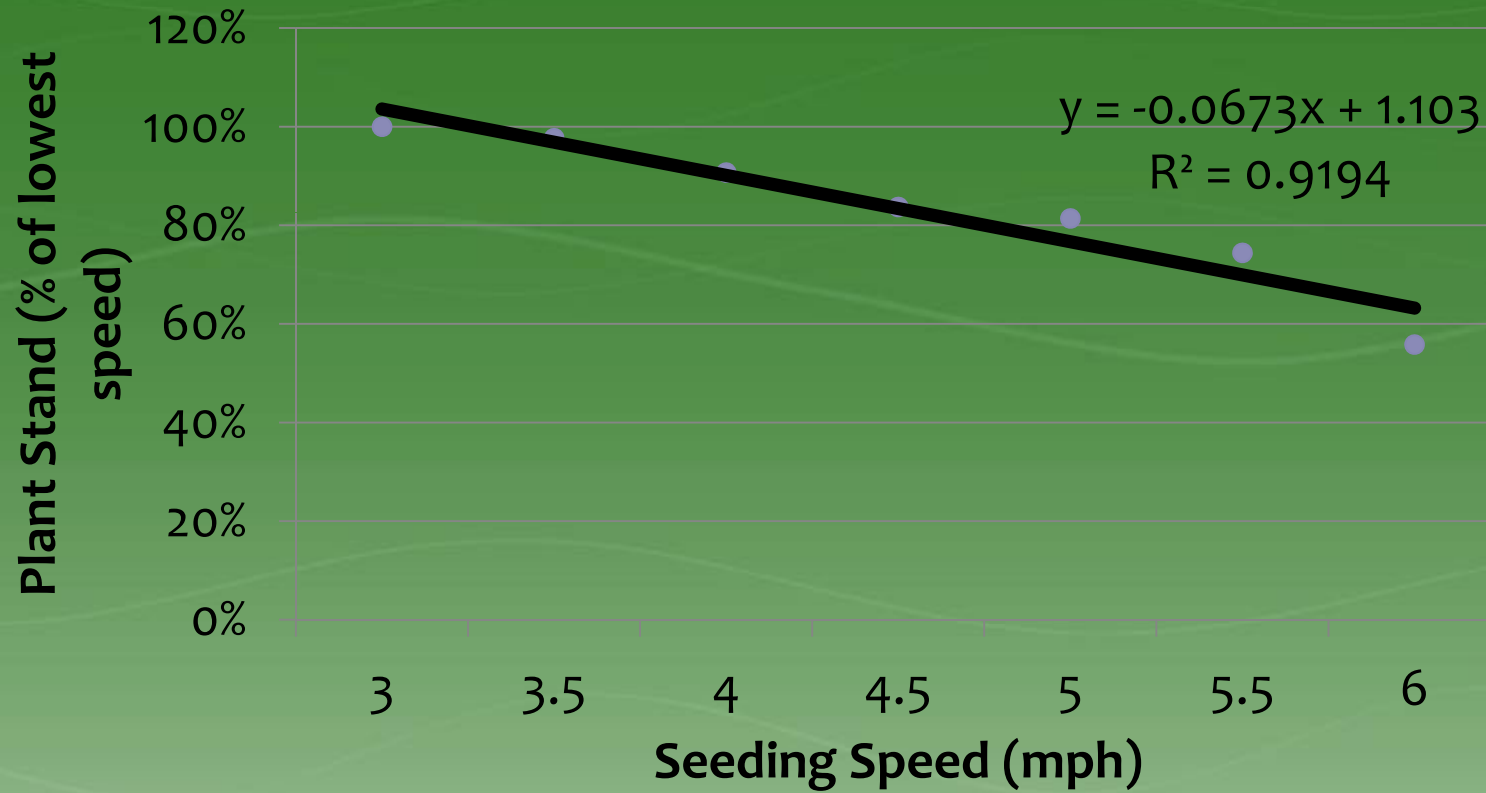
Plant Density (21 DAS)





Simpson

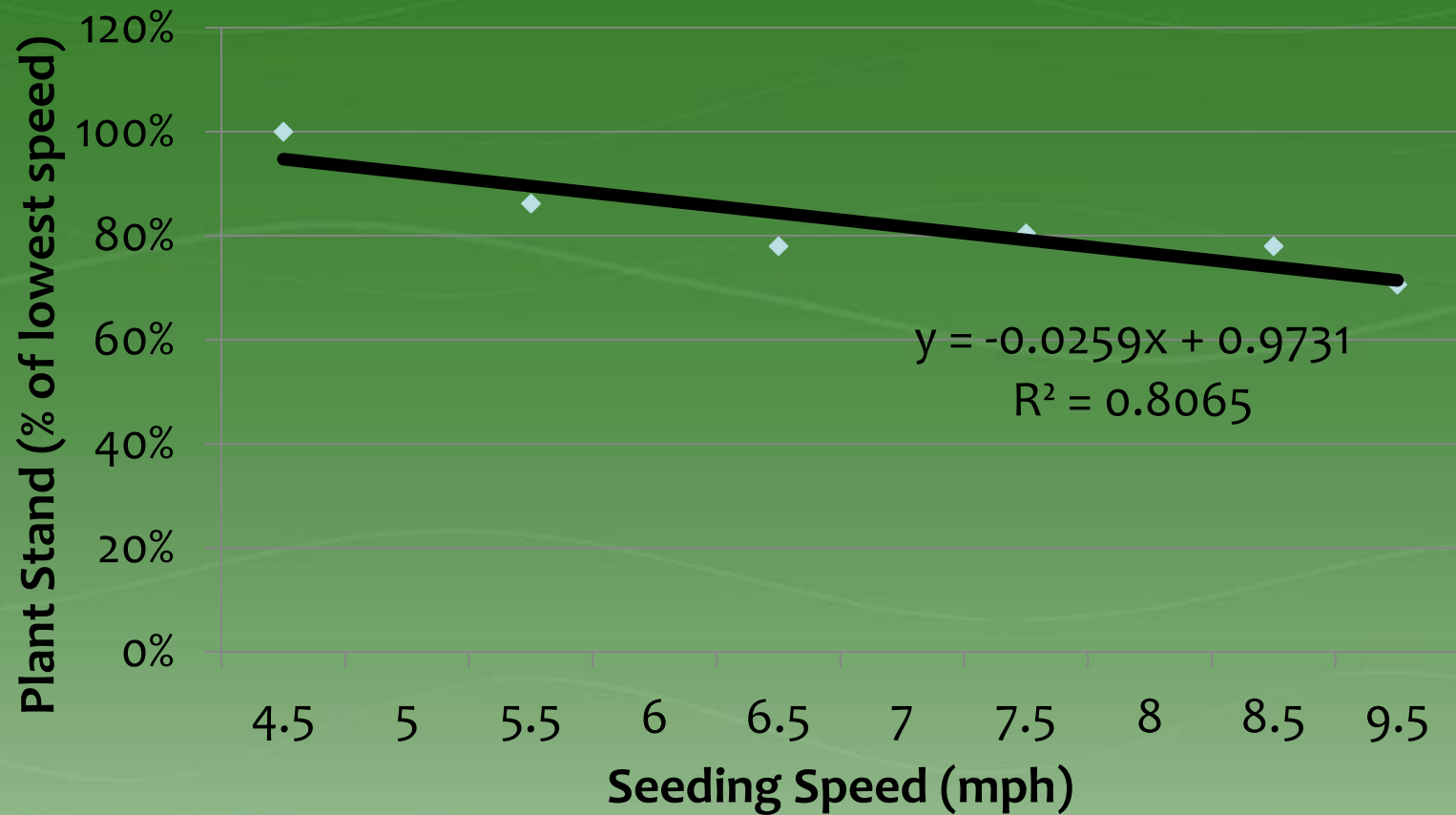
Average 72 plants/m sq





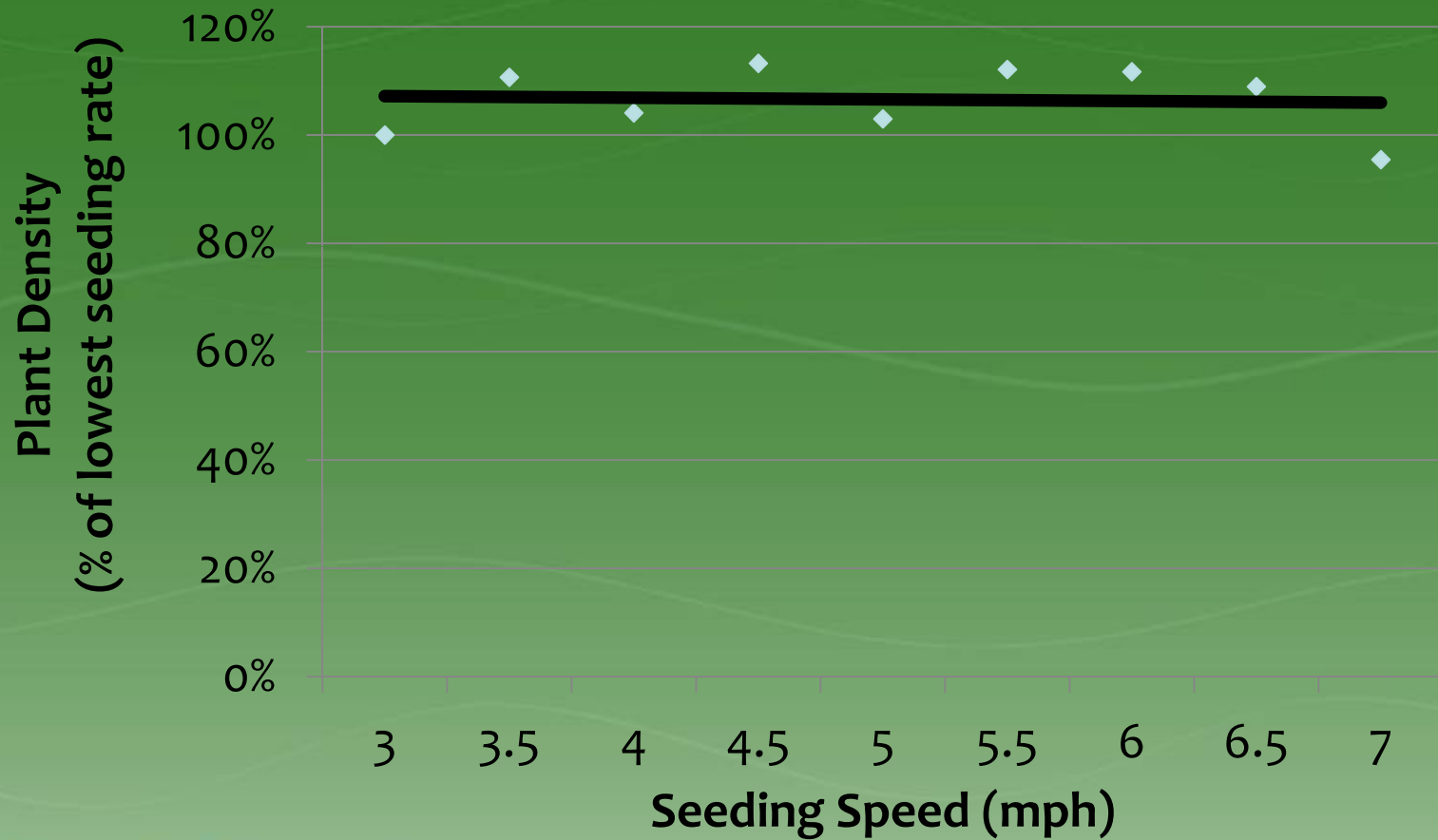
Wilkie

Average of 33 plants/m sq





All 13 sites (21 DAS)





Agronomy 101

- plant density is critical for maximum yields and net returns
 - Seeding rate is # 1 factor under our control
 - Seeding speed may be adjusted if short on time and conditions are good
 - Need more work on row spacing....



Saskatchewan
Ministry of
Agriculture

Thank You!

- NARF
- WARC
- AAFC
- Seager Wheeler
- ADOPT
- SCIC



PIONEER[®]
A DUPONT COMPANY



S. Phelps

