

Potential for Precision Seeding

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Where will future yield increases come from?

- Since the 1950's improved cultivars have accounted for about half of yield increases
- Improved fertility, pest management and management have accounted for the other half
- Breeding continues to advance yield potential, but how much more progress can we see with fertility and pest management
- Is there potential for precision seeding?

Precision Seeding

- Definition: *Placing of desired numbers of seeds at a precise depth and spacing.*
- *Seeding accuracy is not a substitute for other practices*



Benefits



- Plant Starts At Optimum Spot For Growth And Development
- Even Crop Emergence Across Field
- Reduced Seed Cost
- Greater Crop Uniformity
- Higher Yield
- Economic Benefit
 - i.e. More PROFIT



A photograph of a cornfield with green plants and a white marker in the center. The marker has some text on it, but it's not clearly legible. The background is a dense field of corn plants.

Precision Seeded Corn

- Interest in precision seeded corn began with introduction of high yielding hybrids
 - Seed costs were high
 - Crop was very responsive to management

Precision Seeded Corn

- Optimum population of 36000 plants/ac, reducing that to 24000 reduced yield by 10 bu/ac
- Reducing row space from 30 to 15 inches increased yield by 7 bu/ac
- Plants equally spaced increased yield 7-19 bu/ac
- Narrow (15") rows partially compensated for uneven spacing within rows, but may require higher seed rate

Precision Seeded Corn

- Uneven seed depth results in uneven emergence and development
- Having a mix of early and late emerging plants decreased yield by 4 bu/ac compared with all early, and 17 bu/ac compared with all late.
- **Overall, precision seeded corn increased yield by 15-20%**



But Corn Isn't Canola

- Small seed size
- Difficult and/or costly to 'singulate' seed
- Emergence % is variable
- 'Self thinning' occurs
- Lower yields
- Large capacity to compensate for low populations



Seed Rates for Canola

- Seed Rate; usually yields don't differ much between 40-150 plants/sq M
- Seed at 5 lb/ac (125-200 seeds/sq M)
- Rates with large seeded hybrids?
- Shotgun approach to seeding
- Plant more than necessary and hope that enough survive to produce a good crop

Seeding Depth

- Critical to 'seed to moisture but not so deep as to prevent emergence or reduce vigor
- Half to $\frac{3}{4}$ inch is ideal



Spacing Between Rows

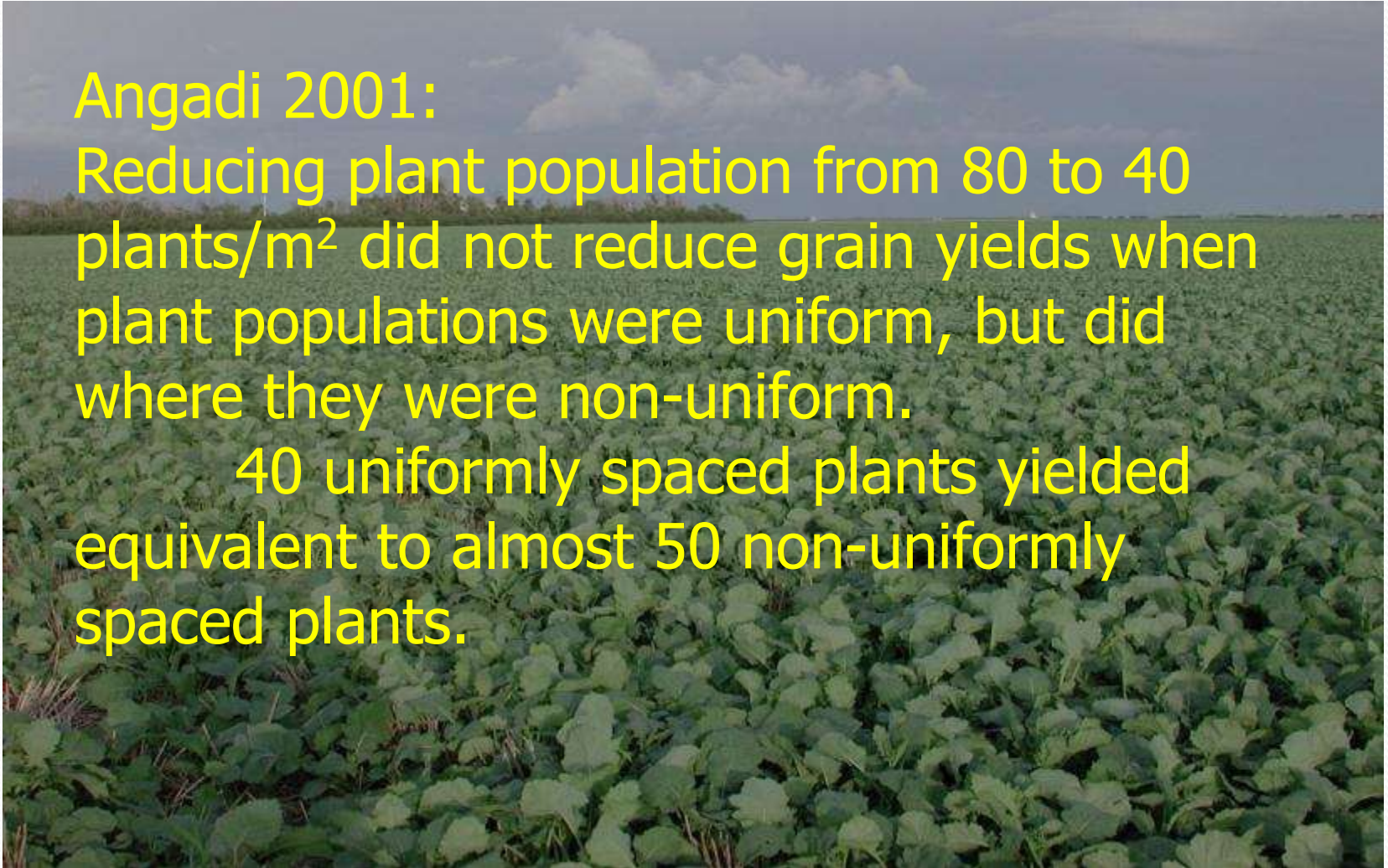
- Relatively little yield difference between 8 and 12” rows
 - Wider rows may promote weed competition,
 - Wider rows may reduce disease
- Wider than 12” spacings are being evaluated
 - Reduced cost to manufacture and operate machines
 - Wider rows means plants are spaced closer together in widely spaced rows

Spacing Within Rows

Angadi 2001:

Reducing plant population from 80 to 40 plants/m² did not reduce grain yields when plant populations were uniform, but did where they were non-uniform.

40 uniformly spaced plants yielded equivalent to almost 50 non-uniformly spaced plants.



Spacing Within Rows

Angadi 2001:

As populations declined, having plants uniformly distributed became more important.



Precision Seeded Canola Study

- Compare a Valmar roller with the UltraPro (Seedmaster) roller.
- Uniformity of plant spacing
- Can we reduce seed rates?
- Can we increase yield?
- Locations:
 - NARF – Melfort
 - WARC- Scott
 - IHARF Indian Head
 - WCA- Swift Current
 - SERF- Redvers



Precision Seeded Canola

- UltraPro roller improves uniformity between rows, and possibly within; but does not 'singulate'
- Designed for canola
- Compare roller types with rates of 10, 20, 40, 80, 160 and 320 seeds/ sq M
- Evaluate plant density and spacing
- Crop maturity and yield

10 Seeds/sq M Melfort

Precision Roller



Valmar



20 Seeds/sq M Melfort

Precision Roller

Valmar



40 Seeds/sqM Melfort

Precision Roller

Valmar



80 Seeds/sq M Melfort

Precision Roller

Valmar



160 Seeds/sq M Melfort

Precision Roller

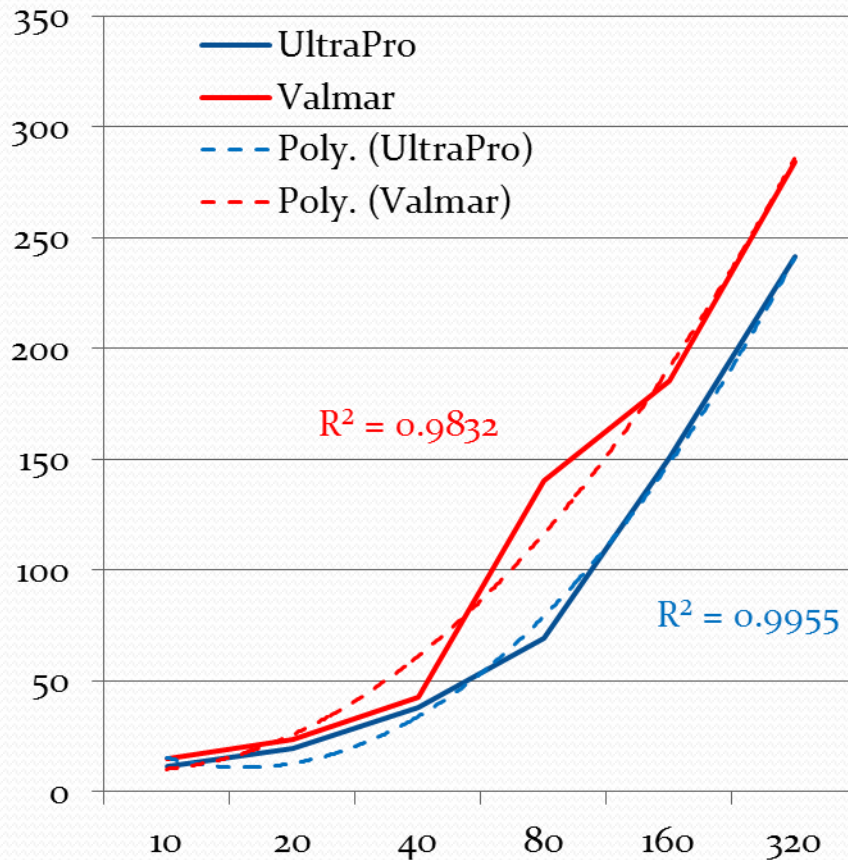


Valmar

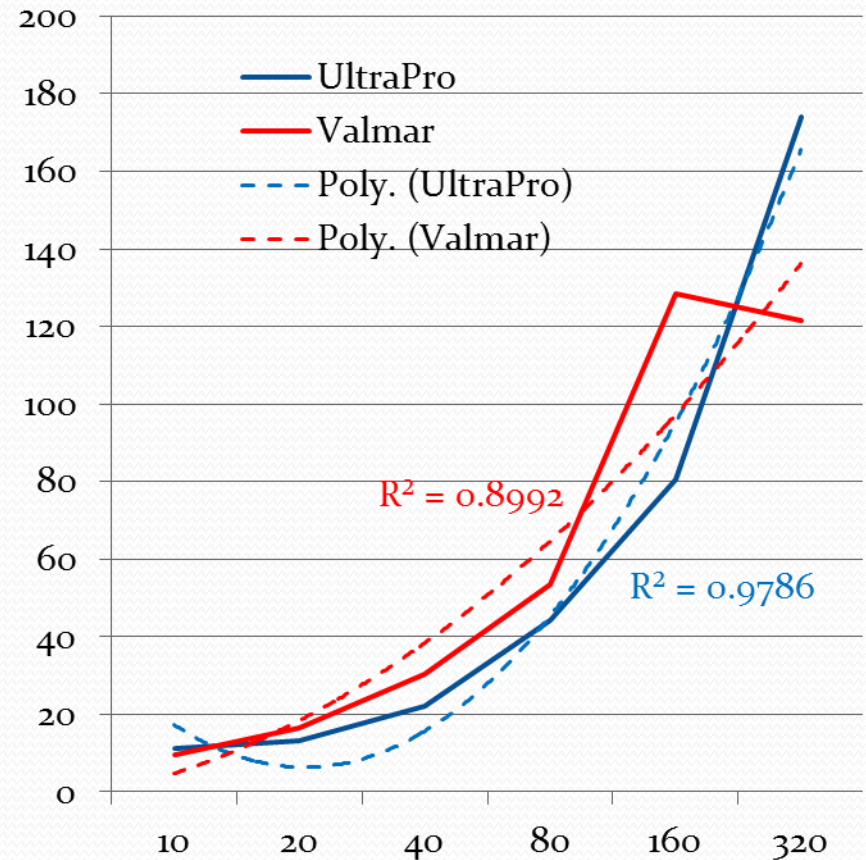


Spring Plant Density (plants/M2)

Indian Head



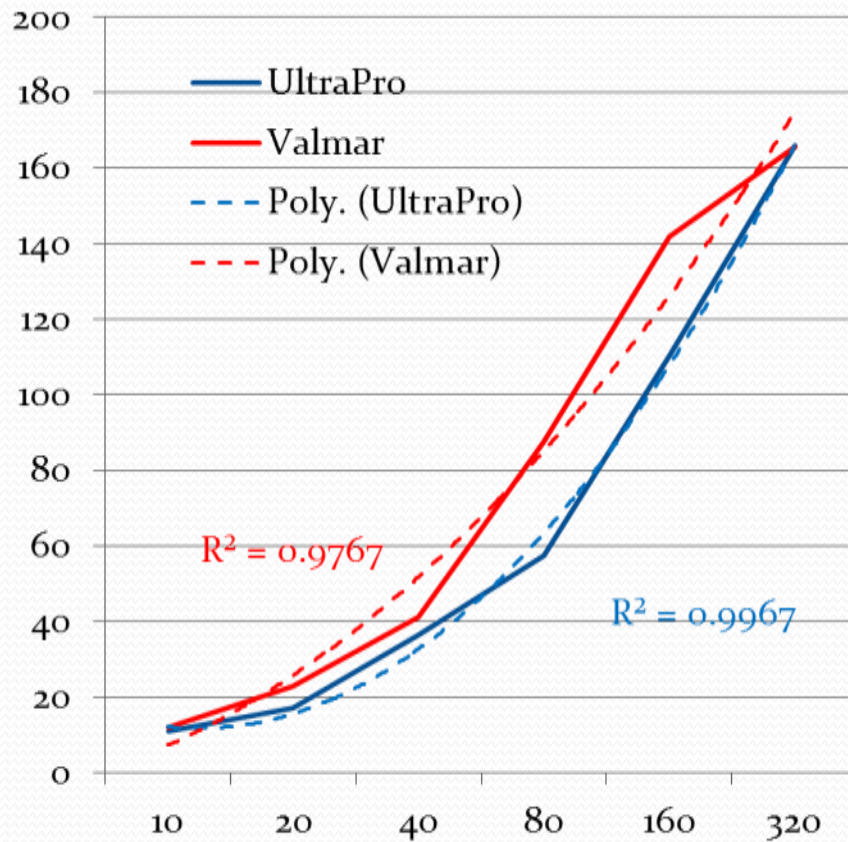
Melfort



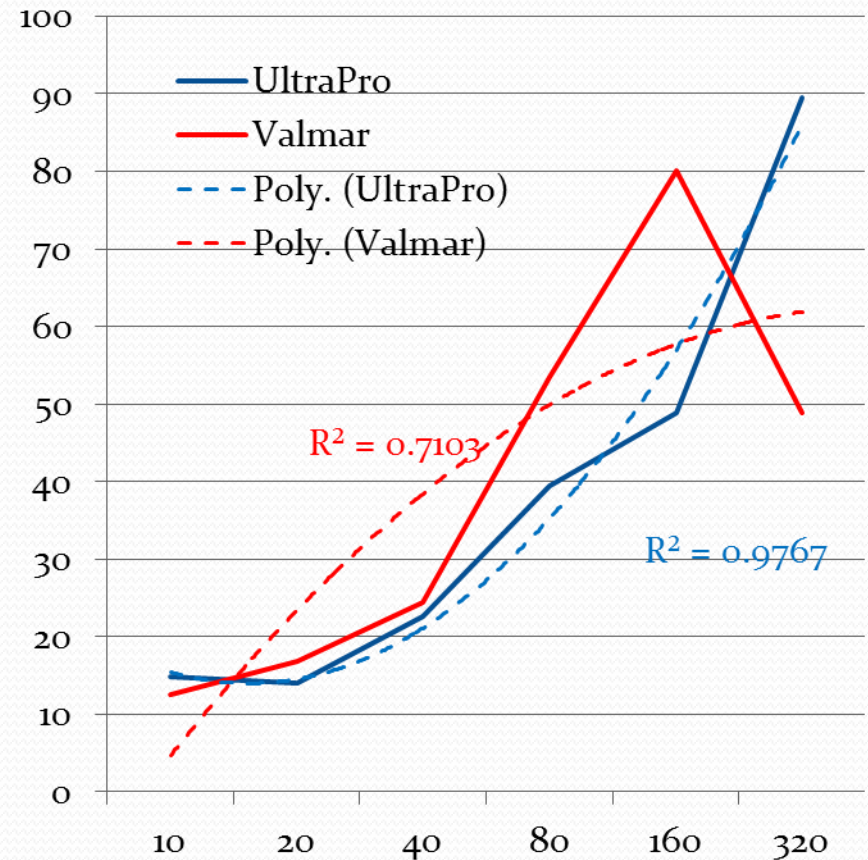
Seed Rate (seeds/M2)

Fall Plant Density (plants/M2)

Indian Head



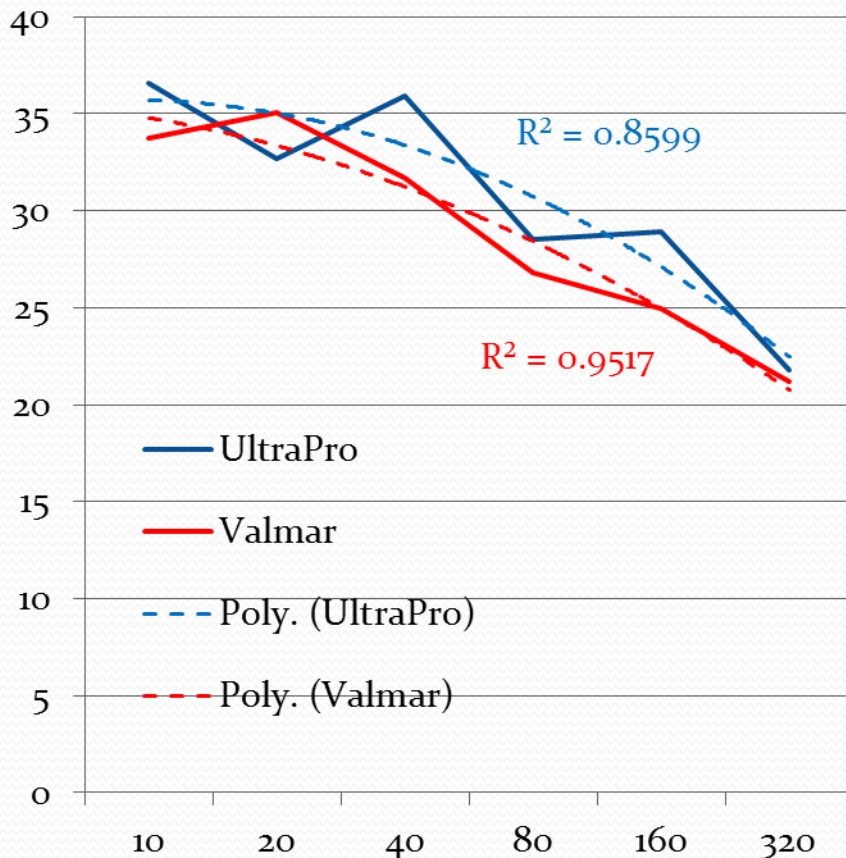
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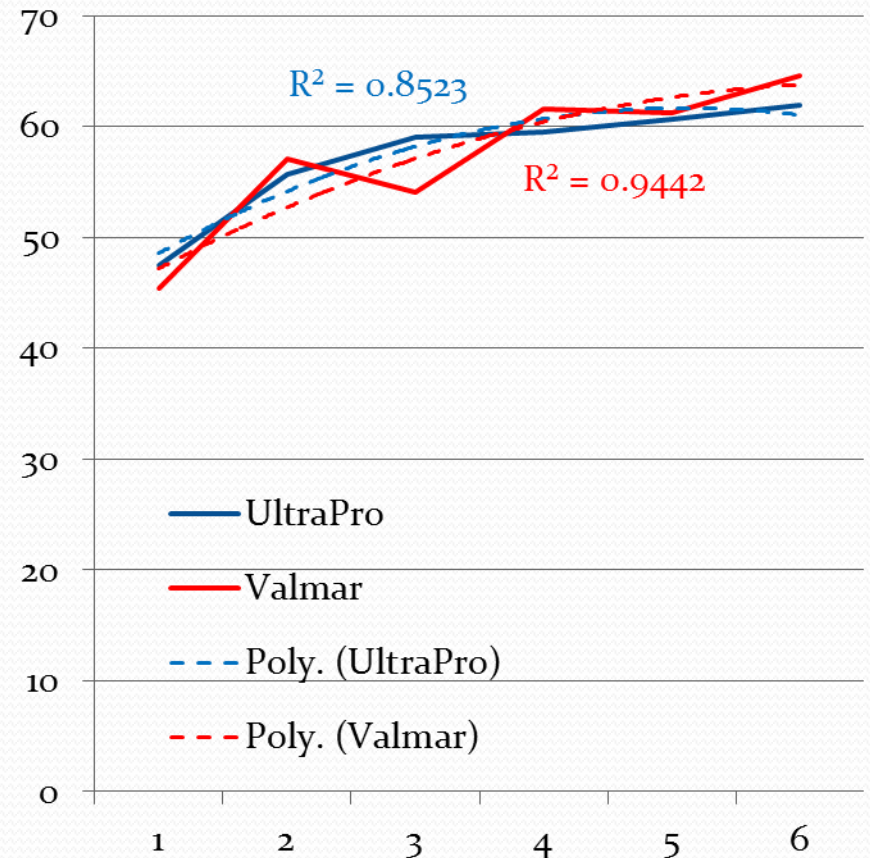
Seed Rate (seeds/M2)

Canola Yield (kg/ha)

Indian Head

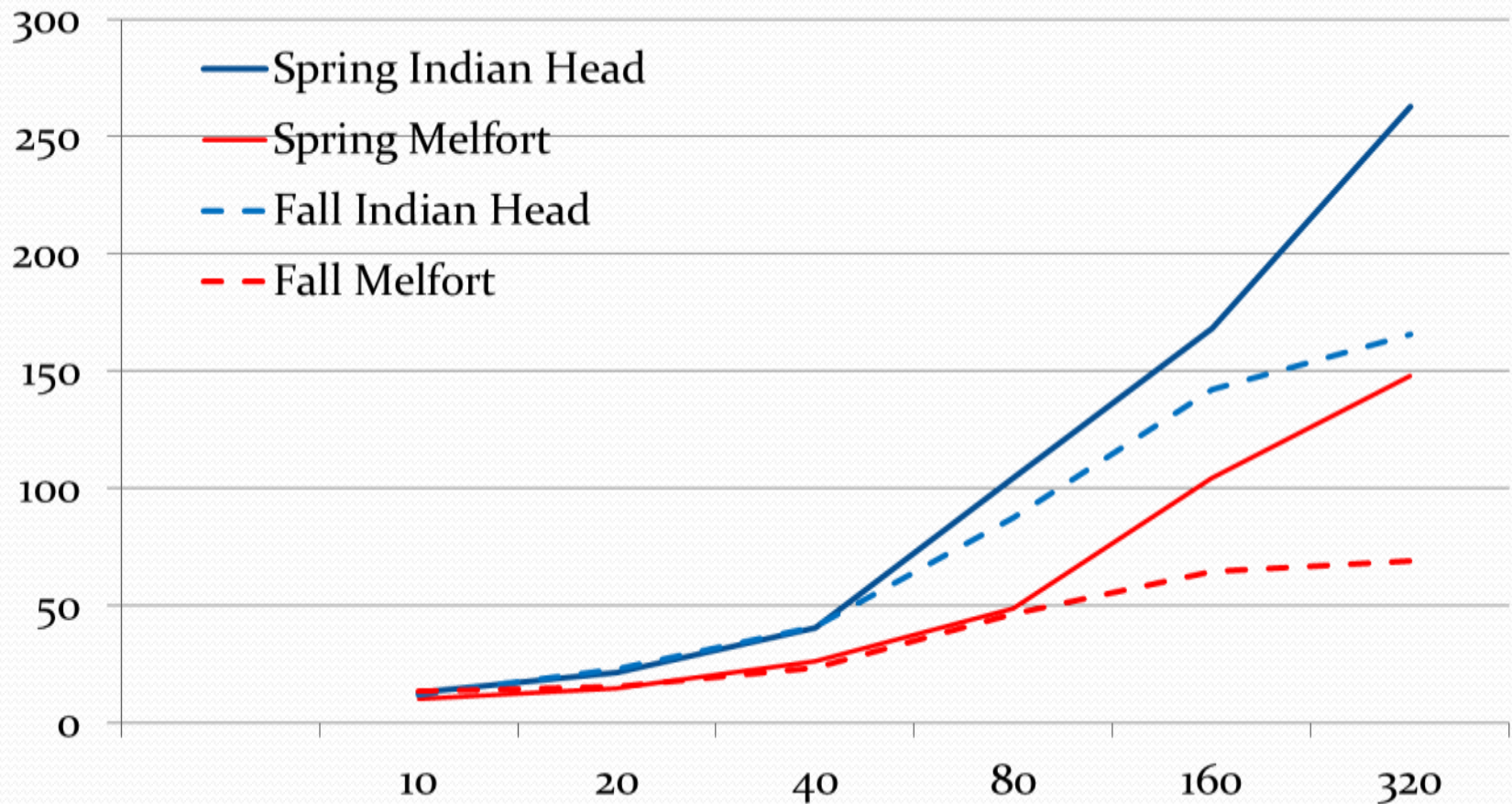


Melfort

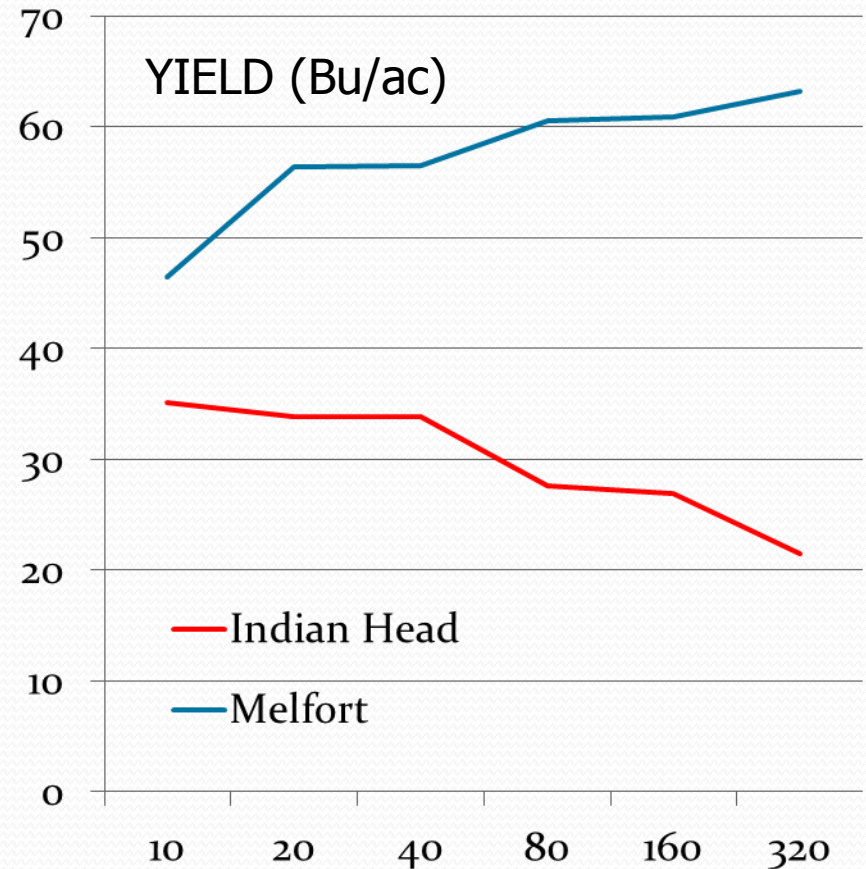
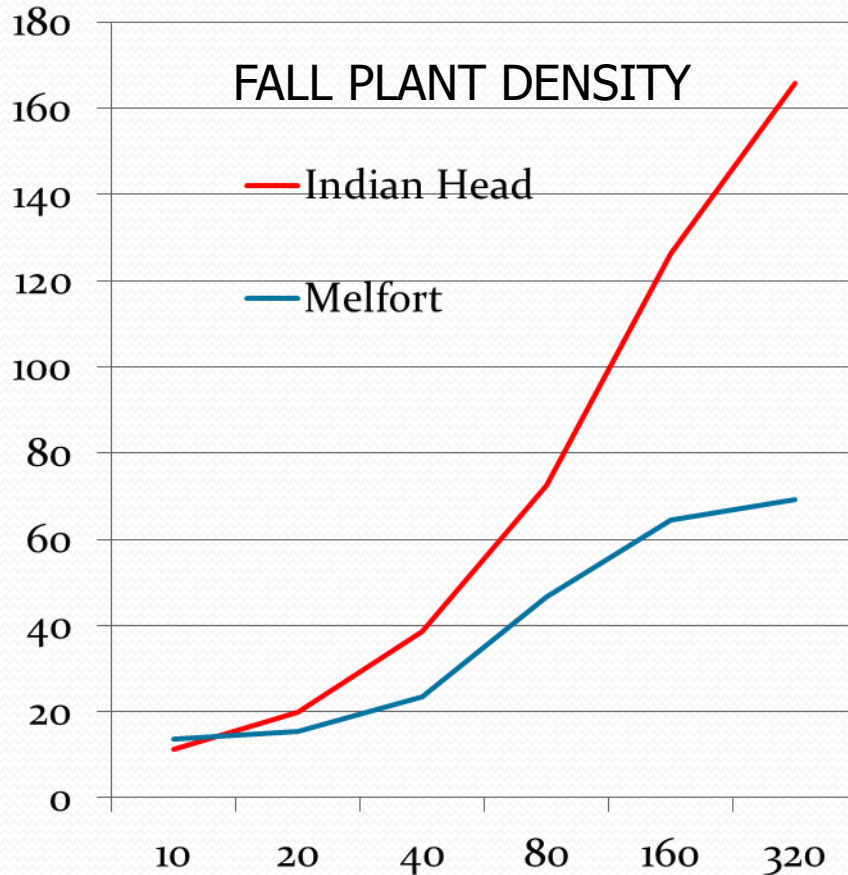


Seed Rate (seeds/M2)

Relationship Between Spring and Fall Plant Densities



Relationships between fall plant density and yield



Some Preliminary Observations

- Planned to look at uniformity of spacing within rows
- May need to look more closely at spacing within **and** between rows
- Emphasis on plant density and spacing in spring
- Density and spacing at harvest may be more revealing
- What is impact of lodging in 2012

What is the Potential for Canola?

- Potential likely is high if we could accurately control plant populations
- Better uniformity between rows is part of the puzzle
 - Need to devise better ways to evaluate this
- High quality seed, better depth control, better protection of seed are other factors
- Need to understand why plants are lost, and how crop adjusts

The Canola Dilemma

- If half the seeds we plant never survive to maturity, maybe we need to seed multiple seeds in a 'hill drop' configuration
- Can we breed for reduced plant mortality
- What is needed is 1 seed = 1 plant at harvest.

Potential for Other Crops?

- Large seeded pulses may be a good candidate
 - Large seed is easier to control rate, and even singulate
 - % emergence is usually high
 - Ideal plant densities are low
- Cereals likely to be less responsive
 - Higher desired plant populations mean almost full rows, so spacing is already more uniform
 - Might make 'controlled tillering' work

Summary

If we want to realize the full potential of precision management (eg. precision seeding) we need to know precisely how crops respond to management.

Acknowledgements



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Growing Forward 



SaskCanola
Saskatchewan Canola Development Commission