Field Trials of Coated Confection Sunflower Kernels for Precision Planting

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2018 NSA Research Forum, January 10-11, 2018

Outline:

- Introduction
- Progress: Nov. 2012-2016
- Progress: 2017
- Plans for 2018

XL Hybrid Confection Seed:

- **Poor plantability**
- **Low germination**

Proposed Solution:

- Maintain germination
- Consistent shape and size

Progress
Nov. 2012 – 2016

Hulling: Effect of Seed Orientation

	No Control	Transverse
# Passes	5	3
Kernel Release (%)	70	75
Intact Kernel (%)	75	85
Germination (%)	88	92

Hulling:

Modified Almond Huller (Kamper Fabrication, CA)

Capacity: 10 kg of intact kernels in 100 h

Coating Trials: 2015-16

COMPANIES

- Germains
- AgInnovation
- Seed Dynamics
- Summit Seed Coatings
- Universal Coating Systems

COATING MATERIALS

- Polymers (3 types)
- Cellulose
- Limestone
- GroCoat
- Pumice
- Gypsum
- Zeolite
- Polymers (3 types)

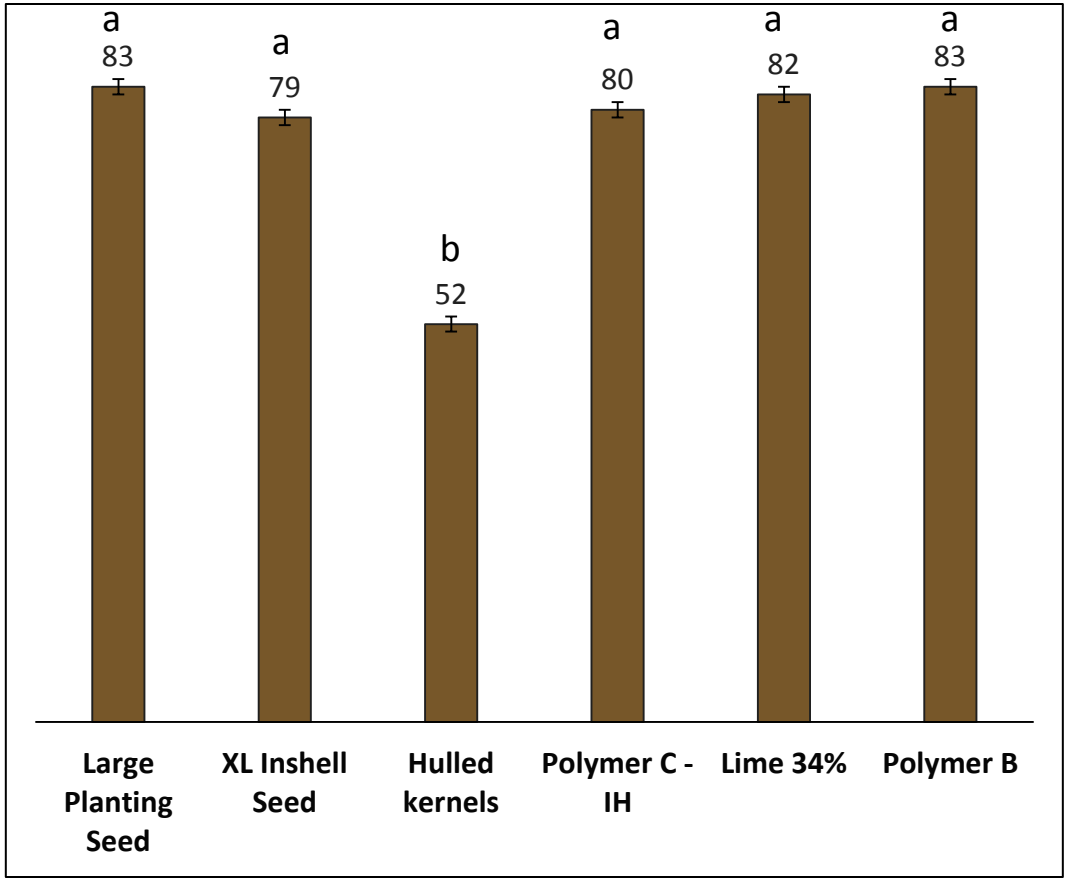
Coating Trial Results, 2016:

Coating Material Type	Germination %	Germination After Singulation %
XL Seeds	**85**	**85**
Large Planting Seeds	**90**	**88**
Hulled Kernels	**92**	**68**
Cellulose	**78**	**73**
Gypsum	**79**	**75**
Zeolite	**89**	**80**
Limestone	**86**	**79**
Pumice	**86**	**82**
Polymer A	**85**	**80**
Polymer B	**81**	**78**
Polymer C - IH	**90**	**84**

Coating Trial Results, 2016:

Coating Build-up	Germination %	Germination After Singulation %
XL Seeds	**85**	**85**
Large Planting Seeds	**90**	**88**
Hulled Kernels	**92**	**68**
8 %	**88**	**78**
34 %	**85**	**82**
50%	**82**	**78**

Live Seed Emergence: 2016



Objectives for 2017

- Improving the coated kernel viability and plantability by optimizing the build-up levels
  - 25%, 30 %, 35%, & 40%

- Field testing of coated kernels under different growing conditions
  - At 2 locations (Prosper, Minot)

Coating Trials: 2017

Commercial:

Companies	Materials	Build-up
Summit Seed Coatings Universal Coating Systems	Limestone Zeolite Polymer A	20% 25% 30% 35%

In-house:

Materials	Build-up
Polymer B	20%, 25%, 30 %, 35%

Machine Coat (USC tabletop treater)

Evaluation of Coated Kernels: 2017

Lab Tests:

- Germination
- Singulation
- Post-Singulation Germination

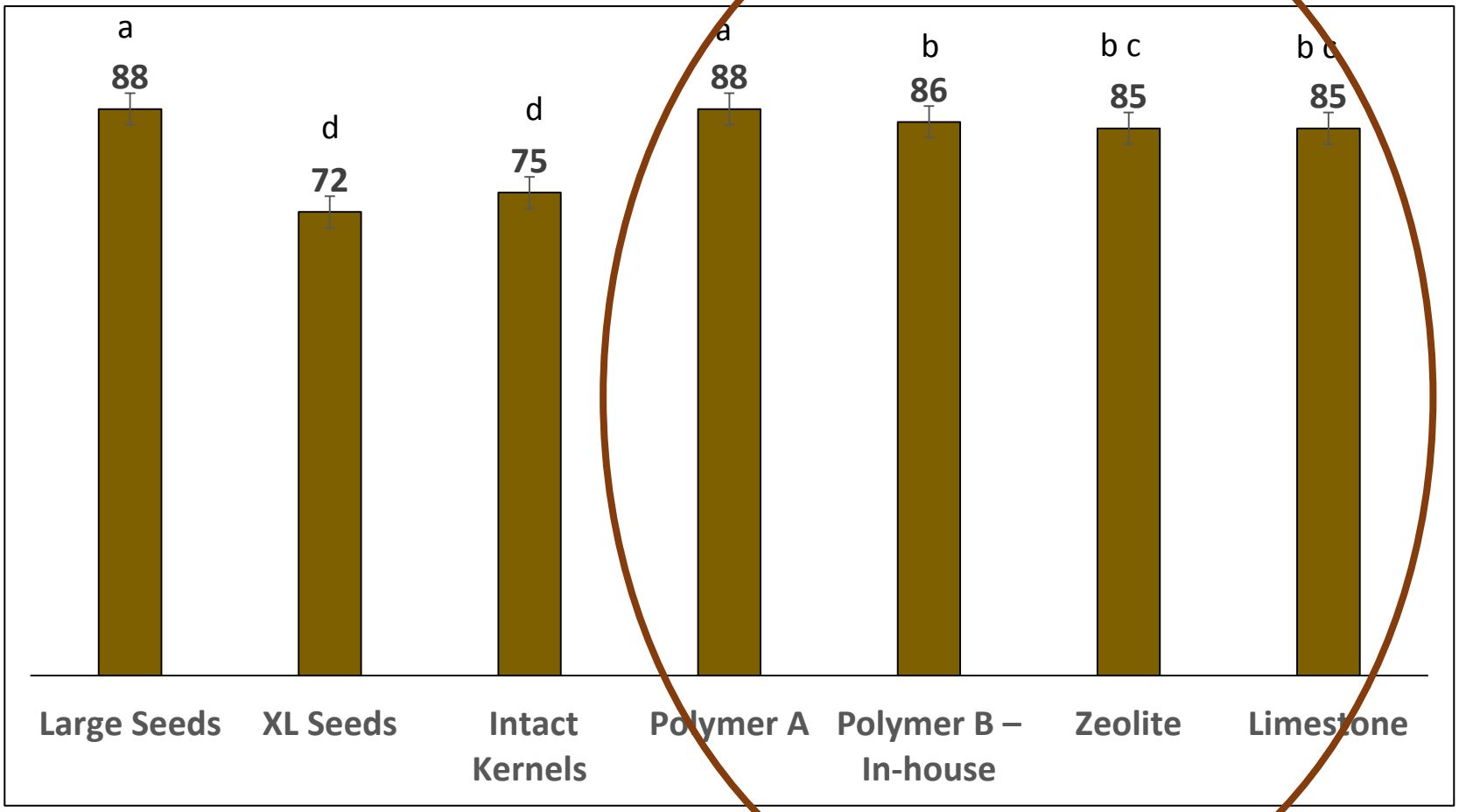
MeterMax Test Stand

Field Tests:

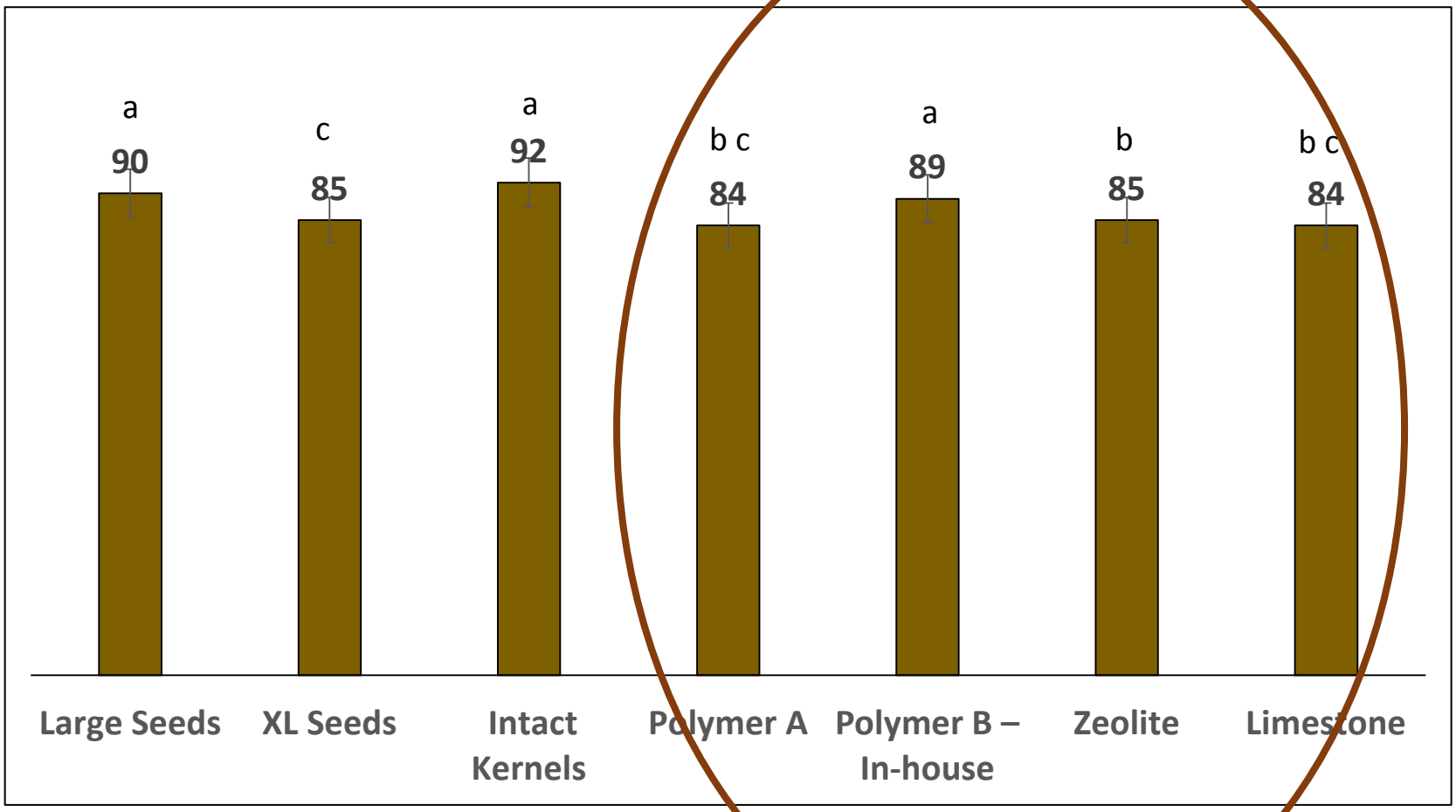
- Live Seed Emergence
- Branching
- Seed Yield

Lab Tests: Effect of Coating Materials

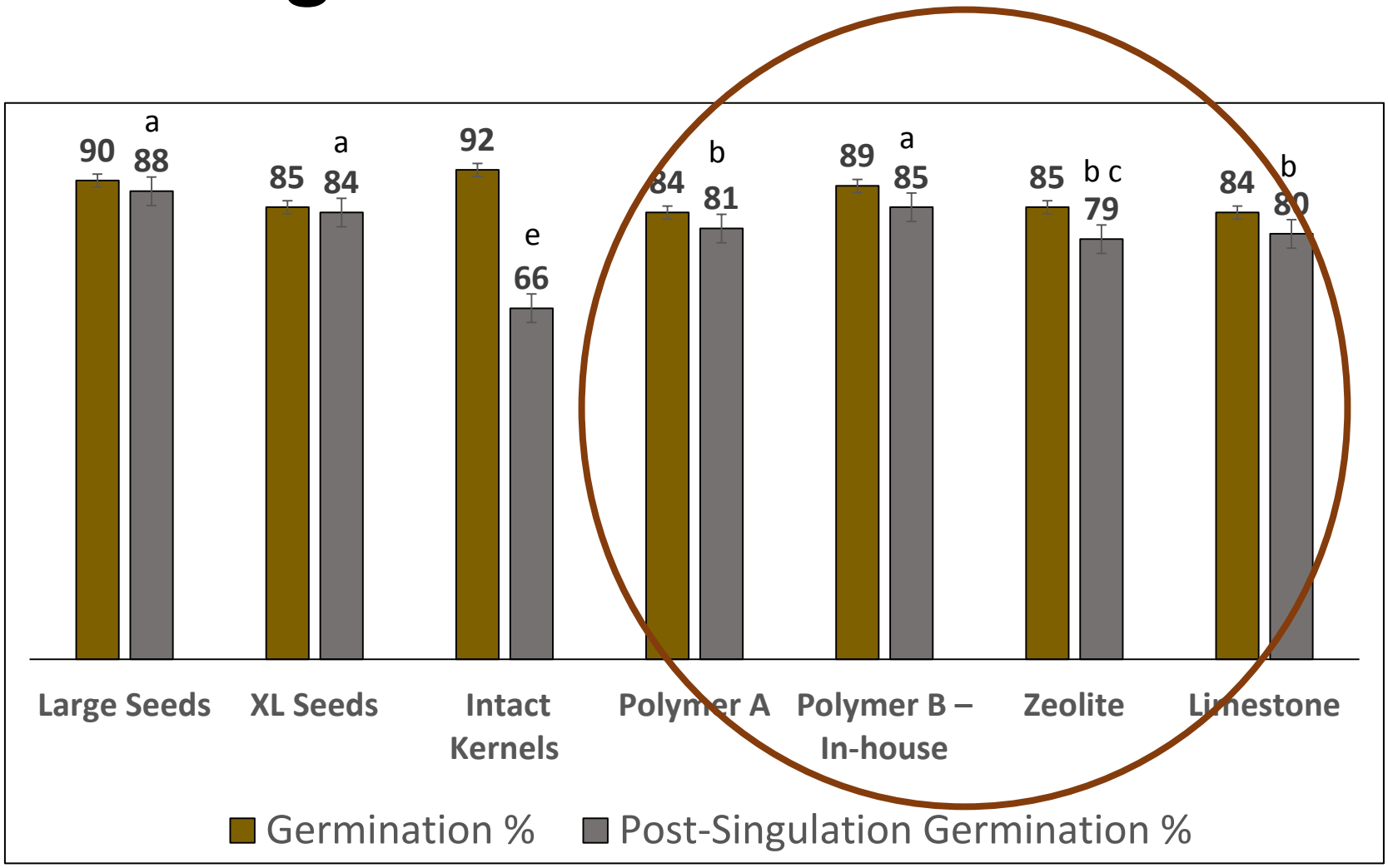
Singulation %



Germination %

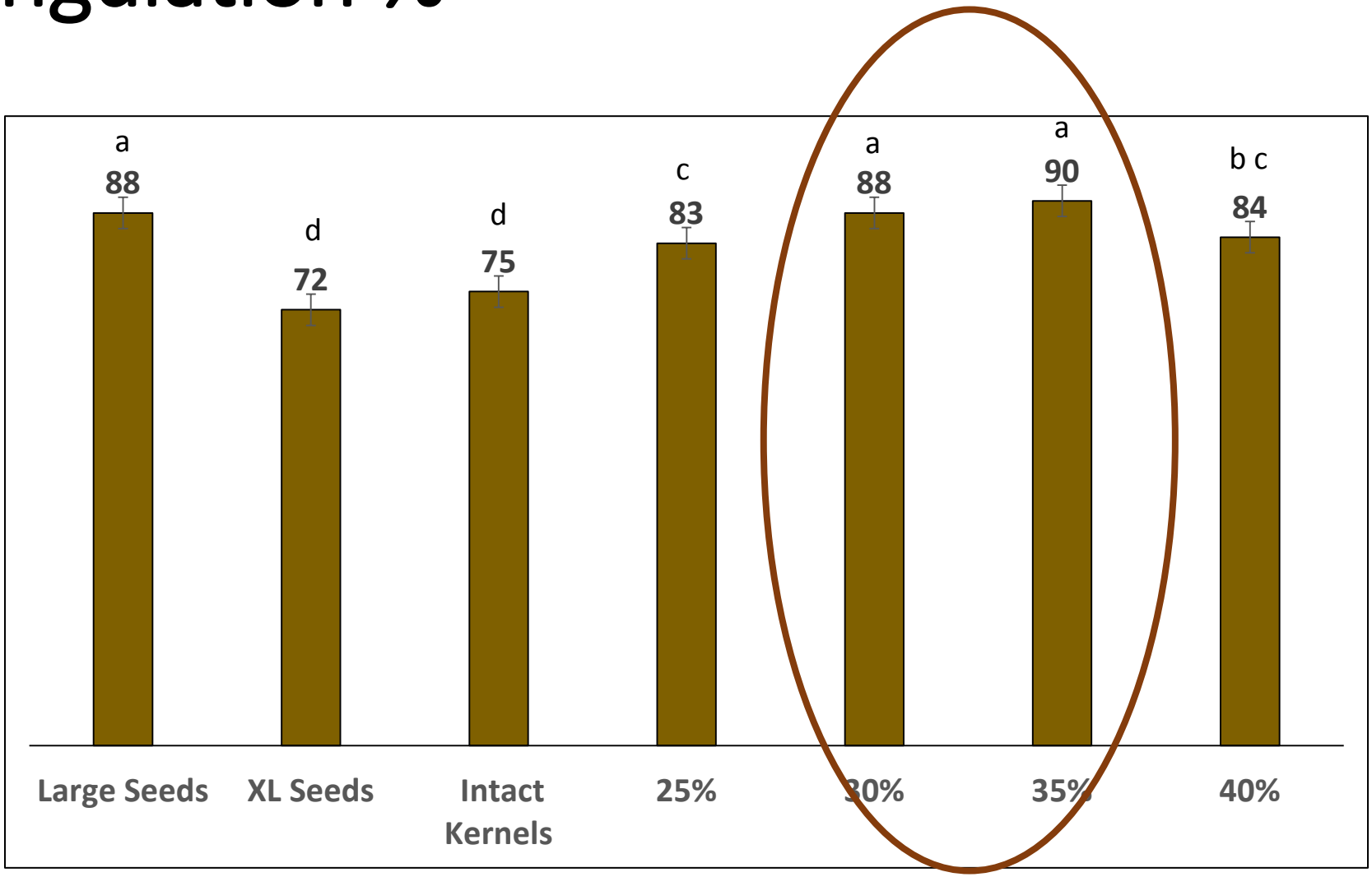


Post Singulation Germination %

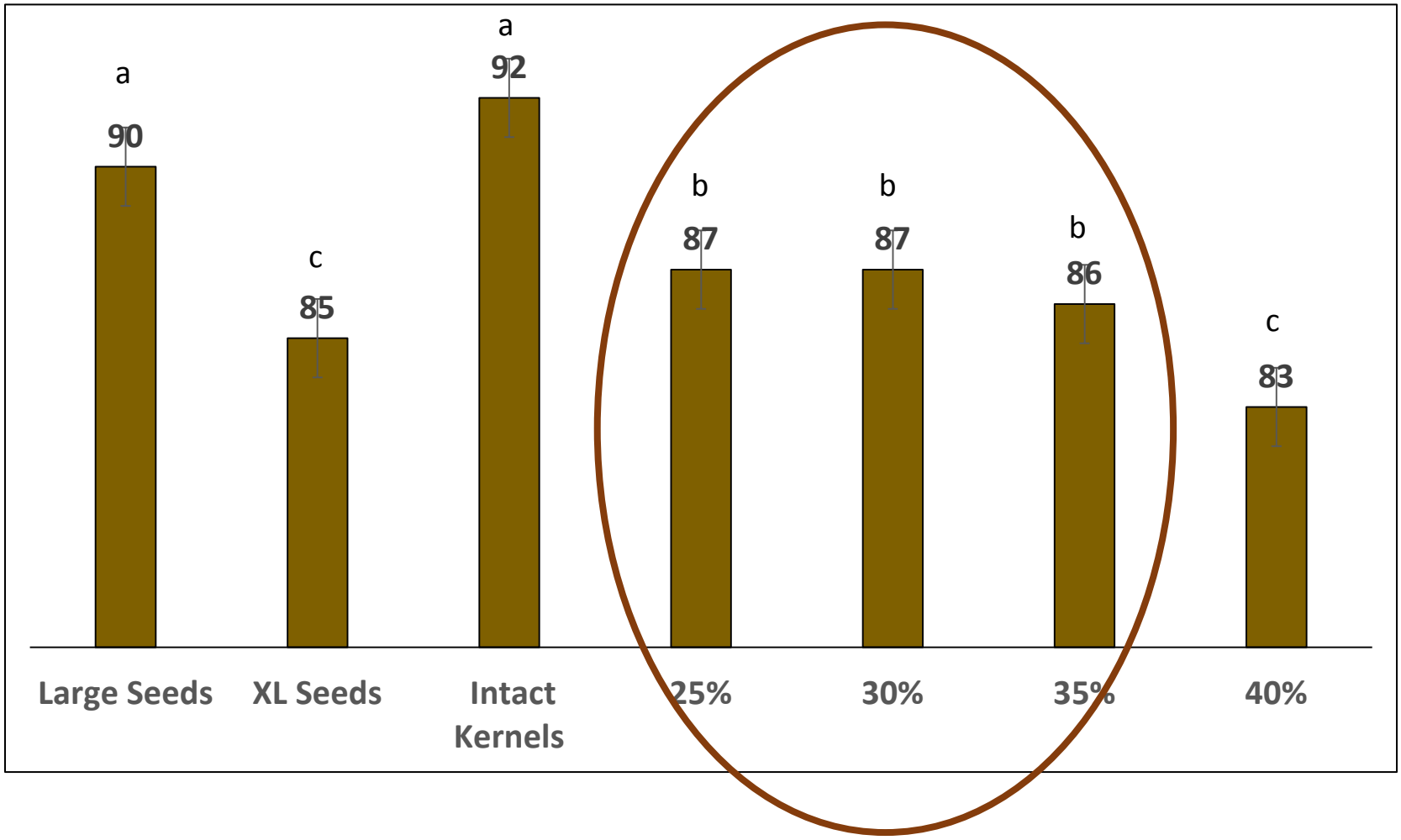


Lab Tests: Effect of Coating Build-up Levels

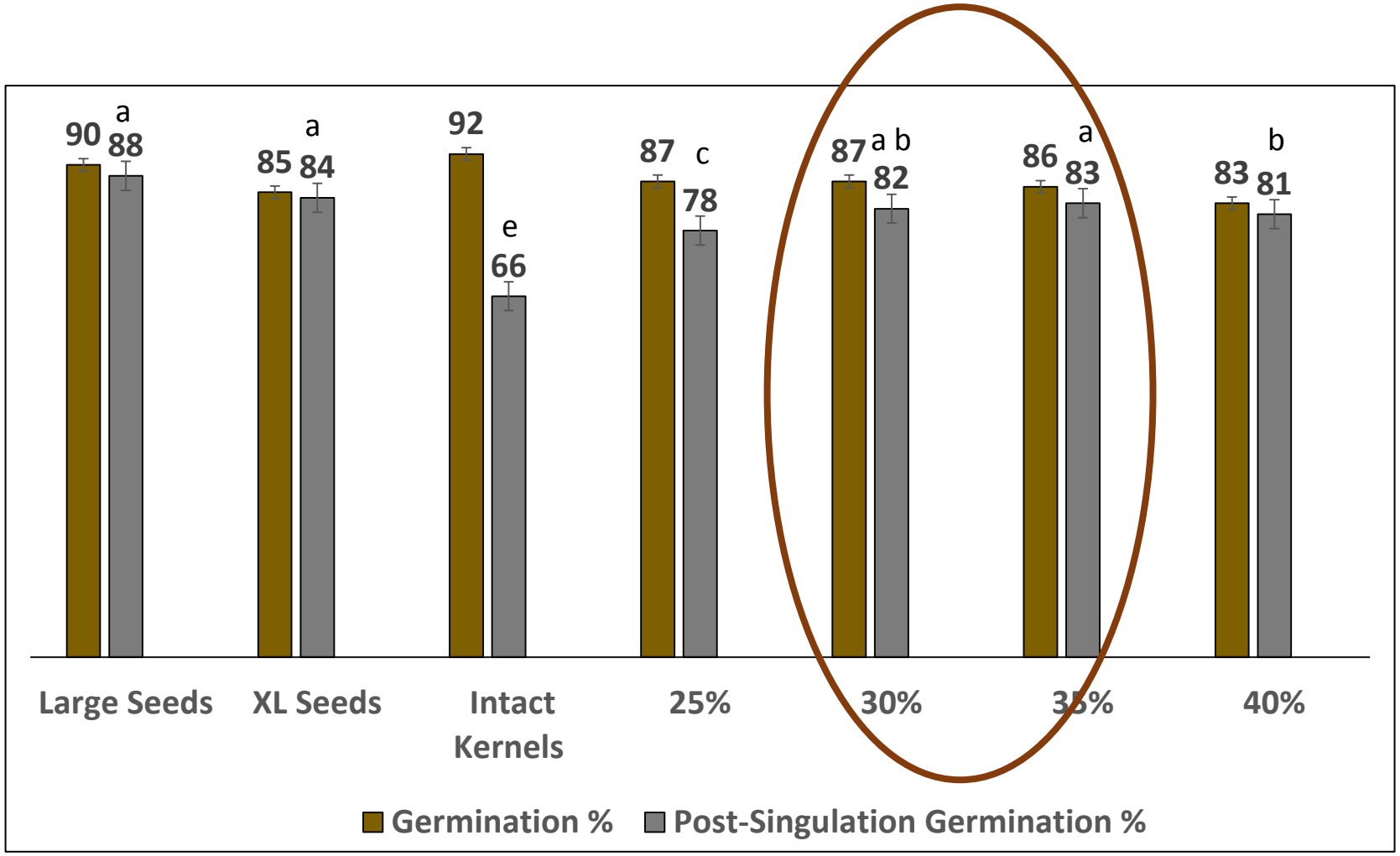
Singulation %



Germination %



Post Singulation Germination %



Field Trials - Prosper

Almaco SeedPro precision planter (Almaco, Ames, IA)

John Deere Seed Plate

Treatments:

Large Planting Seeds
XL Seeds
Zeolite – 30% and 35% build-up
Limestone – 30% and 35% build-up
Polymer A – 30% and 35% build-up
Polymer B-IH – 30% and 35% build-up

Field Trials - Minot

Treatments:

Large Planting Seeds
XL Seeds
Polymer A – 30% and 35% build-up
Limestone – 35% build-up

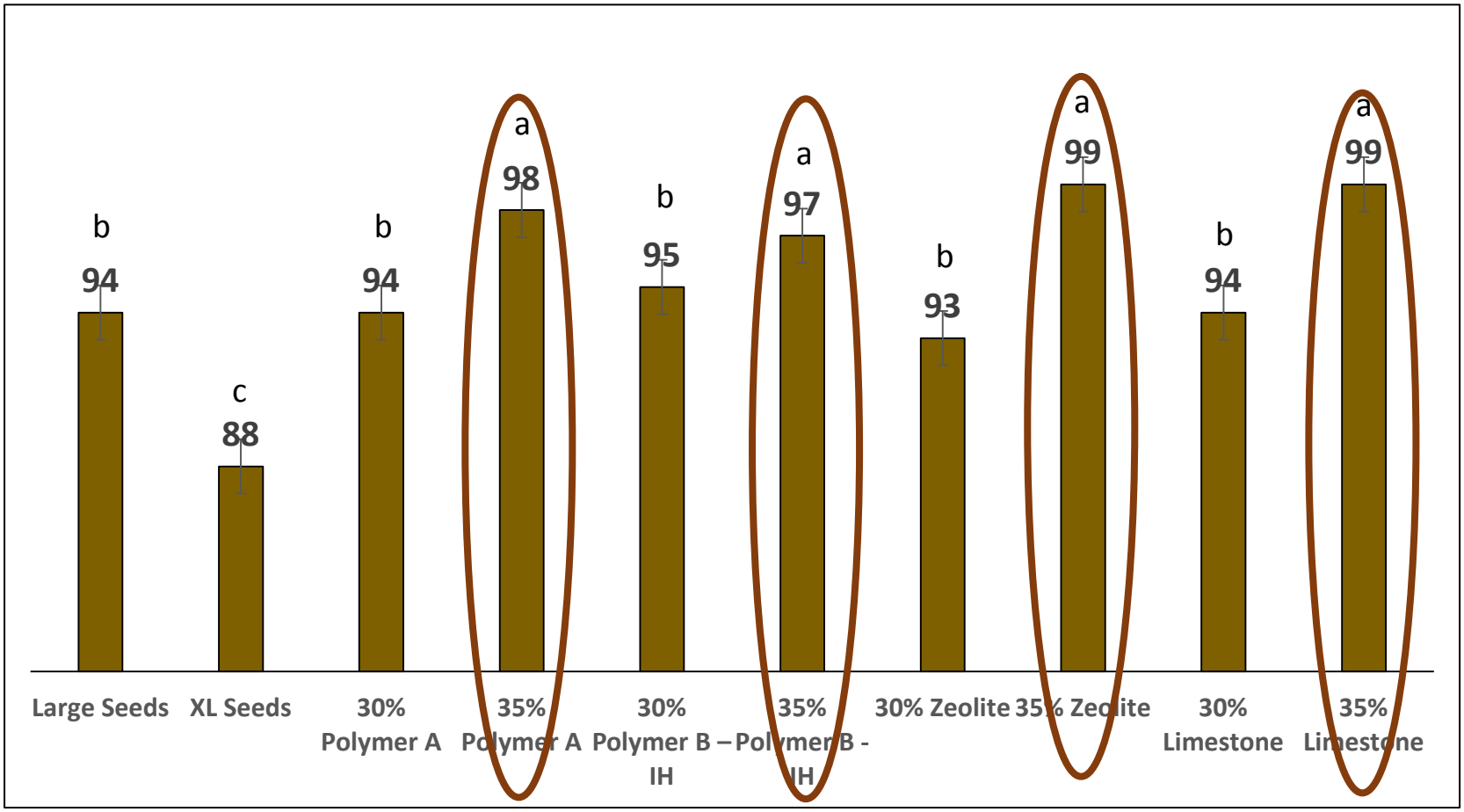
Custom built small plot row crop precision planter
(Seed Research Equipment Solutions, South Hutchinson, KS)

John Deere Seed Plate

Field Conditions

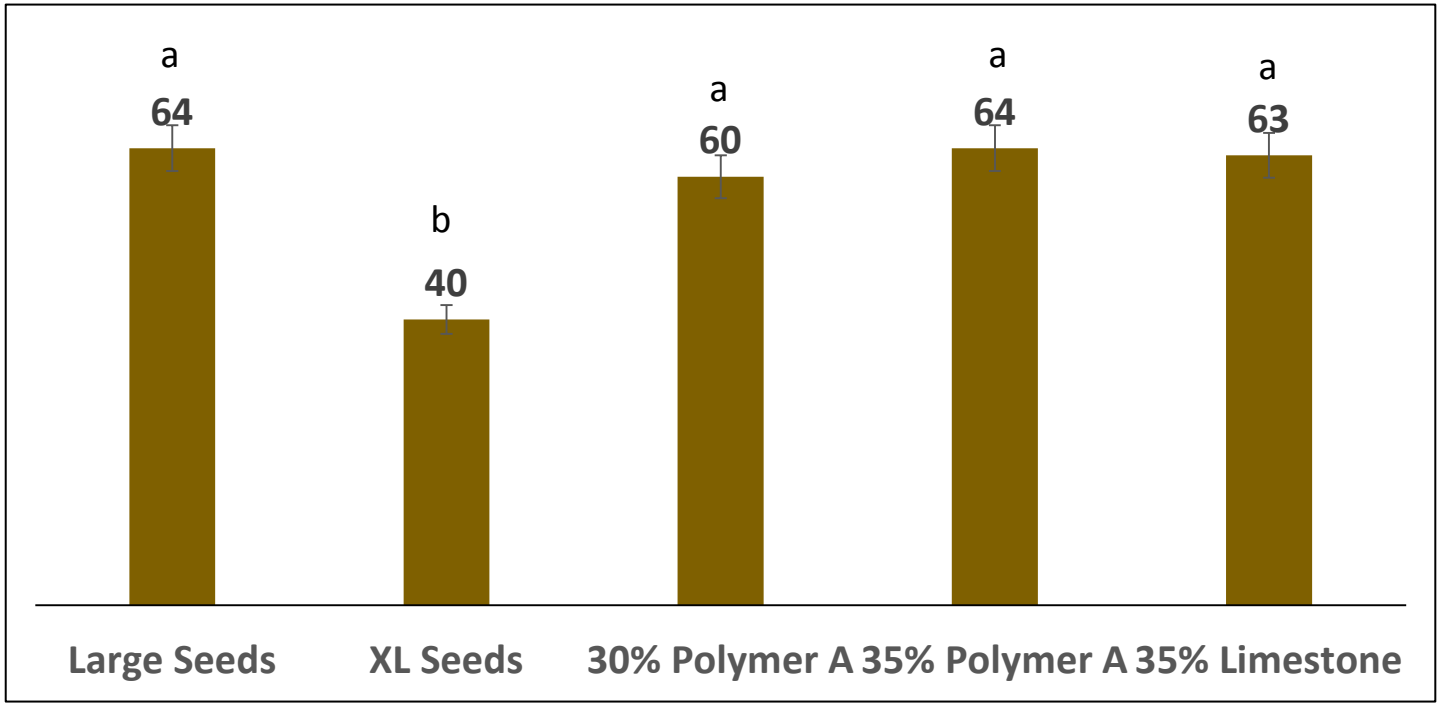
	Prosper, ND	**Minot, ND**
Initial Soil Moisture	11%	3.5%
Precipitation during the emergence period	81 mm	45 mm
Total Precipitation	350 mm	187 mm
Soil Type	Perella–Bearden silty clay loam	Williams loam

Live Seed Emergence % - Prosper



Live Seed Emergence better than XL seeds and comparable to large seeds

Live Seed Emergence % - Minot

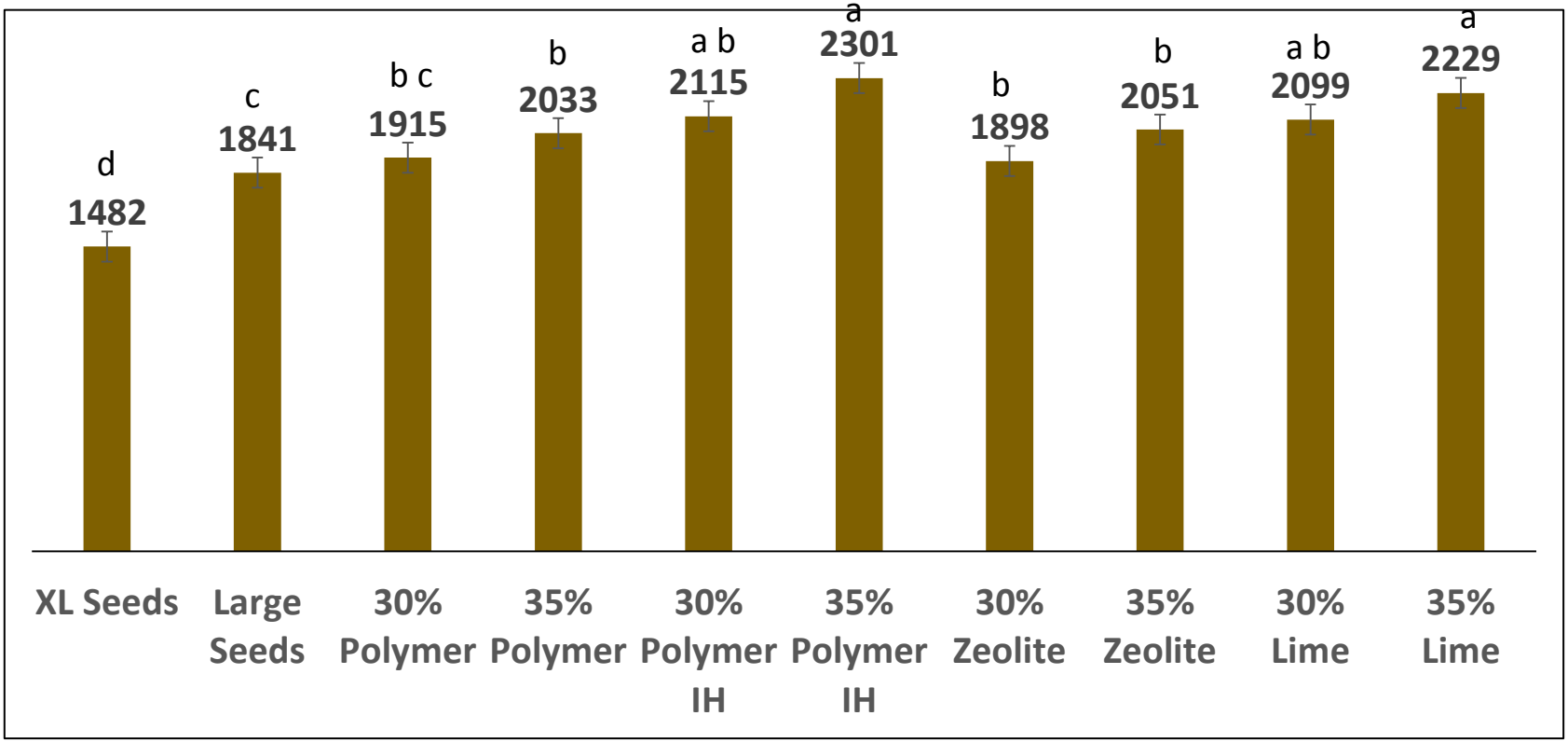


Live Seed Emergence better than XL seeds and comparable to large seeds

Branching: In-shell

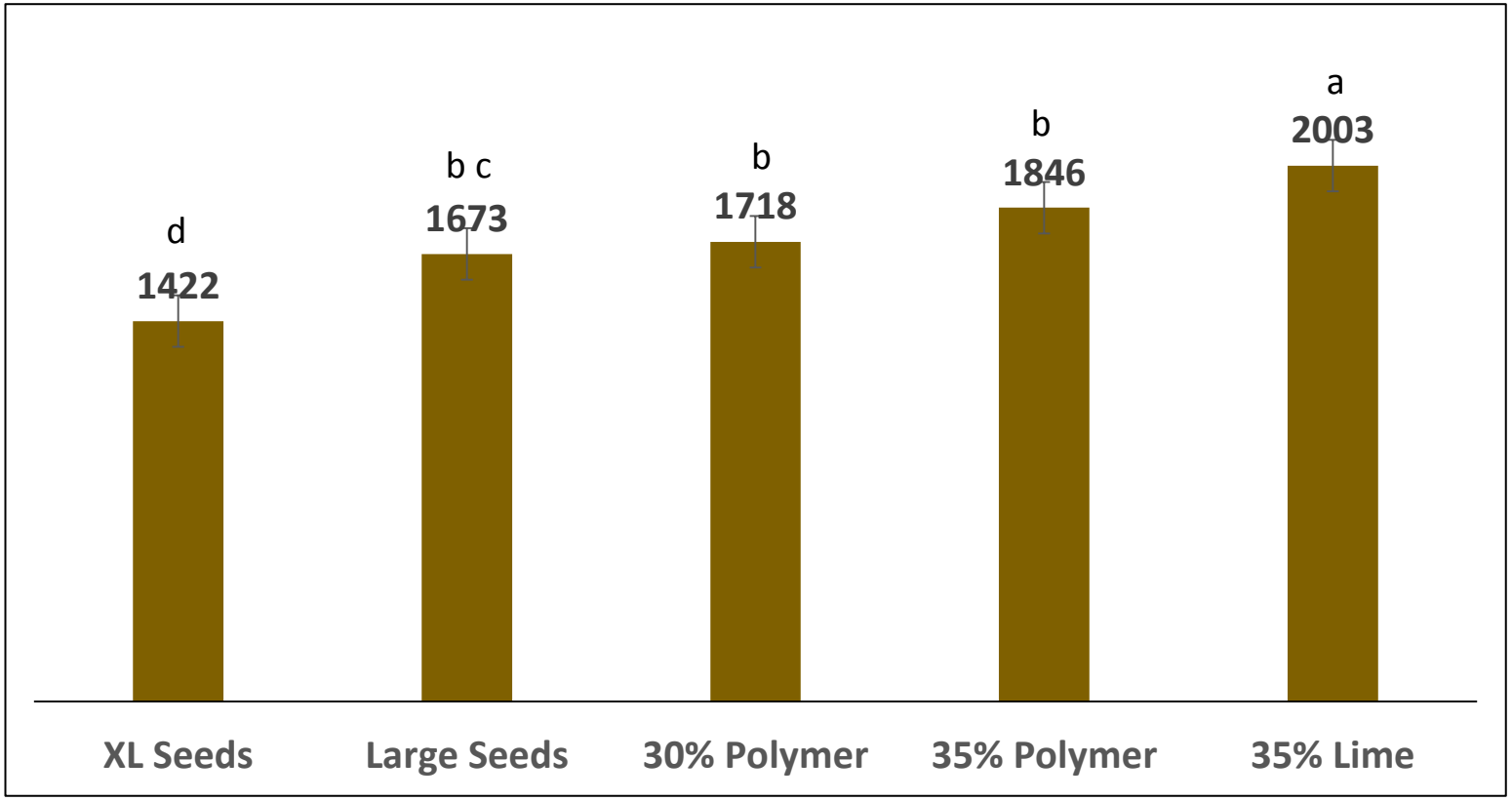
Treatments	Branching %
Large Seeds	14%
XL Seeds	21%
30% Polymer A	-
35% Polymer A	-
30% Polymer B	4%
35% Polymer B	-
30% Zeolite	-
35% Zeolite	-
30% Lime	-
35% Lime	-

Seed Yield (lb/ac) - Prosper



35% build-up levels had a higher yield than 30% build-up levels

Seed Yield (lb/ac) – Minot



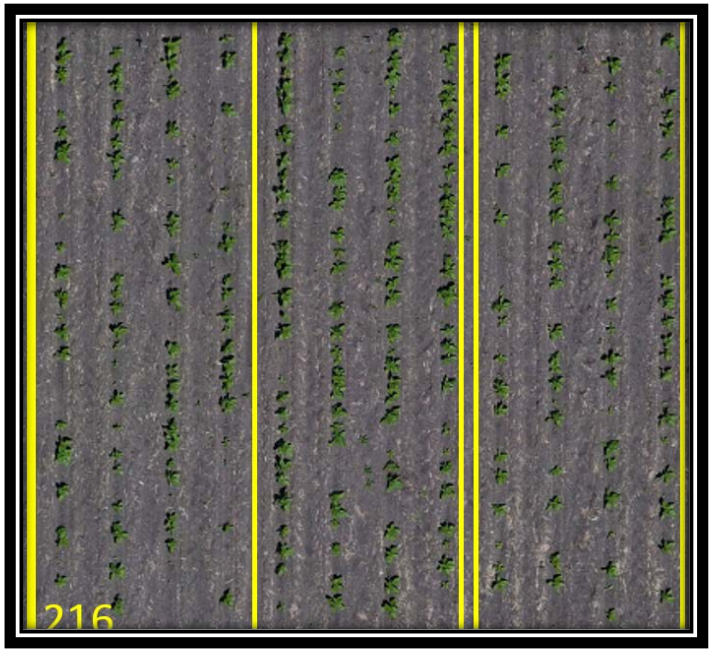
Similar trends as of Prosper

Conclusions

- Live seed emergence at Prosper was significantly higher for all the coated kernel treatments (93 – 99%) than the extra-large seeds (88%) and similar or better than the large seeds (94%)
- Seed yield of all the coated kernel treatments was 29% and 23% higher than the XL seeds and large seeds, respectively
- 35% Build-up levels resulted in both higher live seed emergence and yield
- No or very little branching in coated kernel treatments
- Similar trends under moisture stressed growing conditions at Minot

Goals for 2018

- Complete storability tests on coated kernels
- Use UAV imaging along with logged data from a precision planter
  - Seed emergence
  - Seed singulation
  - Early branching effects



Acknowledgments

- NSA Confections Group
- Bob Majkrzak, Todd Mondry & Dan Merritt - Red River Commodities
- Seed Coating and Polymer Companies – AgInnovation, Seed Technology Services, Summit Seed Coatings, Universal Coating Systems (UCS), Seed Dynamics, Germains, Bayer Crop Sciences
- Alan Gaul, Seed Conditioning Specialist, Iowa State University
- North Dakota Agricultural Experiment Station
- USDA National Institute of Food & Agriculture (NIFA)
- Joel Ransom, Darrin Eisinger, Brent Hulke, Darrin Haagenson, John Nowatzki, Jonathan Roe, Alexa Hoffarth, Abbi Klos, Ademola Ajayi-Banji, Andrew Whalen, William Boehner - NDSU