



Winter Malting Barley Research

Brook Wilke

W.K. Kellogg Biological Station

Michigan State University

wilkebro@msu.edu




Inspired Brewing®



Project **GREEN**



 American Malting Barley Association, Inc.



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Winter Barley

- I'm excited about winter barley in Michigan!





Winter Barley Observations

- Yield is ~twice that of spring barley in SW Michigan
- Grain protein is inherently lower than spring barley
 - Maybe we can use more nitrogen fertilizer to boost yields
- Winter hardiness is an ongoing question





Winter Barley Observations

- Harvest timing is one month earlier than spring barley, and 1-3 weeks earlier than winter wheat
- Weed pressure is lighter than spring barley
- Diseases such as powdery mildew and fusarium head blight seem to need hot and wet conditions to thrive. Winter barley grows and matures much earlier than spring barley, potentially avoiding the hot and dry weather





Key Research Questions

- What varieties perform best?
- Does winter barley consistently over-winter in Michigan?
- Can we meet quality standards with winter barley?
 - How do we achieve those goals?
- How much nitrogen should we use?
 - Does this change with variety?
- Does a fungicide application improve yield, or is it just a vomitoxin insurance policy?
- Can we double crop after barley?



Other Research Questions

- How does planting date / rate influence yield or quality?
- How much does yield and quality vary across a field?
- Does sulfur influence yield or quality?
- Does split N application influence yield or quality?
- Can we improve yields with foliar fertilizers without increasing grain protein?



MSU Winter Barley Research Results

- Winter Barley Variety Trials
 - https://www.canr.msu.edu/malting_barley/uploads/files/MSU%20WMBT%20KBS%202017.pdf





MSU Winter Barley Research Results

WINTER MALTING BARLEY TRIAL – 2018 RESULTS

The Winter Malting Barley Trial (WMBT), through the University of Minnesota, was planted in Hickory Corners and Kawkawlin, MI in the fall of 2017. The plots included 27 varieties with three replications in a lattice design.

Hickory Corners, MI

Variety	Yield (bu/ac)	Test Weight (lbs/bu)	% Plump	Height (Inches)	Lodging # of plots
05ARS561-208	80.6	44.4	87.8	33.3	1
06ARS617-25	88.4	46.0	92.1	34	0
07ARS515-7	52.6	45.8	79.0	38.3	2
07ARS518-13	84.2	47.0	94.5	39.7	1
2WI15-8674	49.2	40.9	90.6	36	2
2WI15-8688	89.0	46.2	95.5	36	0
2WI15-8775	82.4	45.2	87.3	39.3	2
AC09/327/3 ^a	106.3	48.3	98.5	36	0
AC11/341/28	105.0	47.3	96.1	36.3	2
AC11/367/2	107.0	45.0	96.3	35.3	0
CHARLES	67.9	43.2	96.6	33	1
DH120304	103.5	48.6	99.0	36.3	0
DH130910	97.2	49.6	99.1	37	0

HICKORY CORNERS TRIAL DETAILS

Planting date: 9/26/17 @ 120 lbs/A

Fertility: 9/26/17 – 20 lbs N/acre, 65 lbs K/acre

4/5/18 – 12 S/acre, 102.5 lbs N/acre (50 lbs AMS + 200 lbs urea/acre)

Fungicide: 5/29/18 – 8 oz/acre Prosaro®

Harvest: 7/2/18

Growing season conditions: September was warm and very dry, but a switch to wet and cool conditions occurred mid-October, and cool



MSU Winter Barley Research Results

WINTER MALTING BARLEY TRIAL – 2018 QUALITY

The Winter Malting Barley Trial (WMBT), through the University of Minnesota, was planted in Hickory Corners and Kawkawlin, MI in the fall of 2017. The plots included 27 varieties with three replications in a lattice design.

Hickory Corners, MI

Variety	GC	4 ml GE	8 ml GE	WS	CP	DON	RVA
CHARLES	100	92	54	38	11	0.7	39
ENDEAVOR	99	90	33	57	10.6	0.9	45
Flavia	98	99	44	55	10	0.9	112
Hirondella*	99	99	81	18	11.7	1.3	133
MCGREGOR*	99	94	70	24	11	5.7	88
SU_Mateo	99	100	90	10	9.9	< 0.3	110
THOROUGHbred*	99	96	74	22	10.9	2.7	145
WINTMALT	98	97	56	41	10.8	0.4	140

GRAIN QUALITY

Grain quality is the most important characteristic for malting barley.

If the barley doesn't meet quality specifications, it may be rejected by the malthouse. Conversely, premiums may be offered for barley that meets or exceeds quality standards.

Ideal values for the quality data shown on this page

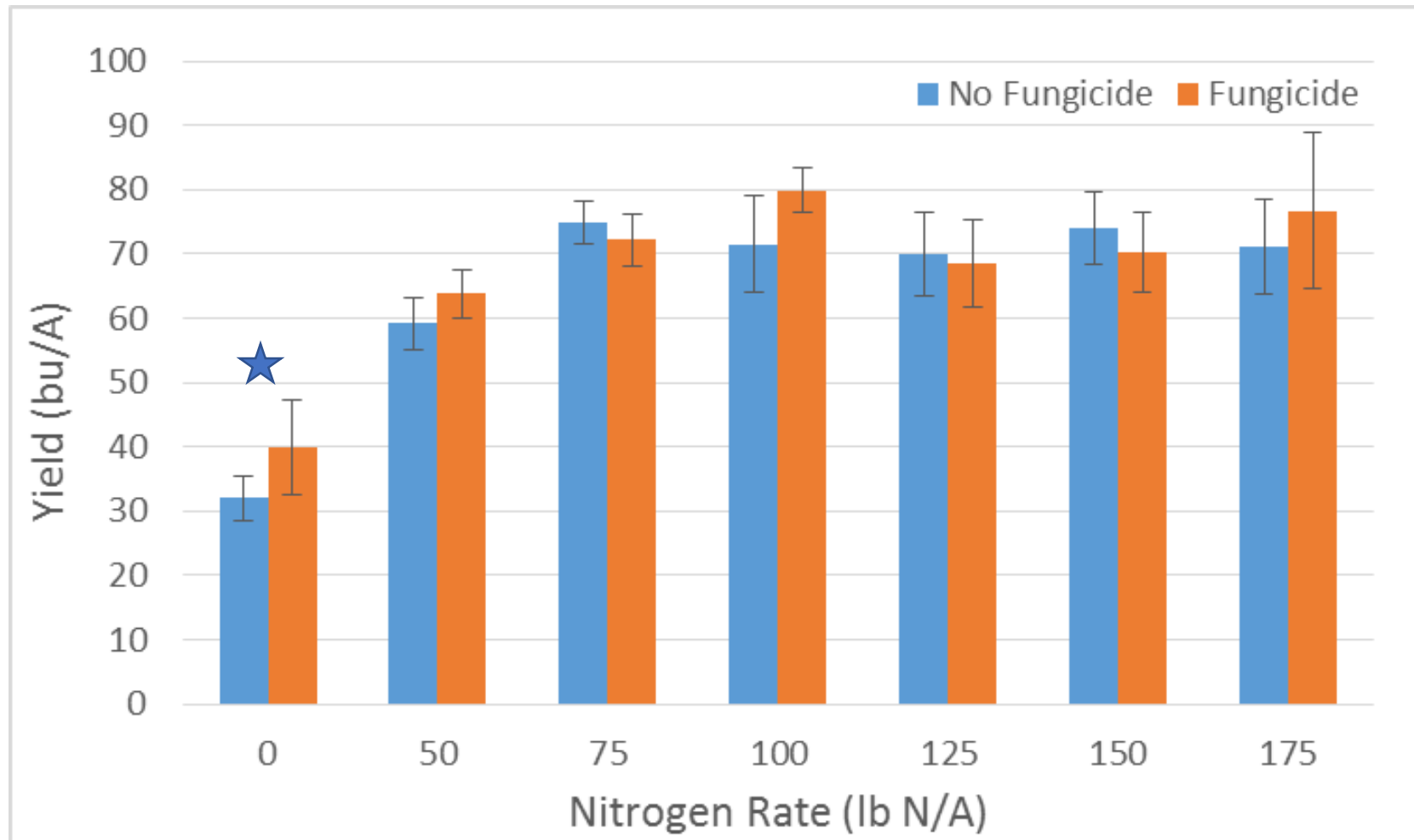


Winter Barley Agronomy



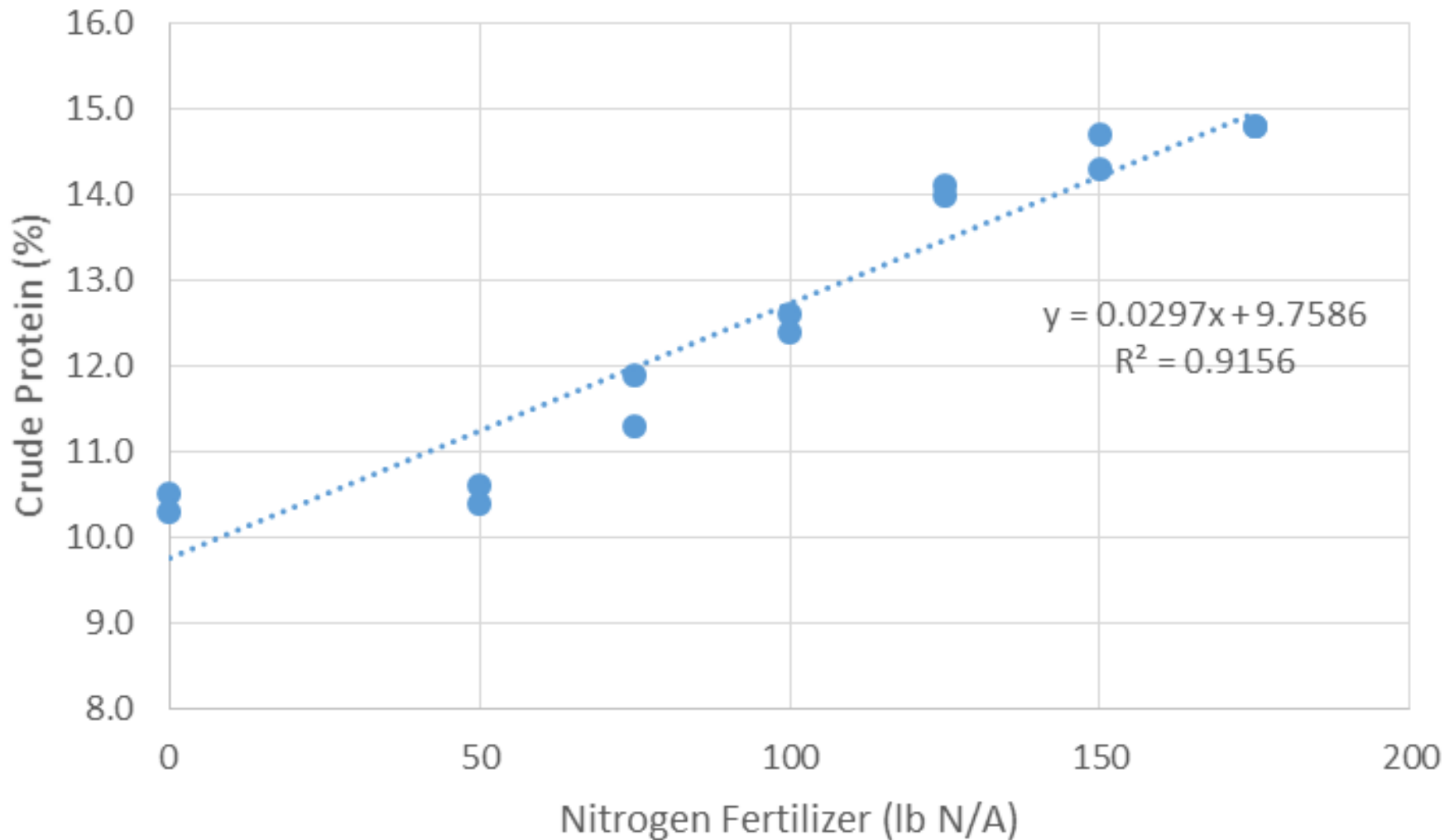


2018 Nitrogen Rate Trial (Puffin)





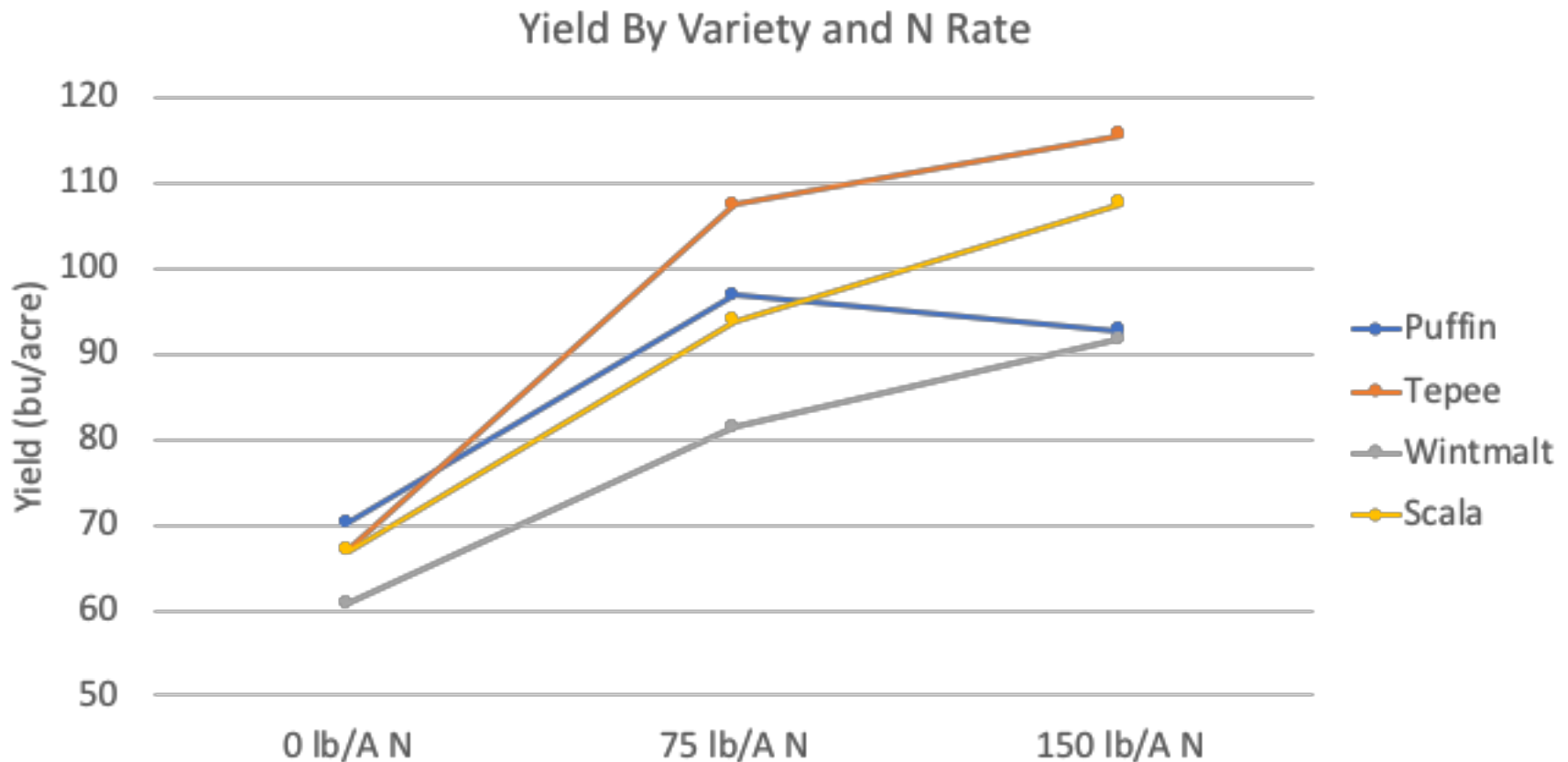
Nitrogen Fertilizer





Variety Differences

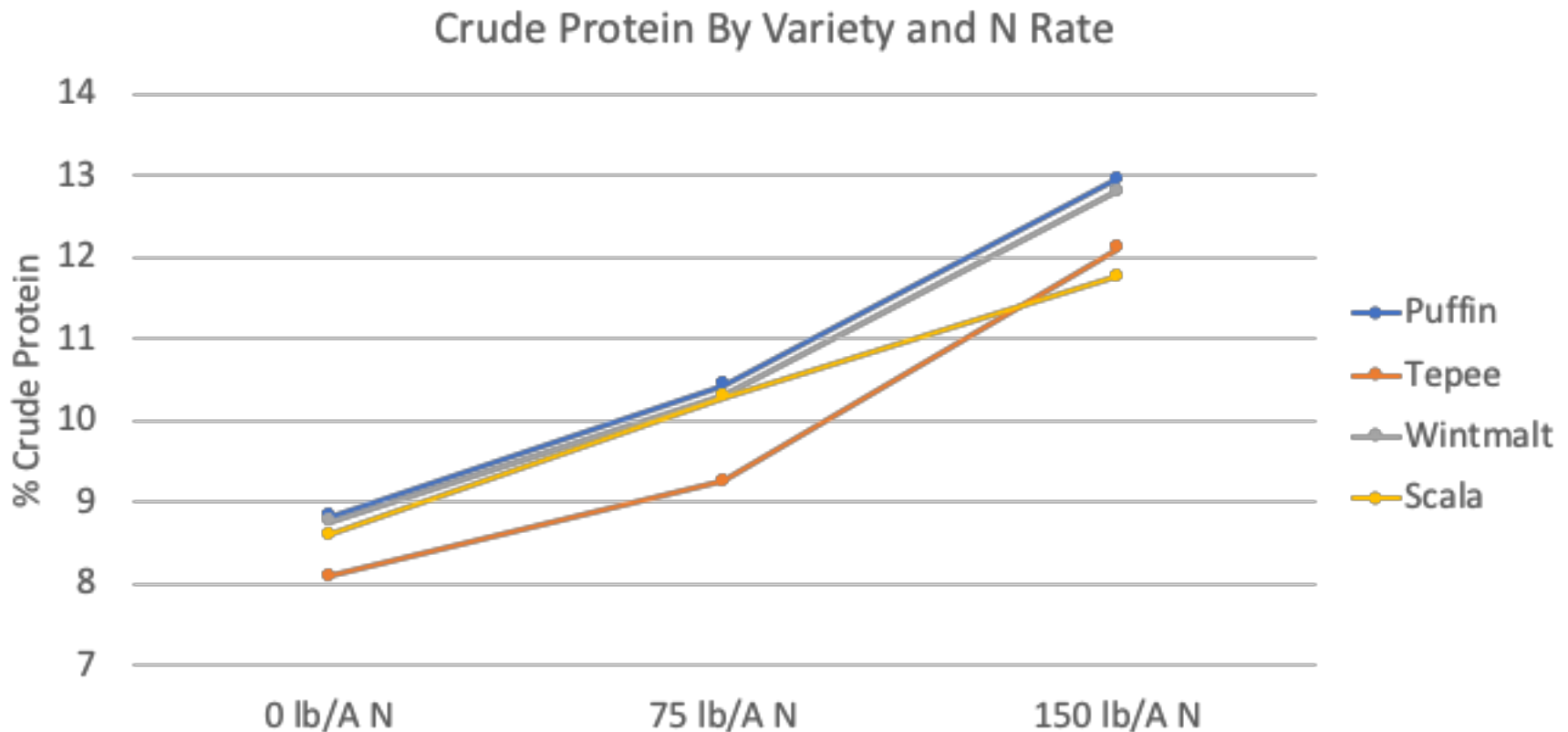
- Not all varieties responded the same!





Variety Differences

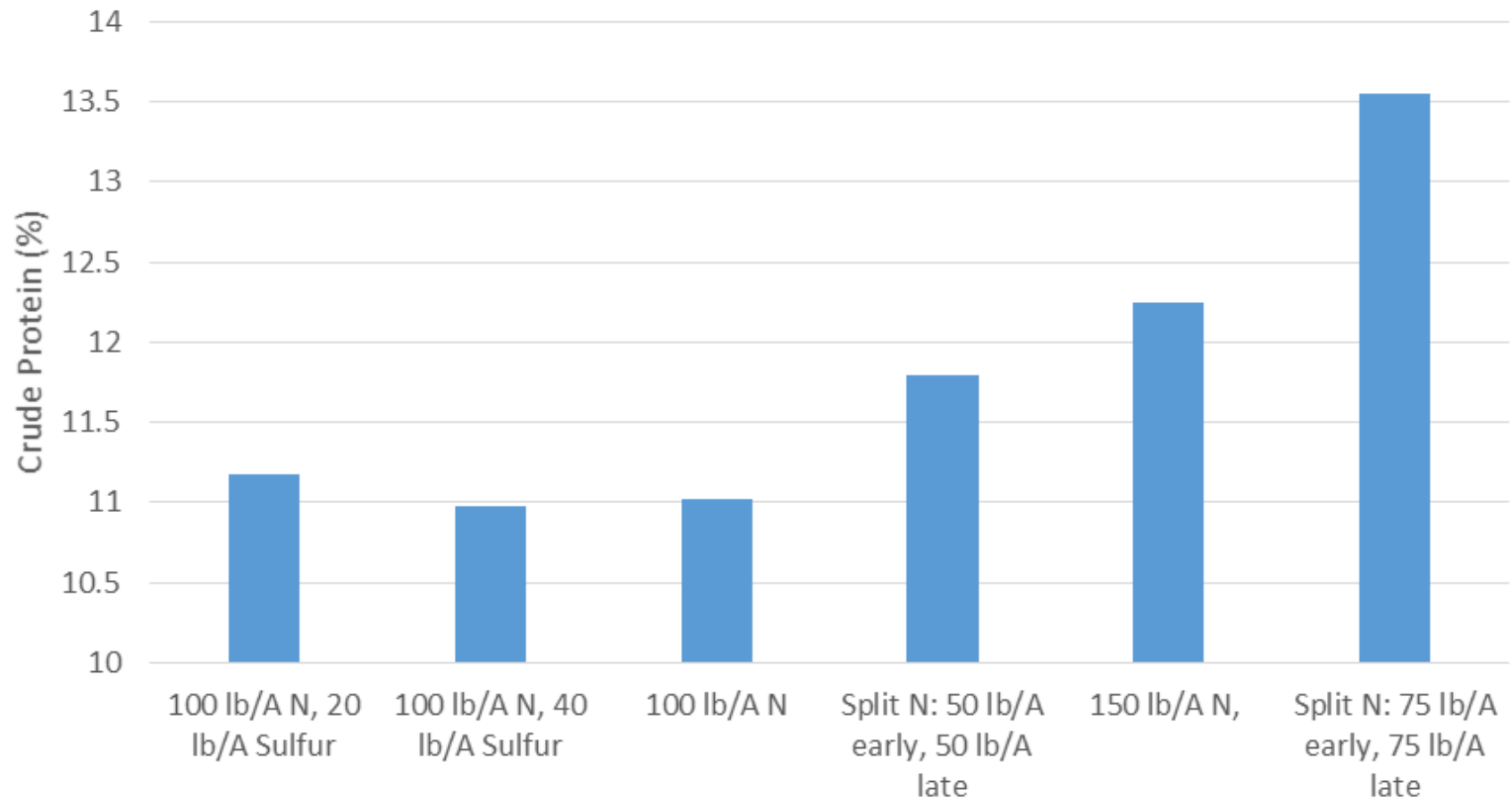
- Not all varieties responded the same!





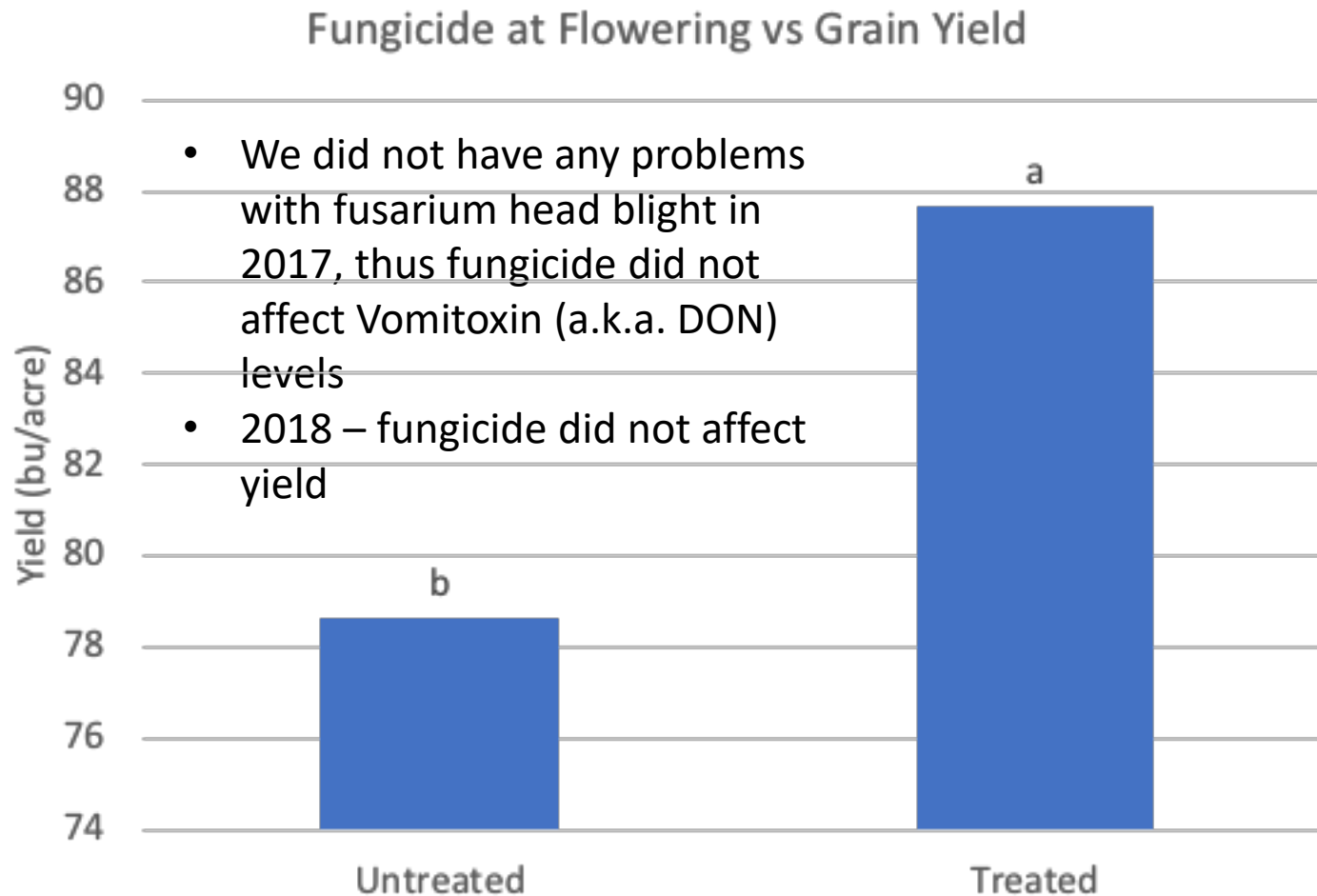
Nitrogen and Sulfur Fertilizer

Fertilizer vs. Crude Protein





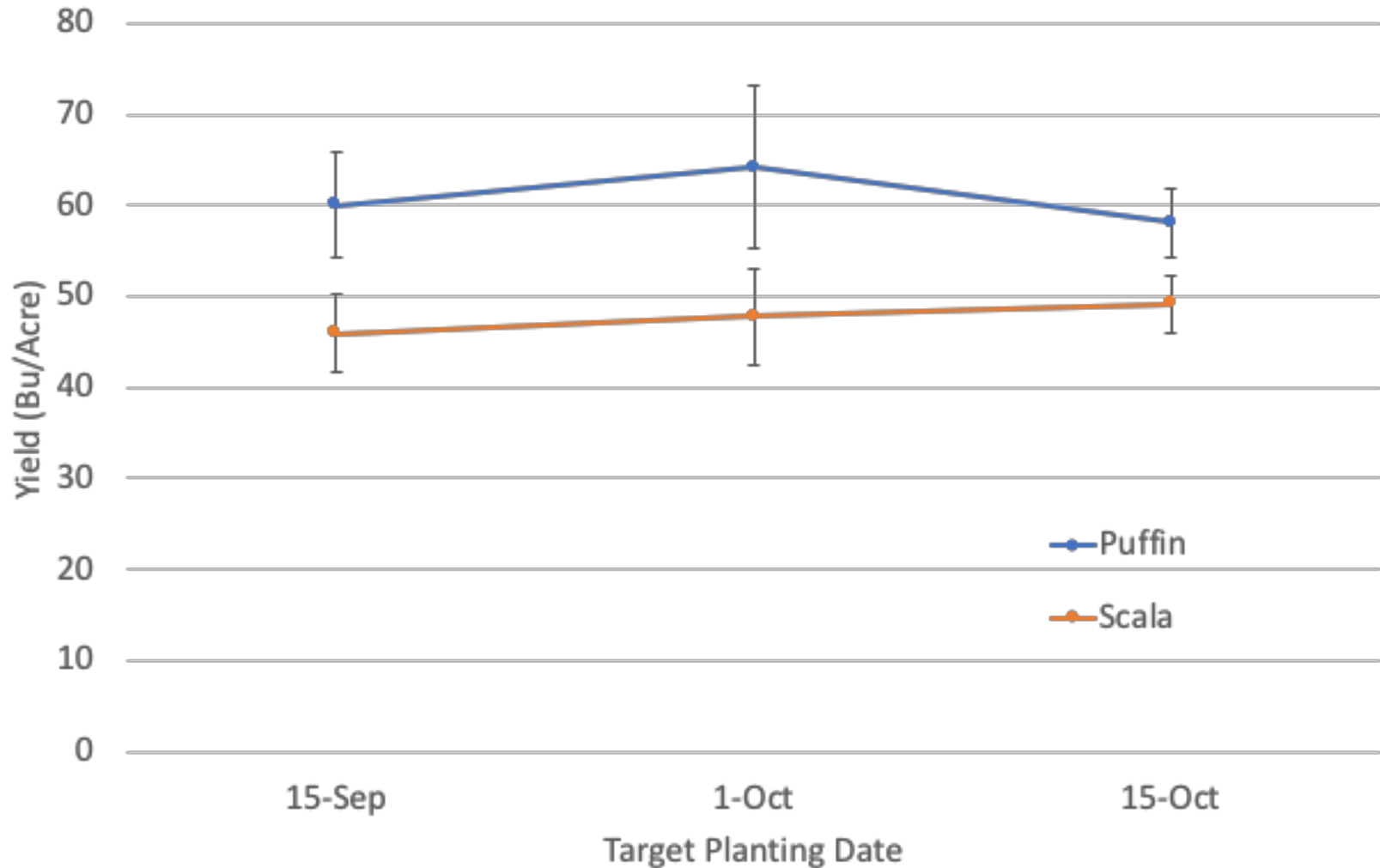
Fungicide at Flowering



Variety	Nitrogen Rate (lbs/A)	Fungicide	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (*ASBC)	Alpha amylase (20°DU)	Beta-glucan (ppm)	FAN (ppm)
Puffin	0	Yes	37.7	95.1	36	81.4	1.9	1	9.0	4.23	52.2	86	50.2	51	150
Puffin	0	No	37.5	95.2	28	81.3	1.8	1	8.9	4.28	50.4	82	49.7	45	146
Scala	0	Yes	44.4	98.2	41	82.3	n.d.	3	8.9	4.16	47.0	106	51.9	30	135
Scala	0	No	44.1	98.5	29	81.7	n.d.	3	9.2	4.11	48.5	106	51.9	17	132
Teepee	0	Yes	39.6	97.4	35	81.9	2.2	1	8.7	4.22	52.1	104	48.8	22	162
Teepee	0	No	40.3	97.1	25	81.5	2.2	1	8.3	4.18	51.5	100	46.7	20	145
Wintmalt	0	Yes	38.8	98.3	45	79.9	n.d.	3	9.1	4.03	46.0	82	49.2	23	129
Wintmalt	0	No	39.5	98.5	34	79.6	3.1	2	9.5	4.02	46.0	84	51.1	13	132
Puffin	75	Yes	36.0	93.4	29	80.0	1.8	1	10.1	4.45	45.7	91	45.6	201	151
Puffin	75	No	35.2	92.6	21	79.4	1.6	1	10.5	4.41	45.0	89	48.2	131	154
Scala	75	Yes	43.0	98.1	27	81.2	n.d.	3	10.4	4.29	44.1	111	52.3	52	139
Scala	75	No	42.5	97.9	21	80.7	n.d.	3	10.7	4.22	42.0	110	52.7	32	138
Teepee	75	Yes	40.0	94.6	20	81.6	2.1	1	10.0	4.47	48.2	118	50.2	23	163
Teepee	75	No	39.3	94.4	14	81.1	1.9	1	9.6	4.44	47.3	113	50.3	24	163
Wintmalt	75	Yes	38.2	95.7	27	79.0	3.3	2	10.8	4.28	42.6	91	51.2	34	138
Wintmalt	75	No	39.1	95.0	31	78.4	n.d.	3	11.1	4.12	38.9	93	58.7	44	141
Puffin	150	Yes	36.5	90.4	20	78.1	1.8	1	13.2	4.82	37.9	92	42.3	319	166
Puffin	150	No	35.6	92.3	13	77.7	1.8	1	13.5	4.79	36.8	95	45.9	229	163
Scala	150	Yes	41.7	96.3	21	79.2	1.9	1	13.0	4.70	36.5	122	58.5	133	162
Scala	150	No	40.8	96.2	14	79.2	1.8	1	12.5	4.64	38.0	120	59.6	70	161
Teepee	150	Yes	36.7	89.7	16	79.5	2.0	1	12.1	4.85	41.7	122	50.5	72	187
Teepee	150	No	38.2	92.8	9	79.9	1.8	1	11.9	4.88	41.3	124	54.6	28	186
Wintmalt	150	Yes	37.1	92.0	31	76.8	n.d.	3	13.6	4.41	32.7	101	60.4	126	161
Wintmalt	150	No	36.0	91.4	28	75.8	2.4	2	13.2	4.66	34.9	98	65.5	105	183
CONRAD MALT CHECK			40.7	97.4	55	81.6	2.6	1	12.3	5.04	42.1	126	92.0	151	216
CONRAD MALT CHECK			40.2	97.0	56	81.6	2.6	1	12.7	5.27	43.2	121	89.8	198	224
CONRAD MALT CHECK			40.9	97.4	55	81.8	2.5	1	12.8	5.49	44.8	117	92.1	229	223



2018 Planting Date Trial





Double Cropping

- SARE Partnership and AMBA Grants to evaluate double cropping opportunities with winter barley
- Winter barley harvested late June
 - Can we reliably double crop beans after winter barley?
 - What are the best management practices to ensure success of both crops?





Double Crop Soybeans Pilot 2017





Double Crop Soybeans Pilot 2017

- Estimated yield = 10-15 bu/acre
 - Extremely dry summer
 - 2.4 maturity group soybeans matured prior to frost
 - Very small beans and many aborted beans



Double Crop Soybeans 2018

- No-till planted July 2, 2018, 4 replications
- 3 Maturity Groups (1.9, 2.4, 2.8)
- 2 Planting Rates (140K, 200K)
- Irrigation vs. Dryland
- Forage Crop and Cover Crop Plots Included



Double Crop Soybeans 2018





Double Crop Soybeans 2018





Double Crop Soybeans 2018



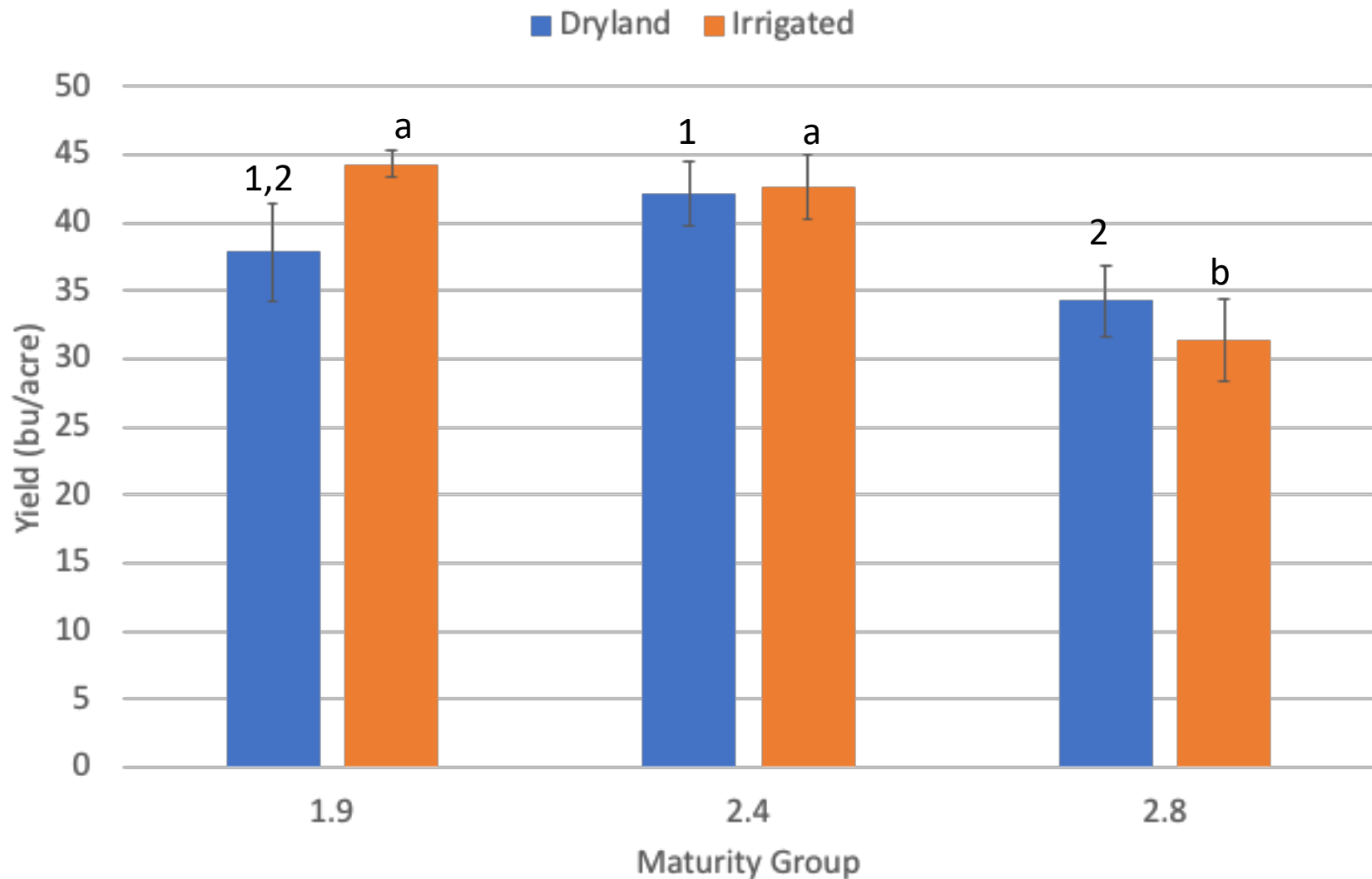


Double Crop Soybeans 2018





Double Crop Soybeans 2018





Double Crop Soybeans

- Plentiful rainfall late summer 2018
 - ~4 inches of irrigation water added
- Planting rate (140K vs. 200K) did not influence yield
- 2.8 Maturity Group did not mature before frost resulting in many immature beans in harvest
- 3-4 days difference in R1 stage between maturity groups
- Soybean quality data TBD



On Farm Double Crop Soybeans

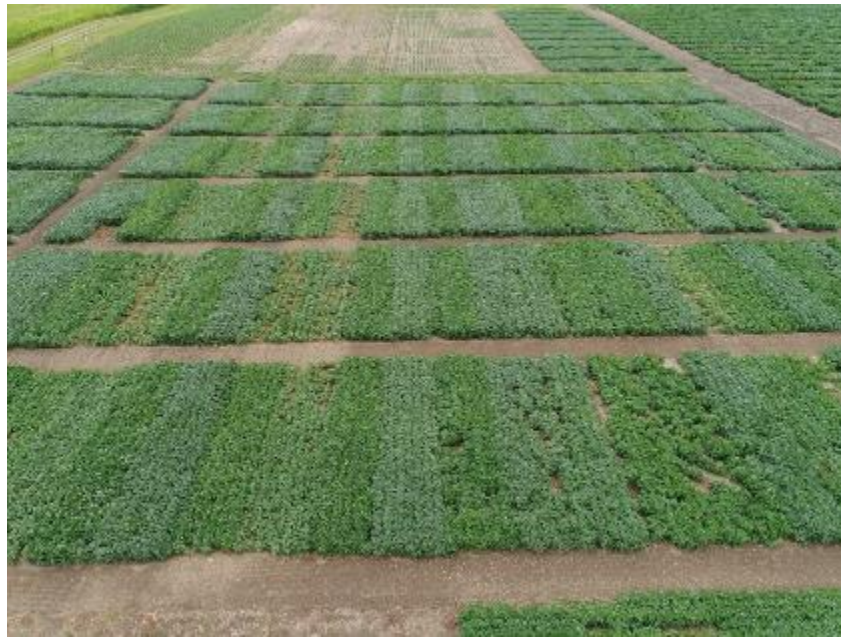




On Farm Double Crop Soybeans 2018

- One farmer didn't find time to double crop after barley because he was too busy
- One farmer in Kawkawlin, MI harvested 26 bu/acre from 10 acres after barley (planted 7/5/18)
- One farmer tried relay intercropping soybeans with winter barley with very poor success
- One farmer consistently double cropping after wheat (with irrigation) is excited about being able to plant soybeans ~10 days earlier

Management Strategies to Optimize Soybean Yield and Quality Across Planting Dates

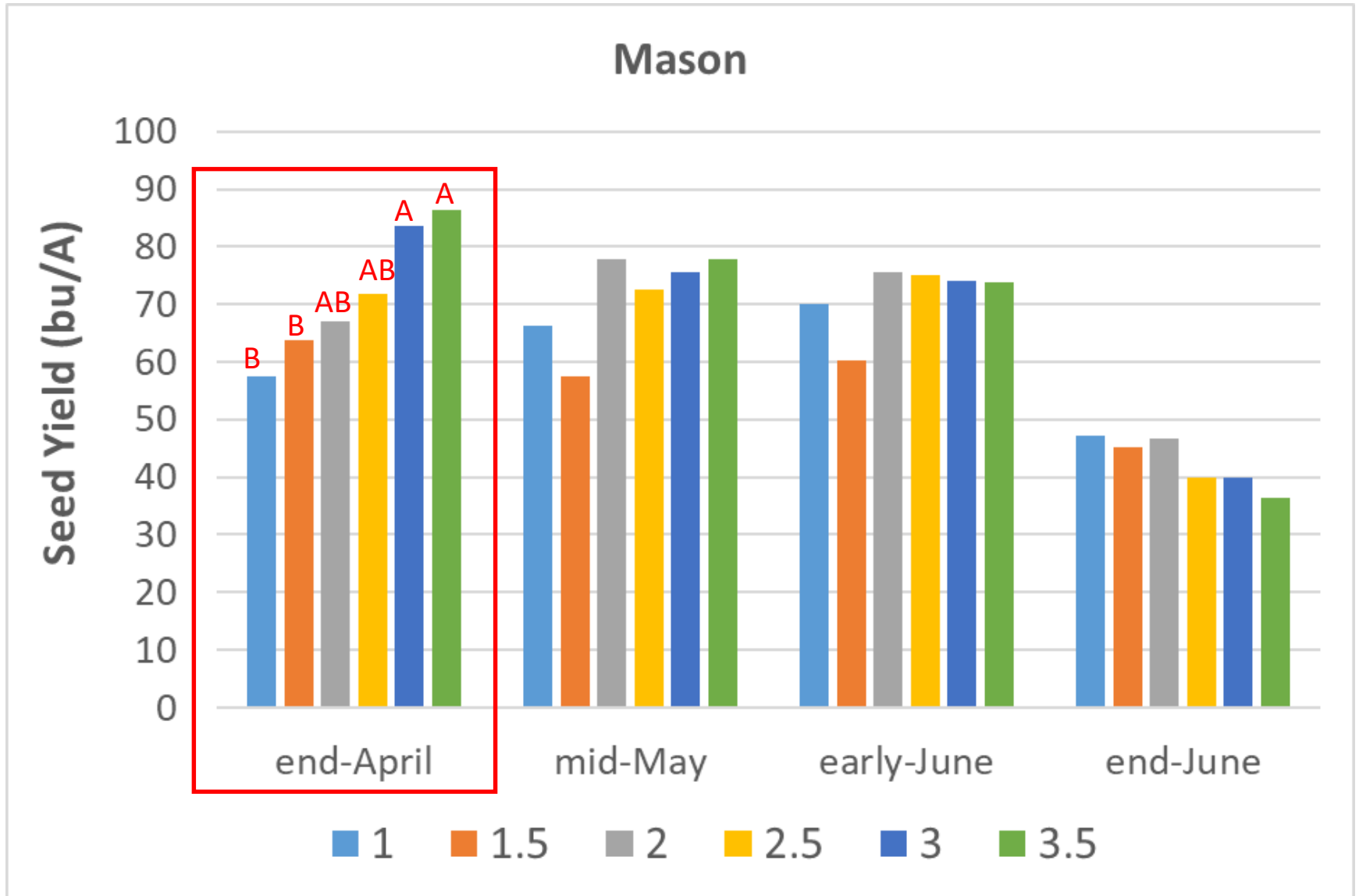


Tom Siler and Manni Singh



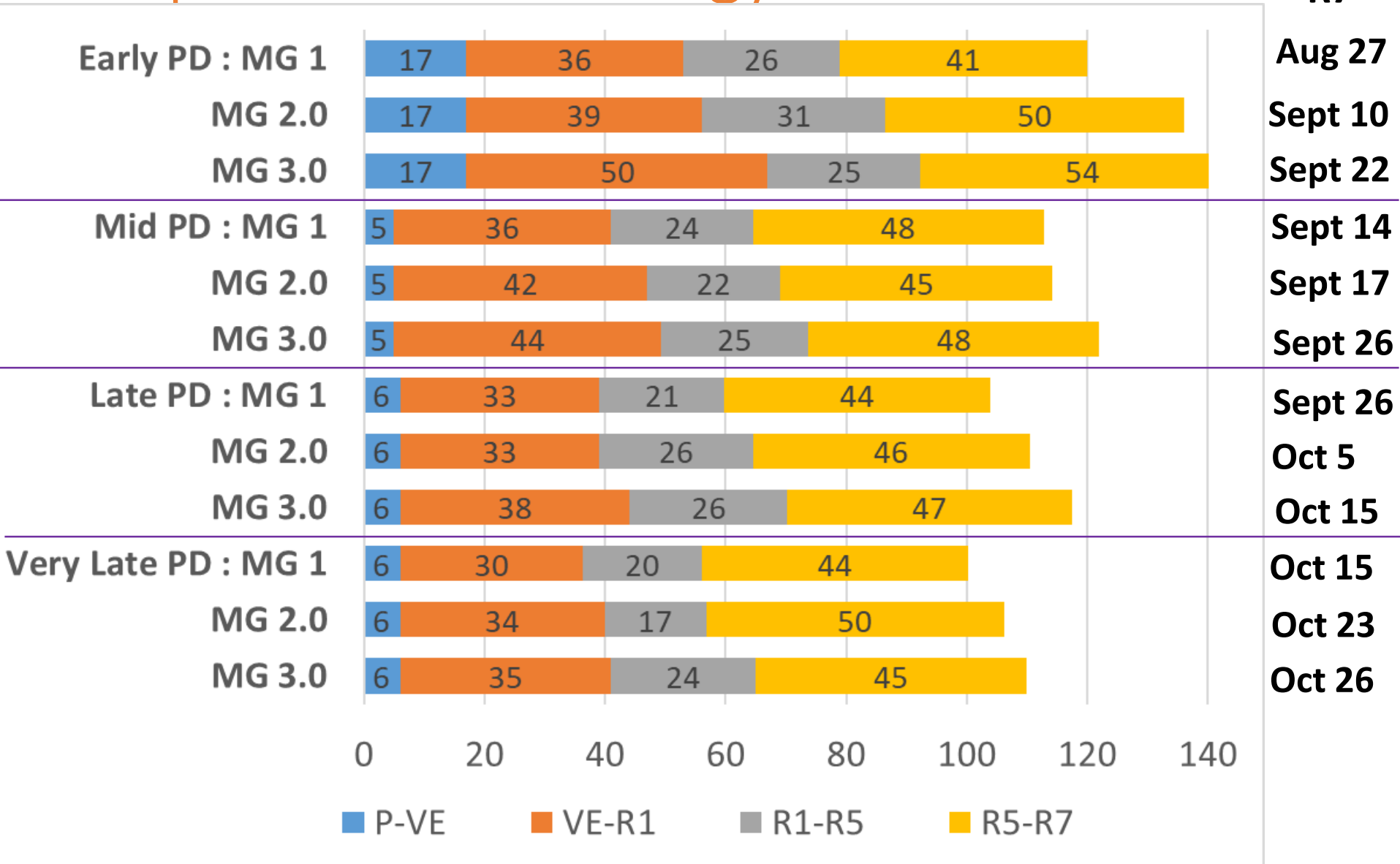
**Michigan Soybean
Promotion Committee**
www.michigansoybean.org

Plant date x Maturity group- Mason

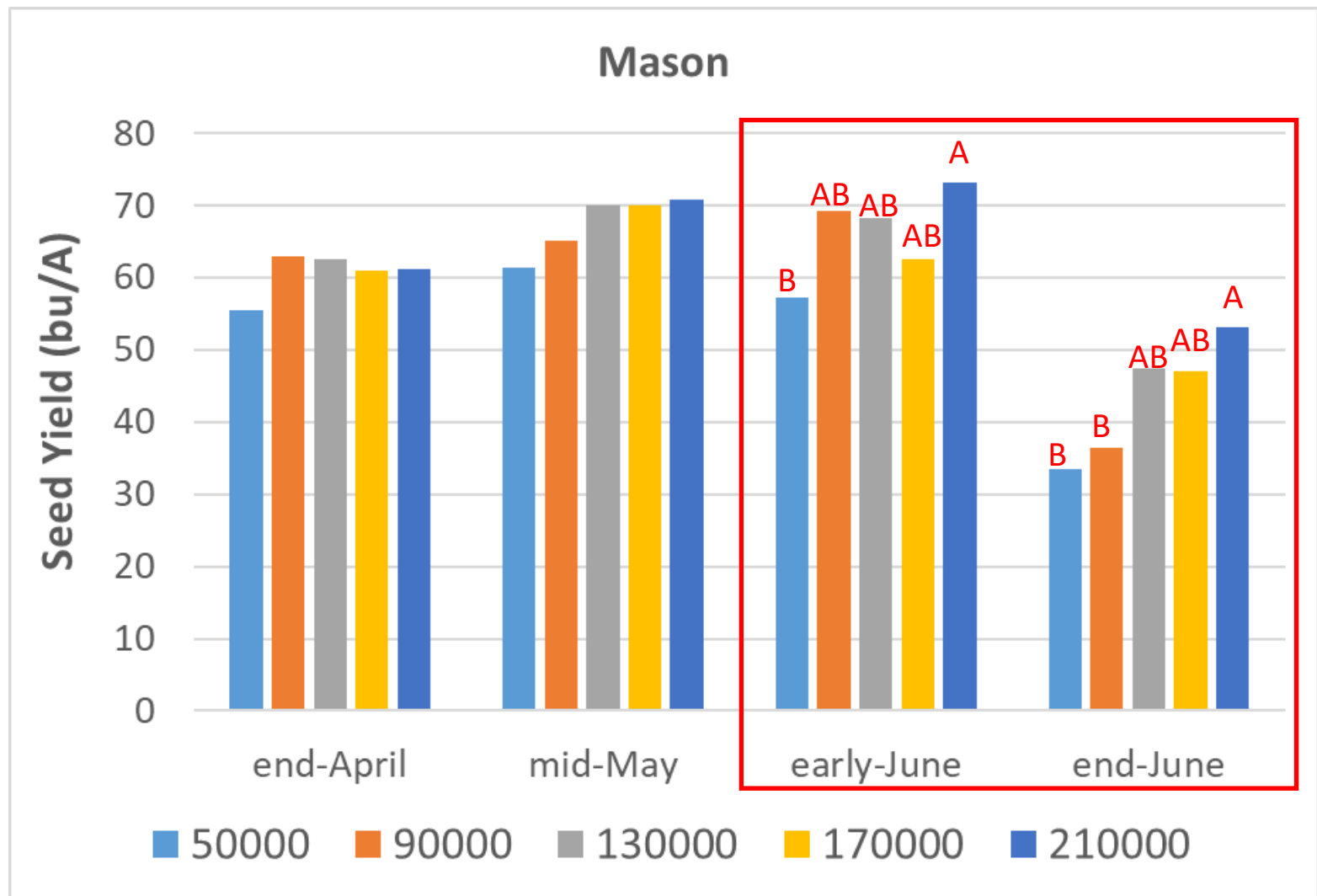


Impacts on Phenology

R7



Plant date x Seed rate- Mason



- Seed treatment: No yield difference, did impact plant stand



Double Crop Soybean Summary

- 40 bushels of soybeans at \$9 per bushel added \$360 gross profit
 - \$320 net profit after ~\$40 input costs (not including labor or machinery costs)
 - Others in the area have estimated that ~10-12 Bushels / Acre covers all costs (Tim Boring, MABA)
- Cover crop / forage biomass alternative exceeded 4 tons / acre (\$35 seed cost per acre)
- Harvest was very difficult because of wet weather in November / December, and timely planting can be challenging for farmers.



A Sales Pitch for Winter Barley

- Winter barley fits our climate, **if it can consistently survive the winter!**
 - Grows when we have consistent moisture, whereas corn and spring barley grow during the summer
 - Provides opportunity for double crop / cover crop
 - Double crop may provide “insurance” for growing malting barley
 - Adds crop diversity
 - Higher protein grain than corn
 - Disease pressure is manageable



Sales Pitch Part 2

- Livestock farms are particularly well suited to grow winter barley
 - If grain doesn't meet malting quality, or lack of market, feed it!
 - Harvest the straw for bedding / feed
 - If planted early enough in fall, can we graze the early growth before winter?
 - Haul manure after barley harvest
 - Grow a double crop of forage or soybeans after the barley harvest



Questions?



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