2016 IHARF Agronomy Update

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IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

IHARF Funding Sources

- Grain revenues from approximately 1200 ac of owned & rented cropland comprise up to 50% of gross operating funds
- Additional revenues come from approximately 40-50 research & demo projects annually which are funded through government (provincial & federal), producer groups & private industry

Source	% of Outside Funding (Cash & In-Kind)							
	2010	2011	2012	2013	2014	2015	2016	**AVG**
Industry	49%	30%	36%	35%	32%	28%	27%	**32%**
Producer	36%	48%	45%	20%	26%	46%	41%	**37%**
Government	15%	22%	19%	45%	42%	26%	32%	**31%**

Phosphorus Fertilizer Rate & Placement in Faba Beans

Indian Head 2015 & 2016 (ADOPT)

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Faba bean Phosphorus Trials

Treatments

2015 P_2O_5 rates: 0, 22 & 45 lb P_2O_5 / ac

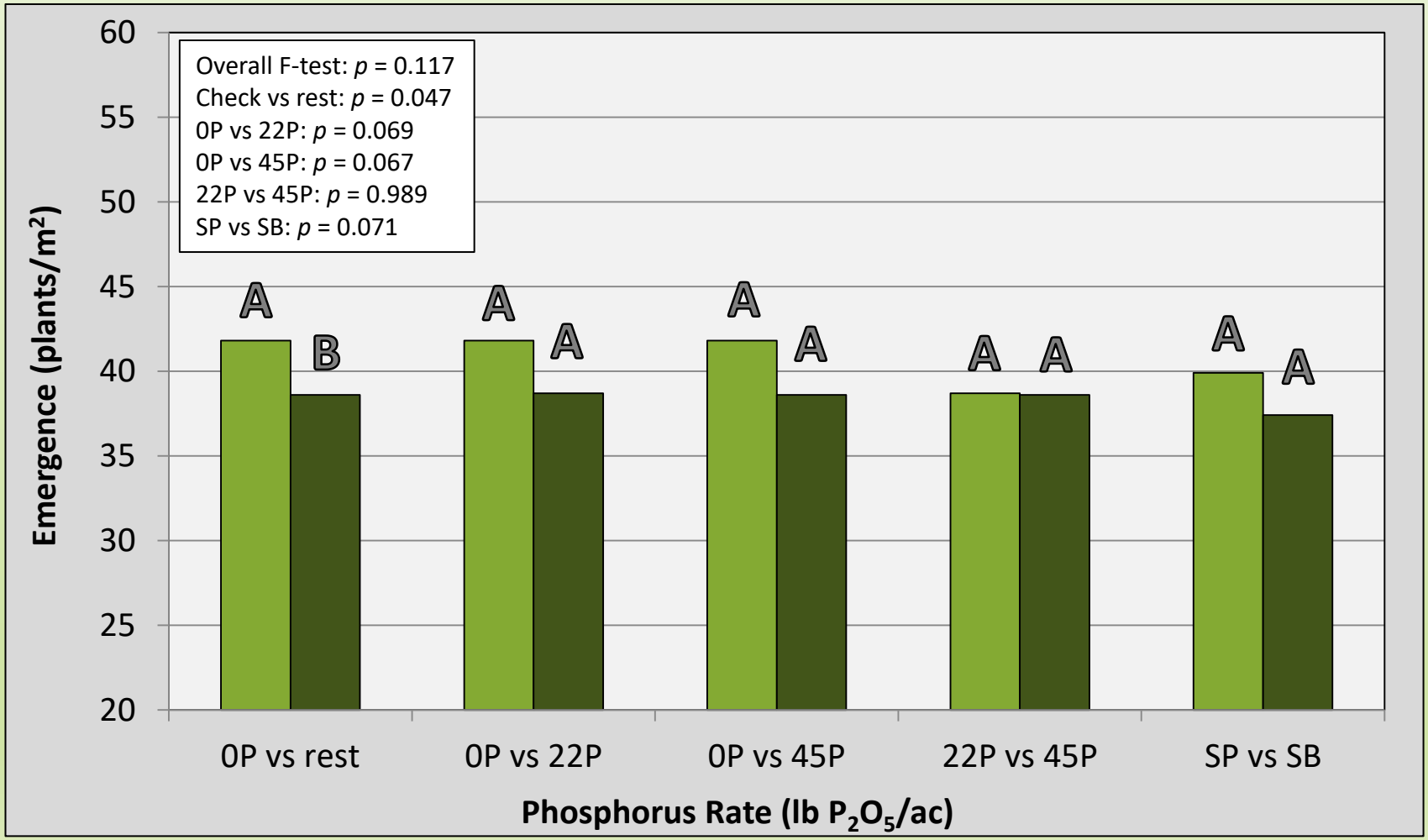
2016 P_2O_5 rates: 0, 18, 36, 53, 71 lb P_2O_5/ac

Placement Methods: Seed-placed (in-furrow) vs. Side-band

- P_2O_5 source was commercial grade monoammonium phosphate (11-52-0)
- Snowbird faba-beans direct-seeded into spring wheat stubble (SeedMaster, 12" spacing) in the 1st week of May at ~55 seeds/m^2
- Nitrogen was not balanced across treatments, seed inoculated with 2x label rate of seed-applied peat based inoculant
- Weeds controlled using pre-emergent & (spring) in-crop herbicides, Priaxor applied at early-mid bloom
- Pre-harvest glyphosate applied at maturity, centre 5 rows of each plot straight-combined when fit to do so

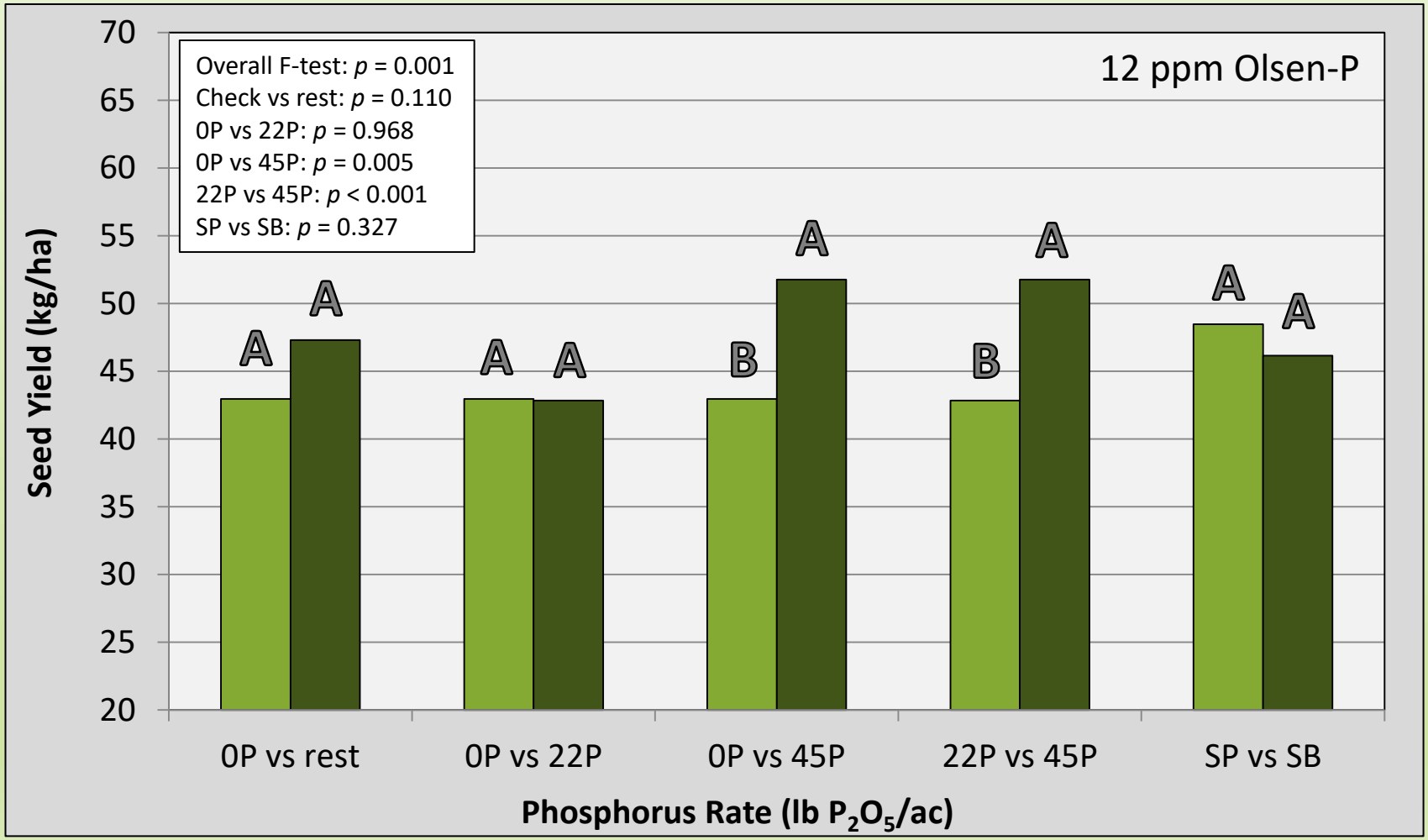
Phosphorus Effects On Emergence

Indian Head 2015 (~4 weeks after planting)



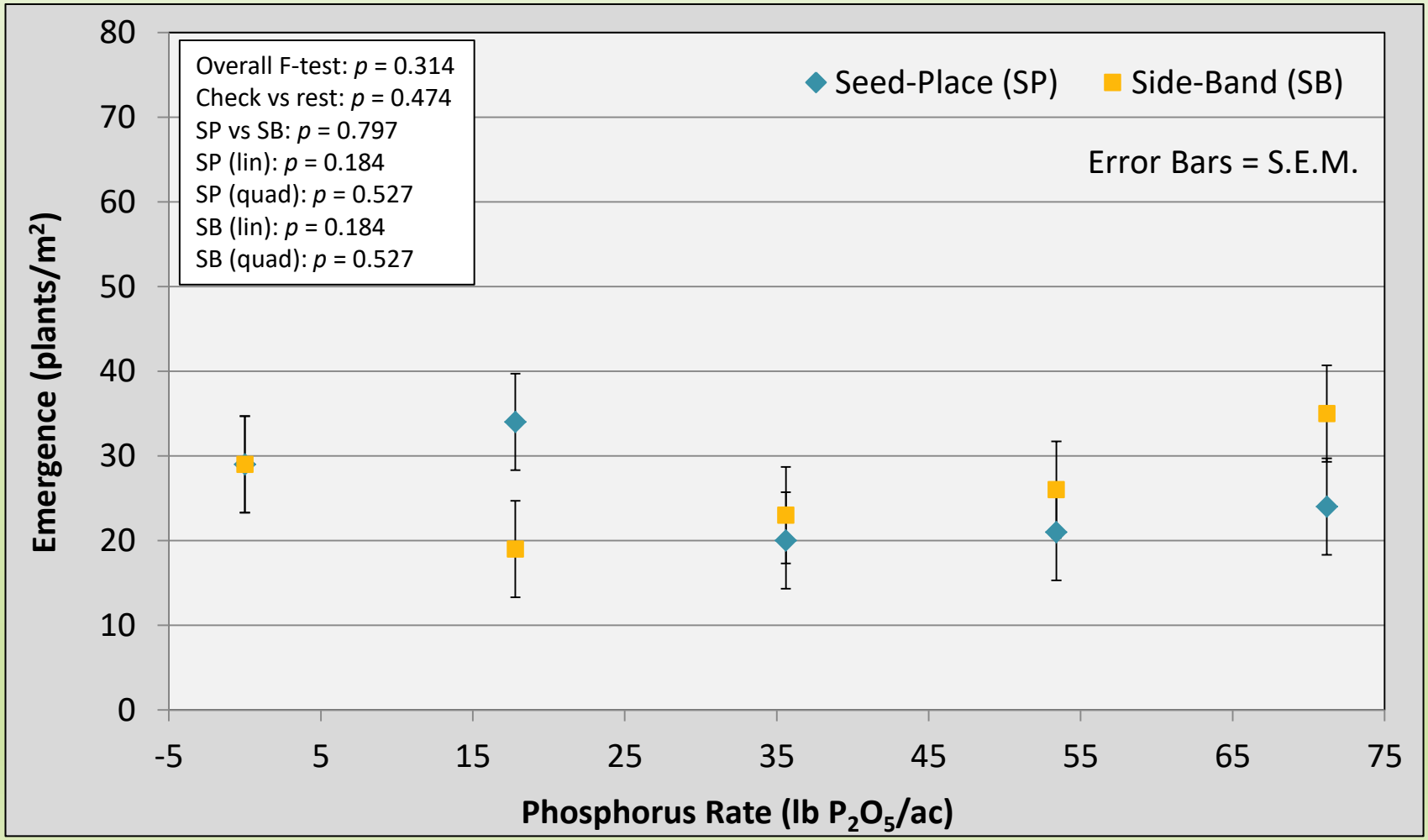
Phosphorus Effects On Seed Yield

Indian Head 2015



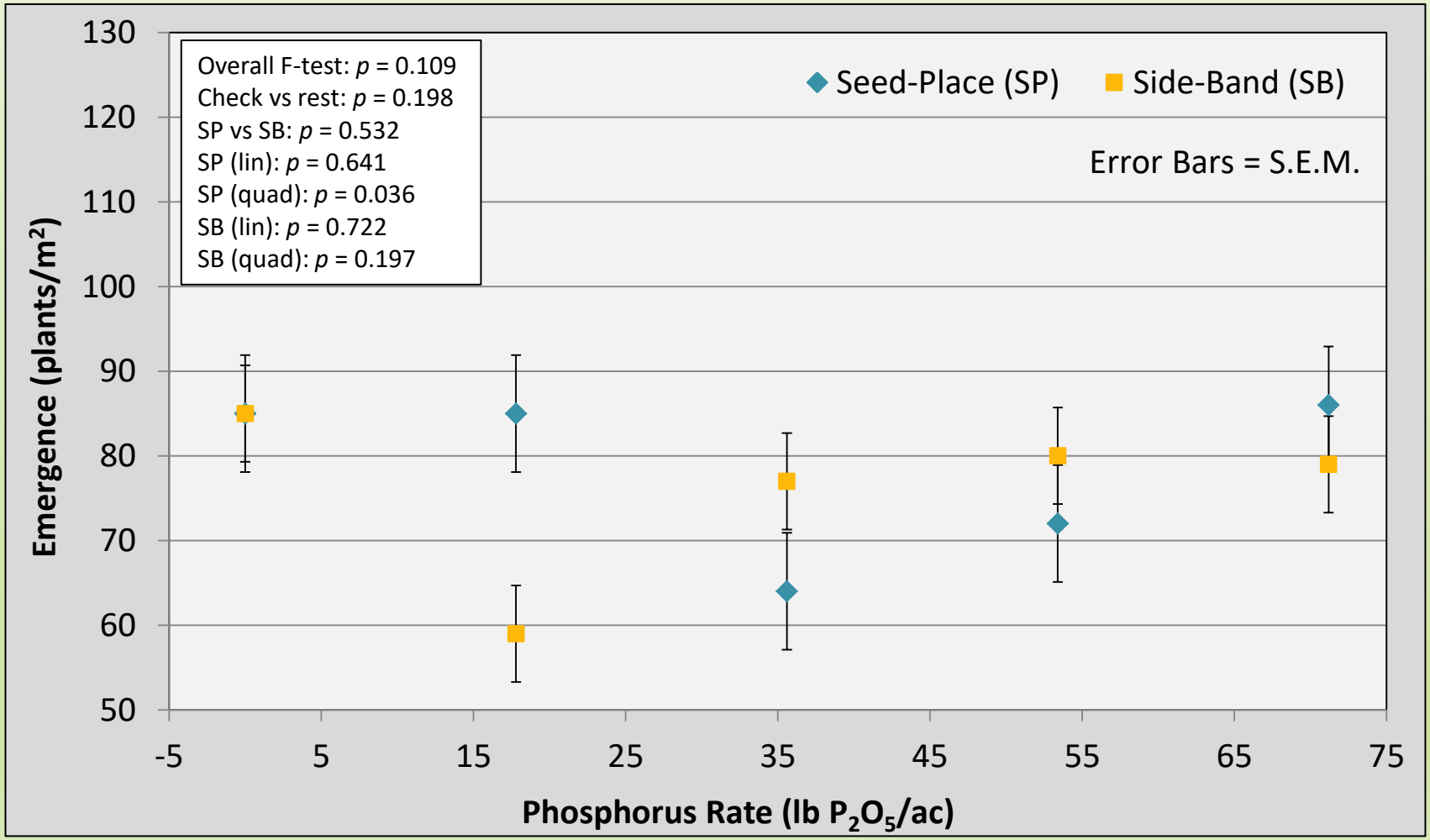
Phosphorus Effects On Emergence

Indian Head 2016 (16 days after planting)



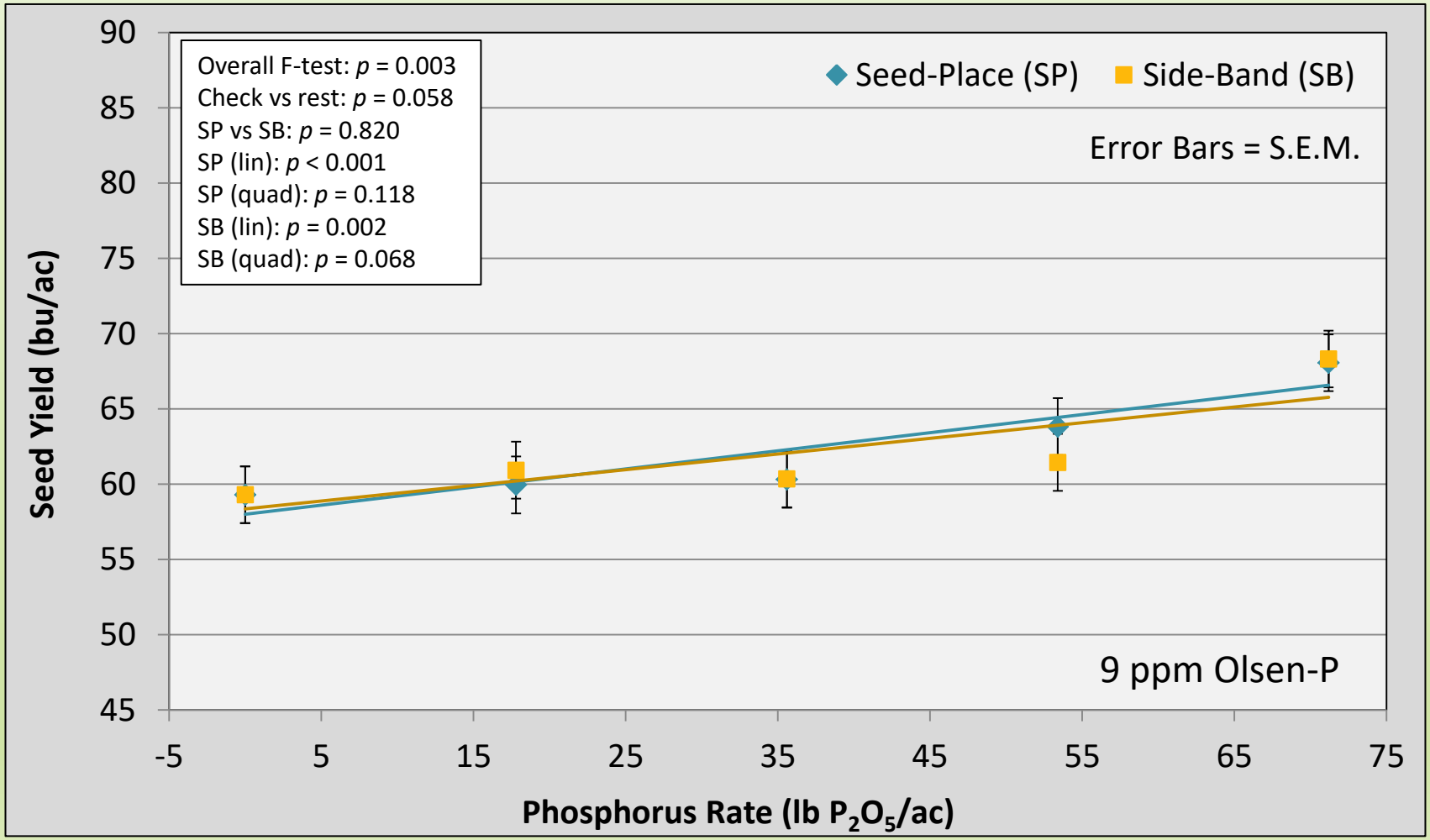
Phosphorus Effects On Emergence

Indian Head 2016 (32 days after planting)



Phosphorus Effects On Seed Yield

Indian Head 2016



Faba Bean Response to Phosphorus – Conclusions

- Faba beans are large users of P, removing 1.1-1.3 lb $P2O_5$/bu
  - 2015 crop removed ~51-60 lb P2O5 at 46 bu/ac, ~68-81 lb/ac in 2016
  - 90 bu/ac faba beans in 2014, estimated removal was 99-117 lb P_2O_5/ac
  - Not likely practical to fertilize for replacement under high yielding conditions
- No evidence of seedling toxicity w/seed-placed P in either year
  - 8% fewer plants on average w/P fertilizer in 2015 but no SP vs SB difference
  - High rates of seed-placed P not recommended, results may vary widely depending on seeding equipment, soil properties & environmental conditions
- Relatively strong yield response to high rates of P fertilizer observed in both 2015 and 2016
  - 20% yield increase w/45 lb P_2O_5/ac in 2015 but no increase at 22 lb P_2O_5/ac
  - 6% avg yield increase w/P but linear response & 15% (9 bu/ac) at 71 lb P_2O_5/ac
- Small & inconsistent effects on seed size over the 2-yr period

Soybean Response to Dual Inoculation & N Fertilizer

Indian Head 2015 & 2016 (SPG)

Nitrogen Management Recommendations for Soybeans in Saskatchewan (SPG)

Indian Head, Outlook & Melfort (2015-17)

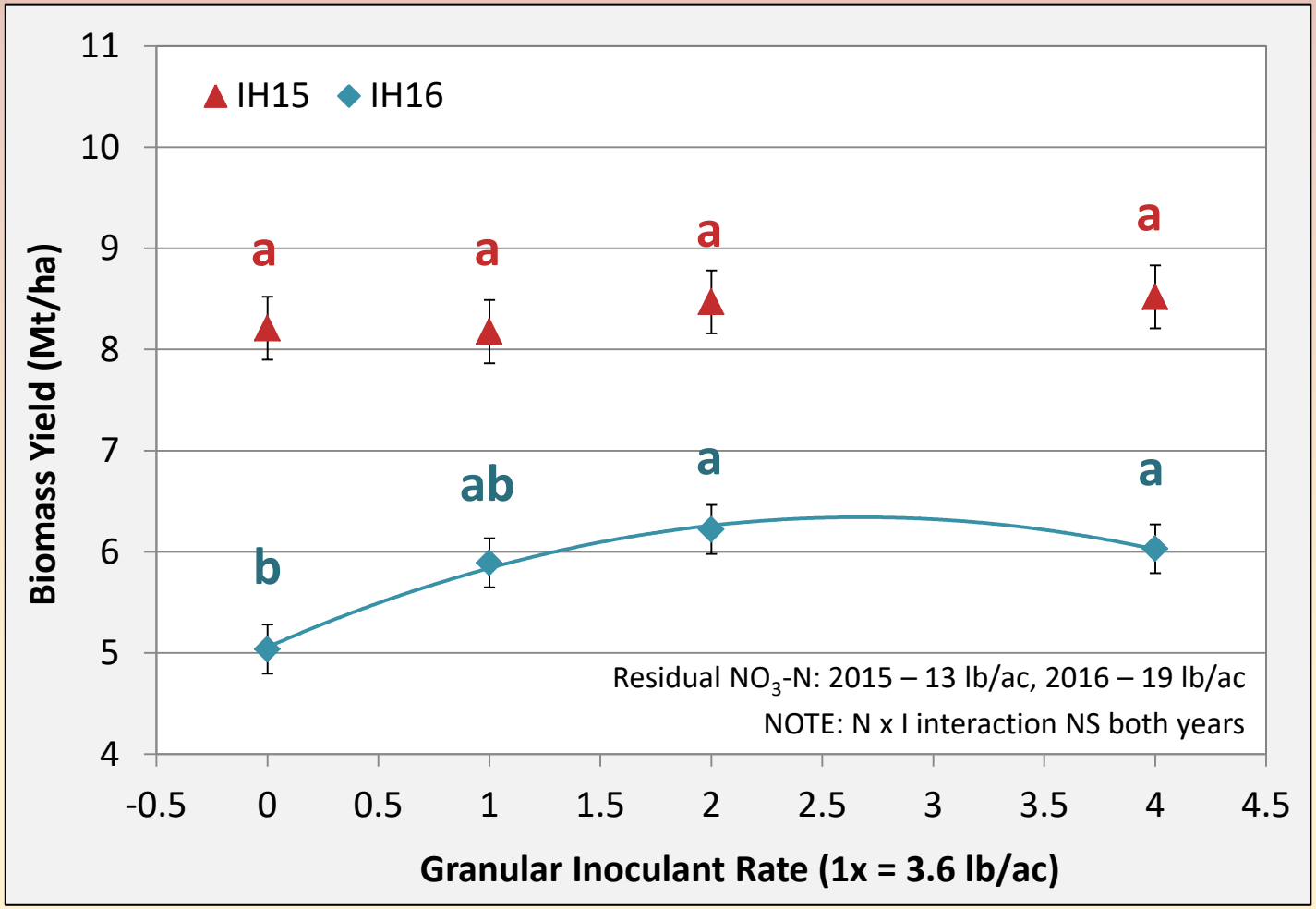
Inoculant	N Fertilization
Liquid only (single inoculant)	No supplemental N fertilizer
Liquid + 1x rate granular (3.6 lb/ac)	50 lb N/ac as side-banded urea
Liquid + 2x rate granular (7.2 lb/ac)	50 lb N/ac as side-banded ESN
Liquid + 2x rate granular (14.4 lb/ac)	50 lb N/ac as dribble-banded UAN (R3 stage)

Data Collection

1) Biomass Yield 2) Tissue Nitrogen 2) N Uptake 3) Pod Height 4) Seed Yield 5) Seed Size 6) Grain Nitrogen 7) N Exports

- All seed commercially treated w/Optimize liquid inoculant
- Granular product was Cell-Tech soybean (3.6 lb/ac on 12” spacing)
- DK23-10, all other factors constant & intended to be non-limiting
- Only data from Indian Head is presented for brevity

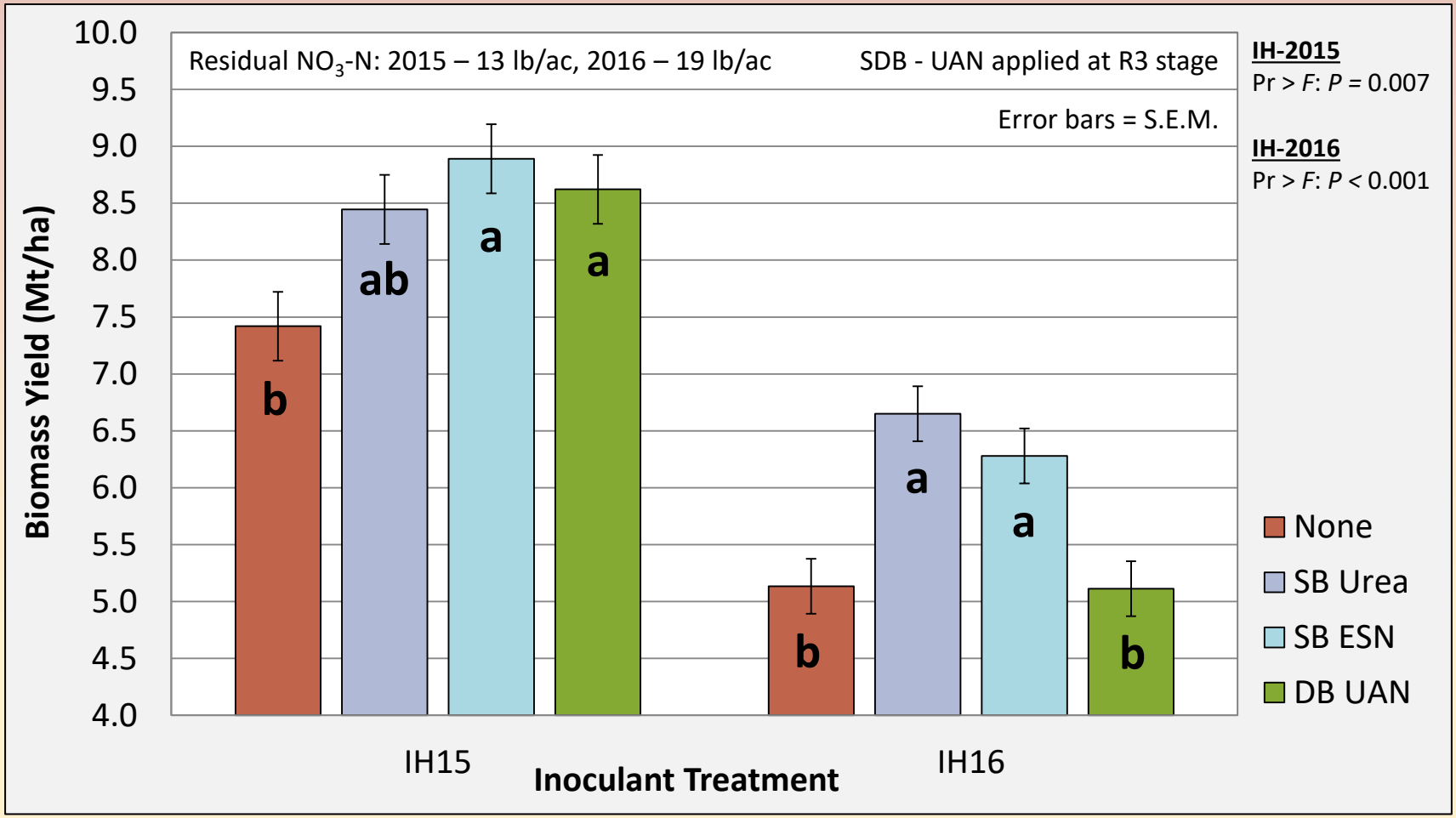
Inoculant Effects on Soybean Biomass Yield (Indian Head)



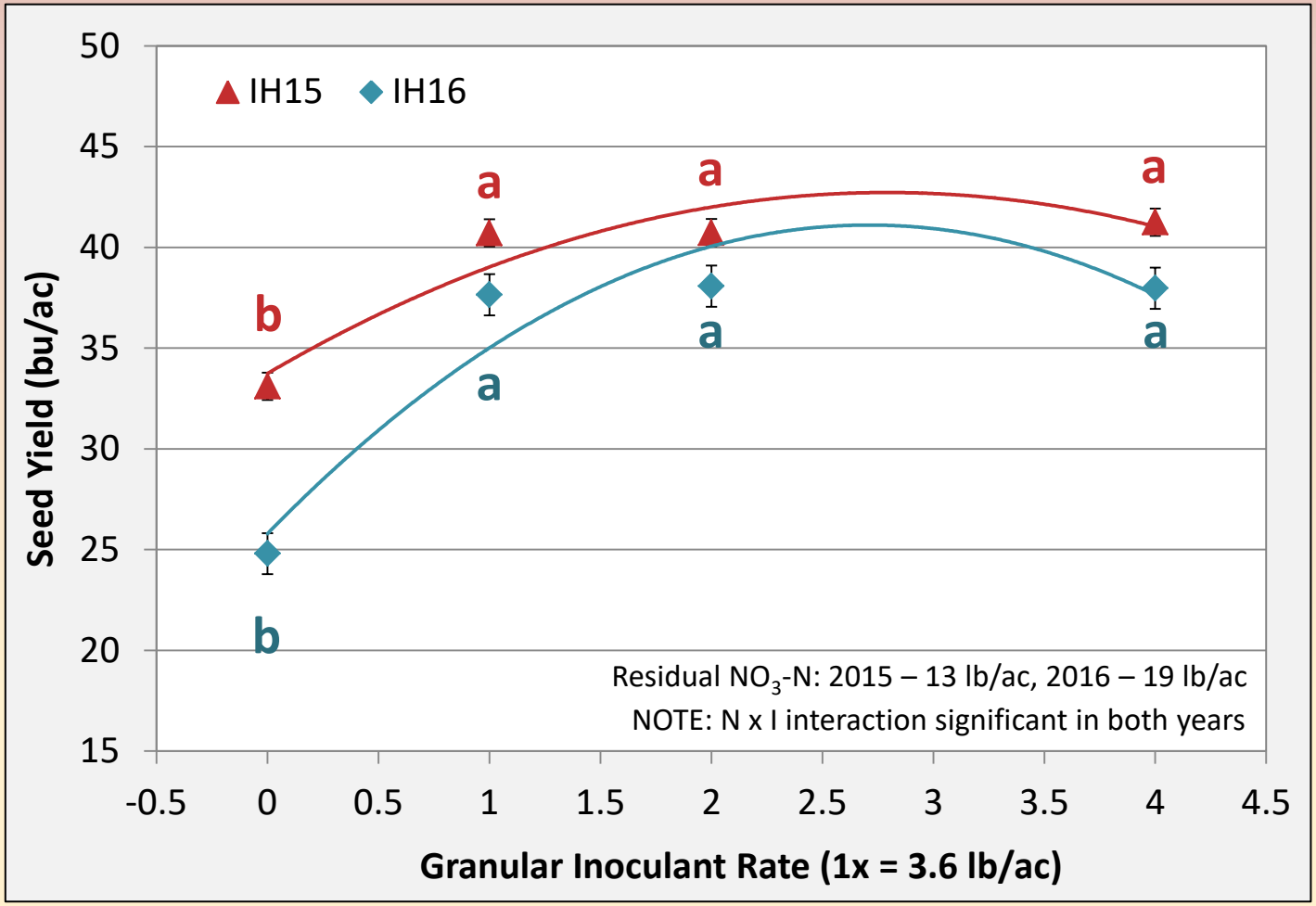
IH-2015
Pr > *F*: *P* = 0.792
Lin: *P* = 0.378
Quad: *P* = 0.914

IH-2016
Pr > *F*: *P* < 0.001
Lin: *P* = 0.011
Quad: *P* = 0.011

Nitrogen Effects on Soybean Biomass Yield (Indian Head)



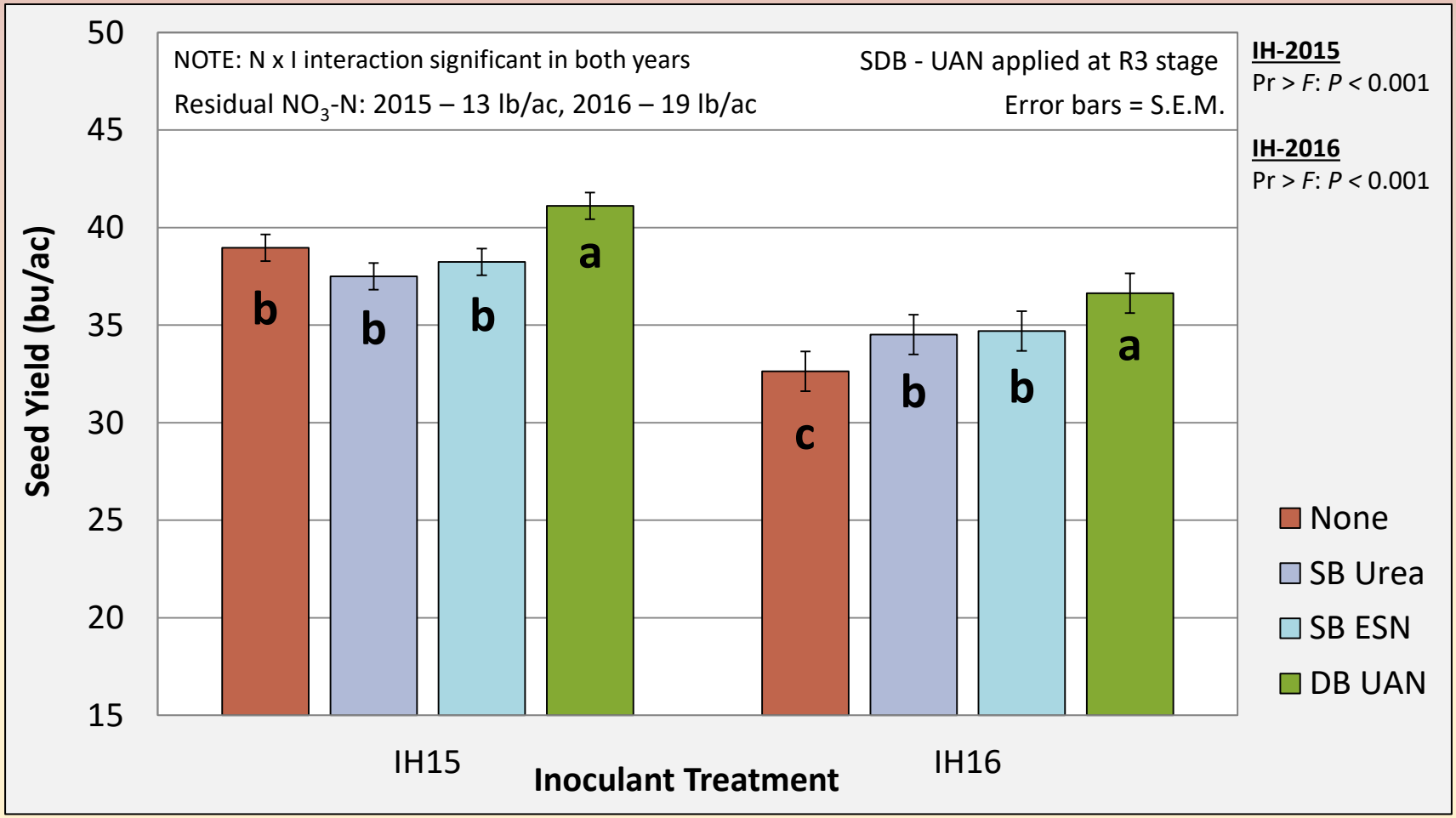
Inoculant Effects on Soybean Seed Yield (Indian Head)



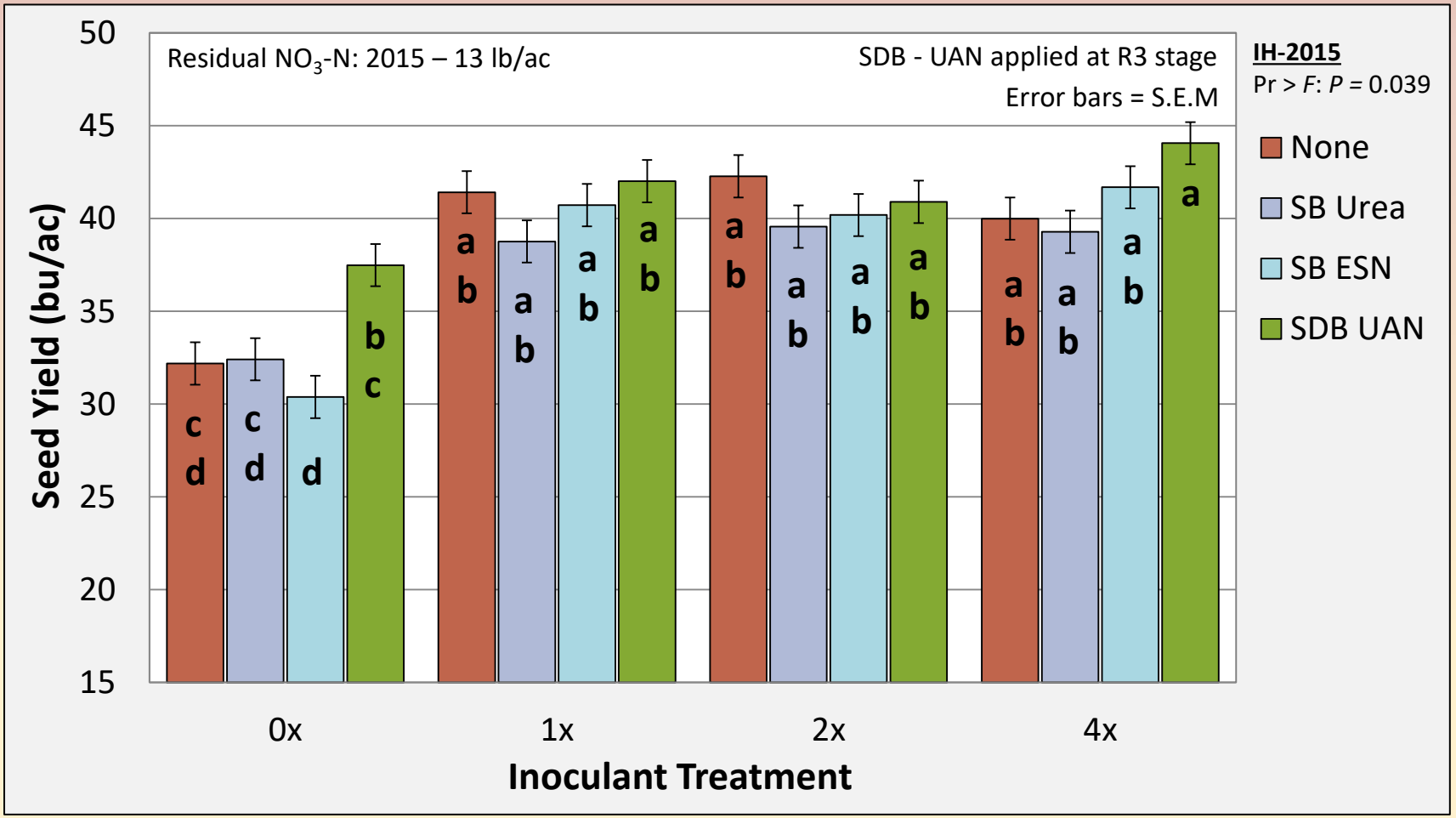
IH-2015
Pr > *F*: *P* < 0.001
Lin: *P* < 0.001
Quad: *P* < 0.001

IH-2016
Pr > *F*: *P* < 0.001
Lin: *P* < 0.001
Quad: *P* = 0.001

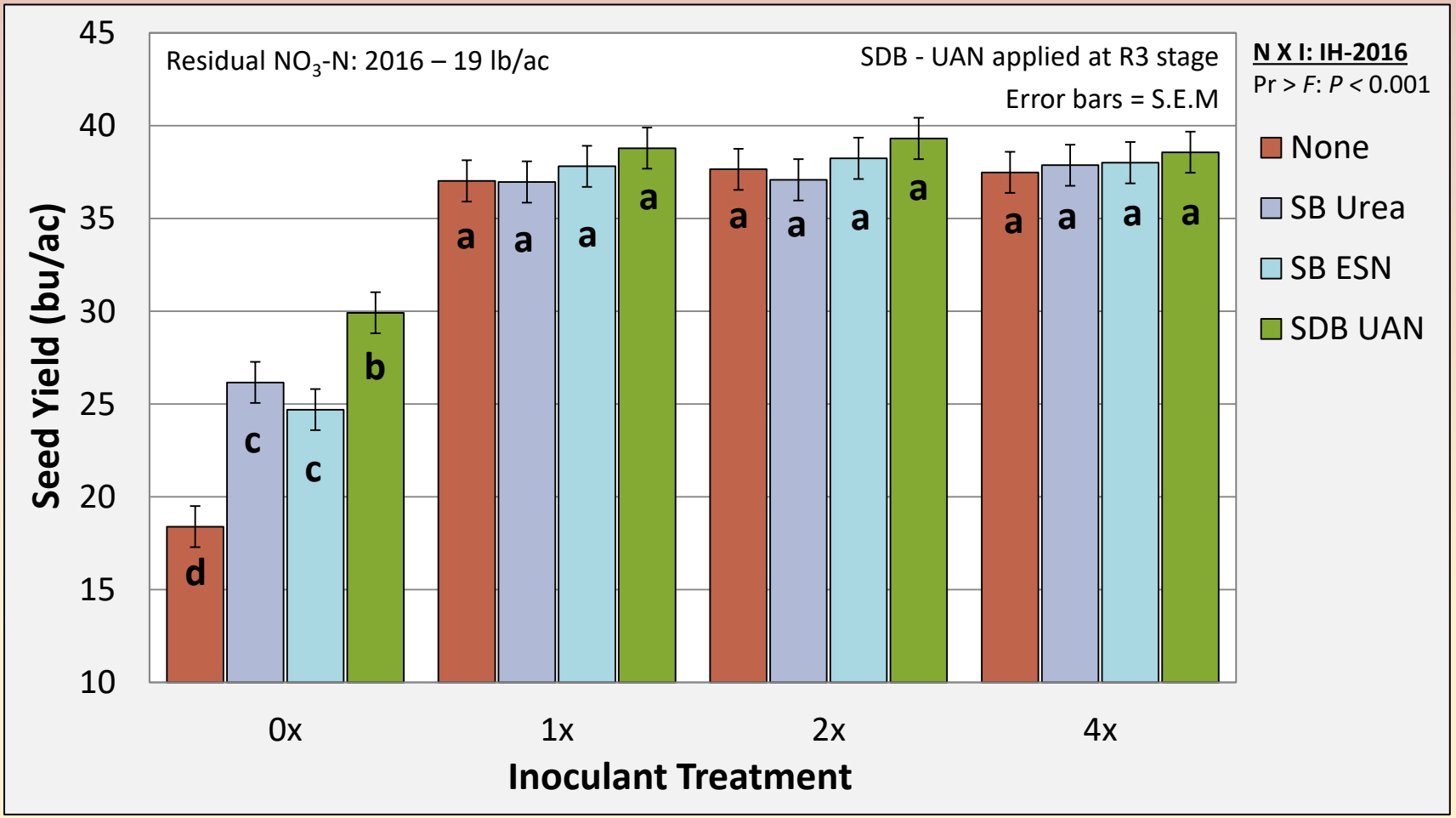
Nitrogen Effects on Soybean Seed Yield (Indian Head)



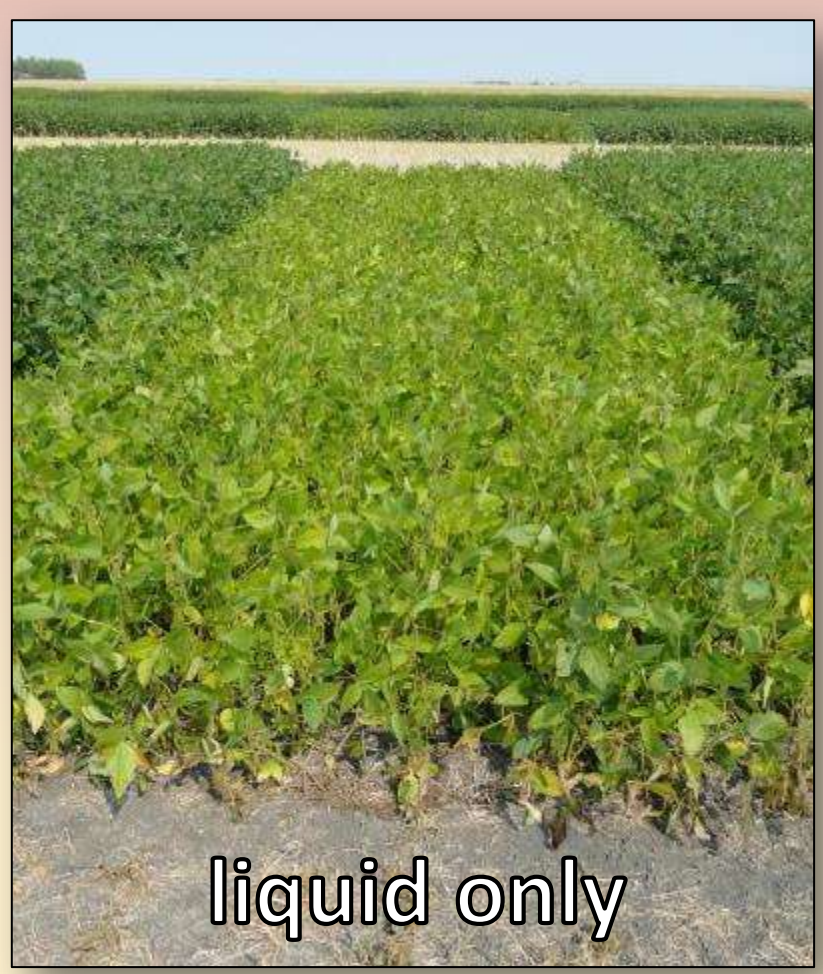
Inoculant x N Interactions for Soybean Seed Yield (IH15)

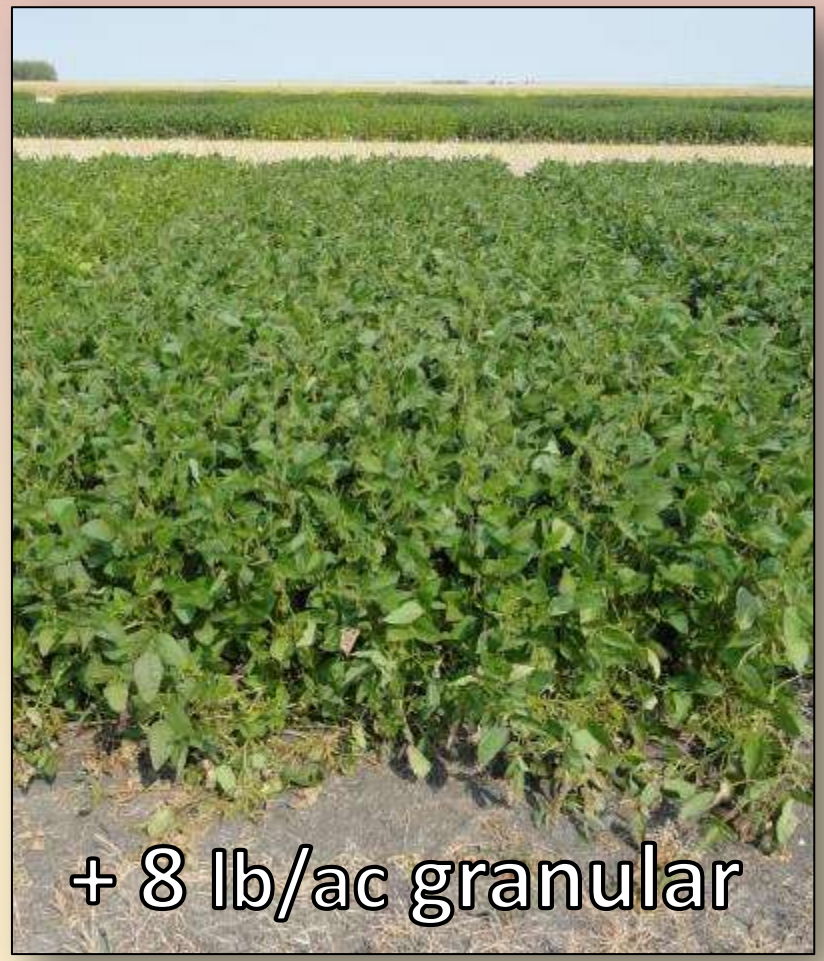


Inoculant x N Interactions for Soybean Seed Yield (IH16)



Visual Response to Dual Inoculant (IH-2015)





Visual Response to Dual Inoculant (IH-2016)

Soybean Inoculation & Starter Nitrogen - Conclusions

- Effective nodulation critical to meet the N demands of high yielding soybeans & most SK field trials in SK show benefits to double application
  - Total above-ground N uptake is approximately 152-180 lb N/ac at 40 bu/ac
  - In current trial, 24% & 52% higher yield w/dual inoculant in 2015 & 2016 (across N rates)
  - 19% & 36% benefit at Melfort & Outlook (2015), 33% across all currently available sites
- Start N consistently increased biomass yield but only had a positive effect on seed yield in the absence of granular inoculant
  - Late season N (R3 stage) always the most effective to recover yield loss w/poor nodulation
  - 16% over control & 91% of double inoculated at IH-15, 63% and 79% at IH-16
- As soybeans become well established in crop rotations, likelihood of yield benefits from dual inoculation is expected to diminish
  - Economic response in only 2/25 fields in MB w/field history of 2 or more soybean crops
- Always assess nodulation, regardless of field history or inoculation methods
  - Look for at >5 healthy nodules/plant at R1 growth stage (gives time to address deficiency)
  - When nodulation is poor, 50 lb N/ac applied at R3 mitigates some yield loss

THANK YOU

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IHARF Crop Management Field Day
Jul. 18, 2017, Indian Head, SK