

Field Pea Input Study: Grain Yield and Economics

Laryssa Grenkow, Western Applied Research Corporation

Eric Johnson, Agriculture and Agri-Food Canada

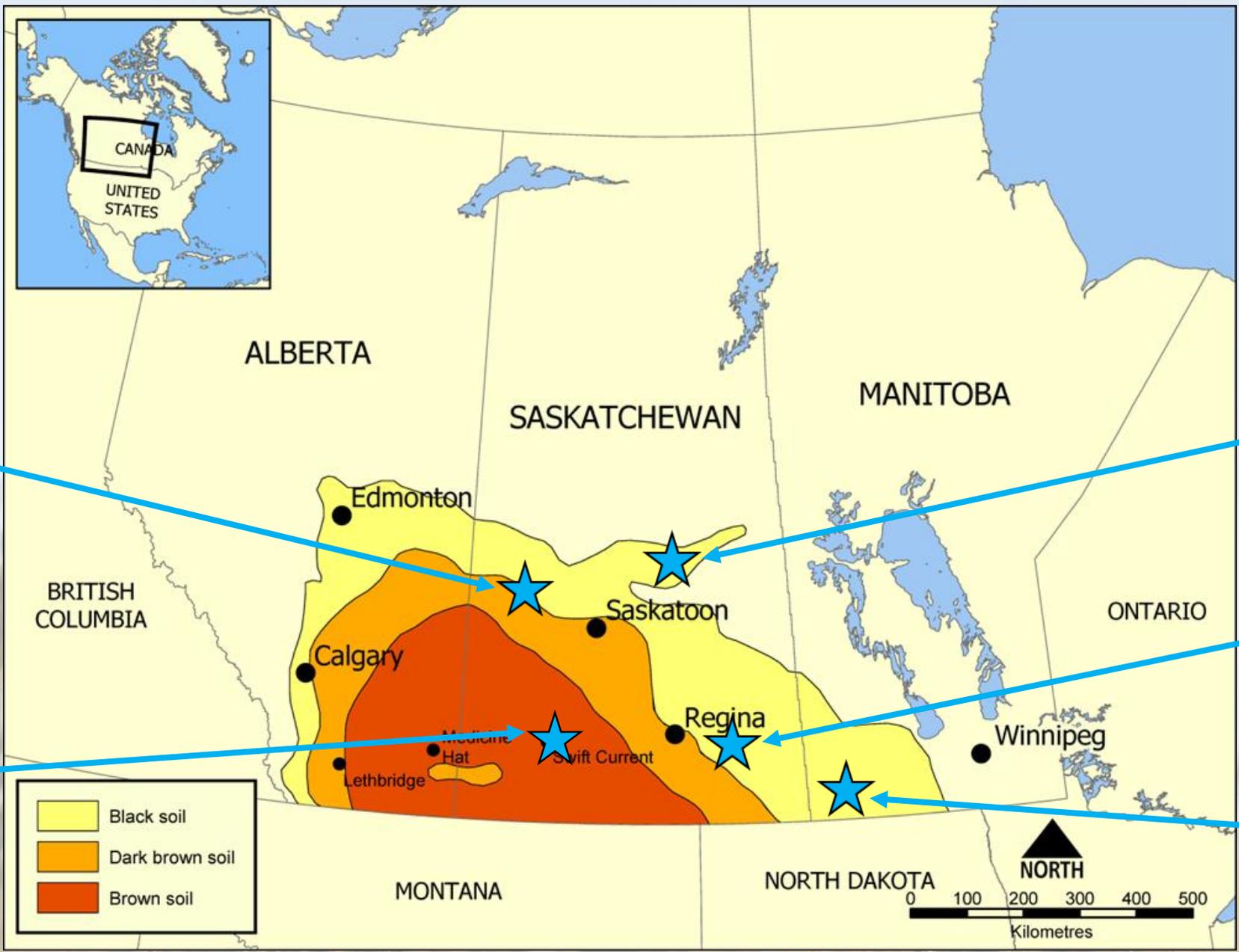
Stewart Brandt, Northeast Agricultural Research Foundation

Chris Holzapfel, Indian Head Agricultural Research Foundation

Bryan Nybo, Wheatlands Conservation Area

Anne Kirk, University of Manitoba

Sherrilyn Phelps, Saskatchewan Pulse Growers



Scott, SK
(High-Yielding Site)

Melfort, SK
(High-Yielding Site)

Indian Head, SK
(Low-Yielding Site)

Swift Current, SK
(Low-Yielding Site)

Minto, MB
(High-Yielding Site)

"Palliser's Triangle map". Licensed under Creative Commons Attribution-Share Alike 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Palliser%27s_Triangle_map.png#mediaviewer/File:Palliser%27s_Triangle_map.png

The Inputs & Treatment Structure

Inputs	Empty Input Package	Full Input Package
Seeding rate (SR)	60 seeds/m ²	120 seeds/m ²
Seed treatment (ST)	None	Apron Maxx RTA <i>(Fludioxonil + Metalaxyl-M & S-isomer)</i>
Inoculant type (GI)	Liquid Cell-Tech	Granular Cell-Tech
Starter N fertilizer (Fz)	None	34 kg N ha ⁻¹ <i>(granular 46-0-0 side-banded)</i>
Foliar Fungicide (Fn)	None	1 st - Headline EC <i>(pyraclostrobin)</i> 2 nd - Priaxor DS <i>(pyraclostrobin + fluxapyroxad)</i>

Study Objectives

Within the different soil/climatic zones of the Northern Great Plains, determine:

1. Which individual agronomic practices contribute most to field pea seed yield
2. How inputs interact and which combination produces the highest yields and economic returns





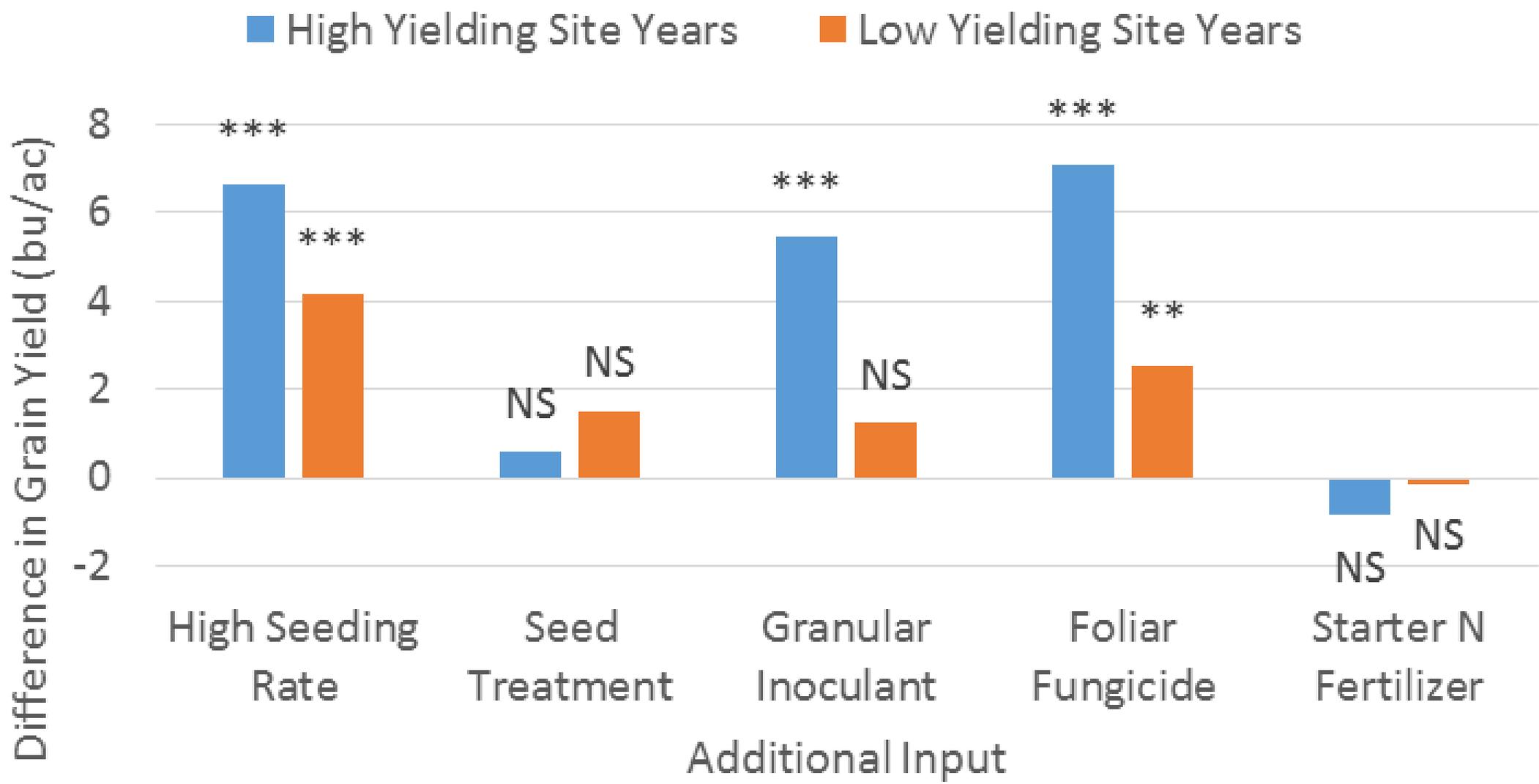
Full Input Package



Empty Input Package

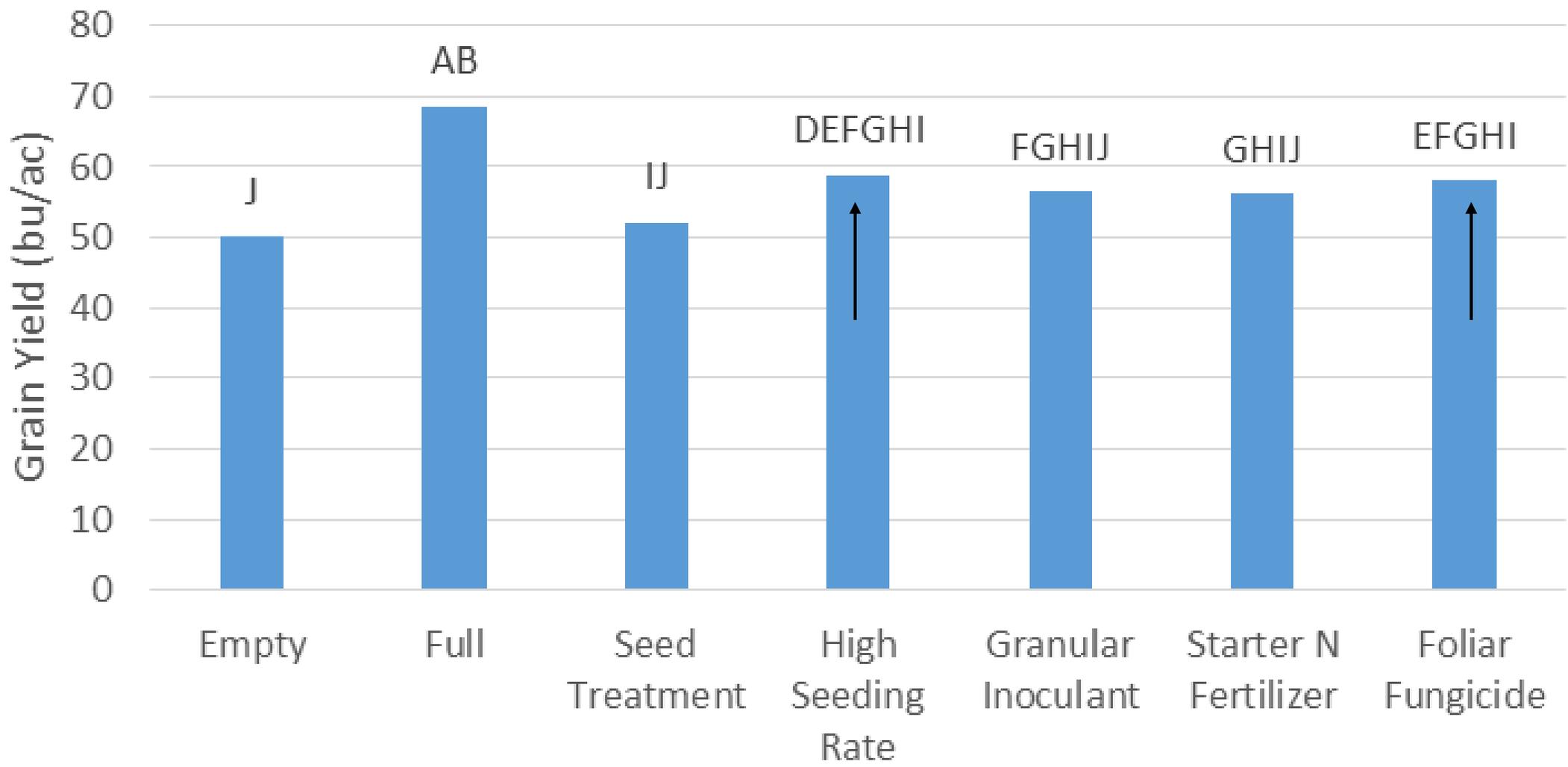


Mean Increase in Grain Yield by Adding the Additional Input

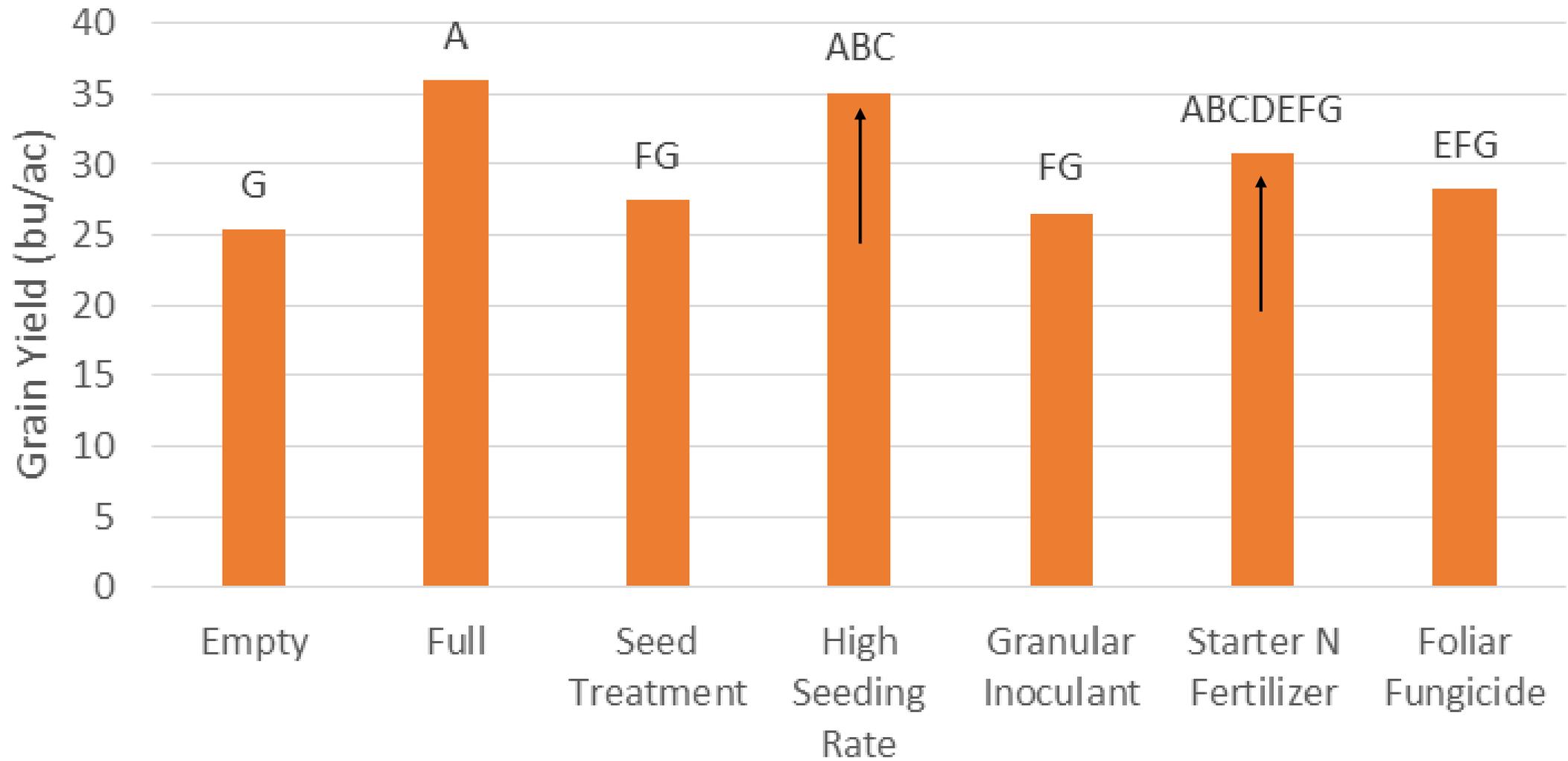


*** = P<0.0001, ** = P<0.01

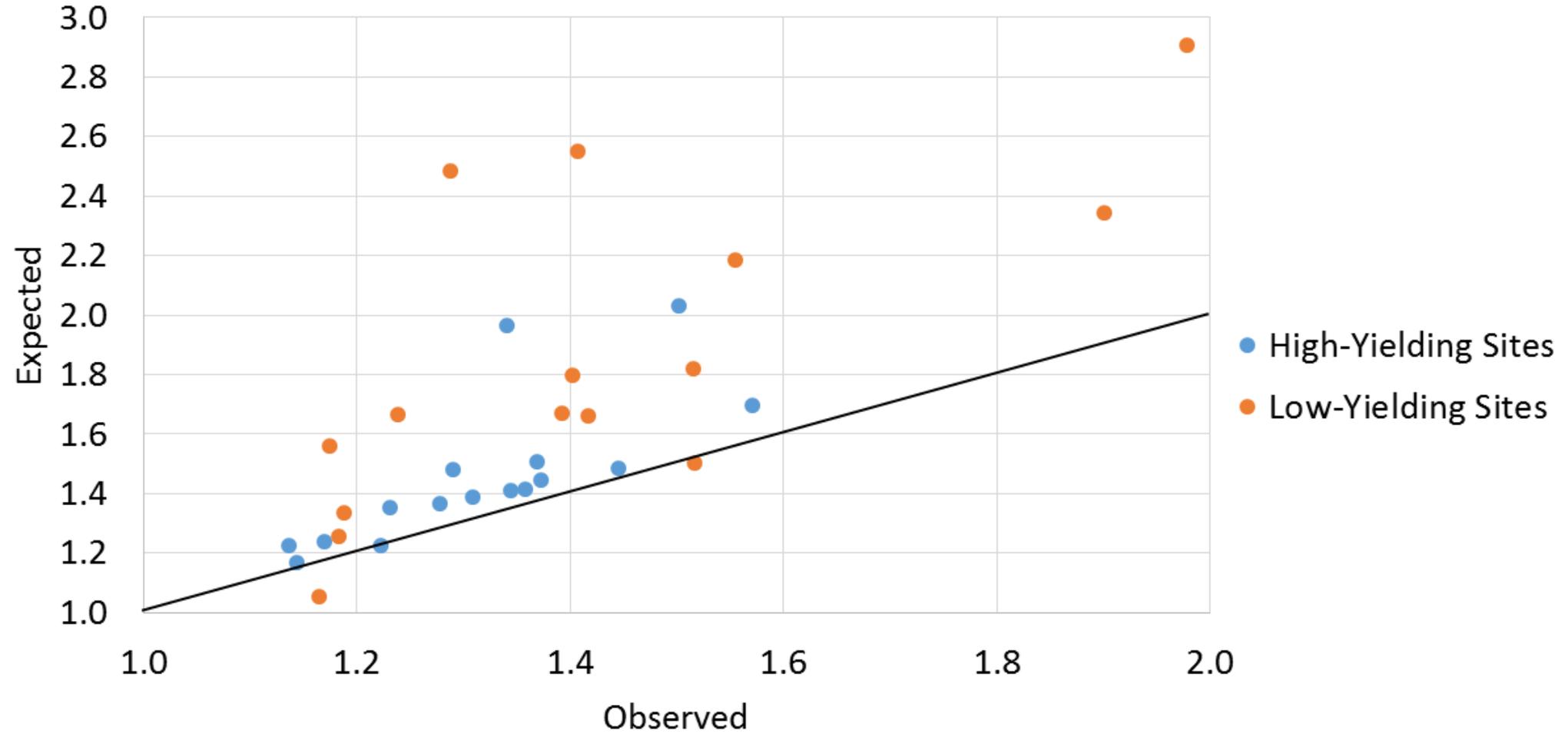
Grain Yield of Individual Input Treatments Compared to Empty and Full Input Packages at High Yielding Site Years



Grain Yield of Individual Input Treatments Compared to Empty and Full Input Packages at Low Yielding Site Years

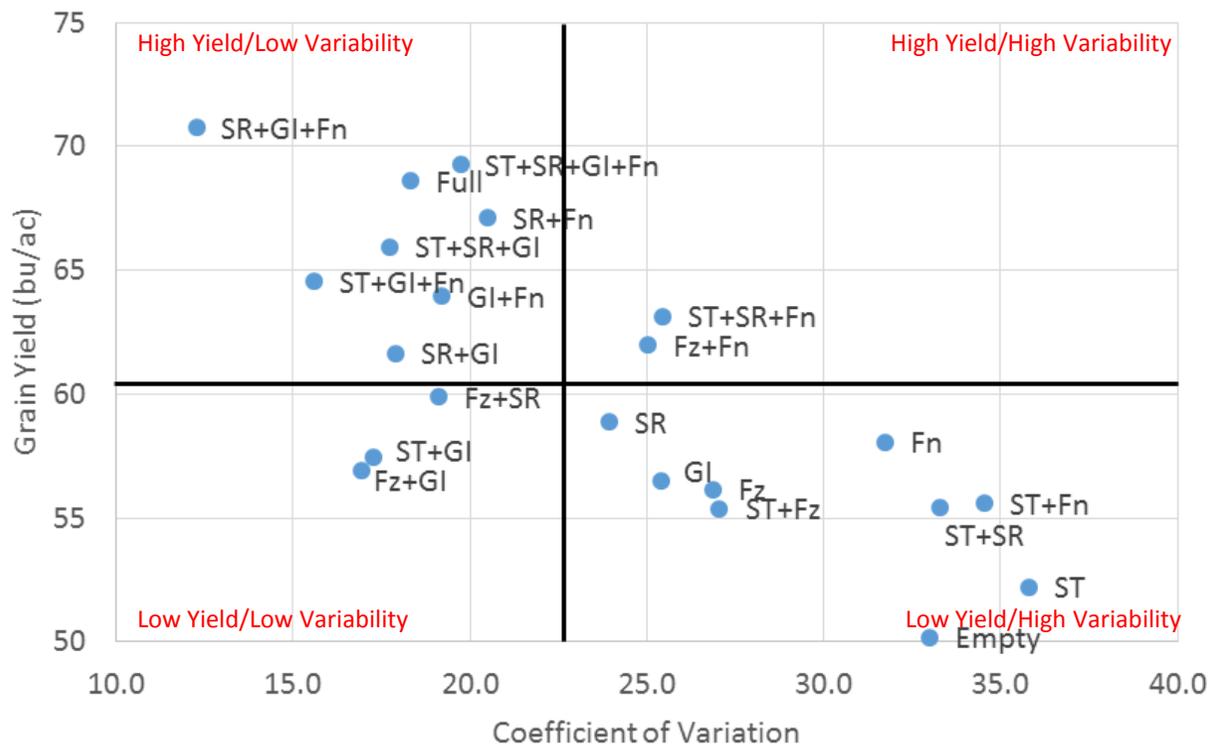


Observed Versus Expected Treatment Means

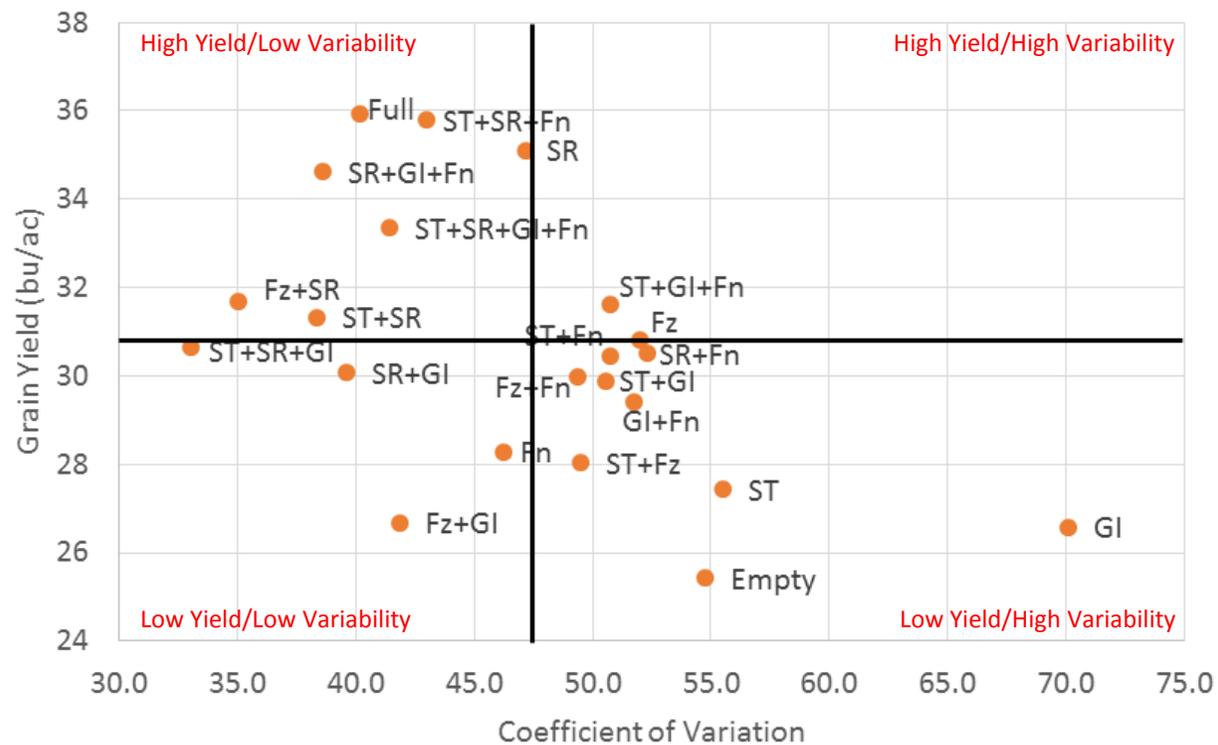


Grain Yield and Variability

High Yielding Site Years

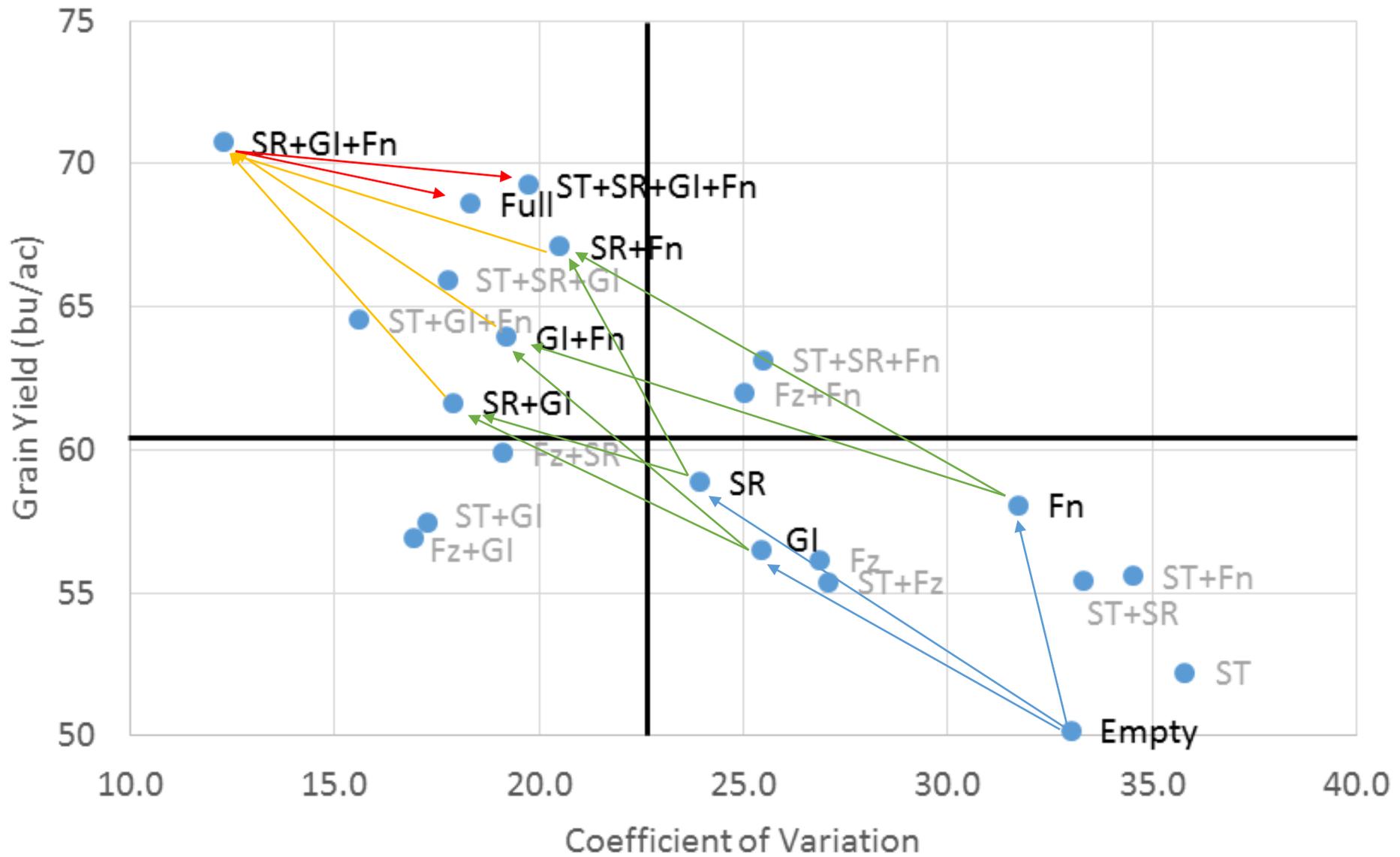


Low Yielding Site Years



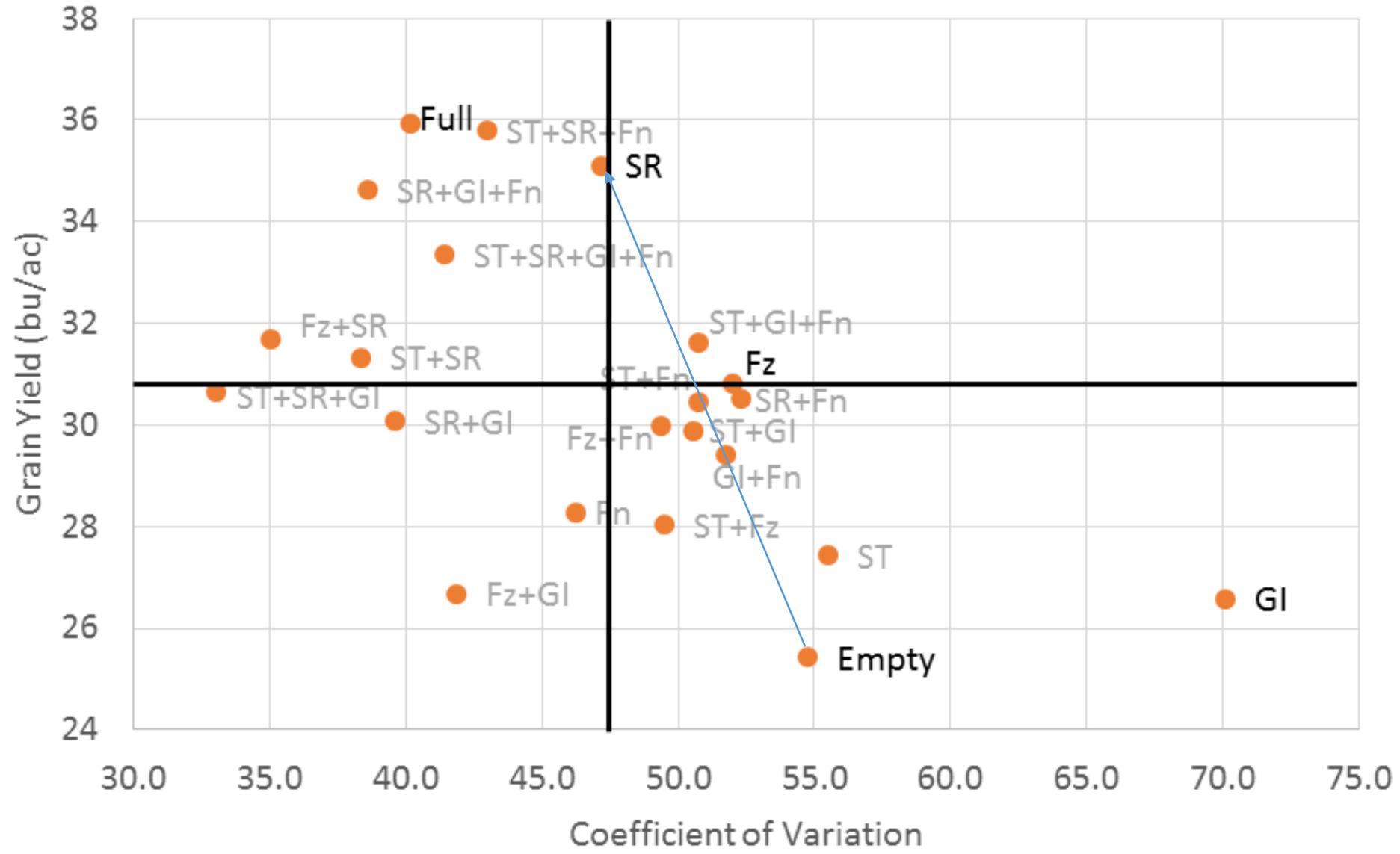
ST = Seed Treatment; Fz = Starter N Fertilizer; GI = Granular Inoculant; Fn = Foliar Fungicide; SR = High Seeding Rate

High Yielding Site Years



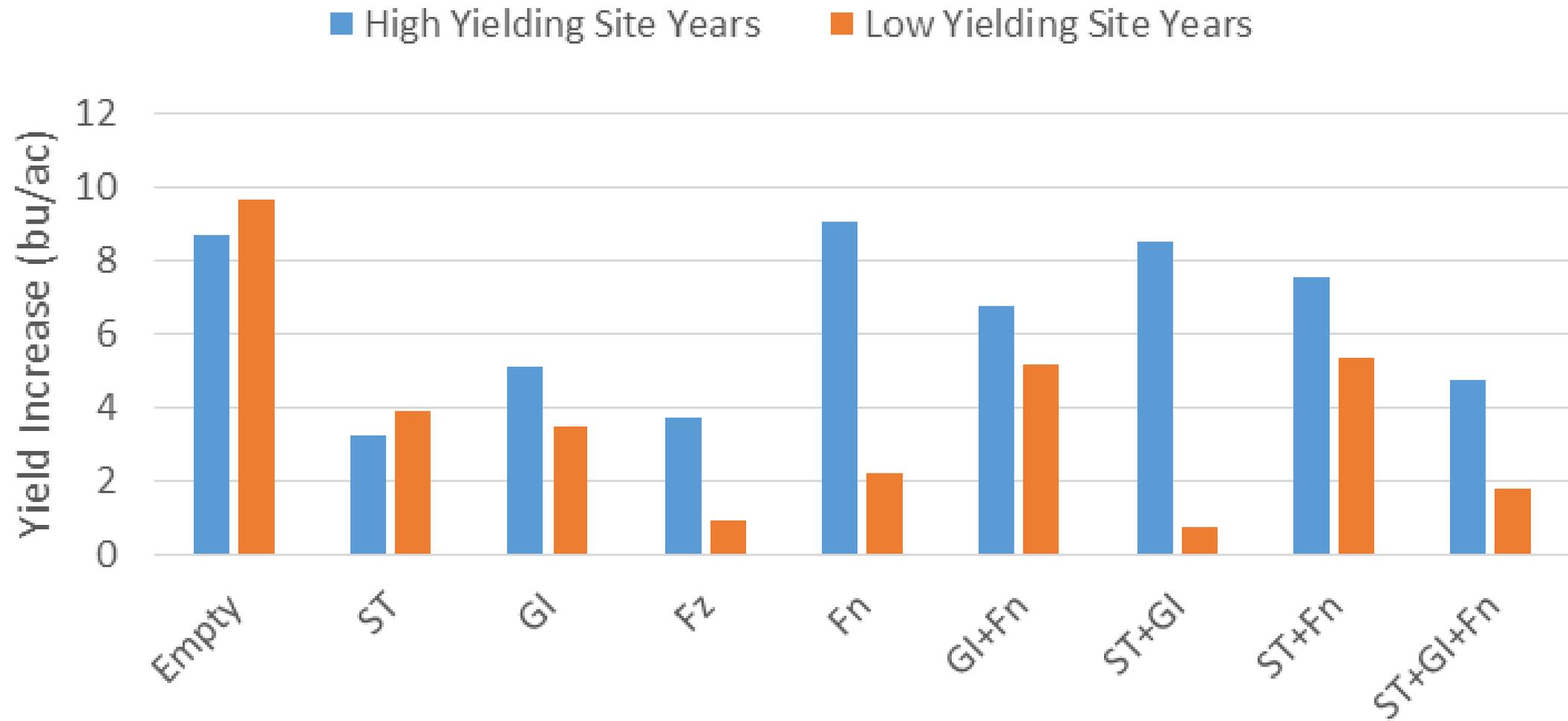
ST = Seed Treatment; Fz = Starter N Fertilizer; GI = Granular Inoculant; Fn = Foliar Fungicide; SR = High Seeding Rate

Low Yielding Site Years

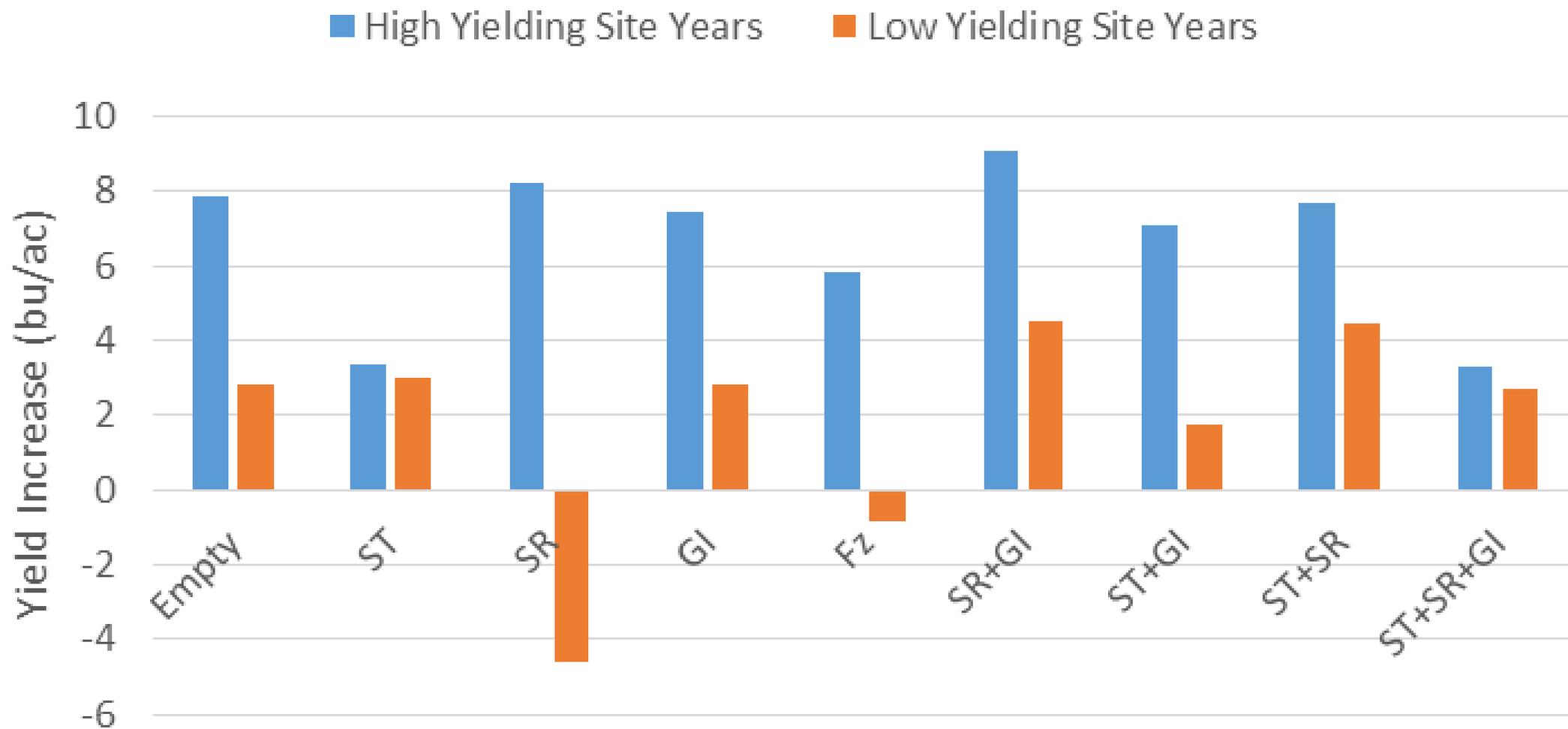


ST = Seed Treatment; Fz = Starter N Fertilizer; GI = Granular Inoculant; Fn = Foliar Fungicide; SR = High Seeding Rate

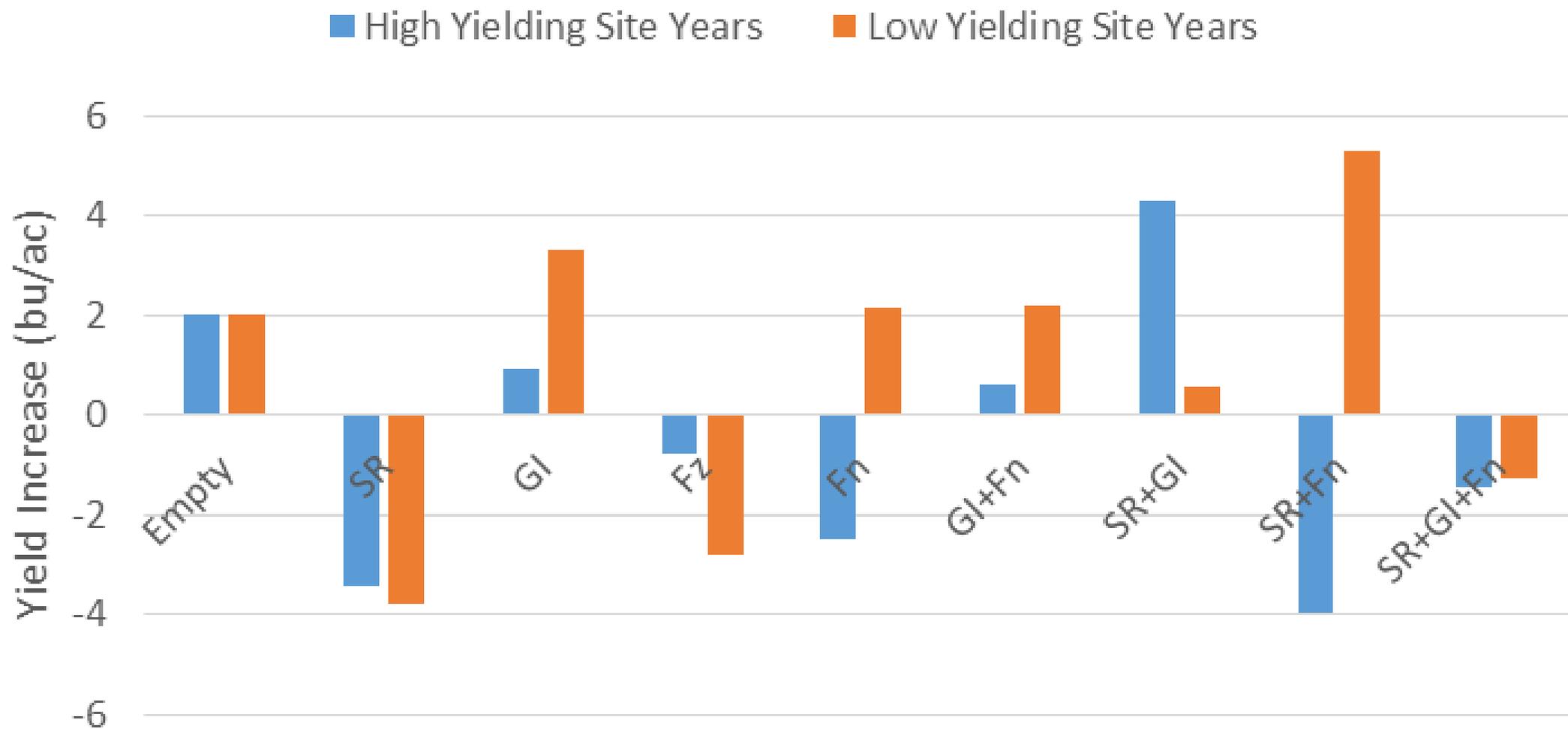
Yield Increase of Adding High Seeding Rate to Various Input Packages



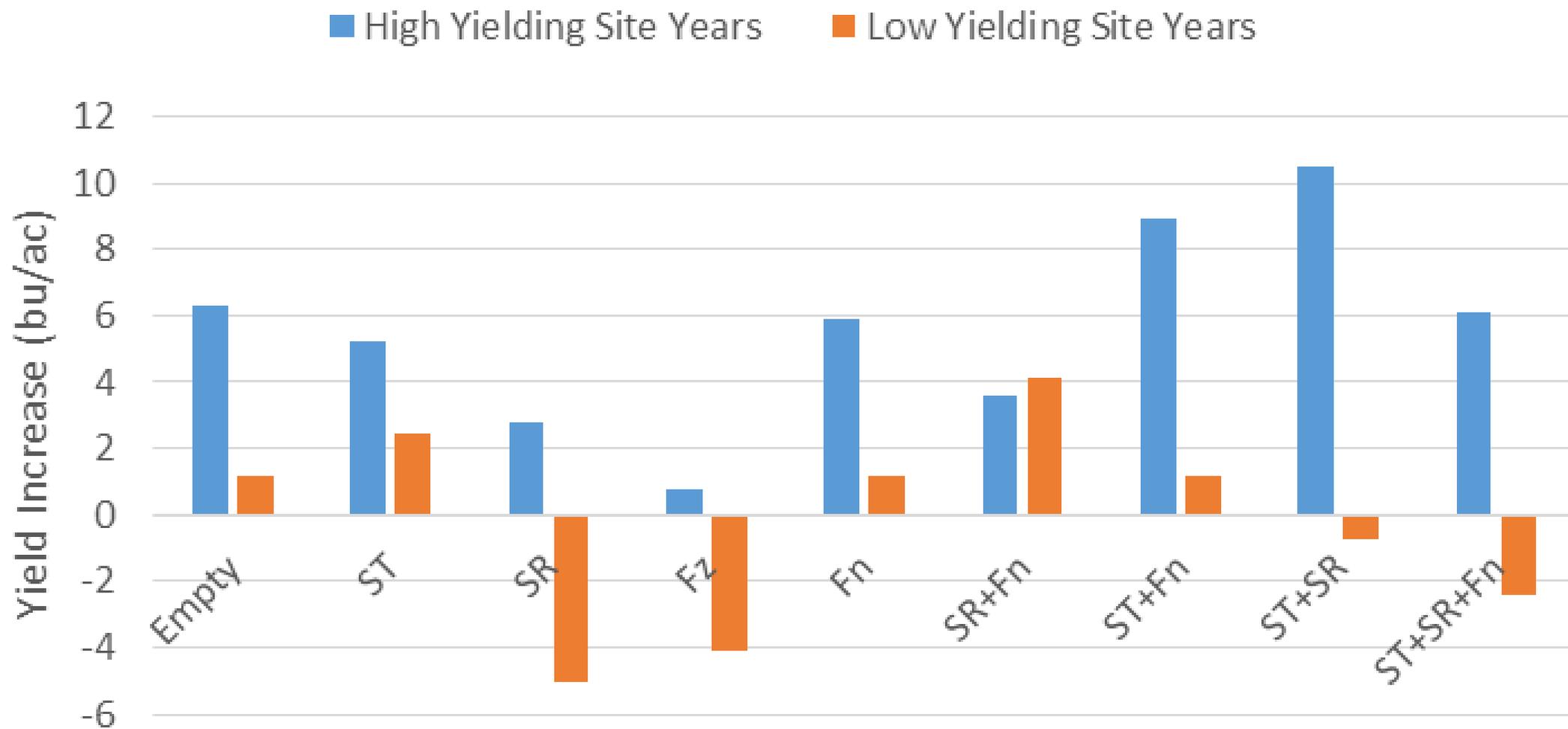
Yield Increase of Adding Foliar Fungicide to Various Input Packages



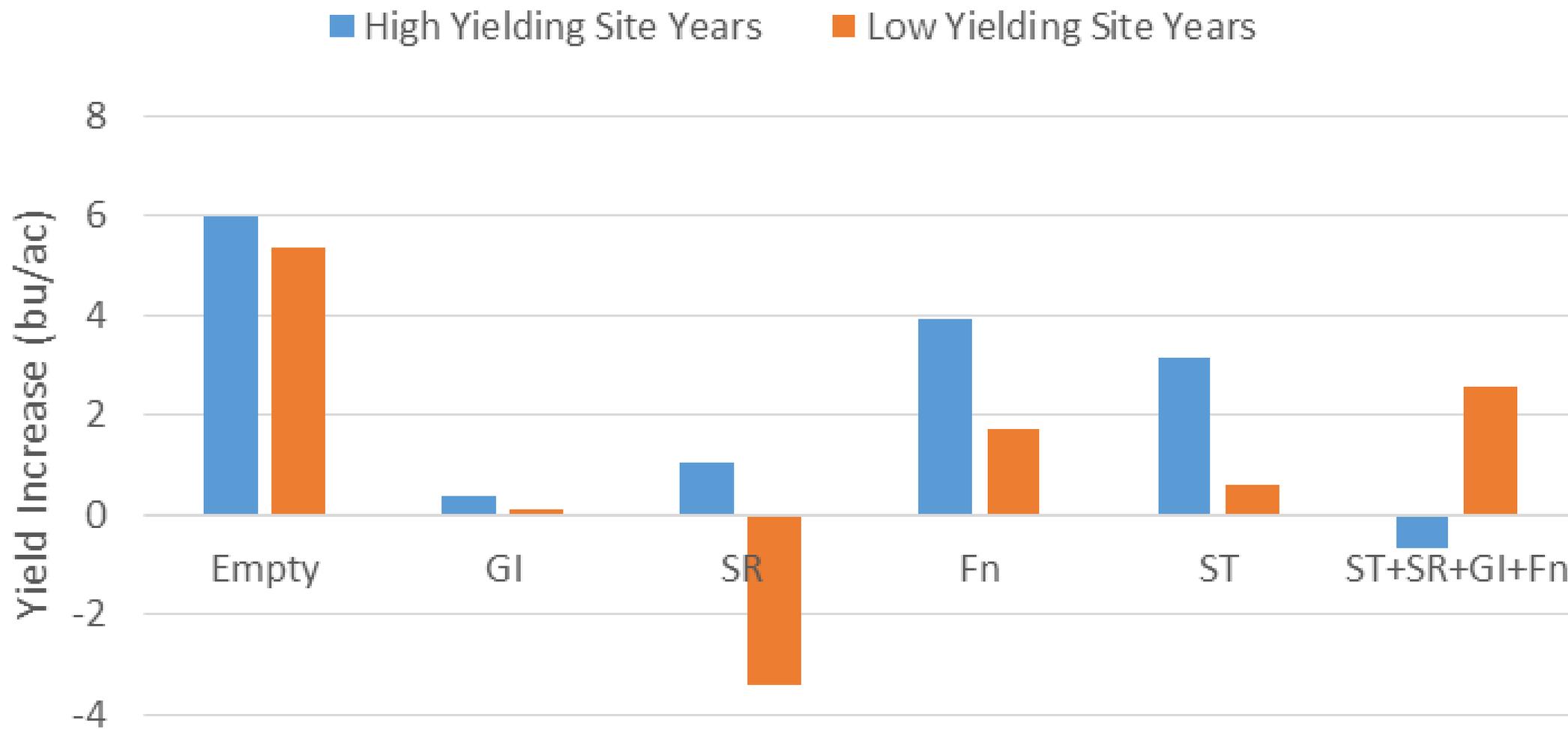
Yield Increase of Adding **Seed Treatment** to Various Input Packages



Yield Increase of Adding Granular Inoculant to Various Input Packages



Yield Increase of Adding Starter N Fertilizer to Various Input Packages



Costs of Production

Input	\$/ac
Low Seeding Rate	20.61
High Seeding Rate	41.23
Foliar Fungicide	44.94
Starter N Fertilizer	14.40
Liquid Inoculant (@ Low Seeding Rate)	2.70
Liquid Inoculant (@ High Seeding Rate)	5.40
Granular Inoculant	9.50
Seed Treatment (@ Low Seeding Rate)	5.77
Seed Treatment (@ High Seeding Rate)	11.55
Return	\$/bu
Price for Peas	7.00

- **CDC Meadow Seed = \$10.50/bu**
 - TKW = 220g/1000seeds
 - Bushel Weight = 60 lbs/bu
- **Headline EC = \$15.27/ac**
- **Priaxor DS = \$19.67/ac**
 - 2 applications (@ \$5/pass) = \$10/ac
- **Urea @ \$0.48/lb N, 30 lbs N/ac**
- **Granular Cell-Tech = \$72/25lb bag**
 - 3.3lbs inoculant/ac for 10" row spacing
- **Liquid Cell-Tech = \$55/3L bag**
 - 1089 kg seed treated/bag
- **Apron Maxx RTA = \$460/10L**
 - 235mL/100kg seed

*Costs of production & price for peas from 2014 Crop Planning Guide from Saskatchewan Ministry of Agriculture

Net Revenue

High Yielding Sites

Treatment Ranking	\$/ac
SR+GI+Fn	400
ST+SR+GI	399
SR+GI	381
SR+Fn	378
ST+SR+GI+Fn	378
GI+Fn	373
ST+GI+Fn	371
ST+GI	366
GI	365
SR	365
Full	359
Fz+SR	358
Fz	355
Fz+GI	354
Fz+Fn	351
ST+Fz	344
ST+SR+Fn	339
Fn	338
ST	337
ST+SR	330
Empty	328
ST+Fn	315

Low Yielding Sites

Treatment Ranking	\$/ac
SR	199
Fz	178
ST+GI	173
ST	163
ST+SR	161
Fz+SR	161
SR+GI	160
GI	156
Empty	155
ST+Fz	153
ST+SR+GI	152
ST+SR+Fn	147
SR+GI+Fn	147
Fz+GI	142
ST+GI+Fn	140
ST+Fn	139
GI+Fn	131
Full	130
Fn	130
Fz+Fn	127
ST+SR+GI+Fn	126
SR+Fn	122

Conclusions

- Under “Good” growing conditions:
 - Input combinations of **2 or 3 interacted in additive** fashion
 - Generally, yield and **yield variability improved** with each **additional input** added
 - **SR, Fn and GI** were the inputs that most **consistently increased yields and economic return**, especially when applied **all in combination**
 - ST and Fz provided inconsistent effects on yield
- Under “Poor” growing conditions:
 - Yield was **more variable** and input interactions were generally **not additive**
 - Overall response to SR and Fn was significant; however, the **high cost of the Fn** resulted in those treatments having the **lowest economic return**
 - Either **SR or Fz** applied alone **maximized yield and economic return**