Corn Seeding Rate Management

2014 Syngenta Technical Services

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Corn Seeding Rate – Finding the Right Balance

How do we manage the fine line ?

- Seeding rate *below* optimum
  - Big ears
  - Yield not maximized
- Seeding rate *above* optimum
  - More ears
  - Yield increase does not justify additional seed cost

Number of ears from 1/1000th of an acre at various seeding rates

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Hybrid Response to Seeding Rate - Ear Flex

32,000 28,000 23,000 19,000 15,000

Plants/ Acre

- Ear flex response will vary by hybrid

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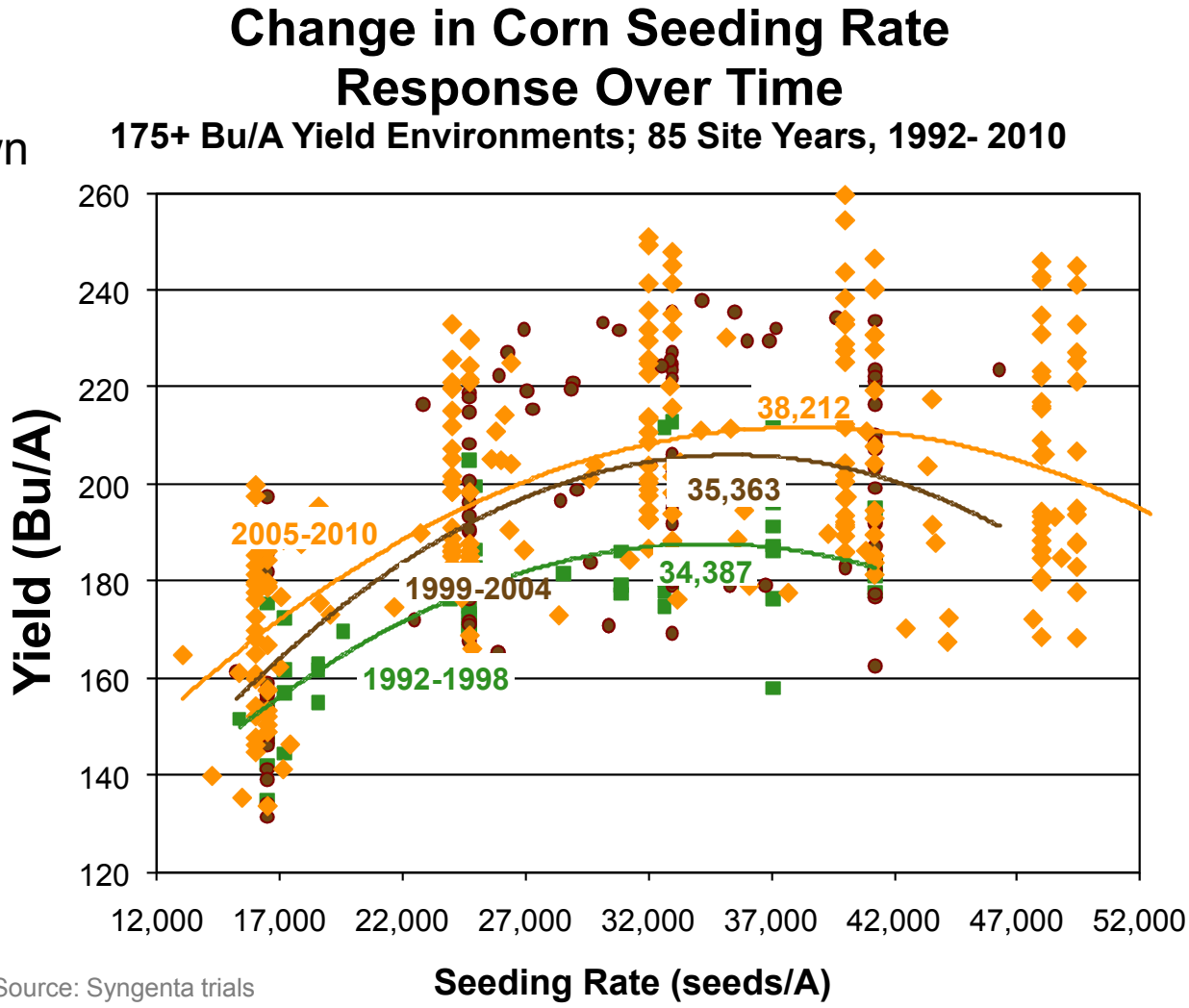
Why are Corn Population Recommendations Increasing?

- Syngenta Technical Services data have shown an increase in seeding rate recommendations
- What is causing this trend?
  - New genetics?
  - Hybrids bred to tolerate higher populations?



Source: Syngenta trials

Seeding Rate Study - Goals

- Study conducted to:
  - Quantify relationship between seeding rate and yield
  - Examine the effect of yield environment
  - Measure the effect of grain price and seed cost
  - Characterize differences in hybrid response
- End Goal:
  - Develop hybrid- and yield environment-specific seeding rate recommendation for maximum profitability potential

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Seeding Rate Study - Design

- Long-term, multi-location study
  - 1992 to 2013; up to 10 locations per year
  - Wide maturity range of adapted hybrids (slightly early to full season)
  - Trials were planted in a broad range of environments
    - Yield environments: < 125 to > 225 Bu/A
    - Conventional tillage to no-till
    - Dryland to irrigated

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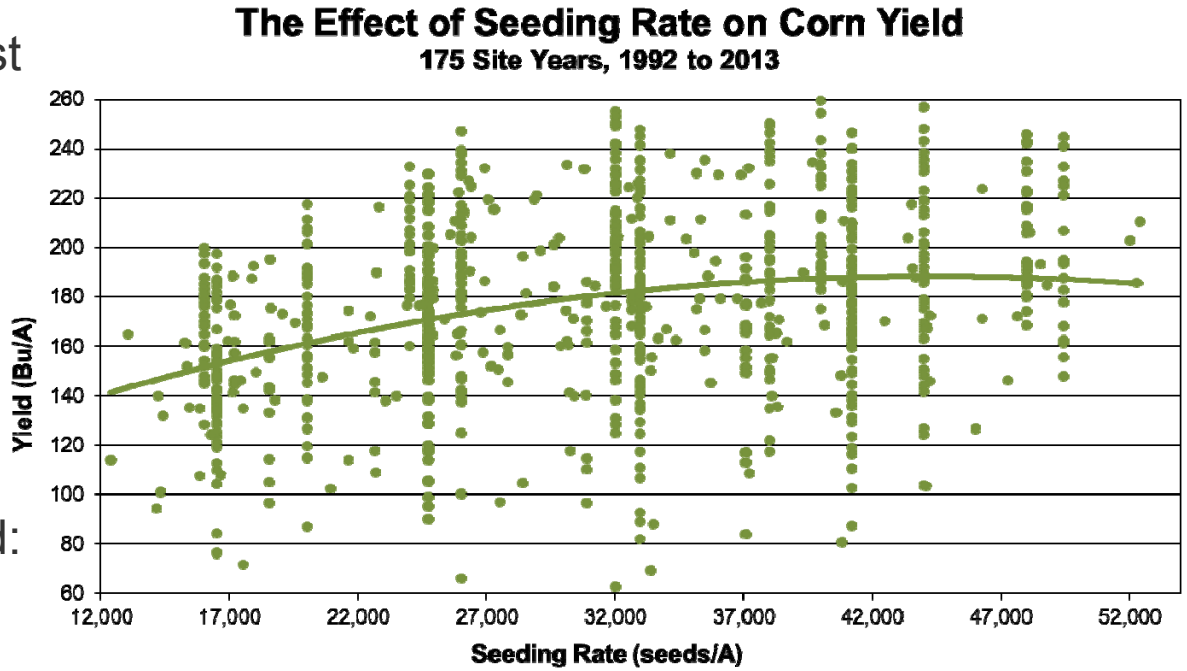
Corn Seeding Rate Summary (All Locations)

- Yield increased as harvest population increased
- Lack of a strong relationship between harvest population and yield (R^2 = 0.14)
- Other factors are involved:
  - Hybrid
  - Weather
  - Irrigation
  - Fertility
  - ***Yield potential of field***



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Source: Syngenta trials

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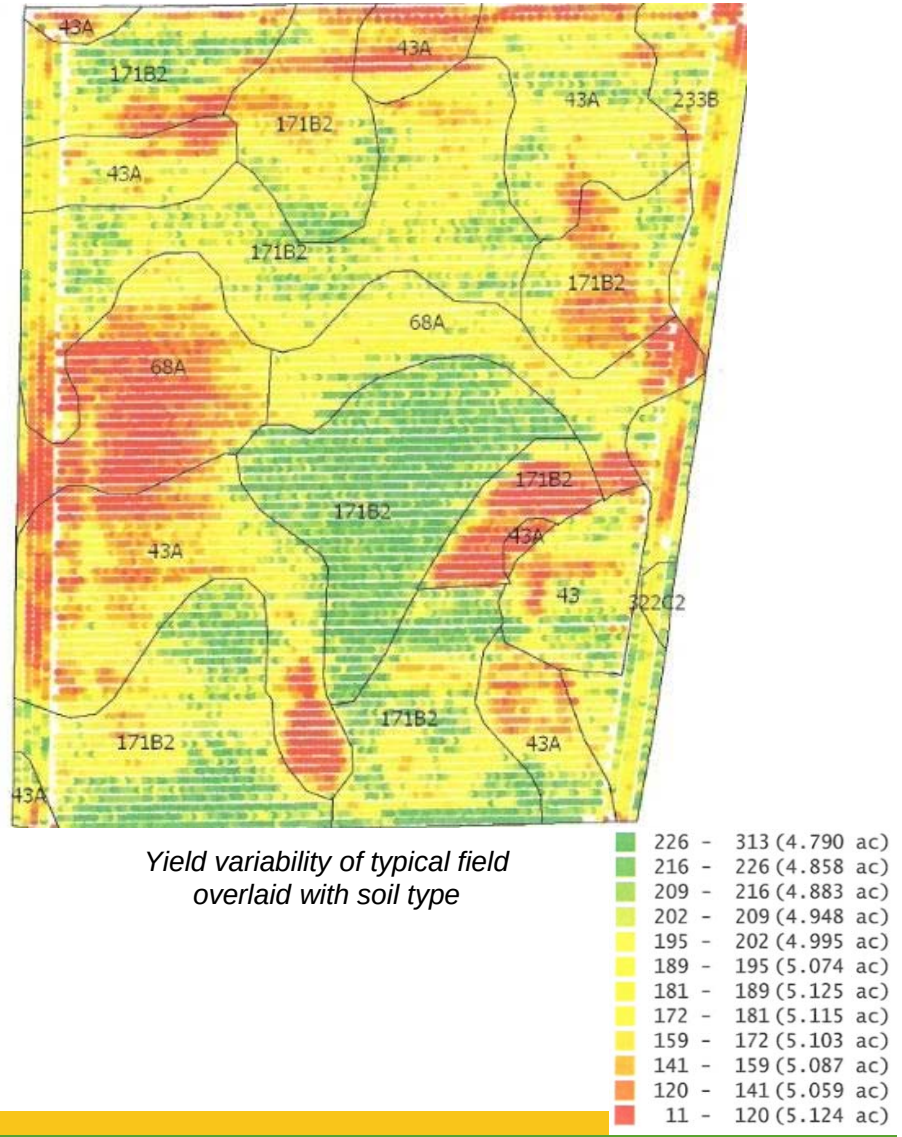
Determining Optimum Seeding Rate

1. Understand field yield potential
   - Based on proven field history
   - Multiple-year average
   - Fields can be divided into zones
2. Determine the seeding rate for the environment that gives the highest economic return per acre
3. Understand how the hybrid planted will respond compared to other hybrids
   - Will cover later!



Yield variability of typical field overlaid with soil type

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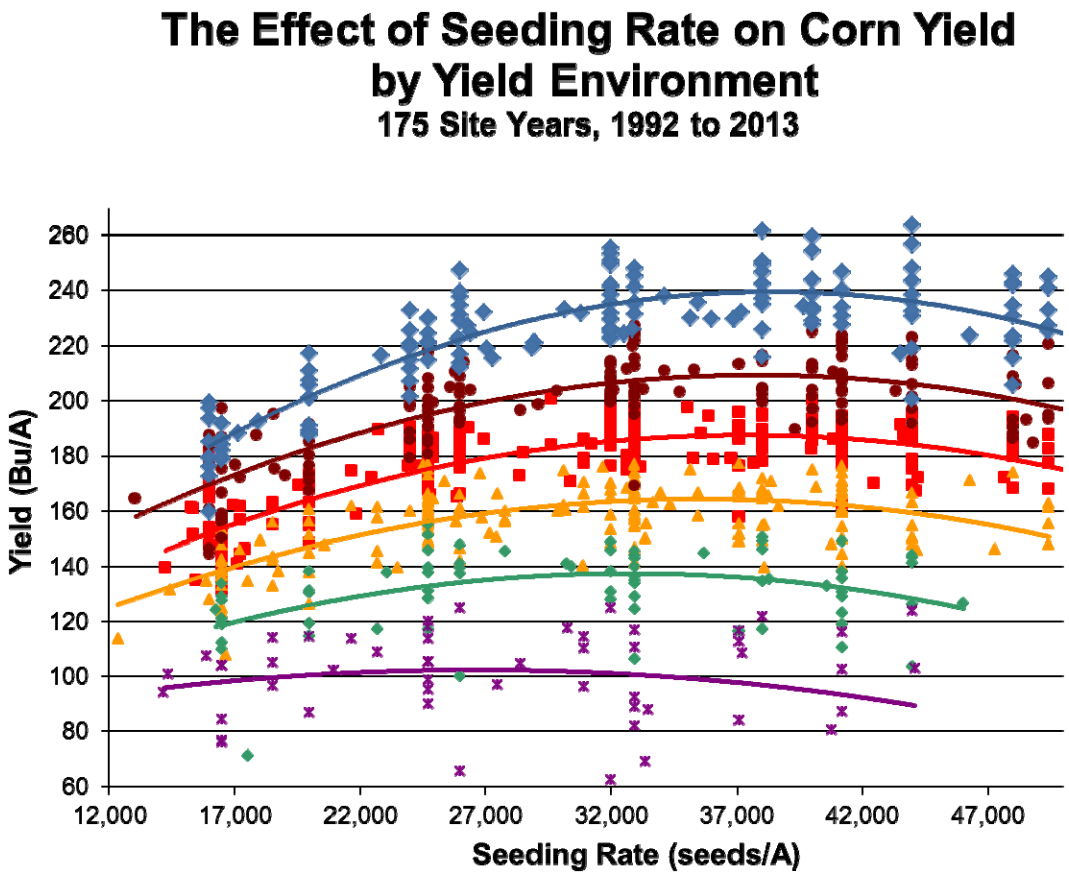
Seeding Rate Influence on Yield

- Seeding rate is dependent on yield potential of field
- Other factors to consider:
  - Commodity price
  - Seed cost producing the highest yield does not guarantee maximum economic return
- Must offset increased seed cost

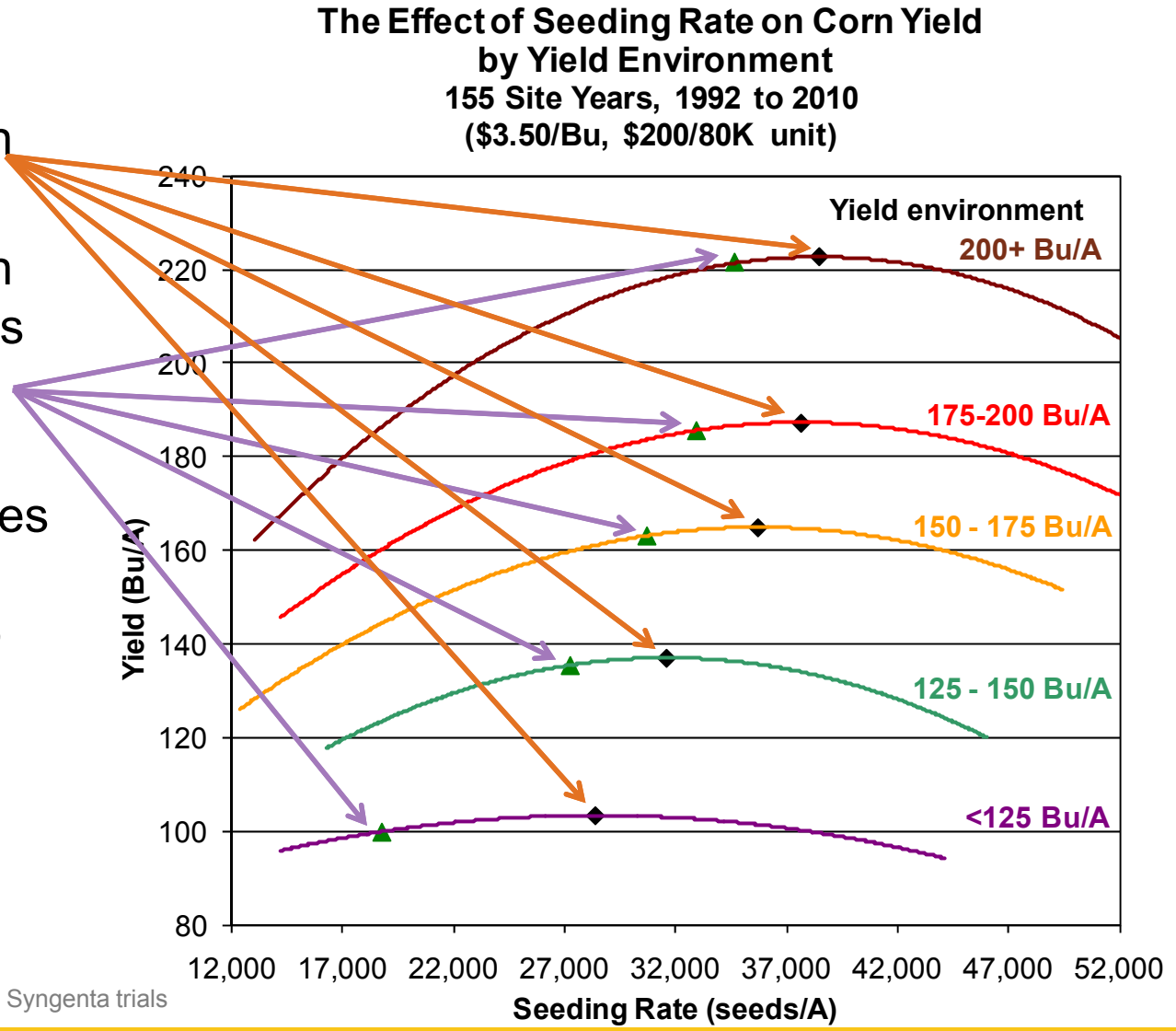


Yield Environment (Bu/A)	225+	200-225	175-200	150-175	125-150	<125
R-squared	0.72	0.61	0.65	0.49	0.19	0.04

Source: Syngenta trials

Economics of Seeding Rate

- Seeding rate at which yields are maximized
- Seeding rate at which best economic returns are achieved
- As commodity prices increase, seeding rates with best economic return move closer to seeding rate that maximized yield



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Source: Syngenta trials

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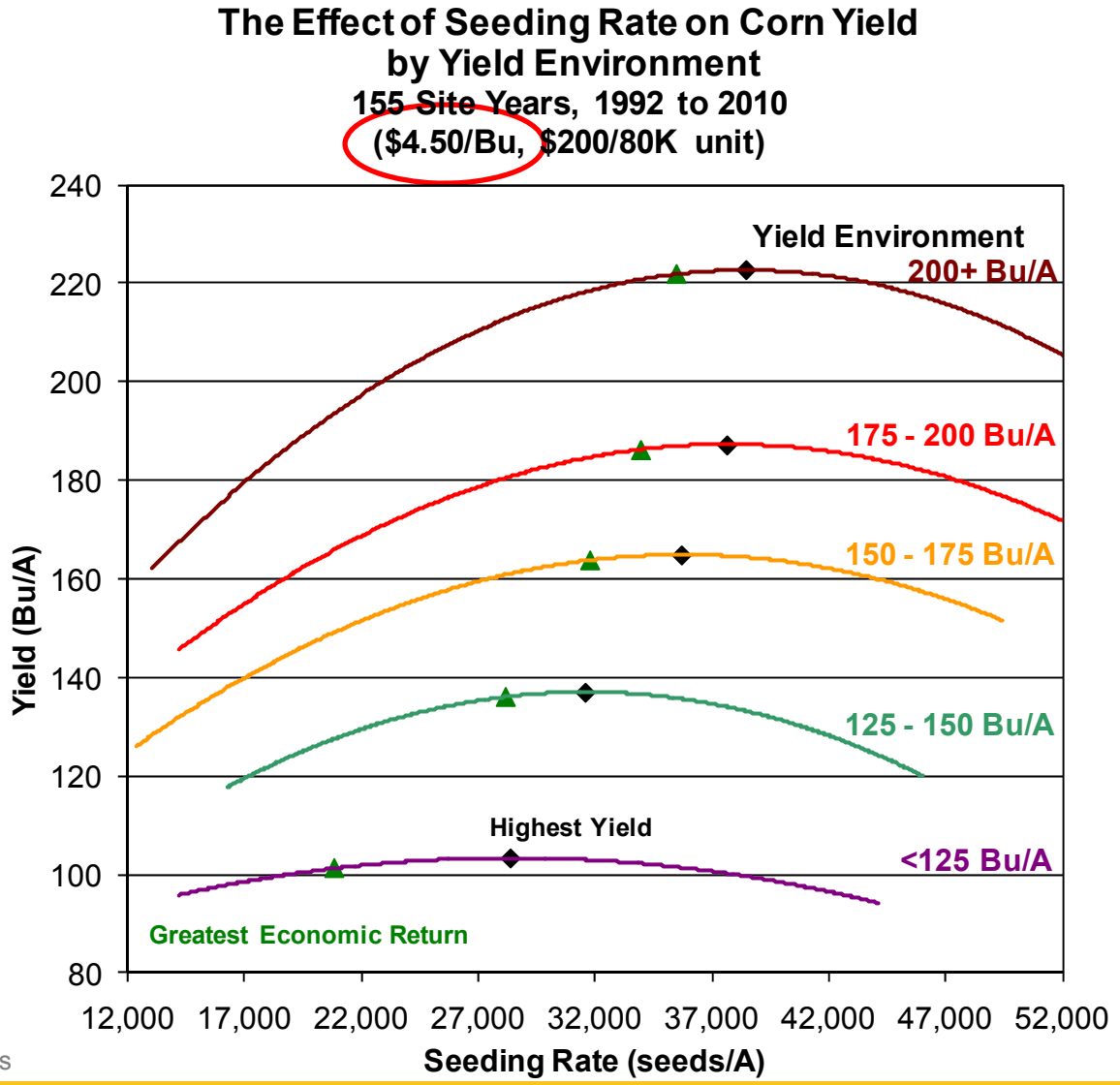
Economics of Seeding Rate

- Assuming $4.50 per bushel
- Seeding rate with greatest economic return shifts



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Source: Syngenta trials

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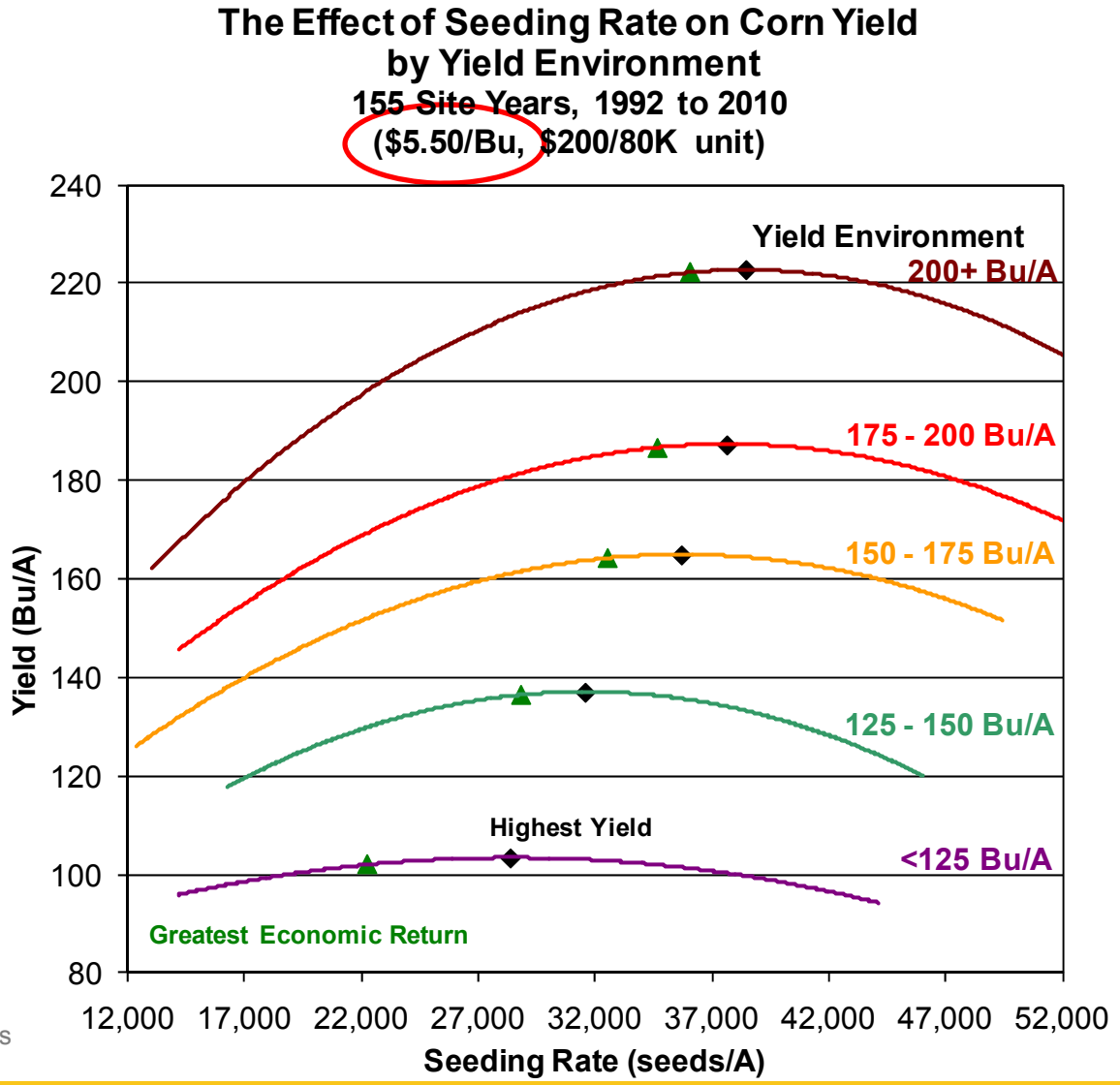
Economics of Seeding Rate

- Assuming $5.50 per bushel
- Seeding rate with greatest economic return shifts further
- Seeding rates for your farm should consider anticipated grain price



Source: Syngenta trials

Seeding Rate and Yield Environment Conclusions

- Yield response to seeding rate varied by yield potential of the field
- As yield potential of the field increased:
  - The seeding rate producing the highest yield increased
  - Seeding rate with the greatest economic return increased
- Higher yielding environments react more to adjusting seeding rates

Optimum Planting Rate Recommendations

1. Determine yield environment
2. Estimate grain market price
3. Determine **optimum** seeding rate

Yield Environment (Bu/A)	Highest Yielding Seeding Rate (seeds/A)	Optimum Seeding Rate (seeds/A) by Commodity Price ($/Bu) (Seed Cost = $250/80K Unit)				
		$2.00	$3.00	$4.00	$5.00	$6.00
225+	38,400	31,300	33,700	34,900	35,600	36,000
200 - 225	38,300	29,700	32,600	34,000	34,900	35,500
175 - 200	37,300	27,400	30,700	32,300	33,300	34,000
150 - 175	35,500	24,500	28,200	30,000	31,100	31,900
125 - 150	32,700	21,800	25,400	27,300	28,400	29,100
< 125	26,600	16,000	16,500	17,400	19,200	20,500

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Source: Syngenta trials

Role of Economic Factors

- Historically, economic returns are influenced more by grain price than by seed cost
- Rule of thumb:
  - a $1.00 increase in grain price will influence optimum seeding rate about the same as a $50/80K unit decrease in seed cost

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Characterizing Hybrid Seed Rate Response

Seeding rate adjustment range:

- -15% from optimum
- Optimum
- +15% from optimum

Seeding rate response ratings:

★ = Best probability for obtaining highest economic return

● = Hybrid will perform well under normal conditions

▼= Economic returns are rarely achieved; hybrid is better suited to other seeding rates

16,000 Plants/A *40,000 Plants/A*

Source: Syngenta trials

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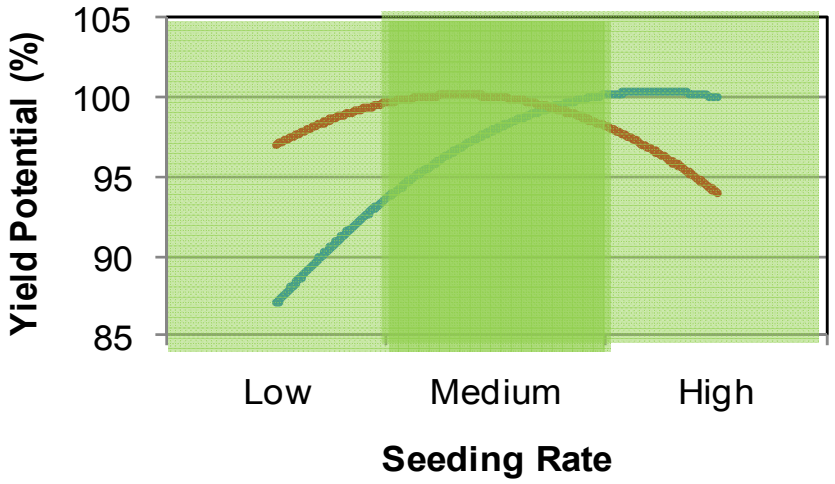
Example - Hybrid Seeding Rate Ratings

Hybrid Series	Seeding Rate Adjustment		
	-15%	Optimum	+15%
Hybrid A	▼	★	★
Hybrid B	★	★	●



Source: Syngenta trials

Adjusting Seeding Rate for Hybrid

1. Choose the right hybrid for the field
2. Estimate yield potential and grain price
3. Use **optimum** seeding rate derived from yield environment and expected grain price chart
    - The optimum seeding rate is a starting point
4. Fine-tune seeding rate based on ratings in “Hybrid Seeding Rate Response Chart”

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Customizing the Seeding Rate

Example:

1. Determining optimum seeding rate
   - 175-200 Bu/A yield environment
   - $3.00/Bu commodity price and $250/80K unit seed price
   - Optimum seeding rate is 30,700 seeds per acre
2. Adjusting seeding rate for hybrid
   - Hybrid A will be planted and is rated as:

-15%	Optimum	+15%
▼	★	★

   - Hybrid maintains optimum economic returns when planted from **30,700** to **35,300** seeds/A (30,700 + 15% = 35,300)
   - Root strength should be considered prior to increasing population

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Source: Syngenta trials

Enhanced Seeding Rate Applications

Hybrid example:

- What if this hybrid is planted with a variable rate planter?
  - Yield range of field is 130 to 180 Bu/A
- Reference optimum seeding rate in chart for grain price

Yield Environment (Bu/A)	Highest Yielding Seeding Rate (seeds/A)	Optimum Seeding Rate (seeds/A) by Commodity Price ($/Bu) (Seed Cost = $250/80K Unit)				
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Source: Syngenta trials

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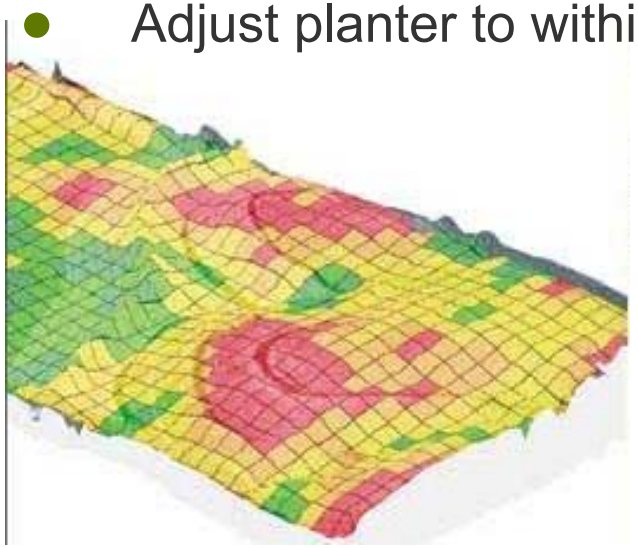
Enhanced Seeding Rate Applications

Hybrid example:

- Hybrid is rated ★ at both optimum and 15% over optimum
  - Calculate 15% over optimum for all environments
- Adjust planter to within the seeding rate range for each environment



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Yield Environment (Bu/A)	Seeding Rate (seeds/A)	
	Optimum	+15%
175 - 200	30,700	35,300
150 - 175	28,200	32,400
125 - 150	25,400	29,200

Source: Syngenta trials

Hybrid Response to Seeding Rates

Using hybrid seeding rate response ratings:

- Do not use ratings to drive hybrid choice
  - Choose the hybrid that is right for the field first, then look at ratings
- Ratings are based only on yield response
  - Stalk and root strength can also influence performance at high population
- Drought tolerance, disease tolerance, high pH tolerance, and plant and ear height are also important hybrid characteristics to consider when selecting a hybrid

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Questions ?

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