

# Dry Bean Management

## Getting it Right production meeting

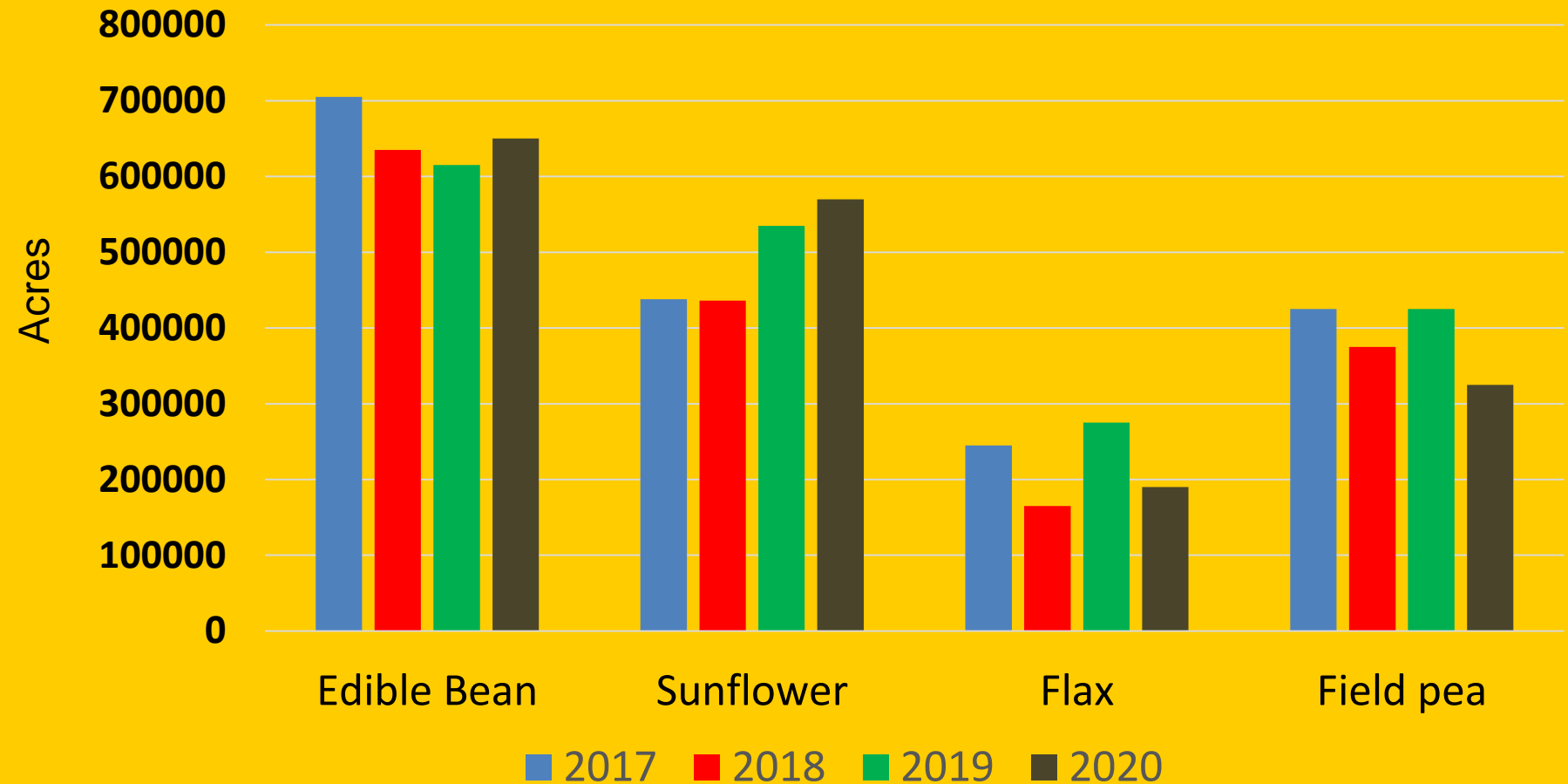
Hans Kandel  
Extension Agronomist

EXTENDING KNOWLEDGE >> CHANGING LIVES

NDSU

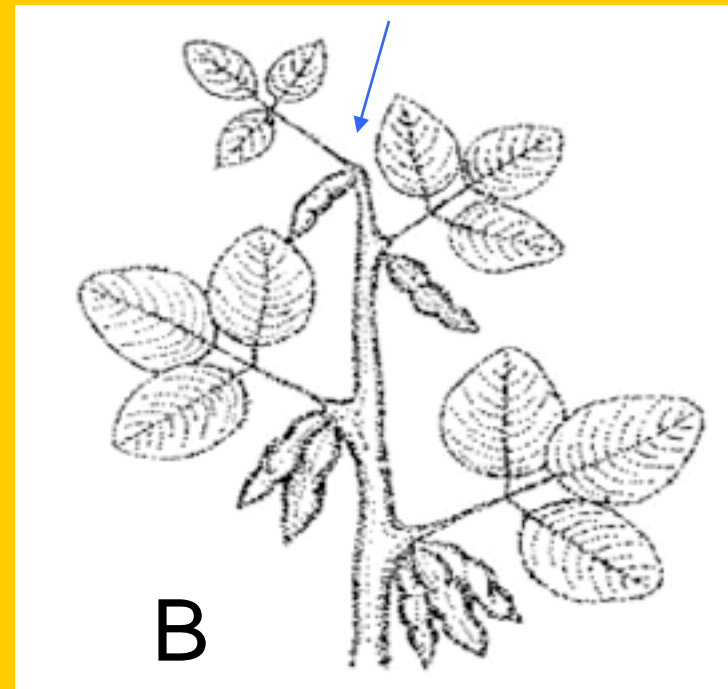
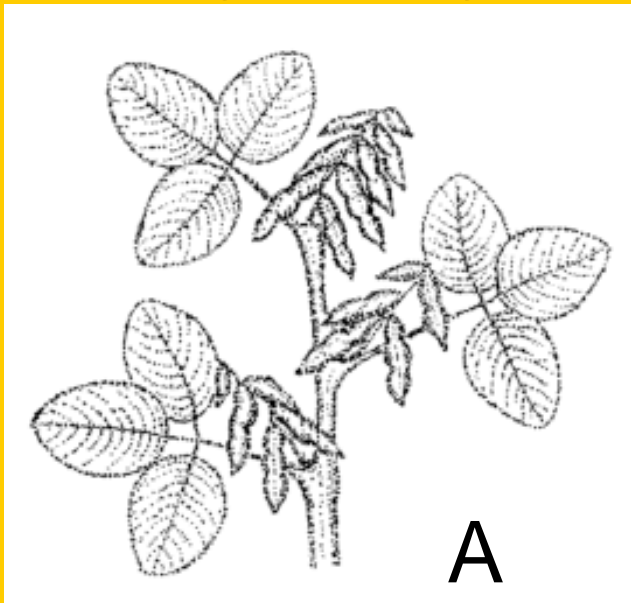
EXTENSION

# North Dakota Planted Acres by Crop 2017-2019, projected 2020



# Plant Growth Forms

- Determinate (A)
  - Growth terminates at an inflorescence
- Indeterminate (B)
  - Vegetative growth continues indefinitely when favorable



# Plant Architectural Classification

Genetics	Type	Type Refined	Description
<i>Determinate</i>	I	Ia	Erect Bush
		Ib	
<i>Indeterminate</i>	II	IIa	Upright short vine
		IIb	Upright vine
	III	IIIa	Prostrate Vine
		IIIb	
	IV	IVa	Climbing
		IVb	

# Plant Architecture



**Type I**

**Type II**

**Type III**

**Type IV**

# Plant Architecture

Erect  
Bush



Type I

Upright



Type II

Prostrate  
vine



Type III

Climbing

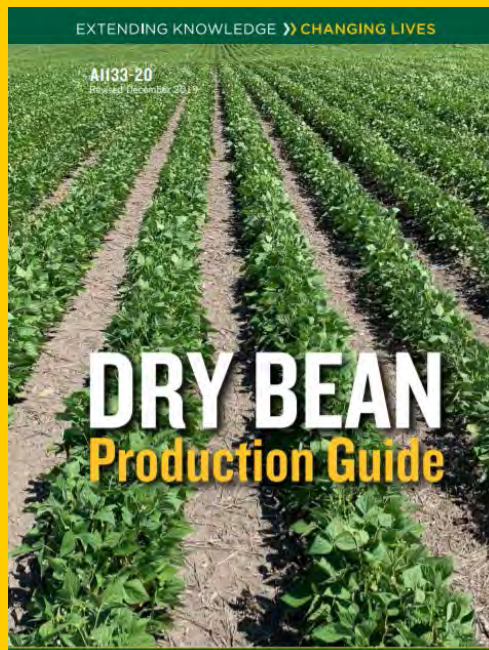


Type IV



# Growth Stages in Production Guide

- Google NDSU Dry Bean Production Guide
- <https://www.ag.ndsu.edu/publications/crops/dry-bean-production-guide>



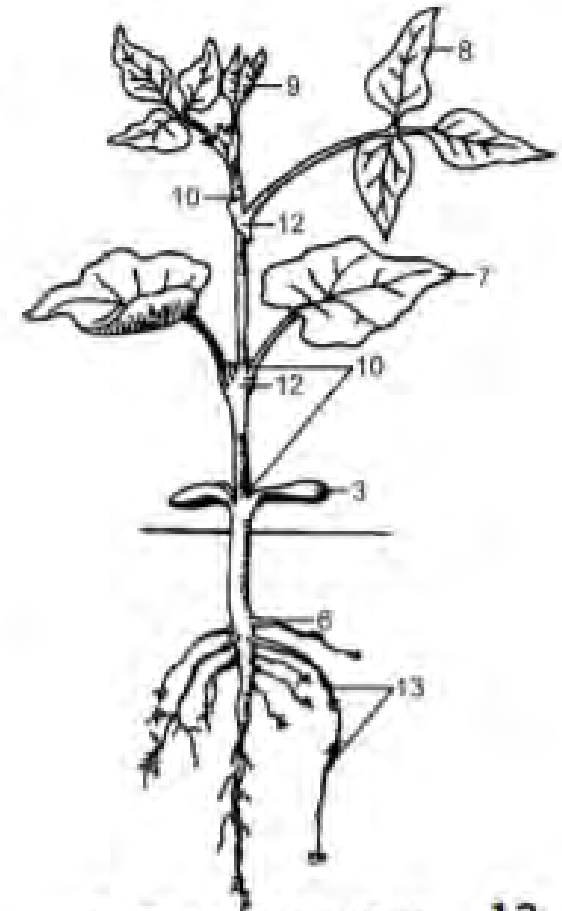
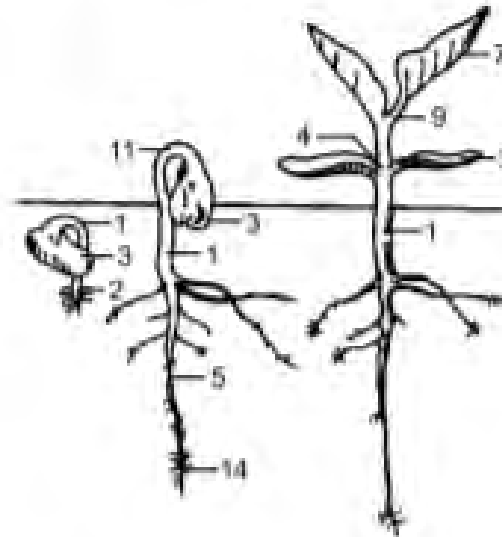
Stage No.	General Description <sup>1</sup> Vegetative Stages	Days from Planting <sup>2</sup>
VE	Hypocotyl emergence (crook stage)	7-8
VC	Cotyledon (seed leaves) and unifoliolate leaves visible	8-9
V1	First fully developed trifoliolate at the third node	10
V2	Second trifoliolate (count when leaf edges no longer touch)	19
V3	Third trifoliolate (secondary branching begins to show in leaf axils)	29

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# Bean plant

**Figure 1. Plant description.**

1. Hypocotyl
2. Radicle
3. Cotyledon (simple leaf)
4. Cotyledonary node
5. Tap root
6. Lateral (branch) root
7. First true leaf (unifoliolate)
8. Trifoliolate leaflet
9. Terminal bud
10. Axillary buds
11. Hypocotyl arch
12. Nodes (point of leaf attachment)
13. Nodules
14. Root hairs





**VE Emergence**

Hypocotyl emergence.



**VC Unifoliate**

Unrolled cotyledons and unifoliate leaves.



**V1 Trifoliate**

First unrolled trifoliate leaf.



**V2 to Vn**

Second unrolled trifoliate leaf, third unrolled trifoliate leaf, fourth, etc.

**V5** bush/determinate or  
**V8** vine/indeterminate

Flower buds visible.



**R1** *Beginning bloom*

**R2** *Beginning pod*

**R3** *50% bloom*

One open flower at any node.

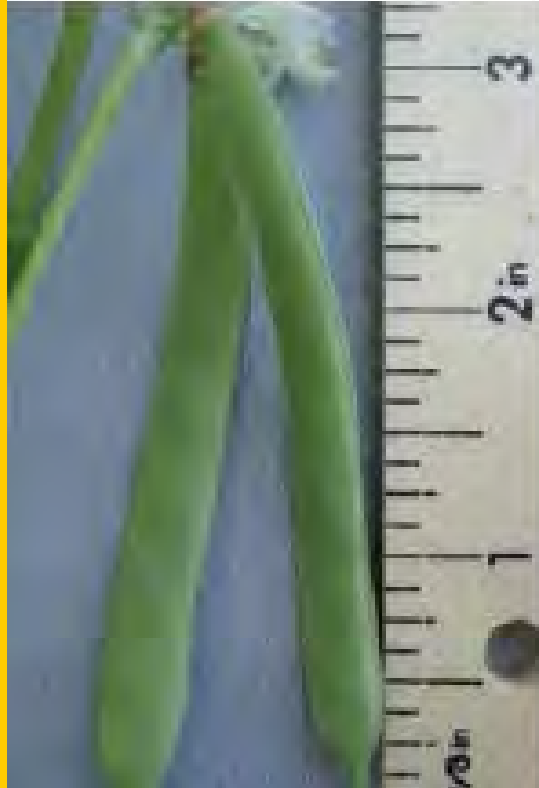
Pods 1/2-inch long at the first flower position (base of the plant) or *pin bean* stage.

Pods 1-inch long at the first flower position. Determinate plants becoming denser, but not taller.



**R4 Full Pod**

Pods 2 to 3 inches long at the first flower position.



**R5 Beginning seed**

Pods 3 to 4 inches long. Seeds discernible.



**R6** 50% seed

Seeds at least 1/4-inch in length over long axis.



**R7** Full seed

Oldest pods with fully developed seeds.



**R8** Beginning maturity

Leaves yellowing over half the plant. Small pods ripening.



**R8.5** Mid maturity

Oldest pods beginning to ripen.



**R9** Full maturity

At least 80% of pods ripening, 30% of leaves still green.



*Ready to harvest*

All pods ripe, 15–18% seed moisture.





# Extension Bulletin A-654-19

- Google “NDSU Variety Trial Results
- <https://www.ag.ndsu.edu/varietytrials/dry-bean>

## VARIETY TRIAL RESULTS

Google Custom Search

NDSU > Variety Trial Results > Dry Bean

### Variety Trial Results

- Alfalfa
- Barley
- Borage
- Buckwheat
- Camelina
- Canola
- Chickpea
- Corn
- Crambe
- Dry Bean
  - 2019 Trial Results
  - 2018 Trial Results

### Dry Bean

This page provides access to Dry Bean Variety Trial Results from all NDSU Research Extension Centers. Variety Trial Results are best viewed in Adobe Reader. Adobe Reader is free software that lets you view and print Adobe Portable Document Format (PDF) files. To access PDF files you need Adobe Reader installed. [If you do not have Adobe Reader on your computer, you can download it below.](#)

[Download Adobe Reader](#)

Here are the latest Dry Bean Variety Trial Results from around North Dakota

-  [2019 Trial Results-Dry Edible Bean Precision Planting, NCREC, Minot](#)
-  [2019 Trial Results-Dry Edible Bean, NCREC, Minot](#)

### Trial Results Publications

[Trial Results - Dry Bean - North Dakota \(A654\)](#)

### Results by Type

- Irrigated
- Black
- Cranberry
- Dark Red Kidney
- Great Northern
- Light Red Kidney

# Extension Bulletin A-654-19

- Several Locations
- Look for trends instead of a single year/location
- Use LSD to make realistic comparisons
- CV: Coefficient of variation
  - Less than 20% for yield

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A654-19

## North Dakota Dry Bean

*Variety Trial Results for 2019 and Selection Guide*

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### List of Tables

- Table 1. North Dakota Dry Edible Bean Harvested Acreage, 2003 to 2019.
- Table 2. North Dakota Dry Edible Bean Production by Commercial Class, 2003 to 2018.
- Table 3. 2019 Cranberry and Kidney Bean Variety Trial – Park Rapids, Minn.
- Table 4. 2019 Miscellaneous Dry Bean Variety Trial – Park Rapids, Minn.
- Table 5. 2019 Cranberry and Kidney Bean Variety Trial – Perham, Minn.



# Dry Bean Diversity



Light Red Kidney



Dark Red Kidney



Pinto



Navy

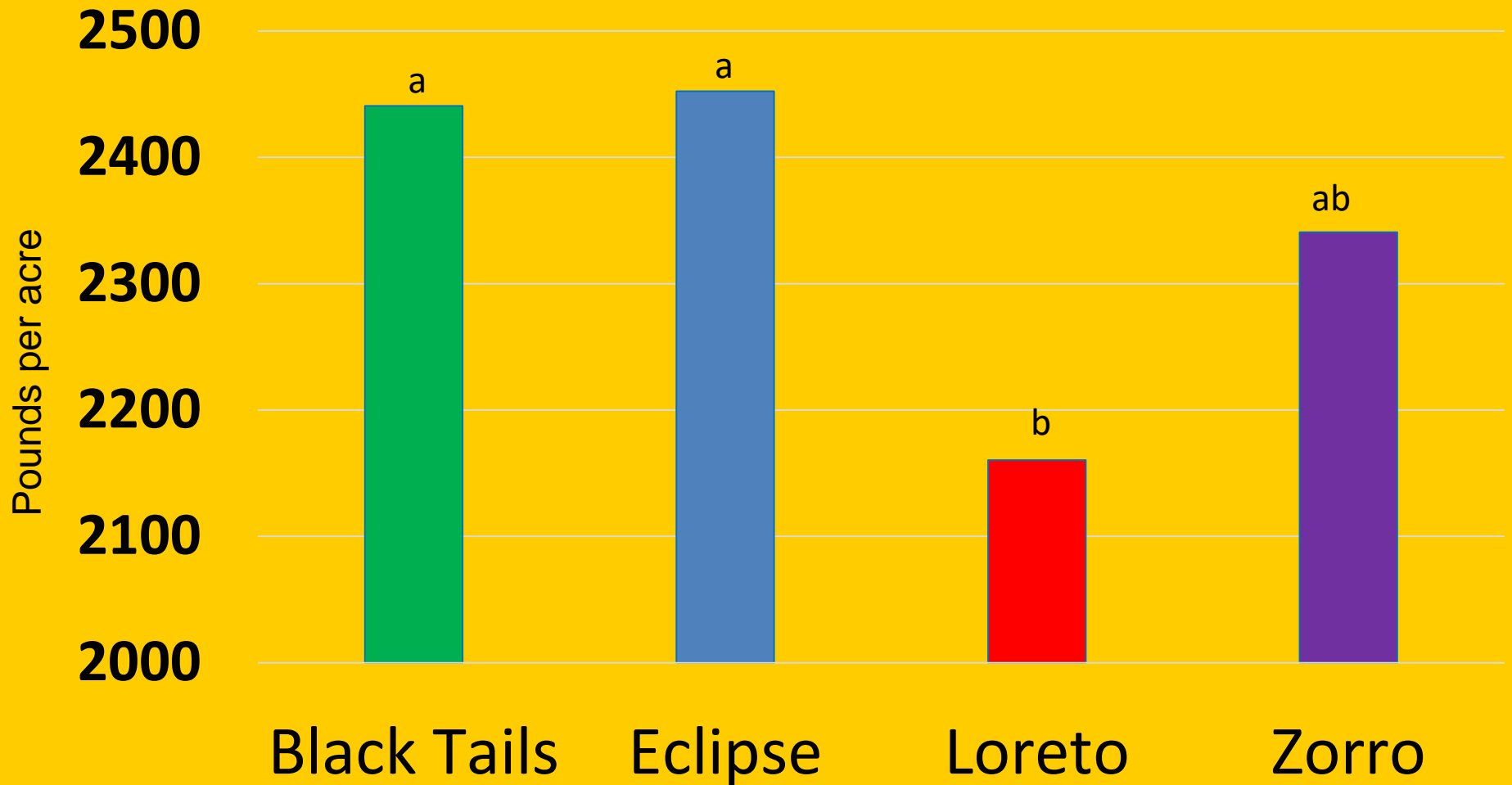


Great Northern



Black

# NDSU 2019 black bean yield 7 environments



# ND Twilight (NDF120287) Black Bean

- Uniform dry-down (similar to Eclipse)
- 2-3 days earlier than Eclipse
- Upright plant architecture
- Resistance to Bean common mosaic virus
- Resistance to rust (race 20-3)
- Intermediate resistance to Soybean cyst nematode and Common bacterial blight



**ND Twilight**



**Zorro**

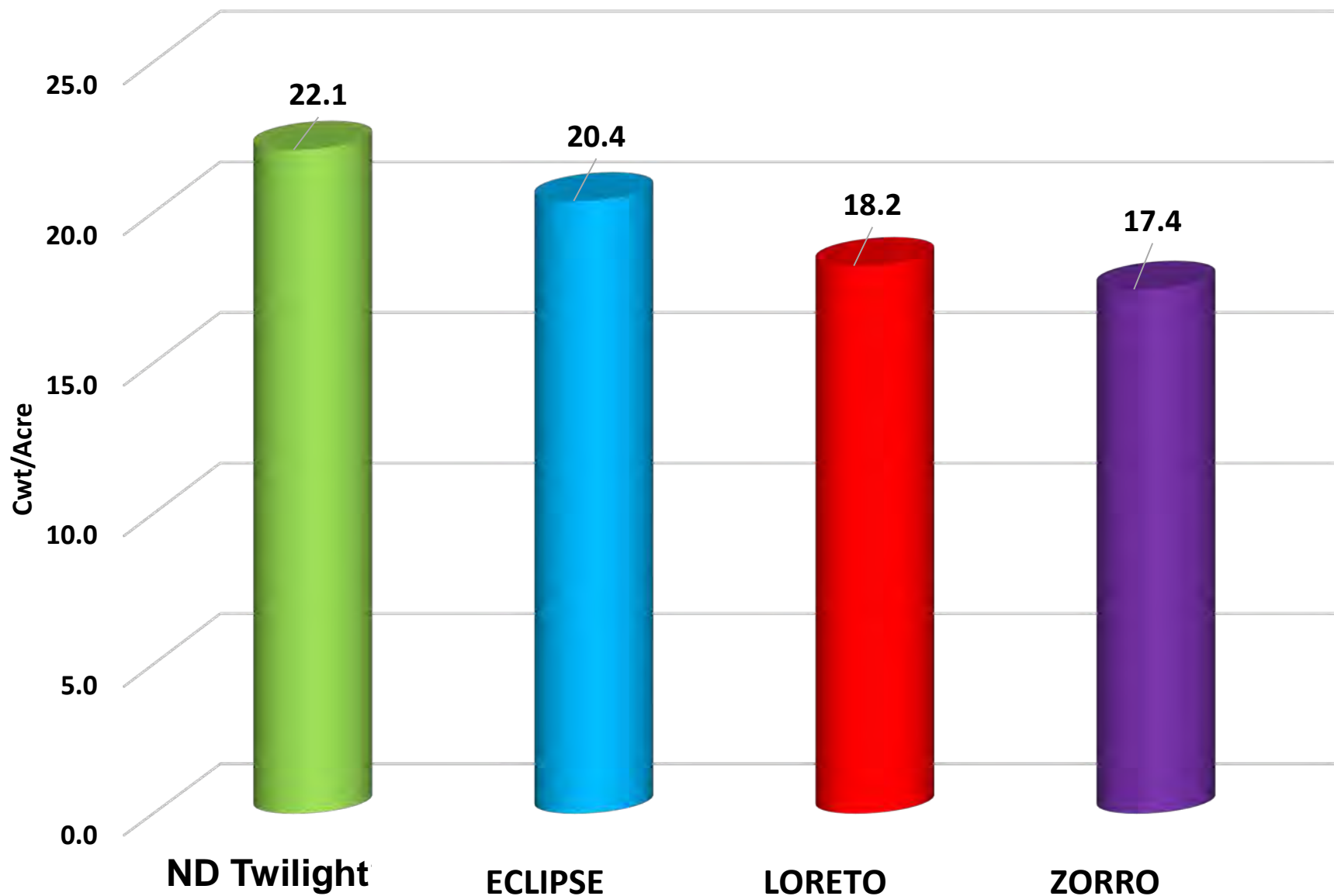


**Loreto**



**Eclipse**

# Seed Yield (Cwt) of Black Bean Varieties Across 21 Common Environments (2014-2019)





# Pinto slow darkening gene







**WINDBREAKER**



**ND-Palomino**



**LAPAZ**



**VIBRANT**


Prosper 2019

**Samples harvested on Nov-2019**

**Slow Darkening Pintos continue to be a better option for delayed harvest**



# Slow darkening gene

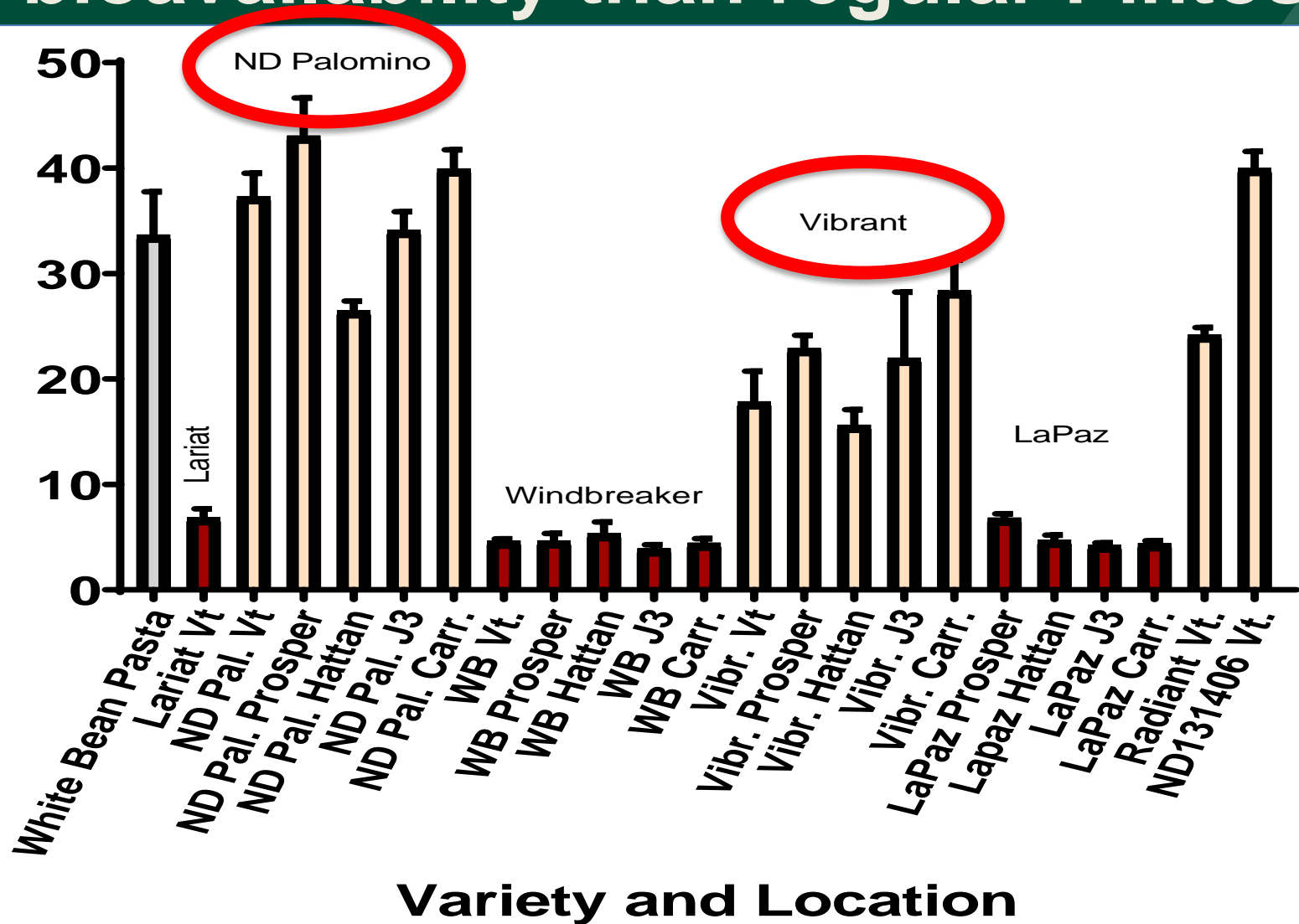
- Public perception:
- - Consumer: dark beans = old  longer cook time
- - Grower: dark beans = poor germination / vigor

# Slow darkening gene

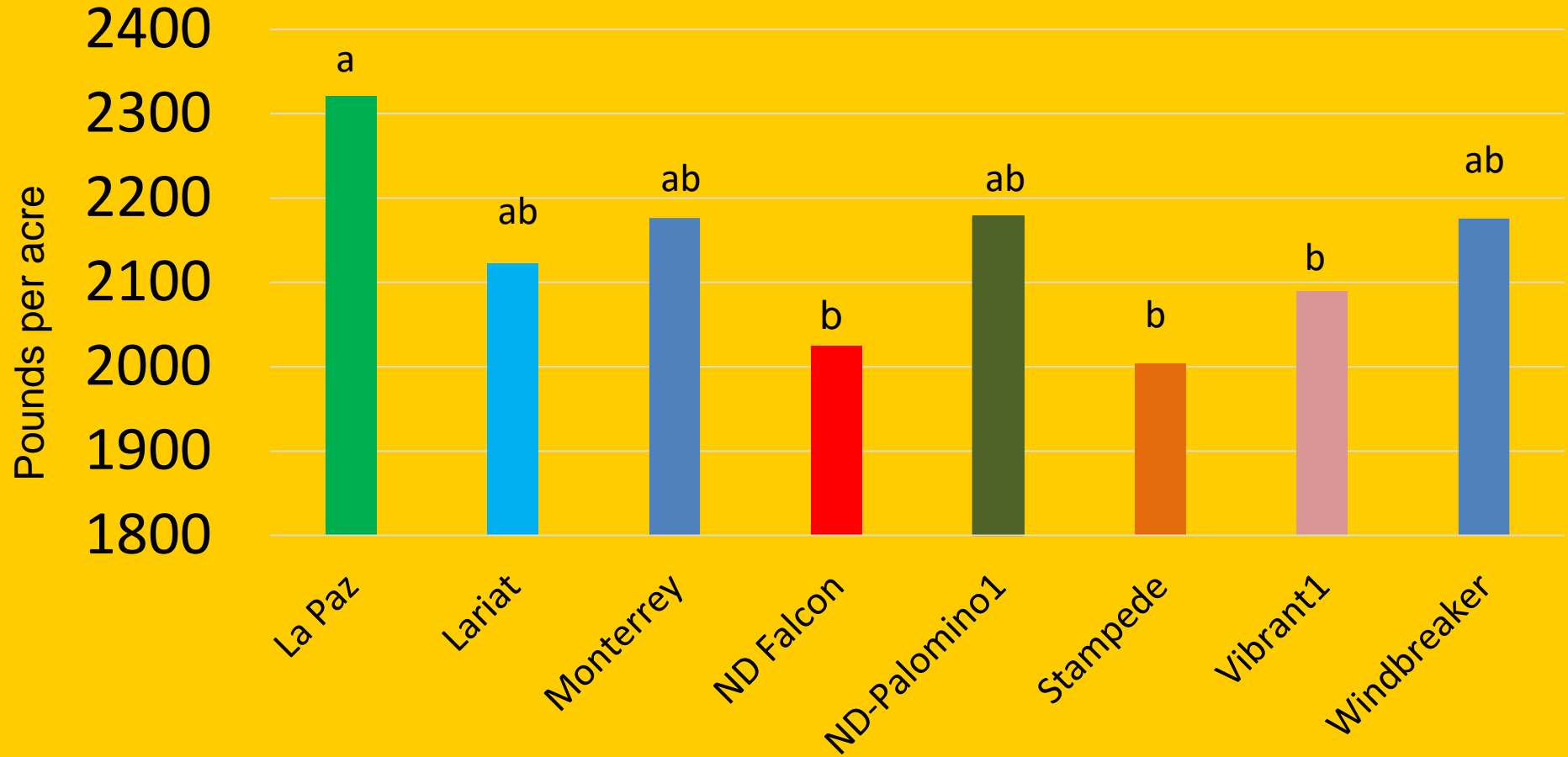
- Seed darkening negatively affects prices
- Several factors may cause seed darkening:
  - -Environment: Light, Temperature, Rainfall
  - -Storage
  - -Variety
  - -Diseases



# Slow darkening Pintos have 4X higher Iron bioavailability than regular Pintos!



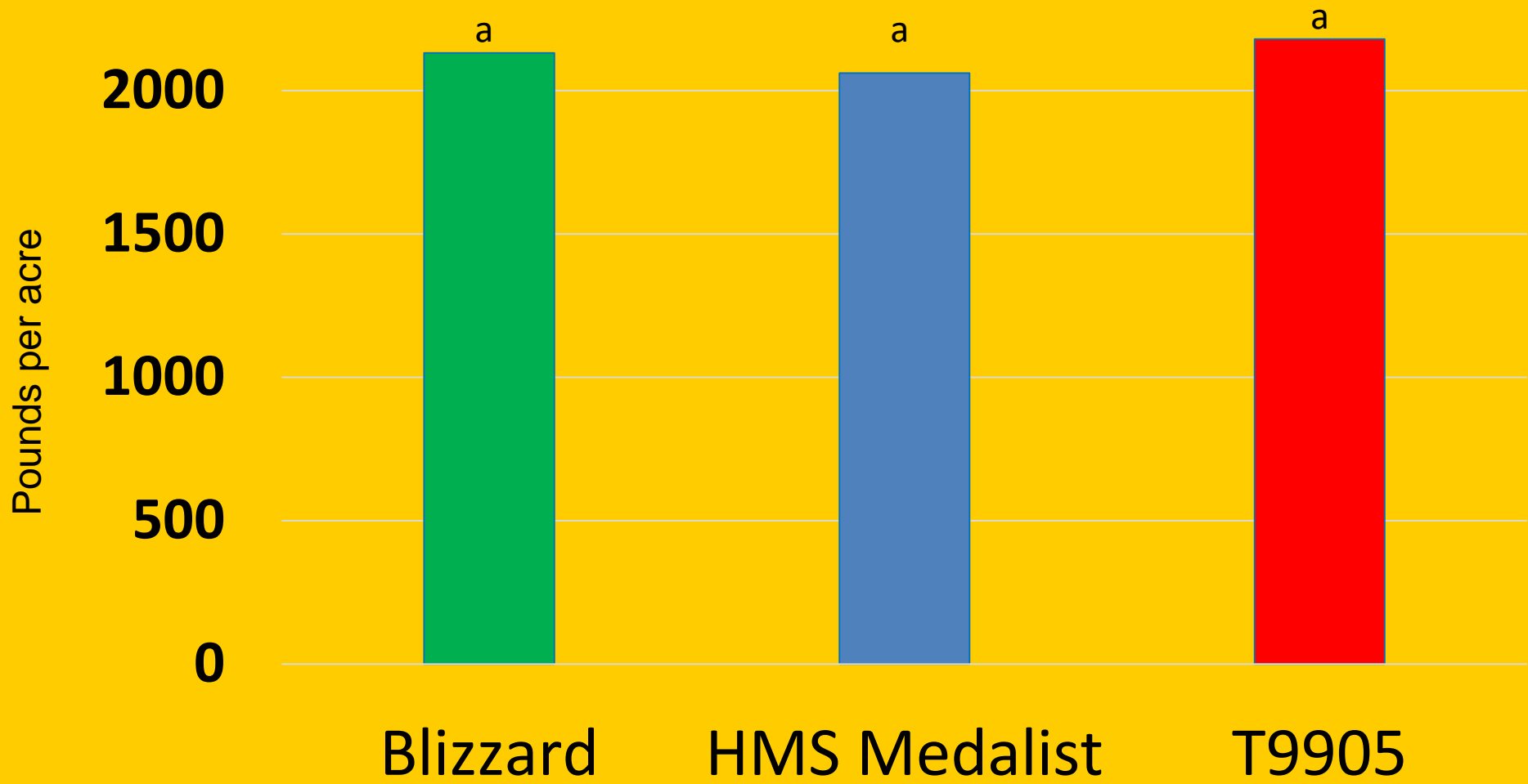
# NDSU 2019 pinto bean yield 9 environments



# 2019 Seed Yield of Pinto Varieties (8-9 locations)



# NDSU 2019 Navy bean yield 7 environments



# Seeding Management Tips

- Treat seed to maximize emergence/stand counts if planting early in cool soils.
- Watch seed/fertilizer placement to maximize stands.
- Do stand counts.



# Seeding Management Tips

- Adjust seeding rate for each seed lot based on seed count and germination percentage.
- Consider rate adjustments based on moisture conditions and planting date.