Dry Bean Management
Getting it Right production meeting

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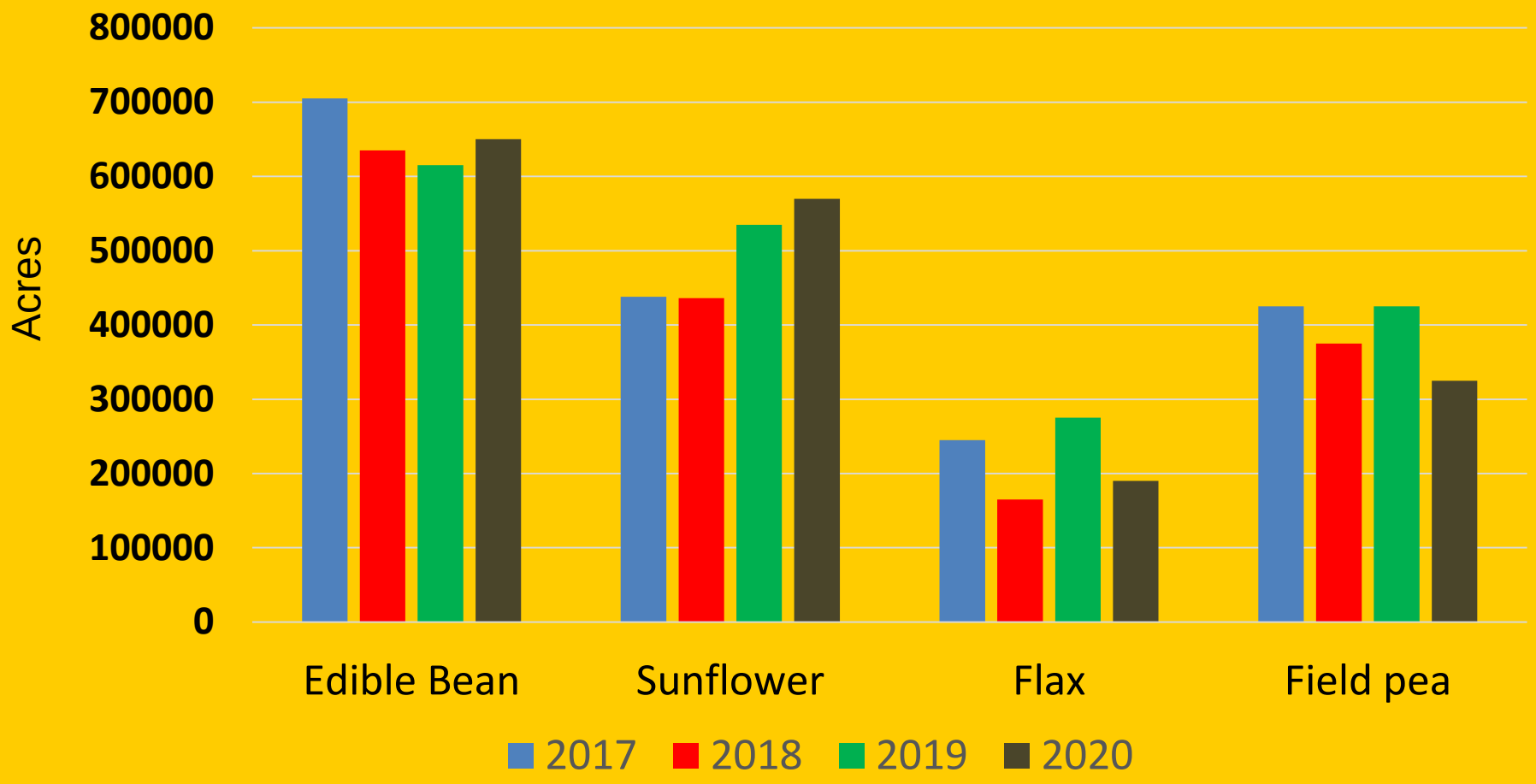
EXTENDING KNOWLEDGE ›› CHANGING LIVES

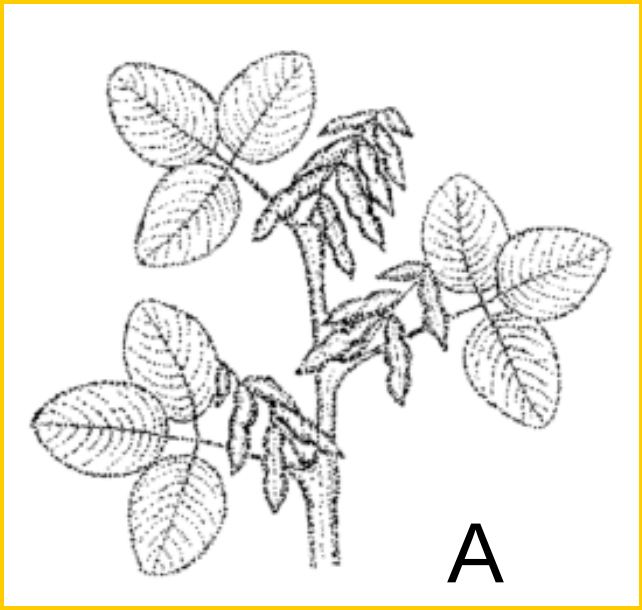
NDSU | EXTENSION

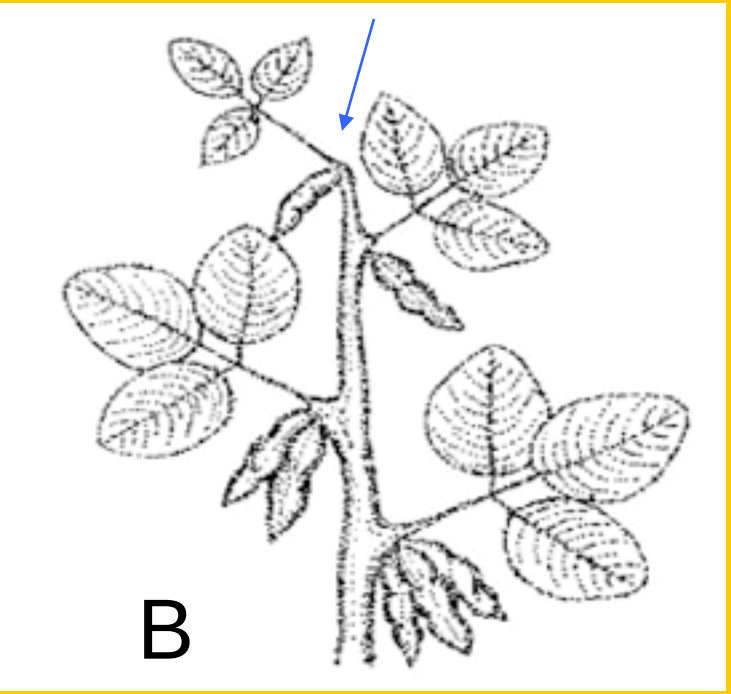
North Dakota Planted Acres by Crop 2017-2019, projected 2020



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
Determinate	I	Ia	Erect Bush
		Ib	
Indeterminate	II	IIa	Upright short vine
		IIb	Upright vine
	III	IIIa	Prostrate Vine
		IIIb	
	IV	IVa	Climbing
		IVb	

Source: CIAT.org.

Plant Architecture

Type I **Type II** **Type III** **Type IV**

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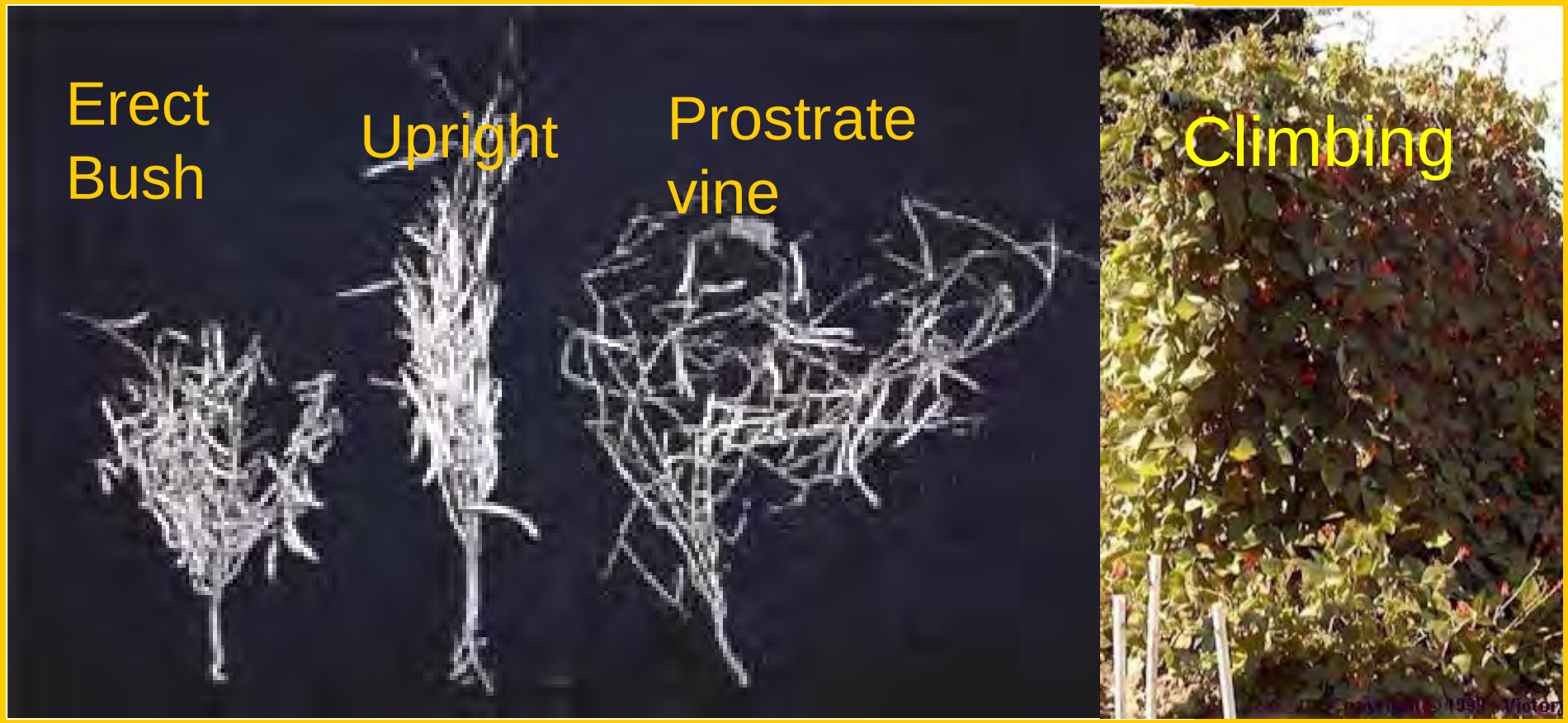
Source: Kelly, J.D.

Plant Architecture



Type I **Type II** **Type III** **Type IV**

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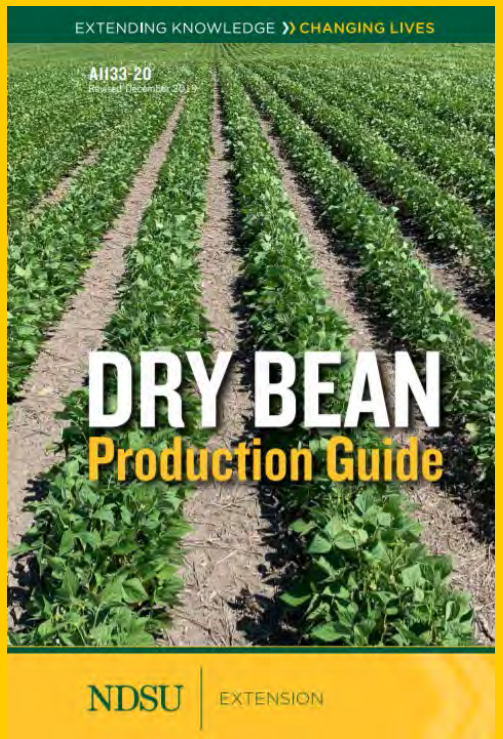
Source: Kelly, J.D.

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[1] Vegetative Stages	Days from Planting[2]
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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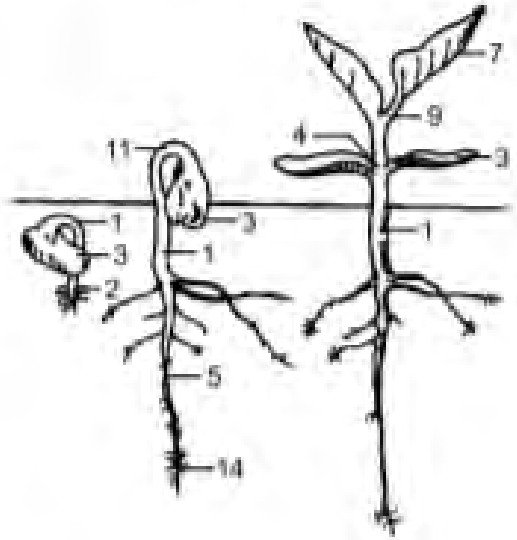
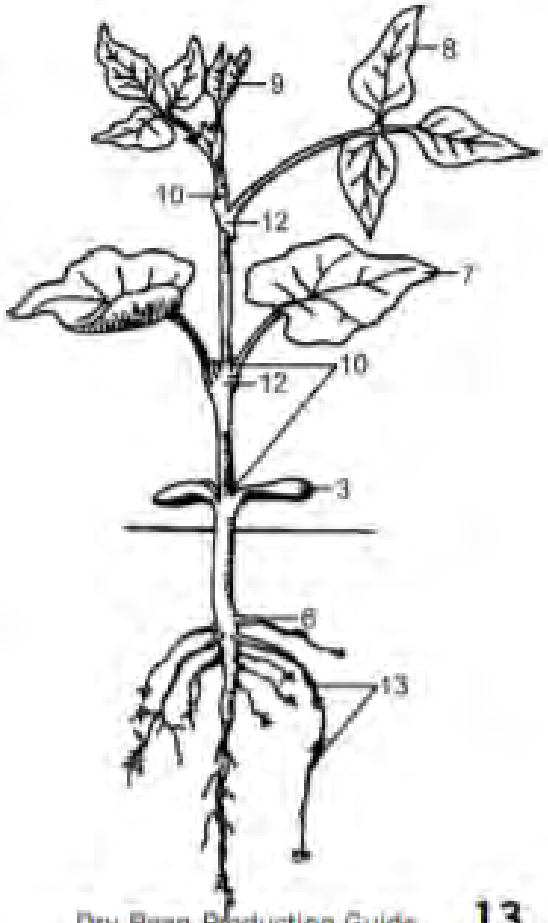
Bean plant

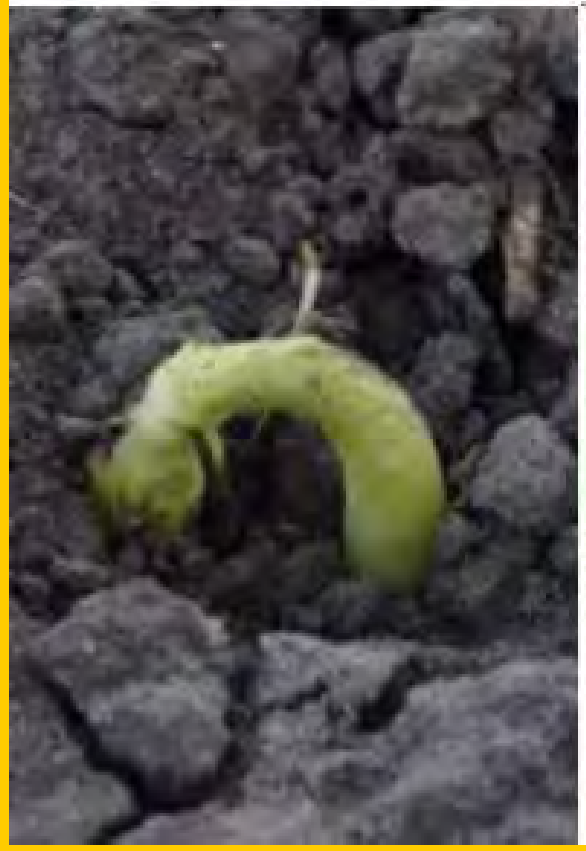
Figure 1. Plant description.

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*	VC *Unifoliate*	V1 *Trifoliate*
Hypocotyl emergence.	Unrolled cotyledons and unifoliate leaves.	First unrolled trifoliate leaf.



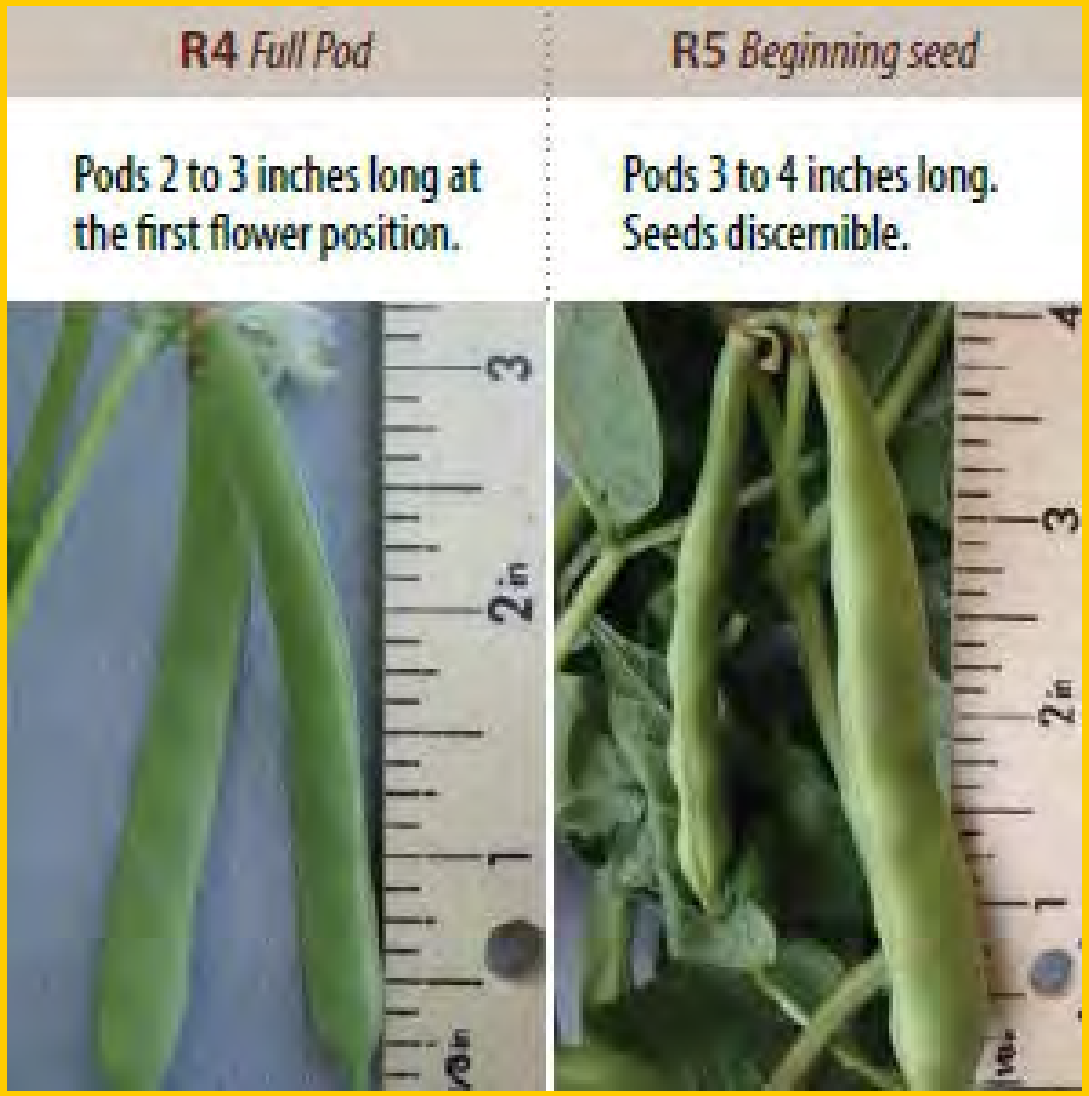
Source: manitobapulse.ca

V2 to Vn	V5 *bush/determinate* or V8 *vine/indeterminate*
Second unrolled trifoliate leaf, third unrolled trifoliate leaf, fourth, etc.	Flower buds visible.

Source: manitobapulse.ca

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.	
			

Source: manitobapulse.ca



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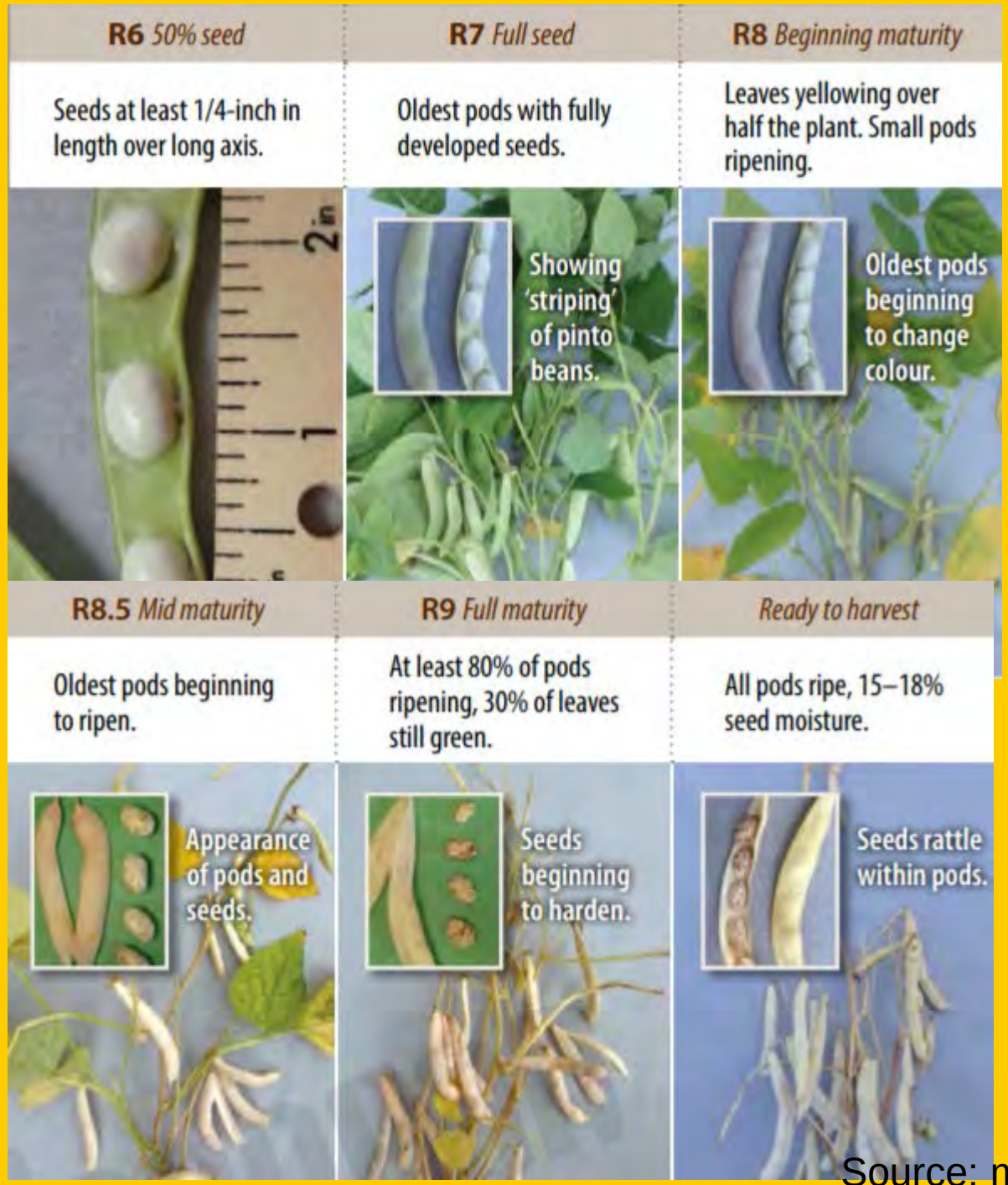
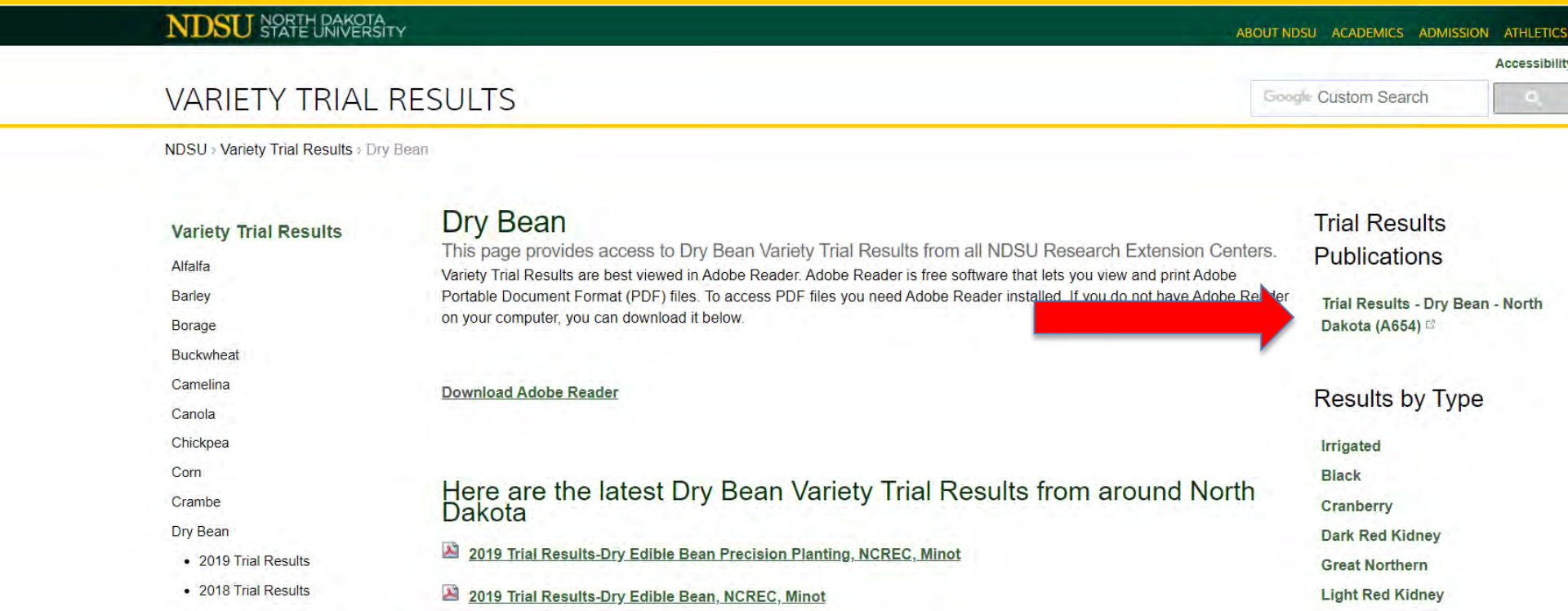


Source: manitobapulse.ca

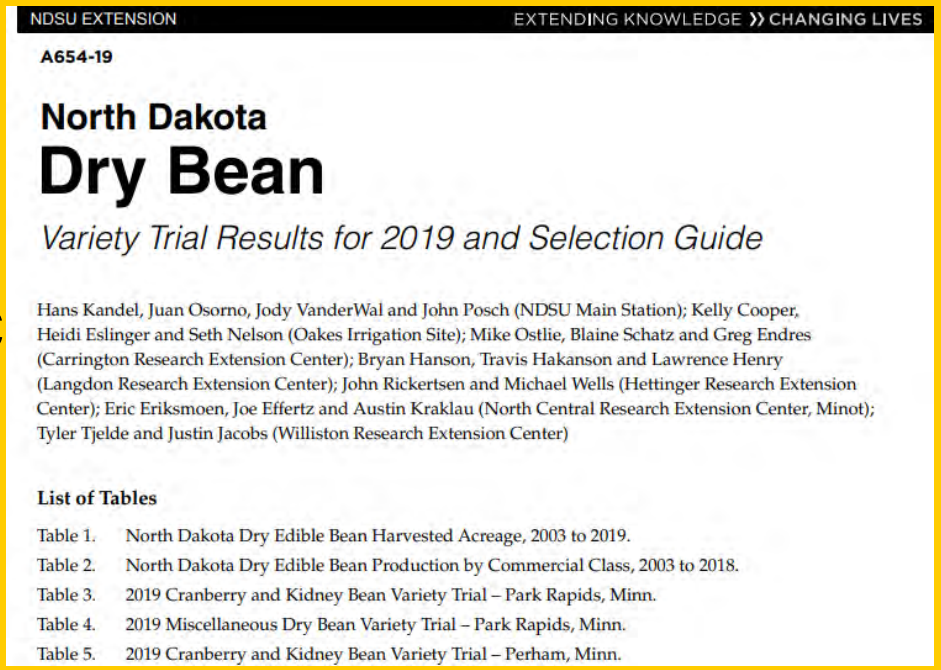
Extension Bulletin A-654-19

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



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 that 20% for yield



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A654-19

North Dakota

Dry Bean

Variety Trial Results for 2019 and Selection Guide

Hans Kandel, Juan Osorno, Jody VanderWal and John Posch (NDSU Main Station); Kelly Cooper, Heidi Eslinger and Seth Nelson (Oakes Irrigation Site); Mike Ostlie, Blaine Schatz and Greg Endres (Carrington Research Extension Center); Bryan Hanson, Travis Hakanson and Lawrence Henry (Langdon Research Extension Center); John Rickertsen and Michael Wells (Hettinger Research Extension Center); Eric Eriksmoen, Joe Effertz and Austin Kraklau (North Central Research Extension Center, Minot); Tyler Tjelde and Justin Jacobs (Williston Research Extension Center)

List of Tables

Dry Bean Diversity

Light Red Kidney

Dark Red Kidney

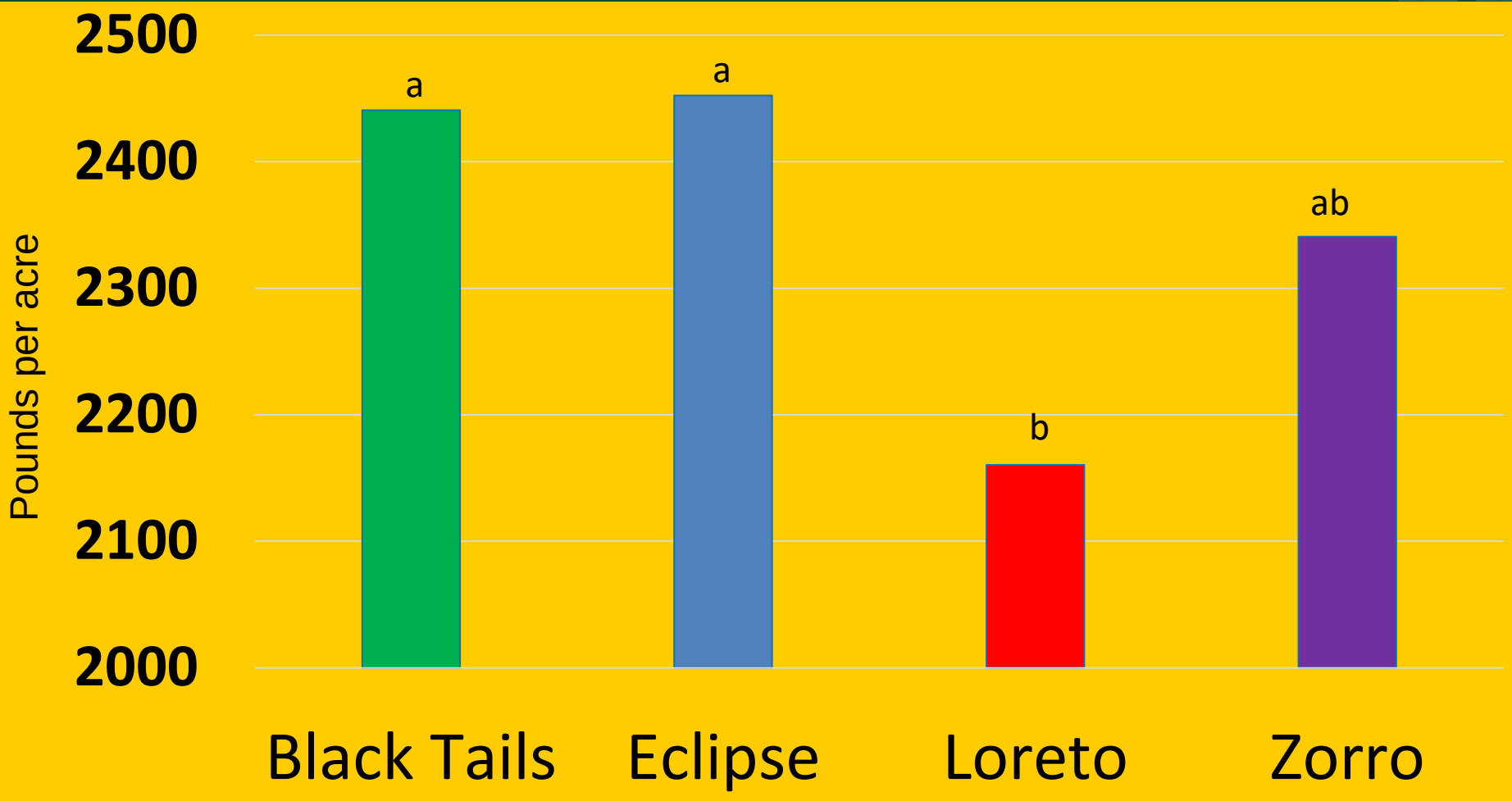
Pinto

Navy

Great Northern

Black

NDSU 2019 black bean yield 7 environments



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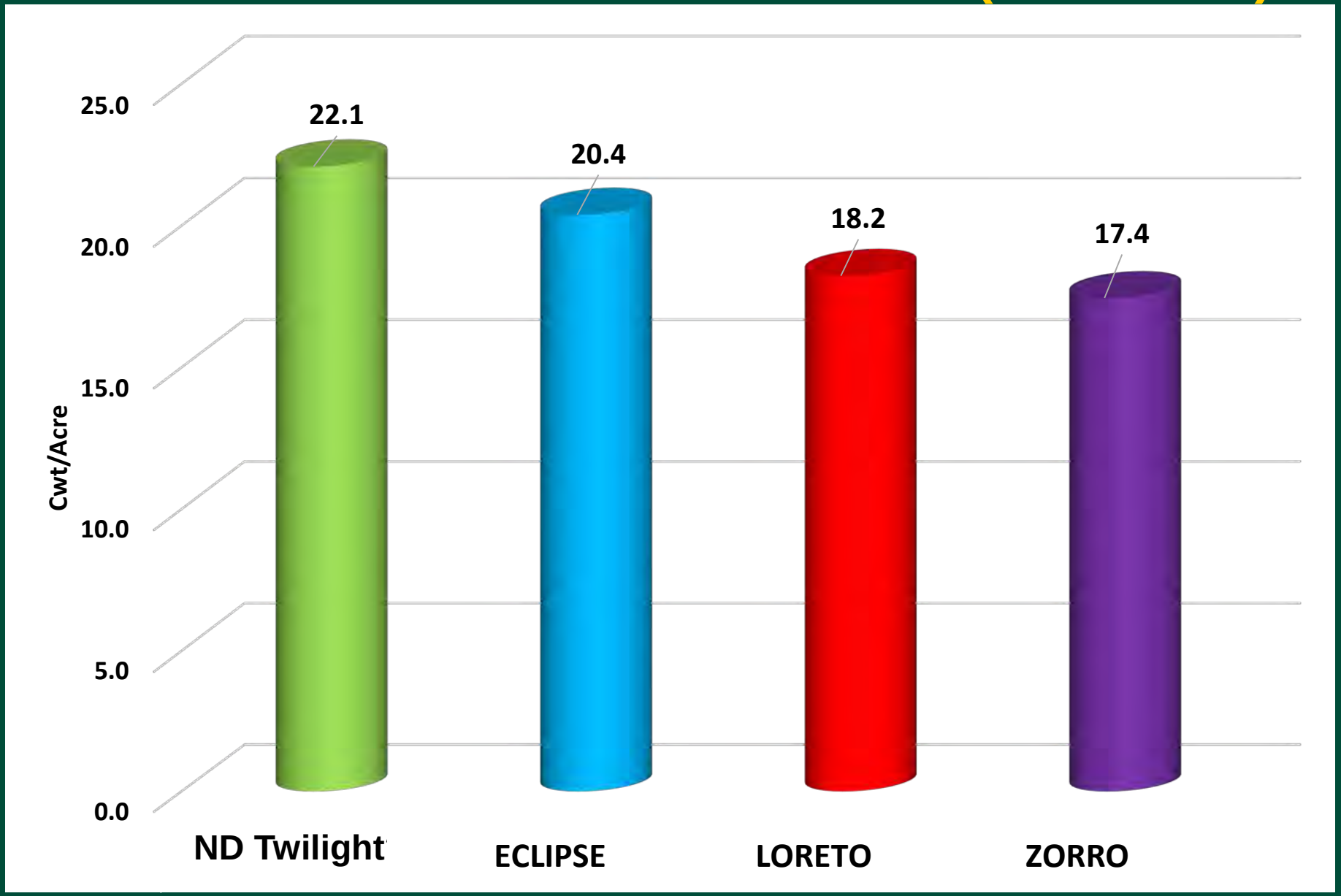
Minot, Hettinger, Langdon, Carrington and Oaks, Williston and Carrington irrigated

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

J. Posch

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



Pinto slow darkening gene

Samples harvested on Nov-2019

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

J. Posch

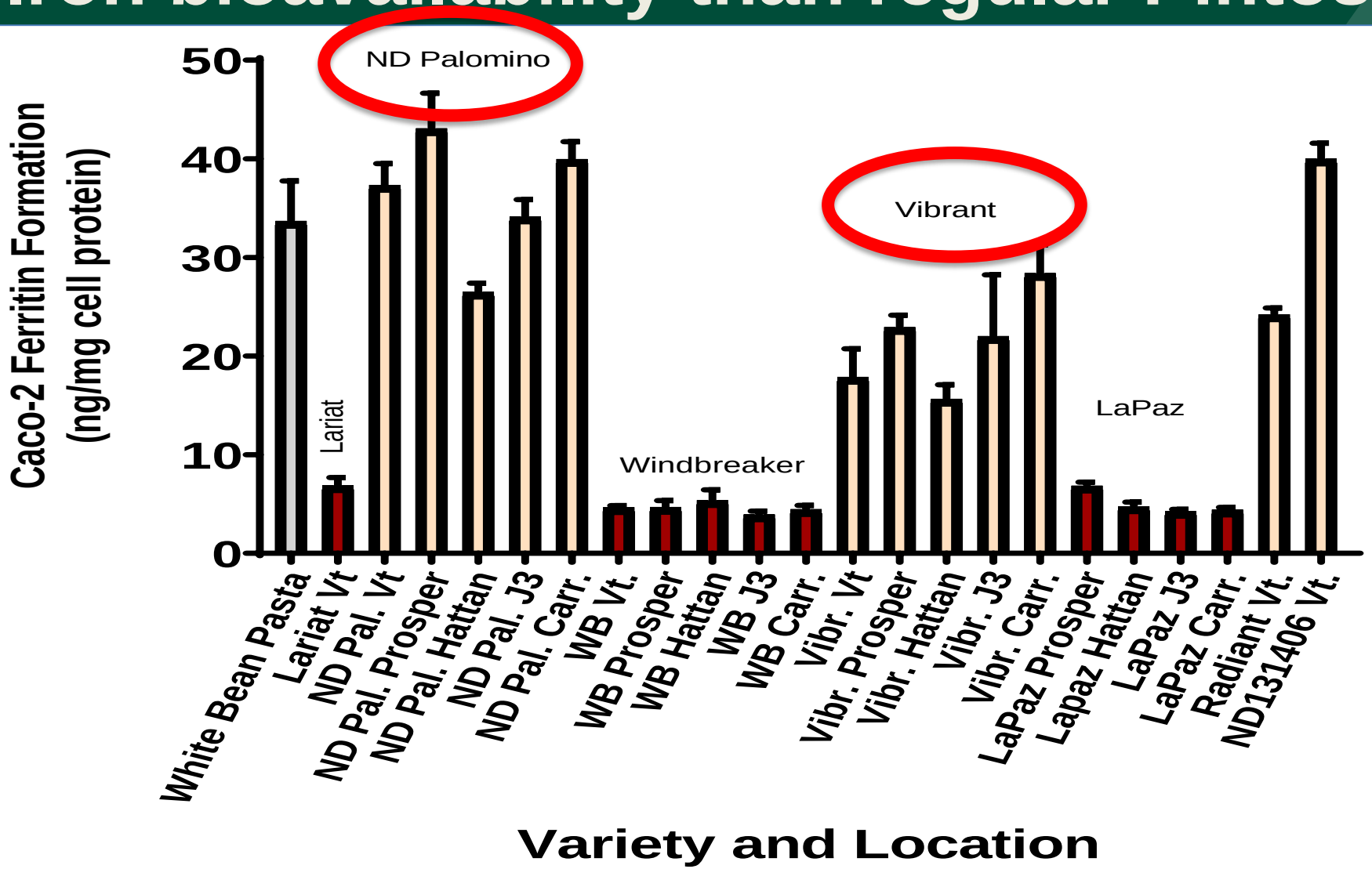
Slow darkening gene

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

Slow darkening gene

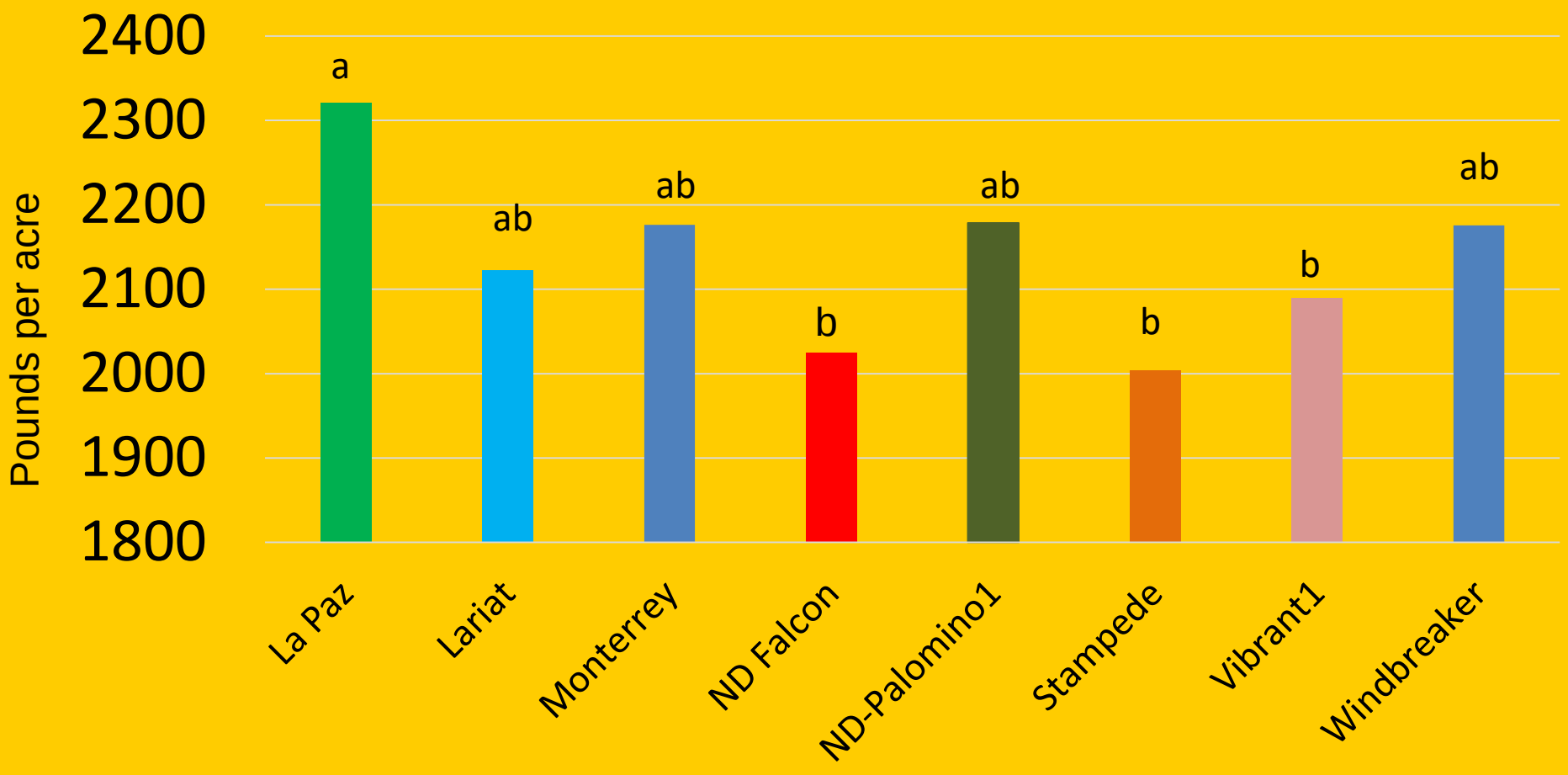
- Seed darkening negatively affects prices
- Several factors may cause seed darkening:
- -Environment: Light, Temperature, Rainfall
- -Storage
- -Variety
- -Diseases

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



Glahn, Wiesinger, and Osorno, 2019

NDSU 2019 pinto bean yield 9 environments



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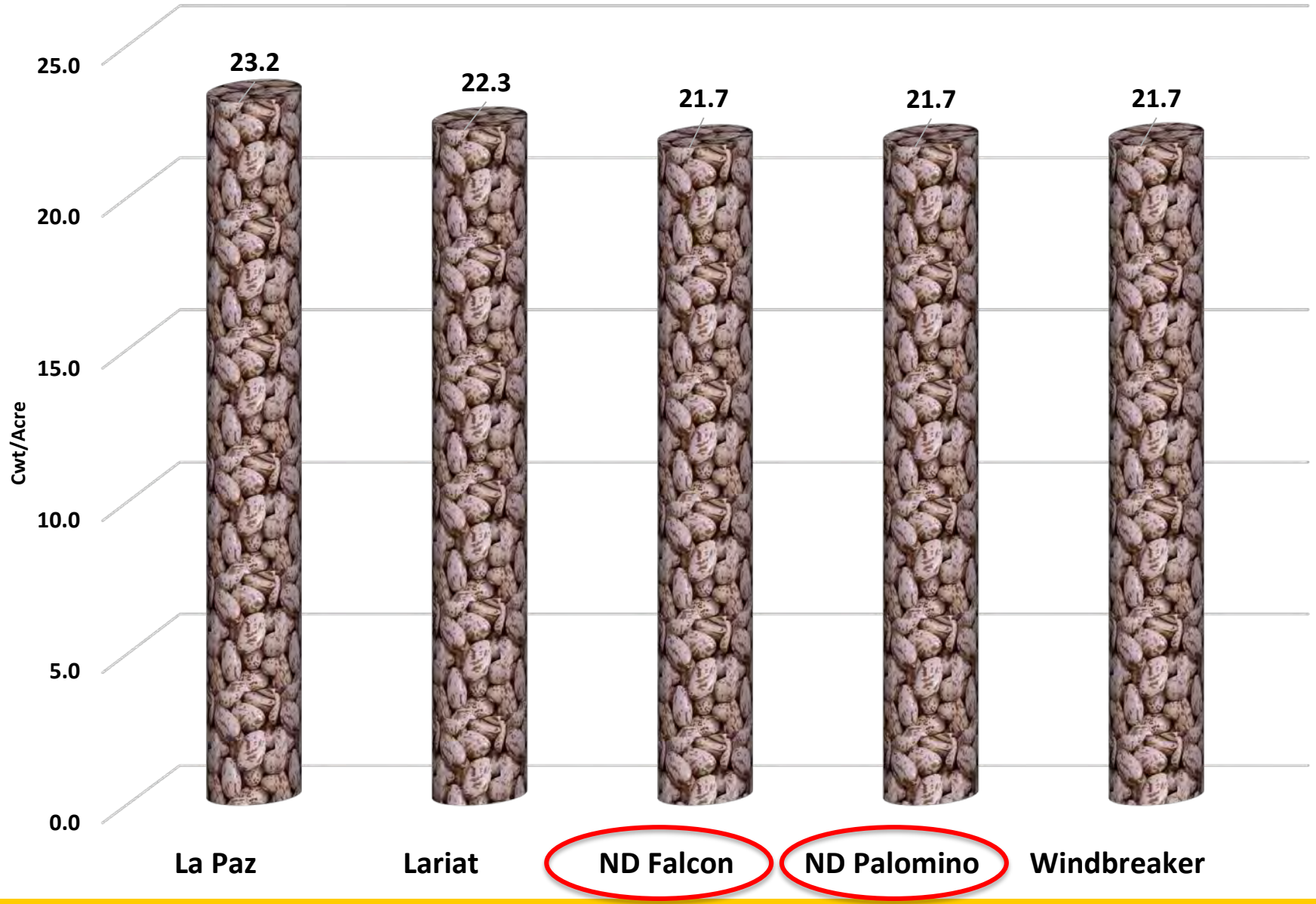
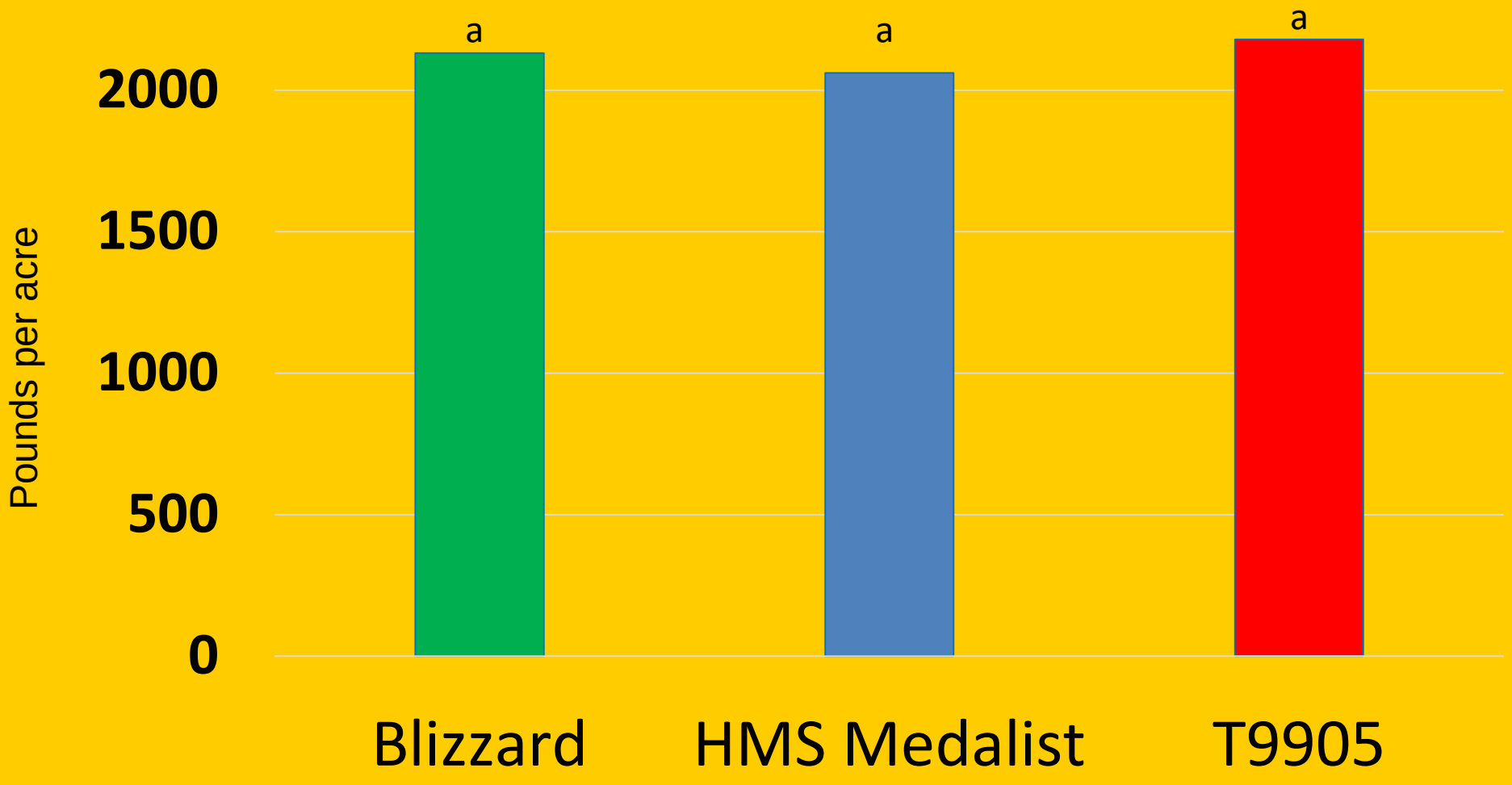
Minot, Hettinger, Langdon, Carrington, Park Rapids, Perham and Oaks, Williston and Carrington irrigated

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



NDSU 2019 Navy bean yield 7 environments



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Minot, Hettinger, Langdon, Carrington and Oaks, Williston and Carrington irrigated

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.