

HIGH PROFIT WHEAT



1. Building a foundation for yield and profit:

Plant establishment strategies

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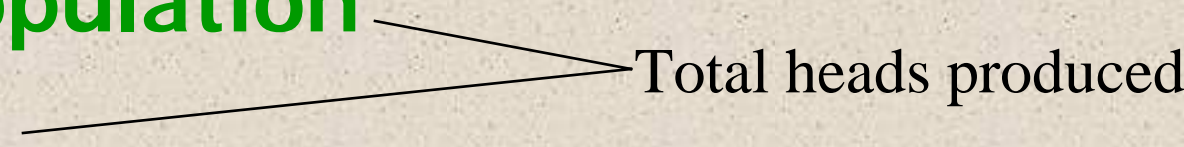
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HIGH PROFIT WHEAT

Plant establishment strategies

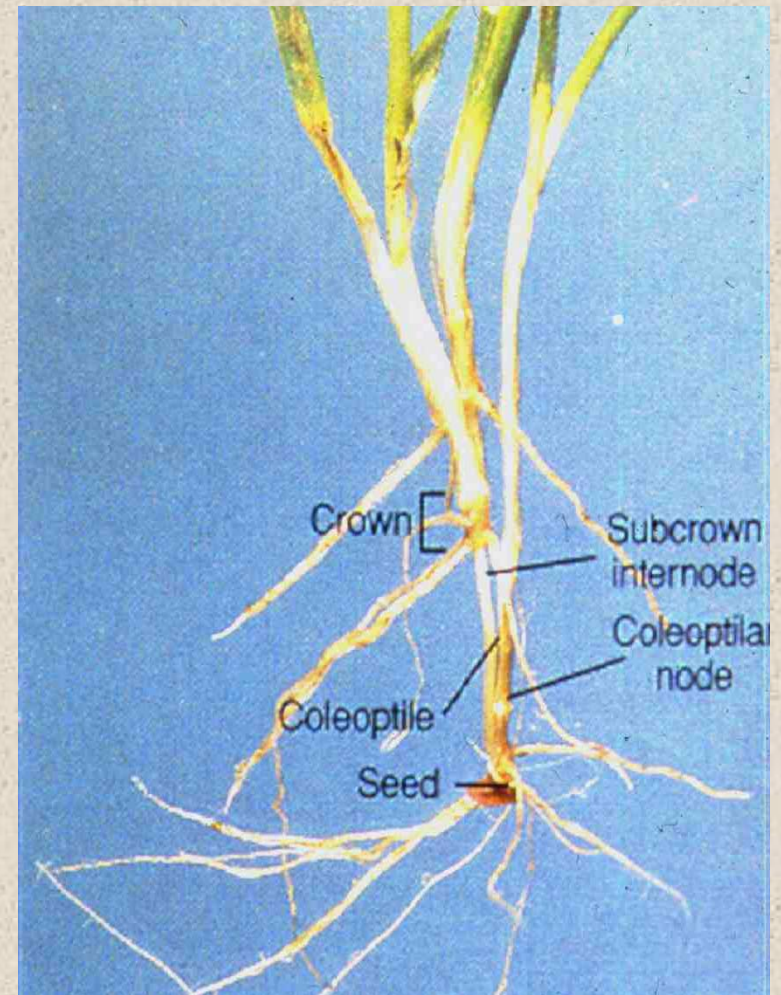
- Variety Selection
- Quality Seed
- Crop Rotation
- Good Seedbed and Soil Moisture
- Early Seeding
- Proper Seeding Techniques
 - Adequate plant population
- Good Plant Nutrition
- Good Pest Management

Basic components of Wheat yield

- **Plant Population**
 - **Tillering**
 - **Head Size**
 - 25 spikelets are genetically possible
 - **Number of Kernels Set**
 - 5 seeds are possible in each spikelet
 - **Weight of Kernels**
- Total heads produced
- 

A Quality Seedbed is Critical

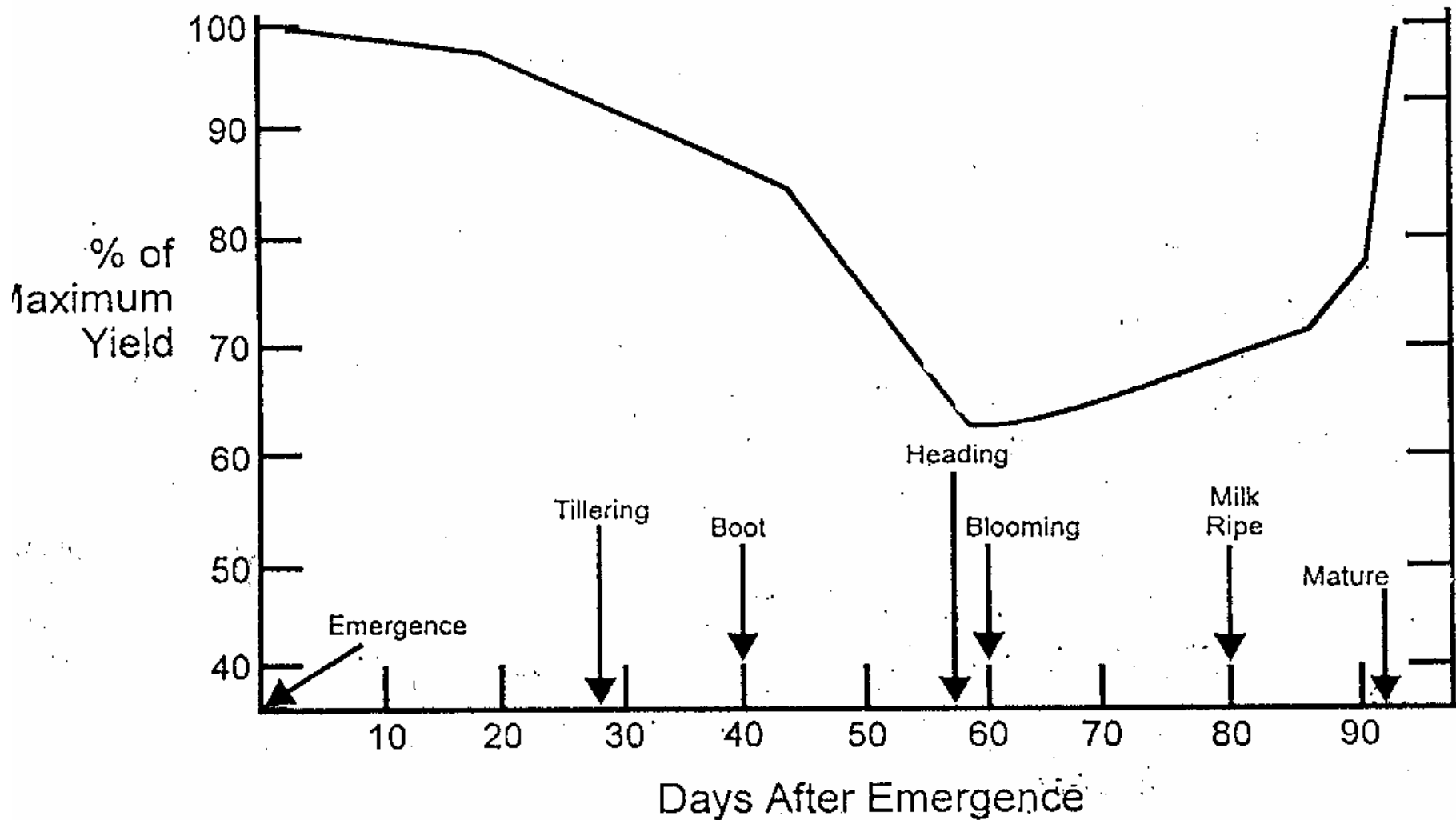
- Promotes uniform germination
- Promotes good seminal and crown root growth
- Conserves soil moisture
- A good stand provides weed competition, uniform ripening, more precise pesticide applications



Manage soil moisture

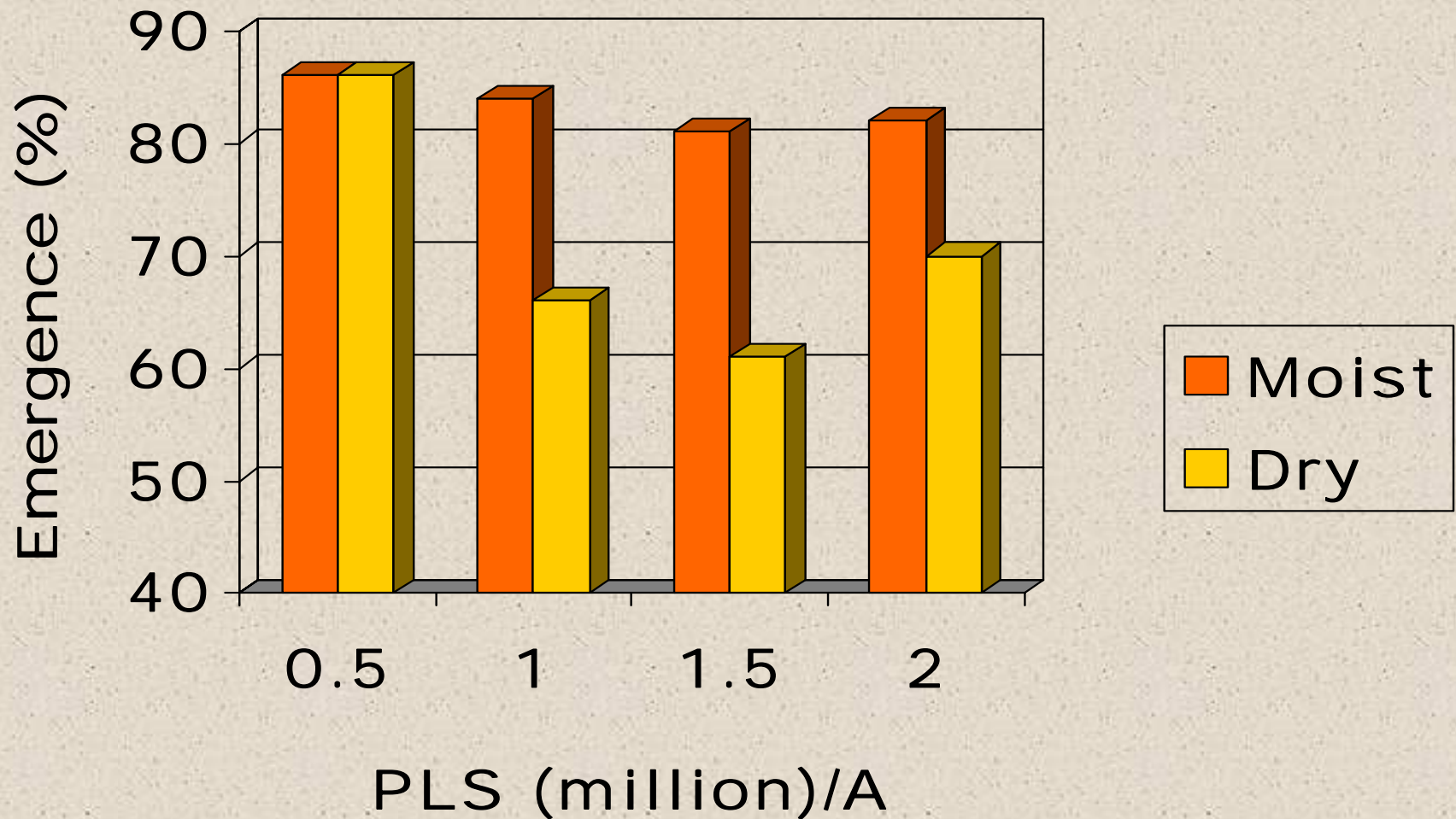
- **Establish yield goals based on a reasonable estimate of moisture availability**
 - 1 inch of water needed for 2.5 – 3 bu/A production
- **Reduced tillage**
 - Snow catch
 - Reduced soil drying
- **Consider rotations**

Effect of water shortage at various growth stages on grain yield reduction as compared to a well-watered wheat crop

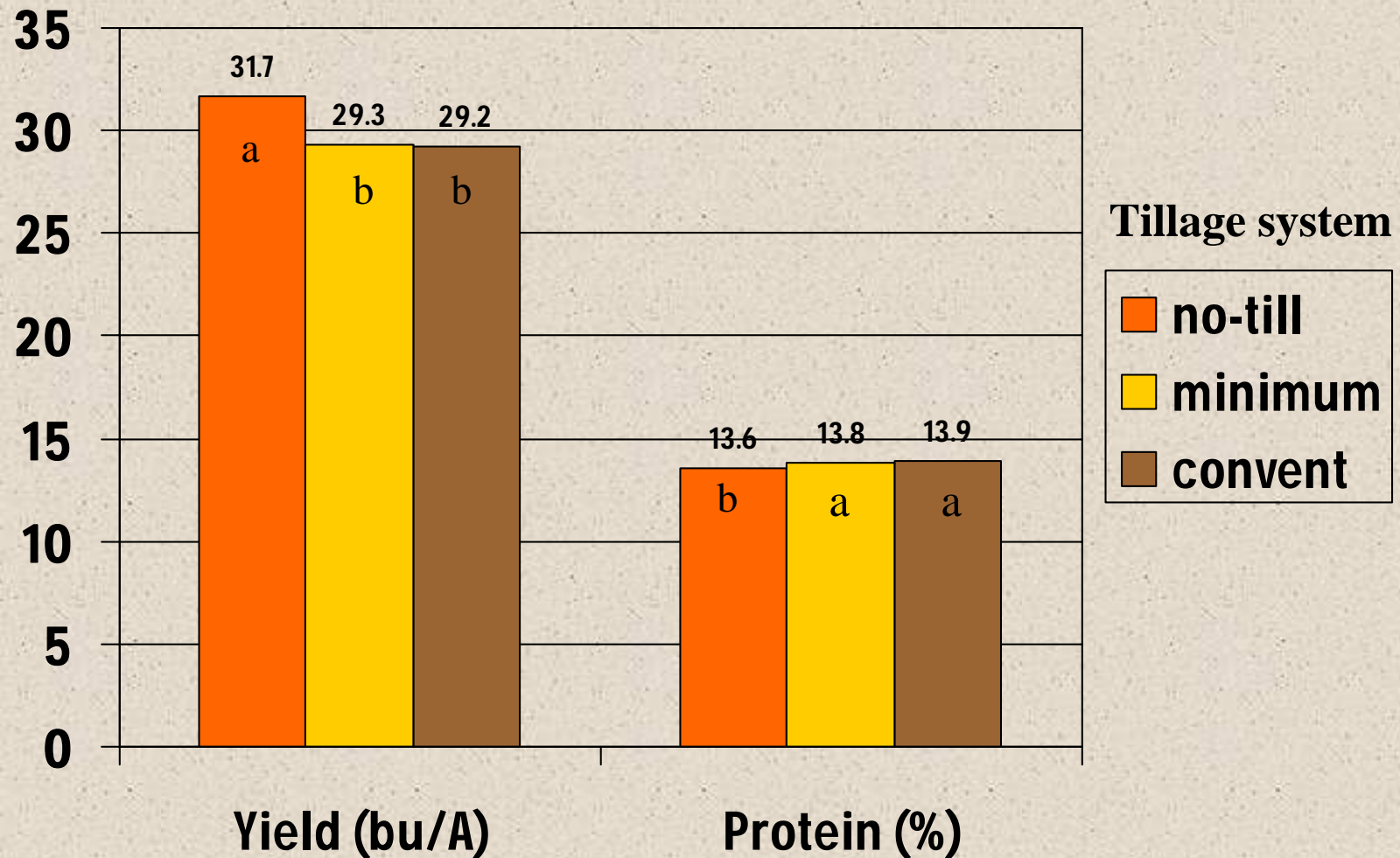


Langdon HRS seeding rate studies, Langdon, 1991-93.

Effect of seedbed moisture on plant emergence



Wheat yield and protein with tillage systems, Carrington, 1988-97.



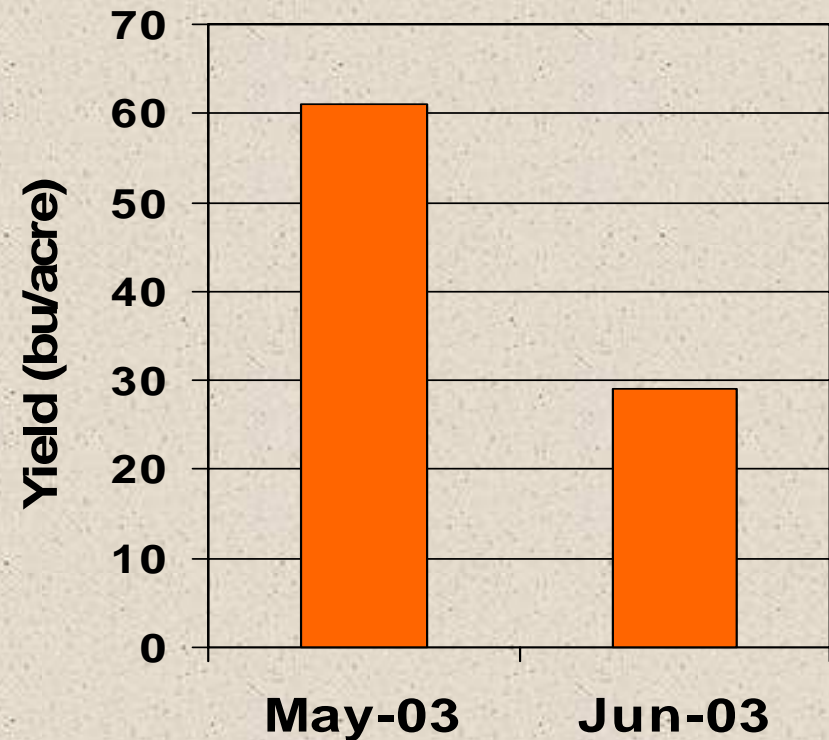
Strive for uniformity in emergence

- Seed 1.5- to 2-inches deep
- Ensure that seeding equipment is adjusted
- Use healthy seed
 - Low germination usually means poor vigor in emerging seedling
- Consider seed treatment
 - fungicides and insecticides

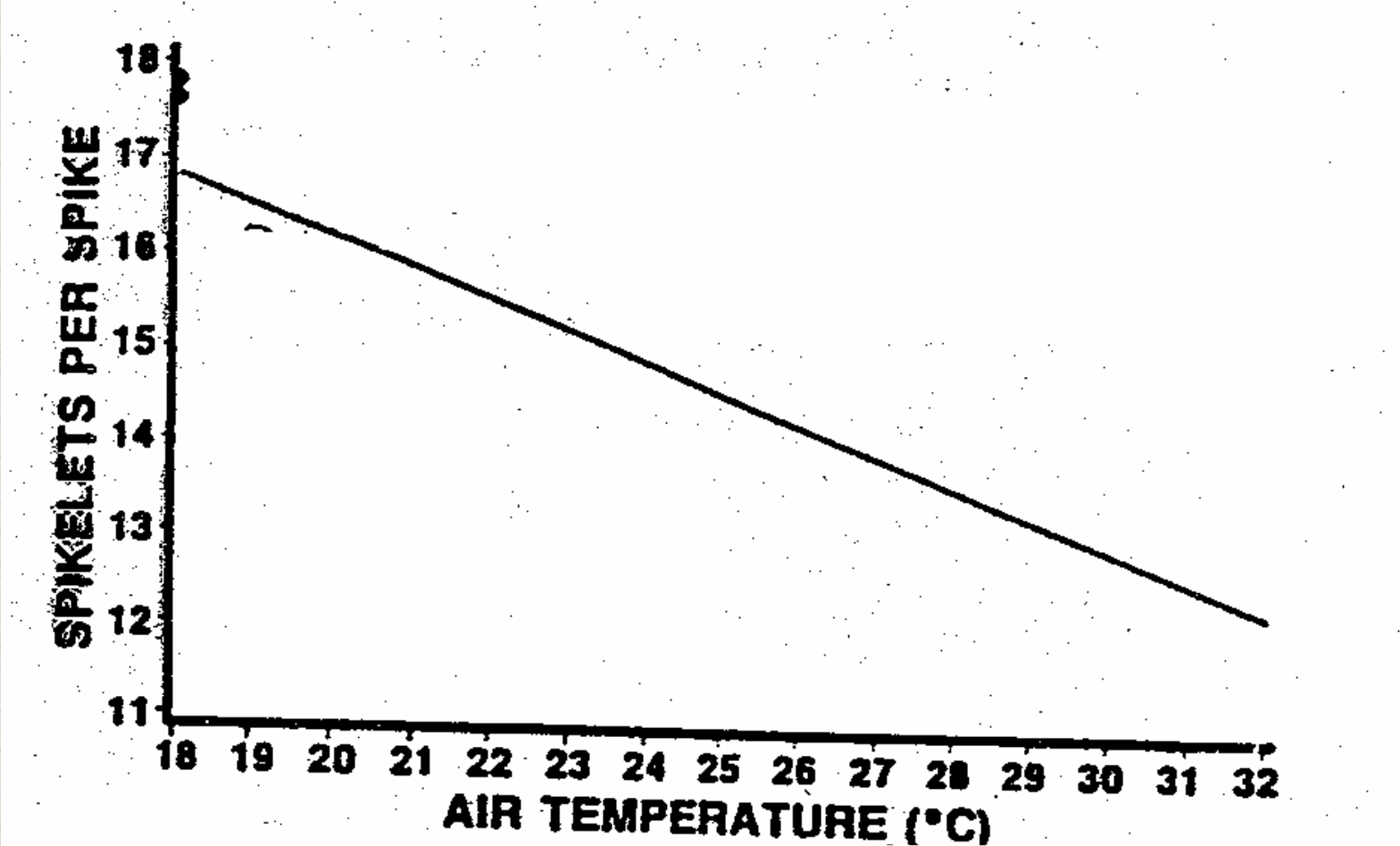
Seed early

- Cool temperatures enable higher yield potential
- 1% reduction in yield for every day delay after May 15th

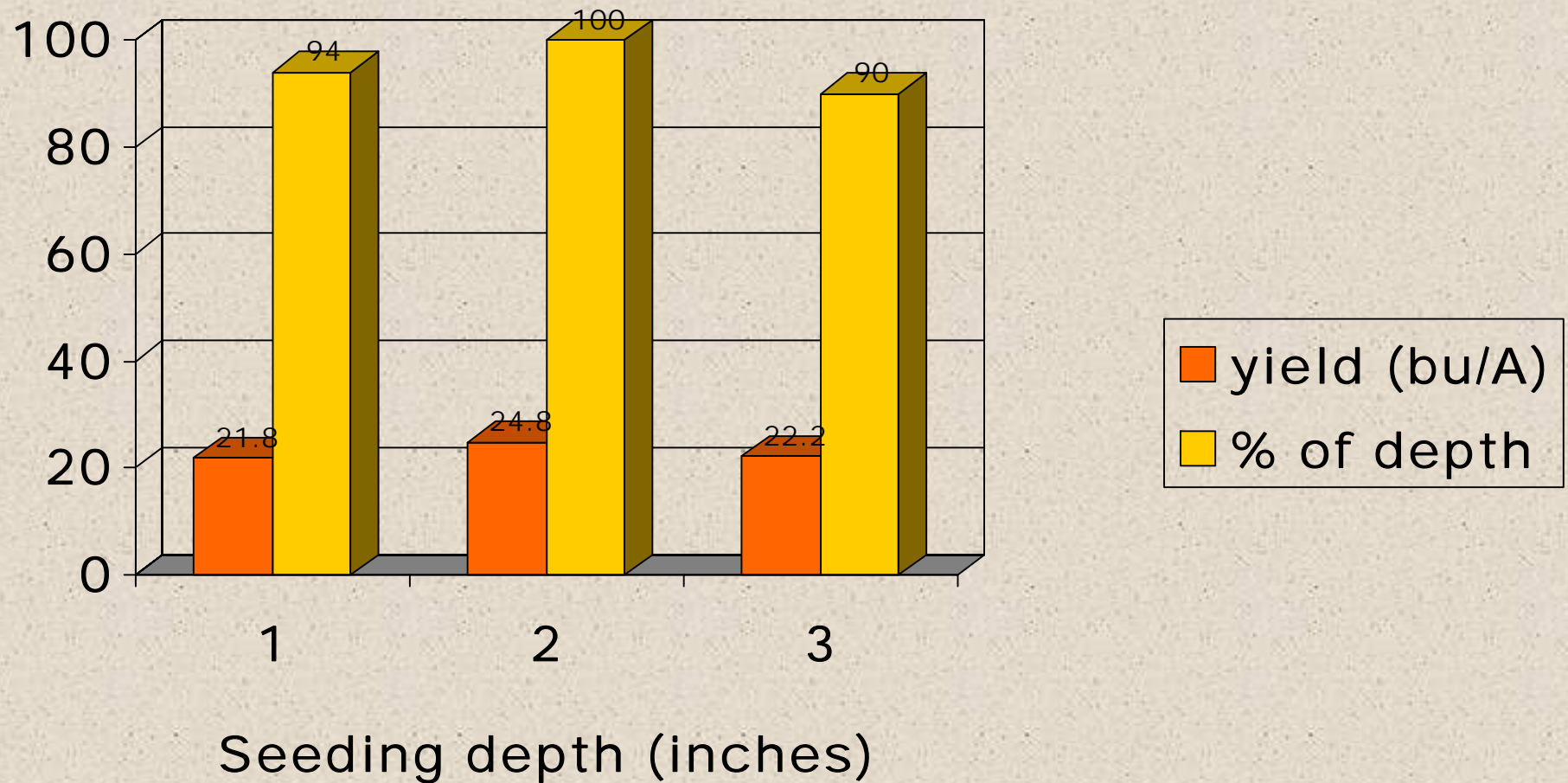
Effect of seeding date at Langdon, 2001



Linear regression of total spikelets developed per spike of controlled environments and field grown spring wheat on maximum daily air temperature during the 4.0 to 5.5 Haun leaf growth stage



HRS wheat yield with seeding depth, Saskatchewan, 1970-73



Spring wheat seed size and seeding rate effects on yield loss due to wild oat (*Avena fatua*) interference.

R. Stougaard and Q. Xue

Weed Science. 52:133-141. 2004

- Trial conducted 1999-2001 at Kalispell, MT.
- Seed size: **large** = retained on 2.7-mm sieve and **small** = 1.9- to 2.3-mm sieve.
- Seeding rates = 19 and 31 seeds/ft² (average established stand = 16 and 25 plants/ft²).

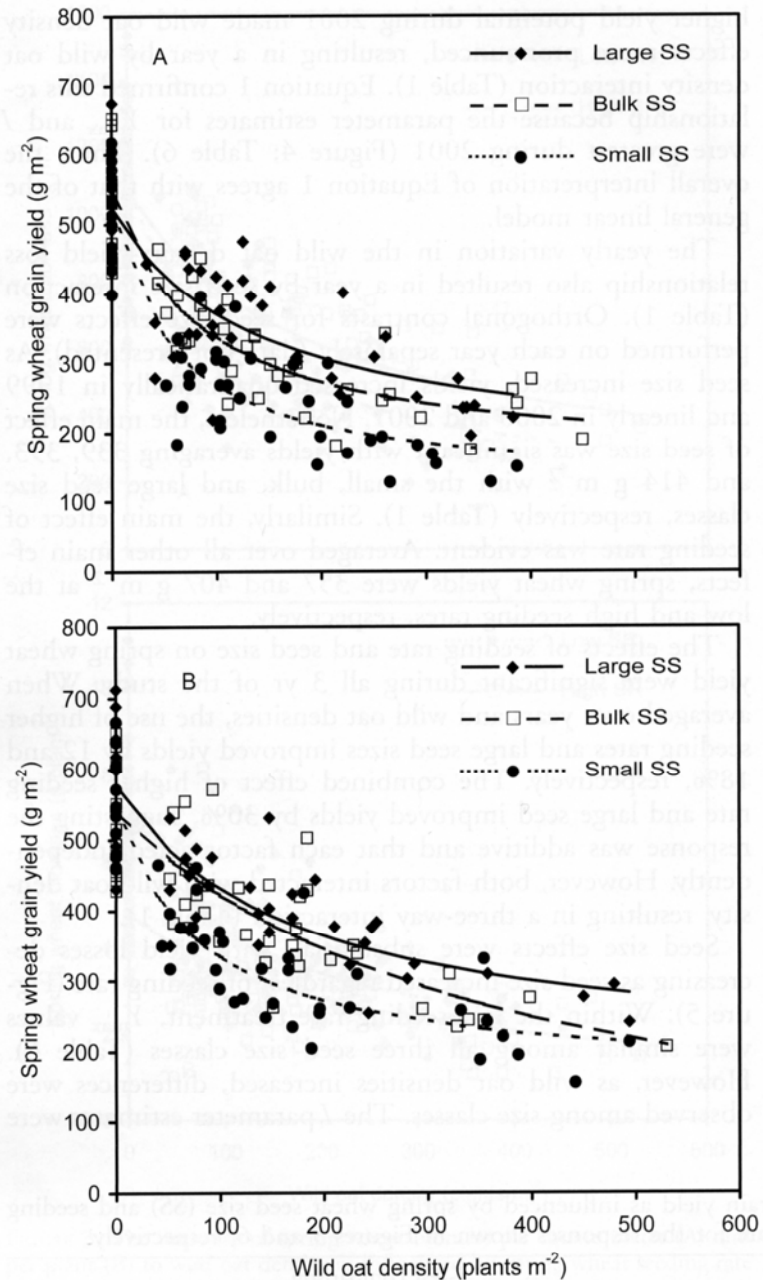


FIGURE 5. The response of spring wheat grain yield to wild oat density as influenced by spring wheat seed size (SS) under low (A) and high (B) spring wheat seeding rates.

Seeding rate

- **Establish a plant population of 1 to 1.5 million plants/acre**
 - **23 to 34 plants/ft²**



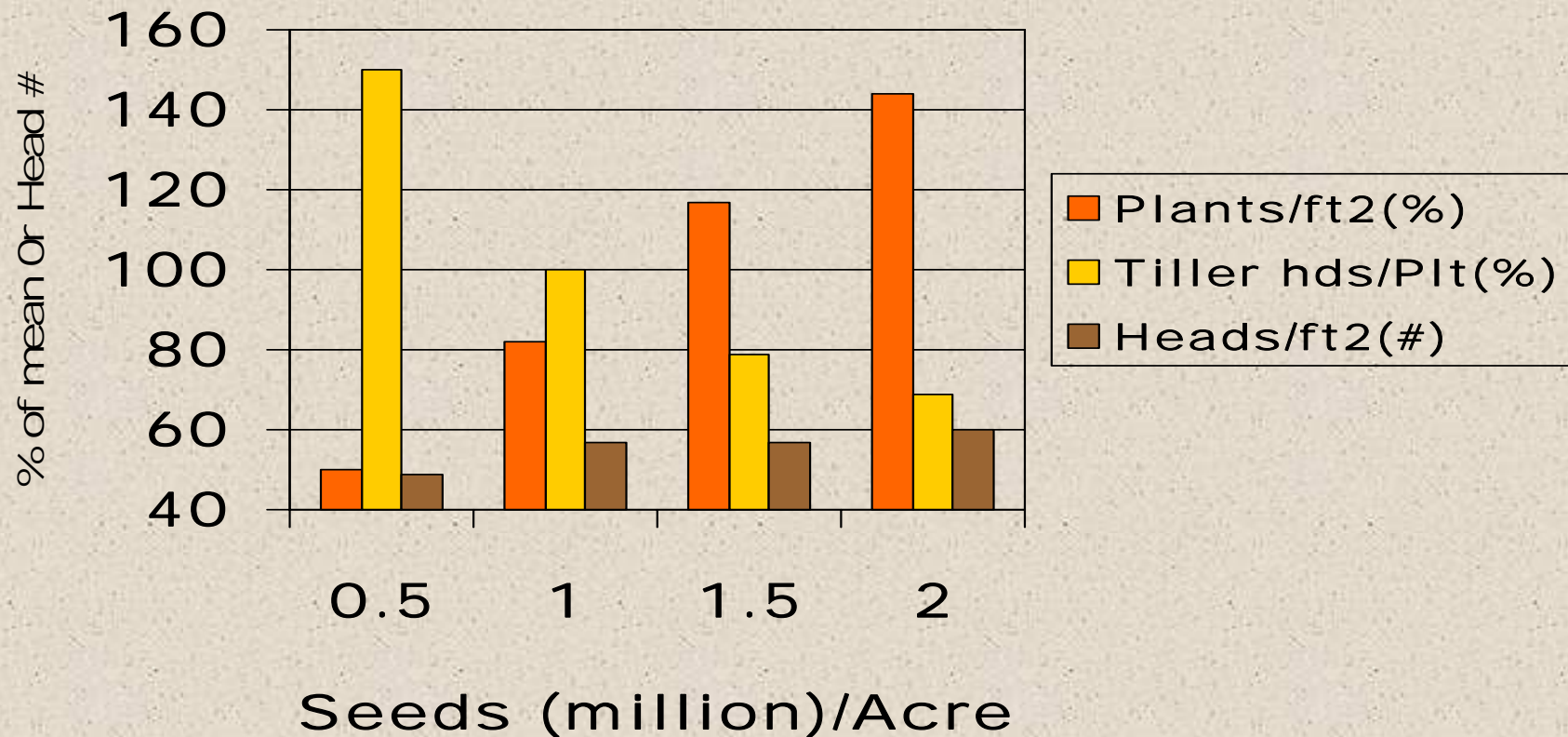
Wheat seeding rate conversion to established stand

Seeding rate (million PLS/A)	Established stand			
	10% field loss		25% field loss	
	Million plants/A	Plants/ft ²	Million plants/A	Plants/ft ²
1.25	1.13	26	0.95	22
1.5	1.35	31	1.13	26
1.75	1.59	36	1.31	30
2.0	1.8	41	1.5	34

HRS Wheat seeding rate trial, Langdon, 1991-93*.

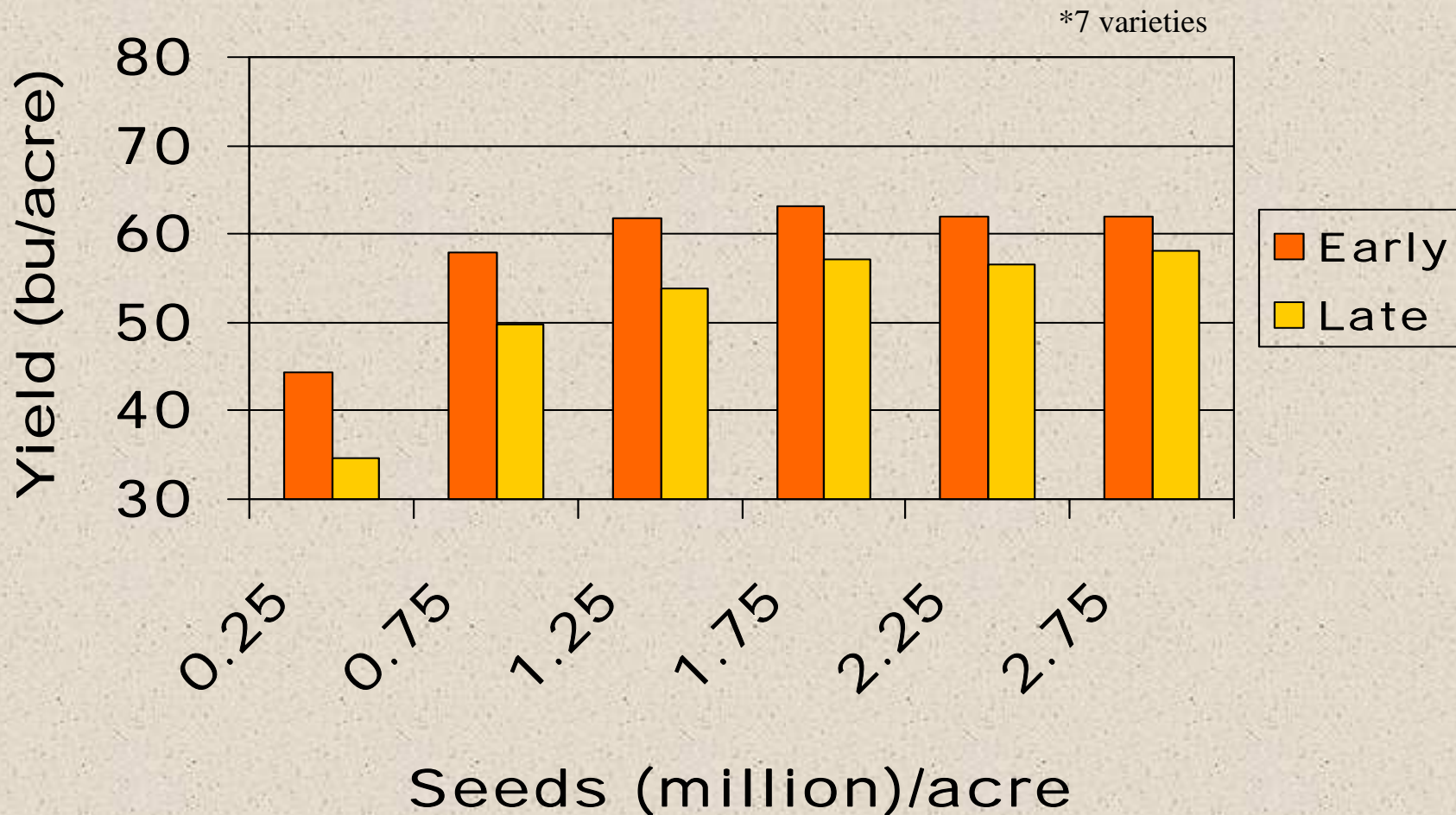
- 16 locations in northeast ND
- 'Grandin'
- Seeding rates of 0.5, 1.0, 1.5 and 2.0 million seeds/acre
- **Plant population of 34 plants/ft² (1.48 million plants/A) optimized yield.**
- **Establish stand of ≥ 26 plants/ft² and no significant yield advantage with stand > 34 plants/ft².**
 - **15 plants/ft² reduced yield 9% (vs. 26 plants/ft²)**

HRS Wheat seeding rate impact on yield components, Langdon, 1991-93*.



*Grandin; 16 locations

Yield with HRS* seeding rates, Crookston, MN, 1996-1998.

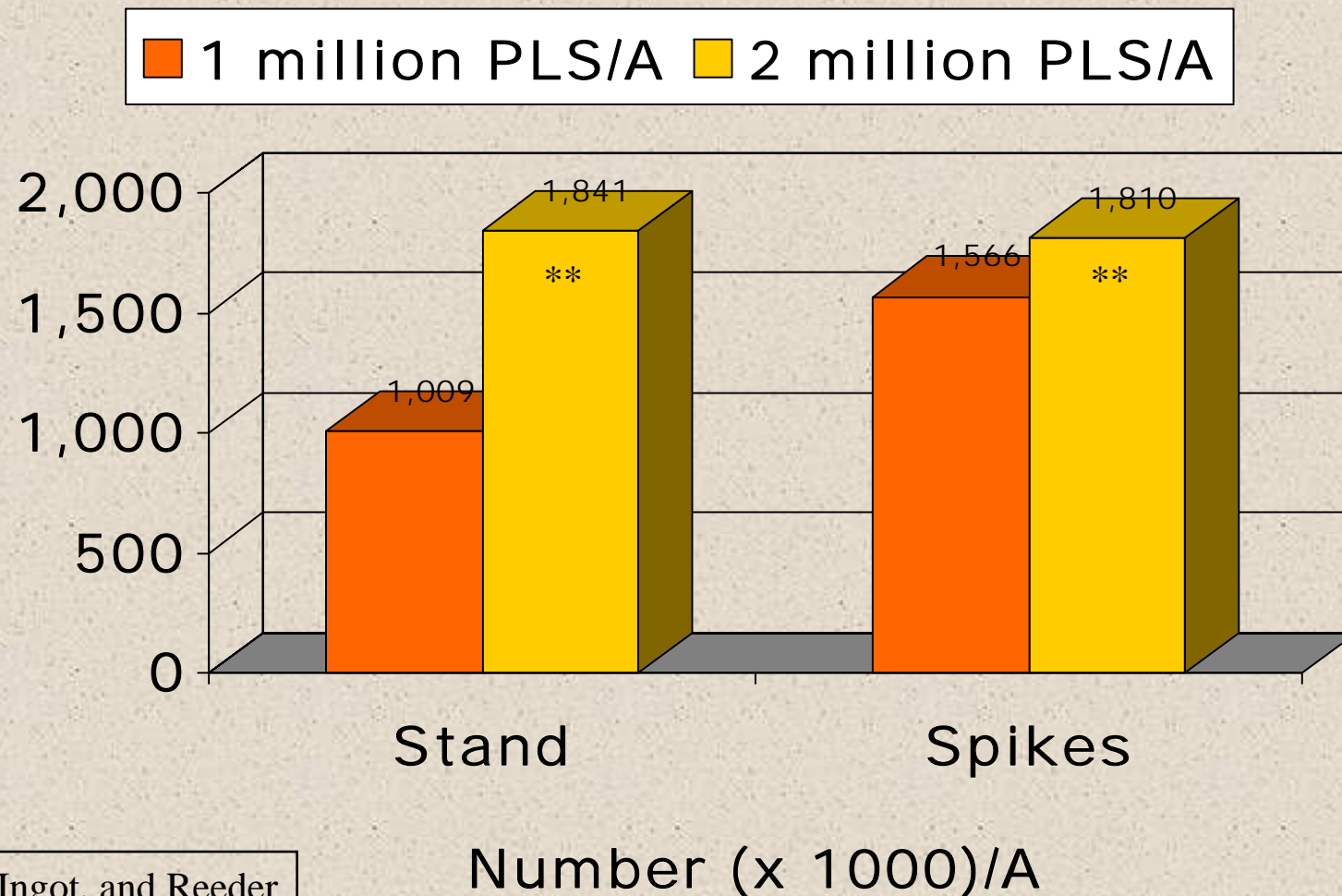


Optimum plant density = about 35/ft²

HRS wheat trials involving seeding rates, ND, 2003.

Location	Seeding rate (million PLS/A)	Seed yield (bu/A)
Casselton	1	68.1
	1.5	67.1
Carrington1	1	90.7**
	1.5	87.8
Carrington2	1	53.3
	2	52.1
Langdon	1.2	71.9
	1.8	72.3
Prosper	0.9	39.4*
	1.2	39.7
	1.5	42.1
	1.8	42.3
Minot	1	62.5
	1.8	64.7

HRS wheat variety* response to seeding rate and foliar fungicide, Carrington, 2003.



*Alsen, Ingot, and Reeder

Durum wheat management trial, Garrison, 2003.

Seeding rate (million PLS/A)	Yield (bu/A)	TW (lb/bu)	Protein (%)	Net income (\$/A)
1.0 (88 lbs/A)	62.5	63.3	12.3	188
1.5 (132 lbs/A)	64.7	64.0	12.0	191

Plant Establishment Strategies - Summary

- **High yield requires good management (and cooperation from 'Mother Nature')**
 - **Seed early**
 - **Establish a stand of 1 to 1.5 million plants/acre**
 - 23-34 plants/ft²
 - ✓ Adequate seedbed, soil moisture, seed quality, seeding techniques
 - **Consider other factors discussed during workshop**
 - Variety selection, plant nutrition, pest management, etc.

Questions or comments?



[3HiProfitWDFranzen.ppt](#)