Barren Corn Issues in 2002

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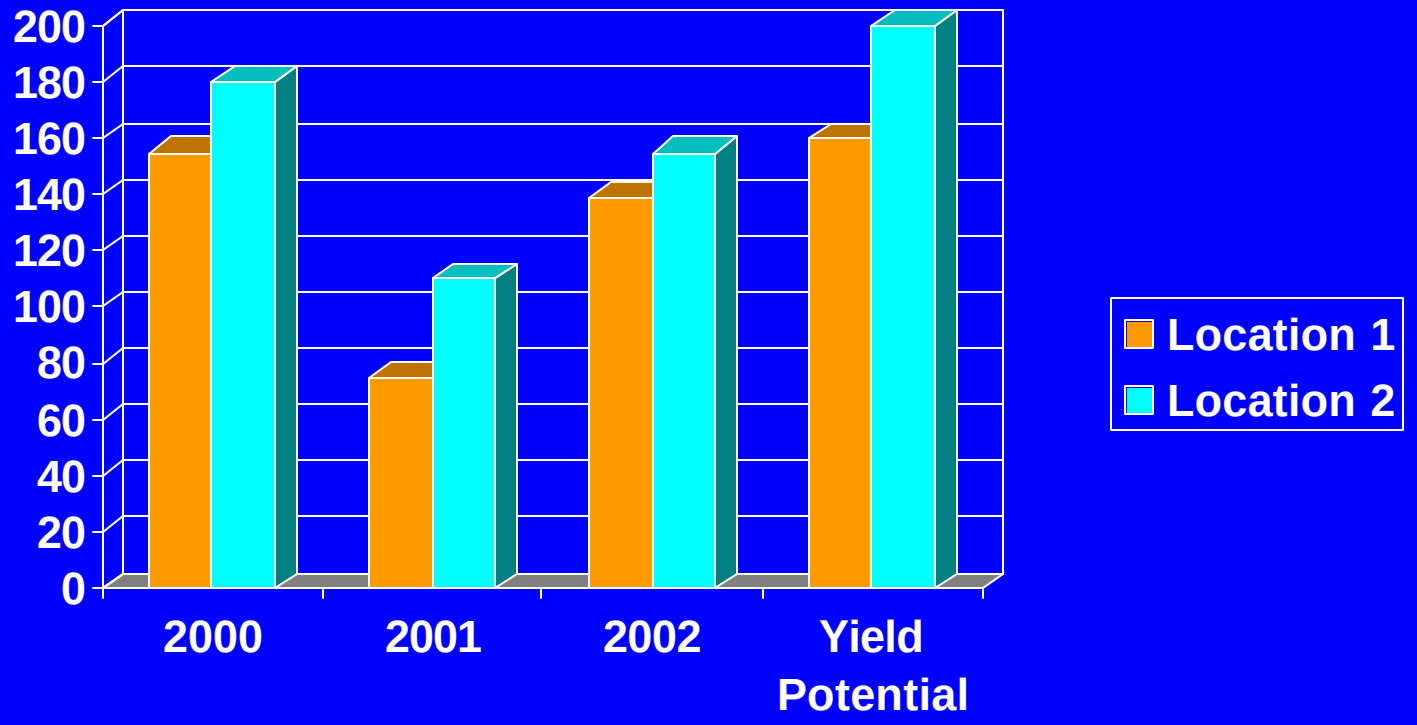
“Yield Problems” in Corn

- Problem fields reported in southern Wisconsin
- Yield less than anticipated
- High frequency of plants barren or form small ears
- Problem fields mixed among fields with expected yield
- Two fields in western Dane County selected for study

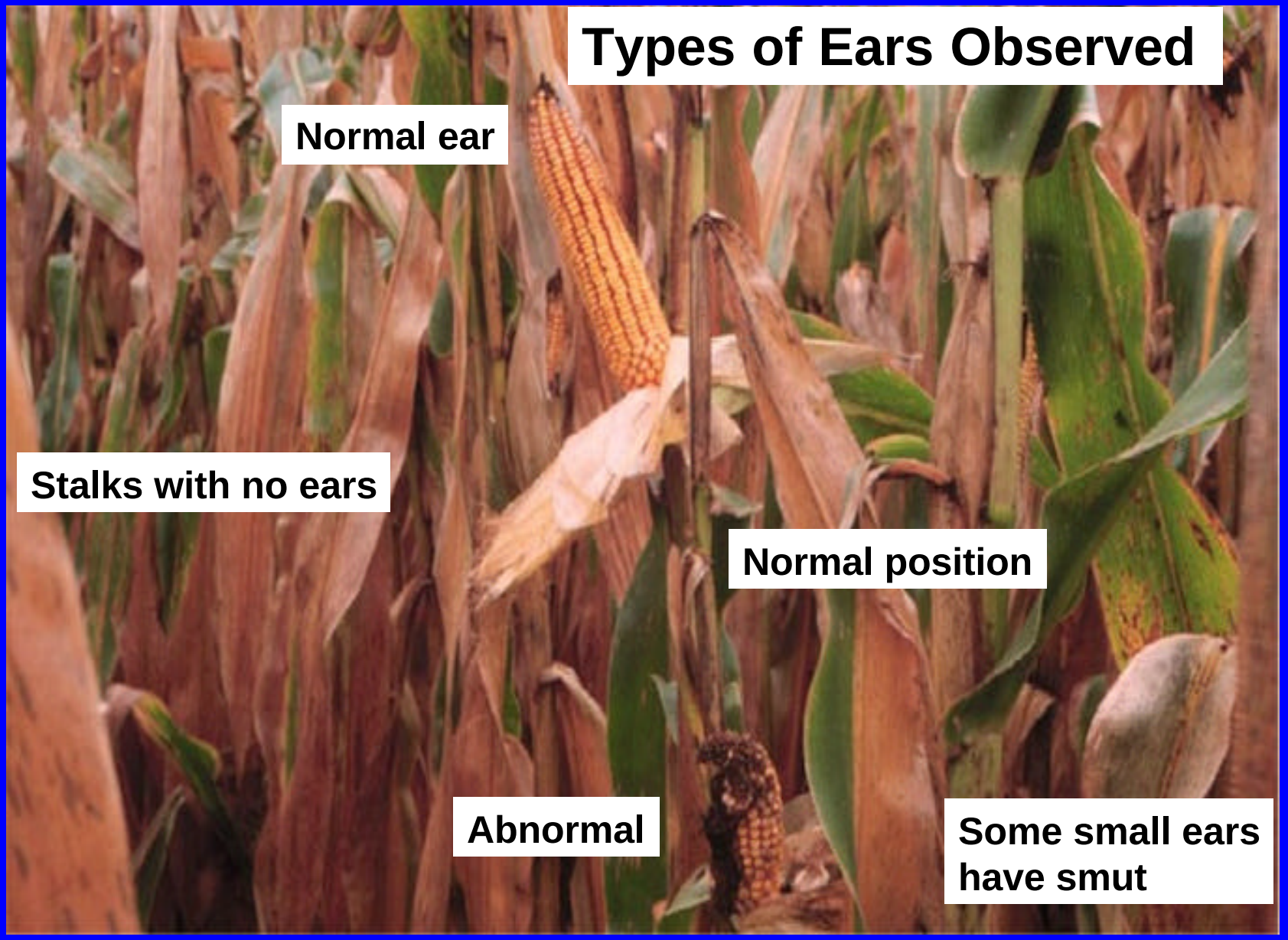
Change in Corn Yield by Year bu/a



Field Management

- Location 1
- Corn 15 of past 20 years (irrigated)
- Peat soil
- Expected yield = 160 bu/a
- Planting date - May 22, 2002
- Problem observed across herbicides and insecticides

- Location 2
- Corn 18 of past 20 years
- Silt loam soil
- Expected yield = 200 bu/a
- Planting date - May 17, 2002
- Problem observed across herbicides and insecticides

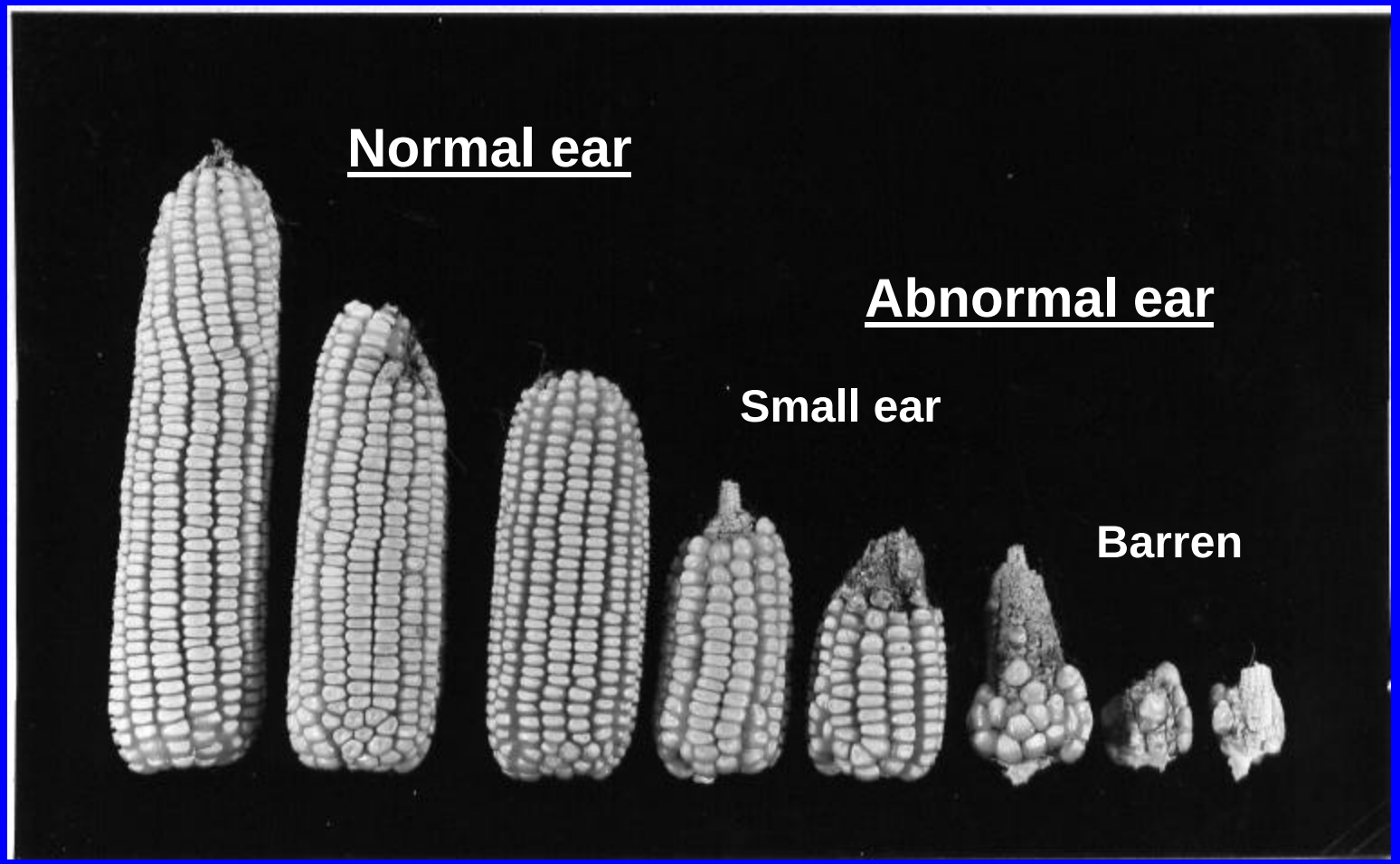

Types of Ears Observed
Normal ear
Stalks with no ears
Normal position
Abnormal
Some small ears have smut

Symptoms Associated with High Incidence of Abnormal Ear Development

Plants with abnormal ears have upright and narrow leaves and are frequently taller than plants with normal ears.

Plants tassel uniformly.
High frequency of plants with delayed emergence of earshoots.
<u>Tassels and silk not synchronized.</u>

Range of Ear Development in Problem Fields



Breakdown of Reproductive Problems - Location 1- 2002

	Abnormal Ears			
Hybrid	Small	Smut	Barren	Total
	%	%	%	%
A	20	4	8	32
B	16	4	2	22
C	14	7	2	23
D	19	5	2	26

Breakdown of Reproductive Problems - Location 2- 2002

	Abnormal Ears			
Hybrid	Small	Smut	Barren	Total
	%	%	%	%
A	24	5	7	36
B	15	3	3	21
C	13	5	3	21
D	24	4	3	31

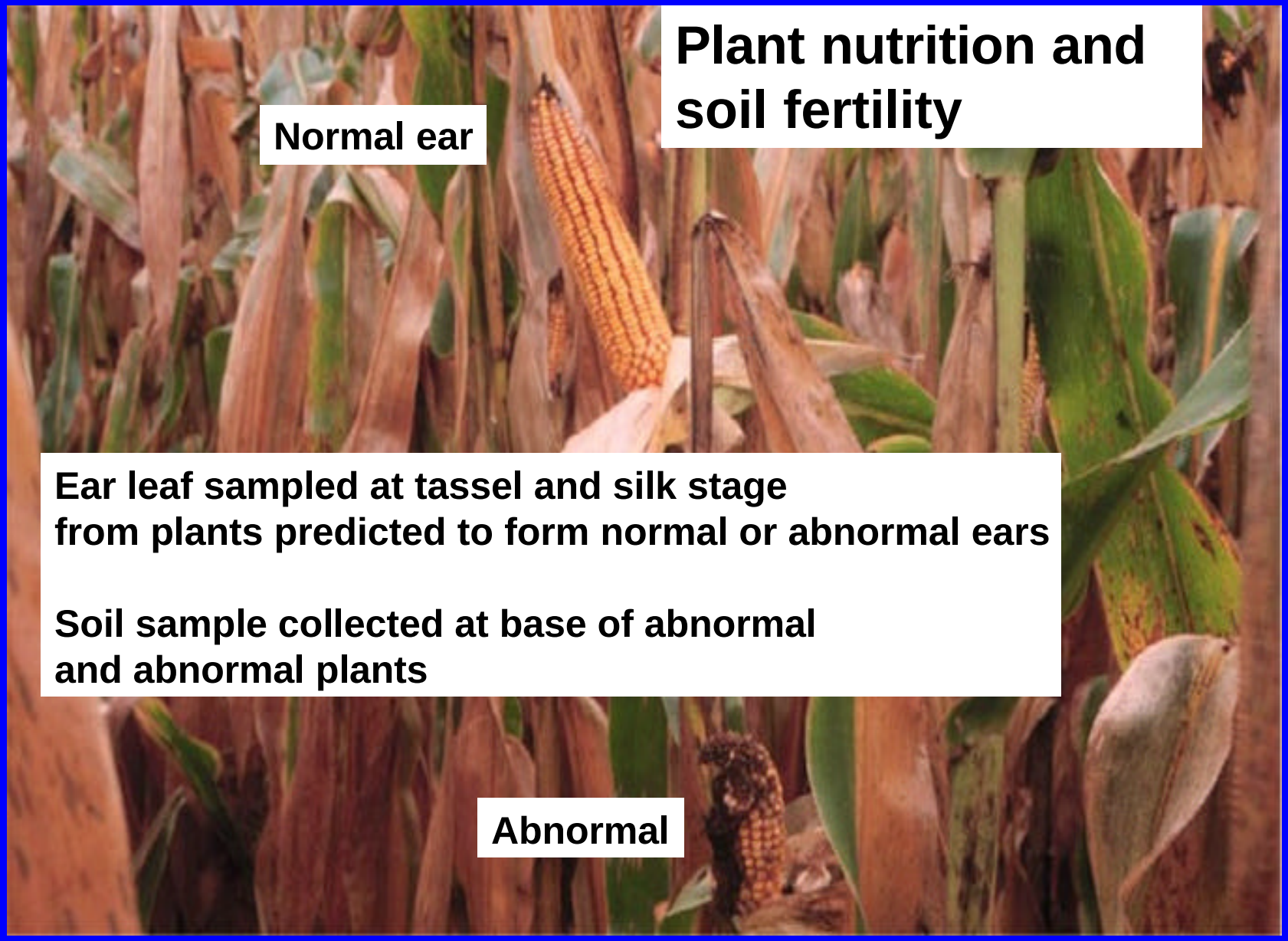
Abnormal Ears and Yield 2002

	Location 1		Location 2	
Hybrid	Abnormal	Yield	Abnormal	Yield
	%	bu/a	%	bu/a
A	32	139	36	140
B	22	153	21	155
C	23	156	21	169
D	26	137	31	105

Cause of desynchronized pollen shed and silk emergence???

- Soil fertility
- Plant nutrition
- Plant tissue analysis similar for plants with normal and abnormal ears

Plant nutrition and soil fertility



Ear leaf sampled at tassel and silk stage
from plants predicted to form normal or abnormal ears

Soil sample collected at base of abnormal
and abnormal plants

Soil Characteristics

- Location 1
- pH = 6.4
- OM = 40.0 %
- P ppm
  - normal = 19
  - abnormal = 22
- K ppm
  - normal = 113
  - abnormal = 117

- Location 2
- pH = 6.7
- OM = 3.5 %
- P ppm
  - normal = 68
  - abnormal 68
- K ppm
  - normal = 199
  - abnormal 188

Plant Tissue Analysis - ppm

- Location 1 (peat)
- N normal = 2.81
  - abnormal = 2.94
- P normal = 0.31
  - abnormal = 0.30
- K normal = 2.19
  - abnormal = 2.34
- S normal = 0.22
  - abnormal = 0.23

- Location 2 (silt loam)
- N normal = 2.53
  - abnormal = 2.58
- P normal = 0.28
  - abnormal = 0.30
- K normal = 2.18
  - abnormal = 2.22
- S normal = 0.19
  - abnormal = 0.21

Plant Tissue Analysis - %

- Location 1 (peat)
- Zn normal = 25.66
  - abnormal = 23.71
- B normal = 9.23
  - abnormal = 9.16
- Mn normal = 22.91
  - abnormal = 20.72
- Fe normal = 358
  - abnormal = 313
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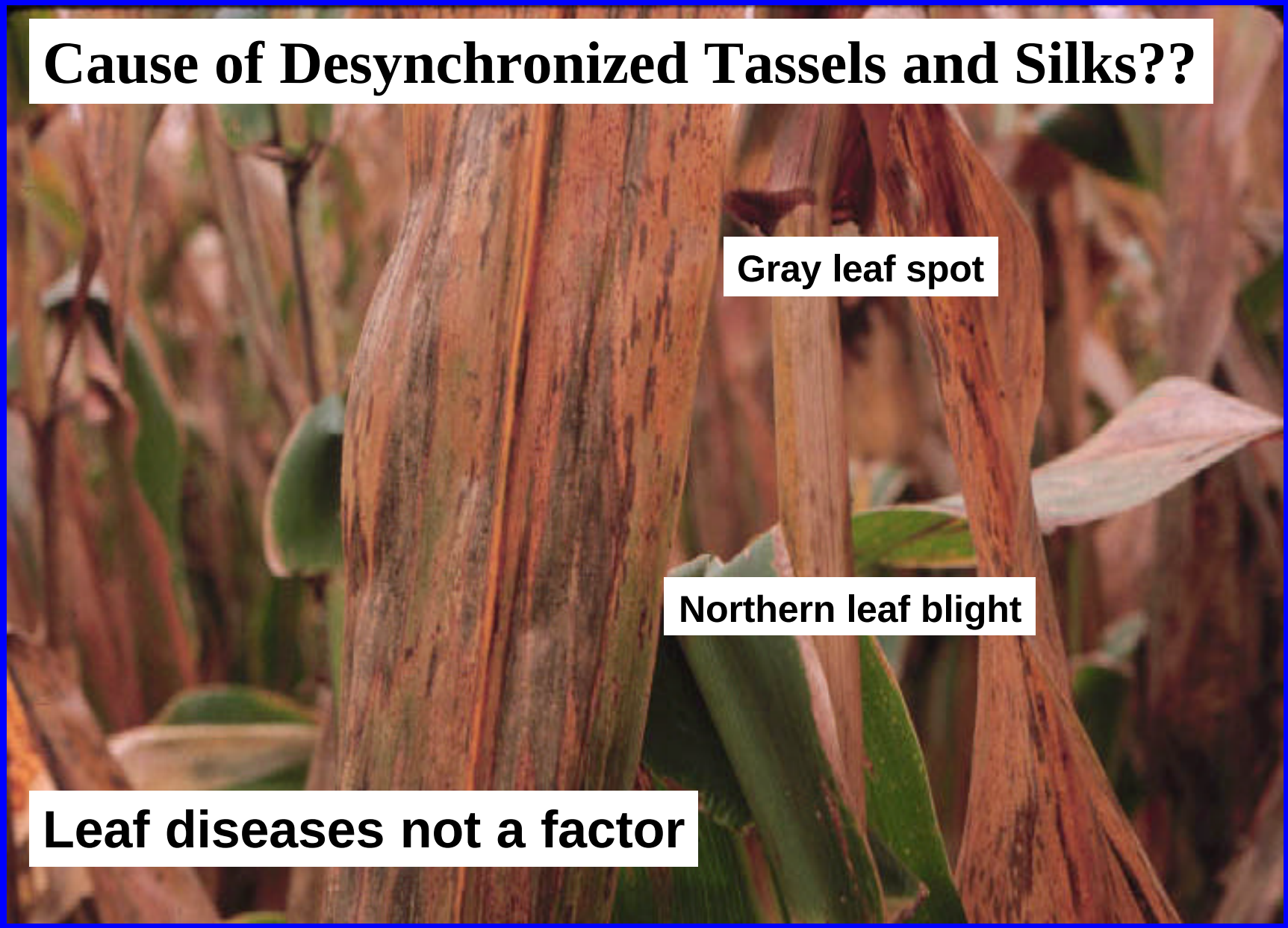
- Location 2 (silt loam)
- Zn normal = 21.65
  - abnormal = 27.31
- B normal = 3.0
  - abnormal = 3.0
- Mn normal = 30.38
  - abnormal = 28.52
- Fe normal = 53
  - abnormal = 62

Cause of Desynchronized Tassels and Silks??



Leaf diseases not a factor

Theoretical Causes of Yield Problem

- Fungicides applied to seed
  - missing an important pathogen
  - phytotoxicity
- Plant nutrition; micronutrients
  - sample during vegetative stages
- Plant Pathogens
  - seedling and root pathogen
  - unknown virus

Changes in fungicides applied to seed; transition from Captan to Apron and Maxim

Hypothesis 1: Related to seed fungicides

- Apron and Maxim not providing control of Pythium in some fields
- Results in slow emerging plants that silk later than normal
- Apron and Maxim are phytotoxic to corn in some fields and to some hybrids.
- Growth regulator effect disrupts corn reproduction

Virus Pathogens of Corn

Hypothesis 2: Unknown virus infects corn disrupting reproduction

- Virus not detected
- No obvious symptoms associated with corn viruses
- Unprecedented insect activity since 2000
- Experiments planned to explore this question

Symptoms commonly caused by viruses in corn

Summary

- Yield goals not being meet in specific fields.
- High incidence of barren plants
- Tassels emerge uniformly but not silks
- Cause unknown
- Frequency of problem in Wisconsin is unknown