# FERTILITY PLACEMENT FOR CONSERVATION TILLAGE SYSTEMS

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# WHY CONSERVATION TILLAGE

- LABOR SAVINGS
- TIME MANAGEMENT
- EQUIPMENT/FUEL COSTS
- SOIL PRODUCTIVITY
- WATER QUALITY

# SOIL CONSERVATION IS A SOCIETAL CONCERN

- DEGRADATION OF THE RESOURCE
  - FERTILITY
  - ORGANIC MATTER
  - TILTH
- WATER QUALITY
  - SEDIMENT
  - NUTRIENTS
- PROGRAM COST
  - EXPENSIVE TO MANAGE
  - CHEAPER TO PREVENT

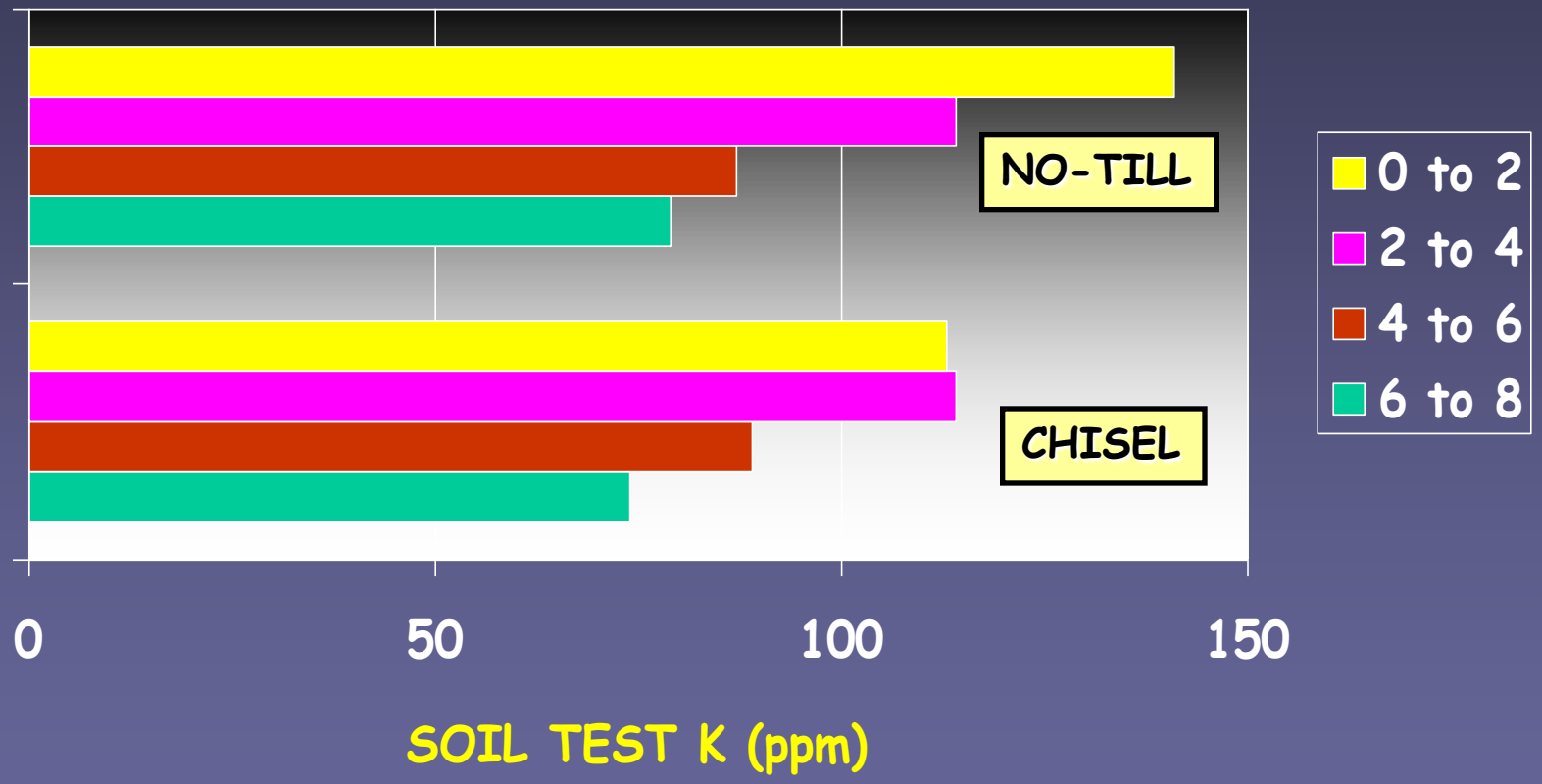
# FERTILIZER MANAGEMENT ISSUES IN CONSERVATION TILLAGE

- HOW MUCH – WHAT – WHERE - WHEN
- NUTRIENT STRATIFICATION
- MANURE AND FERTILIZER ?
- COMPACTION CONSIDERATIONS
- EQUIPMENT AND PLACEMENT

# SOIL TEST TO DETERMINE NUTRIENT NEED

- SAMPLING DEPTH VARIES
  - MULCH TILLAGE: 3/4 DEPTH OF TILLAGE
  - NO-TILL; STRIP-TILL: 6-7”
    - INCLUDE 0-2” SAMPLE FOR pH
- ONCE IN THE ROTATION OR EVERY 3-4 YEARS
- NUMBER OF SAMPLES/FIELD VARIES
  - MINIMUM 10 CORES/SAMPLE

# K STRATIFICATION AFTER 3 YEARS IN TILLAGE SYSTEM




*WOLKOWSKI, 2000*

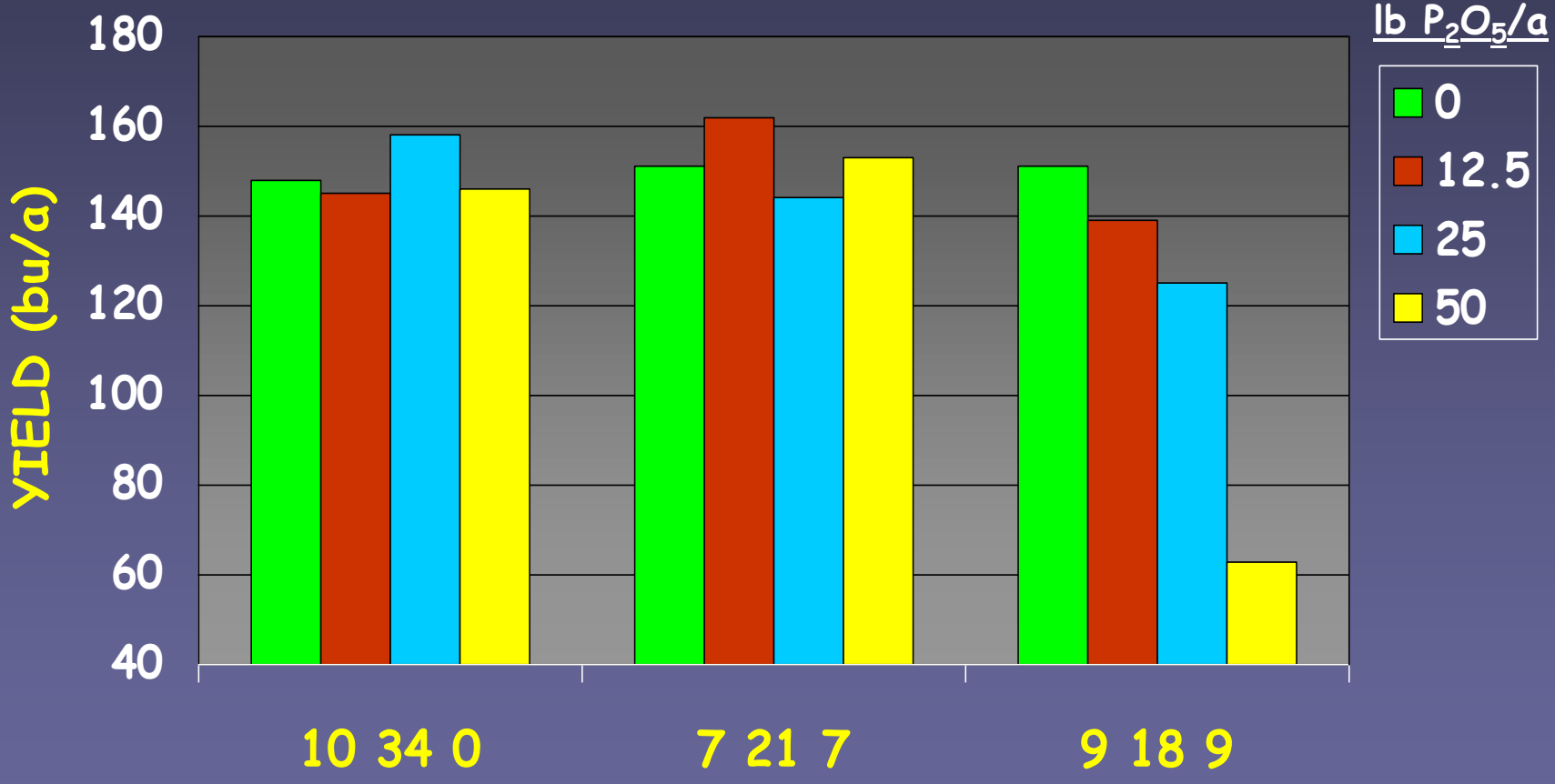
# BANDING vs. BROADCAST

- BANDING MORE EFFICIENT
  - LESS FIXATION BY SOIL
  - "PRECISION PLACEMENT"
  - REDUCED RISK FOR LOSS
  - POSITIONALLY AVAILABLE
  - SLOW EARLY PLANT METABOLISM
- BROADCAST TO CORRECT LOW TESTS
  - SOME TILLAGE MAY BE NEEDED
- VOLATILIZATION LOSS FROM UREA CONTAINING MATERIALS

# WHAT ABOUT SEED-PLACEMENT

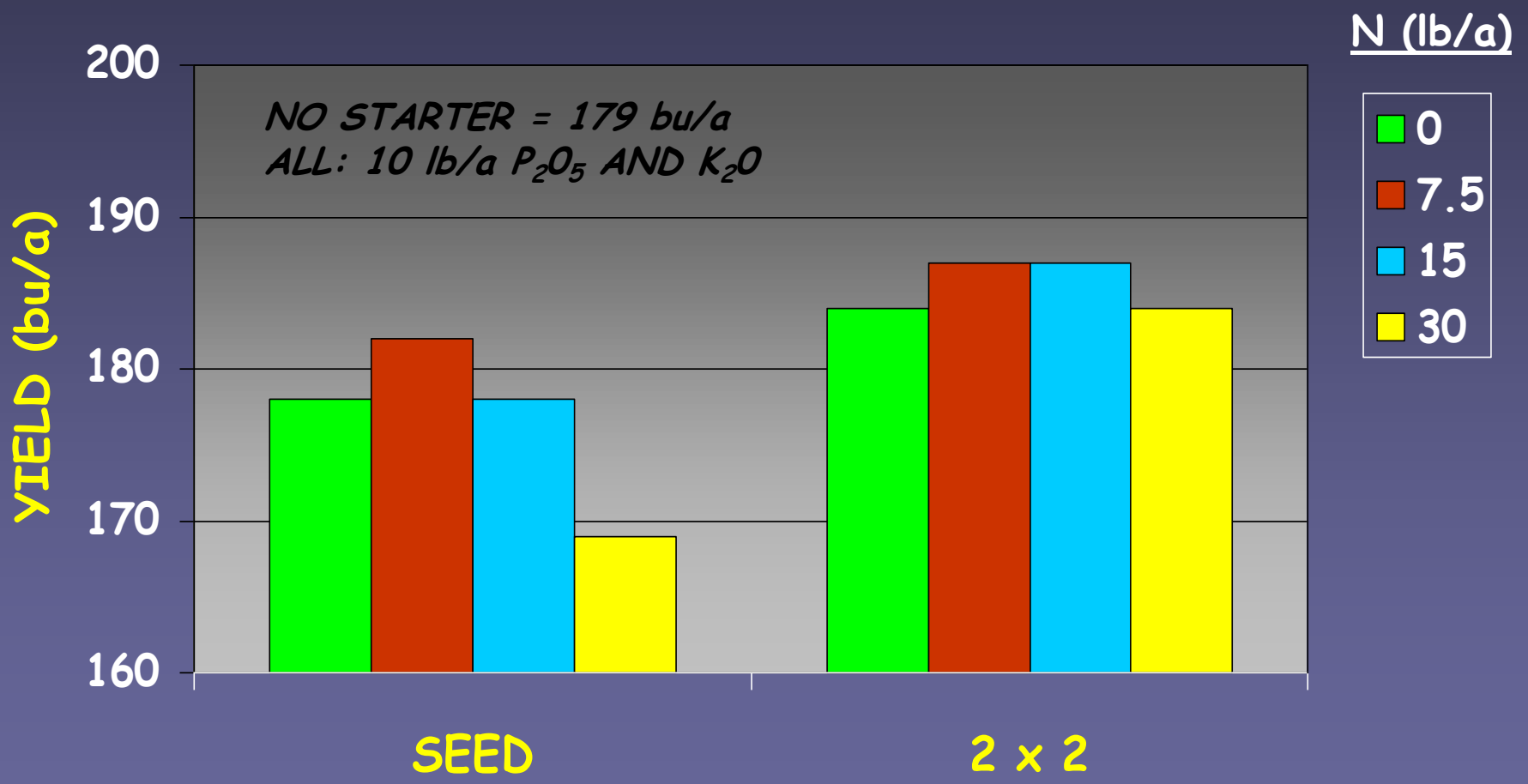
- WISCONSIN SOILS TYPICALLY RESPOND TO ROW-APPLIED FERTILIZER
- MANY SOILS TEST IN THE HIGH RANGE
- TIME NEEDED TO FILL HOPPERS REDUCES PLANTING EFFICIENCY
- SOME SUGGEST HIGHER AVAILABILITY FOR SEED-PLACED MATERIALS

# INFLUENCE OF RATE AND TYPE OF SEED-PLACED FERTILIZER




GELDERMAN et al., 1995

# INFLUENCE OF RATE AND PLACEMENT OF UREA FERTILIZER ON A SILT LOAM SOIL




WOLKOWSKI, 1999

# RECOMMENDATIONS TO REDUCE SEED-PLACED INJURY

- LIMIT TO 10 lb N + $K_2O$/a
- AVOID HIGH SALT CARRIERS
- NO UREA, UAN, ATS
- USE CAUTION ON SANDY OR DRY SOILS
- AVOID USE ON SALT-SENSITIVE CROPS

# WILL MANURE CONFLICT WITH FERTILIZER AND TILLAGE MANAGEMENT

MANURE LAGOON MIXING
USDA-DFRC, 2001

# CONSERVATION TILLAGE AND NUTRIENT MANAGEMENT PLANNING

- NMP WILL ALLOCATE MANURE TO MORE FIELDS ON A FARM
- SOME MAY BE DIRECTED TOWARD SLOPING LAND
- ROTATIONS AND TILLAGE MAY NOT BE ADAPTABLE TO MANURING
- CREDIT THE MANURE NUTRIENTS

# MANURE INCORPORATION TOOLS: USDA-DFRC FIELD DAY, AUGUST, 2001

NARROW POINT INJECTOR
ROLLING TINE COVERAGE

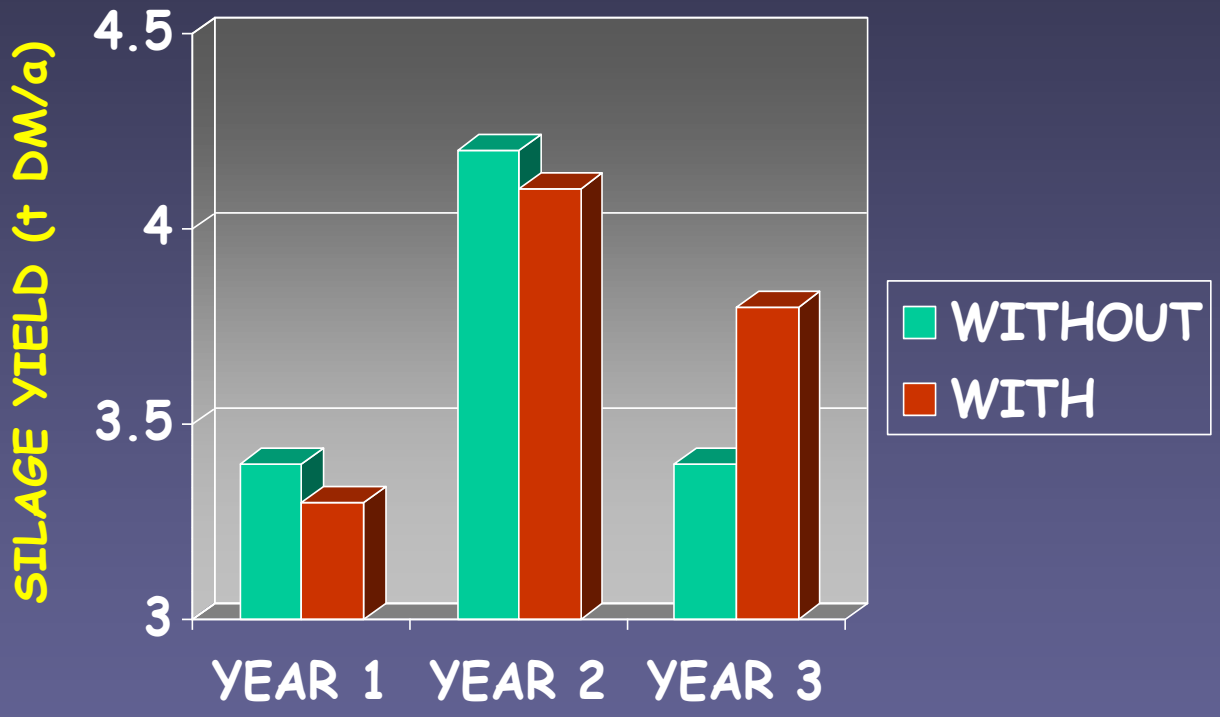
RELATIVELY AGGRESSIVE
SMOOTH SEEDBED

# MANURE INCORPORATION TOOLS: USDA-DFRC FIELD DAY, AUGUST, 2001

SWEEP INJECTOR

ROUGHER SURFACE, MORE RESIDUE
WATCH YOUR STEP!!

# NEED FOR ROW-PLACED FERTILIZER ON MANURED LAND

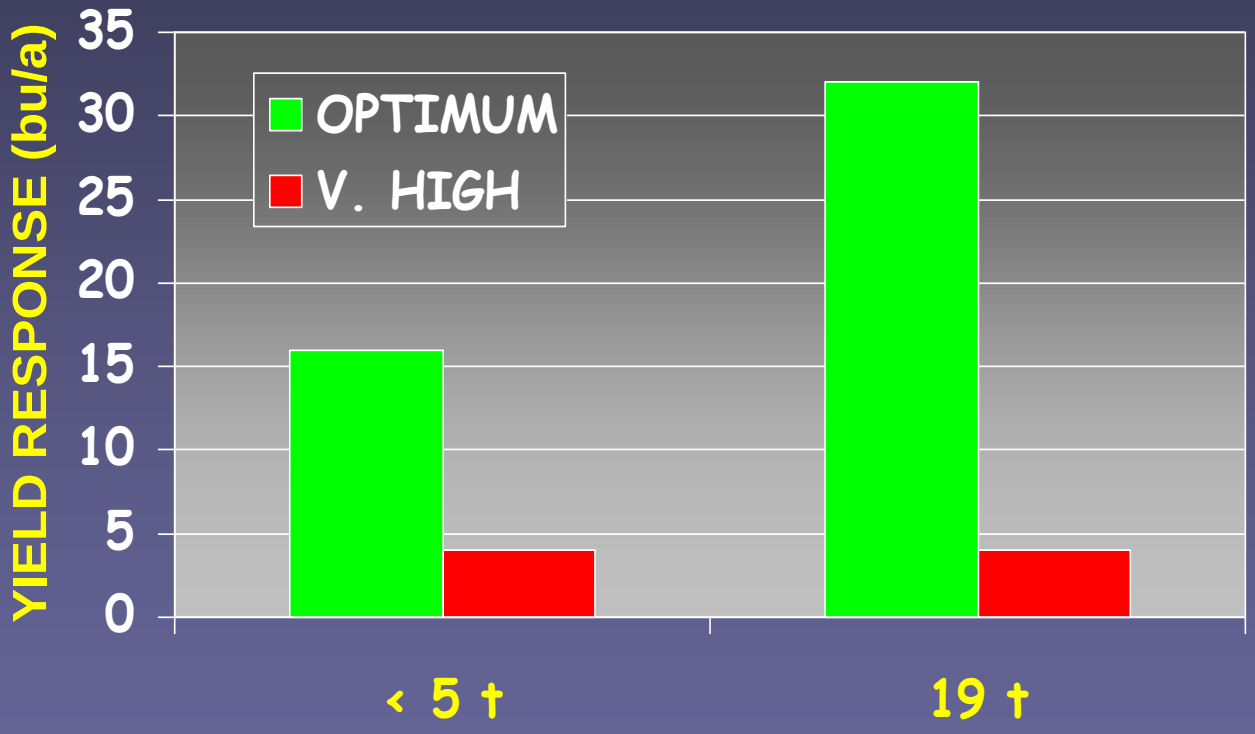



*MOTAVALLI et al., 1993*

# MANAGE SOIL COMPACTION

- SOIL COMPACTION REDUCES YIELD
- LIMIT UNNECESSARY TRAFFIC, AVOID OPERATIONS ON WET SOILS, LIGHTEN LOADS
- POTASSIUM MANAGEMENT IS IMPORTANT
- SUBSOILING IS NOT A QUICK FIX

# RESPONSE OF CORN TO ROW-APPLIED K, OSHKOSH WIS.,(3 yr. avg.)




45 lb $K_2O$/a; 2 x 2 PLACEMENT

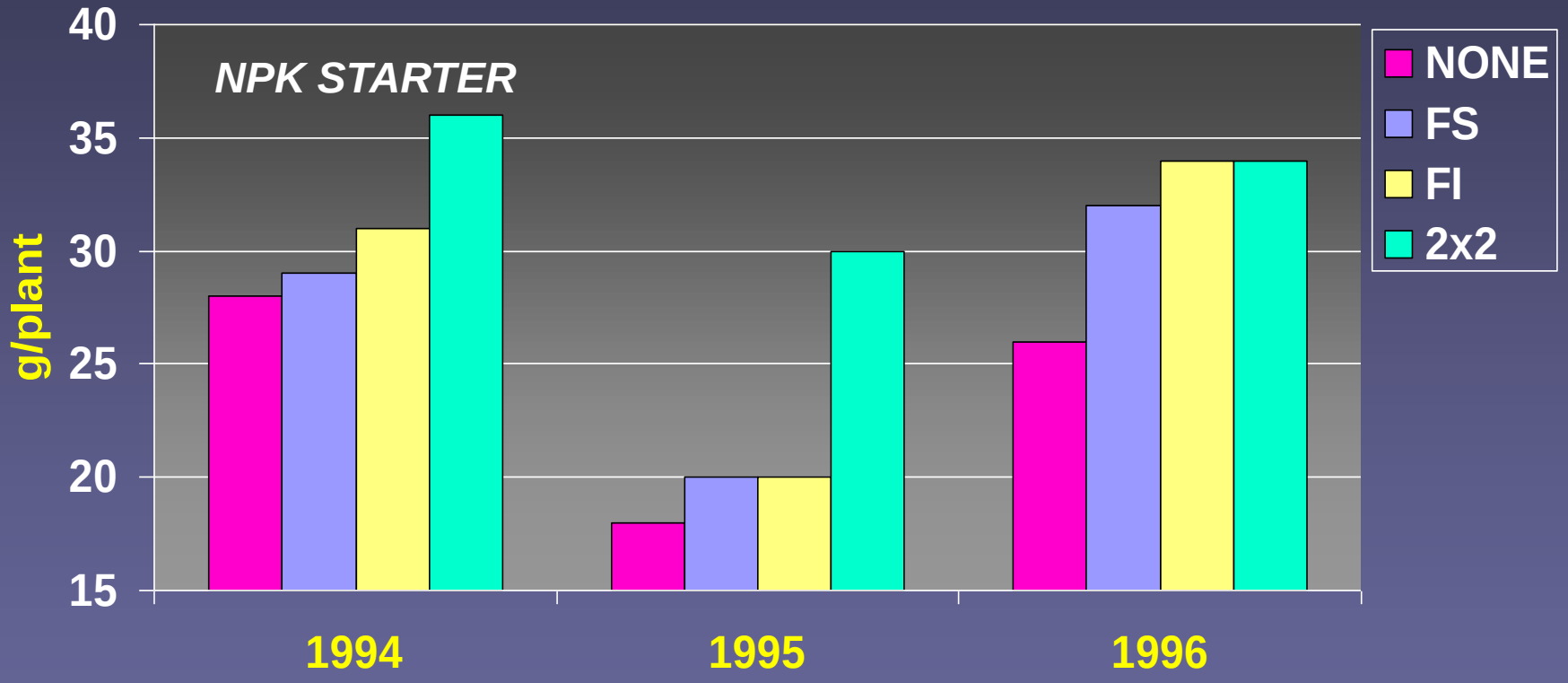

STRIP TILLAGE OPTIONS
- FALL vs. SPRING
- SHALLOW vs. DEEP
- LIQUID vs. DRY

# THREE MAJOR CATEGORIES AFFECT FERTILITY MANAGEMENT

- ROW OR RESIDUE CLEARING
  - REMOVE RESIDUE
  - FINGER COULTERS, BRUSHES, SWEEPS
- STRIP TILLAGE (SHALLOW: < 6 in.)
  - MOVE RESIDUE, SEEDBED PREP., ROW FERTILIZER
  - FLUTED COULTERS, DISCS
- STRIP TILLAGE (DEEP: > 6 in.)
  - DISRUPT COMPACTION, DEEP-PLACE FERTILIZER
  - KNIVES
  - SOME WITH COULTERS TO MOVE RESIDUE OR CREATE MINI-RIDGES

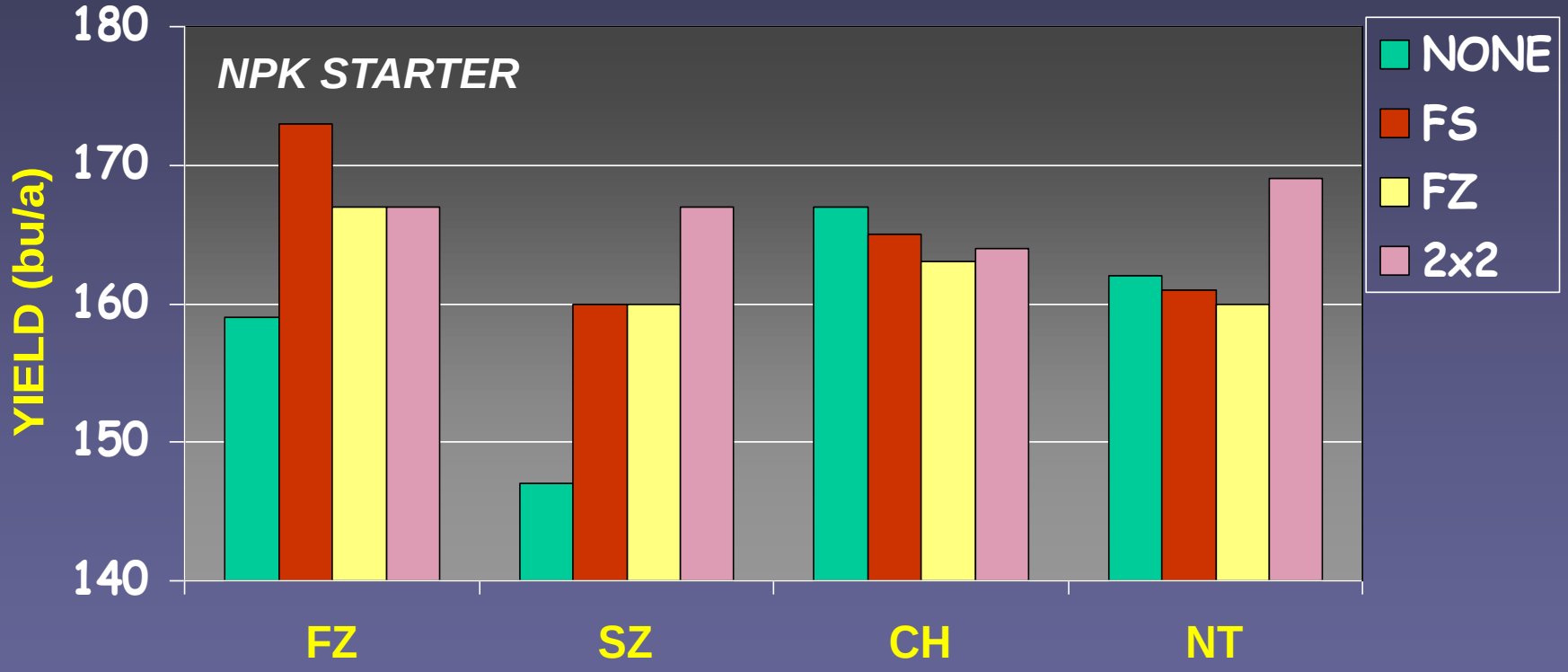

ROW CLEARING
BANDED PLACEMENT WITH
SEED OR 2 x 2 AT PLANTING

# MAIN EFFECT OF ROW FERTILIZER ON CORN GROWTH, ARLINGTON, 1994-1996

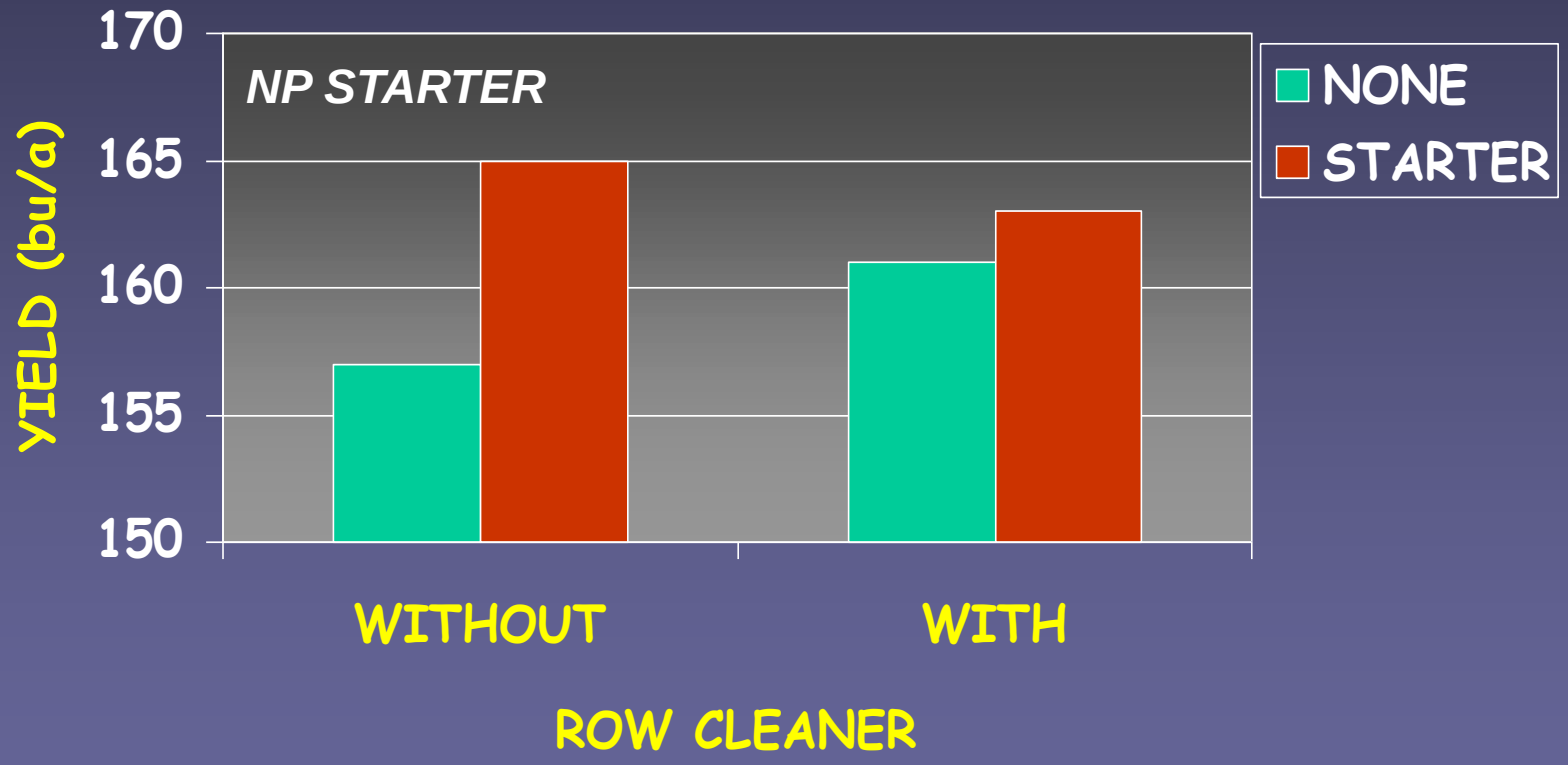



MEASUREMENTS TAKEN AT 12 LEAF STAGE

# INTERACTIVE EFFECT OF TILLAGE AND ROW FERTILIZER, ARLINGTON, 1994-1996



# INTERACTION BETWEEN STARTER FERTILIZER AND ROW CLEANERS



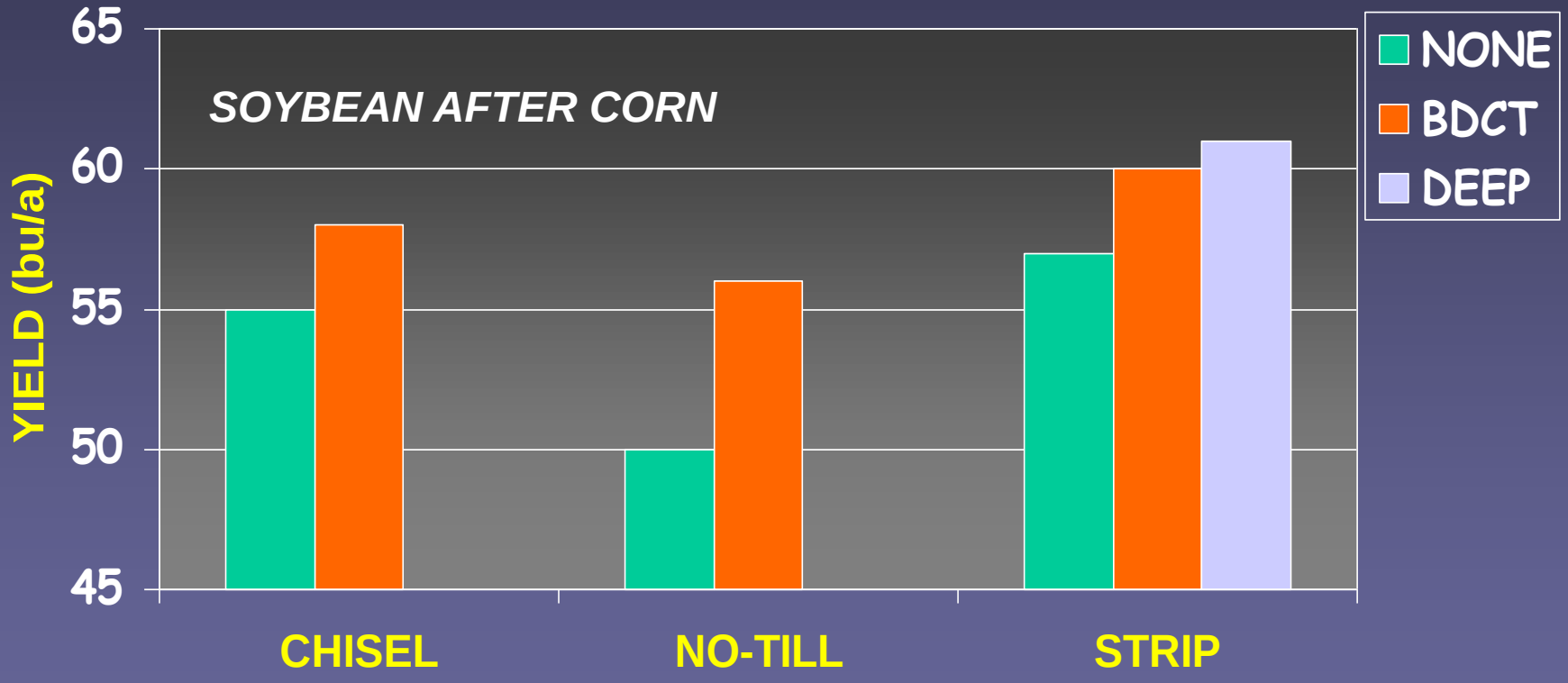

VETSCH AND RANDALL, 2000 (MN)


DEEP BANDED PLACEMENT IN THE FALL WITH STRIP TILLAGE

# *PRELIMINARY UW RESEARCH: DEEP STRIP TILLAGE AND FERTILIZER*

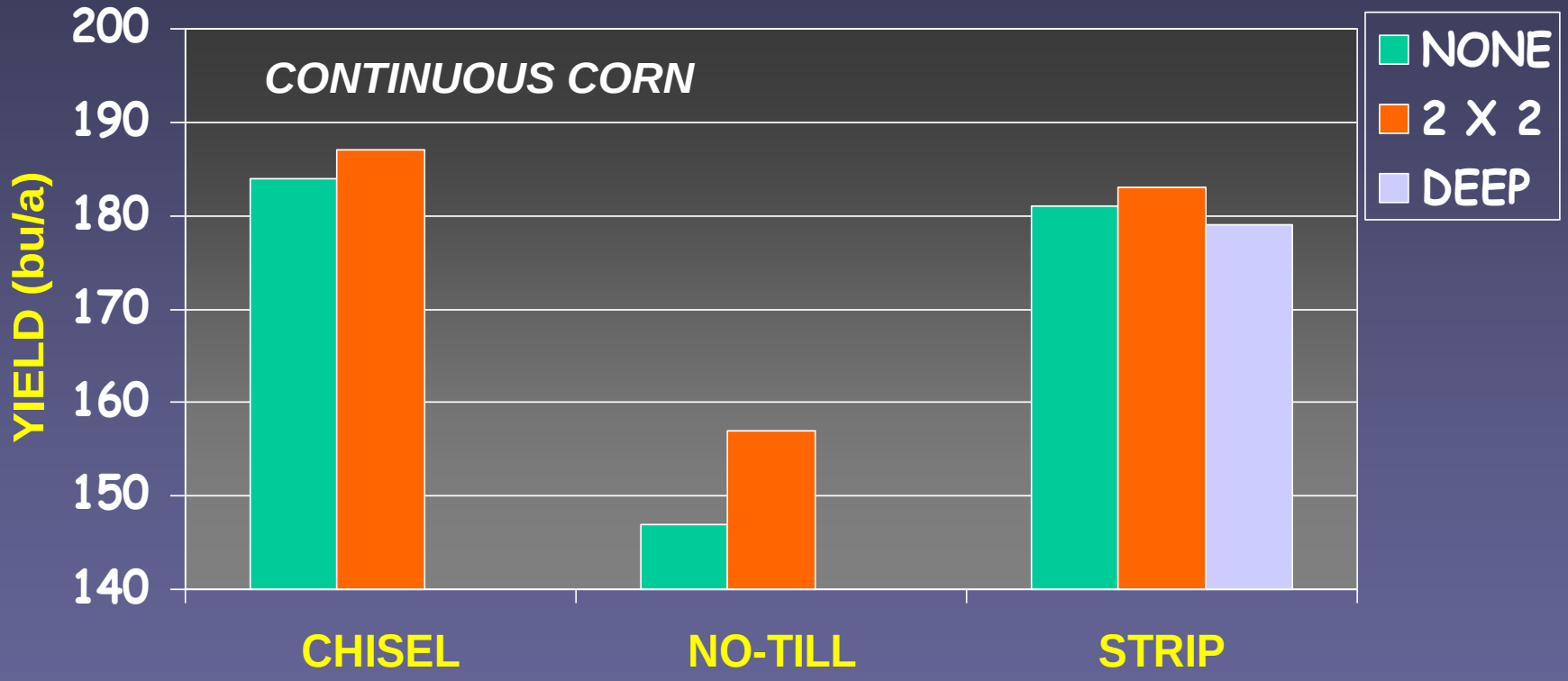
- ARLINGTON, 2001
- CORN/SOYBEAN ROTATION AND CONTINUOUS CORN
- NO-TILL, FALL CHISEL, FALL STRIP
- BROADCAST, 2 x 2, FALL DEEP PLACED

# SOYBEAN RESPONSE TO TILLAGE AND FERTILIZATION, ARLINGTON, 2001




FERTILIZER: 200 lb/a 0-23-30

# CORN RESPONSE TO TILLAGE AND FERTILIZATION, ARLINGTON, 2001

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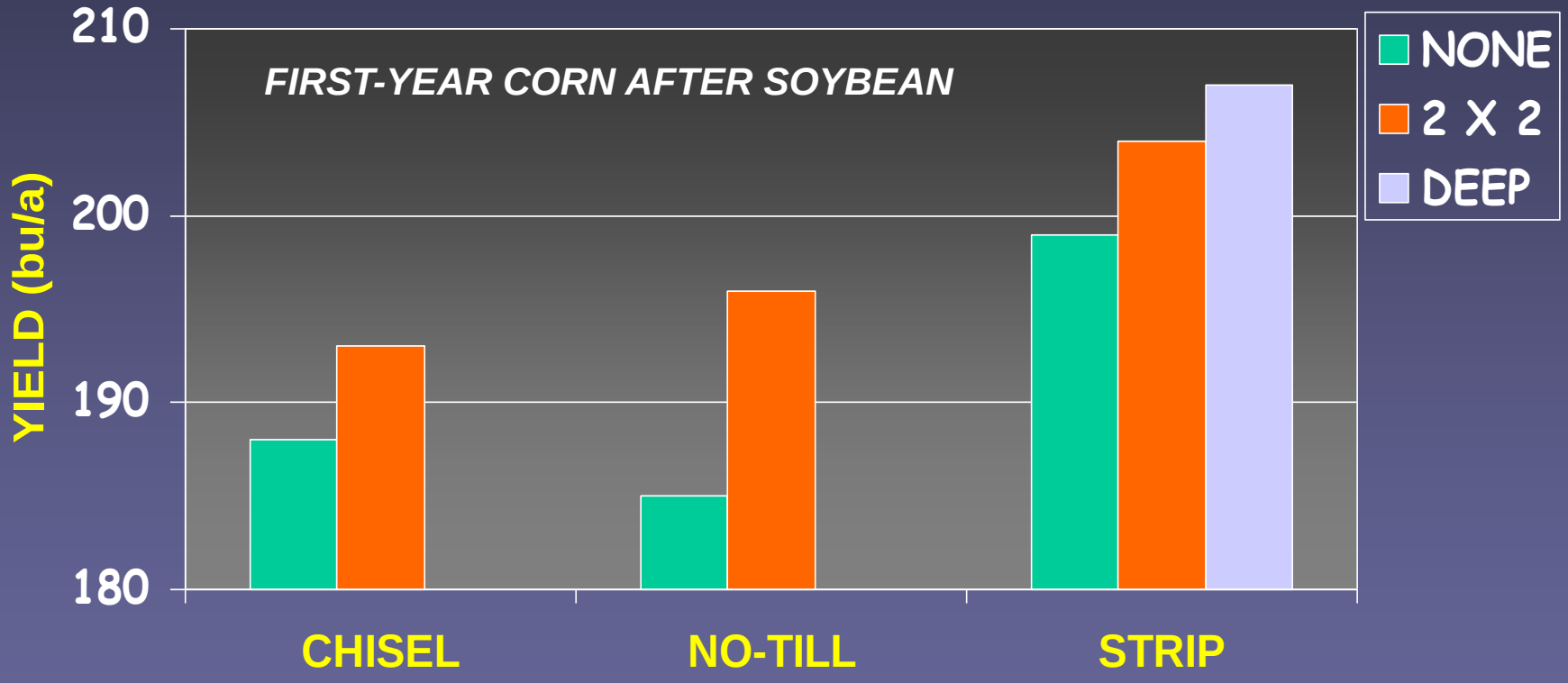
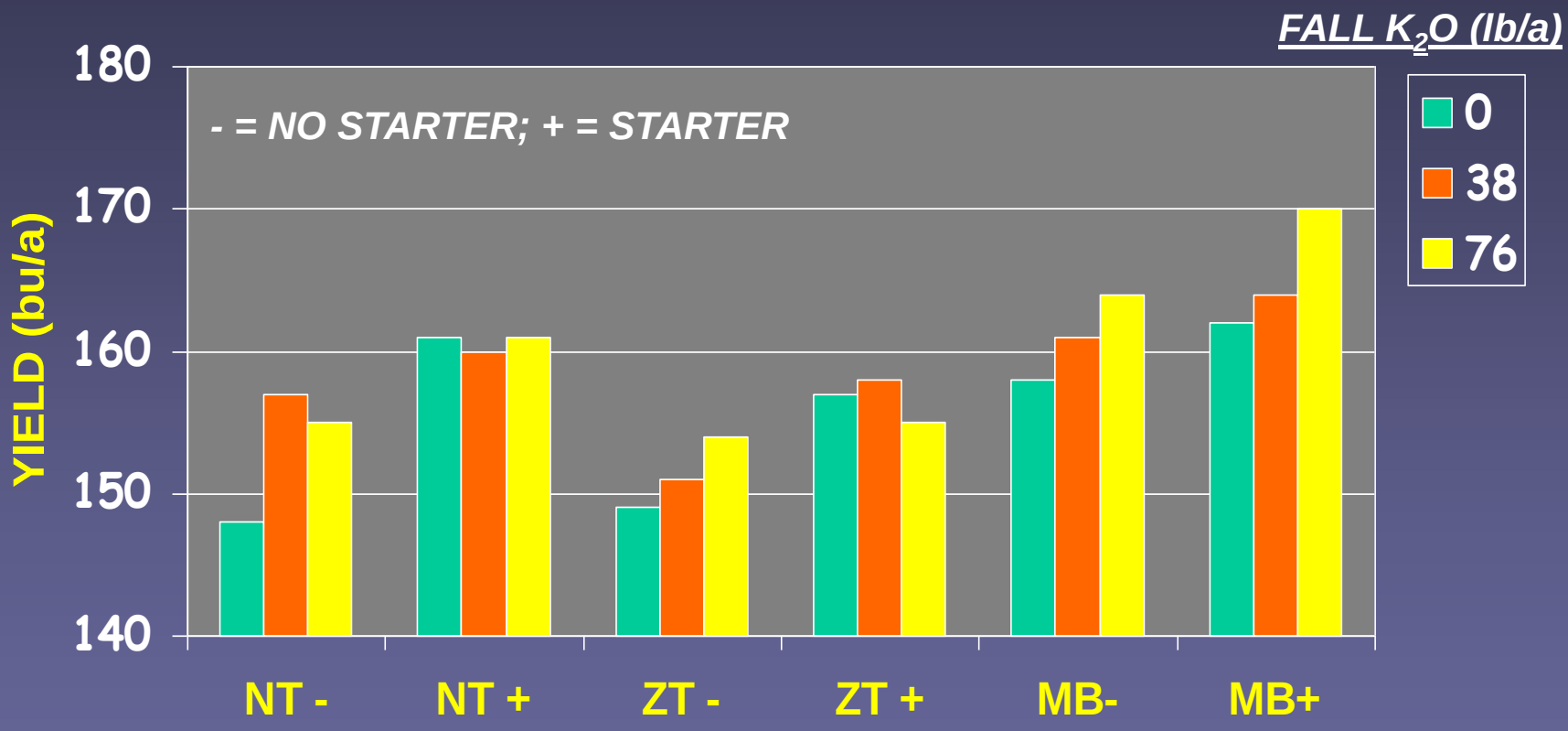


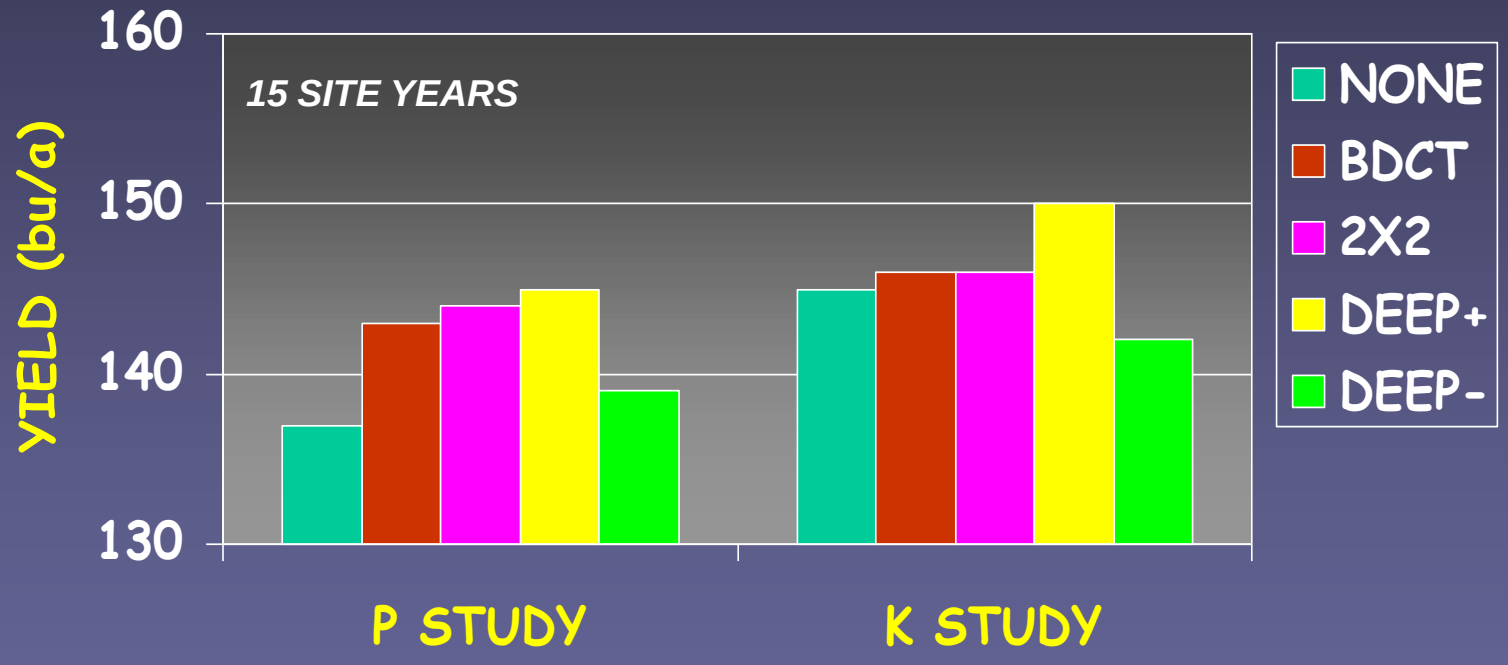

*FERTILIZER: 200 lb/a 0-23-30*

# CORN RESPONSE TO TILLAGE AND K FERTILIZATION, KIRKTON, IN




VYN AND JANOVICEK, 2001 (3 yr. avg.)

# NO-TILL CORN RESPONSE TO P AND K PLACEMENT (IA)




MALLARINO, 1998

# SUMMARY

- SOIL TEST TO DETERMINE NEED
- CONSIDER THE SEED PLACEMENT RISKS
- AVOID SOIL COMPACTION
- CREDIT MANURE
- BANDED PLACEMENT MORE EFFICIENT
  - RESPONSE POTENTIAL GREATER IN NO-TILL
  - USE A COMPLETE MATERIAL
  - 10-20-20 MINIMUM
  - SOME EVIDENCE FOR DEEP K PLACEMENT