

# The Role of Soil Conservation Practices in Sustainable Leaf Tobacco Production

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# Soils are critical to any large scale plant based production system.

## Plants Need:

- Light
- Water
- Oxygen
- Carbon Dioxide
- Mineral Nutrients

## Soils Provide:

- Storage and buffering of mineral nutrients.
- Storage and delivery of water to roots.
- Gas exchange with the air to support root respiration.
- A means of physical support
- Support microbial decomposition



Continued production of profitable burley tobacco crops depends on how well the grower maintains the physical condition of his soils.

*Greater* PROFIT FROM  
BURLEY TOBACCO  
GROWN ON *Productive* SOIL

By HAROLD F. MILLER and IRA E. MASSIE



This vigorous grass-legume sod is ideal to precede tobacco.



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1962

# Typical Field Preparation for Tobacco

- Primary tillage
  - Plowing



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- Secondary Tillage
  - Disking (4+ times)
  - Power tiller



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# Typical Field Preparation for Tobacco

- Primary tillage
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- Secondary Tillage
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  - Power tiller
- Bedding
- Cultivation



# Tillage

## Benefits

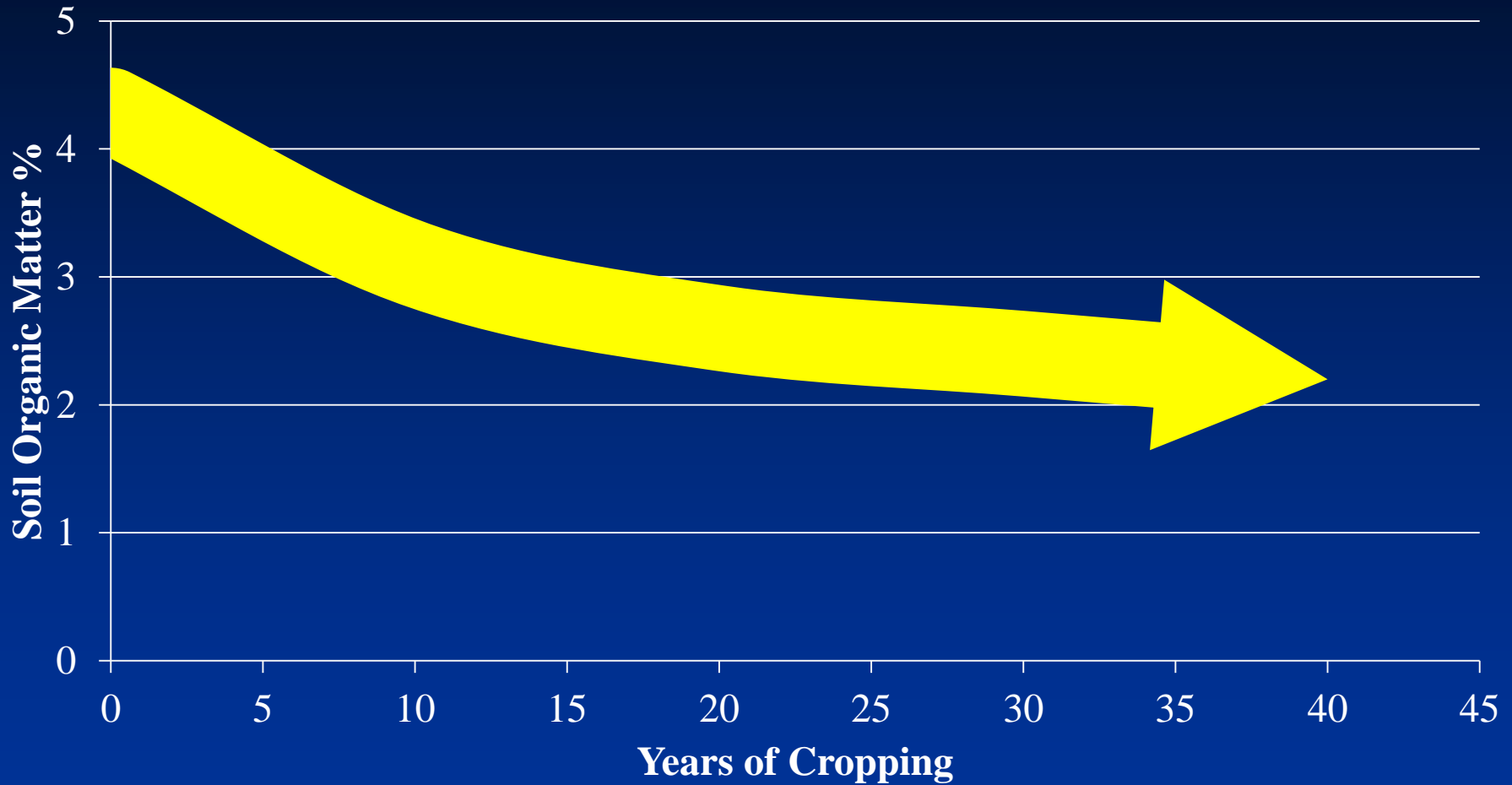
- Vegetation control
- Incorporate organic matter
- Incorporation of chemicals and fertilizer
- Improve transplanter operation
- Alleviate compaction
- Improve aeration/drainage

## Negative Impacts

- Hastens organic matter loss
- Structural degradation
- Increased susceptibility to compaction
- Increased erosion

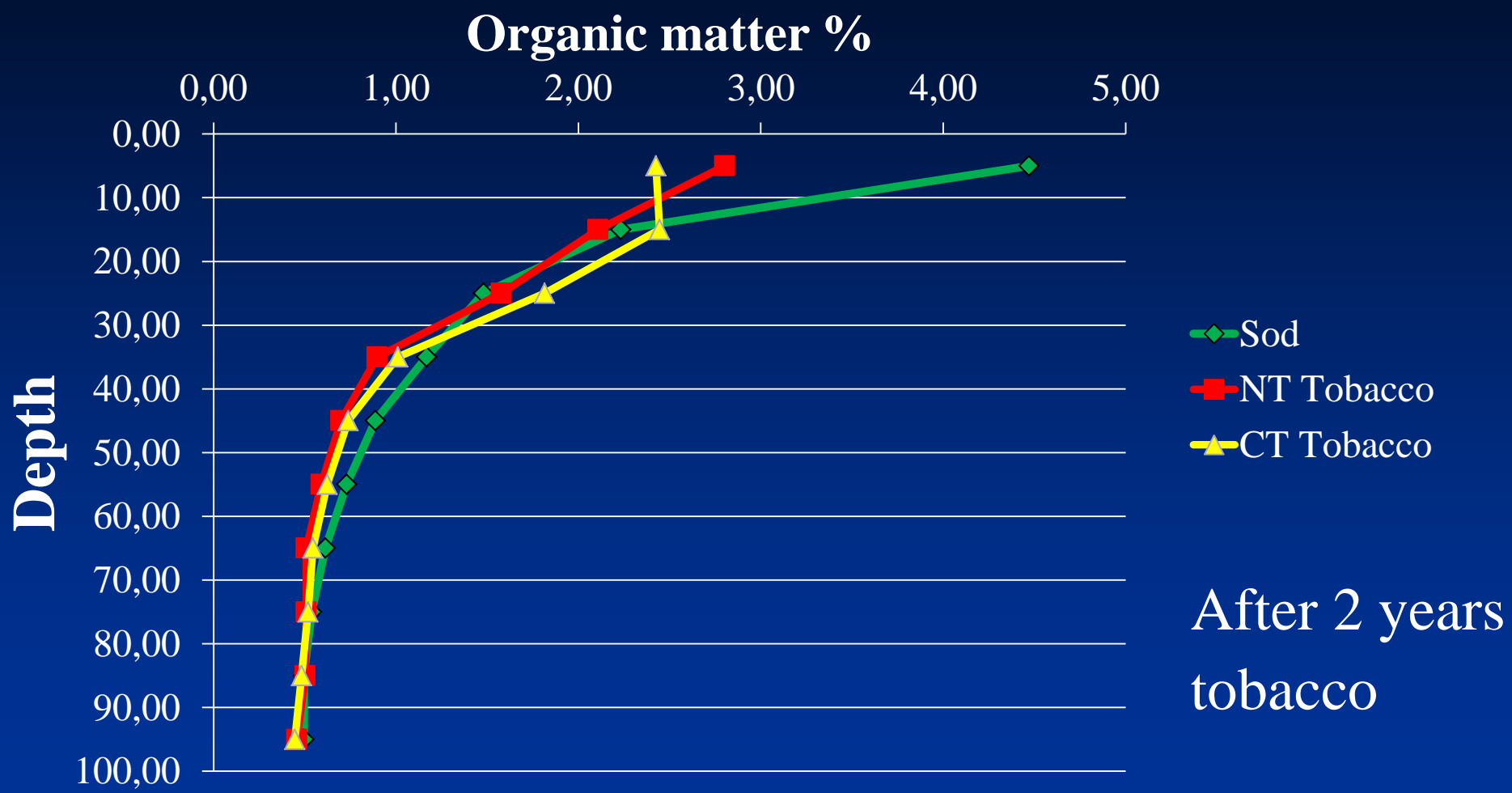


# Effect of Cropping on Soil Organic Matter



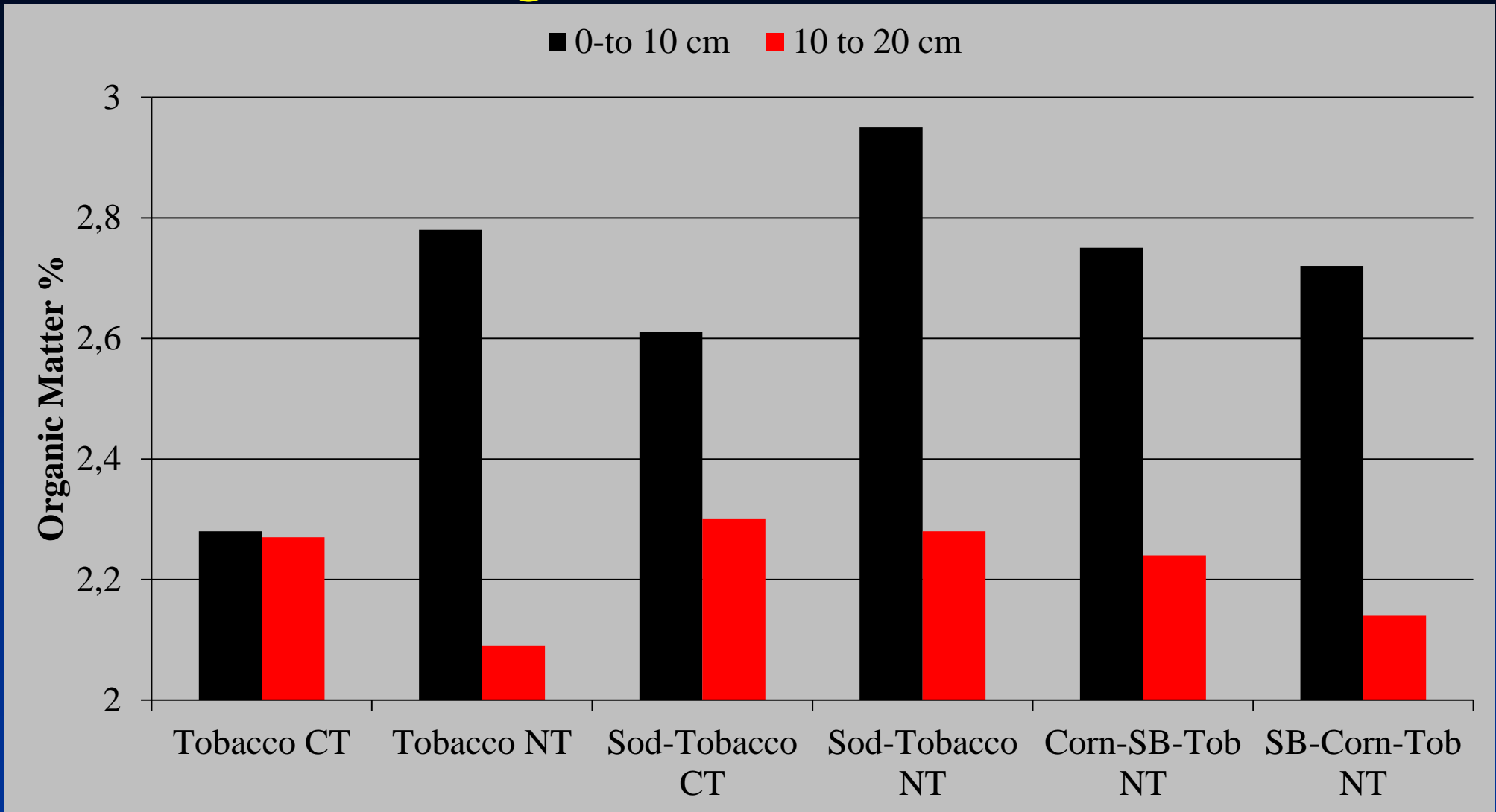
Adapted from Brady: The nature and Properties of Soils, Ninth Edition

# Effect of Tobacco Tillage on Soil OM



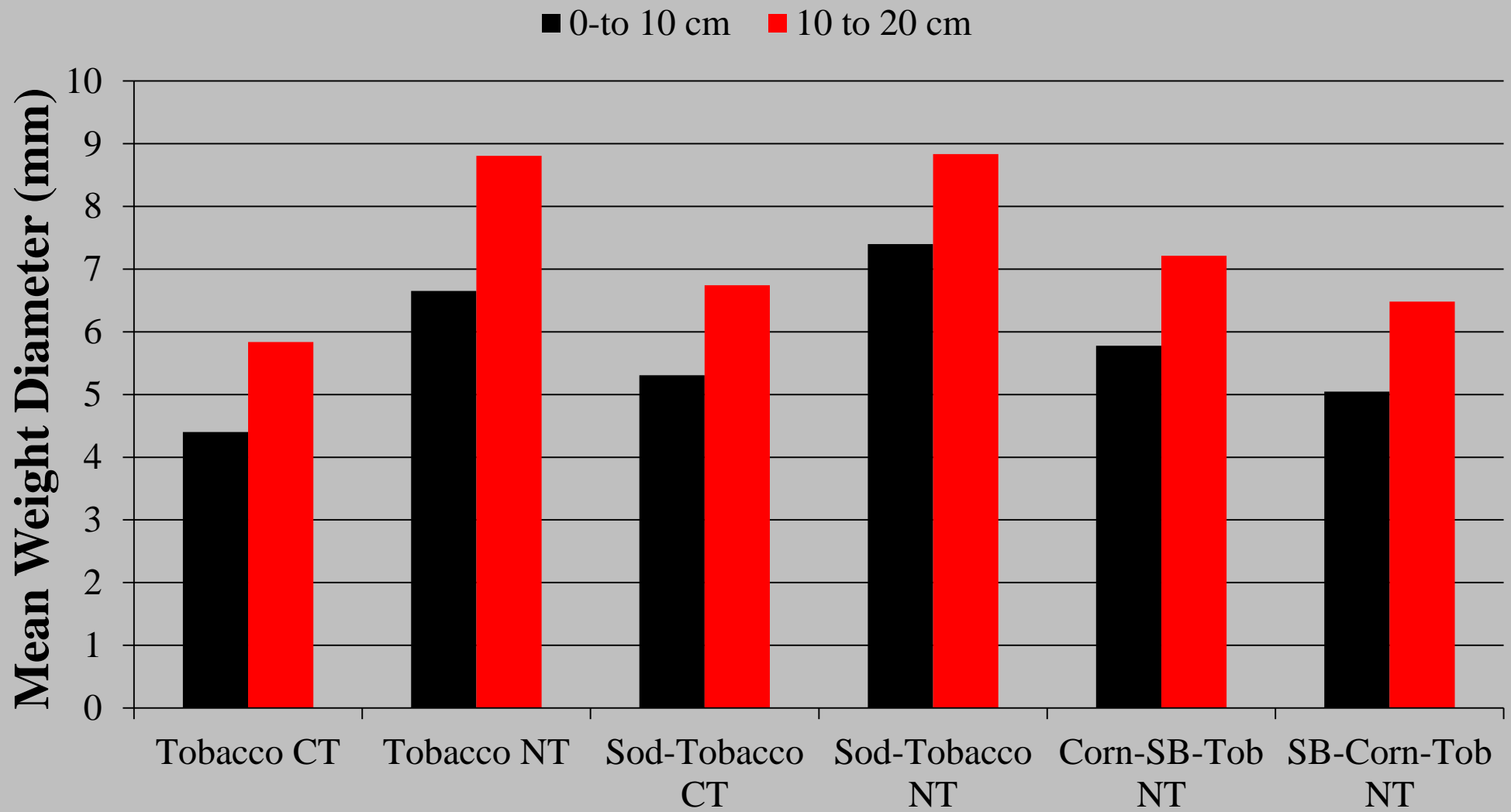
After 2 years tobacco

# Effect of tillage and rotation on soil OM



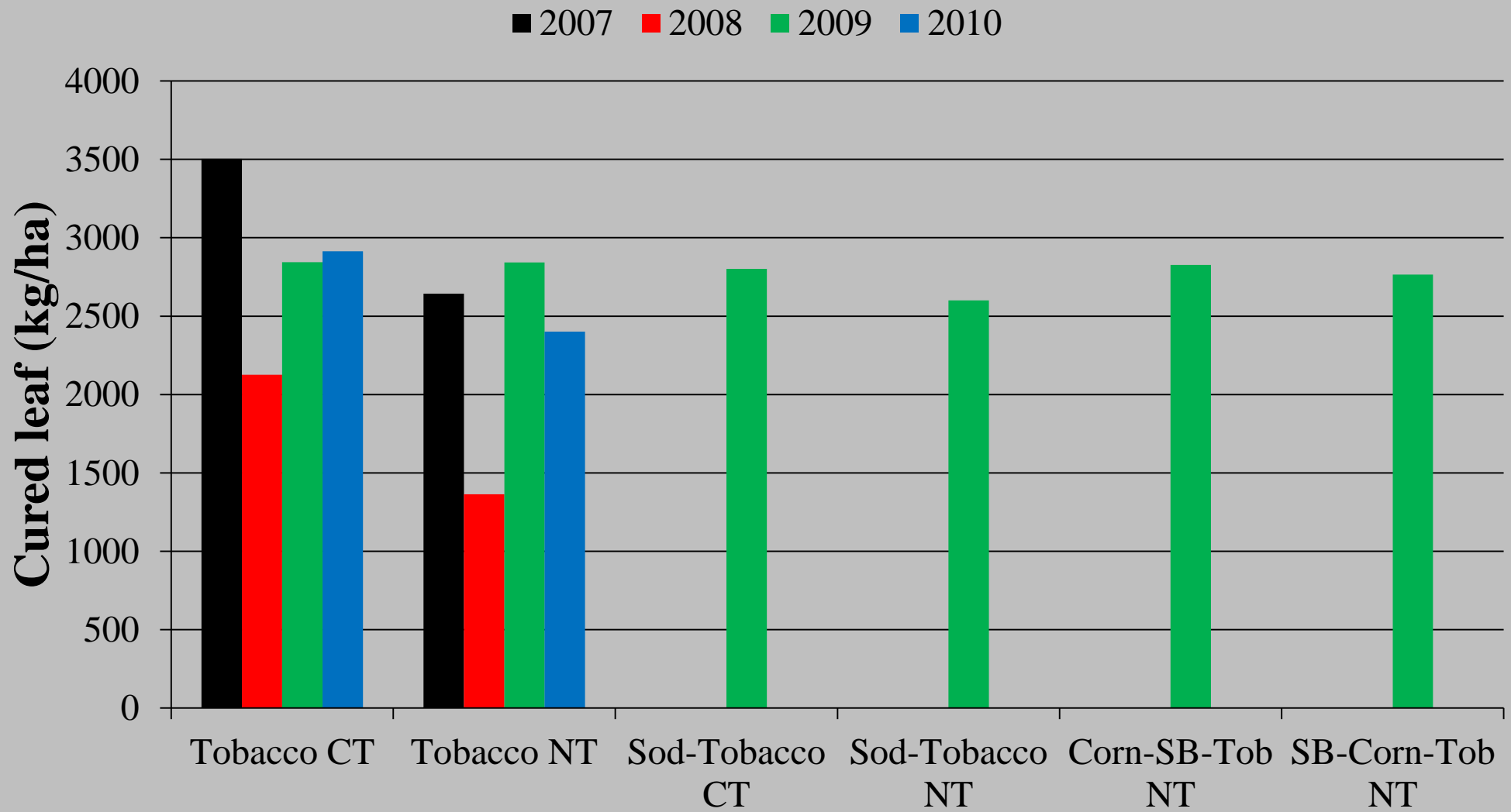
4 Years in Rotation

# Effect of tillage and rotation on soil aggregation



4 Years in Rotation

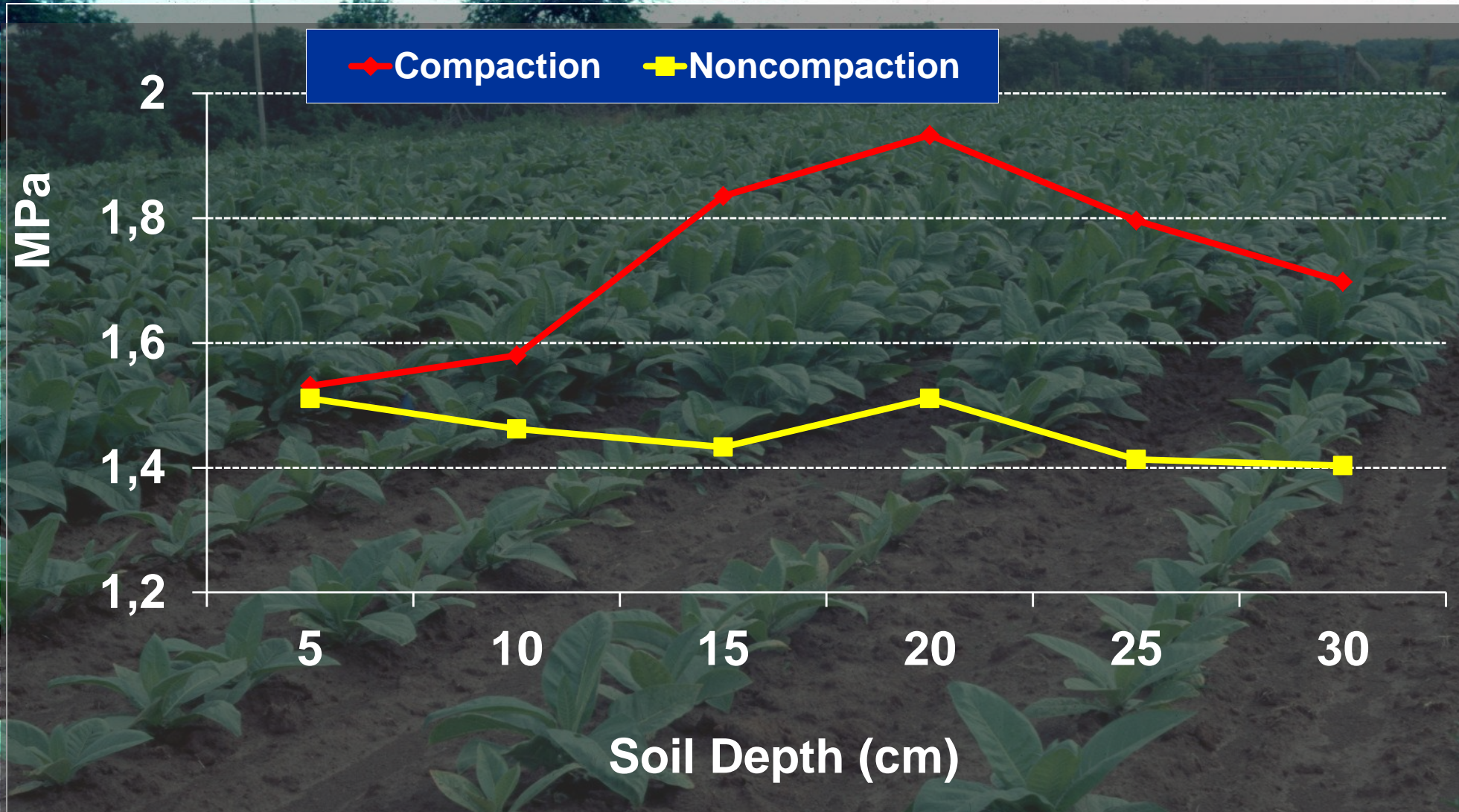
# Effect of tillage and rotation on burley leaf yield



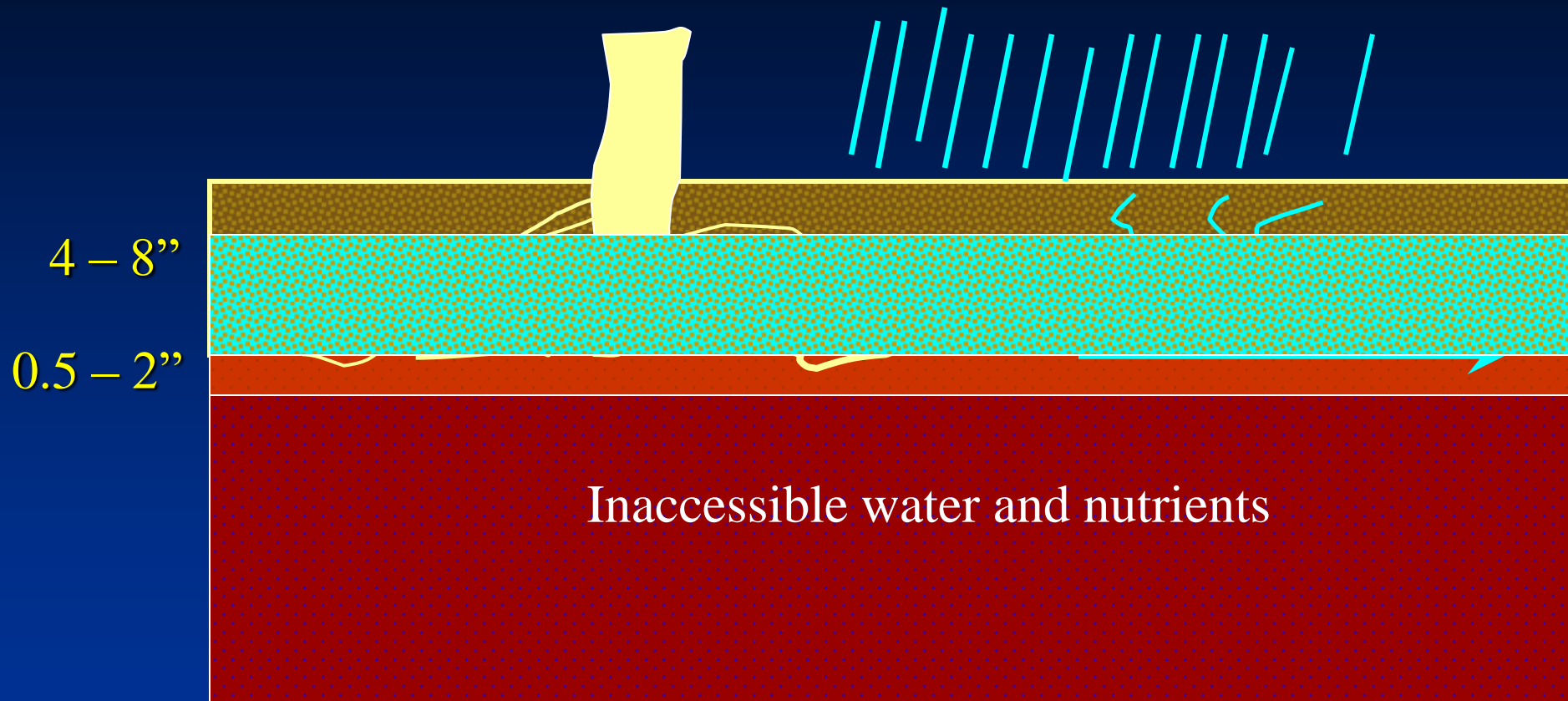
4 Years in Rotation

# Compaction created with a disk





# Compaction caused by tillage





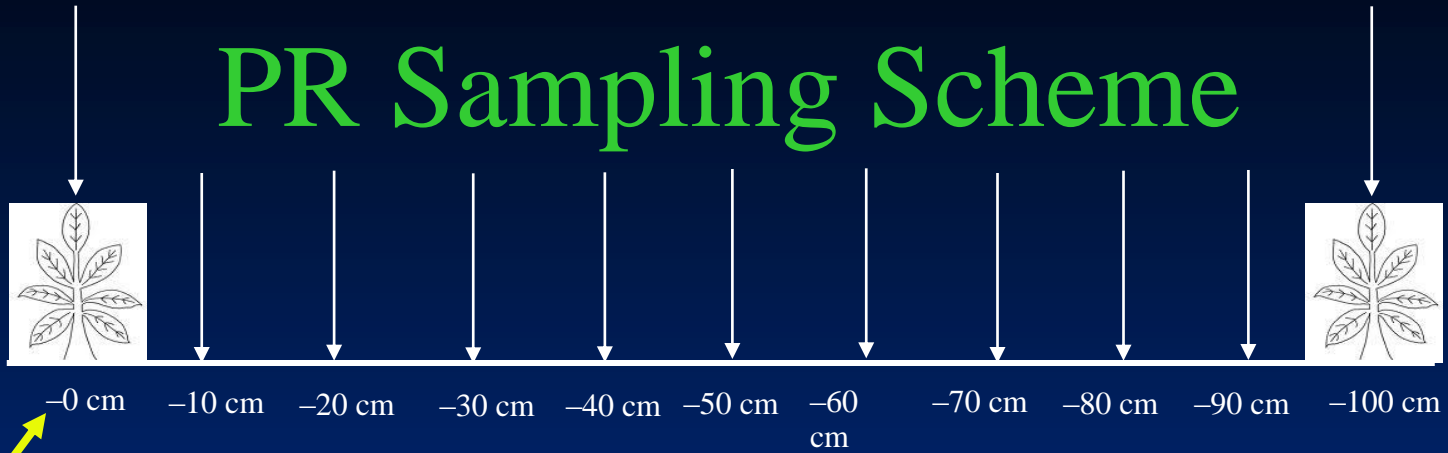




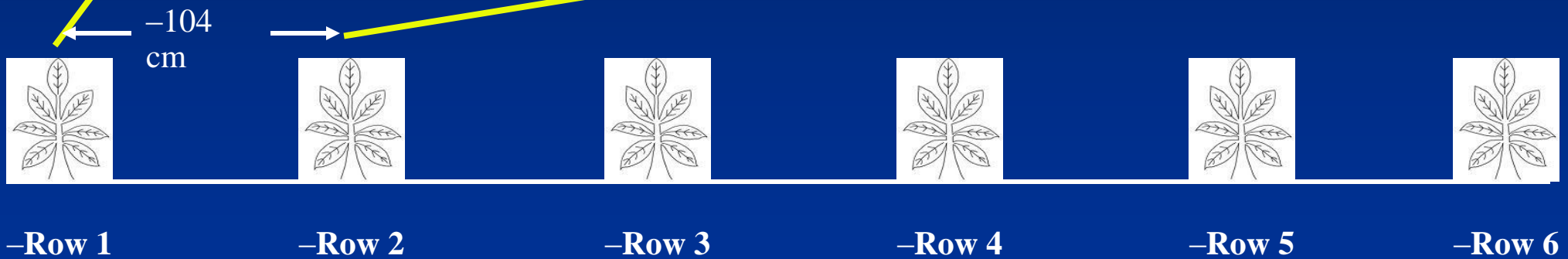
# PR Sampling Scheme

-Row 1

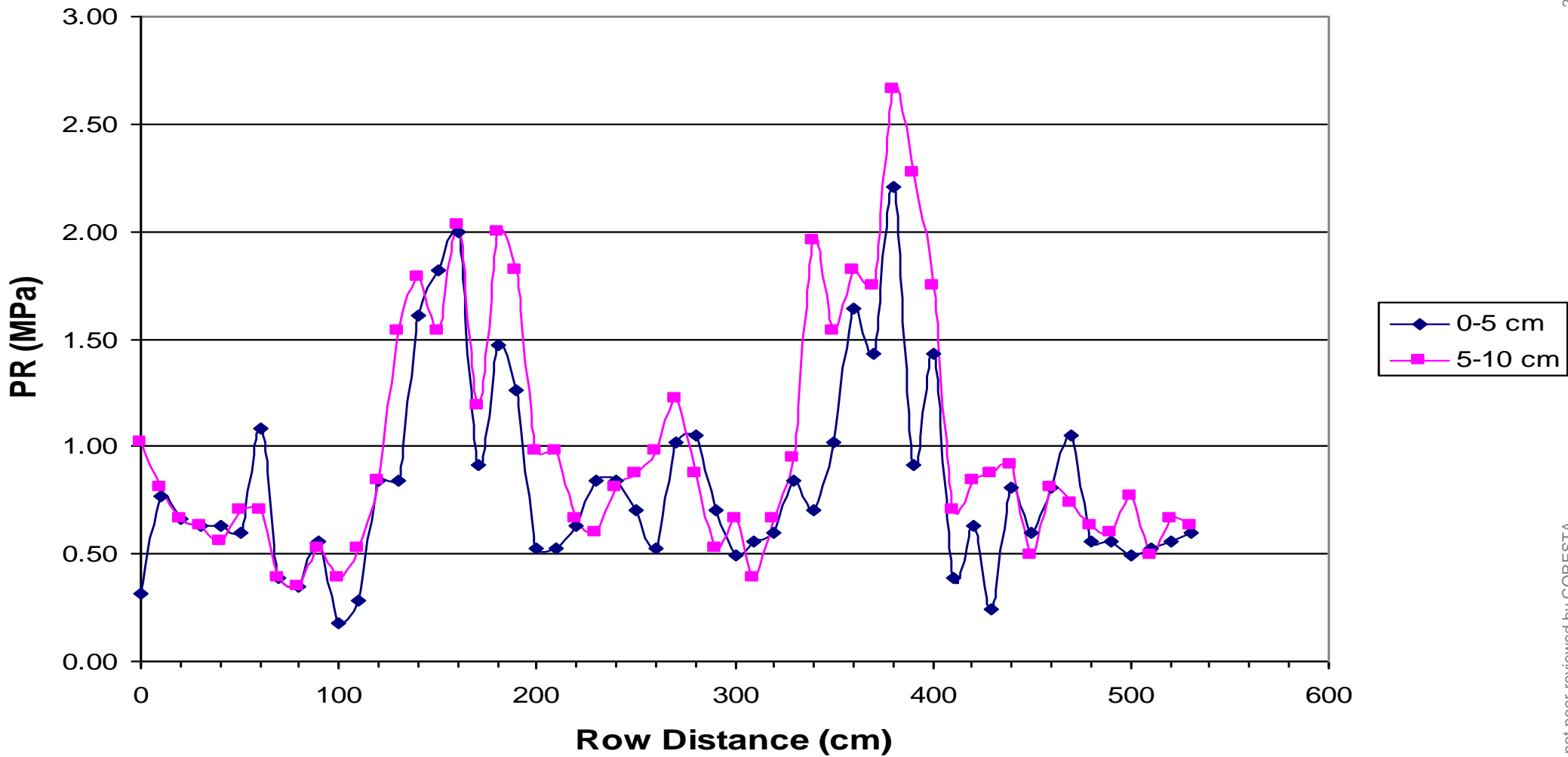
-Row 2



-PR 1 -PR 2 -PR 3 -PR 4 -PR 5 -PR 6 -PR 7 -PR 8 -PR 9 -PR 10 -PR 11



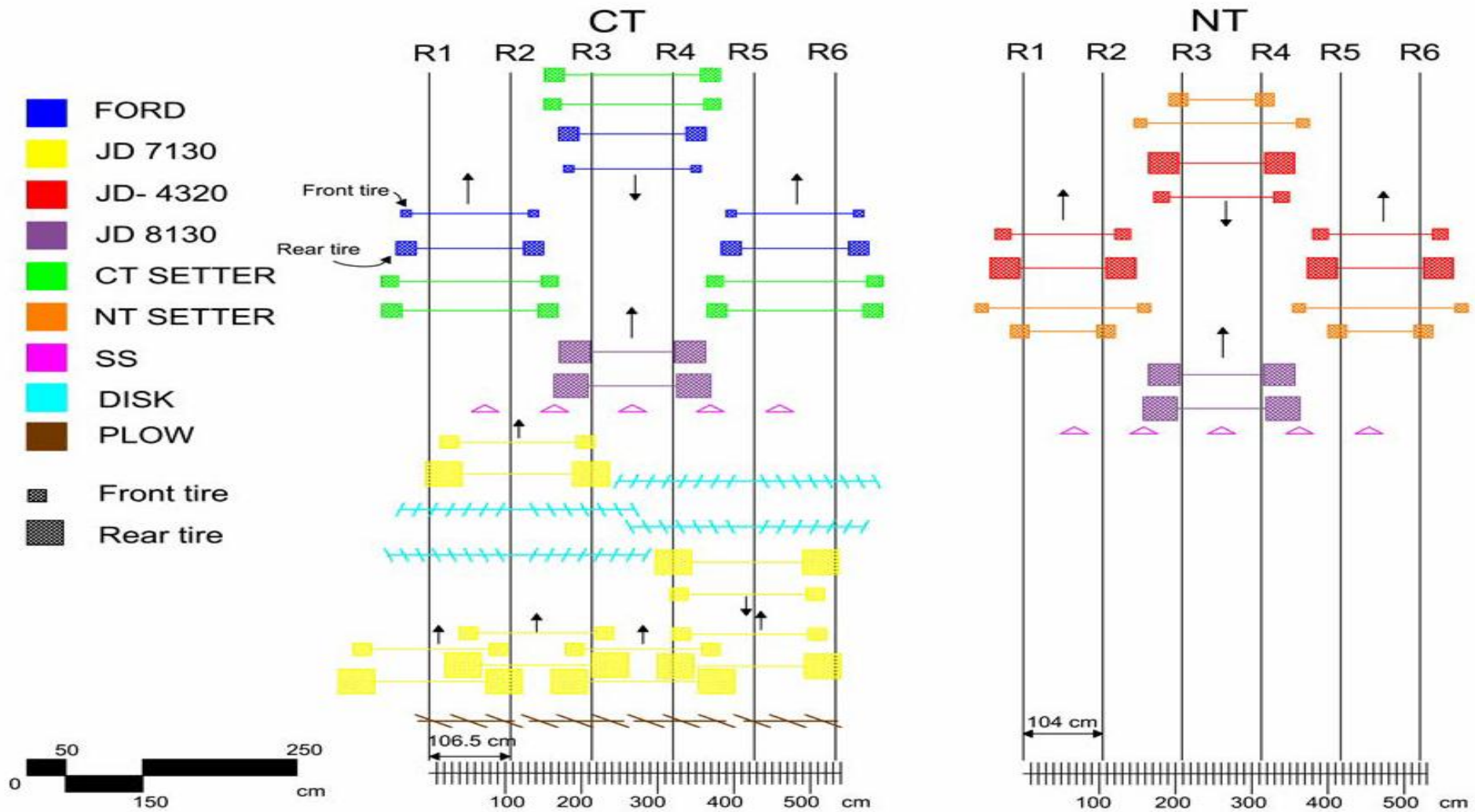
# CT - Not Subsoiled



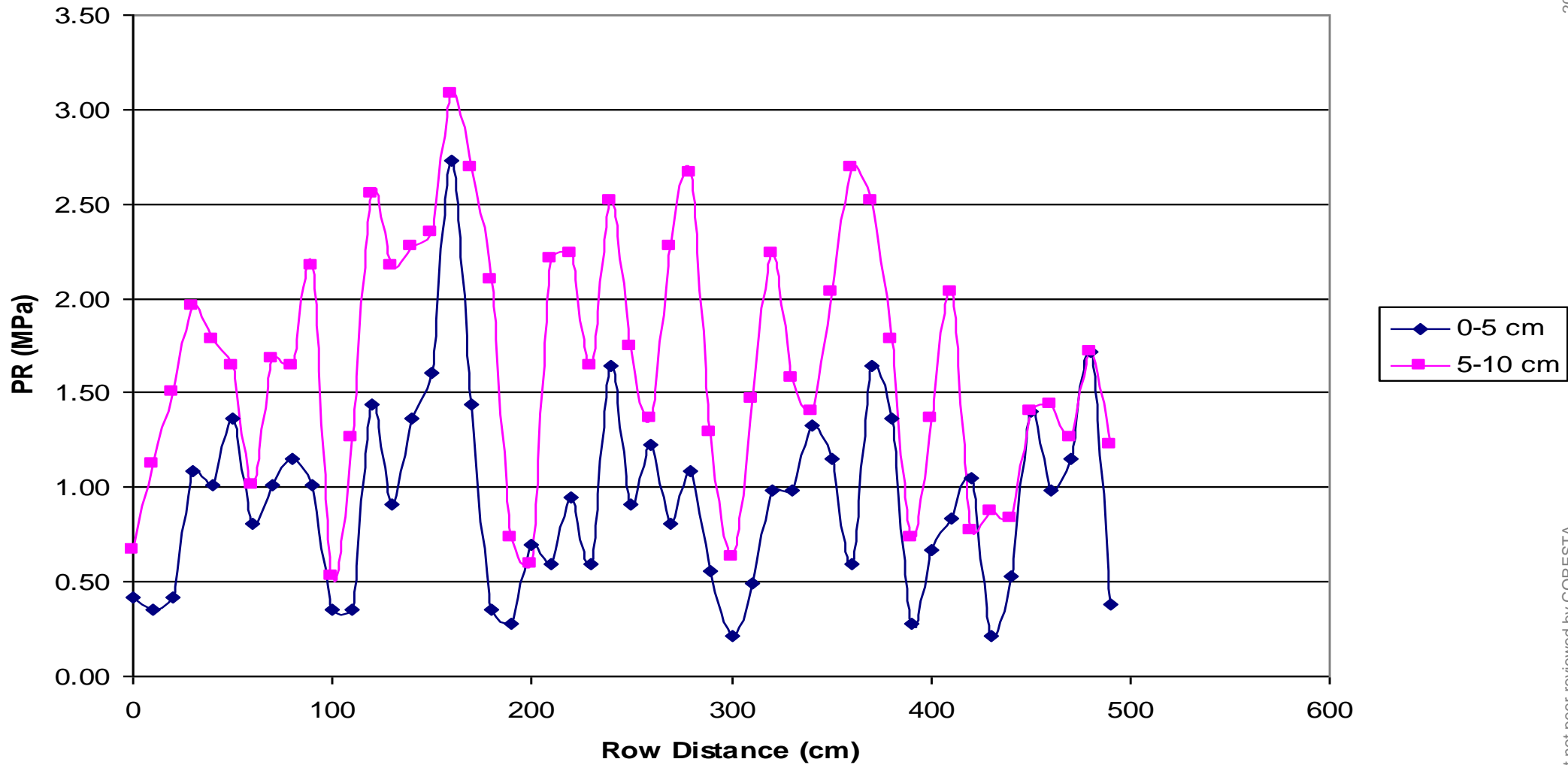
–Rows are located at approximately 0, 100, 210, 310, 430, and 530 cm respectively

# Tillage and Transplanting Traffic Patterns

## In the CT and NT Treatments



# NT - Subsoiled



-Rows are located at approximately 0, 100, 200, 300, 390, and 490 cm.



# Soil Erosion

- Degraded soil quality
- Reduced water holding
- Lowered fertility
- Reduced productivity
- Environmental effects

# Older Than Dirt Soil??



- It takes 500 to 1000 years to form 2.5 cm of soil.
- 2.5 cm of soil weighs approximately 367,000 kg/ha
- At an erosion rate of 10,000 kg/ ha per year.
- 2.5 cm of soil would be lost in 37 years



# Soil Erosion Reduction with Conservation Tillage



# Potential Benefits of Conservation Tillage Tobacco Production

- Soil Conservation
- Improved Soil Quality
- Moisture Conservation
- Reduced Field Preparation
- Allows timely field operations
- Cleaner cured leaf



# Adoption of soil conservation measures

- US/North Am

- Cover crops
- Rotation - 8

- Burley

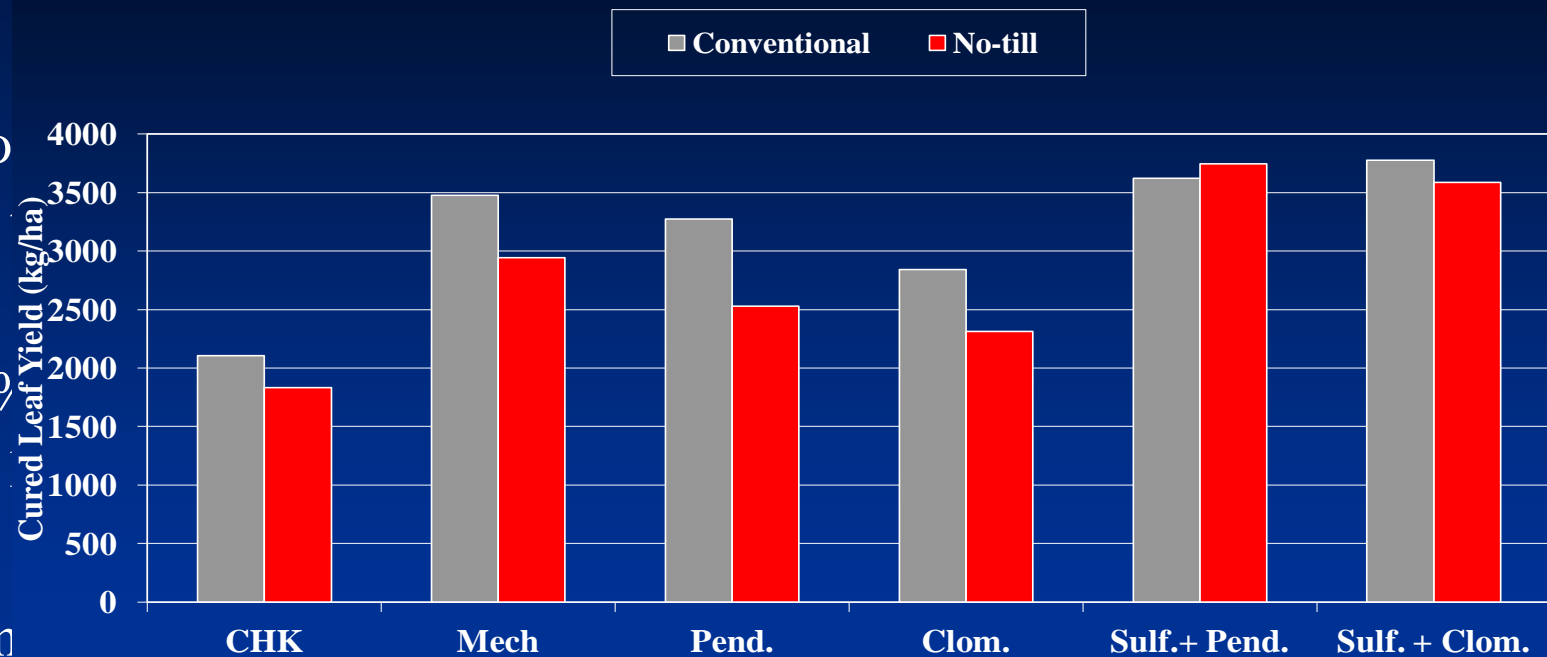
- No-till – 2 to
- Strip-till – 7

- Dark

- No-till - < 1%
- Strip-till - >

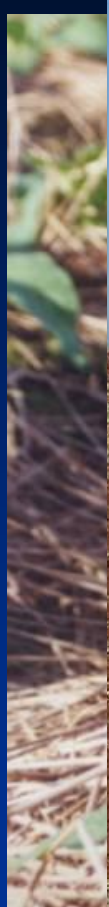
- Flue Cured

- Ridge on con
- Grass waterw



# Adoption of soil conservation measures

- South America
  - Cover crops
  - Rotation
- Burley
  - Ridge
    - No-till
    - Minimum-till
- Flue Cured
  - Ridge
    - No-till
    - Minimum-till



# Adoption of soil conservation measures

- Africa
  - Commercial Flue-Cured
    - Rotation
      - Maize
    - Ridge on contour
  - Small Scale Burley and Flue
    - Rotation
      - Maize
    - Ridge on contour
    - Ridge – pre-planted
      - Limit erosion
      - Trap water



# Adoption of soil conservation measures

- Europe
  - Rotation
    - Limited land resource
  - Ridge till
    - On contour in sloped fields

# How can the industry increase use of soil conservation practices?

- Promote research and education
  - Identify appropriate technologies
    - Soil type/properties
    - Weed control options
    - Local cultural practice
    - Resources available to grower
  - Educate growers on the value of conservation
- Provide grower incentives
  - Direct financial
  - Indirect adoption assistance
- Support appropriate regulation



# Acknowledgments

- CORESTA Scientific Commission
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Thank you

