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Presentation from the USDA Agricultural Outlook Forum 2017

United States Department of Agriculture
93rd Annual Agricultural Outlook Forum
“A New Horizon: The Future of Agriculture”

February 23-24, 2017
Arlington, Virginia



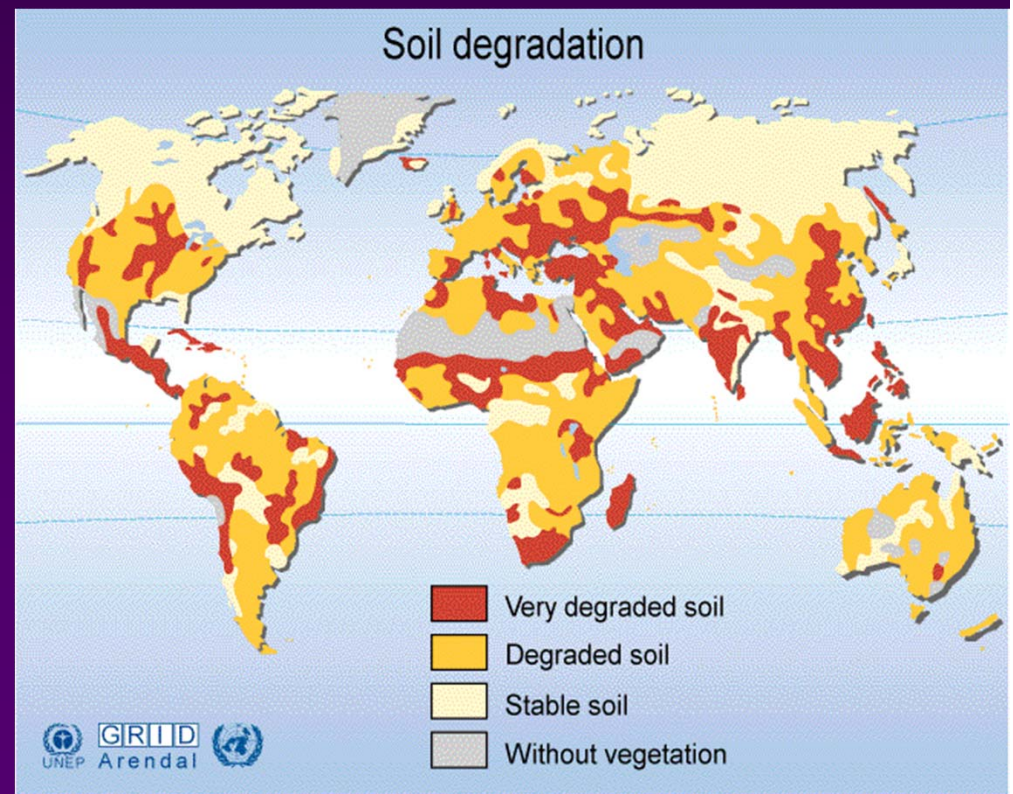
Soil Health: Research, Education, and Extension

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- Erosion
- Decline in organic matter
- Contamination (local and diffuse)
- Paving
- Compaction
- Loss of biodiversity
- Salinization
- Floods and landslides





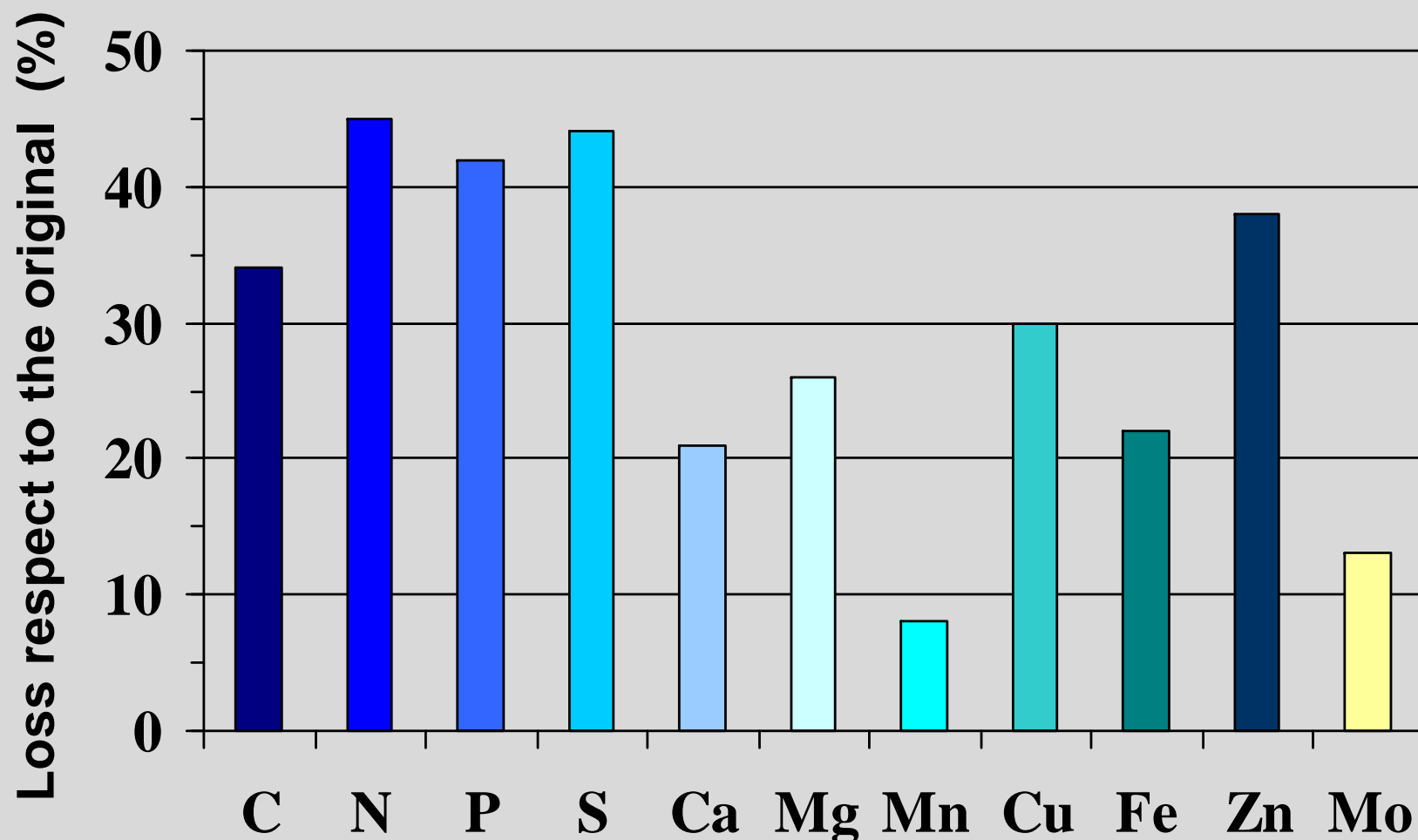


Lal et al., 2012. J. Soil Water
Conserv. 67

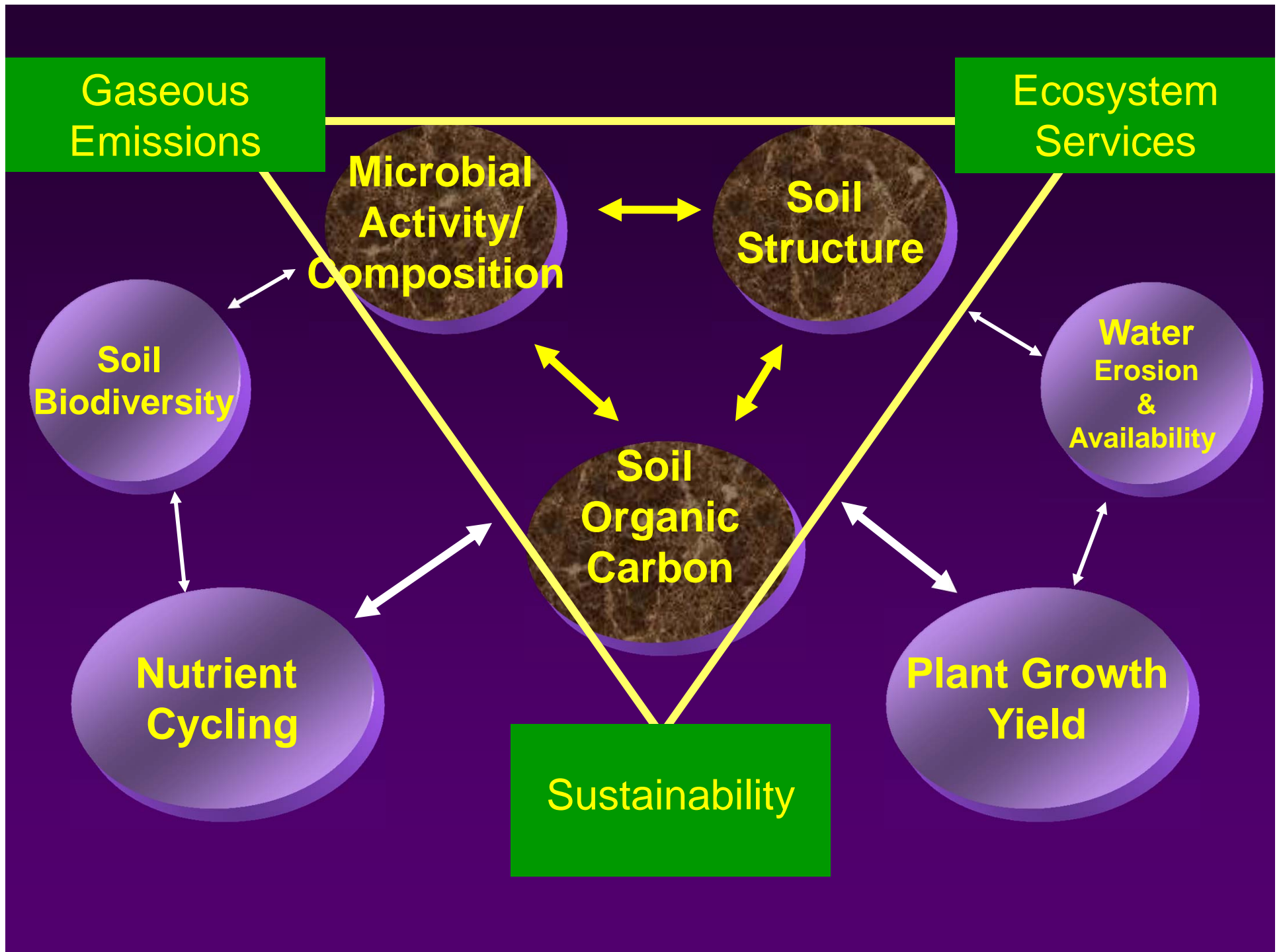
Soil degradation in the Pampean Region of Argentina

Nutrient losses after 80 years of continuous agriculture

Pergamino series - Typic Argiudoll



Source :Andriulo, Galantini y Abrego (1996)

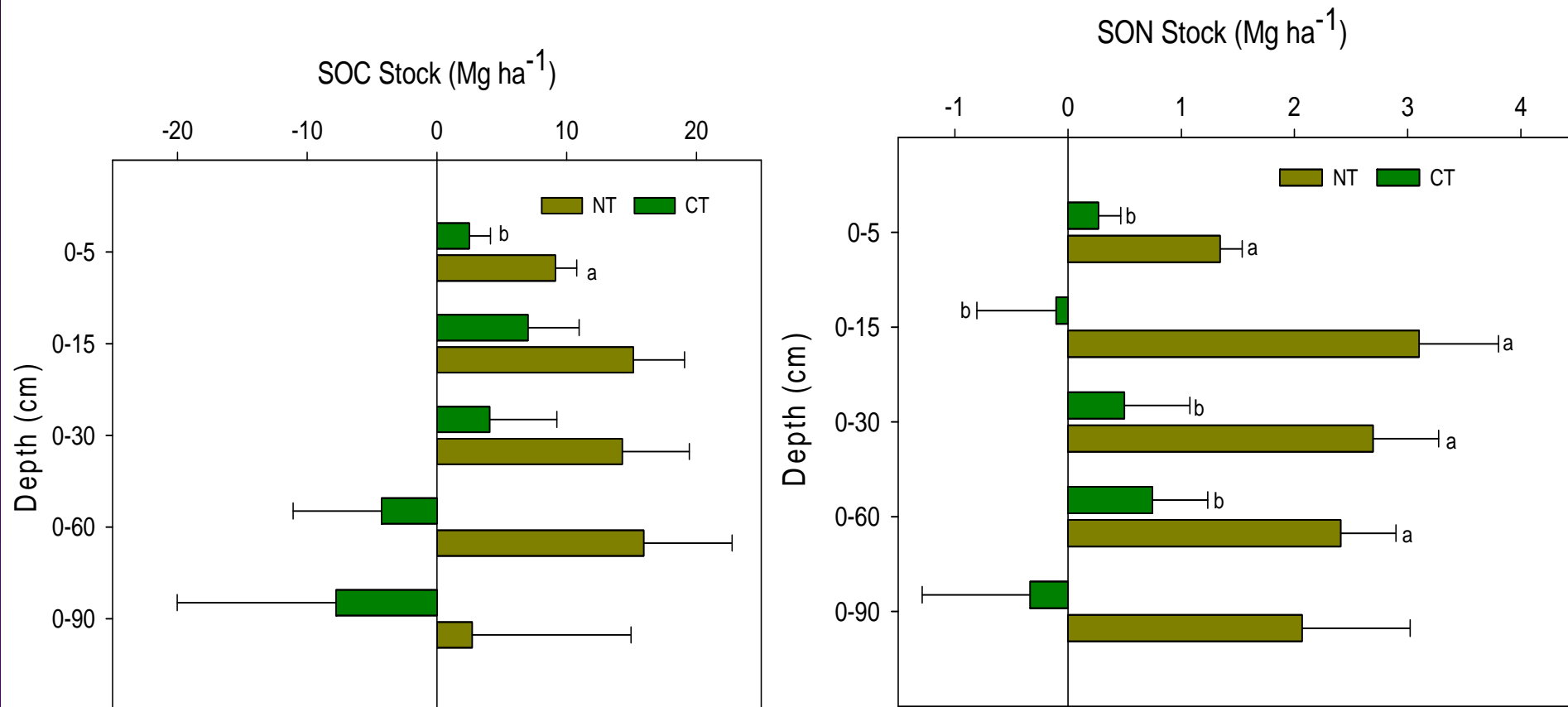


No-Till Cropping Systems

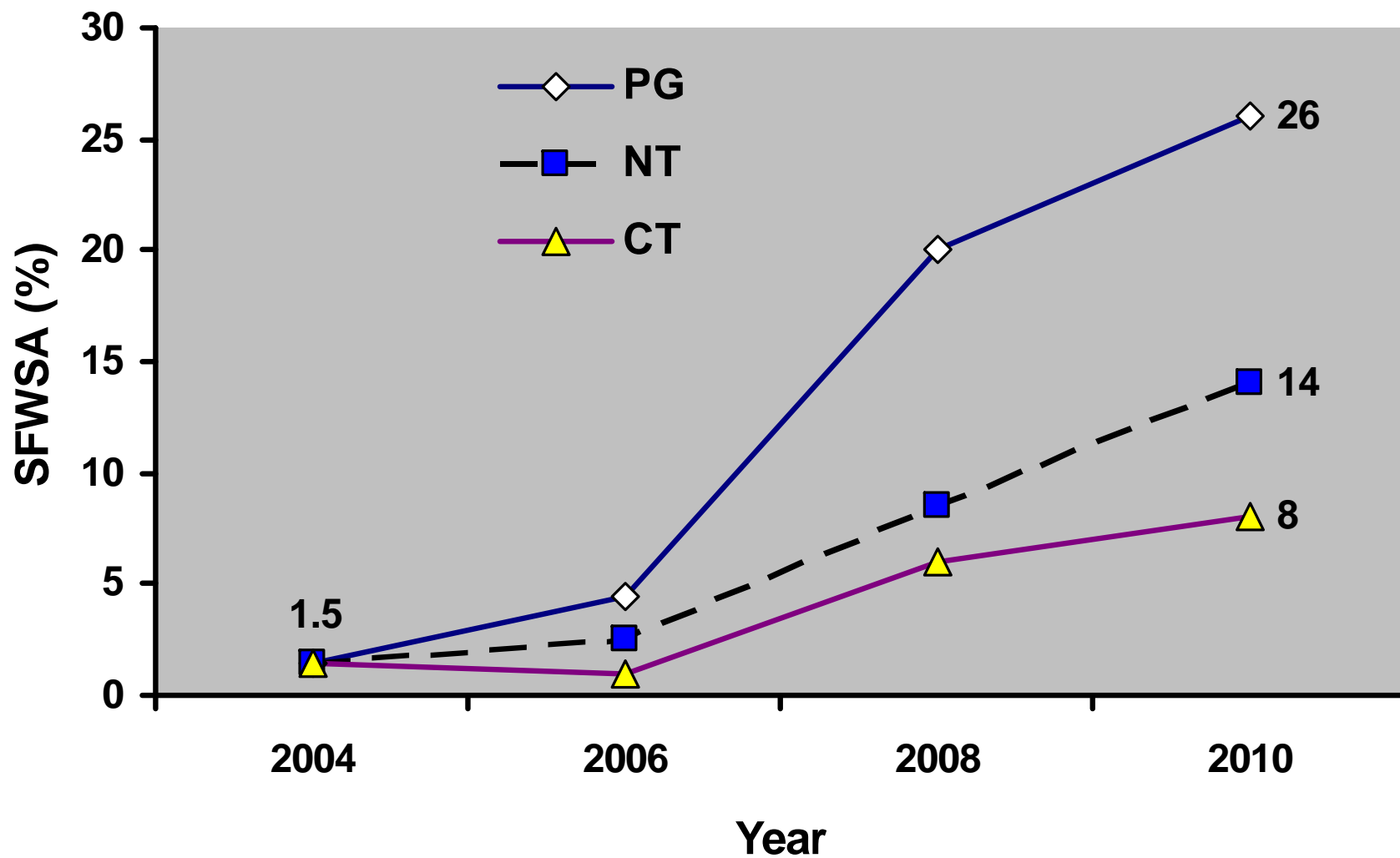


- Restores soil carbon
- Conserves moisture
- Saves fuel
- Saves labor
- Lowers machinery costs
- Reduces erosion
- Improved soil fertility
- Controls weed
- Planting on the best date
- Improves wildlife habitat

SOC and N change affected by tillage



Change in macroaggregate (>2000 um) over time



PG: prairie grass (big bluestem); NT: No-till sorghum; CT: Conventional till sorghum.
SFWSA: sand-free water stable aggregate (Mfombep and Rice 2014)

Increased Soil Health

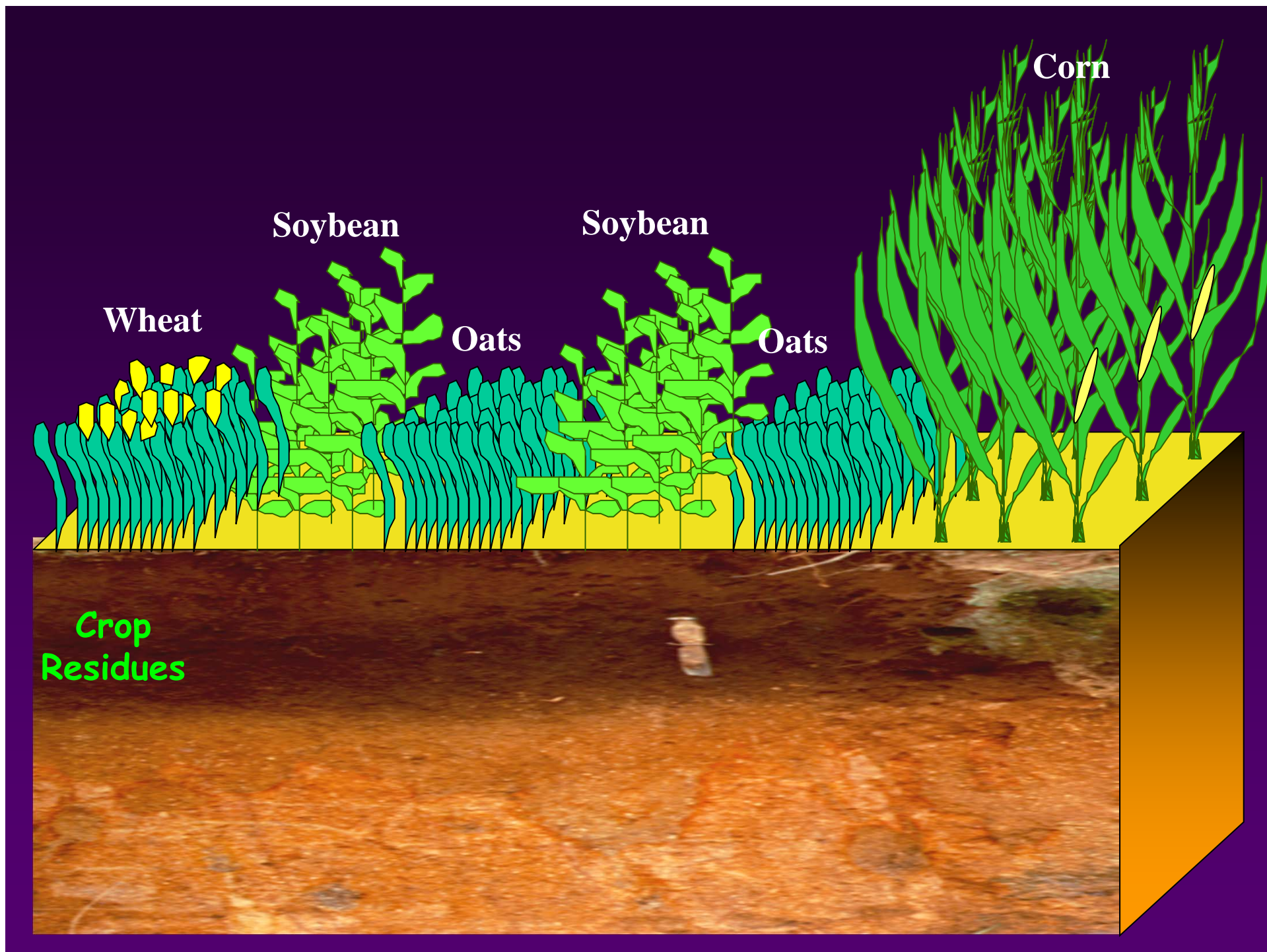
- Higher soil organic matter
- Better soil structure
- Greater microbial activity
- Regional projects on soil quality/soil health 1990's (Universities, USDA-ARS)
- Greater resilience
 - Water
 - Nutrients
- Greater yield stability

How do I assess soil health?

- **Standard soil chemical tests**
 - Organic C and N
 - Available Nutrients
 - Are our current soil nutrient tests appropriate?
 - pH
- **Additional**
 - Aggregate stability
 - Mineralizable C and N
 - Bulk density
- **Biological**
 - Activity
 - Biomass and Composition

Keys to Future Agricultural Systems

- Focus on Soil Health
- Intensify Systems:
 - Fertilizer, water and energy management
 - **Efficiency not inputs**
 - Crop rotations
- Diversify Systems:
 - Crop rotation and management



Summary

As we improve soil health

- How do we assess?
 - Chemistry and physical ok?
 - Biology assessment needs further development
- Are our current nutrient recommendations adequate for soils with high soil quality?
- Dynamic system: what is next?

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U N I V E R S I T Y

Thi work is supported by the USDA NIFA under award number 2016-68007-25066, "Sustaining agriculture through adaptive management to preserve the Ogallala aquifer under a changing climate."