Removing land from CRP: consequences for soil quality

Jessica LM Gutknecht
Soil Science Department
University of Wisconsin-Madison

Introduction

- Ethanol production places demand on corn biomass
- What are the consequences for soil quality of removing land from CRP?

Outline

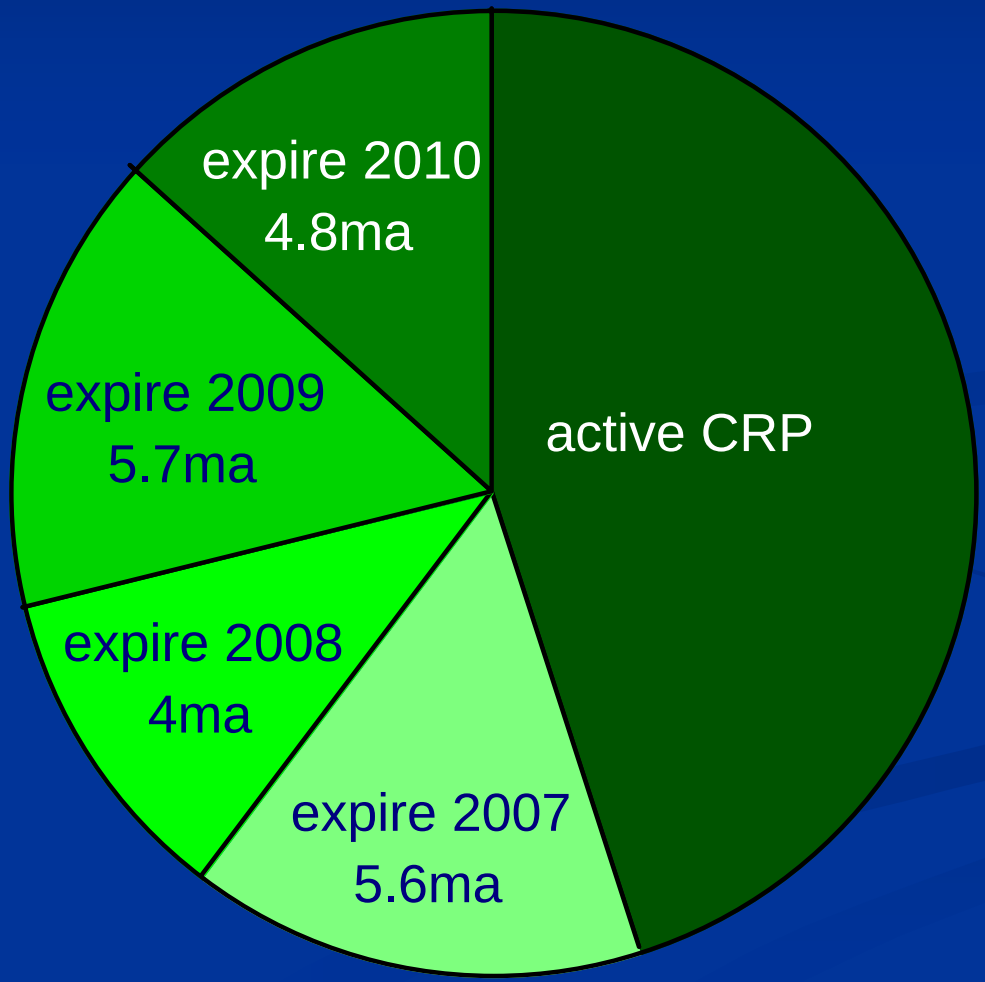
- Brief background
  - How ethanol production may change corn production
  - Definition/discussion of soil quality
- Soil Quality and CRP
  - Effects of CRP on soil quality
  - How removal of land from CRP will impact soil quality and previous CRP benefits

Ethanol production and agriculture

- Expected increase in ethanol production from 4.4 to 6.5 billion gallons per year in 2007
- Expected increase will require 2.6 billion additional bushels of corn (17.3 million acres)
- Possible price increases is incentive to remove land from the CRP program

Ethanol production and CRP

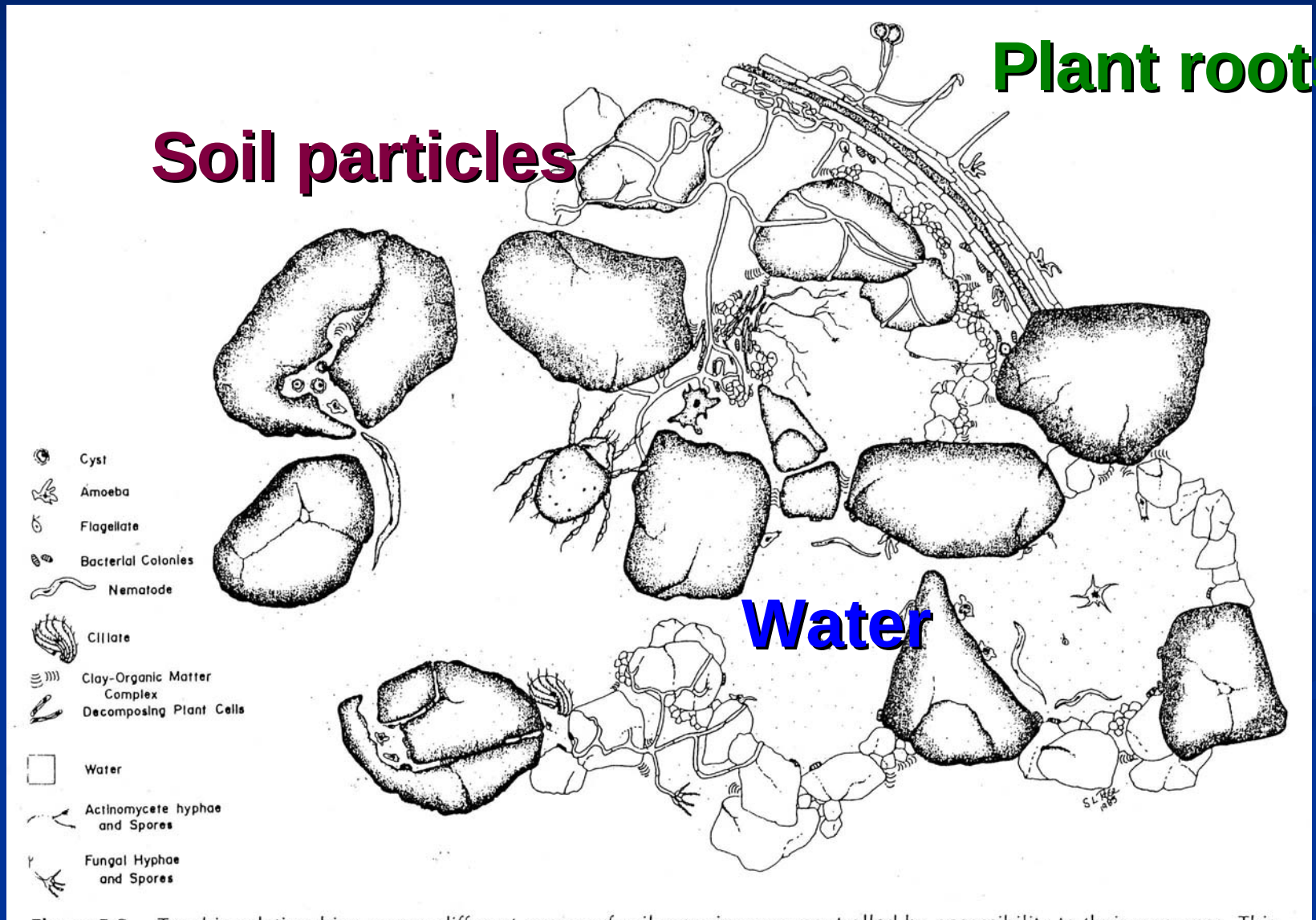
CRP acreage nationally expiring by 2010
Current active CRP= 36.7ma



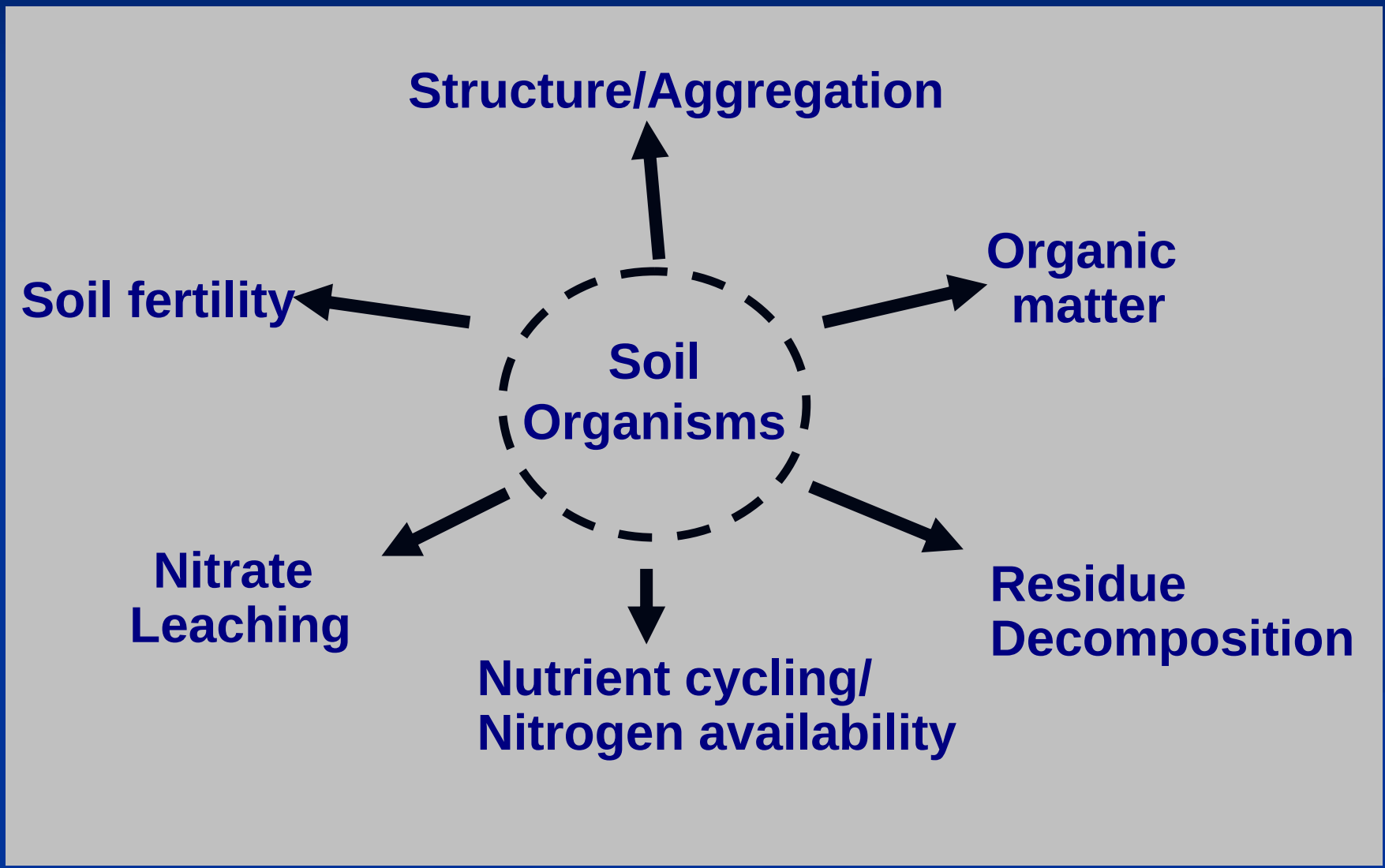
Soil Quality

- Bulk density
- Water content/water infiltration
- Total C and N
- Microbial biomass C and N
- %Organic Matter
- Aggregate stability

Soil quality-a biological perspective



Soil organisms are involved in nearly every aspect of soil functioning - soil 'services'



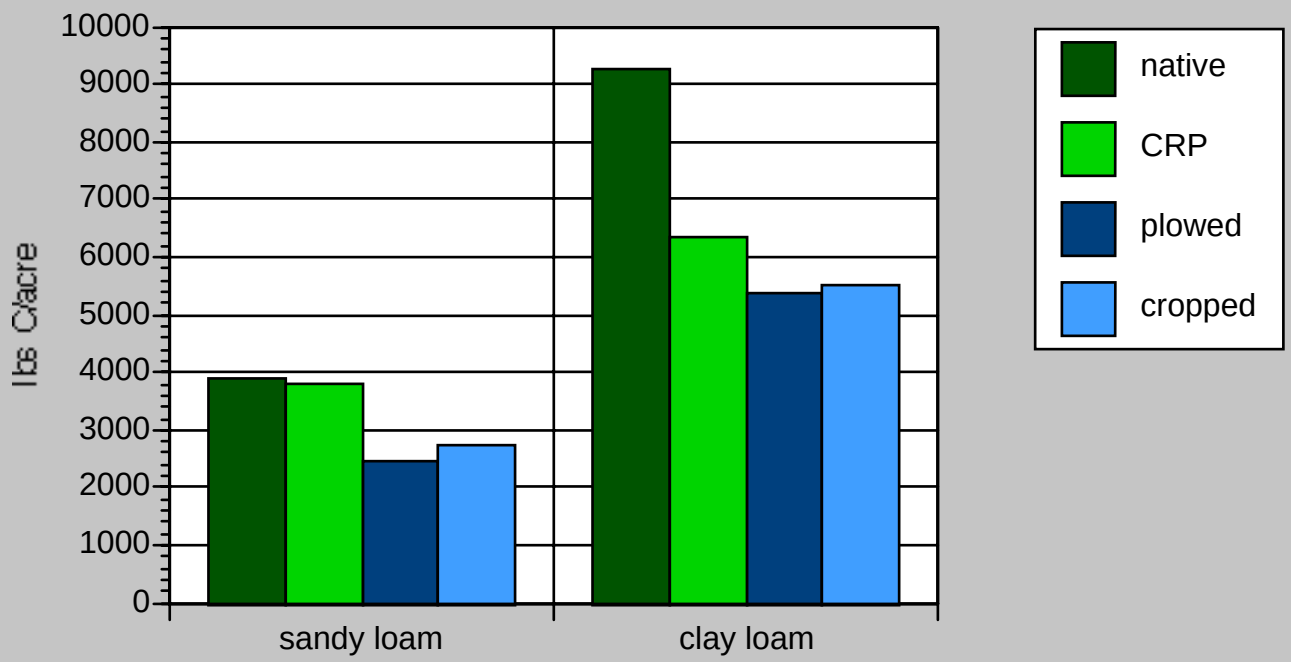
How will removal from CRP impact soil quality?

- Lots of evidence about CRP improving soil quality
- Compelling evidence that positive effects of CRP are lost quickly when land is removed from the program

CRP improves soil quality

- Improved levels of organic carbon and microbial biomass
- Significant decrease in erosion, better aggregate stability
- Results vary but the CRP program is considered a success

CRP improves soil quality



Adapted from Reeder et al. 1998

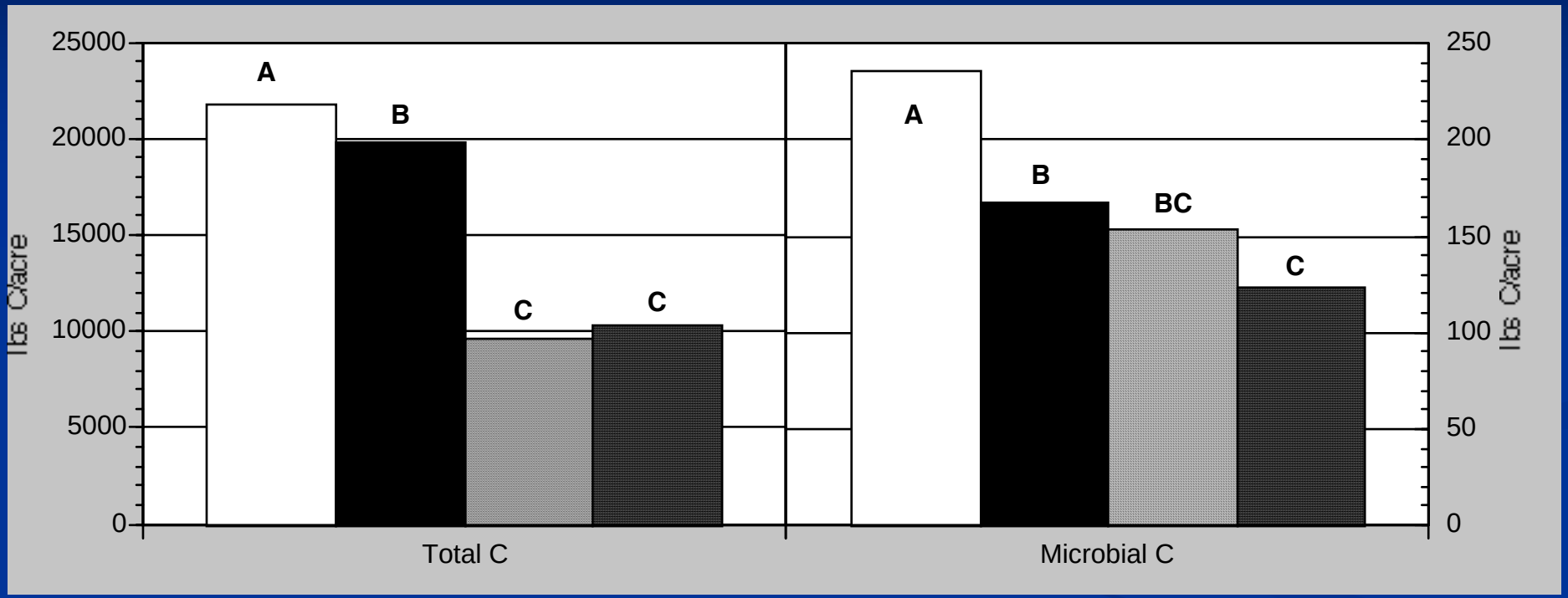
Positive benefits of CRP quickly lost

- Large body of evidence that benefits are quickly lost
- Ex: 9 months after tilling CRP land, all soil quality indicators returned to same levels as surrounding cropland Gilley and Doran (1997)
- Ex: Even native land lost a significant amount of organic carbon only after 2 years Reeder et al. (1998)

Management to conserve CRP benefits

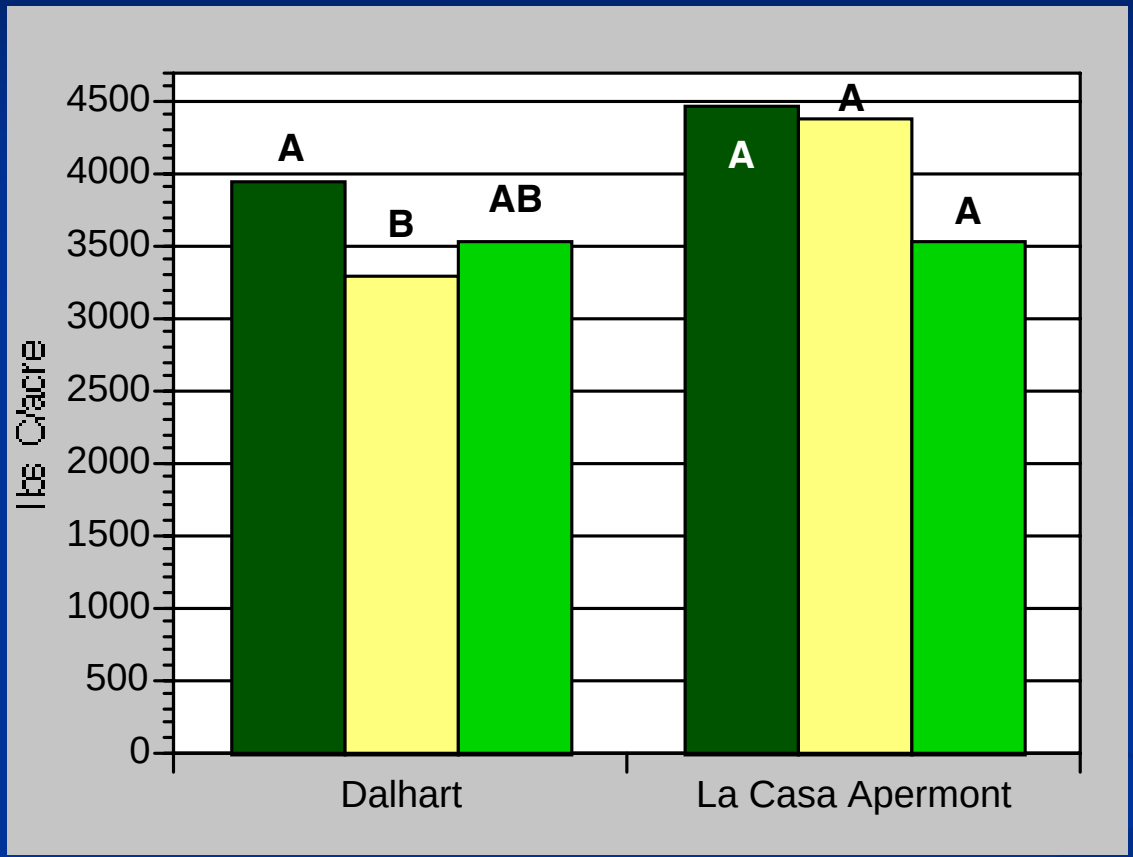
- No-till gives less organic carbon loss when CRP is returned to production (Karlet et al. 1996; Gilley et al. 1997; Gewin et al. 1999)
- It may be difficult to completely keep positive CRP benefits when land is returned to production (Huggins et al. 1998)

Management to conserve CRP benefits



From Gilley et al. 1997

Management to conserve CRP benefits



Adapted from Dao et al. 2001

Conclusions

- CRP has many positive benefits for soil quality
- Keeping land in CRP is the ideal situation, which may not be feasible with increasing ethanol production
- If CRP land must be returned to production, no-till will conserve soil quality

- Acknowledgements
  - Dr. Carrie Laboski
  - Emily Sneller
  - Dr. Teri Balser/Balser lab