

# Soil Carbon Needs Limit Biomass Ethanol Feedstock Supply

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### Background

- Corn stover will be a major feedstock for biofuel production
- Estimates of available feedstock are needed for industry development
- Maintenance of the soil resources must be addressed in feedstock availability calculations
  - Current estimates of feedstock supply computed by subtracting stover needed for erosion control from total production (based on harvest index)
  - Stover needed to replenish soil organic carbon (SOC) not considered
- Johnson et al. (2006) estimates of source carbon needed to maintain SOC

### Objective

Compare amount of stover needed to control erosion and maintain SOC under selected conditions

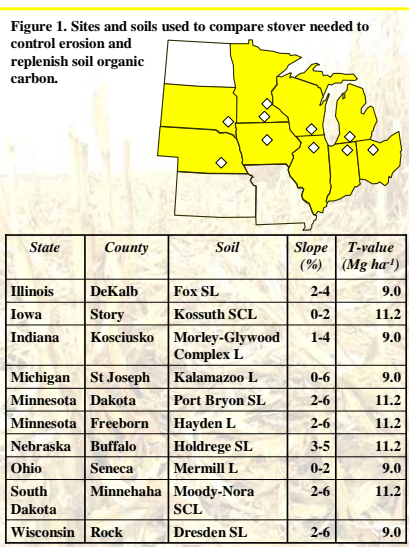
### Method

- Stover needed to control erosion
  - Water erosion—RUSLE2 (USDA-ARS, 2003a)
  - Wind erosion—WEPS (USDA-ARS, 2003b)
- Stover needed to replenish SOC
  - Johnson et al. (2006)
- Sites and soils—ten important corn production counties in nine top corn producing states (Fig. 1)
- Conditions
  - Corn-corn vs. Corn-soybean
  - Moldboard plow vs. conservation tillage
  - Erodibility ( $k = 0.32$  for all soils investigated)

### Results

- Stover needed to replenish SOC exceeds that needed to control erosion for all conditions evaluated (Fig. 2; Wilhelm et al., 2007)
- Management practices greatly impact stover required to control erosion and maintain soil quality (Fig. 2)
- Recent estimates of sustainably available biomass feedstock are likely overstated (Fig. 3)
- Great urgency exists to gather reliable data to confirm these calculations and to expand the computations to more cropping systems and agricultural regions

Figure 1. Sites and soils used to compare stover needed to control erosion and replenish soil organic carbon.



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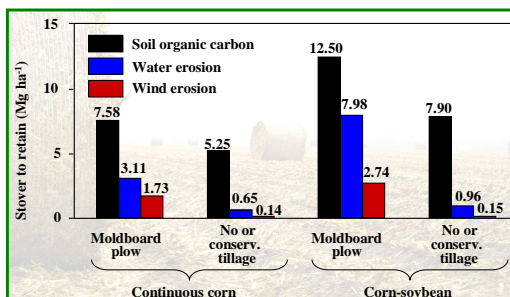


Figure 2. Stover needed to control erosion and replenish soil organic carbon under selected production practices and locations.

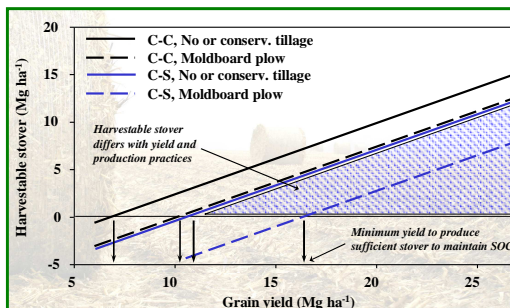


Figure 3. Sustainably harvestable stover based on carbon input needed to replenish soil organic carbon under selected production practices.

### References

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