



Managing soil organic matter and nitrogen in organic field crops:

Lessons from a 12 year trial

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Building soil organic matter

- Provides a **strong foundation** for soil life (habitat and food resources), root health, water and nutrient storage, aeration, stabilizes atmospheric carbon, **NITROGEN SOURCE**.



Managing nitrogen in organic systems

- Two sources of nitrogen: historic and recent
- **Historic: Soil organic matter built up from past inputs supplies N through mineralization**
- **Recent: Legumes and compost provide recent N**



Living Field Laboratory (LFL) @ KBS



LFL goals

- Understanding nitrogen processes
- Does historic management (compost and cover crop build up of SOM) influence biological N fixation?



N in air

N in soil



Nodules

LFL Organic N inputs: Compost, soybean and clover



Dairy compost

(4 Mg/ha or about 2 tons/A: doesn't look like much)



Experimental treatments (est. 1989)

● CROPPING SYSTEMS

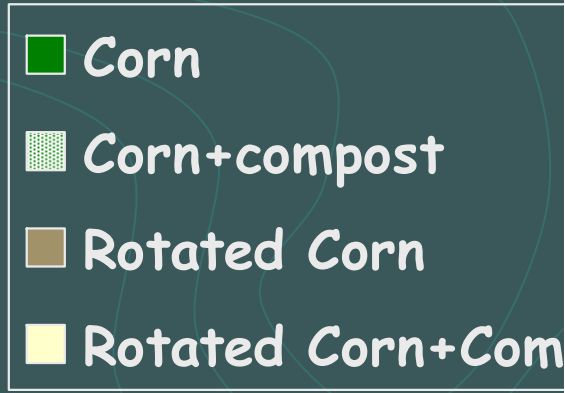
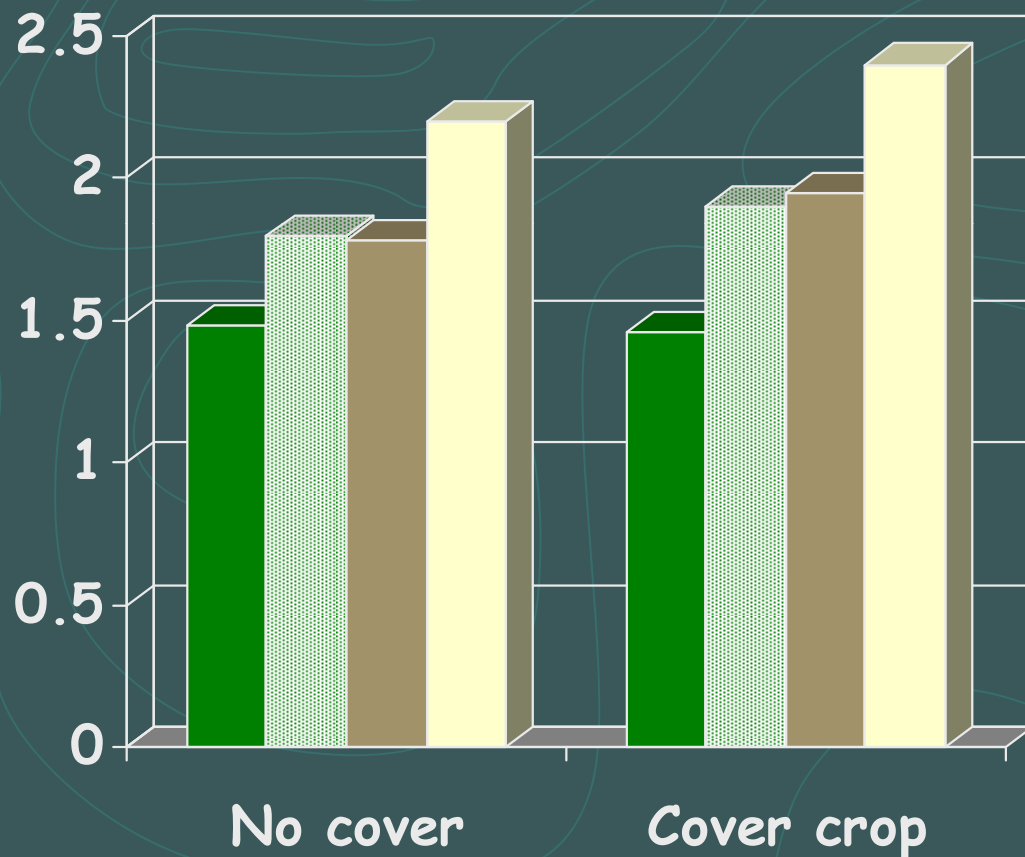
- Corn-corn-corn ... continuous
- Corn-corn-soybean-wheat Rotated
- +/- **Cover crop** or **fallow**

● MANAGEMENT SYSTEMS

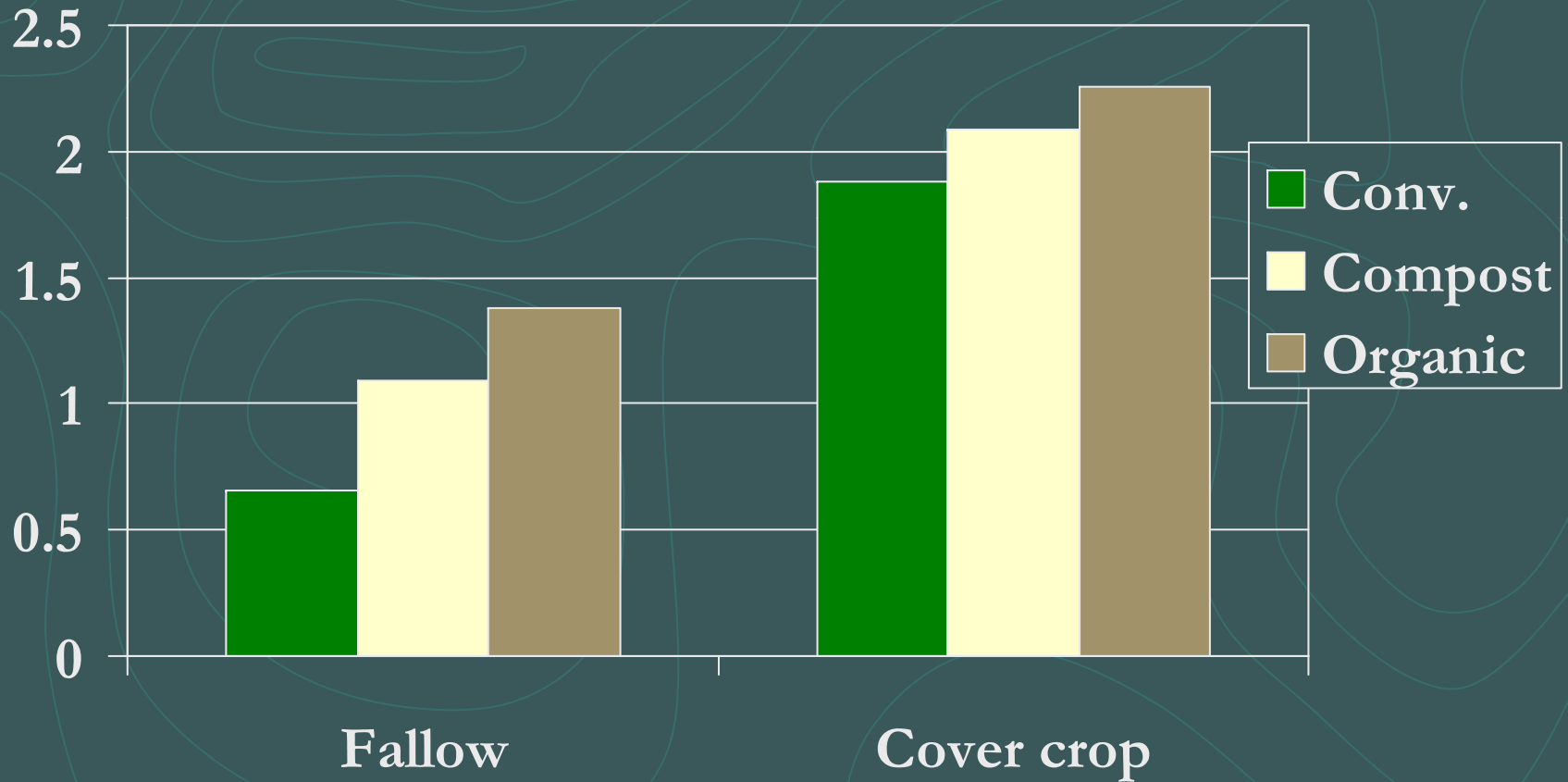
- Conventional (herbicides + fertilizer, PSNT credit)
- Compost (herbicides + 2 t/A dairy compost)
- Organic (tillage + 2 t/A dairy compost)

Living Field Laboratory

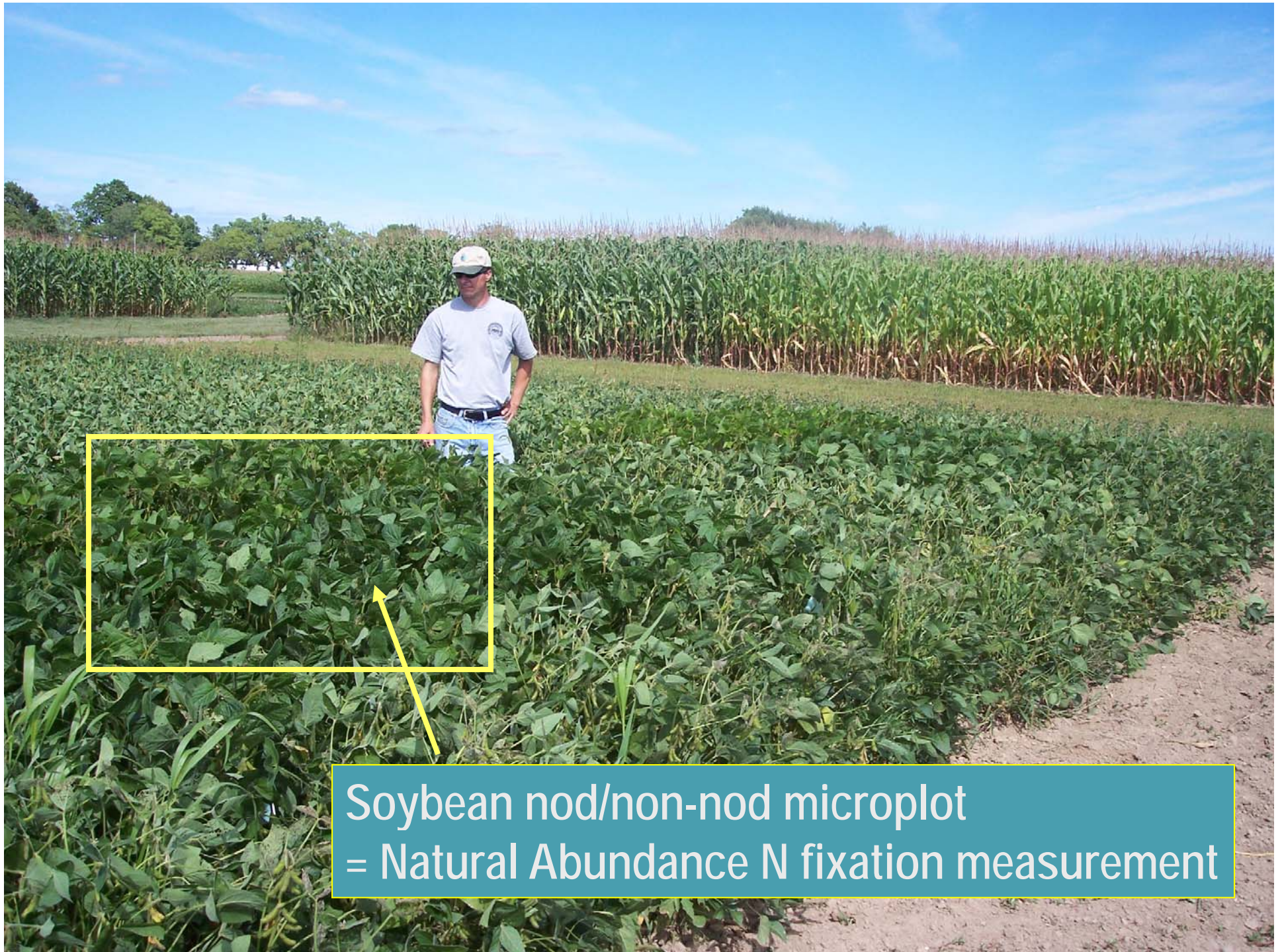
Soil organic matter (%)



Compost increases spring biomass



Spring biomass: cover crop vs. weed fallow, LFL 2006-2008



Soybean nod/non-nod microplot
= Natural Abundance N fixation measurement

N Fixation measurement



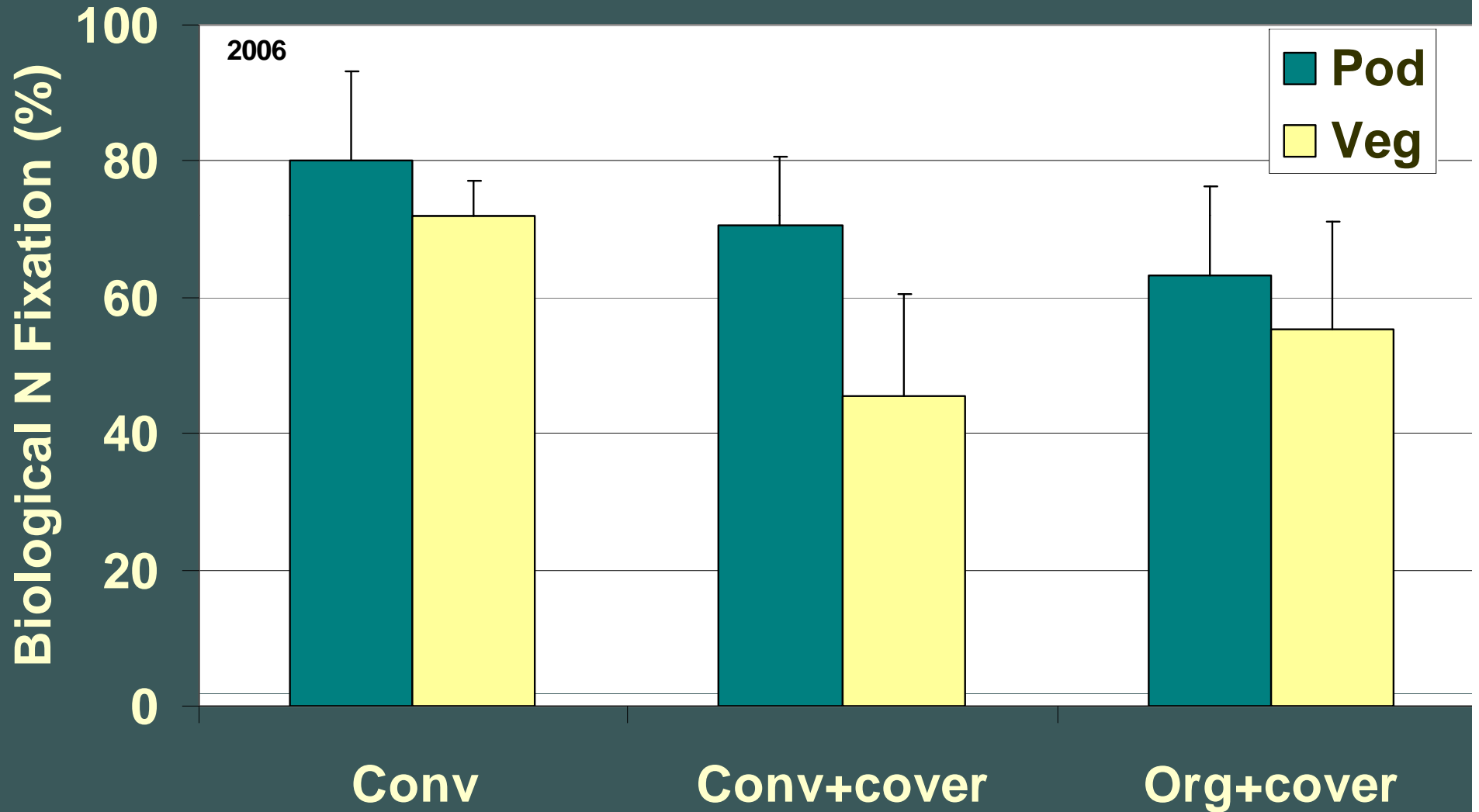
Nodulated and non-nod soybean isolines



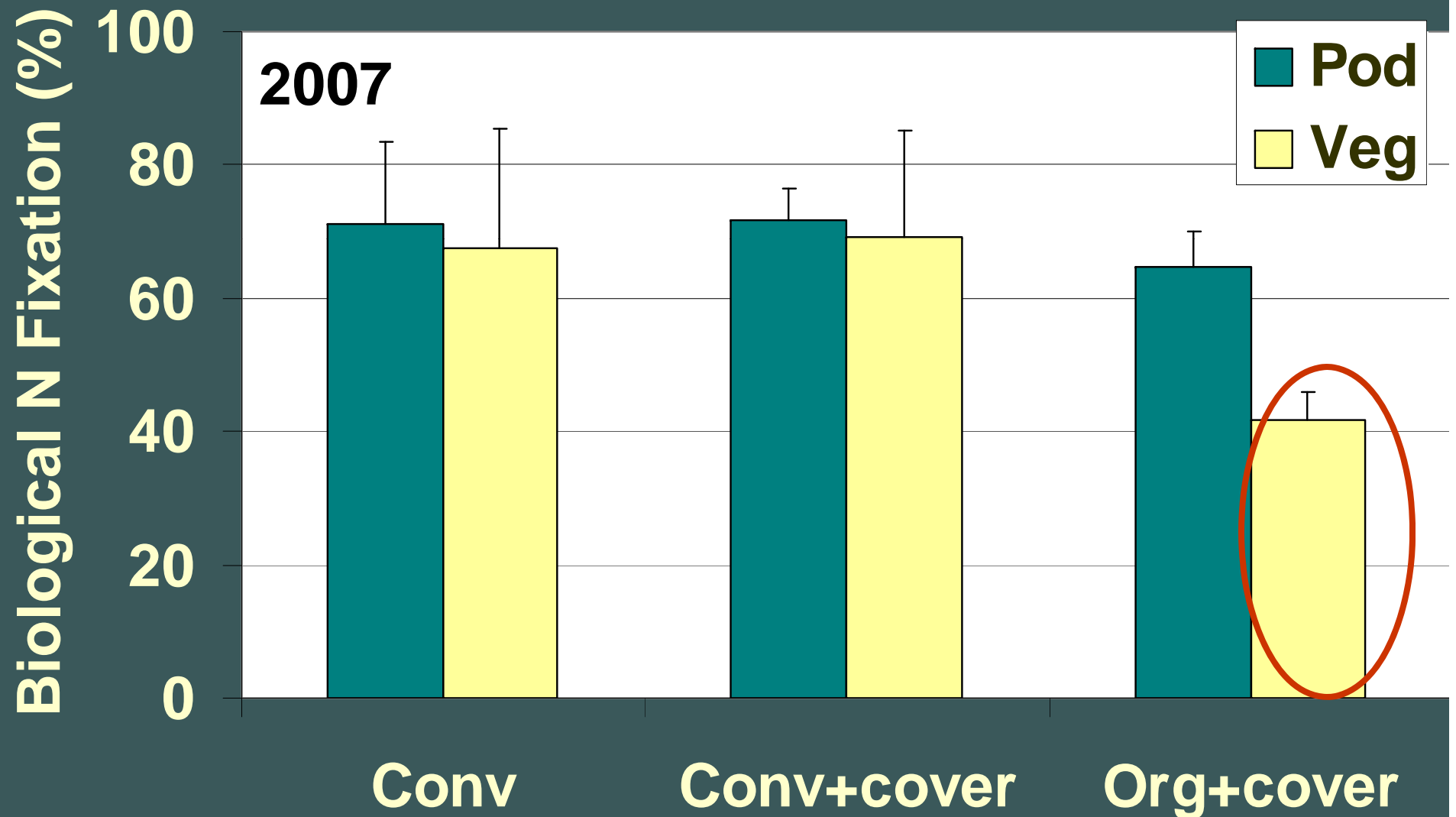
Biomass sampling

Natural abundance method: non-nod soybean 'Williams 82' provided the non-fixing N reference value (soil $^{15}/^{14}\text{N}$ signal)

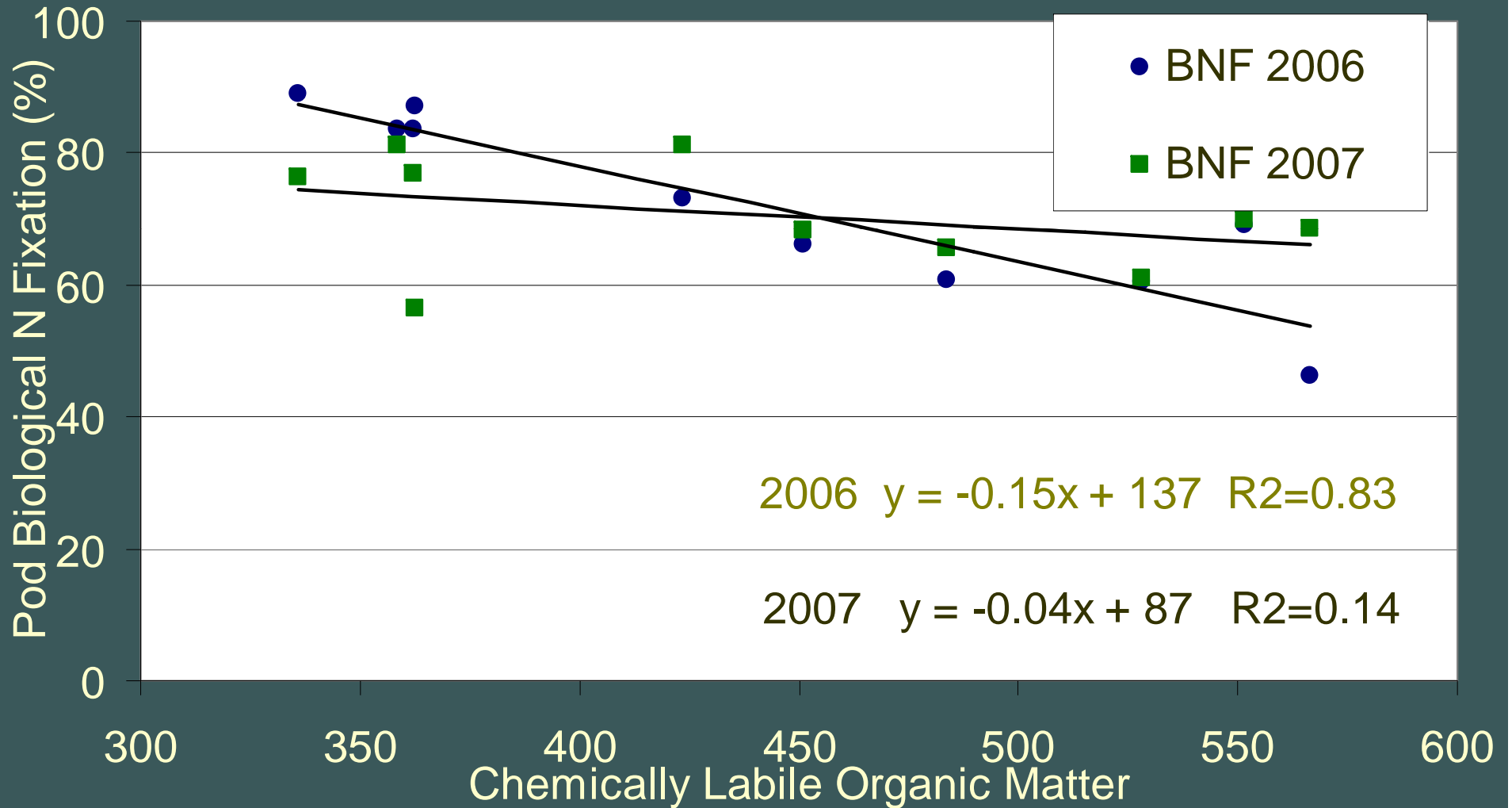
Biological N Fixation - 2006



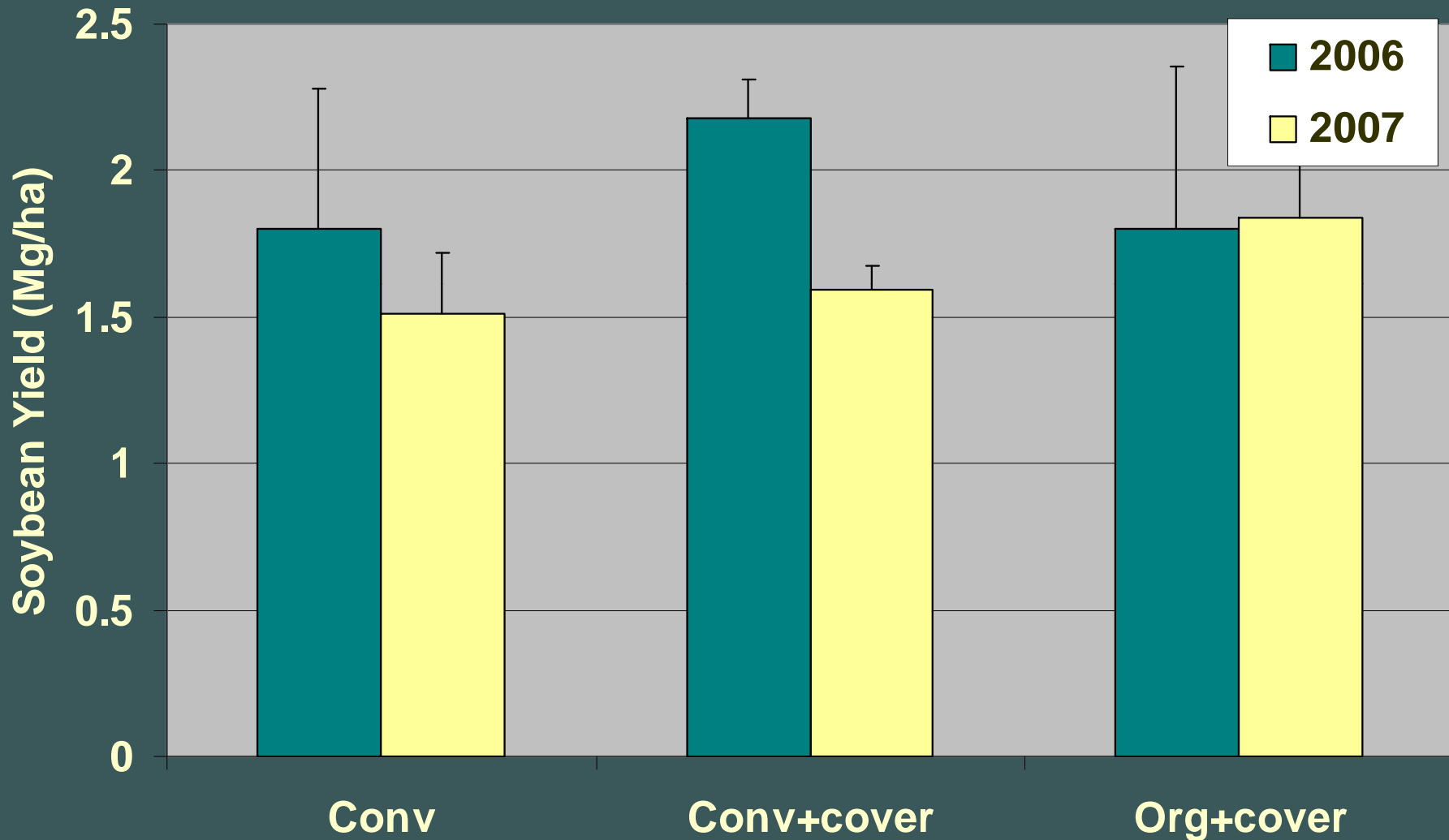
Biological N Fixation – 2007 (dry spell)



N fixation vs. 'Labile' carbon (permg. oxid)



LFL Soybean grain yield 2006 & 2007





Summary

- ❑ Management system influences N fixation
- ❑ SOM build up under organic management supplies N through mineralization, which is **balanced** by reduced soybean N fixation

**Trust your soil,
Save \$\$\$ & time!**